ASAHI SUNAC

Operation and Maintenance Manual

Rotation controller

TTC200

This manual contains important information on warnings and cautions.
Read the manual thoroughly before starting to operate this equipment, and follow the instructions.
Always keep the manual handy until such time as the product is no longer being used. If your manual is lost or worn badly, do not hesitate to contact our agency which is closest to you, or the Asahi Sunac Corporation, directly, and ask us to send you a new one.

11th Edition: November 11, 2022

Introduction

Thank you very much for choosing our Rotation controller (TTC200).

In order to keep the equipment in the best condition for an extended period, please carefully read this manual before use. Above all, the specifications, warnings and prohibitory or cautionary instructions shown herein shall be fully understood and observed during the use of the equipment.

The equipment covered by this manual is designed for industrial coating work. It shall be used by those who have been duly trained regarding the handling and scope of application and have an understanding of the operating procedure.

If you need further information about this manual, please call any of our branches listed on the back cover by specifying the “model” and “serial No.” of your equipment.

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1 For Your Safety

Contents of this instruction manual shall be fully understood and the instructions shown herein shall be strictly observed. Using the machine without following instructions in this manual may lead to **bodily injury or damage to properties.**

The safety measures described herein are the minimum requirements and additional measures may also be required. All requirements provided by laws and legislations as well as rules and guidelines laid by your company or office shall be observed.

The cautionary instructions shown below shall be construed as minimum basic requirements for safety in the use of our product.

●Cautionary instructions are shown in three levels as defined below.

⚠ WARNING	Calls the user's attention to a situation that may lead to bodily injury and describes how to avoid that situation.
⚠ CAUTION	Calls the user's attention to a situation that may lead to damage or breakdown to the equipment and describes how to avoid that situation.
NOTE	Gives important or helpful information.

※ Please remember that the situation mentioned under ⚠CAUTION may also lead to a serious disaster under certain circumstances. All instructions are important for your safety and prevention of machine disorder and shall be strictly observed.

This manual contains only matters for TTC200.

Please refer to individual instruction manuals for the rotation bell gun and coating machine connected to this equipment.

⚠ WARNINGS

Suitable range of use of the product

The product subjected to this mannual is designed to detect rotational speed of the rotary atomizing automatic gun and constantly maintain set rotational speed through its control.

The product is not explosion-proof. It is not applicable in explosion-proof areas.

For further information on the purpose of the product and the materials used, please consult us.

Please well note that any use under conditions other than specified above is considered misuse unless specially approved by us as it may lead to an unexpected accident.

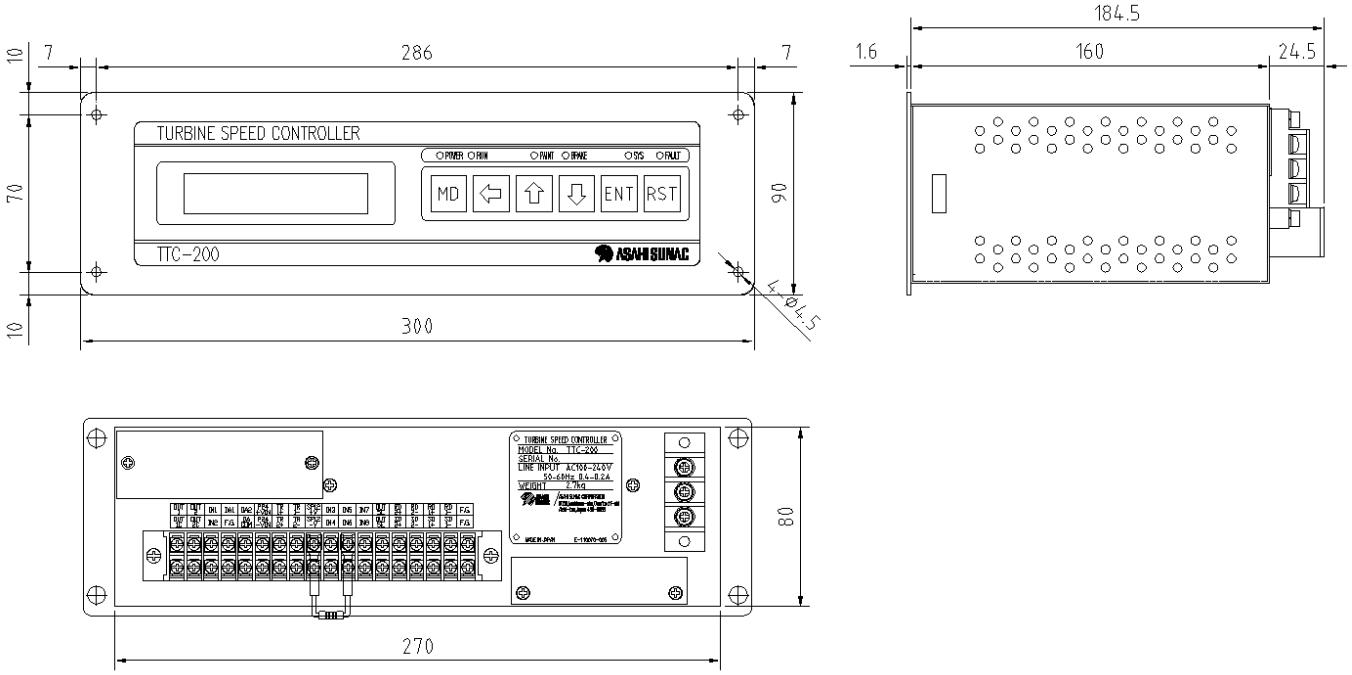
Danger of the misuse

<<General safety notes>>

- Use the equipment after checking the power supply voltage well. Incorrect power input may result in failure or fire.
- Make sure to earth properly as this control device handles high voltage.
  Failure to do so may result in failure, electric shock, injury, or fire.
  Make sure to earth the grounding terminal (class A grounding).
  Ensure that terminal block screws are tightened and the connector is installed.
- Do not rearrange wiring during energization.
- **The control device is not explosion-proof and is not applicable in explosion-proof areas.**
- Avoid using in high temperature, high humidity, or frequently vibrated areas.
- Stop operation as soon as a failure is detected. Turn off the power and confirm electric discharge. Then, short-circuit ground the charging terminal.
  Do not turn on the power again if the protection device or fuse is activated.

2 Outline

This unit enables to control and maintain rotational speed of the bell cup of Sun Bell robots.
It displays current rotational speed while maintaining the rotational speed of the bell cup by giving feedback of a difference between the rotational speed (pulse) and setting rotational speed to an working quantity of the electropneumatic regulator.



2.1 Features

(1) At an input of an electric pulse signal that is proportional to rotational speed, the equipment provides feedback toward a setting value digitized in unit of 1000 rpm for the control.
(2) It stores seven types of the setting rotational speed and allows selecting with an external selection signal or the key switch. In addition, it allows setting data specifically for "WAIT", "FLUSH", and "LOAD".
(3) Data is indicated in digital on the LCD monitor.

2.2 Components

- Controller main unit (TTC200)
- Electropneumatic regulator
- Switching valve
- Photosensor amplifier and optical fiber cable

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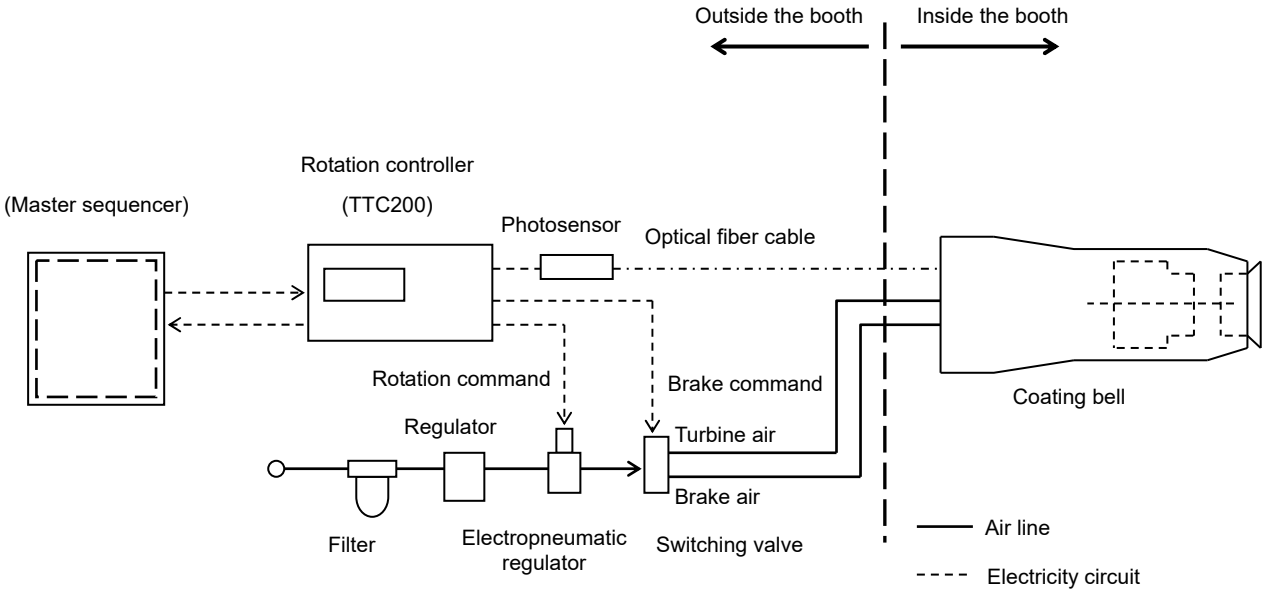
2.3 Optional Parts

- Dividing unit (for OEC-10/ESA61)
- ALB digital input/output unit (optional parts, ALBP880-0)

2.4 Connection Diagram of Devices



⚠ CAUTION

Ensure to purge inside the pipes before connecting the air circulation line because the electropneumatic regulator uses precision parts. Inclusion of scraps or pieces of seal tapes from piping may lead to operation failures. Make sure to install filters and use air that is fully cleaned from solids, water, or oil.

3 Specifications

(1) Part name Rotation controller
(2) Model TTC200
(3) Rotational speed setting 10000 to 120000 rpm (by 1000 rpm)
(4) Input
- Input sensor pulse
- Memory selection (select from 7 patterns), 3-bit binary
- Paint ON
- Rotation ON
- Feedback ON
- Wait
- Flush
- Charge
- Error reset

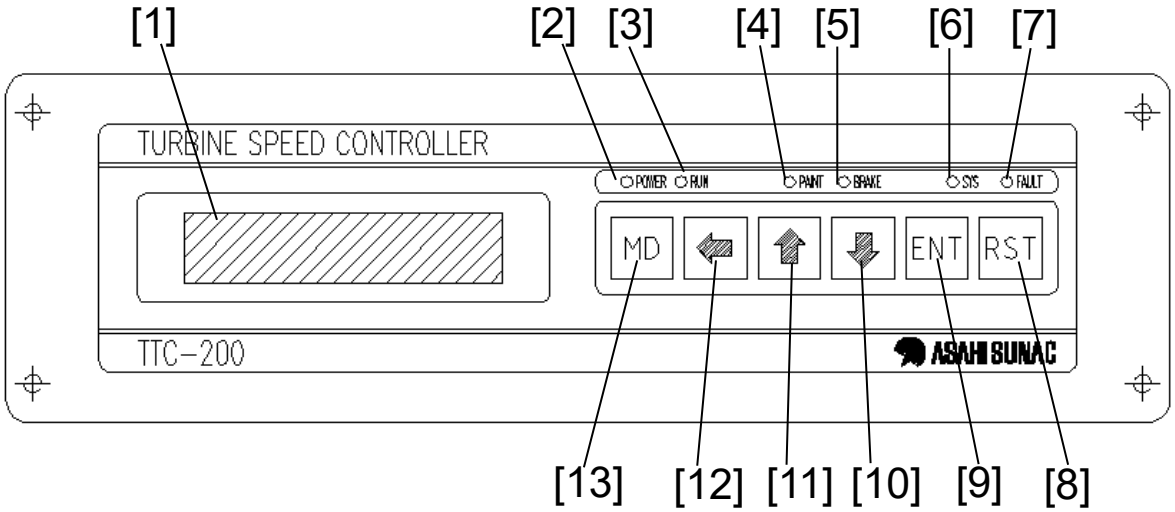
(5) Output
- Electric current output 1 For electropneumatic regulator (select possition 0-20mA or 4-20mA.)
- Electric current output 2 For external monitor (4-20mA)
- Brake air ON
- Error output
- Normal rotation (added from V1.01)

[1] Rotational speed error (maximum, upper limit, lower limit)
[2] Feedback loss error
[3] Start-up wait time, rotation stop error
[4] Photosensor reading error
[5] Electropneumatic regulator control error
[6] System error (RAM initialization warning, overrun error, flaming error, parity error, E2PROM reading warning)
- CPU RUN ON for 0.5 second approx. on a one-second interval.

(6) Rotational speed display
LCD Character display (2 lines × 20 characters)
(7) Status indication
Power supply indication, rotation ON, paint ON, brake ON, system error, control error
(8) Outside dimension W300×H90×D184.5, 2.7kg
(9) Power supply AC100 to AC240V±10%
(10) Power consumption 100-240V, 0.4-0.2A
(11) Ambient temperature 0 to 45°C (no dew formation)
(12) Electric specification
- Class-1
- Overvoltage category II
- Pollution level 2

(13) JIS Protection classification IP54 (only front panel)
(14) Atmosphere No exposure to corrosive gas, dust, steam, drop of water, direct sunlight is allowed.
(15) Equipment cooling Natural cooling

4 Names and Functions of Components



Item	Application
[1] LCD display	Displays current rotational speed, FB input signals and other setting values.
[2] POWER (power supply)	Lights up when the power is turned on.
[3] RUN (rotating)	Displays during rotation. It lights up at an input of the rotation ON signal. The rotation control begins.
[4] PAINT (paint signal)	Indicates paint. It lights up at an input of the paint ON signal.
[5] BRAKE (brake signal)	Indicates braking. It lights up at an input of the brake ON signal.
[6] SYS (system error)	Indicates system errors. It lights up at communication errors or EEPROM errors, etc.
[7] FAULT (control error)	Indicates control errors. It lights up at rotation errors or photosensor amplifier errors, etc.
[8] RST (reset)	Reset switch. It cancels error outputs.
[9] ENT (confirm)	Switch to confirm. It confirms setting values and moves to the next screen.
[10] ⇩ (decrease)	Switch to decrease data values.
[11] ⇧ (increase)	Switch to increase data values.
[12] ⇦ (move the cursor)	Switch to move the cursor on the LCD display.
[13] MD (mode)	Mode switch. The screen moves to the main screen.

5 Operation Method

5.1 Rotational Speed Selection

The rotation controller (TTC200) enables to configure rotational speed electrically and stores up to 10 types of speed data (memory function). Select one of the 10 types from the memory and the equipment enables to maintain the rotational speed at the selected speed during the operation. The selected memory No. is shown on the LCD display to check. The data should be classified into seven types according to types of objects to be painted or paint types. The three remaining are used for the specific purposes (Wait, Flush, and Charge).

See the initial setting LCD display "I05 Communication Method" to select the memory.

You can select a communication type by placing the cursor to required setting on the "I05 communication method" screen and pressing the "ENT" key.

```
I05 COMMUNICATION METHOD
DNet  _CC-L  HLS  Non
```

There are four types available to select with: [1] Select with the unit panel board (Non), [2] select with the ALB terminal block (HLS), [3] select with the CC-Link communication (CC-L), and [4] select with the Device Net communication (Dnet).

If [2] Operation priority setting (S15) is selected as Unit, you can select from the memory on the unit panel board regardless of the selection of the communication method (I05) (added from V1.01).

5.1.1 Memory Selection Method

- If Non is selected for the "I05 communication method":
  1. Press "MD" on the standard screen.
  2. Press "←" five times then press the "ENT" key to change to the memory change screen.

```
<MEMORY CHANGE>
  Memory No.1 → No.  2
```

  3. Press "↑" or "↓" to select desired memory No. then press "ENT" to change to the selected memory No. The selected memory No. would not be confirmed if you press "MD" to change the screen without pressing "ENT".

- If HLS is selected on the "I05 communication method":
  1. You can select from the memory on the ALB terminal block.
     The memory No. 1 to 7 is 3-bit binary data.

- If CC-L or DNET is selected on the "I05 communication method":
  1. You can select from the memory of the master computer. See communication specifications for details.

The priority order of the input signals is as follows: "WAIT", "FLUSH", "LOAD" and "Memory No.".

5.1.2 Data Setting Methods

TTC200 allows setting rotational speed, upper limit, or rotational speed control deviation, etc. To edit each data, password authorization is necessary ("P01 PASSWORD IN").

[1] Press "MD" on the standard screen.

[2] Place the cursor to "MAINTENANCE" on the B02 screen and press the "ENT" key.

```
B02 MAIN MENU SELECTION 1
☐ INITIAL ☐ SYSTEM ☐ MEMORY ■ MAINTENANCE
```

[3] Place the cursor to "APP" on the N00 screen and press the "ENT" key.

```
M00 MAINTENANCE MENU SELECTION
TST  VER  CLG  PAS  APP
```

[4] Enter your user password on the P01 screen and confirm with the "ENT" key.

```
P01 PASSWORD IN
          0  0  0  0
```

[5] The authorization is successfully complete when the symbol "#" appears on the upper right of the LCD display. After moving to the data setting screen from this state, you can edit setting values (without the authorization completion, the setting value adjustment remains invalid even after the data setting screen appears).

```
B02 MAIN MENU SELECTION                    #
☐ INITIAL ☐ SYSTEM ☐ MEMORY ■ MAINTENANCE
```

[6] Press the "ENT" key to register data setting values. Press the "ENT" key once to register the setting value and move to the next screen at the second pressing.

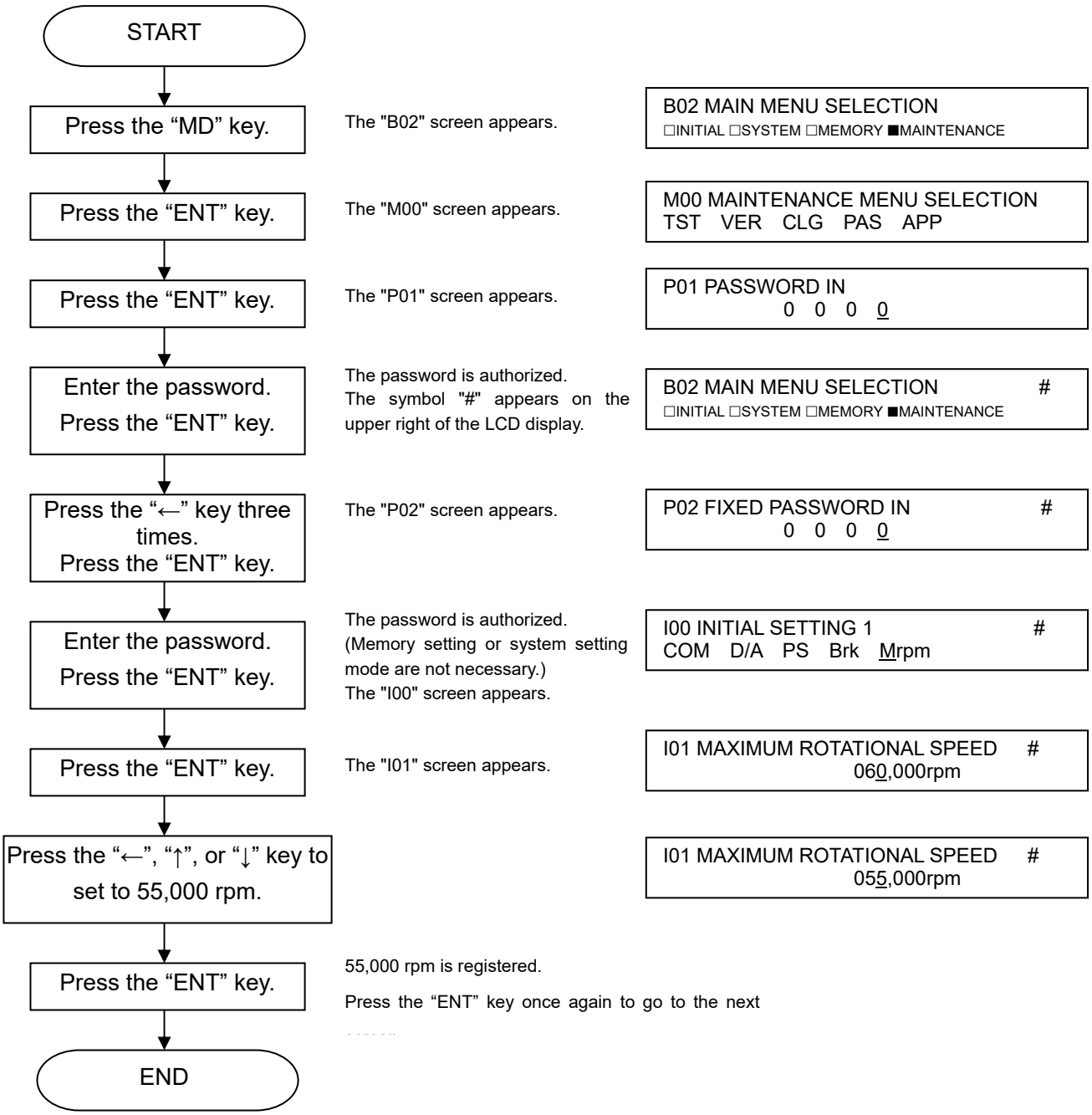
The next screen appears at the first entry of the ENT" key if the password authorization is not completed (numeric values are not registered).

[7] Press the "MD" key on the B02 screen to return to the standard screen. The password authorization is canceled in this case. The password authorization is required if you need to edit the data again.

(Remarks) You need to enter a fixed password on the P02 screen to move to the initial setting mode. See chapter 9 Operation Method for LCD monitor transition details, etc.

5.1.3 Setting Value Editing Method

This section explains how to edit setting values using a setting value for "I01 maximum rotational speed" as an example. This method also applies when you edit other setting values. In this example, the setting value for "I01 maximum rotational speed" is edited from 60,000 rpm to 55,000 rpm.



5.2 Operation

5.2.1 Operation preparation

- Do not install the rotation controller in locations where paint spray can reach.
- Install the electropneumatic regulator, optical fiber, etc. properly and ensure to make adjustments. Failure of installation or adjustments may result in troubles such as frequent errors, etc.
- It is recommended to assign a person in charge to control sensitivity setting. Data is restored to the manufacturer setting after CLEAR ALL, which is needed for program version upgrade, etc. Make sure to record every data.
- See 5.2.2 to adjust the sensitivity.
- Select the FB ON and input RUN (rotation signal) for normal cases. Fixed pulse output signal is sent in emergency cases such as failure to obtain rotation pulse signal, etc. unless you input a FB ON signal.

(The FB ON input method varies according to the "I05 communication method" on the LCD display. It can be entered from the ALB terminal block, the unit main body, or the communication.)
(If the operation priority setting (S15) is selected on Unit, you can switch FB (S09) on the unit panel board regardless of the communication selection. (I05)) (added from V1.01).

5.2.2 Sensitivity Setting

This section explains contents of each data. Moreover, the setting data is not editable unless the user password "P01" is authorized ("#" displayed).

1. Rotational speed upper limit setting (S02)
   A rotational speed upper limit error output is sent if this rotational speed is exceeded for seconds given in the S04 setting.

2. Rotational speed lower limit setting (S03)
   A lower rotational speed limit error output is sent if the rotational speed does not reach this value for seconds given in the S04 setting.

3. Rotational speed error detection time (S04)
   It allows setting detecting time for rotational speed upper limit error, rotational speed lower limit error, feedback loss error, and electropneumatic control error.

4. Rotation wait time setting (S05)
   A start-up wait time error output is sent if rotational speed does not exceed a feedback setting lower limit value for this selected time after an input of the rotation ON signal.

5. Stop time setting (S06)
   It enables to output a rotation stop time error if rotational speed does not drop to 5,000 rpm or less within this selected time after an input of the rotation OFF signal.
   * This is not valid unless ON is selected for "I02 brake use".

6. Brake delay time setting (S07)

The rotation controller enables to switch the brake and the turbine through its control. The rotational speed may fluctuate due to residual pressure caused by changing the contact point. In this case, the impact of the residual pressure can be reduced by changing the setting time.

7. Feedback function setting (S09)

The feedback control is enabled by turning ON this setting if "Non" is selected on the "I05 communication setting". The fixed output mode is enabled when OFF is selected.

8. Rotation control deviation setting (S10)

It enables to set up allowances to the upper and lower rotational speeds to a target rotational speed. For example, if a target rotational speed is 30 krom and the S10 setting is 2000 rpm, the normal speed is 28000 rpm to 32000 rpm. If it exceeds this rotation range for a given time in the S04 setting, a feedback loss error output is sent.

9. Learning range setting (S12)

It allows to set up a range of electropneumatic regulator control error. If a setting value is 0.00 MPa, no electropneumatic regulator control error output is sent.

10. Learning error detecting time (S13) (added from V1.01)

It allows to set detecting time of electropneumatic regulator control error.

11. Error mask mode (S14)

It allows to select valid or invalid setting for output an error if detected any. (0: invalid; 1: valid)

12. Priority operation switch (S15) (added from V1.01)

It enables to select priority between the panel board (Unit) and the external I/O (Remote) switch. This setting is valid for the memory No. and FB ON.

Unit setting: It disables memory No. and FB ON signals on the ALB terminal block and gives priority on the memory selection and FB ON through the board panel operation.

Remote setting: It gives priority on memory No. and FB ON signals on the ALB terminal block and disables the memory selection and FB ON through the board panel operation.

13. Sensor error count setting (S16) (added from V1.02)

It allows setting a reference count value to judge photosensor reading errors.

14. Maximum rotational speed setting (I01)

It enables to output a maximum rotational speed error after it exceeds this setting rotational speed for 0.5 second.

15. Brake use setting (I02)

It enables or disables the brake. The setting becomes valid when it is ON. There are two patterns that need to turn on the brake: [1] The operation is stopped; [2] Target rotational speed is lower than the current one due to memory change, etc.

16. Paint switch setting (I03)

This rotation controller performs the feedback control that enables to switch PID parameters at paint ON (load ON). It allows to edit the parameter switch pattern setting.

Pon setting: It switches the parameters at an input of the paint ON signal (ALB terminal block IN3).

AUTO setting: It switches the parameters when rotational speed becomes stable at the operation starts up.

17. D/A type setting (I04)

It allows to select the current output value of the rotation controller DA1 from 4-20mA or 0-20mA.

18. Communication method setting (I05)

It allows to select a communication type.

19. KP setting correction (I06), KI setting correction (I07)

This rotation controller performs the feedback control that brings optimized start-up using calculations of proportional gain and integral gain with its microcomputer. By changing these two setting values, enables to correct the calculated values of the microcomputer.

It is advised that to review the setting values if overshoot becomes larger due to different air tube diameters, etc. or operation becomes stable at lower rotational speed than a target rotational speed.

$$\text{Operation quantity} = \mathbf{KP}\left(\text{Deviation} + \frac{1}{\mathbf{KI}}\text{Deviation dt}\right)$$

The rotations are controlled through calculation with the formula above, and KP (proportional gain) and KI (integral gain) can be corrected. It is generally calculated as 1.00.

* Larger KP correction leads to a larger KP value that makes a larger operation quantity.
* Larger KI correction leads to a larger KI value that makes a smaller integral value. As a result, the operation quantity is reduced.

20. Air pressure setting (I08)

Please enter the air pressure that is currently supplied. Incorrect air pressure value affects the air pressure or brake air pressure on the fixed output mode.

21. Brake air pressure setting (I09)

It allows to set up brake air pressure.

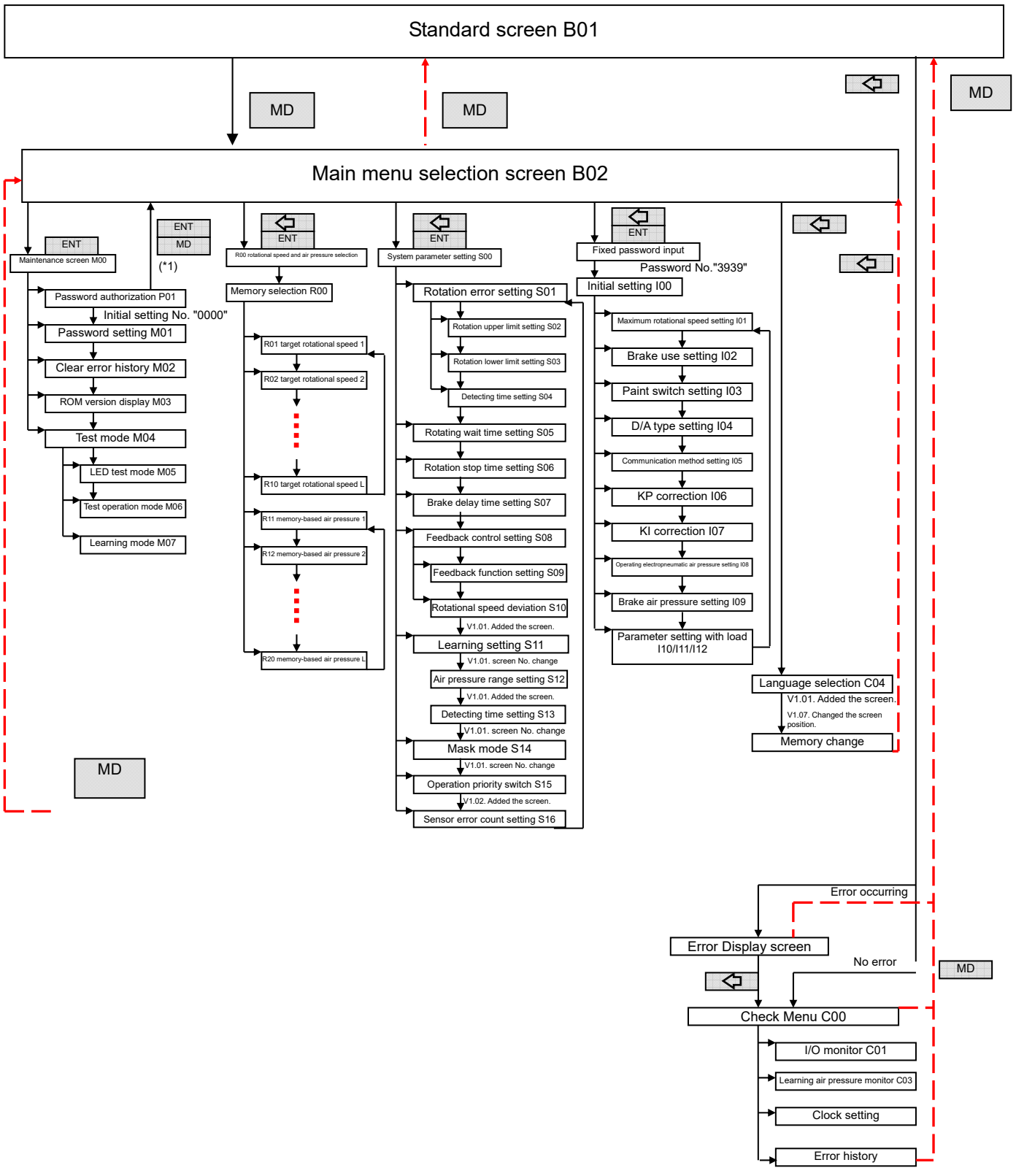
22. PID parameter setting with load (I10: KP) (I11: KI) (I12: Po [added from Ver 1.06])

It allows to set up load parameters at paint ON. Larger KP value and smaller KI value lead to an oversensitive response to loads as characteristics. Please review these two setting values when vibration occurs at paint ON.

By changing the Po setting value, reducing rotational speed slowdown at paint ON.

6.1 LCD Display Transitional Chart

[Mode transitional chart]



7 List of Setting Values

No	Operation mode	Setting name	Setting range	Unit	Initial value	Remarks
S01	System	Rotation error				
S02	System	Rotational speed upper limit value	10,000 to 120,000	rpm	55,000	
S03	System	Rotational speed low er limit value	5,000 to 120,000	rpm	5,000	
S04	System	Rotational speed error detecting time T1	0.0 to 99.9	sec	10.0	
S05	System	Rotation wait time T2	0.0 to 99.9	sec	30.0	
S06	System	Stop time T3	0.0 to 99.9	sec	60.0	
S07	System	Brake delay time setting T4	0.0 to 5.0	sec	0.5	
S08	System					
S09	System	Feedback control		——	ON	
S10	System	Rotation speed control deviation	1,000 to 10,000	rpm	3,000	
S11	System	Learning function				
S12	System	Learning range	0.00 to 0.99	MPa	0.00	
S13	System	Detecting time T5	0.1 to 9.9	sec	2.50	V1.01. Added.
S14	System	Error mask mode				
S15	System	Operation priority setting	UNT:board panel/RMT:external IO		RMT	V1.01. Added.
S16	System	Sensor error count setting	1 to 99		10	V1.02. Added.
I01	Initial	Max. rotational speed setting	10,000 to 120,000	rpm	60,000	Rotational speed on bell specification
I02	Initial	Brake enable/disable		——	ON	
I03	Initial	Load switch method		——	AUTO	
I04	Initial	D/A setting	0-20		4-20	0-20 or 4-20 setting
I05	Initial	Communication method		——	HLS	HLS, etc.
I06	Initial	Proportional gain correction	0.01 to 1.99	——	0.70	Control curve correction
I07	Initial	Integral time correction	0.01 to 1.99	——	1.30	Control curve correction
I08	Initial	Air pressure setting	0.01 to 0.90	MPa	0.9	
I09	Initial	Brake air pressure setting	0.00 - Air pressure setting value	MPa	0.3	
I10	Initial	Load KP setting	0.1 to 9.9	——	1.5	
I11	Initial	Load KI setting	1 to 99	——	3	
I12	Initial	Load coefficient Po	1 to 99	——	60	V1.06. Added.
M01	Maintenance	User password		——	0 0 0 0	
M02	Maintenance	Error history reset	0,1	——		
M03	Maintenance	Version display				
P01	Password	User password authorization			0 0 0 0	Password No. to edit
P02	Password	Fixed password authorization			3 9 3 9	V1.07. Modified No.

About monitor

No	Operation mode	Monitor name	Unit
1	Standard screen	Current rotational speed	rpm
2			
3	Check Menu	I/O monitor	——
4	Standard screen	Error output	——
5	Check Menu	Learning air pressure monitor	MPa
6			

Memory setting

Memory No.	Initial value for target rotation speed	Air pressure setting value
1	20000rpm	0.1MPa
2	20000rpm	0.1MPa
3	20000rpm	0.1MPa
4	20000rpm	0.1MPa
5	20000rpm	0.1MPa
6	20000rpm	0.1MPa
7	20000rpm	0.1MPa
W	20000rpm	0.1MPa
F	20000rpm	0.1MPa
L	20000rpm	0.1MPa

Available to save (100) error history events. Modified from V1.07.

* Fixed output method: LCD setting (feedback function is invalid) or FB signal is off (for HLS terminal block).

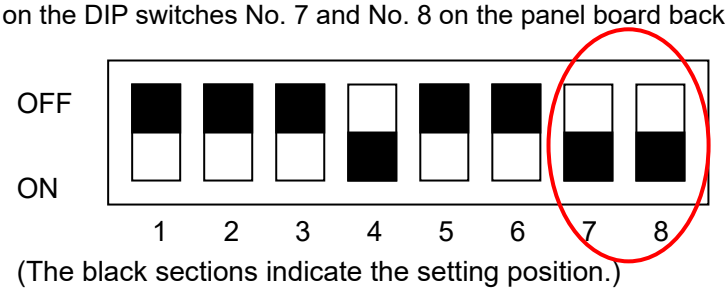
8 DIP Switch Setting and Initialization Method

8.1 Initialization Method

Initialization is required as follows after program version upgrade, external ROM replacement, or internal data damage, etc.

(Initialization procedure)

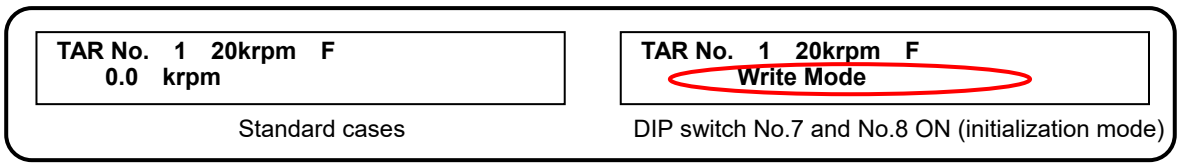
1. Turn on the DIP switches No. 7 and No. 8 on the panel board back as figure bellow.



(The black sections indicate the setting position.)

2. Turn on the power supply again. Check the LCD display "SETTING VALUE INITIALIZATION".
3. Turn off the DIP switches No.7 and No.8.
4. Initialization is complete.

・When the DIP switch No.7 or No.8 is turned on, "Write Mode" appears at the lower part of the LCD main screen.



Dip SW allocation chart

No.	Item	ON	OFF	Remarks
1	Bell type	2^3		
2	Bell type	2^2		
3	Bell type	2^1		
4	Bell type	2^0		
5	LCD backlight	Timer OFF	Constantly ON	
~~6~~	~~Bilingual mode~~	~~English~~	~~Japanese~~	Deleted from Ver 1.05.
7	EEPROM*	Initialization	-	
8	RAM*	Initialization	-	

8.2 Input/output Check Monitor (I/O monitor)

The monitor allows to check input signals or output signals to the TTC-200. You can check signals from the photosensor amplifier, etc. (see 6.1 LCD Display Transitional Chart.)

9 Error Display and Conditions

9.1 Error Display Descriptions

List of error display

Indication on LCD monitor	Error comment	Mask initial value	Judge
# ROTATION UPPER LIMIT ERROR	Rotational speed upper limit error	1	ERROR
# ROTATION LOWER LIMIT ERROR	Rotational speed lower limit error	1	ERROR
# MAX ROTATIONAL SPEED ERROR	Maximum rotational speed error	1	ERROR
# STARTUP WAIT TIME ERROR	Start-up time error	1	ERROR
# ROTATION STOP TIME ERROR	Rotation stop time error	0	ERROR
# PHOTOSENSOR READING ERROR	Photosensor amplifier reading error	0	ERROR
# FEEDBACK LOSS ERROR	Feedback loss error	1	ERROR
# D/A CONTROL ERROR	Electropneumatic regulator control error	1	ERROR
# SYSTEM ERROR WARNING	RAM initialization warning	1	SYS
# OVERRUN ERROR WARNING	Overrun error warning at reception	1	SYS
# FLAMING ERROR WARNING	Flaming error warning at reception	1	SYS
# PARITY ERROR WARNING	Parity error warning at reception	1	SYS
# CLOCK ERROR WARNING	Clock data acquisition error at power supply ON	-	ERROR

9.2 Error Output Valid/Invalid Setting

It allows to determine whether to output detected errors or not. (S12 screen)

```
S12   MASK MODE   (0-1) 1
# ROTATION UPPER LIMIT ERROR
```

・Select 1 to output an error. Select 0 to output no error.

・It allows to set up by each error type.

・It is not available to edit unless your password is authorized with [P01].

9.3 Error conditions

9.3.1 Maximum rotational speed error

- Output an error when the maximum rotational speed setting value (I01) is exceeded for over 0.5 second.

9.3.2 Rotational speed upper limit error

- Output an error after a lapse of the rotational speed error detecting time T1 (S04) if bell rotational speed exceeds the upper limit setting value (S02).

9.3.3 Rotational speed lower limit error

- Output an error after a lapse of the rotational speed error detecting time T1 (S04) if bell rotational speed drops below the lower limit setting value (S03).

9.3.4 Start-up time error

- Output an error if it does not exceed the feedback setting value within a given time (S05) after the rotation signal ON.

9.3.5 Rotation stop time error

- Output an error if bell cup rotation does not drop below 5,000 rpm within a given time (S06) at the rotation control OFF.

9.3.6 Photosensor amplifier reading error

- Measuring pulse intervals from the previous measurement and current measurement (by every 10 msec) and counts up at each sudden interval change.
- It check the counts at every one second. Output an error when the counts exceeds the sensor error count setting (S16) (modified in V1.02).

9.3.7 Feedback Loss Error

- Output an error after a lapse of the rotational speed error detecting time T1 (S04) if bell rotational speed exceeds the rotational speed deviation value (S10).

9.3.8 Electropneumatic Regulator Control Error

- Output an error after a lapse of the detecting time T5 (S13) (added from V1.01) if electropneumatic regulator operation amount exceeds the air pressure range (S11). This error detecting function monitors under the following conditions. After a lapse of the detecting time T5 (S13),
  [1] Learning is activated at the current target rotational speed (see changer 9.4).
  [2] Memory No. 1 to 7.
  [3] The (I03) setting is selected as "Pon" and the paint signal is OFF.
  [4] The feedback function setting (S09) is ON.

9.3.9 Clock data acquisition error (added from V1.07)

- Output an error when clock time data at the power-on is failed to obtain. Please set the clock again, if this error is issued, because accurate error time is not saved in the error history (see chapter 10). Furthermore, this error may occur when the power is not turned on for a long period (one month or more).

9.4 Learning function

- It allows to save air pressure values by every target rotational speed. By memorizing air pressure, it enables to detect output error of the electropneumatic regulator due to connection failure of the photosensor amplifier, air tubes bent, etc.
- The learning function is disabled unless the FB is ON.

9.4.1 Operation Method

[1] Authorize the password. (See 5.1.2 Data Setting Methods.)

[2] Move to the M07 learning mode screen. (6.1 LCD Display Transitional Chart)

```
M07 LEARNING MODE
  20 krpm → 30 krpm
```

[3] Select the rotational speed to start and end the learning function and press the “ENT” key.

[4] Move to the standard screen and start the learning function. (The rotation control starts.)

```
TAR     No.1    20 krpm        F
  20.0 krpm
```

[5] Record the air pressure by every 1,000 rpm automatically. The rotation control is terminated when the recording of the air pressure of the end rotational speed is finished. The learning function is terminated if it does not match the target rotational speed for one minute.

9.4.2 Confirmation Method

[1] Press the "←" key on the standard screen. Move to Check Menu.

```
C00 CHECK MENU
LOG TIME Air I/O
```

[2] Move the cursor to "Air" and press the "ENT" key. Move to the "C03 learning air pressure" screen appears.

```
C03 LEARNING AIR PRESSURE
10 krpm 0.03MPa
```

[3] Press the "↑" or "↓" key to view learning air pressure of each rotational speed.

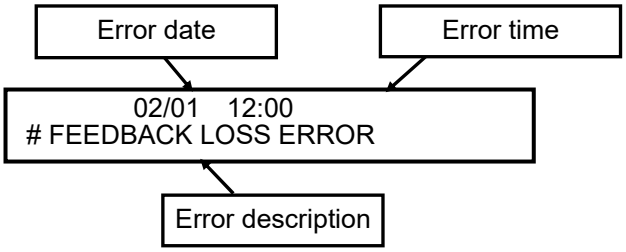
```
C03 LEARNING AIR PRESSURE
11 krpm 0.03MPa
```

10 Clock function (added to the program Ver 1.07)

The program version 1.07 newly allows to view clock data on the error history screen.
This additional function contributes to easier control by detecting timing of each error occurrence.

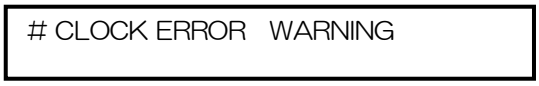
10.1 Error History Display

For this added clock function, the error history screen has been modified as follows.
Also, it enables to save up to 100 events of the error history.



10.2 Clock Acquisition Error

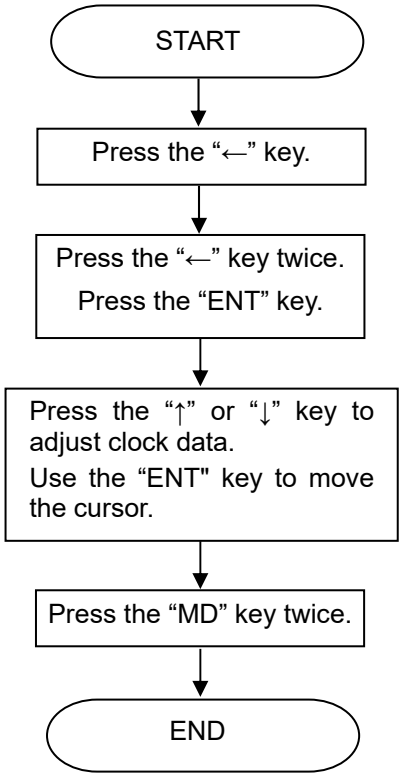
This unit acquire clock data when the power supply is activated. If it fails to acquire accurate clock data, a clock error is detected and the error screen appears.

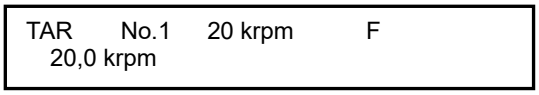


It is advised to set the clock again if the clock error screen appears. (See [17.3 Clock setting method].)

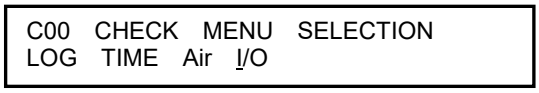
10.3 Clock Setting Method

The following shoes how to set time with the clock.

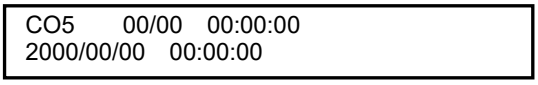


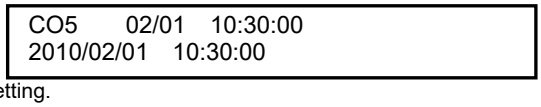


The “C00” Check Menu screen appears.



The "CO5" screen appears.





Press the "ENT" key for setting seconds to complete the clock data setting.

The time that you set appears at the upper part of the monitor.

Confirm if the time is set accurately.

Move to the standard screen.

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11 Assignment of Terminal Block and Wiring

11.1 I/O assignment

a. DI

	Terminal block	Name	Remarks
IN1	IN1/P24-V (sink)	Rotation ON	
IN2	IN2/P24-V (sink)	Error reset	
IN3	IN3/SP12-V (source)	Rotation sensor (TA)	
IN4	IN4/SP12-V (source)		
IN5	IN5/SP12-V (source)	Rotation sensor (TAR)	
IN6	IN6/SP12-V (source)		
IN7	IN7/SP12-V (source)		
IN8	IN8/SP12-V (source)		

※ IN1 and IN2 require 24 VDC power supply.

b. D0

	Terminal block	Name	Remarks
OUT1	OUT1/1C	Brake air	
OUT2	OUT2/2C	Error	
OUT5			

※ 24 VDC power supply is required.

c. D/A

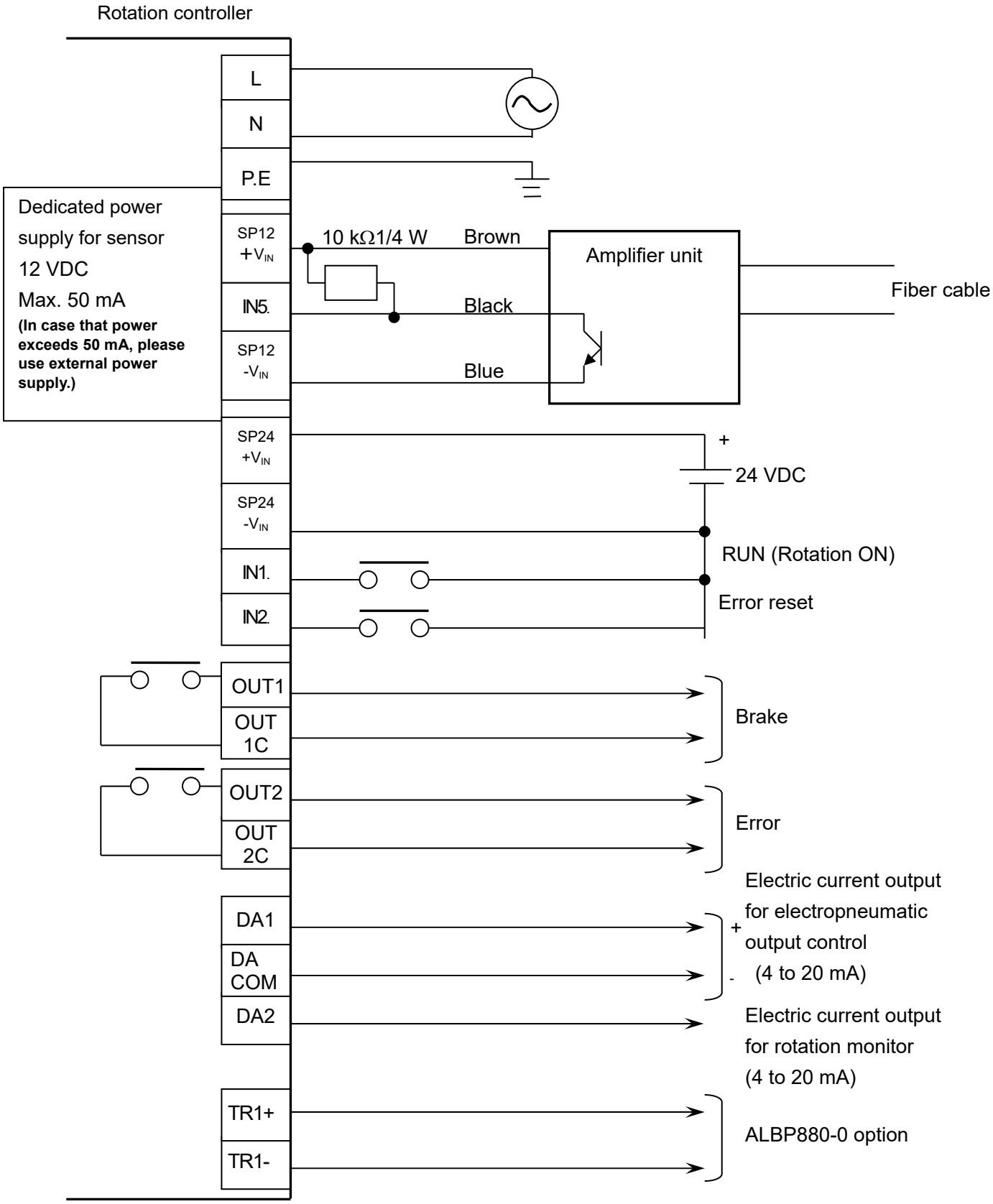
	Terminal block	Name	Remarks
DA1	4-20R+/4-20R-	Electropneumatic regulator	0 to 0.9 MPa
DA2	4-20+/4-20-	Rotation monitor	0 to 60,000 rpm (TA) 0 to 120,000 rpm (TAR)

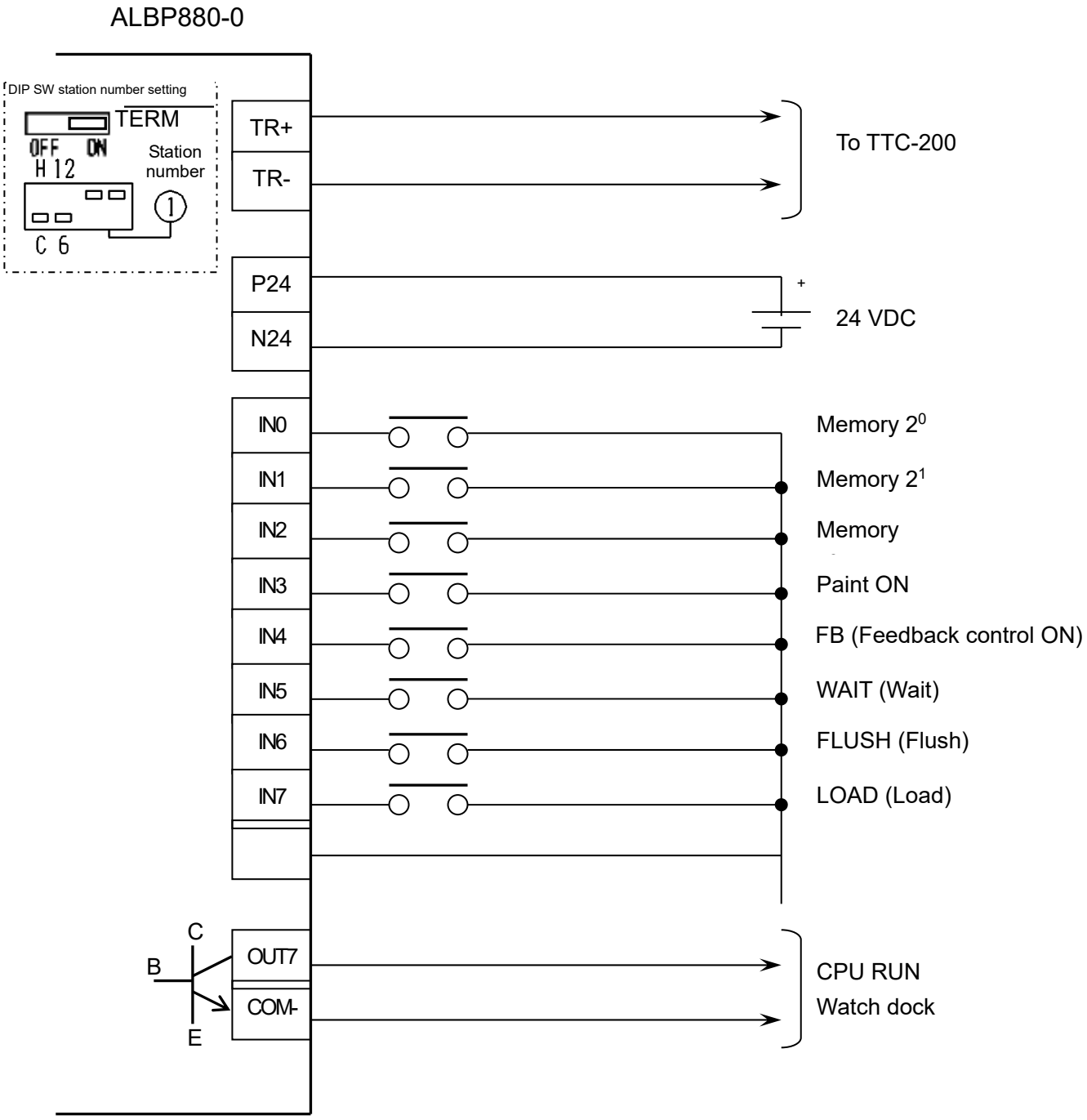
※ 24 VDC power supply is required.

d. HLS (Expansion terminal block ※Option)

	IN	OUT	Remarks
0	Memory2^0		
1	Memory2^1		
2	Memory2^2		
3	Paint ON		
4	Feedback ON		
5	Wait		
6	Flush		
7	Load		
8			
9			
A			
B			
C			
D		Stable rotation	
E		IN3 output (for completed units test)	
F		Watch dock	

11.2 Wiring example of TTC-200





※ Regarding the detailed information of terminal block, please contact our department in charge.

12 Failure Cause and Measure

Failure phenomenon	Cause	Measure
1. The display does not show when the power supply switch is on.	[1] Power is not properly supplied.	[1] Supply AC power source properly.
2. It is not correctly displayed.	[1] The main unit is broken down.	[1] Replace the main unit.
3. Rotational speed is not displayed.	[1] Wires are not properly connected.	[1] See the wiring diagram and connect wires properly.
	[2] Fiber cables are not properly connected.	[2] Connect fiber cables properly.
	[3] The main unit is broken down.	[3] Replace the main unit.
	[4] Rotation detection is failed due to reflector damage (degradation).	[4] Perform maintenance of the gun.
4. Unstable rotation.	[1] Wires are not properly connected.	[1] See the wiring diagram and connect wires properly.
	[2] The paint is ON and OFF.	[2] It is normal that rotational speed temporarily goes up and down, due to high fluctuation level with loads, if discharge amount is high.
	[3] The reflector or optical fiber cable is dirty.	[3] Cut off the tip of the fiber cable for few mm and perform gun maintenance.
	[4] Air tube is bent.	[4] Replace the air tube. Arrange the tube while paying attention not to bend.
	[4] Air tube comes off.	[5] Make sure that the air tube is connected.
5. Maximum rotational speed errors or rotational speed upper limit errors frequently occur.	[1] Turbine air rate is too high.	[1] Change to appropriate pressure after inspecting source of supply air.
	[2] (S02) (S04) setting values is too low.	[2] Increase the setting values higher than setting rotational speed.
	[3] Electropneumatic regulator failure.	[3] Replace the electropneumatic regulator.
6. Rotational speed lower limit errors or start-up wait time errors frequently occur.	[1] Turbine air rate is insufficient.	[1] Arrange pipes to supply at appropriate air flow rate.
	[2] Air hose is bent.	[2] Arrange air hoses while paying attention not to bend.
	[2] (S03) (S05) setting values is too low.	[3] Review the setting values.
7. Rotation stop time errors frequently occur.	[1] The (S06) setting value is not appropriate.	[1] Change the (S06) setting to an appropriate value.
	[2] Electropneumatic regulator failure.	[2] Replace the electropneumatic regulator.
8. Photosensor amplifier reading errors frequently occur.	[1] Fiber cable failure.	[1] Inspect fiber connections and cleanness.

Failure phenomenon	Cause	Measure
9. Feedback loss errors frequently occur.	[1] Turbine air rate is too low.	[1] Arrange pipes to supply at appropriate air flow rate.
	[2] Air hose is bent.	[2] Arrange the air hose while paying attention not to bend.
	[3] Setting value (S10) is too low.	[3] Review the setting values.
10. Electropneumatic regulator control errors frequently occur.	[1] Incorrect learning value.	[1] Check the air piping and start the learning function in a normal state again.
	[2] Setting value (M07) is too low.	[2] Review the setting values.
11. System-related errors frequently occur.	[1] Communication is not properly established.	[1] See the communication specification and connect wires/establish communication.
12. The rotational speed is stable at lower than setting rotational speed.	[1] Turbine air flow rate is too low.	[1] Change to appropriate pressure after checking source of supply air.
	[2] Loads increased due to turbine damage.	[2] Perform maintenance on the gun.
13. Operation is failed on the FB ON mode.	[1] The FB ON setting is turned off.	[1] The (I05) setting value is selected as Non; change the S-09 setting. If not Non, select the FB ON setting according to communication types.

13 Maintenance Log

Shown below is a maintenance log format of a kind we recommend you to keep. Each time that you conduct a maintenance service, such as replacement of a part, tear-down cleaning, post-failure repair, etc., record the details. In the long run, you will find that such a log is very valuable in keeping your equipment in a consistently good operating condition.

Machine name			Static electricity controller <BPS710>		Date of acquisition: YYYY/MM/DD	
Date of service			Portion worked on	Description	Result	Worked by
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
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						In-house / Dealer / Asahi Sunac

14 Revision Record

Version	Date	Revision contents
1st edition	April 16, 2007	-
2nd edition	May 11, 2007	Added the screens (I-10/I-11/S-11/S-12/S-13/S-15).
3rd edition	June 6, 2007	Added the screen (S-16) Added the communication monitors (COM0/COM1).
4th edition	January 8, 2008	Deleted the bilingual mode of the DIP switch No.6.
5th edition	January 22, 2008	Described the user password number and fixed password number.
6th edition	April 10, 2008	Added the screen (I-12). Modified the initial values.
7th edition	February 1, 2010	Added the clock function. Added the C05 "clock setting screen". Modified the error history screen. Revised the monitor description for consistency with TPS-200.
8th edition	March 9, 2010	Changed to the new layout.
9th edition	October 27, 2014	Comment deletion by optional parts discontinued.
10th edition	November 5, 2014	Added the terminal block allotment and the electric wiring.
11th edition	November 11, 2022	Warranty revision

15 Warranty

ASAHI SUNAC CORPORATION (the “Company”) shall provide the original purchaser (the “Purchaser”) with warranty service for a period of one (1) year from the date of purchase of the product, as follows:

- Should you find defects in design or workmanship with regard to parts, ship them back to the Company, with freight prepaid. The Company shall repair or replace the parts free of charge and reimburse the freight charges, provided that, as a result of an inspection and investigation of the parts conducted by the Company, the defects are deemed to be to attributable to the factors within the Company’s responsibility.

- In the following cases, free after-sales service is not provided.

  1. Failure resulting from an inappropriate method of installing this equipment.
  2. Failure resulting from a use method not conforming to this instruction manual or mishandling.
  3. Failure resulting from insufficient maintenance management of this equipment and incorrect handling such as non-conformance to the procedures specified in this instruction manual.
  4. Failure resulting from unauthorized alteration or structure change of this equipment without the Company’s consent.
  5. Failure due to force majeure such as earthquake, disaster, flood disaster or lightening.
  6. Warranty for consumables worn or deteriorated even in the case where this equipment is used correctly.
  7. Repair after the machine has been used outside Japan, and shipping cost.
  8. In addition to the above, failure due to circumstances beyond our control.

- As for items such as parts purchased by the Company from another manufacturer, the warranty of that manufacturer shall apply.

- As for any parts deemed to be defective, the Company shall not be held liable for any expenses beyond the provision of repair or replacement parts free of charge.

- The Company shall not be held liable for any damage to the Purchaser caused by factors not attributable to the Company, such as misuse of product, etc.

●When a transfer of title of this equipment takes place, please see to it that this Operation and Maintenance Manual is handed over to the new owner.

●This equipment is manufactured in compliance with the Laws and Regulations of Japan.
In the rare eventuality of this equipment being used outside Japan, compliance with the safety standards of the relevant countries is of course mandatory.

11th edition November 11, 2022

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