No.EX##-OML0011

Operation Manual

Fieldbus system
Handheld terminal

PRODUCT NAME

EX600-HT1

MODEL/ Series

SMC Corporation

Table of Contents

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.”. They are all important notes for safety and must be followed in addition to International standards (ISO/IEC), Japan Industrial Standards (JIS)[*1)] and other safety regulations[*2)].

*1) ISO 4414: Pneumatic fluid power - - General rules relating to systems.
ISO 4413: Hydraulic fluid power - - General rules relating to systems.
IEC 60204-1: Safety of machinery - -Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety.
etc.

*2) Labor Safety and Sanitation Law, etc.

⚠ **Caution** : Operator error could result in injury or equipment damage.

⚠ **Warning** : Operator error could result in serious injury or loss of life.

⚠ **Danger** : In extreme conditions, there is a possibility of serious injury or loss of life.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.[*3)]
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*3) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

Operator

- This operation manual has been written for those who have knowledge of machinery and apparatus that use pneumatic equipment and have full knowledge of assembly, operation and maintenance of such equipment.
- Please read this operation manual carefully and understand it before assembling, operating or providing maintenance.

⚠ Warning

- Do not disassemble, modify (including change of printed circuit board) or repair this product. Injury or failure can result.
- Do not operate/set the device with wet hands. There is a risk of electric shock.
- Do not operate the product beyond the specification range. Do not apply the product to flammable gas or liquid or the gas or liquid harmful to human body. Otherwise it causes fire, malfunction, or damage to the system. Please confirm the specifications before use.
- Do not use the product in the atmosphere with flammable or explosive gas. Otherwise it causes fire or explosion. This product is not constructed with explosion proof structure.
- The following instructions must be followed when performing maintenance work:
  • Turn off the power supply.
  • Stop the air supply, exhaust the residual pressure and make sure that the air is released to atmosphere before performing maintenance work.

  Otherwise it causes injury.
- Do not press the display. This may cause injury and damage to the LCD display.
- Forced input/output function is the function to change the signal status forcibly. When operating forced input/output function, be sure to check the safety of surroundings and the facility. Otherwise it causes injury and damage to equipment.
- Erroneous parameter setting results in malfunction. Be sure to confirm the settings. Otherwise it causes injury and damage to equipment.

⚠ Caution

- Perform a proper functional check after completing maintenance work. Stop operation if any abnormality is observed or if the product is not working properly. Safety cannot be assured due to unexpected malfunction.
- Switching the HOLD/ CLEAR function selection mode, switches the operation of the input/ output signal at emergency stop, so pay due attention to safety when setting. There is a risk of injury and equipment damage
- When setting the parameters to the factory defaults, unpredictable operation of connected equipment may occur. It is essential to carry out this operation paying attention to safety. Otherwise it causes injury and damage to equipment.

NOTE

Observe the following when selecting and handling the Fieldbus device.
Otherwise it may cause malfunction due to damage or failure.
The instructions on selection (Installation, wiring, operating environment, adjustment, operation and maintenance) described below must also be followed.

Product specification

- Use the product with the specified voltage.
  Use of the product with a voltage outside the specified voltage may result in failure and malfunction.
- Do not mount the unit in a location that will be used as a foothold.
  The unit may be damaged if excessive force is applied by stepping or climbing onto it.
- Reserve sufficient space for maintenance.
  Be sure to reserve sufficient space for maintenance when designing layout of the system.
- Do not remove any nameplates or labels.
  This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or malfunction to the unit.
  It may also result in non-conformity to safety standards.

Precautions on handling

Installation

- Do not drop, hit or apply excessive shock to the unit.
  Otherwise the unit could be damaged, resulting in failure.

Wiring (including plugging in/out of connector)

- Do not bend the cables repeatedly or apply excessive force by pulling or placing heavy loads on them.
  Bending or tensile stress could cause the cables to break.
- Connect wires and cables correctly.
  Incorrect wiring could damage the fieldbus system.
- Do not lay wires and cables together with power or high-voltage cables in the same wiring route.
  Otherwise the wires to the fieldbus system could be affected by noise or induced surge voltage from power lines or high-voltage cables, causing malfunction. Route the wires to the SI Unit and each I/O device to a wire duct or in a protective tube other than those for power lines or high-voltage cables
- Verify the insulation of wiring.
  Poor insulation (interference with other circuits, poor insulation between terminals, etc.) can introduce excessive voltage or current to the SI Unit or each I/O device causing damage.
- When inserting the connector into the Handheld Terminal, insert the connector straight in until it clicks into place.
  Failure to comply with the above precautions may cause damage to the Fieldbus system and result in unpredictable behaviour of the connected equipment.

Operating environment

- Select the proper type of protection according to the environment of operation.
  IP65/67 protection is achieved when the following conditions are met.
  (1) The Handheld Terminal is connected to the unit properly using the correct cable.
  (2) Be sure to mount a waterproof cap on any unused connectors.
  If using the unit in an environment that is exposed to water splashes, please take measures such as using a cover.
- Take sufficient shielding measures if the unit is installed in any of the locations described below.
  Insufficient measures may cause malfunction or failure.
  Verify the effectiveness of the measures after incorporation of the unit into the equipment.
  (1) A place where noise is generated due to static electricity
  (2) A place where electric field strength is high
  (3) A place where there is radioactive irradiation
  (4) A place near a power line
- Do not use the unit in an environment exposed to oil or chemicals.
  Using the product in an environment exposed to any type of oil or chemicals, such as coolants and cleaning fluids, may adversely affect the unit, causing failure or malfunction.
- Do not use the unit in an environment exposed to corrosive gases or liquids.
  The unit may be damaged, leading to malfunction.
- Do not use the unit near a place where electrical surges are generated.
  Internal circuit elements of the fieldbus system can deteriorate or break if equipment generating a large surge (electromagnetic lifter, high frequency induction furnace, motor, etc.) is located near the fieldbus system. Provide surge prevention measures, and avoid interference.
- The product does not have resistance against lightning surges required for CE marking, so please take measures against lightning surge on the equipment side.
- Make sure that foreign matter such as dust and wiring chips do not get inside the product.
  This may cause failure or malfunction.
- Do not expose the reduced wiring system to vibration or mechanical impact.
  This may cause failure or malfunction.
- Do not use the unit in an environment subject to a temperature cycle.
  If it is subjected to a temperature cycle outside of normal temperature changes, this may adversely affect the internal parts of the unit.
- Do not use the unit in a location directly exposed to sunlight.
  If the product is located in such a position, arrange a suitable cover to protect the unit.
  Direct exposure to sunlight may cause failure or malfunction.
- Keep within the specified ambient temperature range.
  Otherwise malfunction could be caused.
- Do not expose the fieldbus system to heat radiation from a heat source located nearby.
  Malfunction could be caused.

Adjustment and Operation

- Do not operate the buttons with a sharp pointed object.
  This may lead to failure due to component damage or short-circuit.

Maintenance and Inspection

- Before performing maintenance work, turn off the power supply, stop the supply of air, exhaust the compressed air from inside the piping, and verify that the air is released to atmosphere.
  Otherwise, there is a risk of unexpected malfunction of the system components.
- Perform maintenance and inspection regularly.
  Otherwise unexpected malfunction of components could occur due to a malfunction of the whole unit.
- Perform appropriate functional checks after completion of maintenance and inspection.
  Stop operation if any abnormality is observed or if the device does not work properly.
  Otherwise an unexpected malfunction of the unit or components could occur.
- Do not use solvents such as benzene and thinner to clean the unit.
  Use a soft cloth to remove stains. For heavy stains, use a cloth soaked in diluted neutral detergent and fully squeezed, then wipe again with a dry cloth.

How to order

EX600 – HT 1 –□

Handheld Terminal

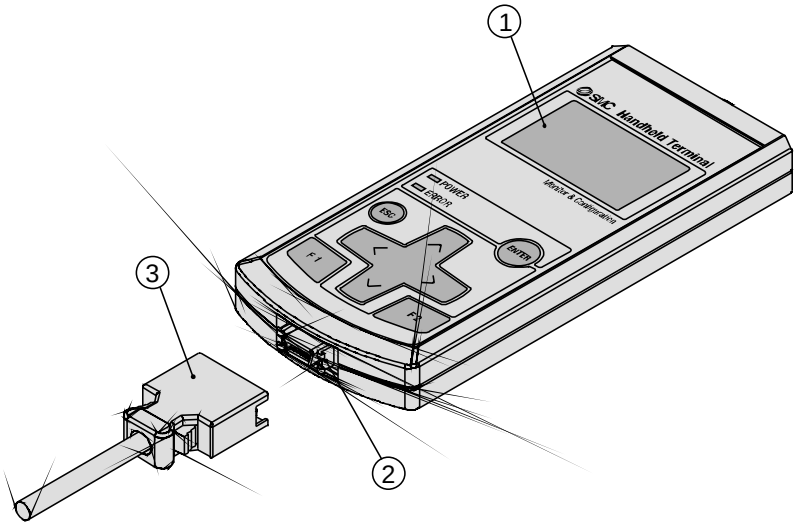
Cable length for Handheld Terminal

Symbol	Description
Nil	No cable
1	1m
3	3m

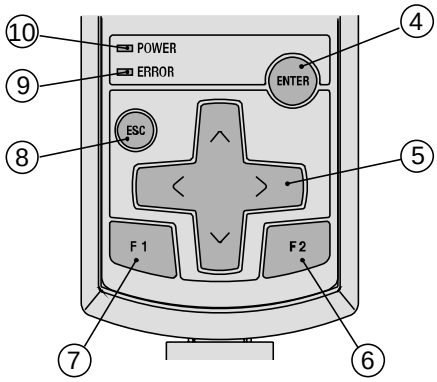
Option

Model Name	Model
Handheld terminal cable 1m	**EX600-AC010-1**
Handheld terminal cable 3m	**EX600-AC030-1**

Name and Function of the Parts



Button and LED definitions



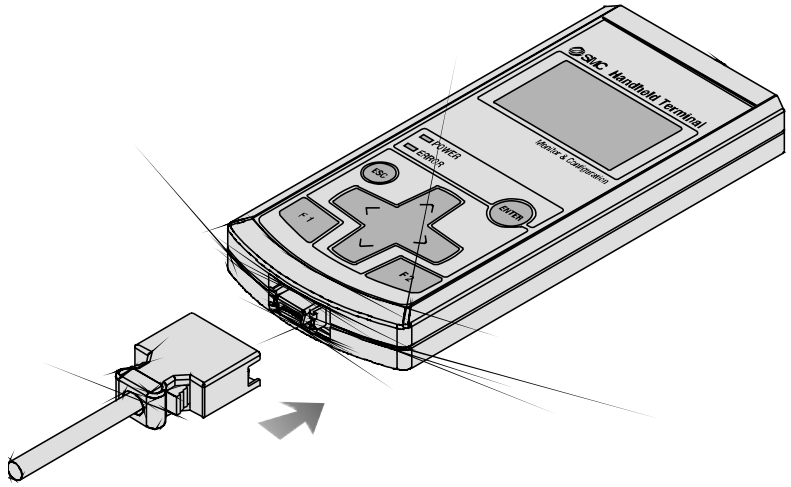
No.	Name	Description
1	LCD display	Displays the operation items and information about the unit.
2	Connector	This connector is for the Handheld Terminal cable.
3	Handheld Terminal cable	Cable to connect the SI Unit to the Handheld Terminal.
4	ENTER button (ENTER)	In selecting screen, this button is used for selecting the required item. In setting screen, pressing this button registers the selected contents.
5	Cursor move button (↑ ↓ ← →) *Hereafter referred to as "Direction Button" in this manual.	This button is used to move the cursor in LCD display upward/downward and right/left direction. Select the required item using this button. Use this button to increase/decrease or turn ON/OFF the setting value.
6	F2 button (F2)	This button functions according to the indication or instruction displayed on the screen.
7	F1 button (F1)	
8	Escape button (ESC)	In selecting screen, this button is used to return to the previous screen. Pressing this button cancels the setting contents and returns to the previous screen.
9	Error LED	The Error LED (Red) turns ON when EX600 diagnostics error occurs. (Refer to Troubleshooting and Error Code for the detailed contents.)
10	Power LED	The Power LED (Green) turns ON when the Handheld Terminal is connected with an EX600 SI Unit and power supply for Control/Input is ON.

Glossary

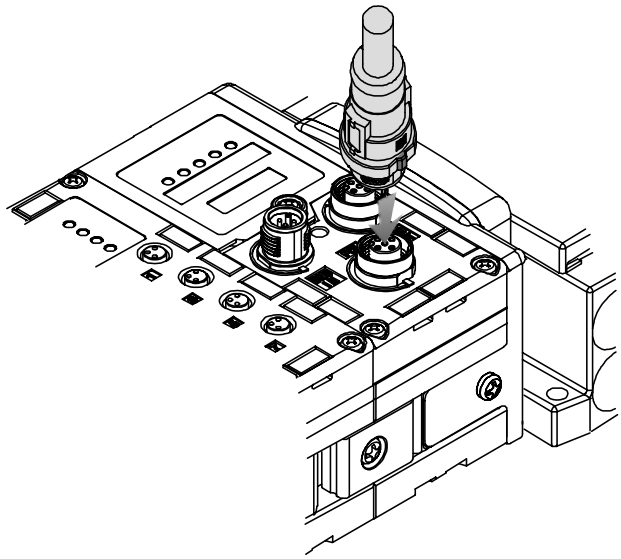
No	Term	Definition
C	Channel Number	Sequential number given to each input and output on an individual module (refer to the manual of each unit for the arrangement of the channels). Number given for each unit's input and output point. Please refer to the manual of each unit for the arrangement of the channel.
D	Diagnostics	Function of EX600 to self monitor if error has occurred or configuration has changed.
E	Error Log	A chronological list of previous errors occurred. A maximum of 30 errors can be recorded.
E	Enforced Output Function	A function to drive an output signal forcibly, ignoring control data from the PLC.
E	Enforced Input Function	A function to specify an input signal forcibly, ignoring signal from the connected sensor.
H	Handheld Terminal (H.T.)	A unit to connect with the SI unit PCI connection, for parameter adjustment, to monitor all input and output signal status, and for Forced Input/Output selection.
I	I/O Unit	General name for Digital Input Unit, Digital Output Unit, Analog Input Unit.
M	Manifold Number	The number of the EX600 manifold that includes the selected unit. This function will be utilized in the future. Until then, the current state will always be 0.
O	ON/OFF Counter	Counter of number of times when output or input changes from OFF to ON.
P	Parameter copy function	Function to copy selected unit parameter setting to all units in the manifold or also to copy channel parameter to all channels in the same unit.
P	Power Save	The LCD's backlight is turned off to save power.
S	SI Unit	Abbreviation for Serial Interface Unit. Unit that connects with PLC, and performs input/output data communication.
T	Tag	An electronic, 4 character name that can be given to units. This name can help with unit management. Electronic name can be given to manage units. Each unit can be given maximum of 4 digits of character.
Y	Unit Number	Selected unit's number. Unit connected right of the end plate becomes unit number 0.

Mounting and Installation

• Wiring Method (connecting Handheld Terminal side connector)
When inserting the connector into the Handheld Terminal, insert the connector straight in until it clicks into place.



• Wiring Method (connecting to the SI Unit)
The M12 cable connector is connected with “connector for Handheld Terminal” at the SI Unit. The method of connecting the cable to the SI Unit is explained on page 11.

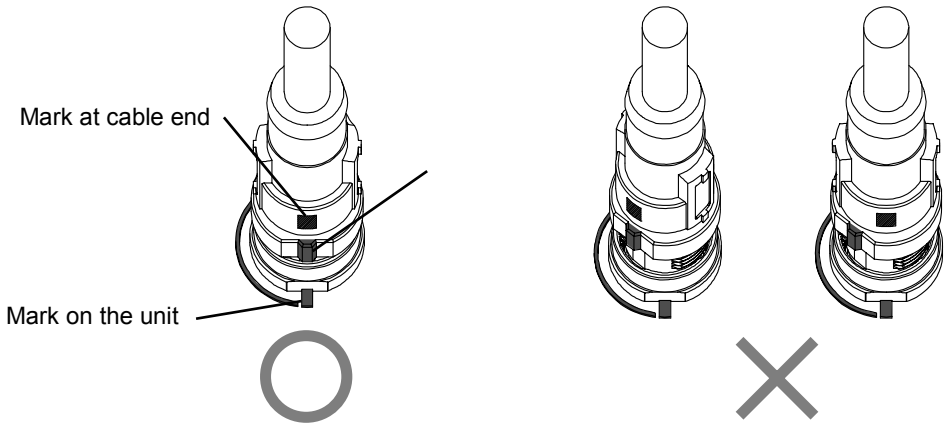


• Wiring

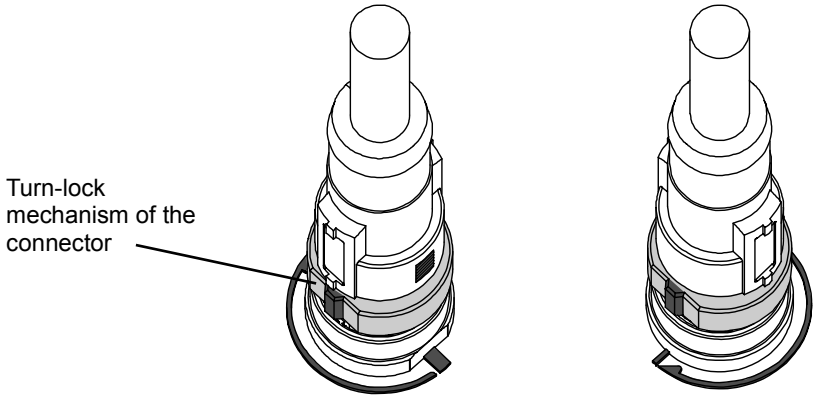
The M12 connector can be mated with a SPEEDCON connector or standard M12 connector.

(1) Set the projected portion of the cable connector metal ring (plug) to the mark on the unit.

(2) Push the connector straight to insert it into the receptacle of the unit. If inserted without aligning the mark, the connector will not mate with the receptacle.



(3) Turn the connector clockwise. It stops when turned 1/4 turn. When the connector is turned 1/2 turn from the original position, the projected portion is set at the diagonal position to the mark and the turn is completed.
Check that the connector is securely locked.



If the connector is turned excessively, it will become difficult to remove.

Setting and Adjustment

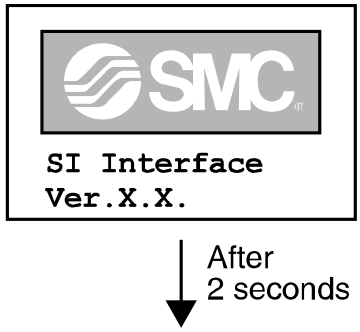
1. Basic Operation

○Turning ON the power

(1) When the SI Unit and the Handheld Terminal are connected with the cable, the power is supplied to the Handheld Terminal.

(2) The POWER LED (green) turns ON and the start up screen is displayed on the LCD display.

(3) After about 2 seconds, the Main Menu screen is displayed.



○Turning off the Power

During Main Menu screen, remove the cable connected to the SI Unit

Notes

-Be sure to put seal caps on any unused connectors of the EX600 SI Unit. Appropriate use of seal caps enables the unit to achieve IP67 protection.

- The cable can be removed only when the Handheld Terminal displays the Main Menu screen. Do not remove the cable while at any other screen, or this may cause equipment malfunction.

○Power Saving

When the power supply is on, and the ESC button is pressed for 2 seconds or more the Handheld Terminal enters power saving mode. The LCD display will turn OFF. Pressing the ESC button again will recover from the power saving mode.

2. Main Menu

The Handheld Terminal has five modes for the various functions.
Each mode is composed of layers with more detailed contents enabling setting and checking of each item.

```
Main Menu
1.I/O monitor
2.Diagnosis Data
3.Sys. Configuration
4.Parameter Setting
5.Terminal Setting
```

Mode Selection Screen

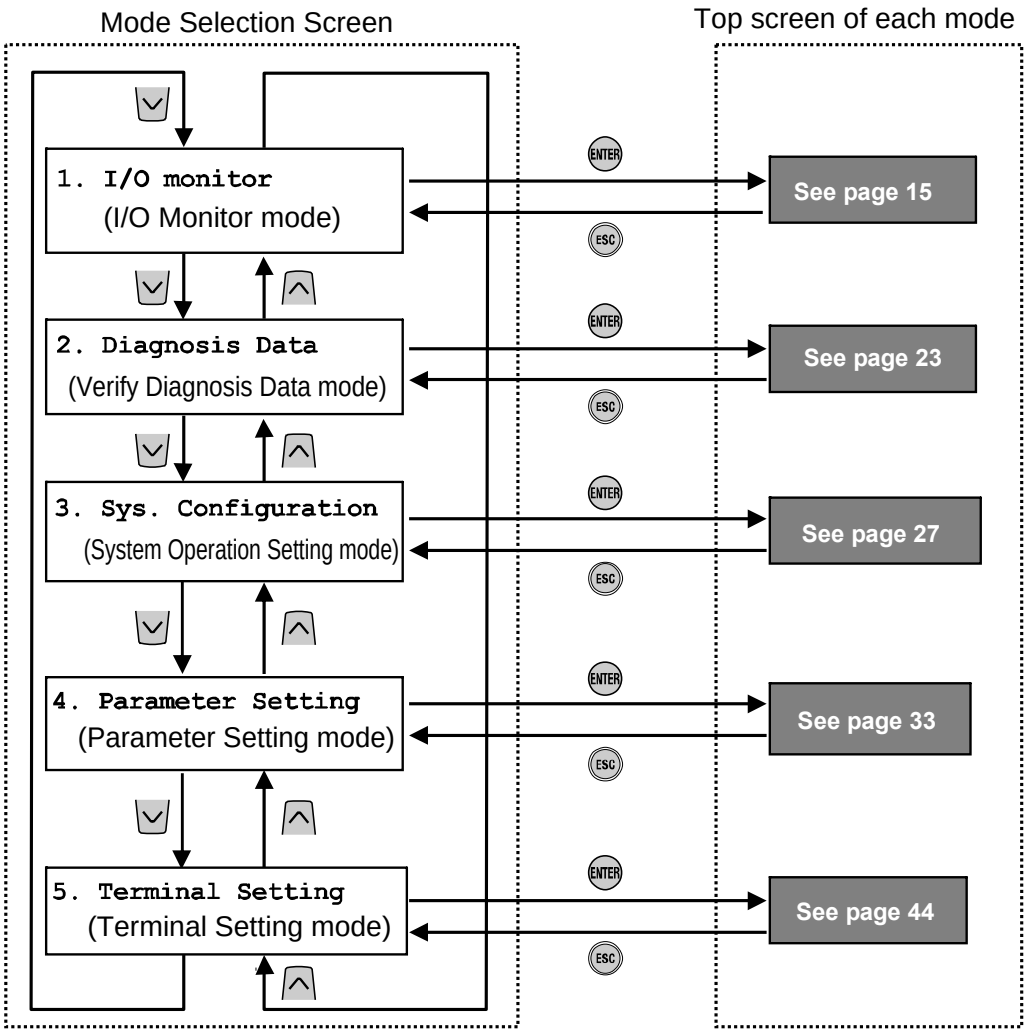
No.	Mode	Description
1	I/O Monitor mode	This mode displays the I/O status of the unit and carries out forced I/O.
2	Verify Diagnostics Data mode	This mode displays the I/O status of the unit, the detailed error contents and error log.
3	System Operation Setting mode	This mode is used to set the following system operations: (1) Input the tag name of each unit. (2) Update the memorized information of manifold configuration. (3) Change the hold/clear function to SW setting of the SI unit or setting by the Handheld Terminal. (4) Clear the ON/OFF counter of each I/O Unit. (5) Reset the parameter of each unit to the factory default value. (6) Clear all error logs.
4	Parameter Setting mode	This mode sets the type of each parameter.
5	Terminal Setting mode	This mode is used to set the following system operations: (1) Set the contrast of the LCD display screen. → 9 levels (2) Set the brightness of the LCD display screen. → 5 levels (3) Set the click sound level when operating a button. → 5 levels (4) Set the time before entering power saving status when there is no operation. → None, 1 min, 3 min, 7 min, 10 min (5) Cancel the operation settings of the Handheld Terminal and return to the initial setting values. (6) Change the password.

○ Main Menu flow

(1) Pressing a direction button ▲ or ▼ of in the Main Menu screen, moves the cursor up or down to select the next mode.

(2) Select a mode and press ENTER button to move to the top screen of the mode.

(3) To return to the Main Menu screen from the top screen of the mode, press ESC button.

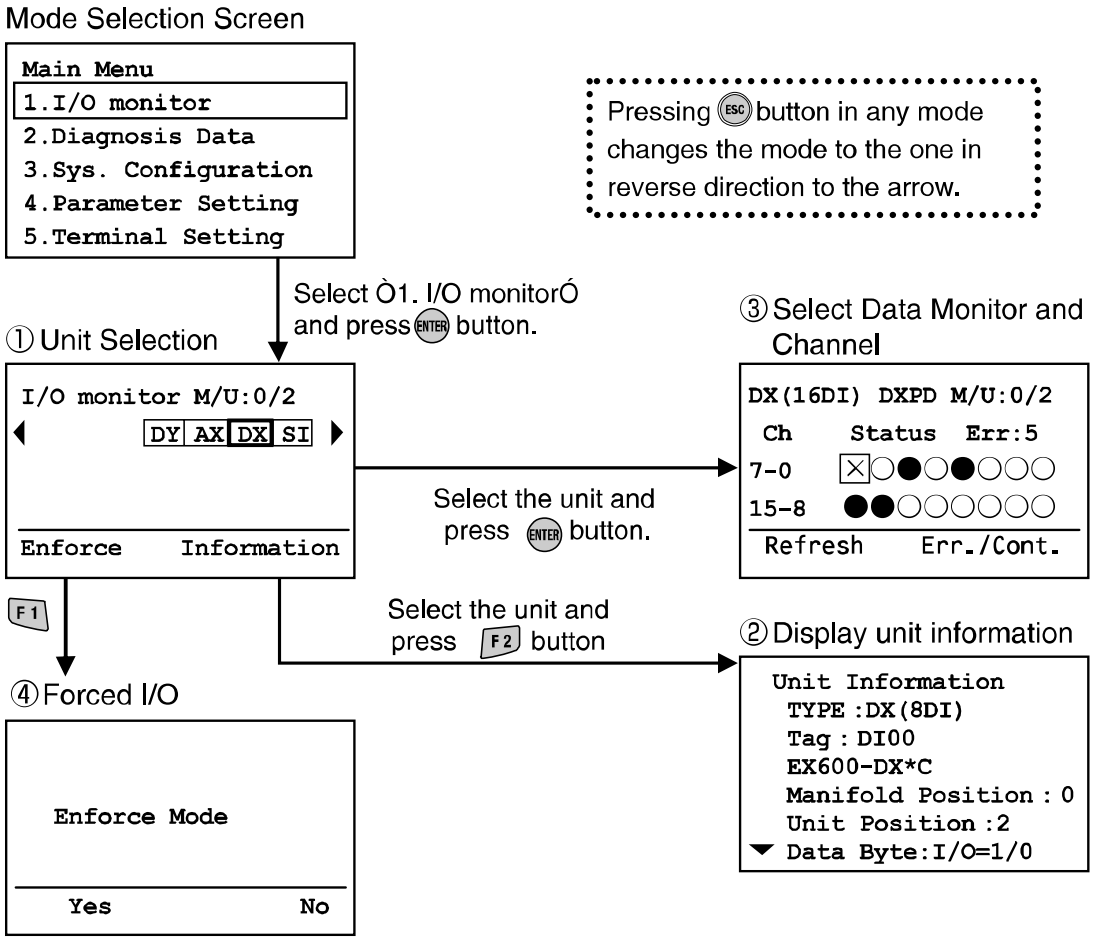


※ When you press one of the buttons above, the mode changes to the one indicated by the arrow.

3. I/O monitor

○ Mode hierarchical structure

The I/O monitor mode has a hierarchical structure as follows:



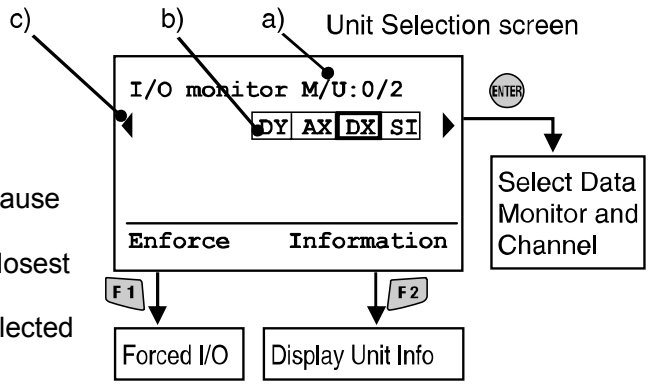
Mode	Outline
(1) Unit Selection	Allows you to select the I/O Unit on which the following operations are made. (See page 16)
(2) Unit Information Display	Displays memory map information about the I/O Units and EX600 system. (See page 17)
(3) Data Monitor and Channel Selection	Displays the input/output status of the I/O Units and the error information. (See page 18)
(4) Forced I/O	Changes the input/output status of the I/O Units forcibly. (See page 19)

○Unit Selection

◊Screen description

a) Manifold/Unit number

Shows the selected manifold and unit number.
Currently, manifold number is always 0, because this value is reserved for future expansion.
Unit number 0 is assigned to the unit which is closest to the end plate.
In case of above, number 2 is assigned for selected DX Unit.



b) Unit abbreviation (See page 62)

Use arrow buttons ◁ and ▷ to select the unit whose information you wish to view.

c) If the information about the unit is not contained in one page, ◄ or ►appears. Use the ◁ or ▷ button to view the next configuration.

If access to the selected unit is disabled, a warning screen appears (as shown in the figure) instead of moving you to the Unit Selection screen. Check that the “ST(M)” LED of the SI Unit is lit up in green and the Handheld Terminal cable is connected firmly. Press ESC button to return to the Main Menu screen.

```
Warning
System access is
not completed.
Please check the
connection
```

○Unit Information Display

◊Screen description

a) The product name displayed on the unit (See page 62)

b) Tag name

c) Model No.

d) Manifold connecting position

e) Unit connecting position
(Assigned to "0" from end plate side)

f) Selected unit occupying bytes (input/output)

g) Total input bytes
(Digital inputs + Analog inputs + Diagnostics information)

h) Total output bytes
(Digital outputs + Analog outputs)

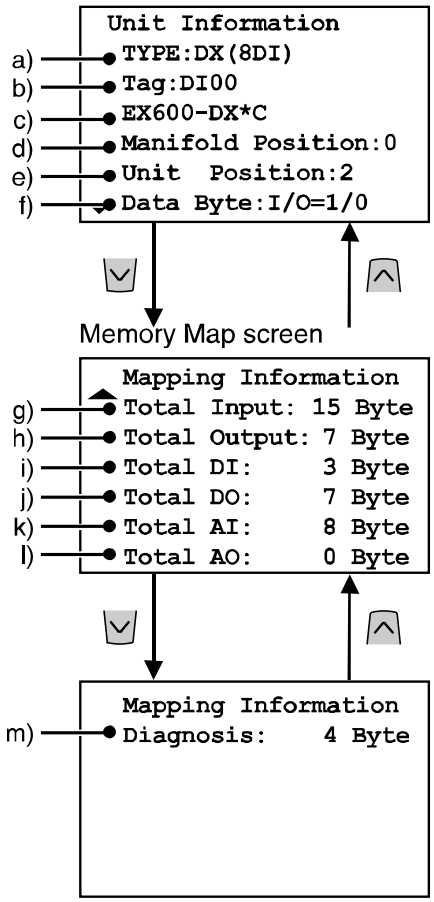
i) Total digital input bytes

j) Total digital output bytes

k) Total analog input bytes

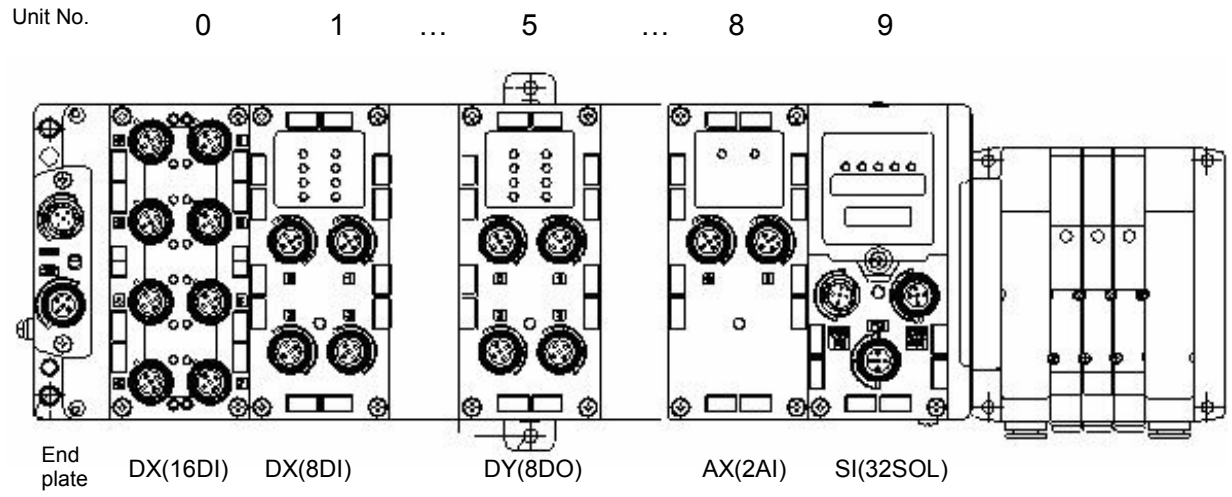
l) Total analog output bytes

m) Diagnostics information data bytes



Address setting Method for EX600 Fieldbus System

The number of EX600 unit is assigned from the end plate side. The unit next to the end plate is assigned as unit number 0. The maximum connected units are 10 including the SI Unit. When 10 units are connected, the number of the SI Unit is 9. The channel number is the same as the unit status indication number.
The output of the solenoid valve manifold which is closest to the SI Unit is the output 0.



○ Data Monitor and Channel Selection

◊ Screen description

a) The product name displayed on the unit.

b) TAG Name

c) Manifold/Unit number

d) Channel number

Use the ↑, ↓, ← or → button to select a channel.

e) Error code (See page 49)

f) Channel status indicator

○: OFF (digital I/O)

●: ON (digital I/O)

X: Error

±***mA: Amount of input (for analog and current input)

±***V : Amount of input (for analog and voltage input)

g) Error code details (See page 49)

h) Counter value (only for SI, DX, and DY)

Display the present ON/OFF Counter value.

Note)

The update interval of the ON/OFF counter value depends on the unit. When the power source is turned on, counting starts from the counter value that was present at the time the power was switched OFF. The memory update interval of the units is as shown below:

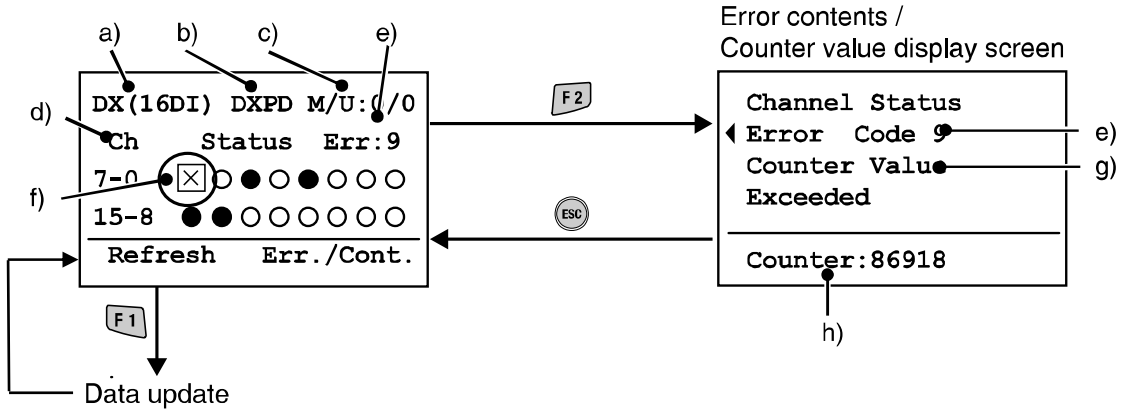
- SI Unit

  Updates from valve output 0 every 30 seconds.

  When valve output is 32, updating interval of all output is 960 (32x30 = 960 seconds).

- I/O Unit (Digital input unit and digital output unit.)

  Input/Output unit updates counter value every one hour (for all channels).

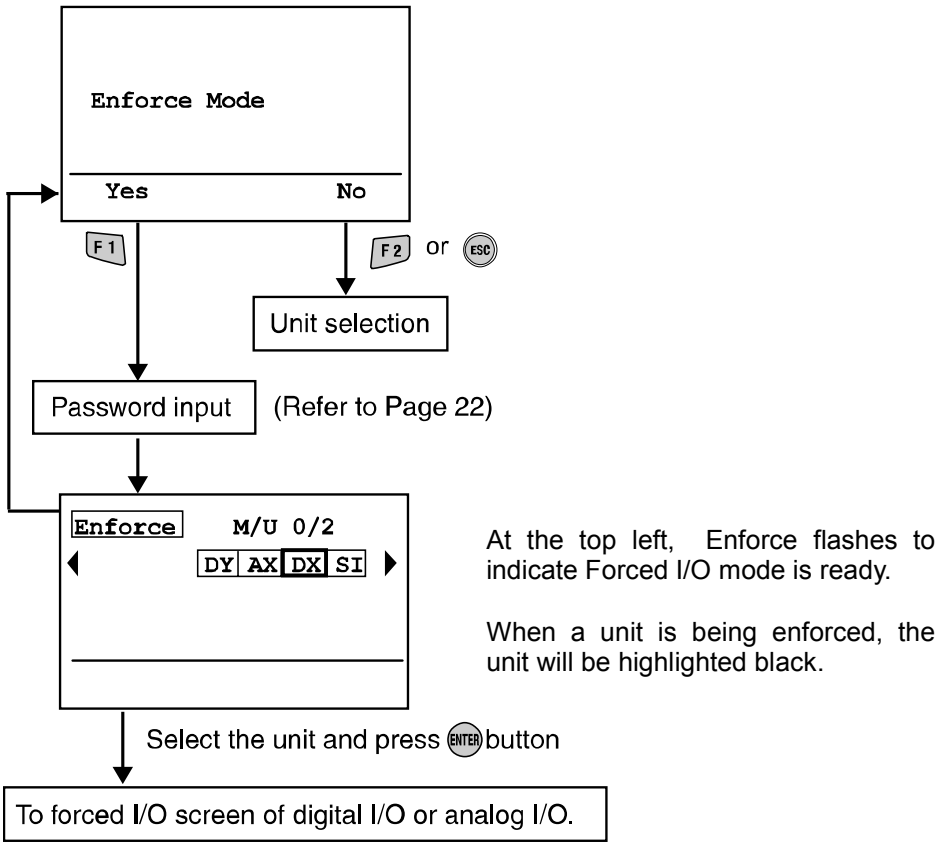


○ Forced I/O

Enforce Mode forces digital and analog input/output data to change. When in enforce input mode, enforced input data is followed ignoring input data from the sensor. While in Enforce output mode, enforce output data is followed ignoring the output data from PLC.

⚠ Warning

♦ Erroneous parameter setting may result in malfunction. Be sure to confirm the settings. Otherwise it causes injury and damage to equipment.



At the top left, Enforce flashes to indicate Forced I/O mode is ready.

When a unit is being enforced, the unit will be highlighted black.

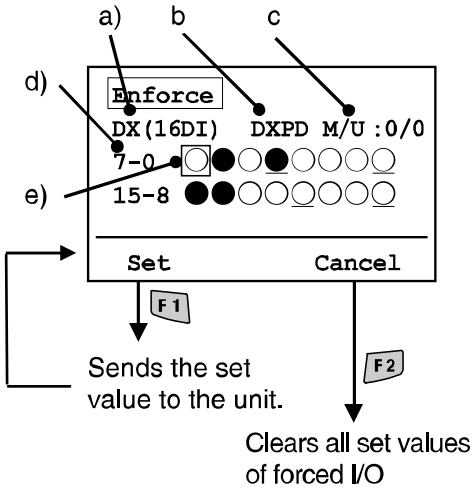
◊ Screen description
a) The product name displayed on the unit. (See page 62)
b) Tag name
c) Manifold/Unit number
d) Channel number
e) Input value
f) Forced I/O status (for analog unit only)

◊ Digital I/O
(1) Each selectable channel is marked with a box ☐ .
(2) Use arrow buttons ^, v, < and > button to select a channel.
○ / ● : Displays the ON/OFF status.
(3) Use ENTER button to change the following three statuses

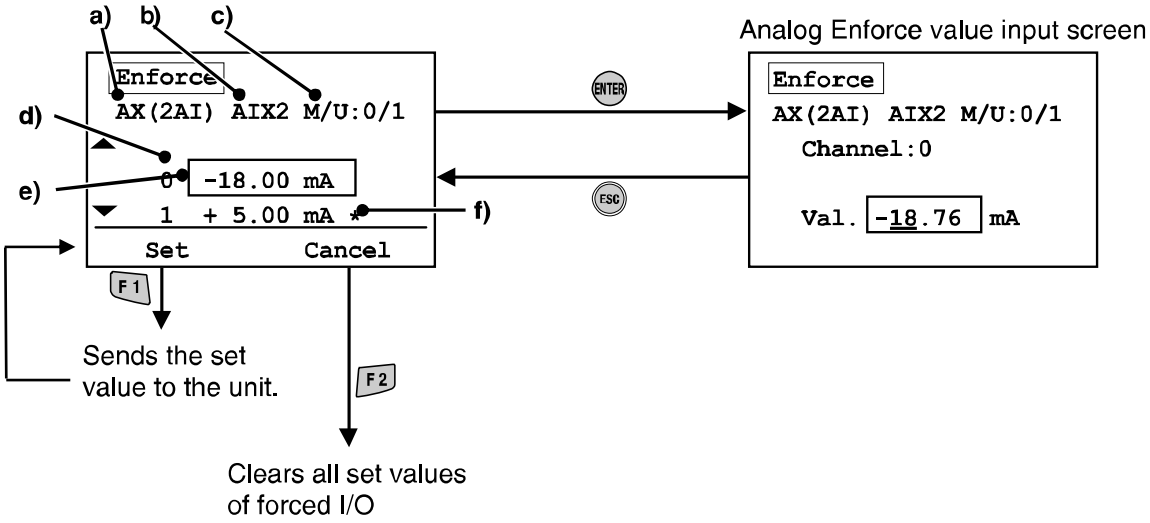
(Present value) (Forced ON) (Forced OFF)

● or ○ → ● → ○

(4) 'Set' or 'Cancel' operation.
Set: Determines the data selection and sends the data to the unit.
Cancel: Returns the forced input or output data to the present values.



◊ Analog I/O



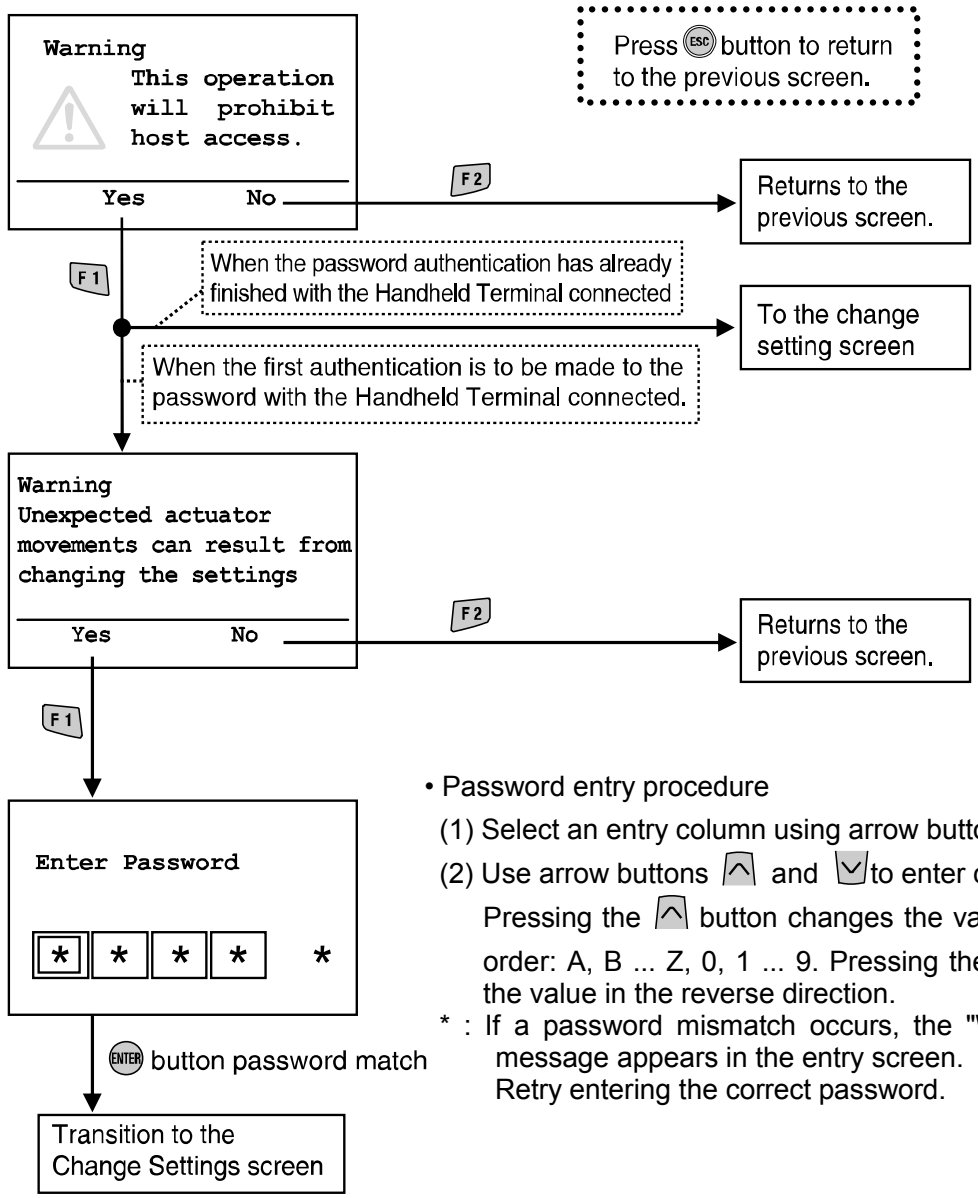
(1) Select a channel with and buttons ∧ and ∨ and press ENTER button.
(To cancel the selection, press the ESC button.)
(2) The digit to input is underlined.
(3) Use < and > buttons to move the input column.
(4) Use ∧ and ∨ buttons to change the numeric value and +/– sign.
(5) Press ENTER to determine the numeric value. (Press ESC to cancel the setting.)
(6) 'Set' or 'Cancel' operation.
Set: Determines the data selection and sends the data to the unit.
Cancel: Returns the forced input or output data to the present values.

Enforced input value can be set within the ranges shown in the following table.

Analog Input Measurement Range	Enforced Input Settable Range
-10 ..10V	-10.50 ~ 10.50V
-5 ..5V	-5.25 ~ 5.25V
-20 ..20mA	-21 ~ 21mA
0 ..10V	0 ~ 10.5V
0 ..5V	0 ~ 5.25V
1 ..5V	0.75 ~ 5.25V
0 ..20mA	0 ~ 21mA
4 ..20mA	3 ~ 21mA

○ Password input

Changing settings in a mode requires entering your password for authentication.
(The factory default is '0000'.)



• Password entry procedure

(1) Select an entry column using arrow buttons < and >.

(2) Use arrow buttons ^ and v to enter characters.

Pressing the ^ button changes the value in the following order: A, B ... Z, 0, 1 ... 9. Pressing the v button changes the value in the reverse direction.

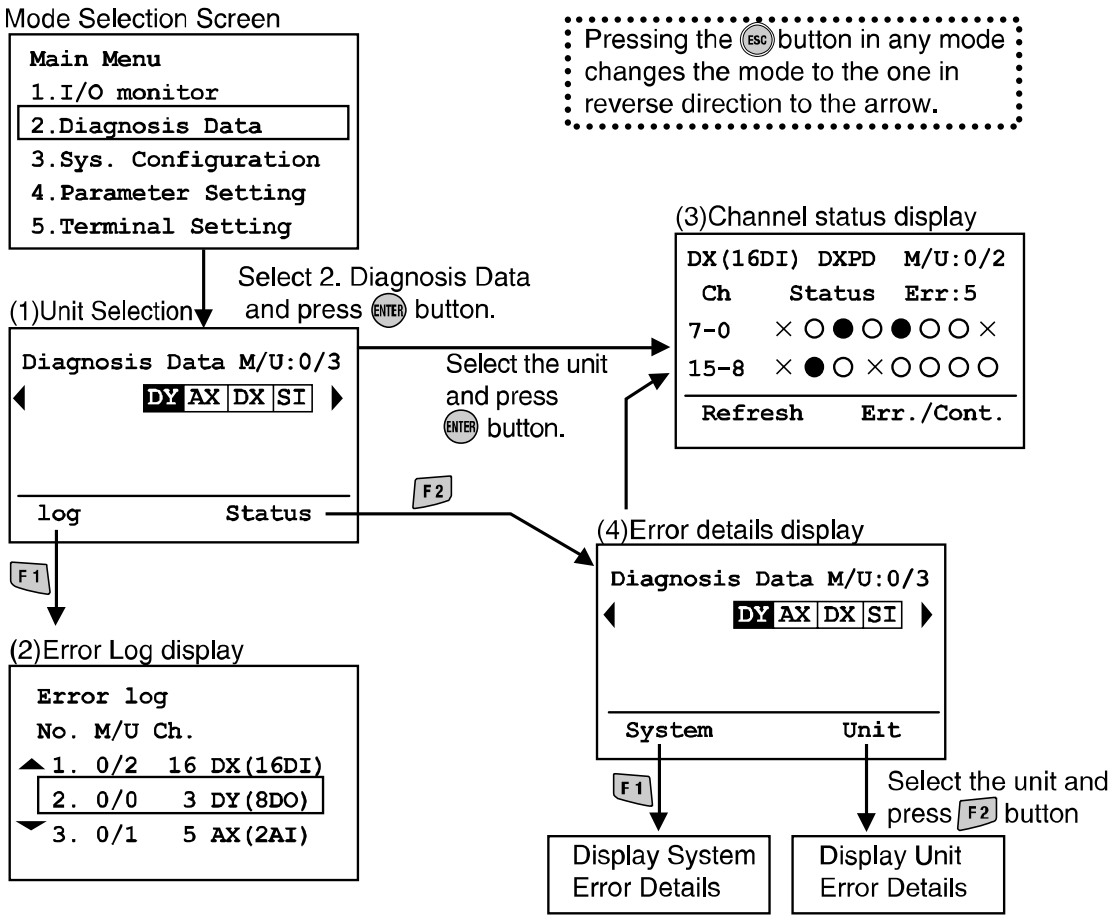
* : If a password mismatch occurs, the "**Wrong Password**" message appears in the entry screen. Retry entering the correct password.

* When changing the setting after returning from power save mode, password input is required again.

4. Diagnostics Data

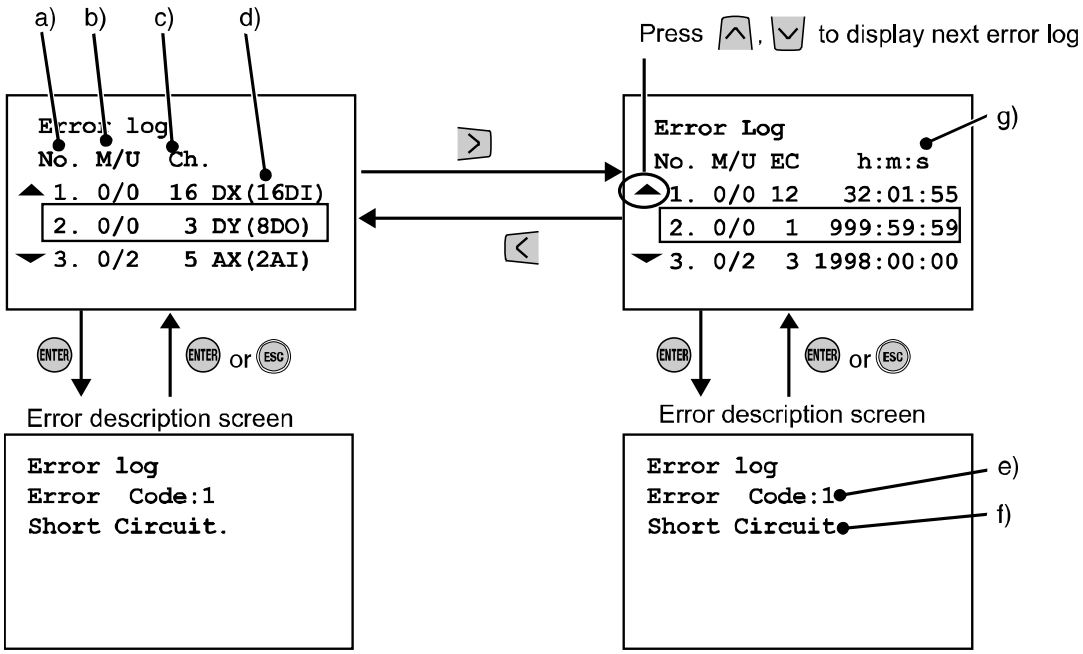
○ Mode hierarchical structure

The Verify Diagnostics Data mode has a hierarchical structure as follows:



Mode	Outline
(1) Unit Selection	Enables the selection oft an I/O Unit on which the following operations are made.
(2) Error Log Display	Displays the EX600 system error log (up to 30 items) in chronological order. (When the number of errors exceeds 30, the latest 30 errors are listed.) (See page 24)
(3) Channel Status Display	Displays the input/output status of the I/O Units and the error information. (See page 25)
(4) Error Details Display	Displays the diagnostics error information for system and diagnostics respectively in detail. (See page 26)

○ Error Log Display



◊ Screen description

The screen shows a top-down list of the new errors.

a) Error log number

The most recent error is displayed in error log No.1. Up to 30 error events can be logged in chronological order.

b) Manifold/Unit number

Indicates the position of the unit where the error occurred.

c) Channel number

Indicates on which channel the error has occurred. In case of a power supply error, "-"will be displayed as the channel number.

d) The product name displayed on the unit

e) Error code

f) Error code details

g) h: Hours, m: Minutes, s: Seconds

The elapsed time from start up to the error is displayed.

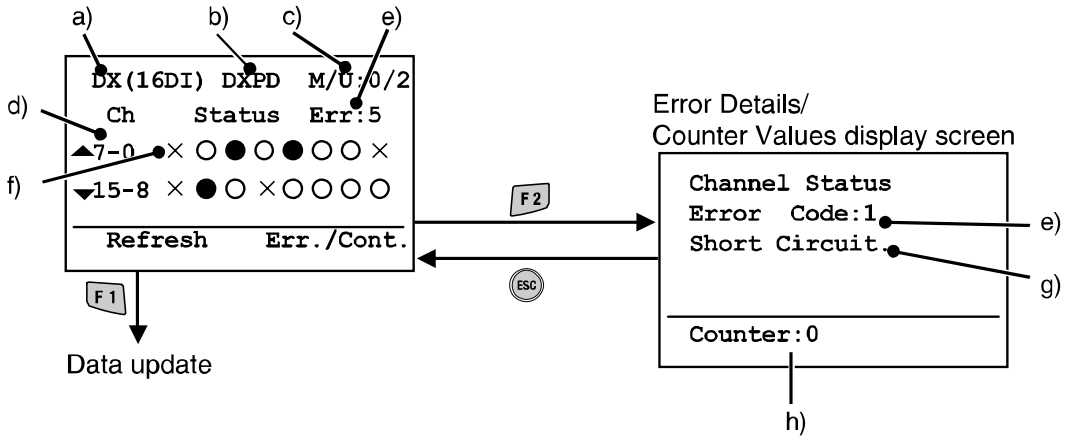
Turning off the power resets the elapsed time.

Note 1) When the manifold configuration is changed, please make sure to clear the error log.

Refer to page 32.

Note 2) Error codes 19 - 23, will not be displayed on the error log (refer to error code list on page 49)

○ Channel Status Display



◊ Screen description

a) Unit product name

b) Tag name

c) Manifold/Unit number

d) Channel number

Use the ▲, ▼, ◀ or ▶ buttons to select a unit channel.

e) Error code

f) Channel status indicator

○:OFF (digital I/O)

●:ON (digital I/O)

X: Error

±***mA:Amount of input (for analog and current input)

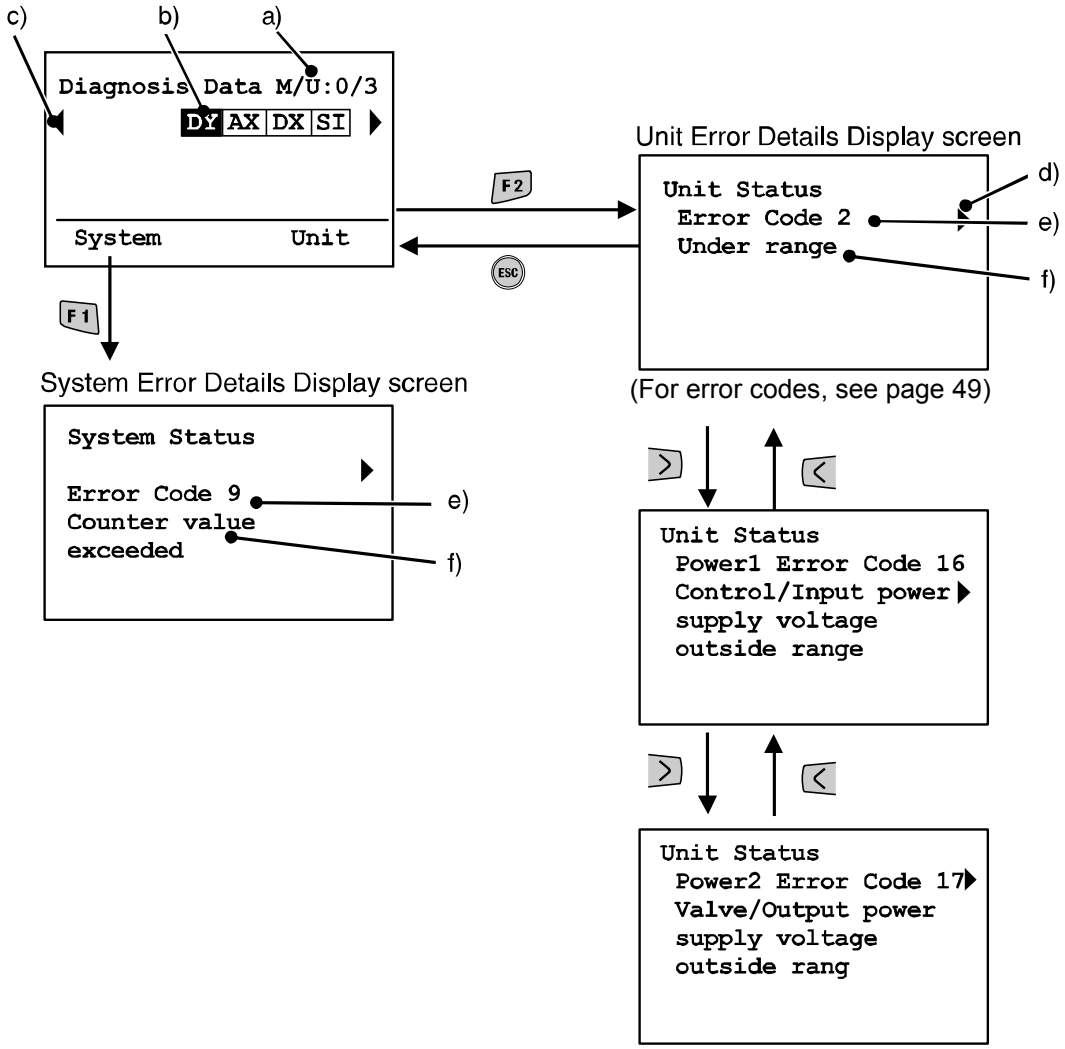
±***V: Amount of input (for analog and voltage input)

g) Error code details

h) Counter value: displays the counter value of SI, DX and DY only.

Display the present ON/OFF Counter value.

○ Error Details Display



◊ Screen description

a) Manifold/Unit number

b) Unit abbreviation

Use arrow buttons < and > to select the unit whose information you wish to view.

c) If the information about the unit is not contained in one page, ◄ or ► appears.

Use the < or > button to view the next configuration.

d) If two or more errors exist, ◄ or ► appears. Use the < or > button to view the next error.

e) Error code

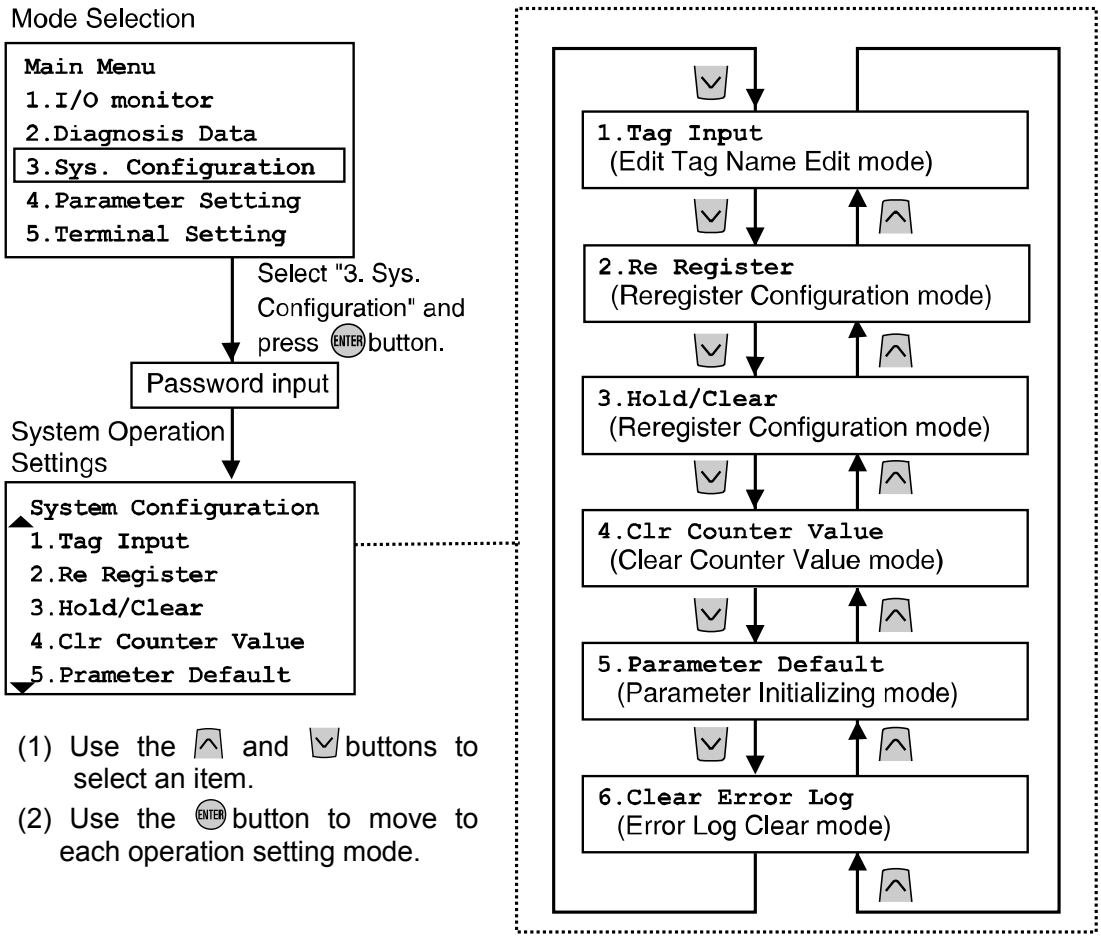
f) Error code details

*: After unit selection, press ENTER button to move to the Channel Status Display screen (page 25).

5. System Configuration

○ Mode hierarchical structure

The System Configuration Settings mode has a hierarchical structure as follows:

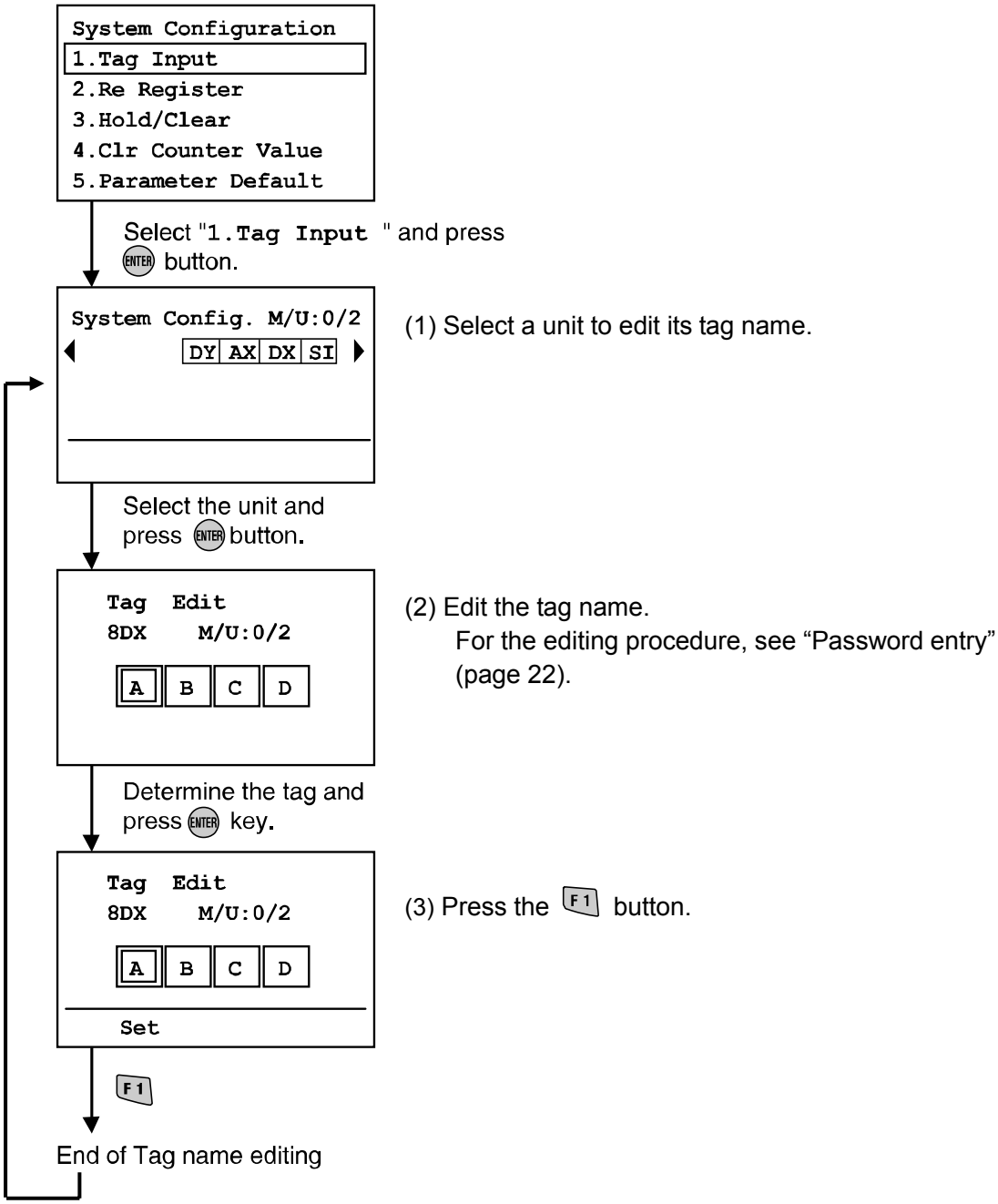


(1) Use the ∧ and ∨ buttons to select an item.

(2) Use the ENTER button to move to each operation setting mode.

Mode	Outline
1) Tag Name Input	Input the tag name of each unit. (See page 28)
2) Re register	Update the memorized information of manifold configuration. (See page 29)
3) Hold/Clear Function	Change the hold/clear function to SW setting of the SI Unit or setting by the Handheld Terminal. (See page 30)
4) Clear Counter Value	Clear the ON/OFF counter of each I/O Unit. (See page 31)
5) Parameter Default	Reset the parameter of all units to the factory default value. (See page 32)
6) Clear Error Log	Clear all error logs. (See page 32)

1) Tag Input (Tag Name Edit mode)

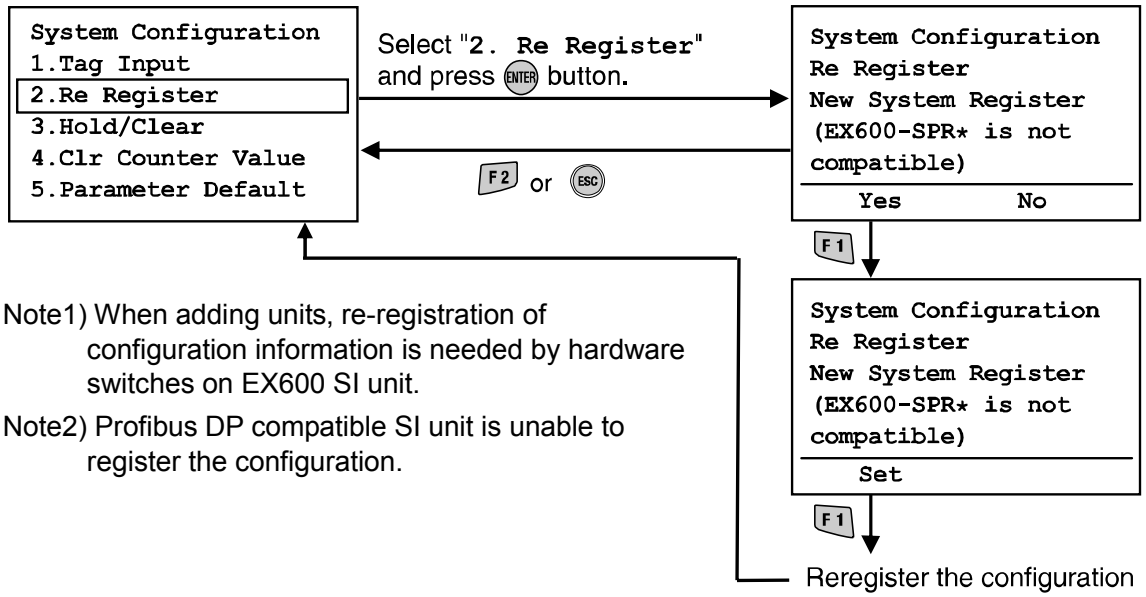


*: To cancel the editing process, press the ESC button to return to the System Configuration Settings screen.

2) Re Register (Re-register Configuration Mode)

EX600 has a configuration memory function which is able to compare the current manifold configuration with the last saved manifold configuration stored in memory. When the configuration differs, a diagnostic error will be generated.

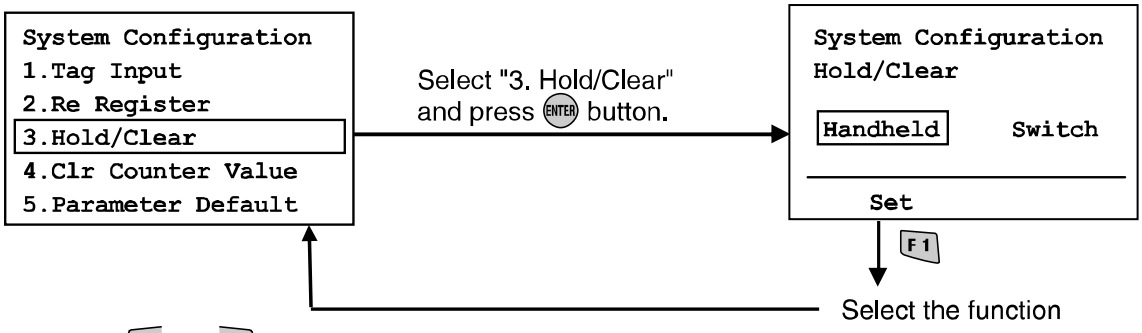
To update the manifold configuration stored in memory, changing of SI Unit setting switch and reset of the power supply are necessary. By using “Re register” function, direct updating from the handheld terminal is possible. Please note that this function is not compatible with Profibus DP compatible SI Unit (EX600-SPR1/2). Profibus DP must perform this function through the Profibus DP PLC.



Note1) When adding units, re-registration of configuration information is needed by hardware switches on EX600 SI unit.

Note2) Profibus DP compatible SI unit is unable to register the configuration.

3) Hold/Clr. SW On/Off (Select Hold/Clear Function mode)



(1) Use the < or > button to select Handheld or Switch.
Handheld: Hold/clear in accordance with the handheld terminal settings.
Switch: Hold/clear according to the hardware switch settings on SI Unit.

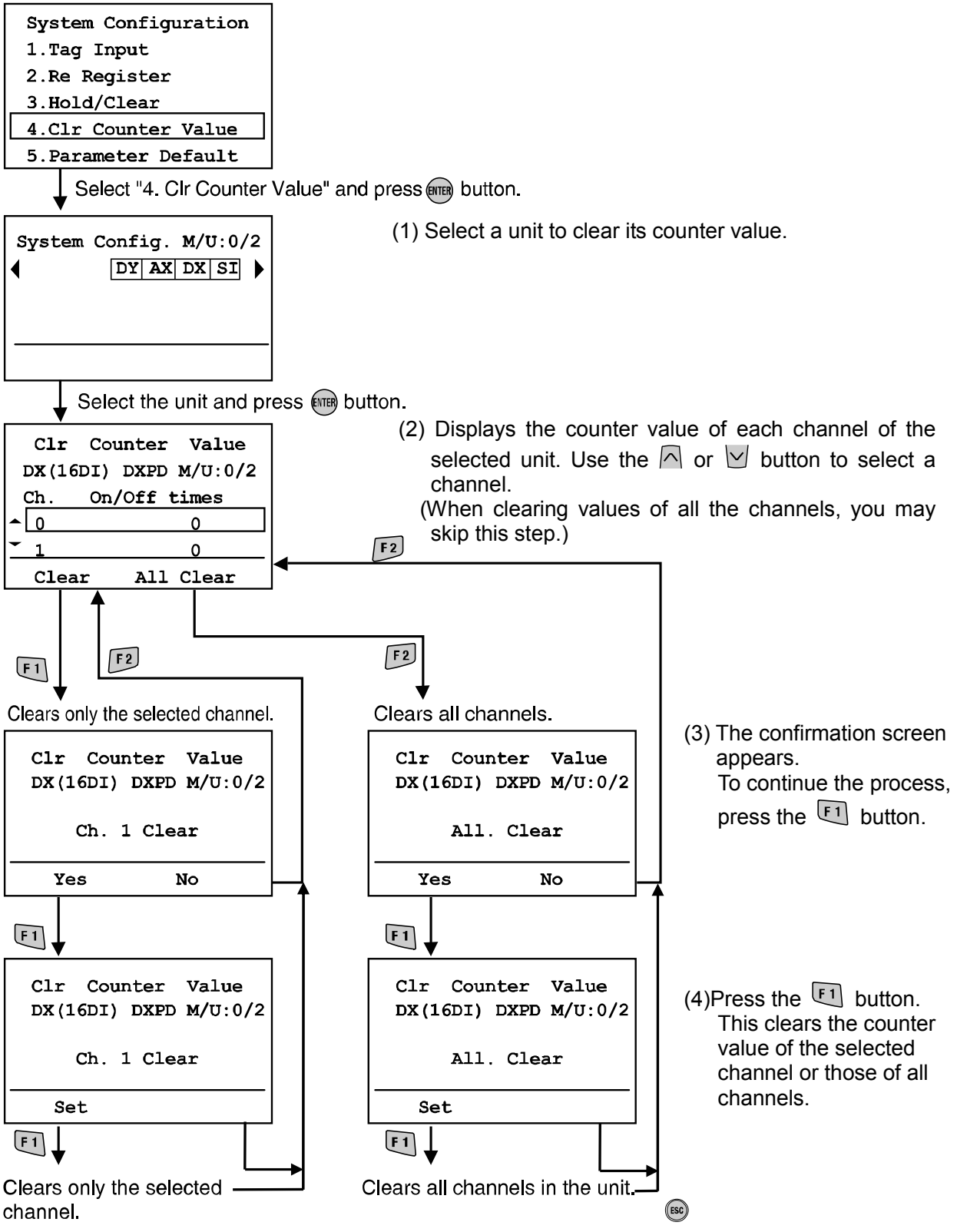
(2) Press the F1 button.
Determine the mode, and return to the System configuration screen.

⚠ Caution

Switching the HOLD/ CLEAR function selection mode switches the operation of the input/ output signal at emergency stop, so pay due attention to safety when setting.

There is a risk of injury and equipment damage.

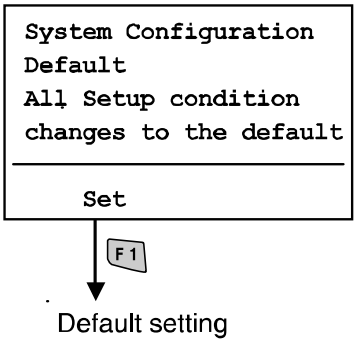
4) Clr Counter Value (Counter Value Clear Mode)



*: To cancel the clearing process, press ESC to return to the System Configuration Settings screen.

5) Default Settings mode

Press F1 button.
All parameter settings return to the factory default settings.
The screen returns to the System configuration Settings screen.
(After pressing F1 button, a countdown will be displayed to indicate how many units remained to be set.)



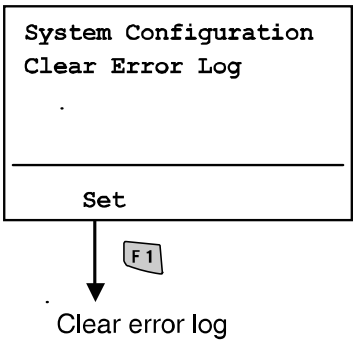
When ESC button is pressed, it will go back to system configuration screen

⚠Warning

♦ When setting the parameters to factory default values, the connected equipment may behave in an unpredictable manner.
Please carry out this operation paying attention to safety.
Otherwise injury and damage to equipment may occur.

6) Clear Error Log

Press F1 button.
All error logs are cleared and the screen returns to system configuration settings screen.

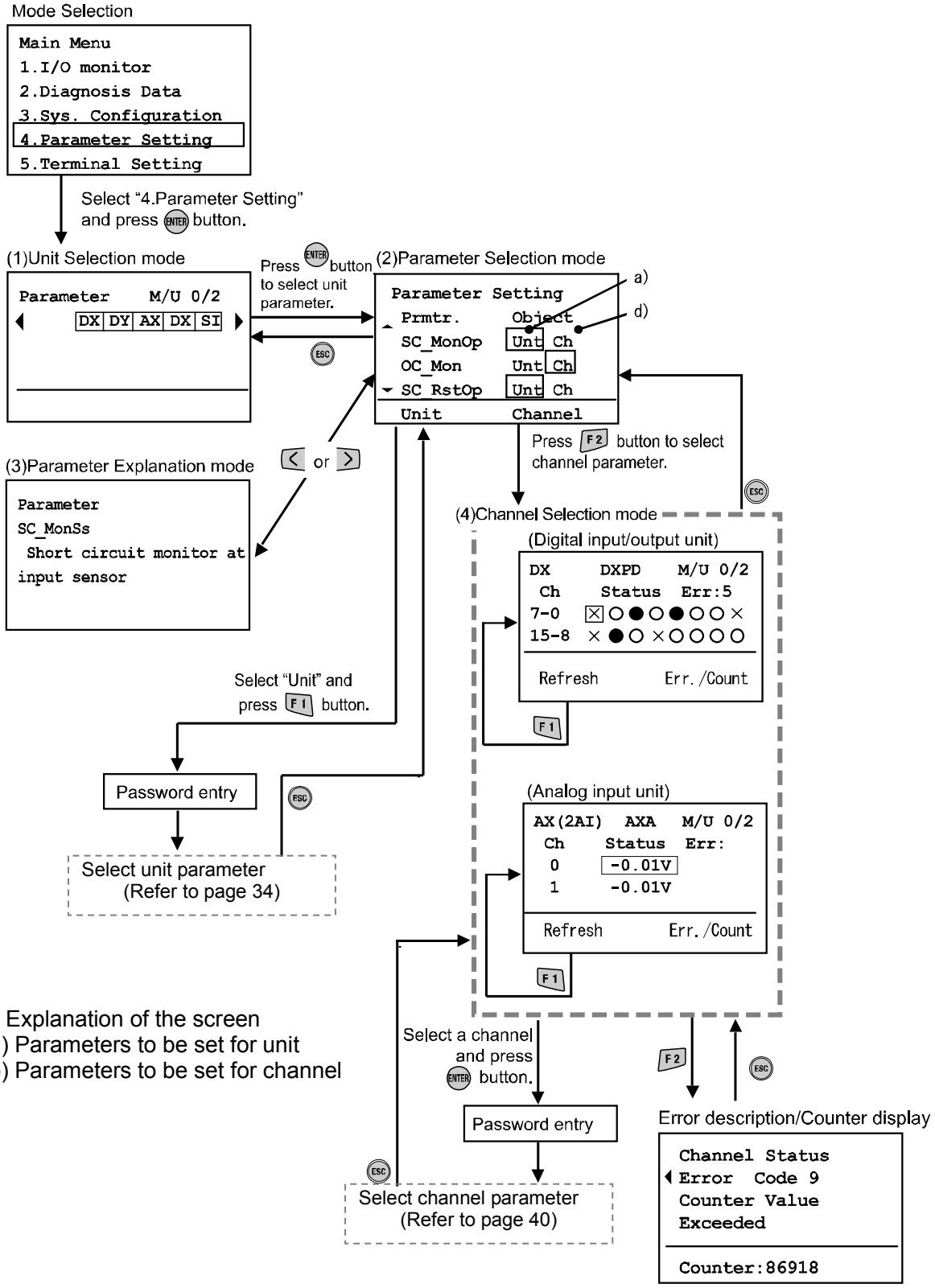


When ESC button is pressed, it will go back to system configuration screen

6. Parameter Setting

○ Mode hierarchical structure

The Parameters Settings mode has a hierarchical structure as follows:



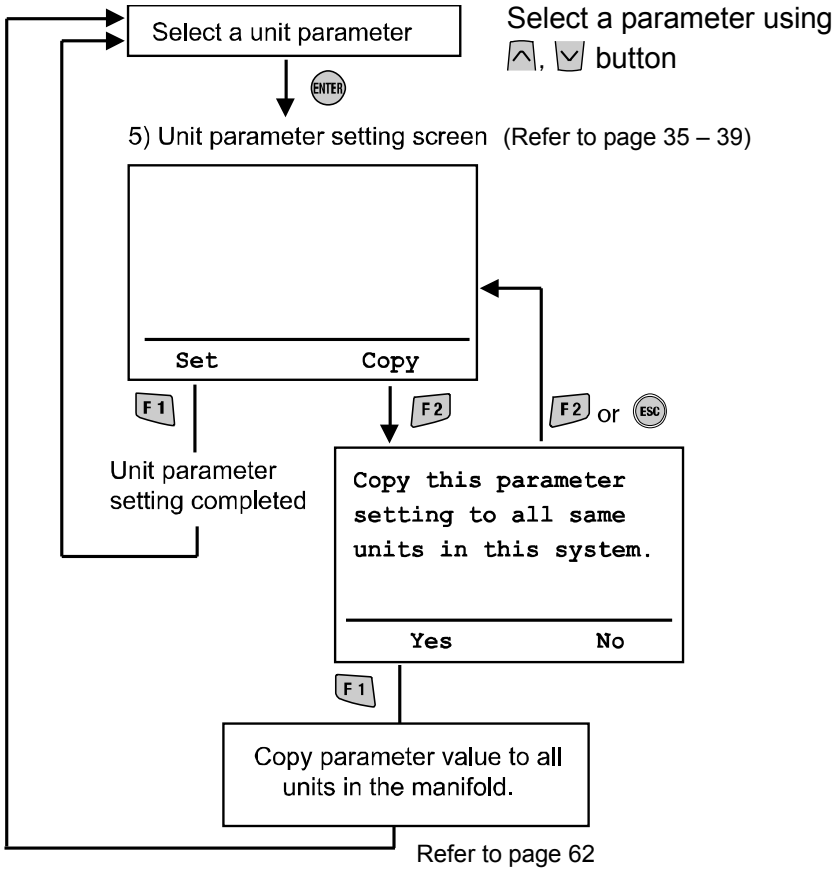
◊ Explanation of the screen

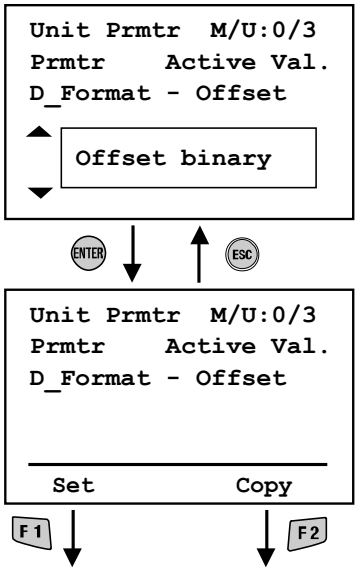
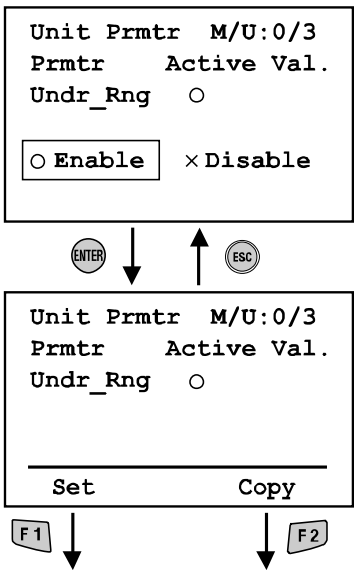
a) Parameters to be set for unit

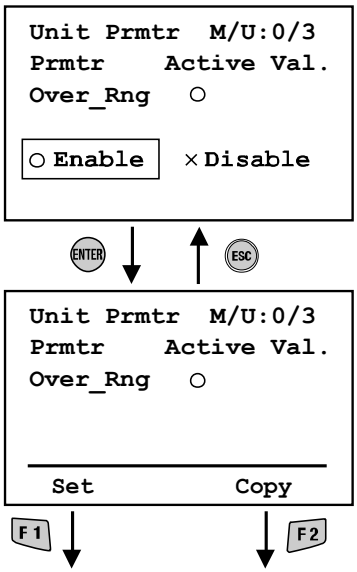
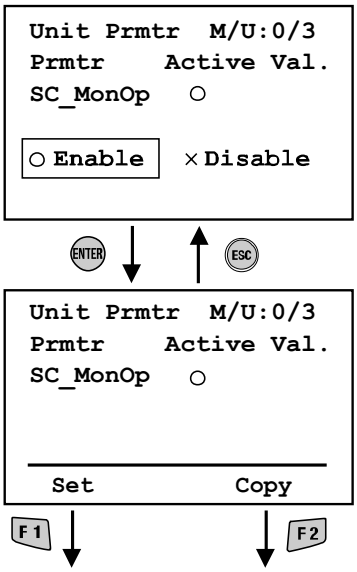
b) Parameters to be set for channel

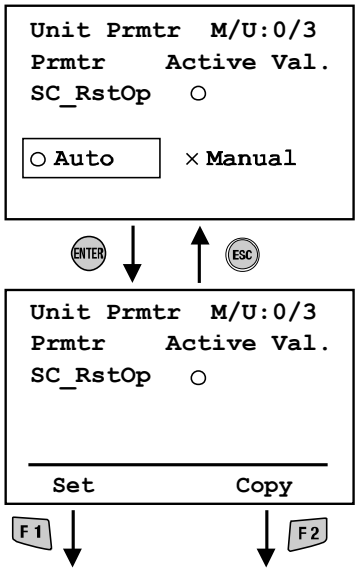
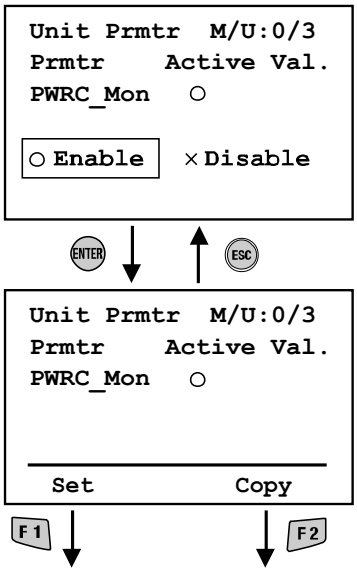
Mode	Outline
(1) Unit Selection	Enables the selection of the Unit whose parameter you want to change.
(2) Parameter Selection	Parameter selection mode displays either parameter [Unt] (the attribute is Unit) or parameter [Ch] (the attribute is channel). If unit parameter is selected, all parameters with the unit attribute will be displayed. If a channel parameter is selected, the Channel Selection screen will be displayed.
(3) Parameter Explanation	Explains the detailed contents of the parameter.
(4) Select Channel Parameter	Allows you to select channel parameter.
(5) Unit/Channel Parameter Setting	Sets the selected parameters. (Refer to page 34 - 43)

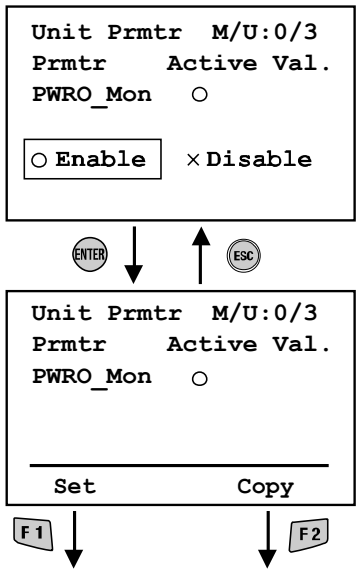
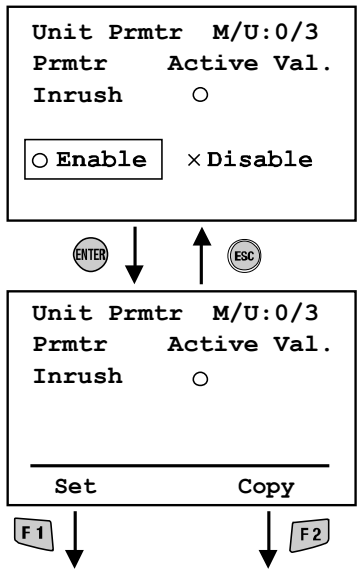
6-1. Unit parameter setting

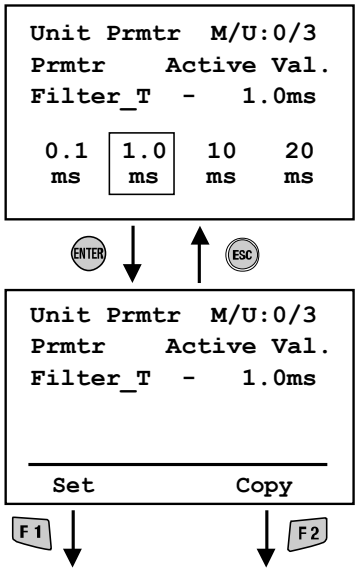
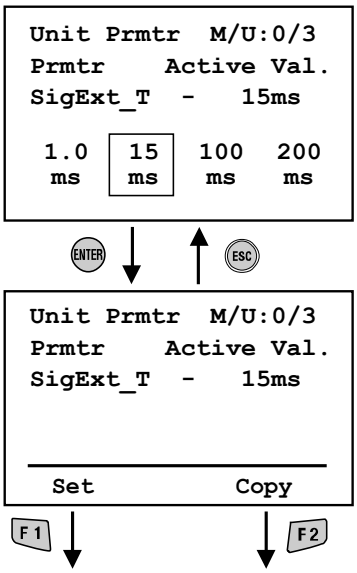


No.	Name(Symbol)	Unit parameter setting screen
1	Analog data format (D_Format)	 Select using ▲, ▼ button
2	Analog under range detection (Undr_Rng)	 Select using ◀, ▶ button

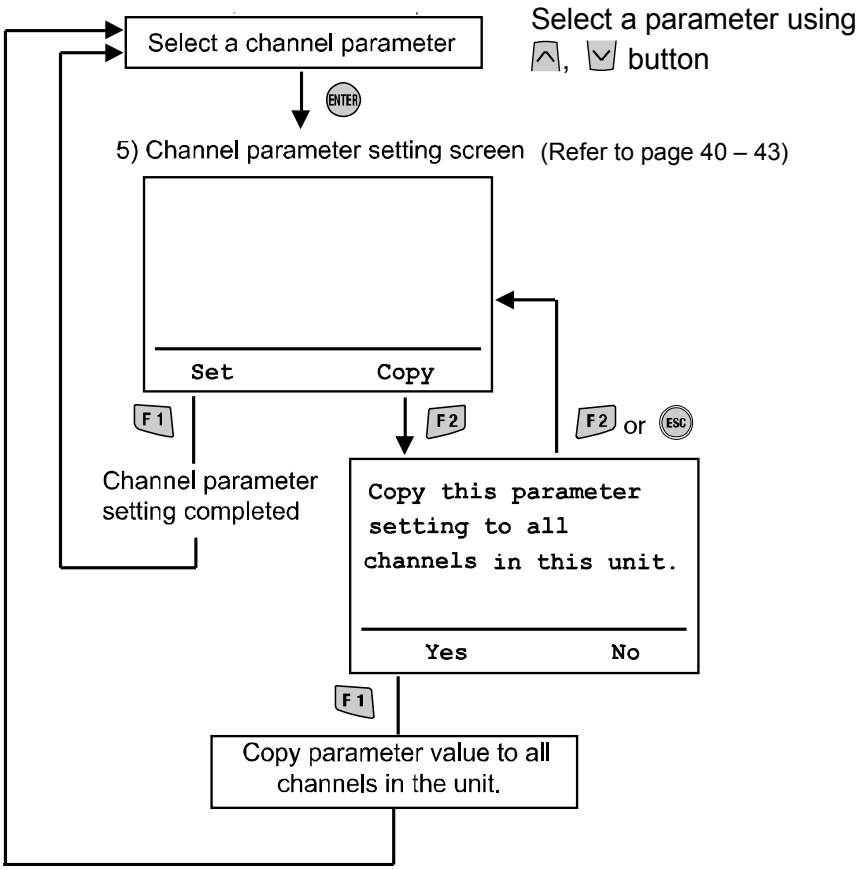
No.	Name(Symbol)	Unit parameter setting screen
3	Analog over range detection (Over_Rng)	 Select using ＜, ＞ button
4	Short circuit detection (SC_Mon) Op: Output Ss: Input	 Select using ＜, ＞ button

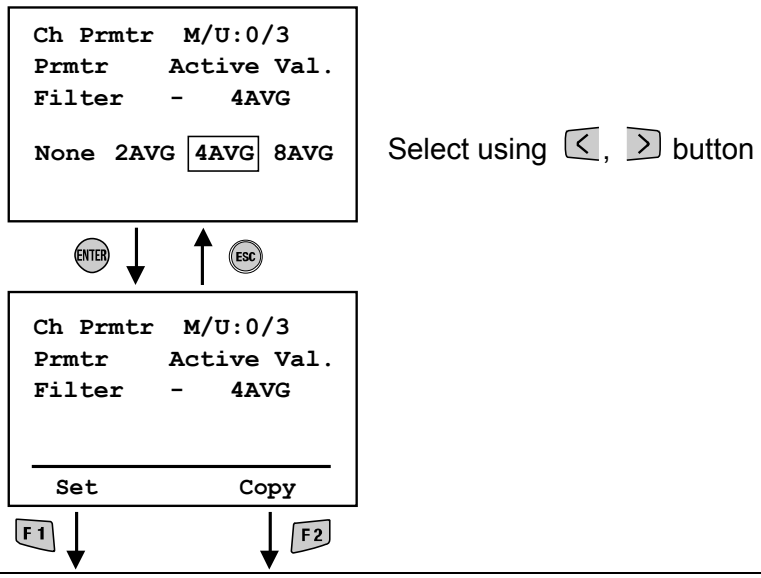
No.	Name(Symbol)	Unit parameter setting screen
5	Restart after short circuit (SC_RstOp)	 Select using ＜, ＞ button
6	Power supply monitor for control / input (PWRC_Mon)	 Select using ＜, ＞ button

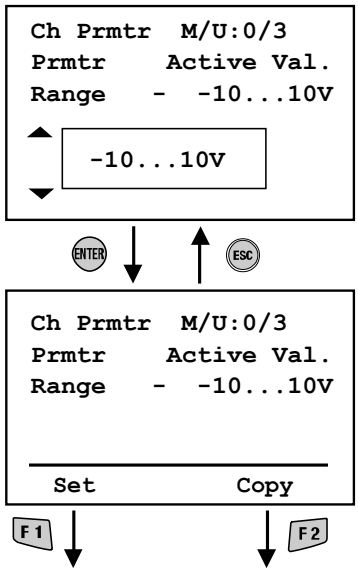
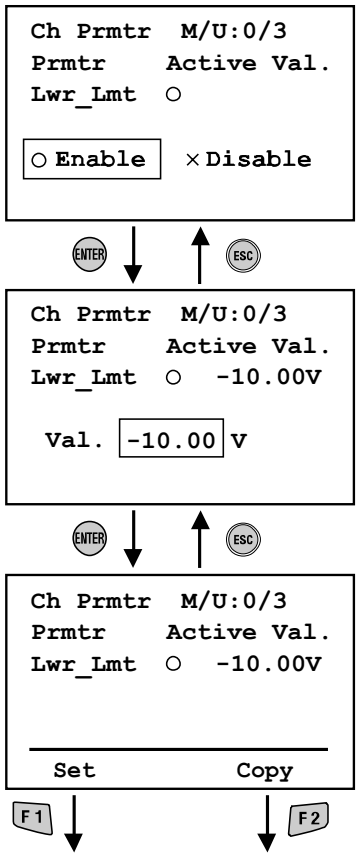
No.	Name(Symbol)	Unit parameter setting screen
7	Power supply monitor for output (PWRO_Mon)	 Select using ＜, ＞ button
8	Inrush current filter (Inrush)	 Select using ＜, ＞ button

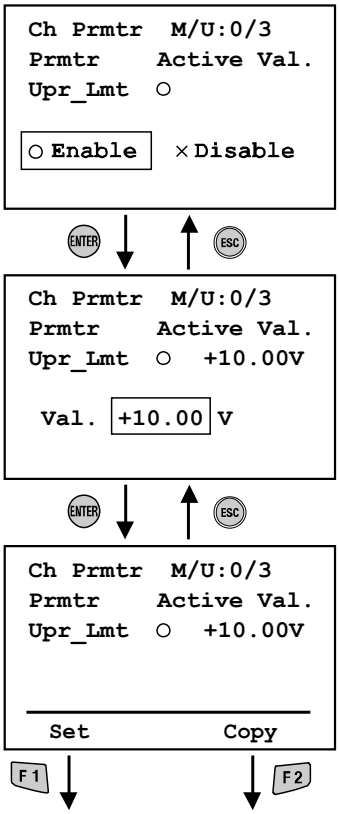
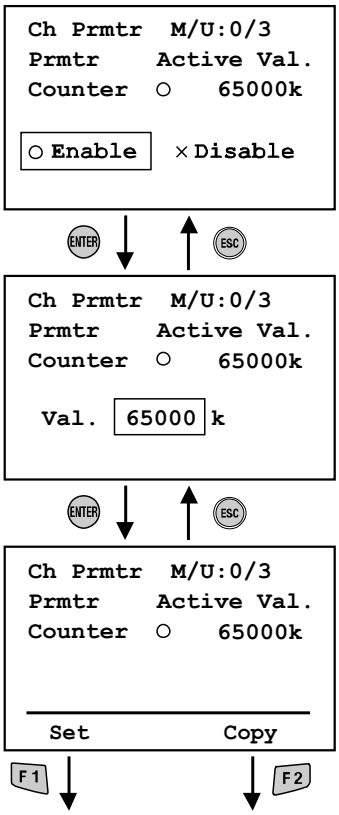
No.	Name(Symbol)	Unit parameter setting screen
9	Input filtering time (Filter_T)	 Select using ＜, ＞ button
10	Input extension time (SigExt_T)	 Select using ＜, ＞ button

6-2. Channel parameter setting

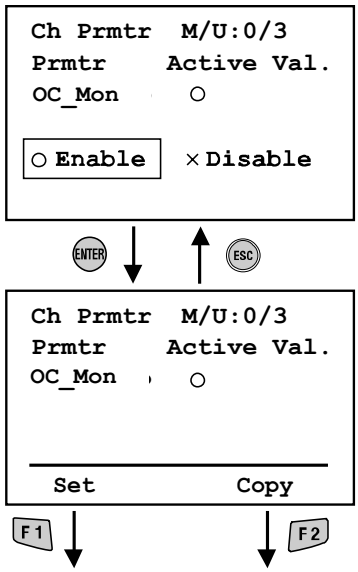
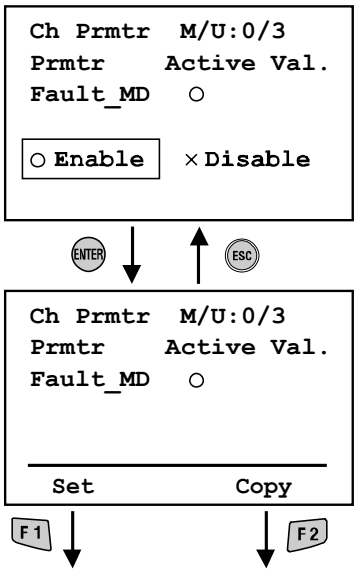


No.	Name(Symbol)	Channel parameter setting screen
1	Analog averaging filter (Filter)	

No.	Name(Symbol)	Channel parameter setting screen
2	Analog input range (Range)	 Select using ∧, ∨ button
3	User setting lower limit (Lwr_Lmt)	 Select using <, > button Move input digit using <, > button. Change value and ± using ∧, ∨ button.

No.	Name(Symbol)	Channel parameter setting screen
4	User setting upper limit (Upr_Lmt)	 Select using <, > button Move input digit using <, > button. Change value and ± using ^, v button.
5	Channel ON/OFF counter monitor (Counter)	 Select using <, > button Move input digit using <, > button. Change value using ^, v button.

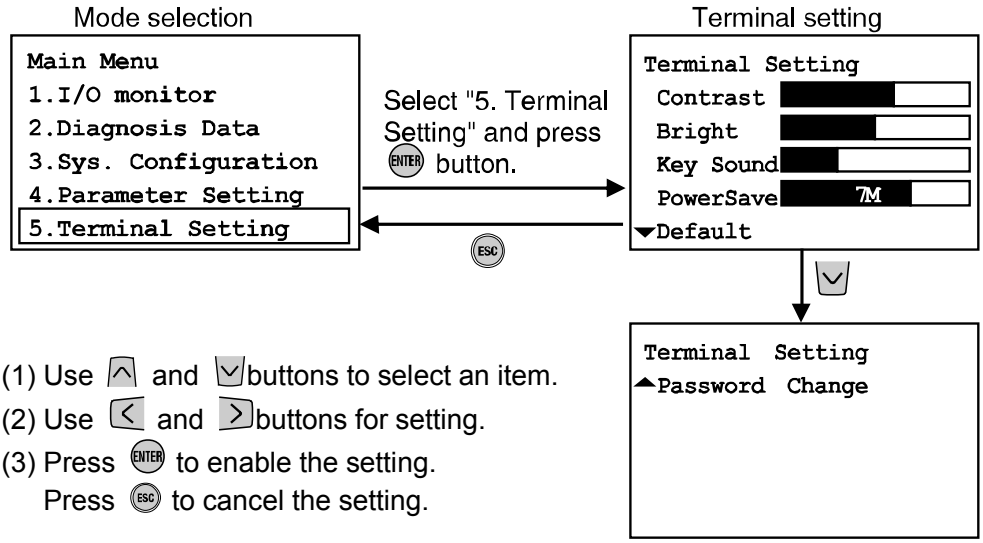
SMC

No.	Name(Symbol)	Channel parameter setting screen
6	Open circuit detection (OC_Mon)	 Select using ＜, ＞ button
7	Output Setting during Communication fault / idle (Fault_MD) (Idle_MD)	 Select using ＜, ＞ button Note1) When using EX600-SDN# (DeviceNet™ compatible SI unit), depending on which PLC is used, there is a model which does not support Idle Function. If that is the case, this function cannot be used. When using EX600-SMJ# (CC-Link compatible SI unit), this function is not supported.

7. Terminal Setting

○ Mode structure

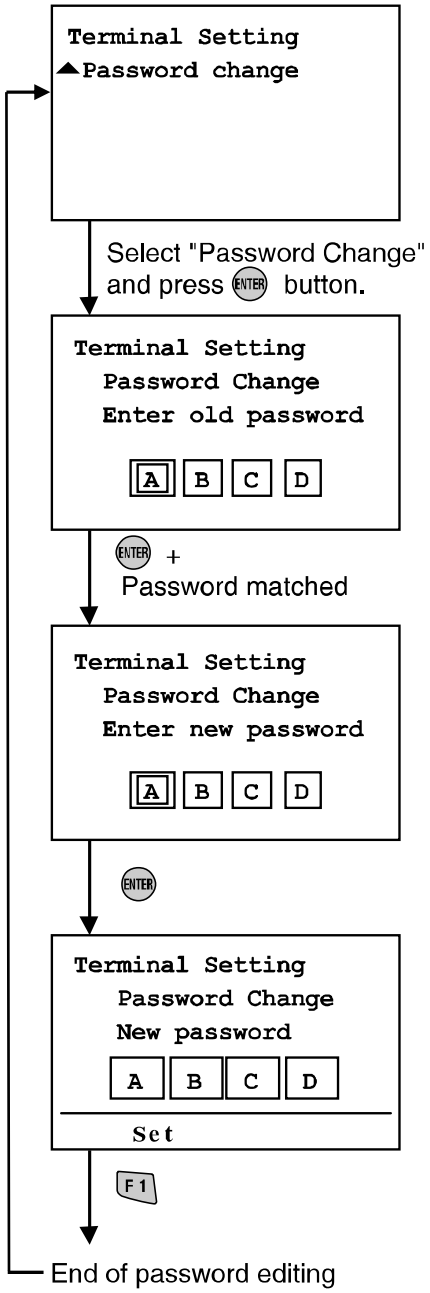
The Terminal Settings mode has a hierarchical structure as follows:



(1) Use ∧ and ∨ buttons to select an item.
(2) Use < and > buttons for setting.
(3) Press ENTER to enable the setting.
Press ESC to cancel the setting.

Mode	Outline	Factory Default Settings
Contrast	Sets one of nine levels (0 to 8) for the LCD display contrast.	4
Bright	Sets one of five levels (0 to 4) for the LCD display brightness.	2
KeySound	Sets one of five levels (0 to 4) for the click sound.	2
PowerSave	Sets one of five levels (none, 1, 3, 7, or 10 min) for the time before going into power save mode when no buttons are pressed for that time.	1min.
Default	Restores all the above to the factory defaults.	-
Password Change	Edits and changes the password	0000

○ Password Change



(1) Enter the current password.
- Password entry procedure
  Select the entry column using Direction Button (< and > buttons).
  Use Direction Button (∧ and ∨ buttons) to enter the characters. Pressing the ∧ button changes the value in the following order: A, B ... Z, 0, 1 ... 9.
  Pressing the ∨ button changes the value in the reverse direction.

*: If a password mismatch occurs, the "Wrong Password" message is displayed in the entry screen. Retry entering the correct password.

(2) Enter new password.
The entry procedure is the same as above.

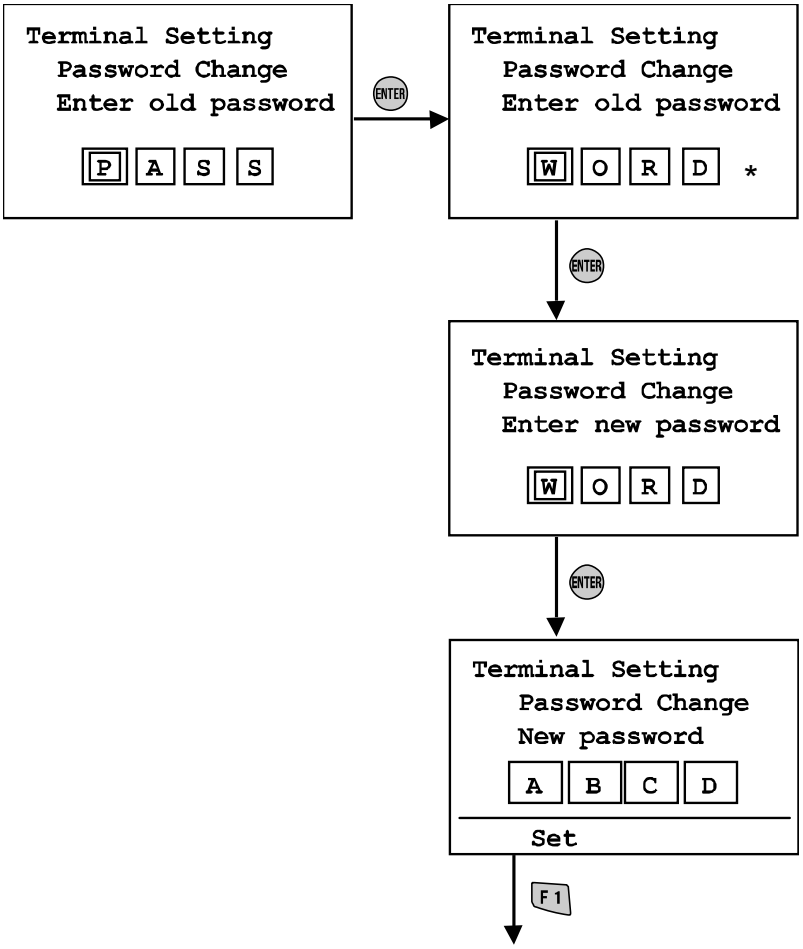
** “PASS” or “WORD” will not be considered valid. Also, any entry containing an asterisk “*” will not be allowed. The message “Password Invalid” will be shown on the screen. Please enter a different, valid password.

(3) Press F1 button.
The new password has been set. Return to the System Operation Settings screen.

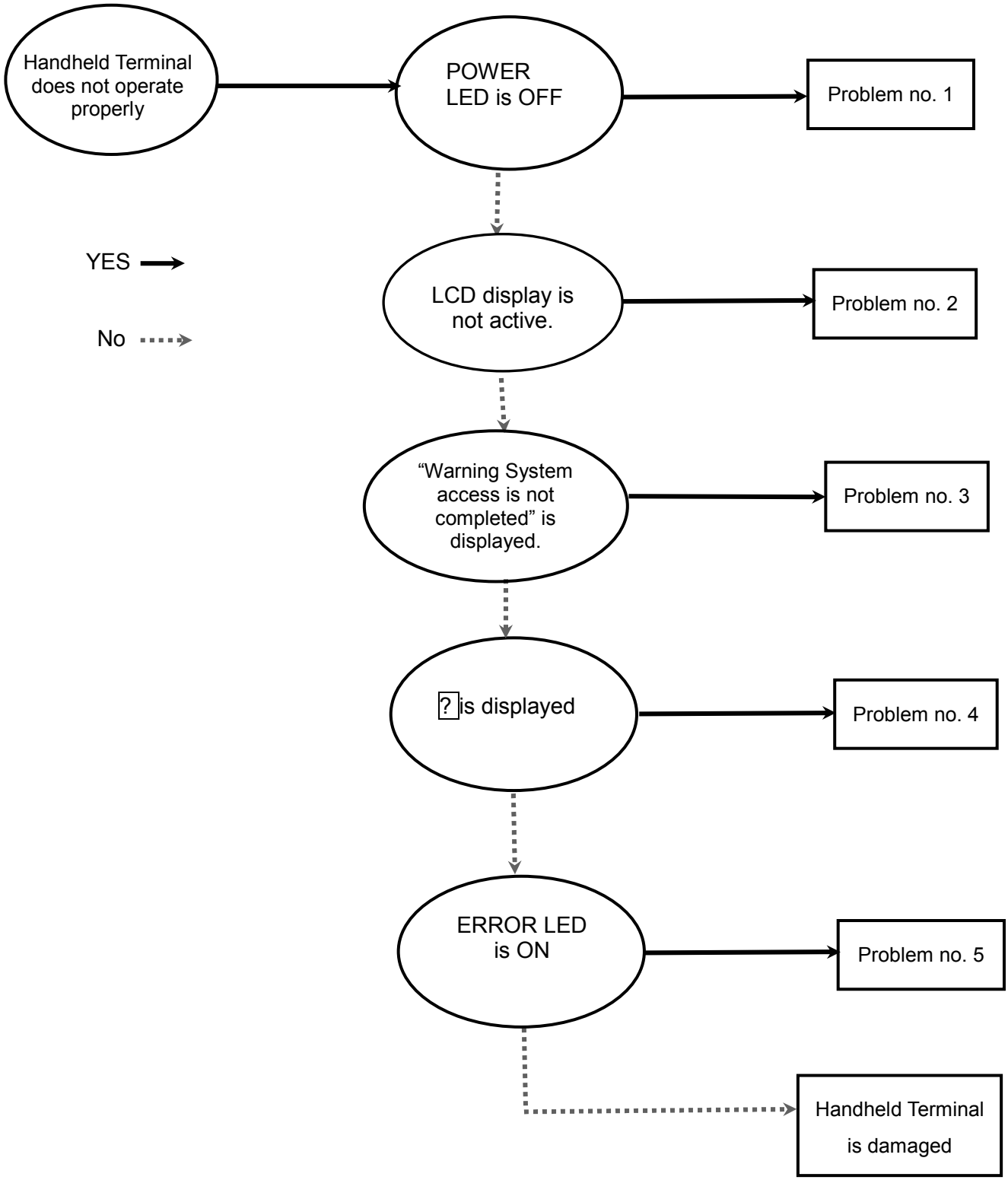
*: To cancel the edit process while you are editing the data, press ESC to return to the previous screen.

* If the password is forgotten, input “PASS”, then “WORD” in password entry or edit mode. A new password can be set.

Enter “P A S S” as the password or the old password and press ENTER button, asterisk (“*”) will be displayed on the bottom right part of the screen.
Enter “W O R D” and press ENTER button, “New Password” entry screen will be displayed.
The user can set a new password using the same method described in the Password input screen.



Troubleshooting



Problem No.	Indication of problem	Problem	Investigation method	Counter-measure
1	POWER LED is OFF	EX600 Power supply voltage level for control and input is not within specification	- Check if “PWR” LED on the SI Unit is green. - Confirm that the regulated power supply voltage is supplied to the endplate.	Supply voltage of 24V±10% to the power supply for control/input. Refer to the manual of the corresponding unit.
		The cable for handheld terminal is defective.	- Confirm the Handheld terminal cable is connected at the correct place. - Confirm the integrity of the connection on the handheld terminal cable.	- Reconnect the cable in the correct place. -Ensure the cable connections are secure.
2	LCD part does not active	Handheld terminal is in power save mode.	Press ESC button. Confirm that the LCD is active.	Same as left
		LCD is damaged	If LCD does not become active after above method is tried, LCD is damaged.	Stop operation and contact SMC sales office.
3	” Warning System access is not completed ” is displayed on the LCD screen	The cable for handheld terminal is defective.	- Confirm that the Handheld Terminal cable is connected at the correct place. - Confirm there is no loose connection on the handheld terminal cable.	-Reconnect the cable in the correct place. - Ensure the cable connections are secure.
		A connection between the units is defective.	Confirm if SI Unit “ST(M)” LED is green.	If LED is blinking red and green, there is connection fault between the units. Re-make and then confirm the connection between the units.
4	? is displayed on unit display	Manifold configuration memory error has occurred.	Confirm if configuration memory is in active state and manifold configuration is correct.	Please refer to respective unit’s operation manual to clear the error.
		Connection between the units is defective.	Confirm the SI Unit “ST(M)” LED is green.	If the LED is flashing red and green, there is a connection fault between the units. Re-make and then confirm the connection between the units.
5	ERROR LED is ON	EX600 diagnostic error has occurred.	Confirm error content through diagnostic data mode	Refer to error code list and respective unit’s operation manual for counter measure to the error.

Error Code list (1)

Error Code	Content	Unit type	Counter measure
1	Short circuit has occurred.	SI Unit	Change the valve with the short circuit and confirm operation.
		Digital Input	Confirm both the channel (n) with the short circuit, and channel next to it (n+1). If a short circuit has occurred, fix wiring, and check cable and input equipment is operating normally.
		Digital Output	Fix wiring on the channel with the short circuit. Confirm that cable and output equipment is operating normally.
		Analog Input	Fix wiring on the channel with the short circuit. Confirm that cable and input equipment is operating normally.
2	Analog input signal is below the measurement range.	Analog Input	Confirm that the of the sensor's analog output is within the measurement range's lower limit
3	Analog input signal exceeds the measurement range.	Analog Input	Confirm that the of the sensor's analog output is within the measurement range's upper limit
6	Open circuit (wire breakage) is detected.	SI Unit	Change the valve with the open circuit and confirm operation.
		Digital Input (only unit w/ open circuit detection)	Confirm that there is no loose connection or wire breakage on the channel with the open circuit. Refer to the digital input unit's operation manual for sensor types that can be used with open circuit detection function.
		Digital Output	Confirm if there is no loose connection or wire breakage on the connector of the channel on which open circuit has been detected.
7	Analog input signal exceeds user settable upper limit value.	Analog Input	Adjust the sensor's analog output to be below the upper limit of the user range.
8	Analog input signal falls below user settable upper limit value.	Analog Input	Adjust the sensor's analog output to be above the lower limit of the user range.
9	ON/OFF counter value has been exceeded	SI Unit	Reset counter to 0, or change the set value, or turn off the diagnostic data.
		Digital Input	
		Digital Output	
16	Power supply voltage for control and input is outside the specified range	SI Unit	Ensure that the Power Supply (for control & Input) conforms to 24VDC±10%.
17	Power supply voltage for output is outside range	SI Unit	Ensure that the Power Supply (for the outputs) conforms to 24VDC+10%./-5%

Error code list 2)

Error Code	Content	Unit type	Counter measure
19	While in operation, a connection error between the units has occurred.	System	Confirm that there are no loose connections between the units. If error does not clear, please stop operation and contact SMC sales office.
20	During start up, a connection error between the units has occurred.	System	Confirm that there are no loose connections between the units. If error does not clear, please stop operation and contact SMC sales office.
21	Configuration memory error has occurred.	System	Reset configuration memory through the SI Unit switch setting or Handheld terminal's Re Register function. Otherwise, turn off the configuration memory function.
22	System error has occurred	SI Unit	SI Unit is damaged. Please stop operation and contact SMC sales office.
23	Internal electronic component is damaged.	Digital Input Digital Output Analog Input	Unit's internal electronic component has been damaged. Please stop operation and contact SMC sales office.

Parameter Setting

EX600 has parameters settable for the system, unit and also each unit's channel through PLC or Handheld Terminal.
There are no priorities in setting the parameter through PLC or Handheld Terminal. The most recent setting will be reflected on the unit.

Caution

The following notes apply to Parameter which can be changed from both PLC and Handheld Terminal (H.T.)

If parameter is changed using the H.T., parameter setting content in the PLC will not be changed. This means that, if the parameter is changed by the H.T., when the communication with the PLC is disconnected and then reconnected again, the parameter settings will revert to the settings saved in the PLC.
When setting parameter which can be set from both PLC and H.T. it is recommended that the setting is made from the PLC.

Moreover, in case of DeviceNet, after editing parameter with the H.T. and after downloading parameter from the DeviceNet Configurator to PLC, the contents of parameters set with the DeviceNet Configurator will be updated again. Therefore when setting parameters that can be set both by PLC and H.T., please set it from the PLC.

Parameter Definition

System parameter

No.	Parameter Name	Contents
1	Hold/Clear Setting Method	Select the setting method of output state during communication fault or communication idle status, either with SI Unit setting switch or Handheld Terminal. When using Handheld Terminal, each channel's output state can be set to Hold/Clear/Force ON. However, when using setting switch, the entire system's output state can be set

SI Unit Parameter

No.	Parameter Name	Contents
1	Power Supply Voltage Monitor (Control/Input)	When power supply voltage for control/input goes above 26V or falls below 21V, a diagnostic error will be generated.
2	Power Supply Voltage Monitor (Output)	When power supply voltage for output goes above 26V or falls below 20V, a diagnostic error will be generated.
3	Short Circuit Detection	If short circuit or over current occurs when the valve output is ON, diagnostic error will be generated.
4	Restart after short circuit	When a short circuit at the valve has been removed, the short circuit detection error diagnostic can be set to automatically reset (error will automatically be cleared) or manual reset (error will not be cleared until power supply is reset)
5	Open Circuit Detection	If an open circuit is detected during Valve Output OFF, a diagnostic error will be generated. This setting can be made for each channel.
6	Output setting during communication fault	At the time of communication fault, each channel's Valve Output can be set to Hold, Clear or Force ON setting. This function will only be activated when the Hold/Clear setting method at the system configuration is set to Handheld.
7	Output setting during communication idle	At the time when the communication is idle, each channel's Valve Output can be set to Hold, Clear or Force ON setting. This function will only be activated when Hold/Clear setting method at the system configuration is set to Handheld.
8	Channel On/Off Counter	The number of times the valve is ON/OFF is recorded for each channel. There is a set value for each channel, and it is possible to generate a diagnostic error when the set value is reached. However, recording the number of ON/OFF is done in 30 second intervals (30 seconds per channel) from CH0 to the channels which have valve outputs. If the power supply for control and input is turned OFF, the last recorded value for each channel will become valid.

Digital Input Unit Parameter

No.	Parameter Name	Contents
1	Short circuit detection	If a short circuit or over current occurs at the sensor power supply, a diagnostic error will be generated.
2	Inrush current filter	When a sensor with high capacitance is connected, at the time power is supplied, over current will be detected. If the inrush current filter is active, during the first 100msec after power is supplied, over current will not be detected.
3	Input filtering time	A change of signal faster than the input filtering time will be disregarded.
4	Input extension time	An Input signal will be extended to the time set by this parameter. If the signal is longer than the setting, then this parameter's setting will be disregarded.
5	Channel On/Off Counter	The number of times the input is ON/OFF is recorded for each channel. There is a set value for each channel, and it is possible to generate a diagnostic error when the set value is reached. However, the counter value is recorded every one hour. If the power supply for control and input is turned OFF, data that has not been recorded will be cleared.
6	Open Circuit Detection (Only available for Open Circuit Detection Unit)	If an open circuit is detected at the input sensor, a diagnostic error will be generated. There is a setting available for each channel. Please note the following: 1) When a 2-wire type sensor is used, during OFF state, a leak current of less than 0.5mA will not be detected. A sensor with a leak current of 0.5mA or more (in the OFF state) must be used. 2) When a 3-wire type sensor is used, if the sensor has a current consumption of less than 0.5mA, an open circuit may not be detected.

Digital Output Unit

No.	Parameter Name	Contents
1	Short Circuit Detection	If a short circuit or over-current occurs at the output's load, a diagnostic error will be generated.
2	Restart after Short Circuit	When a short circuit at the output has been removed, the short circuit detection error diagnostic can be set to automatically reset (error will automatically be cleared) or manual reset (error will not be cleared until power supply is reset)
3	Open Circuit Detection	If an open circuit is detected when the output is in the OFF state, a diagnostic error will be generated. This setting can be made for each channel.
4	Output Setting during communication fault	At the time of communication fault, each channel's Valve Output can be set to Hold, Clear or Force ON setting. This function will only be activated when the Hold/Clear setting method at the system configuration is set to Handheld.
5	Output Setting during communication idle	At the time when the communication is idle, each channel's Valve Output can be set to Hold, Clear or Force ON setting. This function will only be activated when the Hold/Clear Setting method at the system configuration is set to Handheld.
6	Channel On/Off Counter	The number of times the output is ON/OFF is recorded for each channel. There is a set value for each channel, and it is possible to generate a diagnostic error when the set value is reached. However, the counter value is recorded every one hour. If the power supply for control and input is turned OFF, data that has not been recorded will be cleared.

Analog Input Unit Parameter

No.	Parameter Name	Contents
1	Short Circuit Detection	If a short circuit or over-current occurs at the sensor power supply, a diagnostic error will be generated.
2	Analog input measurement range	Selection of Analog Input Range. The settable measurement ranges are: 0...10V, 1...5V, 0...5V, -10V...+10V, -5V...+5V, 0...20mA, 4...20mA, -20mA...+20mA.
3	Analog data format	Select data format, which is outputted to the PLC from the Analog Input Unit. Available selections are: Offset Binary, Signed Binary, 2's Complements.
4	Analog averaging filter	Selection of analog averaging filter. The sampling cycle is about 2 seconds. Selectable values are: No filter, 2 Average (average between the last 2 input values), 4 Average, and 8 Average.
5	Range Upper Limit Error	If the input signal exceeds the upper limit value of the input range (0.5%), a diagnostic error will be generated.
6	Range Lower Limit Error	If the input signal exceeds the lower limit value of the input range (0.5%), a diagnostic error will be generated.
7	User settable value upper limit	If the input signal exceeds the upper limit value of the user settable range, a diagnostic error will be generated. This setting can be made for each channel.
8	User settable value lower limit	If the input signal exceeds the lower limit value of the user settable range, a diagnostic error will be generated. This setting can be made for each channel.

Parameter's Factory Default Setting

System Parameter

No.	Parameter Name	Setting Value	Contents	Setting Level	Default Setting
1	Hold/Clear Setting Method (Hold/Clear)	Switch	Hold/Clear Setting is done at SI Unit's DIP switch.	System	O
		Handheld	Hold/Clear Setting is done at Handheld Terminal		

SI Unit Parameter

No.	Parameter Name	Setting Value	Contents	Setting Level	Default setting
1	Power supply voltage monitor for control and input (PwRC_Mon)	Enable	Enable monitoring of power supply voltage for control and input.	Unit	O
		Disable	Disable monitoring of power supply voltage for control and input.		
2	Power supply voltage monitor for output (PwRO_Mon)	Enable	Enable monitoring of power supply voltage for output	Unit	O
		Disable	Disable monitoring of power supply voltage for output		
3	Short Circuit Detection (SC_MonOp)	Enable	Enable valve short circuit detection	Unit	O
		Disable	Disable valve short circuit detection		
4	Restart after short circuit (SC_RstOp)	Auto	After short circuit has been removed, the error will be cleared automatically.	Unit	O
		Manual	After short circuit has been removed, the error will not be cleared until the power supply is reset.		
5	Open Circuit Detection (OC_Mon)	Enable	Enable valve open circuit detection	Channel	
		Disable	Disable valve open circuit detection		O
6	Output setting during communication fault. (Fault_MD)	Clear	During communication fault, clear valve output.	Channel	O
		Hold	During communication fault, hold valve output.		
		ForceON	During communication fault, turn ON valve output.		
7	Output setting during communication idle (Idle_MD) Note1)	Clear	During communication idle, clear valve output.	Channel	O
		Hold	During communication idle, hold valve output.		
		ForceON	During communication idle, turn ON valve output.		
8	Valve's ON/OFF counter (Counter)	Enable	If output ON/OFF counter exceeds the setting value, a diagnostic error will be generated.	Channel	
		Disable	Diagnostic error will not be generated		O
		Val 1-65000	Set the maximum counter value. Settable value are (1~65000) x 1000 times.		65000

Note1) When using EX600-SDN# (DeviceNet™ compatible SI unit), depending on which PLC is used, there is a model which does not support Idle Function. If that is the case, this function cannot be used. When using EX600-SMJ# (CC-Link compatible SI unit), this function is not supported.

Digital Input Unit Parameter

No	Parameter Name	Setting Value	Contents	Setting Level	Default setting
1	Short circuit detection (SC_MonSs)	Enable	Enable sensor's power supply short circuit detection	Unit	O
		Disable	Disable sensor's power supply short circuit detection		
2	Open circuit detection (OC_Mon) Note 1)	Enable	Enable input sensor open circuit detection	Channel	
		Disable	Disable input sensor open circuit detection		O
3	Inrush current Filter (Inrush)	Enable	Enable inrush current filter	Unit	O
		Disable	Disable inrush current filter		
4	Input Filtering time (Filter_T)	0.1/1/10/20 msec	Set input signal filtering time.	Unit	1msec
5	Input extension time (SigExt_T)	1/15/100/200 msec	Set input signal's extension time	Unit	15 msec
6	Input Sensor's ON/OFF (Counter)	Enable	If input sensor's ON/OFF counter exceeds setting value, diagnostic error will be generated.	Channel	
		Disable	Diagnostic error will not be generated		O
		Val 1-65000	Set maximum counter value. Settable setting value are (1-65000) x 1000 times		65000

Note 1) Open Circuit Detection parameter is only available on Digital input Unit with open circuit detection (P/N EX600-DXPC1, EX600-DXNC1).

Digital Output Unit Parameter

No	Parameter Name	Setting Value	Contents	Setting Level	Default setting
1	Short Circuit Detection (SC_MonOp)	Enable	Enable output short circuit detection	Unit	O
		Disable	Disable output short circuit detection		
2	Restart after Short Circuit (SC_RstOp)	Auto	After short circuit has been removed, the error will be cleared automatically	Unit	O
		Manual	After short circuit has been removed, the error will not be cleared until the power supply is reset		
3	Open Circuit Detection (OC_Mon)	Enable	Enable output open circuit detection	Channel	
		Disable	Disable output open circuit detection		O
4	Output setting during communication fault (Fault_MD)	Clear	During communication fault, clear output	Channel	O
		Hold	During communication fault hold output		
		ForceON	During communication fault, turn ON output		
5	Output setting during communication idle (Idle_MD) Note1)	Clear	During communication idle, clear output	Channel	O
		Hold	During communication idle hold output		
		ForceON	During communication idle, turn ON output		
6	Output ON/OFF counter (Counter)	Enable	If output ON/OFF counter exceeds the setting value, a diagnostic error will be generated.	Channel	
		Disable	Diagnostic error will not be generated		O
		Val 1-65000	Set the maximum counter value. Settable value are (1-65000) x 1000 times		65000

Note1) When using EX600-SDN# (DeviceNet™ compatible SI unit), depending on which PLC is used, there is a model which does not support Idle Function. If that is the case, this function cannot be used. When using EX600-SMJ# (CC-Link compatible SI unit), this function is not supported.

Analog Input Unit Parameter

No.	Parameter Name	Setting Value	Contents	Setting Level	Default setting
1	Short Circuit Detection (SC_MonSs)	Enable	Enable sensor power supply short circuit detection	Unit	O
		Disable	Disable sensor power supply short circuit detection		
2	Analog Input Range (Range)	-10..10V, -5..5V, -20..20mA, 0..10V, 0..5V, 1..5V, 0..20mA, 4..20mA	Select analog input range	Channel	-10V～10V
3	Analog Data Format (D_Format)	Offset Binary, Sign & Magnitude, 2s Complement	Select analog data format	Unit	Offset Binary
4	Analog Filter (Filter)	None, 2value Average 4value Average 8value Average	Select analog data filter	Unit	2 value average
5	Over Range detection (Over_Rng)	Enable	Select analog data format	Unit	Enable
		Disable	Select analog data filter		
6	Under Range detection (Undr_Rng)	Enable	If the analog input exceeds the maximum allowable input range (0.5%), a diagnostic error will be generated	Unit	Enable
		Disable	Above diagnostic error will not be generated.		
7	User Setting Value Upper Limit Error (Upr_Lmt) Note1)	Enable	If the analog input exceeds the minimum allowable input range(0.5%), a diagnostic error will be generated	Channel	
		Disable	Above diagnostic error will not be generated.		O
		Val	Refer to Note1) for possible set value		10V Note2)
8	User Setting Value Upper Limit Error (Lwr_Lmt) Note1)	Enable	If the analog input exceeds the user setting upper limit, diagnostic error will be generated	Channel	
		Disable	Above diagnostic error will not be generated.		O
		Val	Refer to Note1) for possible set value		0V Note2)

Note1) User setting value is settable according to the table below.

Analog input measurement range	User setting value set range	
	Upr_Lmt	Lwr_Lmt
-10 ..10V	-10.5 ~ +10.45V	-10.45 ~ +10.5V
-5V ..5V	-5.25 ~ +5.22V	-5.22 ~ +5.25V
-20 ..20mA	-21 ~ +20.9mA	-20.9 ~ +21mA
0 ..10V	0 ~ +10.45V	0.05 ~ +10.5V
0 ..5V	0 ~ +5.22V	0.02 ~ +5.25V
1 ..5V	+0.75 ~ +5.22V	+0.77 ~ +5.25V
0 ..20mA	0 ~ +20.9mA	0.1 ~ +21mA
4 ..20mA	+3 ~ +20.9mA	+3.1 ~ +21mA

Note 2) Factory default setting for Analog input range is -10...10V
When changing the analog input measurement range, please make sure to confirm the set value and set the correct value accordingly.

Unit Type

Each Unit's symbol and Display name.

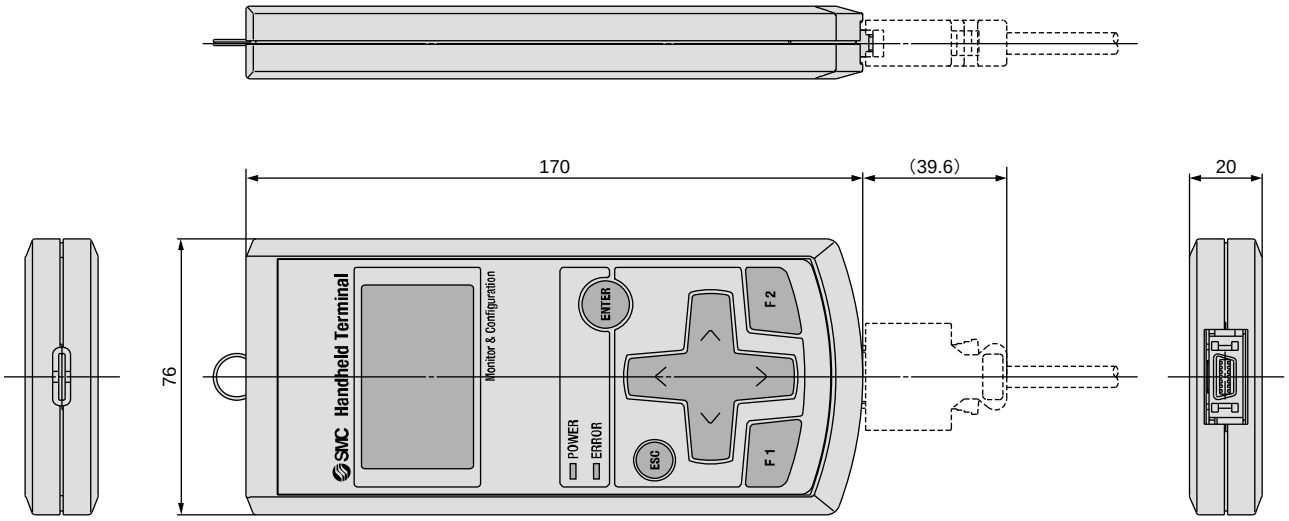
Unit Type	Symbol	Display Name	Model Number
Digital Input	DX	DX (8DI)	EX600-DX*B
Digital Input	DX	DX (8DI)	EX600-DX*C
Digital Input	DX	DX (16DI)	EX600-DX*D
Digital Output	DY	DY (8DO)	EX600-DY*B
Digital Input with open circuit detection	DX	DX (8DI)	EX600-DX*C1
Analog Input	AX	AX (2AI)	EX600-AXA
DeviceNet compatible SI Unit (Occupies 8 Outputs)	SI	SI (8SOL)	EX600-SDN*
DeviceNet compatible SI Unit (Occupies 16 Outputs)	SI	SI (16SOL)	EX600-SDN*
DeviceNet compatible SI Unit (Occupies 24 Outputs)	SI	SI (24SOL)	EX600-SDN*
DeviceNet compatible SI Unit (Occupies 32 Outputs)	SI	SI (32SOL)	EX600-SDN*
PROFIBUS DP compatible SI Unit (Occupies 8 Outputs)	SI	SI (8SOL)	EX600-SPR*
PROFIBUS DP compatible SI Unit (Occupies 16 Outputs)	SI	SI (16SOL)	EX600-SPR*
PROFIBUS DP compatible SI Unit (Occupies 24 Outputs)	SI	SI (24SOL)	EX600-SPR*
PROFIBUS DP compatible SI Unit (Occupies 32 Outputs)	SI	SI (32SOL)	EX600-SPR*
CC-Link compatible SI Unit (Occupies 8 Outputs)	SI	SI (8SOL)	EX600-SMJ*
CC-Link compatible SI Unit (Occupies 16 Outputs)	SI	SI (16SOL)	EX600-SMJ*
CC-Link compatible SI Unit (Occupies 24 Outputs)	SI	SI (24SOL)	EX600-SMJ*
CC-Link compatible SI Unit (Occupies 32 Outputs)	SI	SI (32SOL)	EX600-SMJ*

Specifications

• Specification

Model		EX600-HT1-*
Communication method		RS232C
Baud rate		9600bps
Power supply		Power supplied from SI Unit connector (24VDC)
Current consumption		50mA or less
Display		LCD with back light
Resolution		128 × 64dots
Connector		14-pin connector
Environmental	Protective structure	IP20
	Operating temperature	-10 to 50˚C
	Operating humidity	35 to 85%RH(no dew condensation)
	Withstand voltage	500VAC for 1 minute between frame and external terminals connected collectively
	Insulation resistance	10MΩor more at 500VDC between frame and external terminals connected collectively
	Vibration resistance	10 to 57 Hz: Constant amplitude 0.75 mm p-p 57 to 150 Hz: Constant acceleration 49 m/s2 2 hours for each X, Y, Z direction (non energized status)
	Impact resistance	300 m/s^2 3 times for each X, Y, Z direction (non energized state)
Acquired standard		CE marking
Weight		160g

• Outline Dimensions



Revision history

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