

On-Line Grain Moisture Tester PT-2700

(Type 2751)

(Type 2752)



Operating Manual

On-Line Grain Moisture Tester Safety precautions

The On-Line Grain Moisture Tester may cause accidents (such as property damage) if safety precautions are not followed. Also, due to it being equipped with a motor, injuries may result.

■ Please follow safety precautions




Read the safety precautions in the operating manual carefully.

■ Please do not use the device if it is not working properly

If the tester has been damaged or is not working properly, be sure to consult our repair service.

■ What the warning signs and symbols indicate

In order to prevent accidents due to improper handling of the device, the following signs and symbols have been used in the operating manual and on the device itself. Indications:

 WARNING	Indicates risk of injuries to user or damage to property if this sign is ignored and the device is improperly handled.
 PRECAUTION	Indicates risk of injuries to user or damage to property if this sign is ignored and the device is improperly handled.
 CAUTION	Indicates information the user needs to understand to use the device safely.

Significant symbols



Fire



Electric shock



Being caught in machinery

Deterrent symbols



Prohibited



Do not disassemble



Do not get wet

Symbols for taking action



Required



Unplug from outlet



Connect ground

WARNING



- Use the device with only specified voltage from the power source. Excessive voltage overheats the device, causing breakdown or fire.



- Be sure to connect the ground wire to the ground at the power source.



- Use the specified capacity and type of fuse. When replacing it, first unplug the power cord. Using a fuse other than the fuse specified carries a risk of fire, etc.



- Do not disassemble or alter the On-Line Grain Moisture Tester. Doing so may damage it, or cause electric shocks or injuries. If it is suspected that the tester has been damaged, contact our repair service.



- Be careful not to get the tester wet. It is not waterproof. Getting water inside the device may cause damage or electric shocks.



- Do not remove the moisture sensor while measuring. You may unwittingly touch the rotor and injure yourself.

PRECAUTION



- When plugging in or unplugging the power cord, hold the plug and pull instead of pulling the cord.



- Unplug the power cord from the outlet when the tester is not being used, or when there is a danger of a lightning strike.



- When signs of danger appear (i.e., offensive smell, smoke, fire), take appropriate action (unplugging power cord, etc.).



- Do not turn on the power while pressing the control keys.



- Press only the specified key(s), and do not press any other key combinations.

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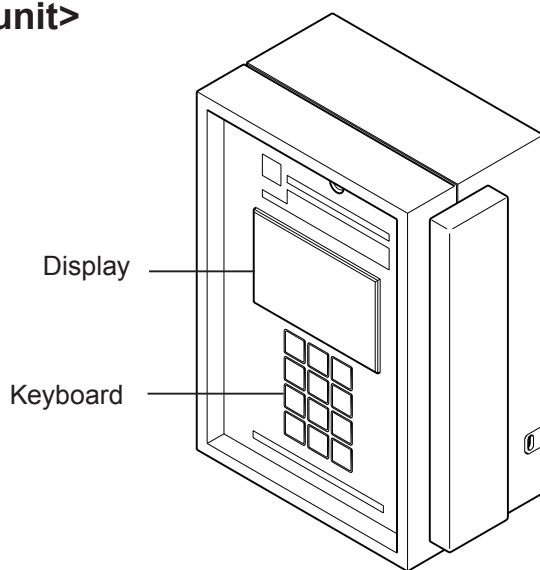
1. Features, Identification view and Accessories

1-1. Features

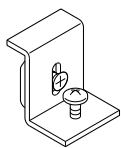
- (1) The PT-2700 can be mounted on a dryer or on a measuring scale at a grains unloading station, and continuously measure moisture.
- (2) Quickly measure with easy operations.
- (3) In “automatic” mode, the device takes measurements while controlling the dryer.
- (4) Manual measurement can be started from a connected external device.

1-2. Part identification

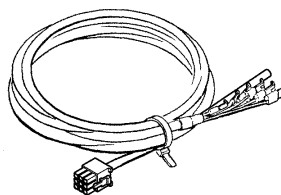
<Main unit>



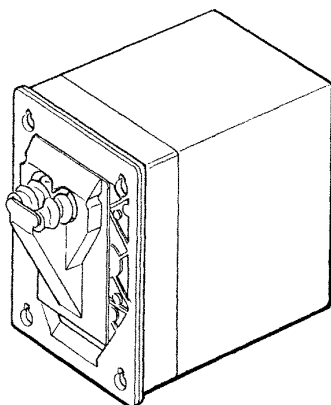
<Accessories>



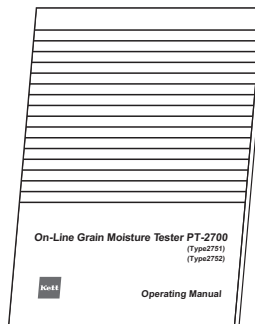
Metal fittings
(See P.12 “5-4. Installation”)



Connecting cable with temperature sensor



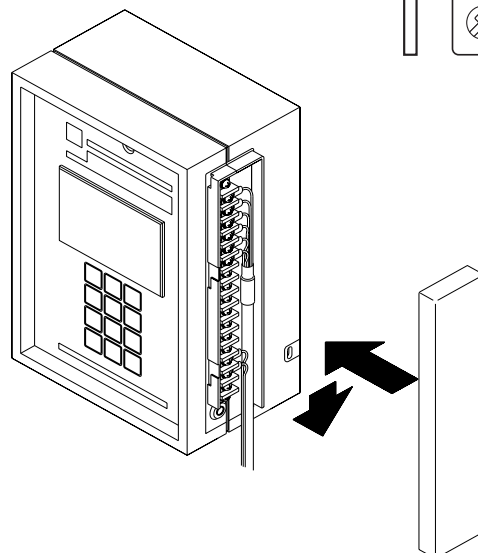
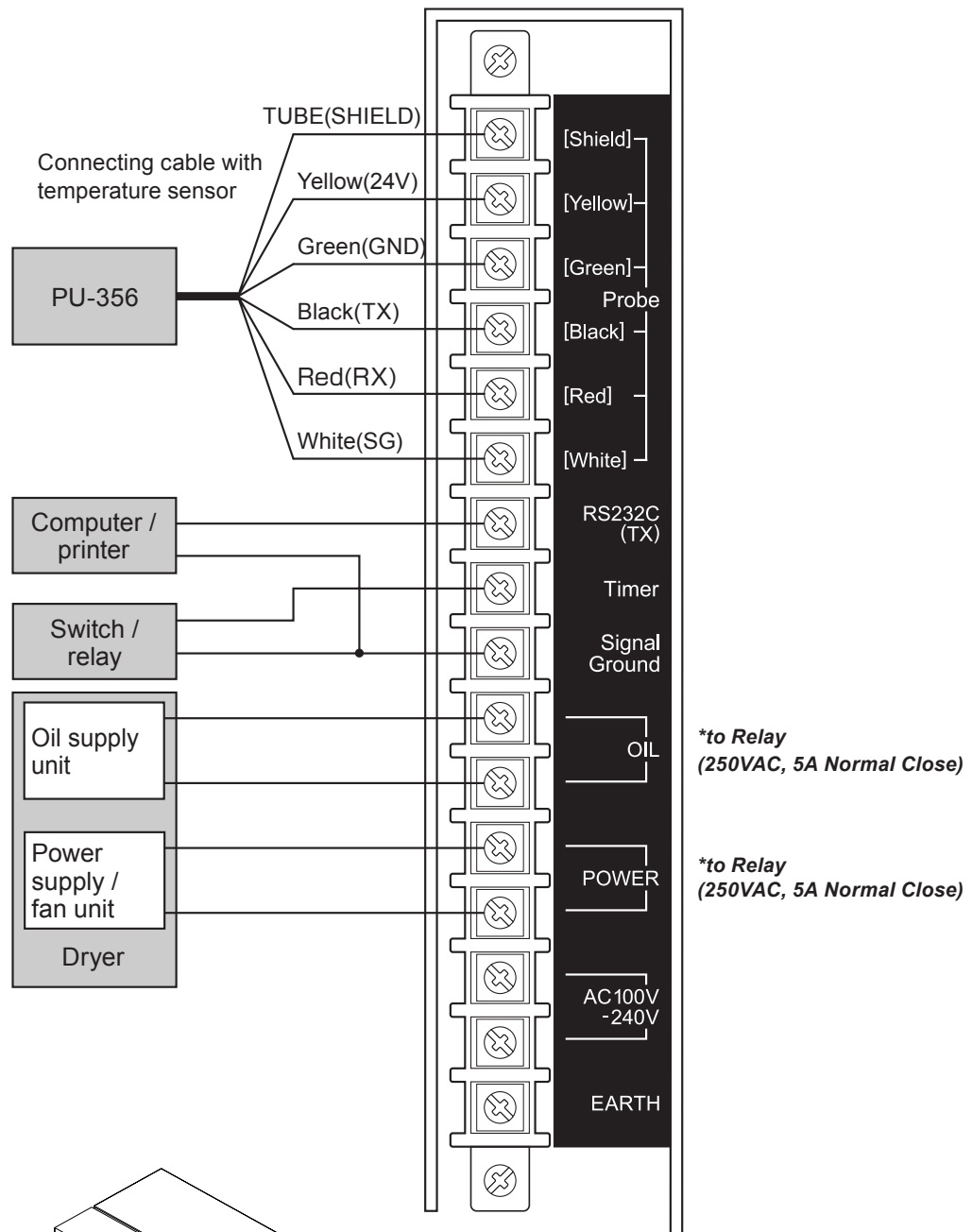
Moisture sensor “PU-356”



Operating manual

2. Connecting the PT-2700, PU-356, and external devices

Connect the PT-2700, PU-356 and external devices (e.g., a dryer) as in the figure below.

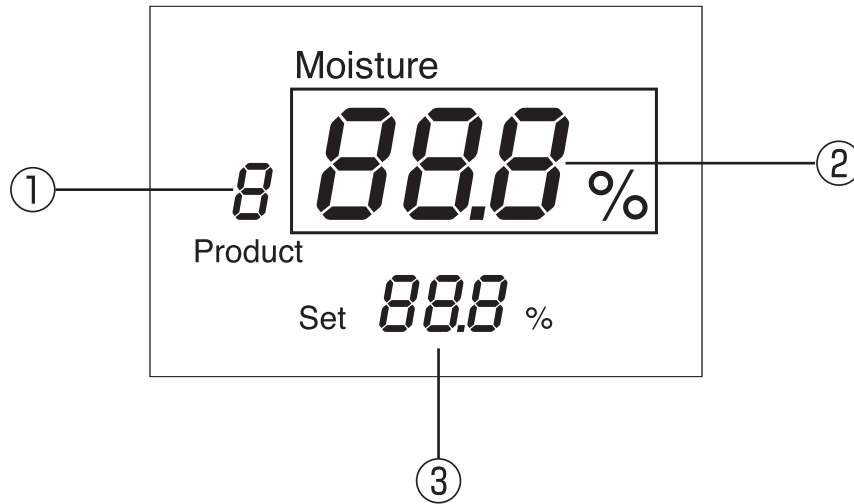


Pull the wires around as in the figure on the left.

After connecting the wires, attach the cover to the terminal block.

3. Display and key functions

3-1. Display



(1) Shows a number designating the item to be measured (This applies only to the PT-2752).

(Because the PT-2751 is for paddy only, it shows "0" all the time.)

Shows "E" when automatic measurement finishes.

(2) Shows moisture content and temperature.

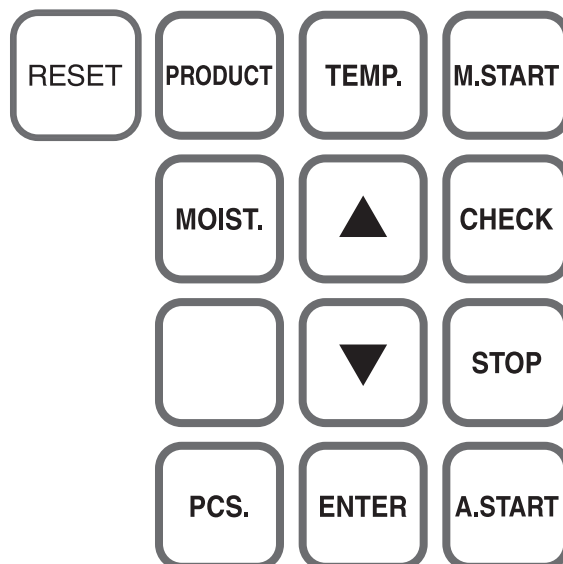
Also shows "AUT" when automatic measurement starts, "MA" at the start of manual measurement, and "CHE" when the circuits of the moisture sensor PU-356 (hereinafter described as PU-356) are checked.

(3) Shows the moisture level selected for automatic stop.

Also shows a blinking display of preset values for the various settings.

** The moisture level set for automatic stop won't be displayed when manual measurement has started. It will be displayed again when automatic measurement is conducted.*

3-2. Key functions



Key	Functions
[PRODUCT]	Sets the item to be measured. 0. Paddy 1. Wheat 2. Barley 3. Brown Rice 4. Milled Rice (used only for PT-2752)
[MOIST.]	Sets the moisture level for automatic stop in automatic measurement.
[PCS.]	Sets the number of grains to be measured or measurement time in manual measurement.
[TEMP.]	Starts the temperature measurement.
[▲] and [▼]	Changes the values of various settings.
[ENTER]	Confirms changed values of various settings.
[M.START]	Starts manual measurement.
[CHECK]	Checks the PU-356 circuits.
[STOP]	Breaks off automatic / manual measurement or temperature measurement.
[A.START]	Starts automatic measurement.
[RESET]	Forces return to condition when power was turned on.

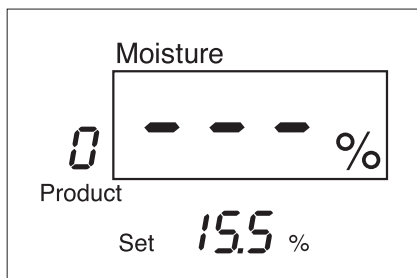
4. Specifications

Applications		Product No.	Product	Measuring range(%)
	PT-2751	0	Paddy	10~35%
	PT-2752	0	Paddy	10~35%
		1	Wheat	10~40%
		2	Barley	10~40%
		3	Brown Rice	10~20%
		4	Milled Rice	10~17%
Measuring principle	: electrical resistance (single grain)			
Measured variable	: moisture			
Minimal display digit	: 0.1% (moisture)			
Measurement precision	: With respect to drying method (105 °C, 5g5hr, crushed), 1σ : 0.5 % or less, at moisture of 20 % or less			
Display	: 7 segment LED			
External output	: RS-232C			
Operating temperature and humidity ranges	: 0 to 50°C (however, must be free of condensation risk)			
Power supply	: AC100 to 240 V (50/60 Hz)			
Power consumption	: Max 120 W			
Fuse	: 250 V 2 A			
Relay	: Maximum allowable current : 5A, Maximum switching voltage : 250 VAC			
Dimensions & weight	: 170 (W)×110 (D)×248 (H), 1.2 kg			
Accessories	: Moisture sensor (PU-356), Connecting cable with temperature sensor, Metal fittings, Operating manual			

5. Preparing for measurement

5-1. Turning on the power

When the power is turned on, all LED display items will be shown; after that, the initial display will be shown.



* The **POWER** terminal and **OIL** terminal are on in the initial state.

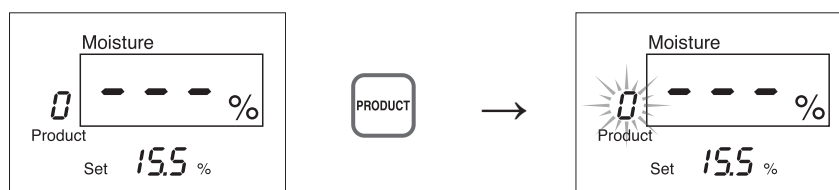
5-2. Settings

Before measuring, set the following conditions as necessary.

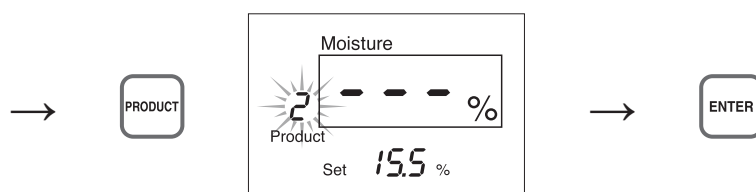
5-2-1. Selecting measuring product (*applies only to PT-2752)

When the initial display is shown, press the [PRODUCT] key.

The number of the PRODUCT will start blinking.



Choose the number designating the item to be measured using the [PRODUCT] key. When the correct number starts blinking, press the [ENTER] key.



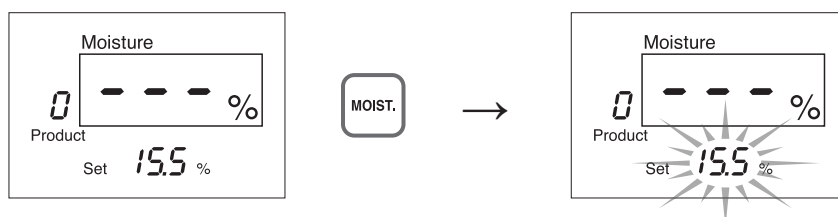
The numbers that designate the items to be measured are
0.Paddy, 1.Wheat, 2.Barley, 3.Brown Rice, 4.Milled rice.

Once the item to be measured has been set, the blinking will stop and the light will become fully lit.

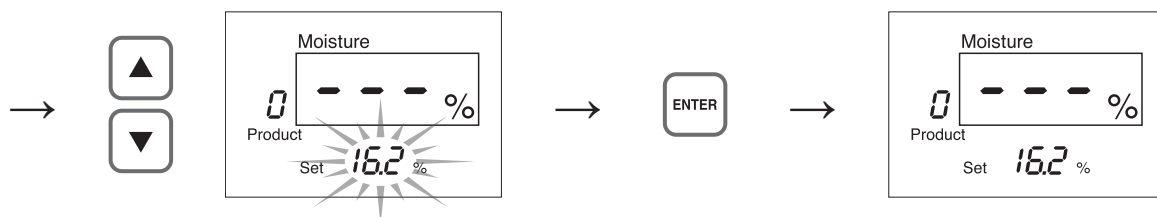
* **Because the PT-2751 is measurable for paddy only, the number designating the item to be measured shows "0" all the time.**

5-2-2. Setting the moisture level for automatic stop

Sets the moisture level for automatic stop mode. The initial setting is 15.5 %. When the initial display is shown, press the [MOIST.] key. The moisture level for automatic stop will start blinking.



Select the numerical value using the [▲] and [▼] keys, then press the [ENTER] key.

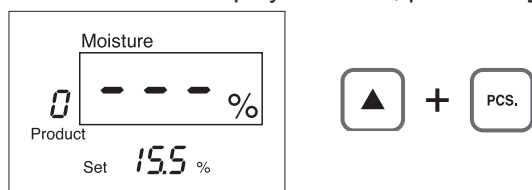


Once the moisture level for automatic stop has been set, the blinking will stop and the light will become fully lit. The moisture level for automatic stop can be set by tenths of a percent anywhere from 11.0 % to 17.0 %.

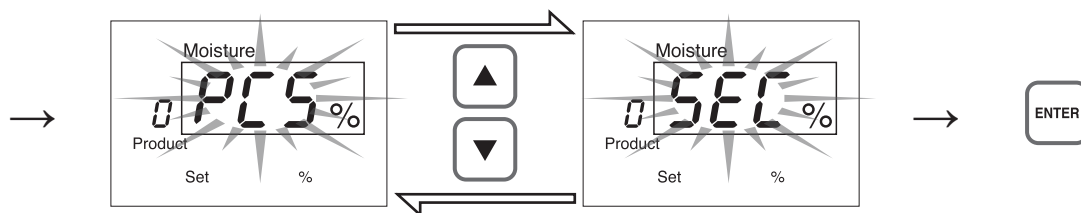
5-2-3. Setting the manual measurement mode

Measurement by number of grains or by measuring time can be selected in manual measurement. The initial setting is for measurement by number of grains.

When the initial display is shown, press the [PCS.] key while pressing the [▲] key.



The current manual measurement mode will be shown ("PCS" for measurement by number of grains, and "SEC" for measurement by time). The measurement mode can be changed by using the [▲] and [▼] keys. Choose the correct mode and press the [ENTER] key.

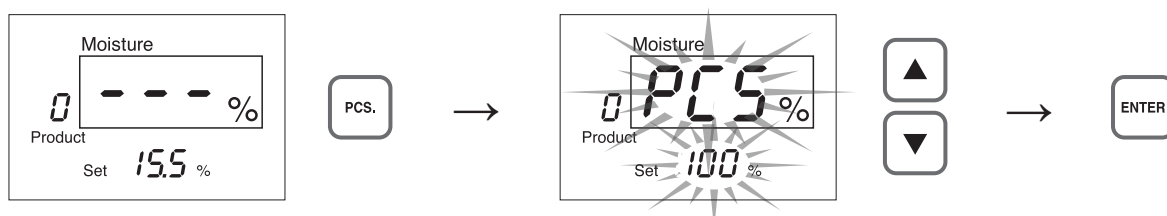


• Setting the number of grains to be measured

When the manual measurement mode is set for measurement by number of grains, number of grains to be measured is set. When the initial display is shown, press the [PCS.] key.

The "PCS" signal (indicating measurement by number of grains), together with the current setting for the number of grains to be measured (100 in the initial setting), will start blinking.

Set the correct number using the [▲] and [▼] keys, then press the [ENTER] key.



The number of grains to be measured is set. The display then switches to the setting for moisture level for automatic stop.

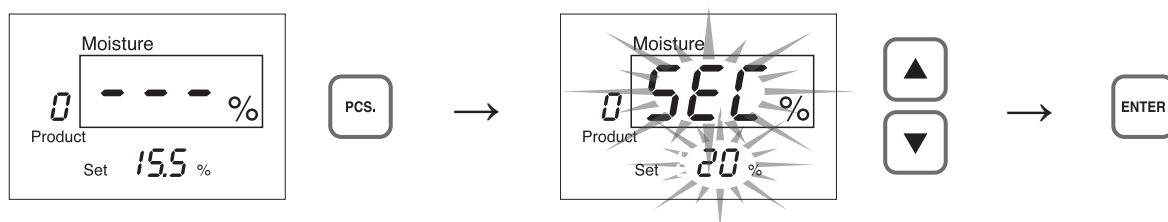
The number of grains to be measured can be set in whole numbers anywhere from 1 to 250.

● Setting the measuring time (seconds)

When the manual measurement mode is set for measurement by time, number of seconds of measurement is set. When the initial display is shown, press the [PCS.] key.

The “SEC” signal (indicating measurement by time) and the current setting for the number of seconds of measurement (20 seconds in the initial setting), will start blinking.

Set the correct number using the [▲] and [▼] keys, then press the [ENTER] key.

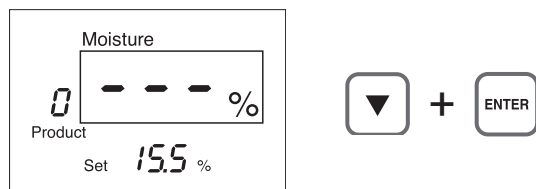


The number of seconds of measurement is set. The display then switches to the setting for moisture level for automatic stop.

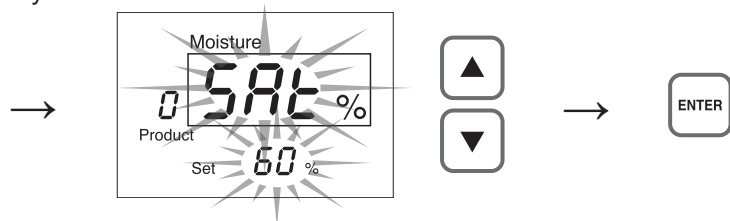
The number of seconds of measurement can be set in whole seconds anywhere from 0 to 999.

5-2-4. Setting the cool-down time

Procedure for setting the interval between completion of moisture measurement (in automatic measurement) and the POWER terminal cutoff — hereinafter described as “cool-down time”. When the initial display is shown, press the [ENTER] key while pressing the [▼] key.



The “SAT” signal, together with the current setting for the cool-down time (60 minutes in the initial setting), will start blinking. Set the correct number using the [▲] and [▼] keys, then press the [ENTER] key.



The cool-down time is set. The cool-down time can be set in whole minutes anywhere from 0 to 90.

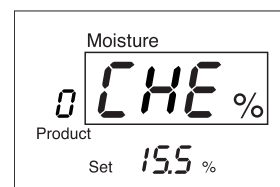
5-3. Checking PU-356 circuits

Checking PU-356 circuits.

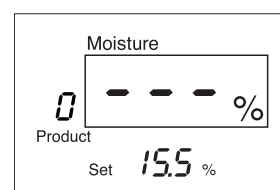
PRECAUTION : Before checking the circuits, make sure that there is no possibility that grain will be fed into the PU-356. If grain gets fed into the PU-356 during the checking process, it could register an error even though the circuits are normal.

(1) When the initial display is shown, press the [CHECK] key.

The display right will be shown, and checking will start.

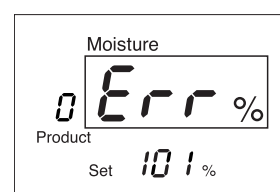


(2) The checking will last for about 20 seconds. If results are normal, the procedure will end and the initial display will be shown.



(3) In case of an abnormality, the display right will be shown.

(4) The error number (in this case, 101) will be shown at “SET” on the display. See “8. Error display” on p. 18 for error numbers.



(5) Press the [STOP] key to go back to the initial display.

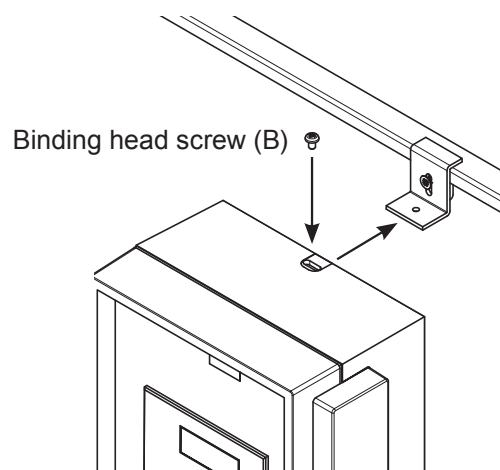
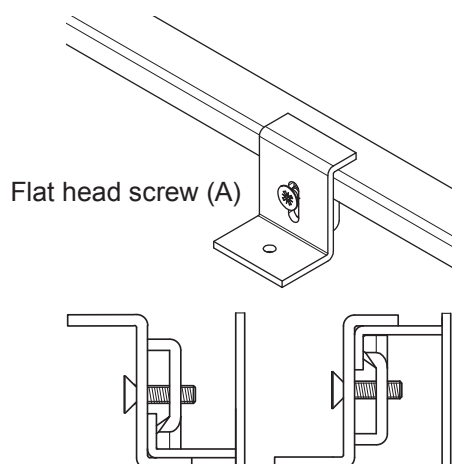
5-4. Installation (Example)

(1) Put a joint part of dryer between the metal fittings.

(2) Tighten the flat head screw (A).

(3) Insert the metal fittings to the main unit of PT-2700.

(4) Tighten the binding head screw (B).



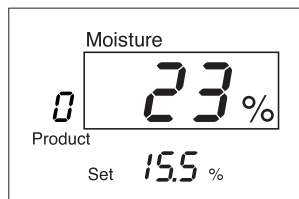
6. How to measure

6-1. Measuring the temperature

The display will show the temperature detected by the temperature sensor attached to the connecting cable.

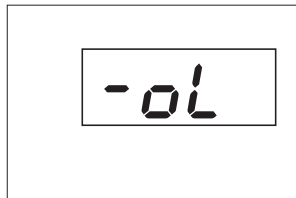
- (1) Press the [TEMP.] key to start measurement.

The temperature will be shown at "Moisture" on the display.

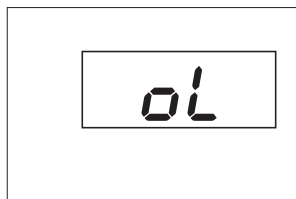


- (2) To stop measurement, press the [STOP] key and hold until the initial display is shown.

- (3) [-oL] will be shown when the temperature shows from -20°C to 0°C .



- (4) [oL] will be shown when the temperature shows from 50°C to 70°C .



- (5) [020] will be shown when the temperature shows less than -20°C .

[021] will be shown when the temperature shows over 70°C .

(See P.18 "8.Error display")

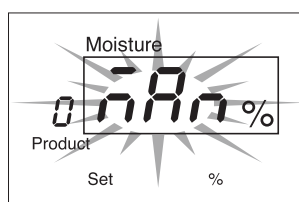
6-2. Manual measurement

Measures the moisture in circulation type grain a dryer or measuring scale by either the number of grains or by a preset number of seconds.

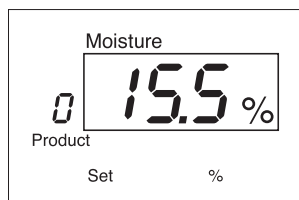
- (1) Set the number of grains to be measured, or the number of seconds for the measurement, as needed.

(See “5-2-3 Setting the mode for manual measurement” on p.10.)

- (2) Press the [M.START] key. The display will show “MAN” and the manual measurement will start. The moisture level set for automatic stop will disappear. When moisture measurement starts, “MAN” will start blinking.



- (3) When the measuring finishes, the moisture content will be shown on the display.



To discontinue the measurement, press the [STOP] key.
The initial display will reappear.

● Using the Timer terminal for manual measurement

Manual measurement can be done by switching off the Timer terminal and Signal Ground terminal. Conversely, manual measurement can be discontinued by switching them on again. In this event, to restart the manual measurement, wait for more than 2 seconds before switching off. In the following cases, before starting manual measurement with the Timer terminal, first switch both on, then wait 0.1 seconds and switch them off again.

- (1) If the terminals were both off when the power was turned on.
- (2) If measurement was started by using the Timer terminal and was completed normally.
- (3) If measurement was started by using the Timer terminal, and was discontinued with the [STOP] key. Note that when both the Timer and Signal Ground terminals are on, manual measurement won't start with the [M.START] key.

6-3. Automatic measurement

The moisture content in grain that is being dried is automatically measured, and when the moisture level is less than the level set for automatic stop, the OIL terminal will switch off. After the time set for cool-down has passed, the POWER terminal will switch off. (Ordinarily, the POWER terminal and OIL terminal are on.)

When the pickup motor is running during moisture measurement, the “Moisture” on the display will start blinking.

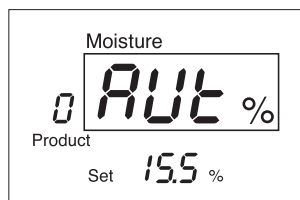
- (1) Set the moisture level for automatic stop, as needed.

(See “5-2-2 Setting the moisture level for automatic stop” on p.10.)

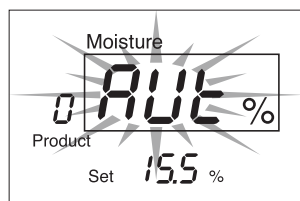
- (2) Press the [A.START] key. The display below will be shown.

When this display is being shown, PU-356 circuits are being checked. During that time, measurement can't be discontinued.

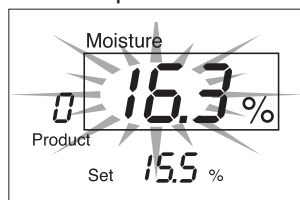
If the moisture level set for automatic stop has not been shown, it will be shown again.



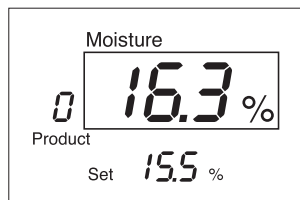
- (3) In about 20 seconds, the “Aut” signal will start blinking and moisture measurement will start.



- (4) Moisture will be measured repeatedly until the moisture level is less than the level set for automatic stop.



During the moisture measurement, the “Moisture” on the display will keep blinking.



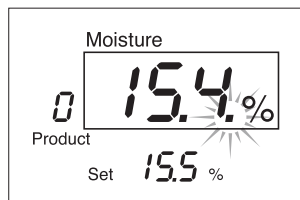
To discontinue the measurement, press the [STOP] key.

The initial display will reappear.

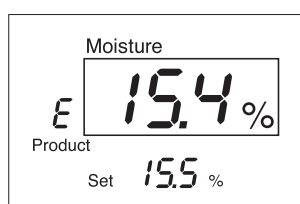
(Continued on next page)

(5) The moisture measurement will end when the moisture level is less than the level set for automatic stop.

The OIL terminal will switch off, and the dot at “Moisture” on the display will start blinking.



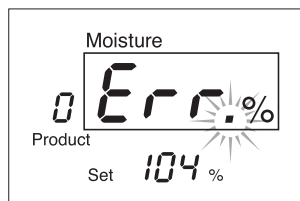
(6) When the time set for cool-down has passed, the POWER terminal will switch off ; the “E” will be shown at “Product” on the display.



(7) If the [STOP] key is pressed after either (5) or (6), the initial display will reappear.

The POWER terminal and OIL terminal will be switched on.

- If an error has occurred during measuring, it will be shown on the display, and the dot at “Moisture” will start blinking. At this time, the OIL terminal will switch off.



When the time set for cool-down has passed, the POWER terminal will switch off, and the “E” will be shown at “Product” on the display.

If the [STOP] key is pressed, the display will go back to the initial display, and the POWER terminal and OIL terminal will switch on.

If the [STOP] key is pressed when the dot at “Moisture” on the display is blinking, the initial display will reappear, and the POWER terminal and OIL terminal will switch on.

6-4. Resetting

During measurement, when an error has been shown, or when measurement has become difficult, the operation can be forced to shut down.

Press the [RESET] key for 2 seconds or more to stop the operation. The device will reset to initial state when the power is turned on.

7. Communicating to computer

The PT-2700 can send out measurement data to a computer by using the RS232C (TX) terminal and the Signal Ground terminal. To connect with a computer, connect the RS232C (TX) terminal to the RxD of the RS-232C connector on the computer, and the Signal Ground terminal to the GND.

7-1. Specifications for RS-232C communication

Communication method	: RS-232C
Communication form	: start-stop synchronous communication
Baud rate	: 9600bps
Data bit	: 8 bits
Parity	: none
Stop bit	: 1 bit

7-2. Computer output format

* *The number in parentheses indicates the number of bytes.*

■ Moisture data

1. STX(1) + moisture data (3) + temperature data (3) + "0" (1) + ETX (1)
2. When mean in manual measurement, and mean of initial moisture in automatic measurement
STX(1) + moisture data (3) + temperature data (3) + "A" (1) + ETX (1)

■ Temperature data

1. When a temperature sensor is between 0 °C and 50 °C:
STX(1) + "000" (3) + temperature data (3) + "0" (1) + ETX (1)
2. When a temperature sensor is between -20 °C and 0 °C:
STX(1) + "000" (3) + "—" (3) + "0" (1) + ETX (1)
3. When a temperature sensor is between 50 °C and 70 °C:
STX(1) + "000" (3) + "+" (3) + "0" (1) + ETX (1)

■ Error codes

1. STX(1) + "ERR" (3) + Error code (3) + "0" (1) + ETX (1)

■ Data information

1. STX (0x02) : start of data
2. Moisture data : decimal points for moisture omitted, transmitted in ASCII code
3. Temperature data : decimal points for temperature omitted, transmitted in ASCII code
4. Error codes : transmitted in ASCII code
5. ETX (0x03) : end of data

8. Error display

When an error is shown, follow the relevant instructions to resolve.

Error No.	Problem	How to resolve
001	Connecting cable is not properly connected, or is broken.	Turn off power to PT-2700. Check the connection of the connecting cable. After connecting it properly, turn on the power. If that doesn't solve the problem, the cable may be broken.
010	At the start of automatic measurement for moisture, the number of grains that were tested in each of three measurements was less than two.	Reset with the [STOP] key. Clean the grain intake on PU-356.
011	In automatic/manual measurement, there was no grain feed for more than five minutes.	
020	The temperature of the temperature sensor shows less than -20°C .	Reset with the [STOP] key. Use the device within the range of the operating temperatures of the temperature sensor (-20°C to 70°C).
021	The temperature of the temperature sensor shows over 70°C .	
030	Abnormal data	Reset with [STOP] key.
040	Abnormal memory	Turn the power to the PT-2700 off and on.
101	Abnormal PU-356 circuits (1)	Reset with [STOP] key. Clean the measurement roller of PU-356. If that doesn't solve the problem, PU-356 circuits are defective.
102	Abnormal PU-356 circuits (2)	
103	Abnormal PU-356 circuits (3)	
104	Motor lock	



KETT ELECTRIC LABORATORY

1-8-1 Minami-Magome Ota-Ku,Tokyo 143-8507 Japan
Tel.+81-3-3776-1121 Fax.+81-3-3772-3001
URL <http://www.kett.co.jp/> E-mail overseas@kett.co.jp