FTN Series

INSTRUCTION MANUAL

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A free copy of the FTN-2008 software for PC for simplified operation can be downloaded from Aikoh Engineering's website (http://www.aikoh.co.jp).

Precautions for Safe Use

Thank you for choosing Aikoh Engineering's product.
For safe use of your product, please read and understand the following precautions:

■Power supply
- This tester can be operated on 100 to 240 VAC.
- Be sure that the voltage to use is within the above voltage.
- Always ground the tester.
- Do not take electricity from a receptacle where voltage fluctuation may occur.

■Installation place
- Install the tester on a flat, horizontal place.
- This tester is heavy. Install it in a place where the tester will not collapse.
- Never install the tester in a place from which it may fall down.

■Load cell
- This tester uses a load cell.
- Handle the load cell with care.
- Install the load cell in the correct orientation.
- When the load cell fails within the warranty period, if it is determined that the failure was caused improper handling by the user, repair fee may be charged.

■Accessories
- This tester comes with accessories.
  Prior to use, check them.
- Check the accessories referring to the attached "List of Goods Delivered."
  Should any item be missing, please contact the dealer.

About This Manual

■This manual explains how to use the tester correctly and safety.
Important information is presented under “Precautions for Safe Use” and “Safety Symbols.”
Be sure to read and understand them thoroughly.

■Those who have experience of using Aikoh’s products should also read this manual thoroughly since this tester requires unique handling procedures.

■Please note that some of the information contained in this manual may become inappropriate for operating the tester due to changes to its specifications and other changes made in the future.

Safety Symbols

■Safety symbols

・Important information to avoid such situations as “injury to the operator and other workers” is presented under the safety symbols explained below. Be sure to read and understand them.

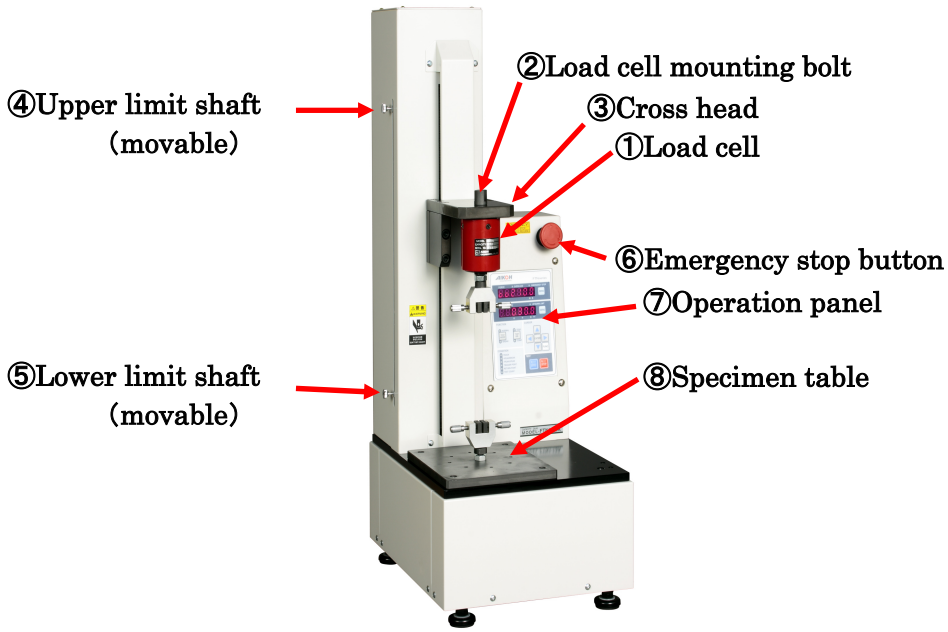
 DANGER	Identifies the instructions that if not followed will result in serious injury or loss of life.
 WARNING	Identifies the instructions that if not followed may result in serious injury or loss of life.
 CAUTION	Identifies the instructions that if not followed may result in personal injury.

■Other Markings

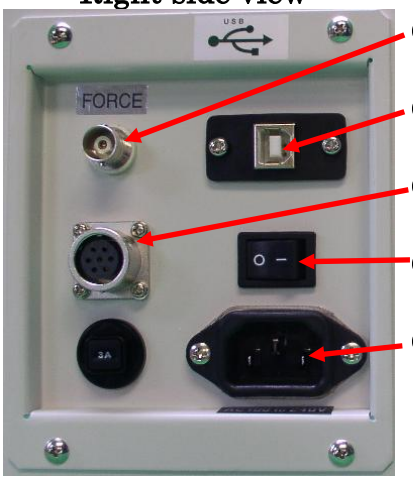
 Advice	Instructions that should be followed when using the tester.
 Tip	Information that should be kept in mind and is useful for operation.

Nomenclature

External view of the tester



Right side view



Load cell

Connection:

・Secure ① Load cell with ② Load cell mounting bolt so as to sandwich ③ Cross head.

・Connect the load cell cable to ① Load cell and ⑫ Load cell connector. (When it is properly connected, you will hear a click sound.)

・Insert the included power cable to ⑨ AC inlet fully.

If the dedicated software is used:

・Insert the USB cable into ⑪ USB connector.

Power on procedure:

・Turn on ⑩ Power switch.

・The power will be supplied and the tester will be started.

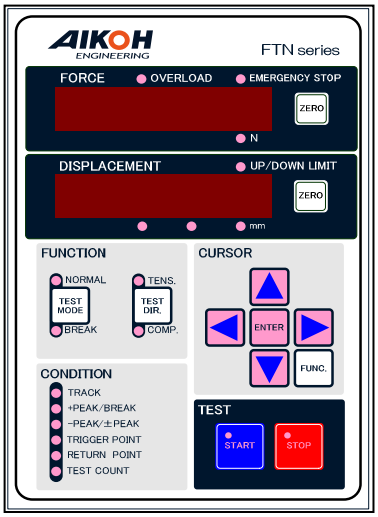
Please use the limit shafts effectively.

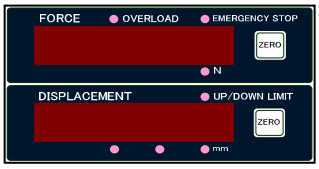
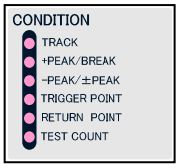
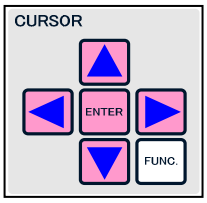
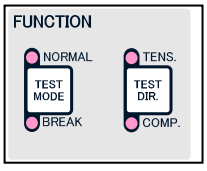
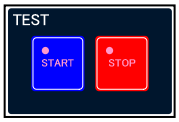
・When the position of ④ Upper limit shaft is adjusted properly, unnecessary movement can be saved.

・Adjust the position of ⑤ Lower limit shaft to prevent collision with the fixture.

Description of the Operation Panel

Operation panel



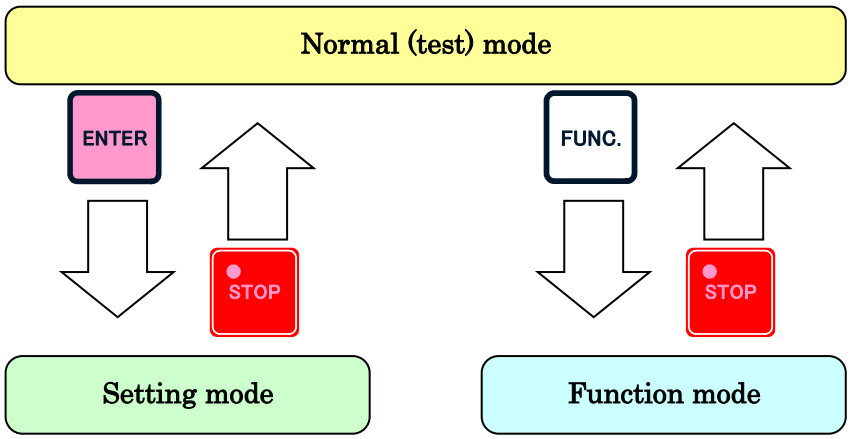
Group	Location	Description
Display		☐Shows the preset force/displacement values. ☐Shows the maximum force value and the displacement value at that force. ☐Shows the force/displacement values when the specimen was broken. ☐Shows measured values of force/displacement. ☐The upper field shows the “test item No”. ☐The lower field shows the “test No”.
Selection indicating LEDs		The on/off status of the LEDs indicate as follow ☐Indicate the status shown in the display.
Operation switches		☐Used to change the display. ☐Used to change conditions. ☐Used to move the crosshead. ☐Used to change numeric values. ☐Used to change the signs. ☐used to go to the function mode.
Test mode /direction select switches and LEDs		☐Used to switch over the test mode. (The LED of the selected mode illuminates.) ☐Used to switch over the test direction. (The LED of the selected direction illuminates.)
Test switches		☐Used to start a test. ☐Used to stop a test. ☐Used to go to the normal mode.

Description of the Modes

Brief description of the modes

Mode	Description
Normal (test) mode	When the power is turned on, the tester is in this mode. ・Used to select a test mode. (Compression & tension/breakage) ・Used to select a test direction. (Compression/tension) ・Used to switch over the contents of the selected display. ・Used to conduct an automatic test. ・Used to conduct a manual test by inching.
Function mode	When the FUNC. key is pressed in the normal mode, the tester will enter this mode. ・Of the basic items, the following three items can be set: Inching speed setting (🕮 2300) Force comparator motion value setting (🕮 4100) Force trigger level setting (🕮 7111) When the STOP key is pressed in this mode, the tester will return to the normal mode.
Setting mode	When the ENTER key is pressed in the normal mode, the tester will enter this mode. ・ All of the basic items can be set. (For the setting items, see the operation flow chart.) When the STOP key is pressed in this mode, the tester will return to the normal mode.

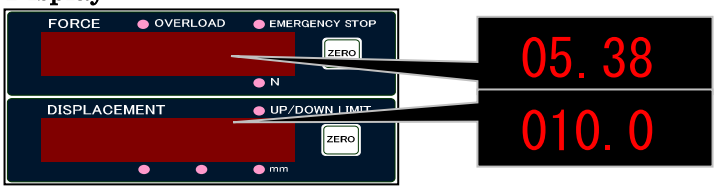
Mode transition



Normal (Test) Mode

When the power is turned on, the tester is in this normal (test) mode.
The display is used as follows:
(Unit: force = N, displacement = mm)

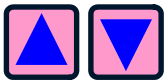
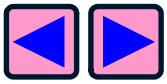
Display



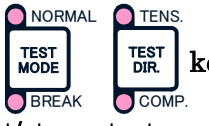
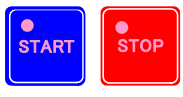
Upper: Force value
Lower: Displacement value

An example of display in the normal mode.

Operation of the keys in the normal (test) mode

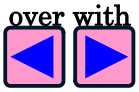
Key	Description
	Used to manually move the cross head (inching).
	Used to change over the contents of the display. (For the items to be shown, see "Contents shown in the display" on next page.)
Force indicating side 	Used to reset the force value being shown to zero. (E.g. track value and max. value)
Displacement indicating side 	Used to reset the displacement value being shown to zero. (E.g. track value and max. value)
	Used to select a test mode. (The LED of the selected mode illuminates.)
	Used to select a test direction. (The LED of the selected test direction illuminates.)
	Starts an automatic test.
	Stops an automatic test.

How to start a test:

Using the  keys, select a test mode and direction and the use the  keys to start/stop a test.

Normal (Test) Mode

Contents shown in the display

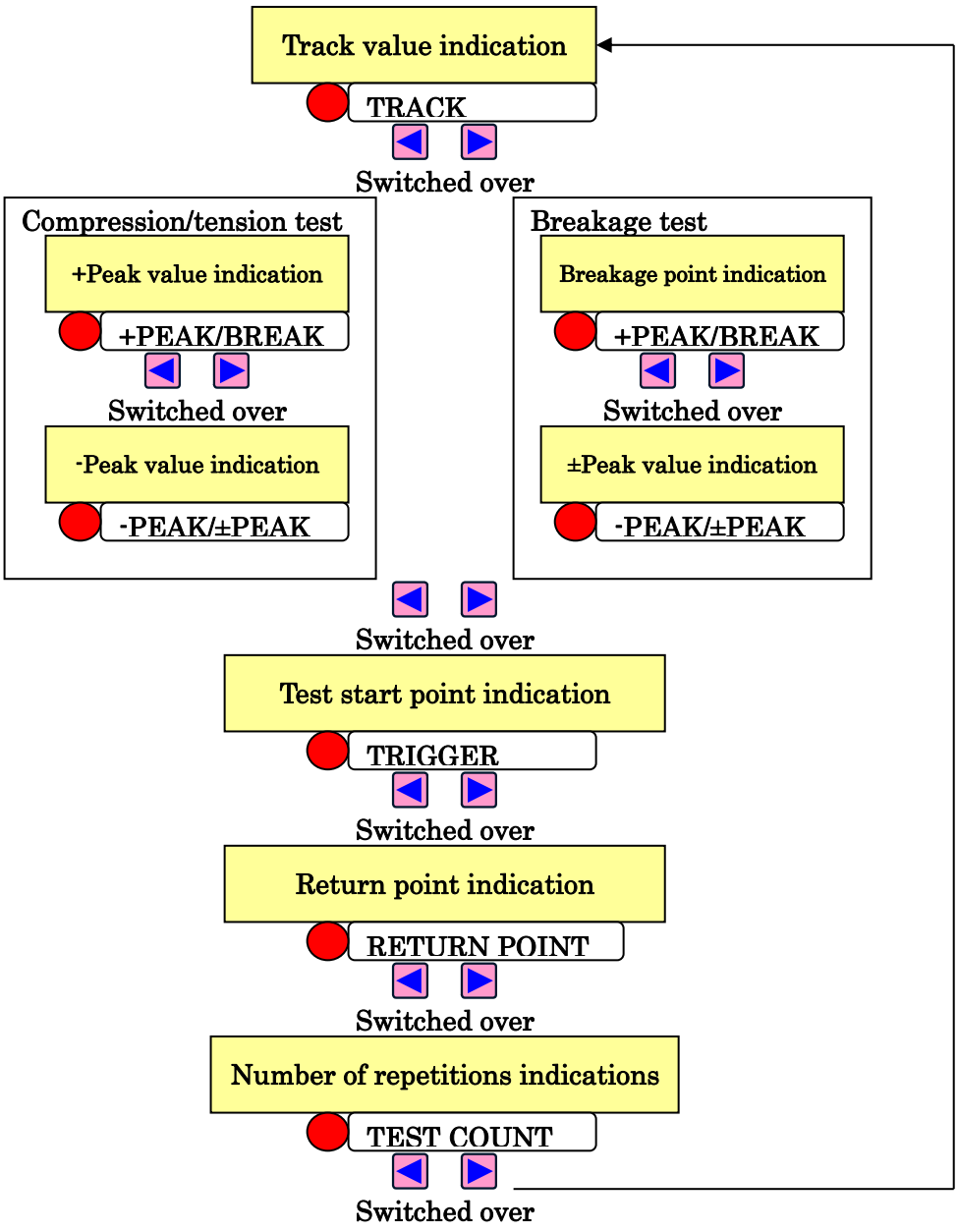
	Selection Indicating LED	Contents Shown	
		Compression/tension test	Breakage test
Switched over with  keys	TRACK	Track value	
	+PEAK/BREAK	Tension side max. value	Breakage detect point
	-PEAK/±PEAK	Compression side max. value	Max. value in absolute value.
	TRIGGER POINT	Trigger value (motion point)	
	RETURN POINT	Return value (motion point)	
	TEST COUNT	Number of repetitions	

- Track value: Present force/displacement
- Max. value: Max. force value and displacement at that force.
- Trigger value: Force/displacement when the trigger was detected.
- Return value: Force/displacement when the test was returned automatically.
- Breakage detect point: Force/displacement when breakage was detected.
- Max. value in absolute value: Max. value in absolute value of force and displacement at that value.
- Number of repetitions: The upper field (FORCE) shows the present count and the lower field (DISPLACEMENT) shows the set count.

Operation Flow in the Normal Mode

The panel display can be switched over with the ◀ ▶ keys.

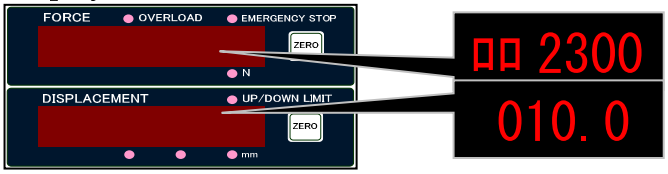
Operation flow chart



Function Mode

When the FUNC. key is pressed in the normal mode, the tester will enter this mode.
The display is used as follows:

Display



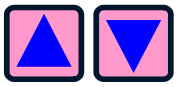
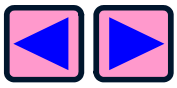
Upper: Setting No. of basic items
Lower: Set value

An example of display in the function mode

The following three items can be set here:

- Inching speed (□□ 2300)
- Force comparator motion value (□□ 4100)
- Force trigger level (□□ 7111)

Operation of the keys in the function mode

Key	Description
	When an item has been selected, these keys are used to switch over between the groups. When data has been entered, these keys are used to change numeric values.
	When data has been entered, these keys are used to move the input place. (The input place is shown flashing.)
	When an item has been selected, this key is used to switch over to the input status. (The input place of the set item is shown flashing.) When data has been entered, this key is used to accept the entered data.
	When an item has been selected, this key is used to return to the normal mode. When data has been entered, this key is used to cancel the entered data.

Operation Flow in the Function Mode

When the FUNC. key is pressed in the normal (test) mode, the tester will enter this mode and special items can be set.

The special items in [ ] can be switched over with the ▲ ▼ keys.

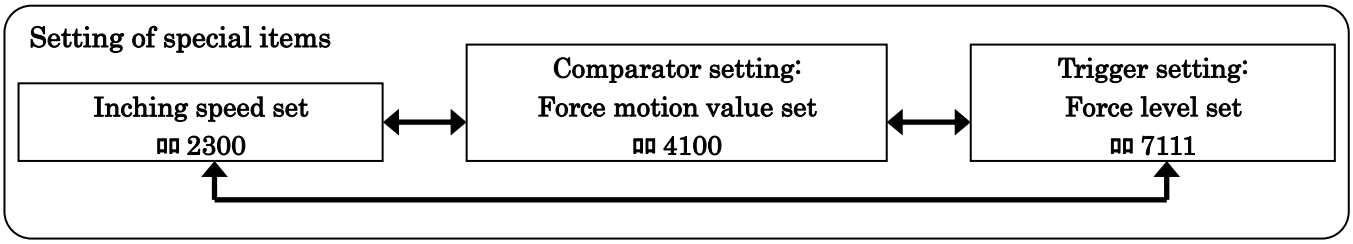
To set data of a special item, select an item and accept it with the ENTER key and then enter data.

After entering data, press the ENTER key again. The data will be accepted.

For data setting and selection, see “Procedure to Set Setting Items” to be explained later.

To return to the normal (test) mode, press the STOP key. The tester will enter the normal mode.

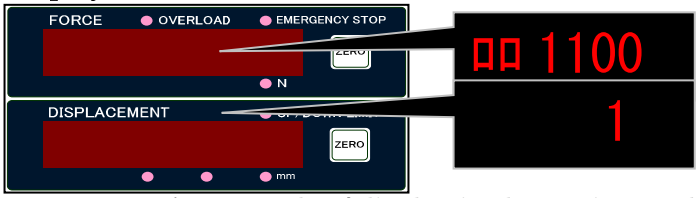
Operation flow chart



Setting Mode

When the ENTER is pressed in the normal mode, the tester will enter this mode.
The display is used as follows:

Display

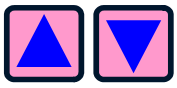
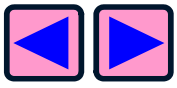


Upper: Setting No. of basic items
Lower: Set value

An example of display in the setting mode

All of the basic items can be set here.
※There are some items that cannot be set.

Operation of the keys in the setting mode

Key	Description
	When an item has been selected, these keys are used to switch over
	between the groups. When data has been entered, these keys are used to change numeric values.
	When an item has been selected, this key is used to switch over to the input status. (The input place of the set item is shown flashing.) When data has been entered, this key is used to accept the entered data.
	When an item has been selected, this key is used to return to the normal mode. When data has been entered, this key is used to cancel the entered data.

Operation Flow in the Setting Mode

When the ENTER key is pressed in the normal (test) mode, the tester will enter this mode and setting items can be set.

The group items in ( ) can be switched over with the ▲ ▼ keys.

The setting items in [ ] can be switched over with the ◀ ▶ keys.

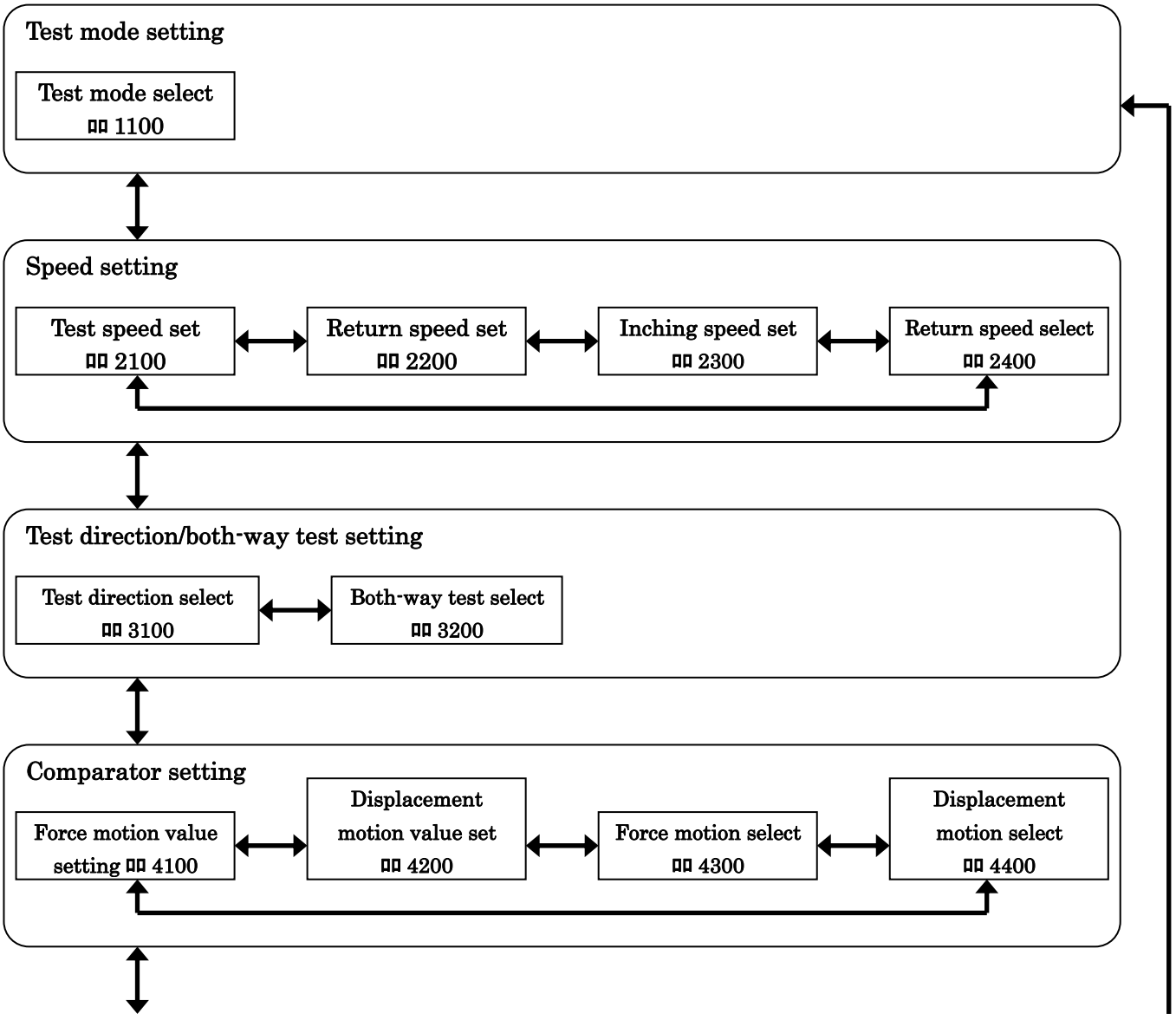
To set data of a setting item, select an item and accept it with the ENTER key and then enter data.

After entering data, press the ENTER key again. The data will be accepted.

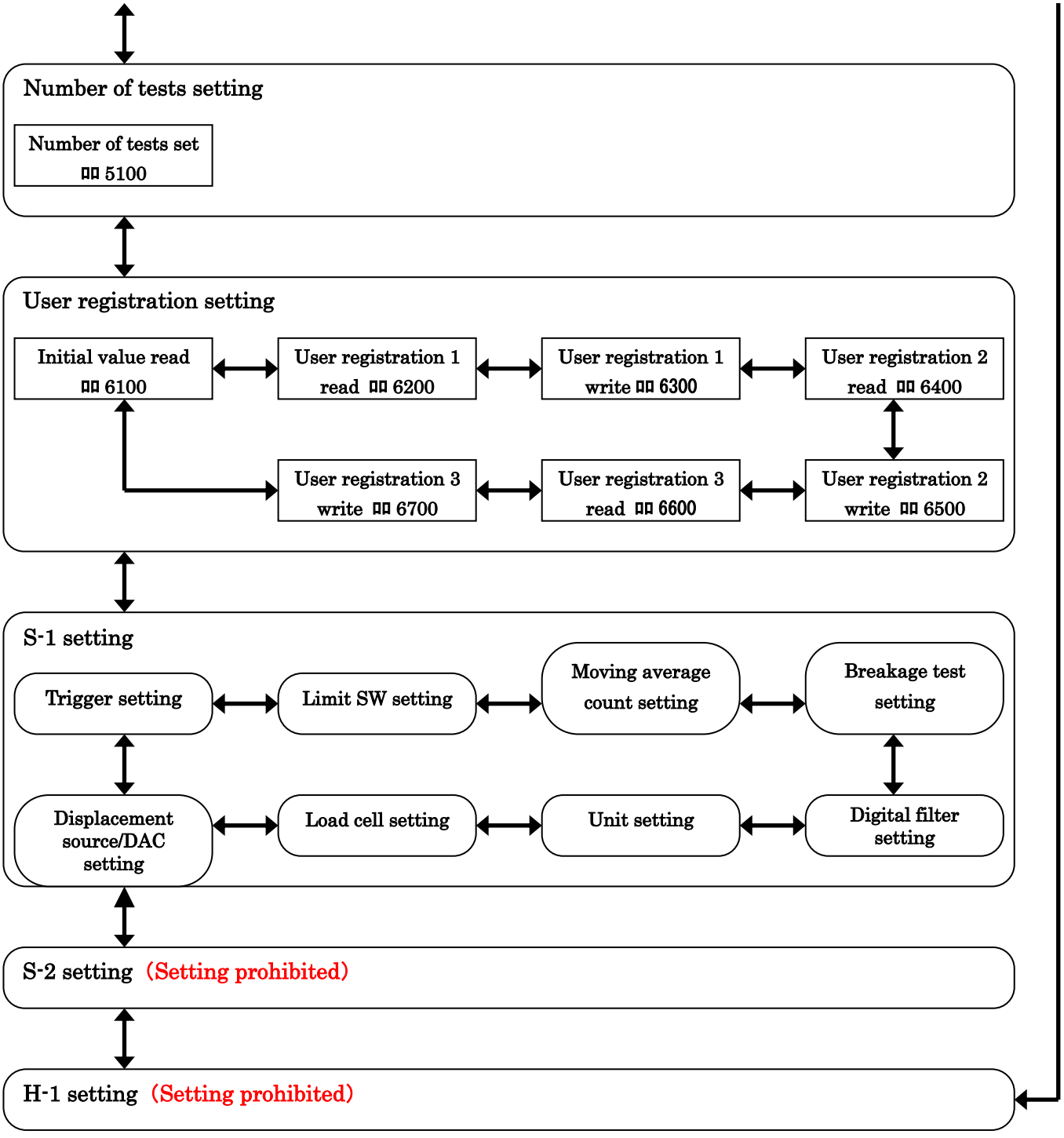
For data setting and selection, see "Procedure to Set Setting Items" to be explained later.

To return to the normal (test) mode, press the STOP key. The tester will enter the normal mode.

Operation flow chart



Operation Flow in the Setting Mode



Procedure to Set Setting Items

The basic items are set in the function mode and the setting mode.
The setting procedure is the same in both modes.
Such operations as "select", "enter" and "accept" are done with the following buttons:

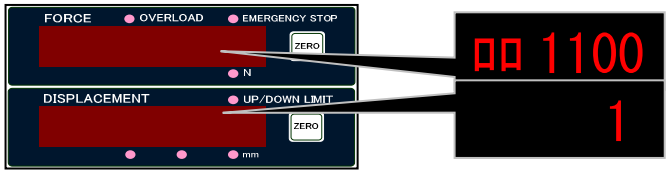
When the 

key is pressed in the test mode, the tester will enter the function mode.

When the 

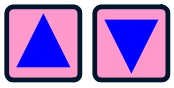
key is pressed in the test mode, the tester will enter the setting mode.

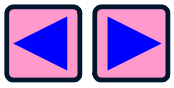
※Note, however, the keys cannot be operated during automatic test.



Upper: Set No. of basic items
Lower: Set value

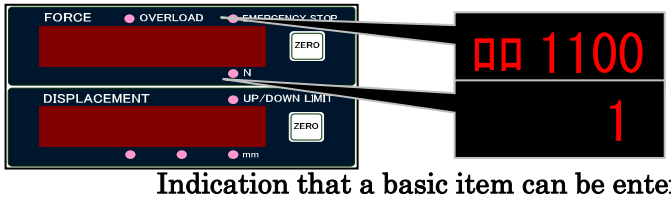
Initial display in the setting mode

By pressing the 
keys, a group of basic items can be selected.

By pressing the 
keys, an item in the group can be selected.

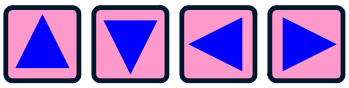
When the 

key is pressed with a basic item being shown, the set value will flash to indicate that data can be entered.



An input position of the set item shown flashing

Indication that a basic item can be entered

Use the 
keys to enter a value.

When the 

key is pressed, the flashing value will be accepted and set.

When the 

key is pressed, the entered value will be canceled and the value will return to the previous value.

When the 

key is pressed with an item being selected (set value not flashing), the tester will return to the test mode.

Examples of Setting

Example 1: Change the test speed from 10.0 (mm/min.) to 15.0 (mm/min.).

ENTER ▼ (Set No. = □□2100)
(Set value = 010. 0)

ENTER ⇒ The least significant digit of the set value flashes.

◀ ⇒ The flashing digit moves to left. (01＊. 0)

▲ × 5 times ⇒ 015. 0 (”5” flashes.)

ENTER ⇒ Set value = 015. 0 (Lit)

⇒ STOP Return to the normal (test) mode.

Example 2: Change the comparator setting: force motion value from 0000.0 to 0010.0.

FUNC. ▼ ENTER (Set No. = □□4100)

◀ × 3 times
▲ Set value = 0010. 0 (” 1” flashes.)

ENTER STOP After accepting the value, go to the normal mode.

Example 3: Change the both-way test to the one-way test.

ENTER ▼ ▼ (Set No. = □□3200)

ENTER ▼ Set value = 2 (One-way)

ENTER STOP

Example 4: Return the setting to the factory shipment settings.

ENTER ▲ ×3 (or ×5) ▼

ENTER ENTER (Accepted by second pressing)
(Read canceled if second button is [STOP[)

STOP

Initial Set Values of Basic Items

List of the basic items at shipment

Group Item	Set Item	Shipment Setting	FORCE indication	DISP. indication
Test mode setting	Test mode select	1: Tens./Comp. test	□□ 1100	1
Speed setting	Test speed set	10.0(mm/min)	□□ 2100	010.0
	Return speed set	100.0(mm/min)	□□ 2200	100.0
	Inching speed set	100.0(mm/min)	□□ 2300	100.0
	Return speed select	2: Return speed	□□ 2400	2
Test direction/ Both-way test setting	Test direction select	2: Compression	□□ 3100	2
	Both-way test select	1: Both-way	□□ 3200	1
Comparator setting	Force motion value set	0.0 (N)	□□ 4100	0000.0
	Disp. motion value set	0.00(mm)	□□ 4200	000.00
	Force motion select	1: Invalid	□□ 4300	1
	Disp. motion select	1: Invalid	□□ 4400	1
Number of tests setting	Number of tests set	1	□□ 5100	00000
User registration setting	Initial value read		□□ 6100	Ld 0
	User registration 1 read		□□ 6200	Ld 1
	User registration 1 write		□□ 6300	SA 1
	User registration 2 read		□□ 6400	Ld 2
	User registration 2 write		□□ 6500	SA 2
	User registration 3 read		□□ 6600	Ld 3
	User registration 3 write		□□ 6700	SA 3
S-1 setting			□□ 7100	S-1
Trigger setting	Source select	1: Invalid	□□ 7110	1
	Force level set	0.0(N)	□□ 7111	0000.0
	Displacement level set	0.00(mm)	□□ 7112	000.00
Limit SW setting	Upper limit motion select	1: Stop	□□ 7120	1
	Lower limit motion select	1: Stop	□□ 7121	1
Moving average count setting	Moving average count select (*1)	6: 32times	□□ 7130	6
Breakage test setting	Breakage detect sensitivity select	2: Middle	□□ 7140	2
	Motion at breakage select	1: Stop	□□ 7150	1
Digital filter setting	Filter select	6: 31.2(Hz)	□□ 7160	6
Unit setting	Force value indicating unit select (*2)	1: N	□□ 7170	1
Load cell setting	Load cell CH select	1: CH1	□□ 7180	1
Displace source setting (*3)	Displacement source select	1: Encoder	□□ 7190	1
	Linear gauge resolution select	2:1(μm)	□□ 7191	2
	Displacement FS set	400.00(mm)	□□ 7192	400.00
DAC setting (*4)	CH1 setting Output select	2: Force	□□ 7193	2
	CH1 setting 0 point set	2030	□□ 7194	2030
	CH2 setting Output select	1 : off	□□ 7195	1
	CH2 setting 0 point set	2030	□□ 7196	2030
S-2 Setting (Setting prohibited)			□□ 7200	S-2
H-1 setting (Setting prohibited)			□□ 8100	H-1

Notes:

*1: Only reading the selected value is allowed and changing the selected value is not allowed.

*2: This item has been set to hide at shipment and is not shown.

*3: The displacement source is the encoder only.

*4: The DAC output is the force value only and the displacement value is not output.

Ranges of Setting Items

Speed setting [□□ 2100～□□ 2400]

・Test speed	5～125mm/min（5～300mm/min: 500N or less）
・Return speed	5～300mm/min
・Inching speed	5～300mm/min
・Return speed select	1: Test speed, 2: Return speed, 3: Inching speed

Comparator setting [□□ 4100～□□ 4400]

・Comparator motion force value	0～FS (full scale)
・Comparator motion disp. value	0～FS (full scale)
・Force motion condition	1: Invalid, 2: Stop, 3: Reversal
・Disp. motion condition	1: Invalid, 2: Stop, 3: Reversal

Trigger-related setting [□□ 7110～□□ 7112]

・Trigger source	1: Invalid, 2: Force, 3: Displacement
・Force trigger value	0～FS (full scale)
・Displacement trigger value	0～FS (full scale)

Number of tests setting [□□ 5100]

・Number of tests	1～999999 times（Always once for breakage test）

Test direction setting [□□ 3100～□□ 3200]

・Test direction	1: Tension, 2: Compression
・Both-way test	1: Both-way test, 2: One-way test (Advance only)

Breakage test setting [□□ 7140～□□ 7150]

・Breakage detect sensitivity	1: Sensitivity low, 2: Sensitivity middle, 3: Sensitivity high
・Motion at breakage	1: Stop, 2: Reversal

Digital filter setting [□□ 7160]

・Filter frequency	1: 1000Hz, 2: 500Hz, 3: 250Hz, 4: 125Hz, 5: 62.5Hz, 6: 31.2Hz, 7: 15.6Hz, 8: 7.8Hz, 9: 3.9Hz, 10: 2Hz, 11: 1Hz

Load cell-related setting [□□ 7210]

・Load cell to use select	1: CH1, 2: CH2, 3: CH3

User “set” data save and read [□□ 6100～□□ 6700]

・User registration	LD1～LD3, SA1～LD3 (3 kinds of settings may be registered)
・Initial value (default) read	LD0 (Reading shipment data)

Limit SW motion setting [□□ 7120～□□ 7121]

・Upper limit SW	1: Stop, 2: Reversal
・Lower limit SW	1: Stop, 2: Reversal

※ For the test mode select [□□ 1100] and test direction select [□□ 3100], the dedicated switches on the panel can be used.

Set Data Errors

When the tester is powered on, if an error occurs to some set data of the tester, an error code (see the list of error codes on following pages) will be shown and the test is kept stopped until the error has been cleared.
If an error has occurred, take an appropriate corrective action described in the table.

1. Hardware error
   This error code is shown when a problem has occurred to the memory device.
   If this error has occurred, turn on the power again.
   If the error code is shown again, the device may be faulty. Please request your dealer or Aikoh Engineering for inspection and repair.

2. Calibration/mechanical set data errors
   These error codes are shown when a problem has been detected in data that was set during calibration of each CH or data of the tester that was set at shipment from factory.
   If an error in this group has occurred, please contact Aikoh Engineering. We will inform you of the data set at shipment so that you can set the data again.
   For the procedure to set the data again, refer to “Procedure to Set Calibration Value Data Again”.

3. Other set data errors
   These error codes are shown when data that was set when using the tester has a problem.
   Set again the data that was set when using the tester.
   For the procedure to set the data again, refer to “Procedure to Set Calibration Value Data Again”.

Error code indication
   If a set data error has occurred, the error code will be shown in the FORCE indicating place. If two or more errors have occurred, the error codes will be shown in both the FORCE and DISPLACEMENT indicating places, which can be scrolled with the UP and DOWN keys.

List of Error Codes

1. Hardware error

Error Code	Description	Corrective Action
E 9999	Hardware error	If this error code is shown again when the power is turned on again, the device may be faulty. Please request your dealer or Aikoh Engineering for inspection and repair.

2. Calibration/mechanical set data errors

Error Code	Description	Corrective Action
E 7220	CH1 Load cell data error	If these errors have occurred, please contact Aikoh Engineering. We will inform you of the shipment data that has been kept in our record. Use it to set the applicable data again.
E 7224	CH1 Load cell sensitivity select data error	
E 7225	CH1 Force value unit select data at calibration error	
E 7226	CH1 Force calibration 0point set data error	
E 7227	CH1 Force calibration +FS set data error	
E 7228	CH1 Force calibration –FS set data error	
E 7230	CH2 Load cell data error	
E 7234	CH2 Load cell sensitivity select data error	
E 7235	CH2 Force value unit select data at calibration error	
E 7236	CH2 Force calibration 0point set data error	
E 7237	CH2 Force calibration +FS set data error	
E 7238	CH2 Force calibration –FS set data error	
E 7240	CH3 Load cell data error	
E 7244	CH3 Load cell sensitivity select data error	
E 7245	CH3 Force value unit select data at calibration error	
E 7246	CH3 Force calibration 0point set data error	
E 7247	CH3 Force calibration +FS set data error	
E 7248	CH3 Force calibration –FS set data error	
E 8111	Display cycle select data error	
E 8112	Force value unit select permission select data error	
E 8140	Motor pulse set data error	
E 8141	Encoder pulse set data error	
E 8142	Speed correction pulse set data error	
E 8143	Thread pitch select data error	
E 8144	Gear ratio select data error	
E 8145	Pulley ratio select data error	
E 8146	7-seg LED brightness select data error	
E 8150	Baud rate select data error	
E 8151	Command system select data error	

List of Error Codes

3. Other set data errors

Error code	Description	Corrective Action
E 1100	Test mode data error	Set the data that was set prior to the test.
E 2100	Test speed set data error	
E 2200	Return speed set data error	
E 2300	Inching speed set data error	
E 2400	Return speed select data error	
E 4100	Comparator force motion set data error	
E 4200	Comparator displacement motion set data error	
E 4300	Comparator force motion select data error	
E 4400	Comparator displacement motion select data error	
E 7110	Trigger source select data error	
E 7111	Trigger force level set data error	
E 7112	Trigger displacement level set data error	
E 7140	Breakage detect sensitivity select data error	
E 7160	Filter select data error	
E 7170	Force value indication unit select data error	
E 7180	Load cell to use select data error	
E 7192	Displacement FS set data error	
E 7193	DAC CH1 output select data error	
E 7194	DAC CH1 0point adjust data error	
E 7195	DAC CH2 output select data error	
E 7196	DAC CH2 point adjust data error	

Procedure to Clear Errors

If a set data error has occurred, clear it by the following procedure:

1. Check the error code.
   If two or more errors have occurred, check the error codes by scrolling them with the UP and DOWN keys.

2. If a hardware error or calibration/mechanical set data error is included, please contact Aikoh Engineering.
   When contact us, please inform us of the serial No. of the tester and error codes.

3. After checking the error code, press the STOP key to force the mode to be changed to the setting mode.
   Note, however, that when a hardware error is present, operation of any keys is not accepted.

4. In the setting mode, set the data in which the error has occurred again.
   The data in which the error has occurred is shown with its item number flashing.
   In the case of calibration/mechanical set data, we will inform you of the shipment data.
   Set that data again.
   For other set data errors, set again the data that was set prior to the test.

5. When the data has been set again, press the STOP key to change the mode to the normal (test) mode.
   Note, however, that if a data error is still present, the mode cannot be returned to the normal (test) mode. Check the data again.

※The calibration value data that you will receive from us is the factory shipment data.
If a load cell has been replaced or added, you cannot solve the problem with the data you will receive from us. The force needs to be calibrated again. Please request your dealer or Aikoh Engineering for force calibration.

Procedure to Set Calibration Value Data Again

Use the following procedure to set calibration value data (data on the order of □□ 7200) when clearing a set data error:

1. Please notify us of occurrence of a calibration value data (□□ 7200) error.
   When contacting us, please tell us the serial No. attached to the side of the tester and the set value number of the error.

2. We will inform you of the password required for setting and calibration value data set at shipment.
   From this point on, it is possible to change calibration value data using the password, but after setting the data again, never change it.
   If the data is changed, correct measurement data cannot be obtained.

3. Using the above error clearing procedure, show the calibration value data on the order of □□ 7200.

4. When the ENTER key is pressed, the password may be entered. Enter the password you have received from us.

5. Show the error data (its set number is shown flashing) with the UP, DOWN, LEFT and RIGHT keys.

6. When the ENTER key is pressed, data may be set again.
   The LEFT and RIGHT keys are used to move the cursor and the UP and DOWN keys are used to enter numeric values. Using these keys, enter the calibration value data you have received from us.

7. After entering the calibration value data, press the ENTER key. The data will be set and the indication of the error of the set number will be cleared.
   If two or more errors are present, repeat the procedure from step 5 to step 7.

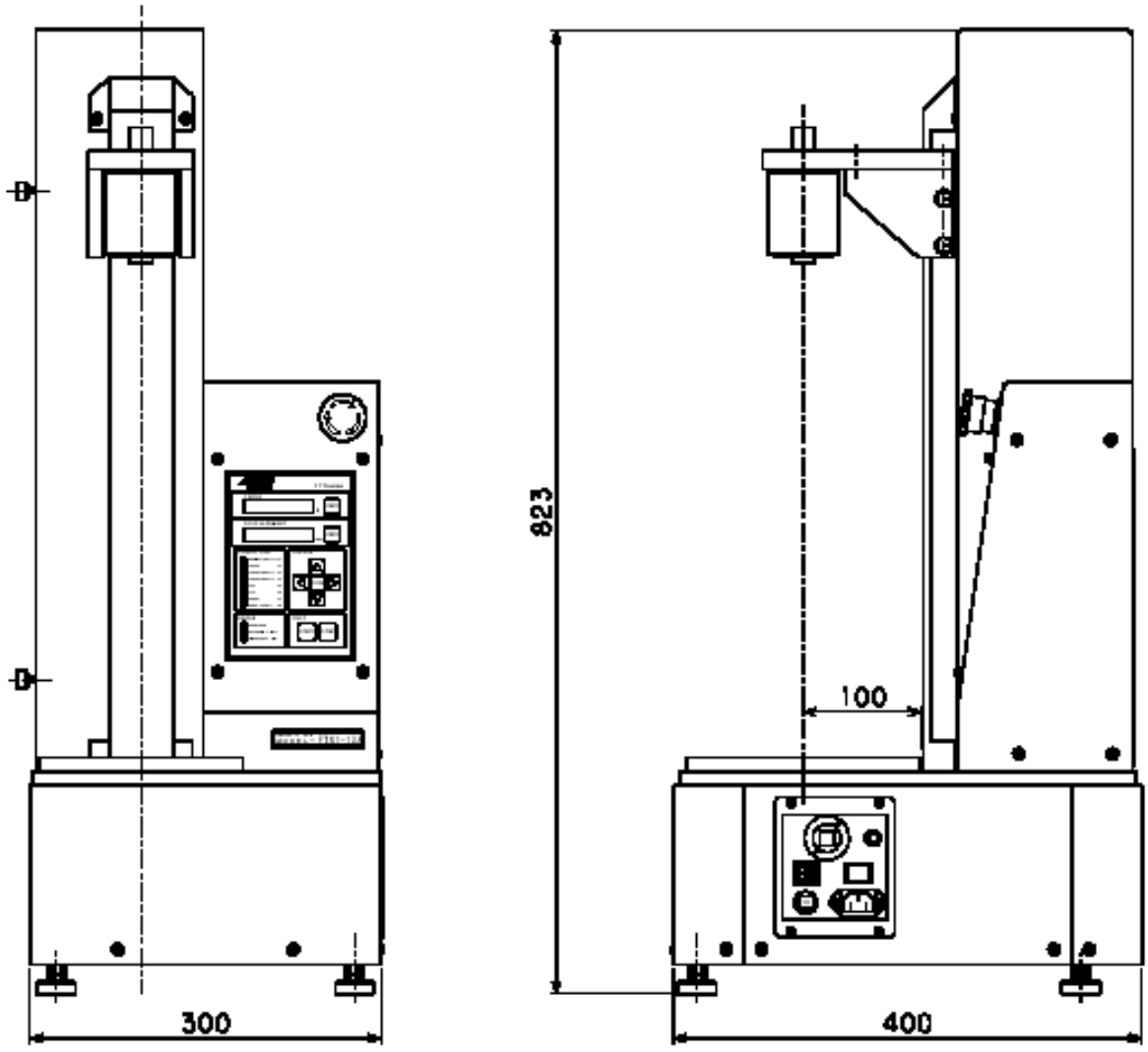
8. Finally, set again the maximum value data (□□ 7220, □□ 7230, □□ 7240) of the channel in which the error occurred.
   Even if an error has not occurred in the maximum value data, it must be set again.
   Otherwise, the above setting of the calibration value data cannot be completed.

9. When re-setting has been finished, press the STOP key to clear the status of calibration value data setting.

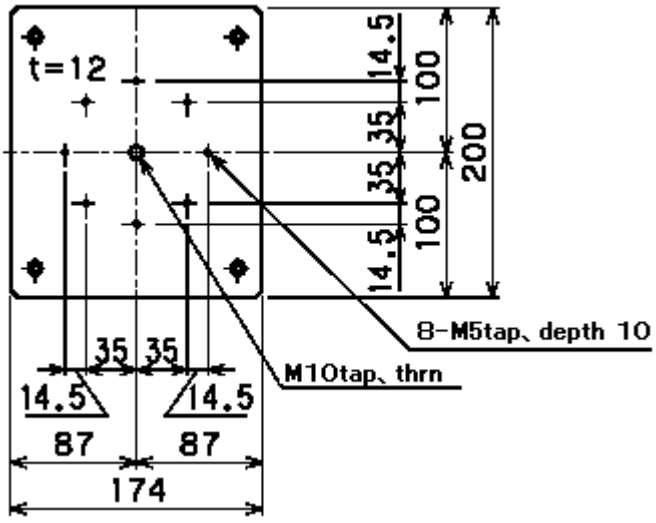
10. Using the above error clearing procedure, clear other errors and complete procedure.

External View

External view of the tester



Specimen table



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