Kett

Near Infrared Grain Tester
AN-820

Operating Manual

Thank you for purchasing this product.
Please read the operating manual carefully and use this product properly.

Contents

1. Features

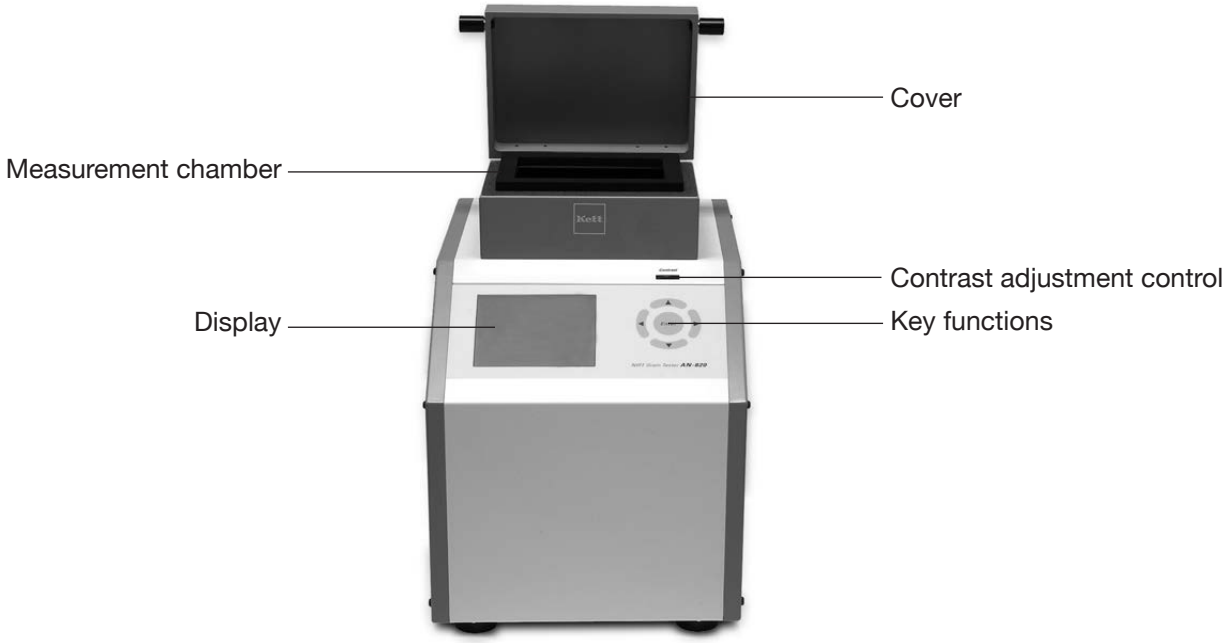
The Model AN-820 composition analyzer is a desk top grain tester (Transmittance type) that utilizes applied near-infrared rice analysis technology.

It employs total-grain measurement formulas for measuring without crushing the sample grain to pieces, so it makes it possible to analyze grain quickly and easily.

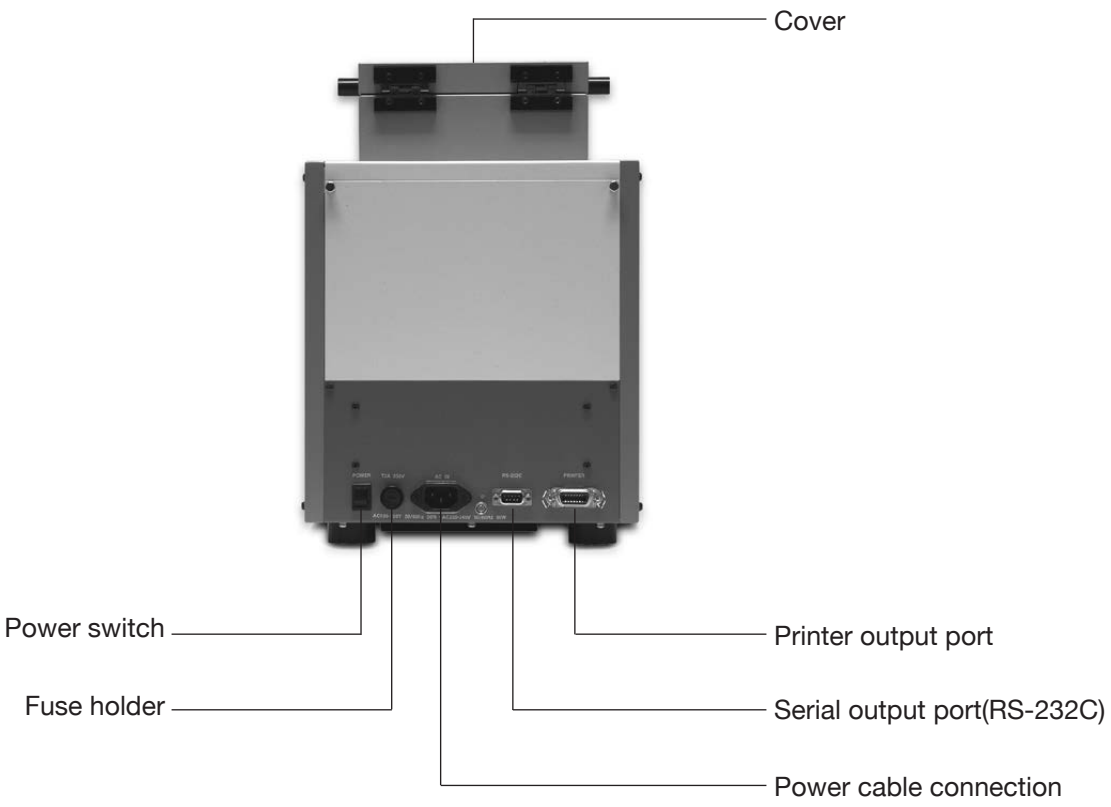
By utilizing tungsten lamp, grating system and NMOS photo-diode array detector, and the result is that we are able to achieve high stability.

2. Main unit & Parts names

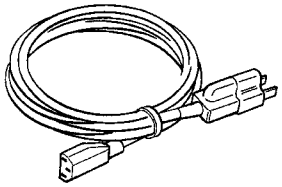
< Front side >



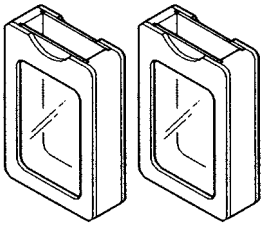
< Rear side >



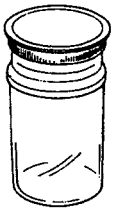
[Accessories]



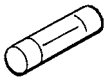
Power cable



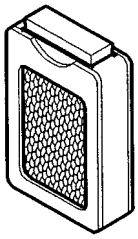
Sample case ×2



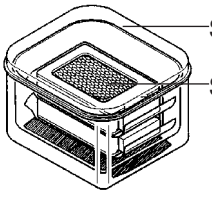
Sampling cup



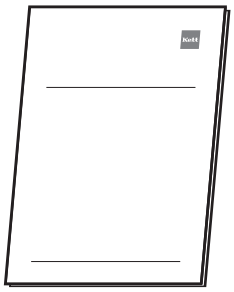
Fuse



Standard samples
(Brown rice / Milled rice)



Storage container for standard samples



Operating manual

3. Specifications

Measurement Method : Near Infrared Transmittance

Light Source : Tungsten lamp (lamp life 20,000hrs)

Applications & Display range :

CH	Application	Protein	Moisture	Amylose (Reference)
1	Short Brown Rice 2	4-10%	10-20%	15-25%
2	Short Milled Rice 2	4-10%	10-20%	15-25%
3	H-Moist Short B.R.	4-10%	10-35%	–
4	R.F.R.-B.G. 2	4-10%	10-20%	15-25%
5	R.F.R.-TWR 2	4-10%	10-20%	15-25%
6	Long Brown Rice	4-12%	10-20%	–
7	Long Milled Rice 2	4-10%	10-20%	0-30%

Sample Volume : Approx. 60mL

Calibration Memory : 4 constituents × 8 channels

Measurement Time : Approx. 40 sec

Operating Environment : 10 - 35°C (Non-condensation)

Display Format : 320 × 240 dot-matrix large-size LCD

Displays Content : Calibration settings / names, Protein, Moisture,
Amylose (reference value), Quality Evaluation Value (Q.E.V)

Power Source : AC100V - 240V (50/60Hz)

Power consumption : 50W

Dimensions : 260(W) × 350(D) × 380(H)mm

Weight : 13kg

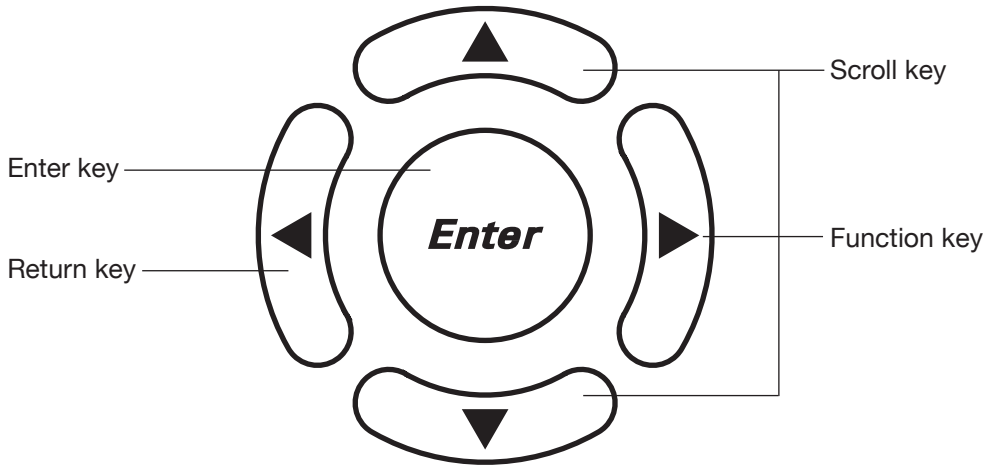
Accessories : Power cable, Sample case ×2, Sampling cup, Fuse,
Standard samples (Brown Rice, Milled Rice),
Storage container for standard samples, Operation manual

Option : Data Logger software NDL-02, Printer VZ-810 (100-240V)

Note : AN-820 should be used below 35°C in environment condition. If the environment temperature is over 50°C, the precision spectroscope would be damaged. And The AN-820 should be also storaged below 50°C environment condition.

Note : A backup battery has been built to this unit so that even if the electricity is cut-off, the calibration in memory will not be lost. Please contact the service desk of our company regarding an replace of backup battery.

4. Keypad Explanation



Enter key : Press this key when you begin measuring or you want to execute or confirm a selected item.

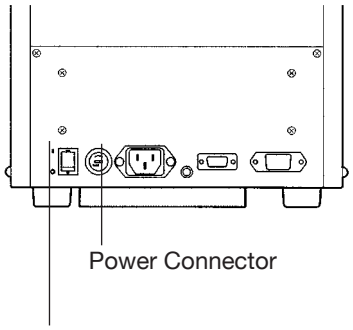
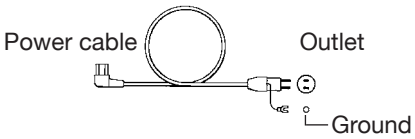
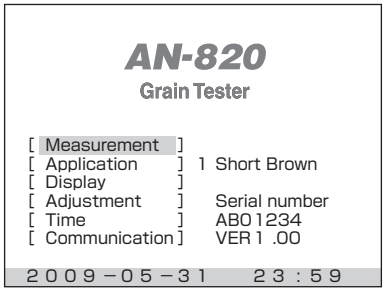
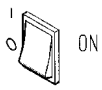
Return key : Press this key when you want to return to a previous screen or when you want to invalidate a selected item.

Scroll key : Press this key when you are selecting an item at the top of the screen or when you want to increase or decrease a numerical value.

Function key : Press this key when you will use a function that was specially set-up at the top of the screen.

5. Preparation

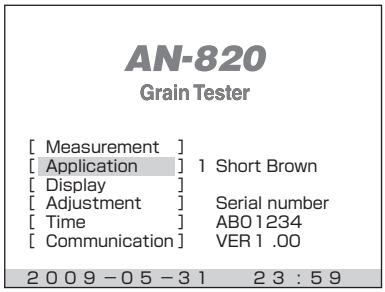
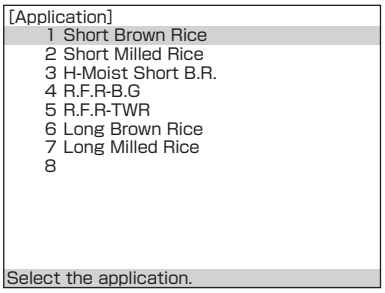
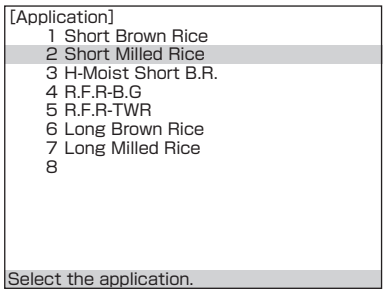
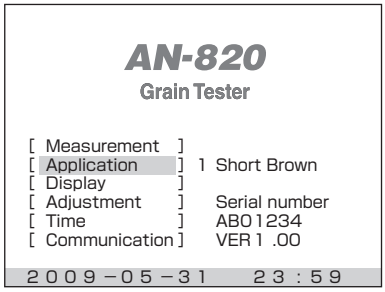
5-1. Power ON

Operation	Display	Explanation
1. Plug the power cable into this unit and connect it to outlet.		 
2. Turn the power switch “ON”, which is located rear side. ☞ Initial screen will be displayed.		 [|] means, turn [ON]  [○] means, turn [OFF] **In case that the screen isn’t Showing or is hard too see, adjust the “Contrast set dial” on the bottom of unit by turning it until thr screen is easy to see.**

Note : Approximately one hour before operation, turn the power “On”, and begin warming up the device.

5-2. Calibration Selection

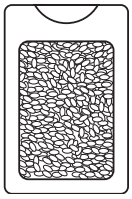
With near-infrared composition analyzers similar to this unit, you prepare each pre-calibration and then analysis compositions. AN-820 has an eight channel capacities and pre-calibrations is done by our company. Before starting analysis, please select a proper calibration according to the grain you want to measure.

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Calibration” setting.		
2. Press the Enter key. ☞ The list of pre-calibration is displayed.		The existing, selected Calibration is diplayed.
3. Select a calibration by using ▲▼ keys.		
4. Press the Enter key. ☞ Calibration will be selected and back to initial screen.		

Note : A backup battery has been built to this unit so that even if the electricity is cut-off, the calibration in memory will not be lost. Please contact the service desk of our company regarding an replace of backup battery.

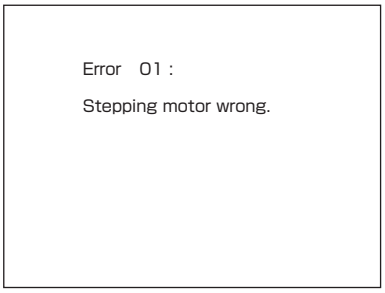
6. Measuring Procedure

6-1. Measuring

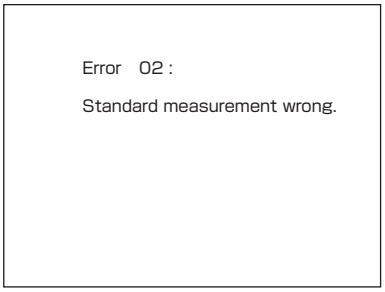
Operation	Display	Explanation
1. By using ▲▼ keys, select the “Measurement” setting.	AN-820 Grain Tester [Measurement] [Application] 1 Short Brown [Display] [Adjustment] Serial number [Time] AB01234 [Communication] VER1 .00 2009−05−31 23:59	
2. Set the sample case and close the cover, and press the Enter key.	[Measurement] Application 1 Short Brown Measurement in progress... Dark ⇩ [Measurement] Application 1 Short Brown Measurement in progress... Reference ⇩ [Measurement] Application 1 Short Brown Measurement in progress... Sample 1/5 ⇩ [Measurement] Application 1 Short Brown Number of measurement times = 1 Q. E. V 76 Protein 6.0 % Protein CM @15.0 5.9 % Protein DM 7.0 % Moisture 14.0 % Amilose 20.7 % ▶Display the average.	 Pouring the sample into the sample case. Strongly tap the bottom of the sample case approx. 10 times in order to make the sample settle firmly. Add additional sample, if thre is empty space at the top. Never open the cover during Measurement. Measurement of built-in standard is in progress. Measurement of sample grain is in progress. Five different parts of sample grain should be measured at one measurement. Remove the sample case after measuring compositions. Press the Enter key, if you want to measure next sample continiously. If press the ◀ key, initial screen will be displayed.

Note : During and /or measurement, there are times when the following messages will be displayed.

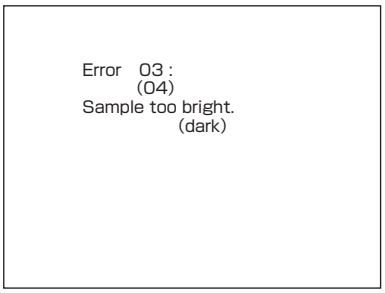
In whichever case except Error 09, press ◄ key, and redo the measurement from the very beginning.



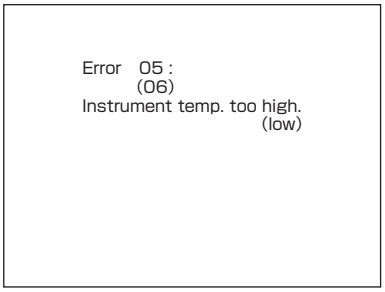
This message appears when stepping motor which works for transporting sample grain case for measurement is wrong thus sample case may stop moving on the way for measurement.



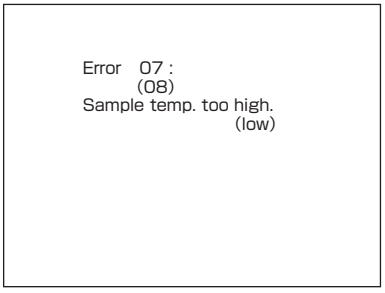
This message appears when built-in standard is wrong.



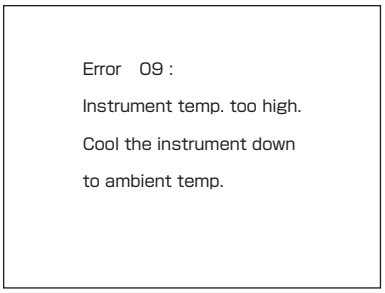
This message appears when the penetration rate of light from the sample is either greater or less than the permissible range.



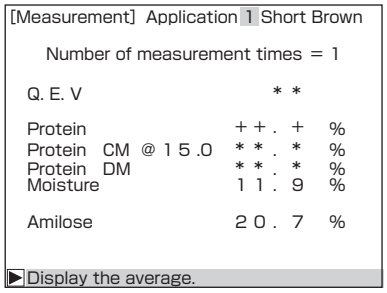
This message appearts when the temperature of the operating environment is either higher or lower than the permissible range.



This message appears when the temperature of the sample is either higher or lower than the permissible range.



This message appears when the temperature in Spectrophotometer is over 45°C and the power is forcibly turned off. In this case, the instrument should be cooled down by leaving it under airy place until it reached to the ambient temperature. The power should be on after confirming that the instrument temperature is cooled down to the ambient temperature.



++.+ : Over the upper limited of Display range.

−−.− : Under the lower limited of Display range.

** : When the caliculation is not available.

Note : AN-820 utilizes a transmittance measurement method, empty space in the sample cases will lead to measurement errors. It is important into the sample case firmly in such a way that there are no empty spaces.

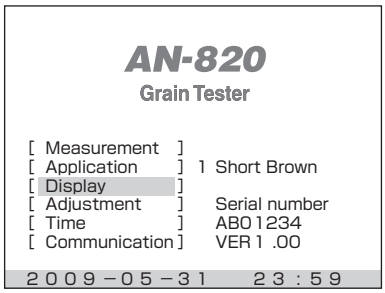
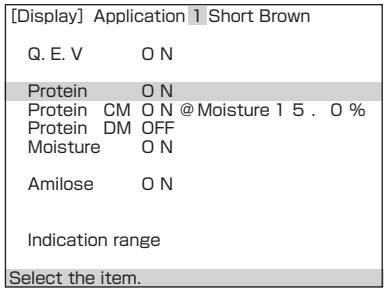
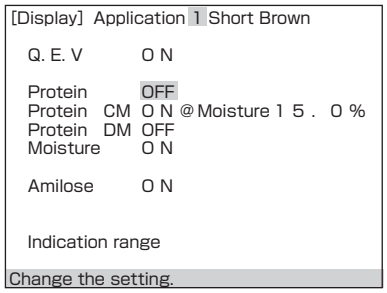
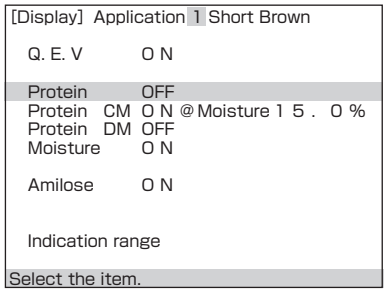
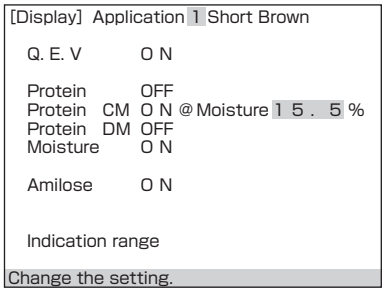
Note : A temperature sensing element is inserted into an opening in the bottom of the sample case in order to measure the temperature of the sample and perform temeprature compensation. However, in order to obtain the most precise measurement results, it is best if different temperarure between the sample and the environment in which the unit is installed are kept to a minimum.

Note : AN-820 should be used below 35°C in enviroment condition in order to equip precision spectroscope which would be damaged in high enviroment condition.

6-2. Average Display

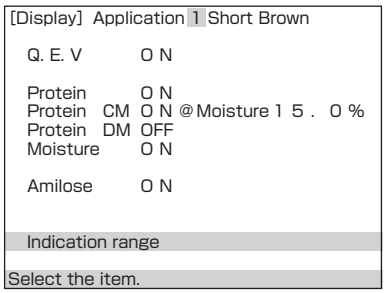
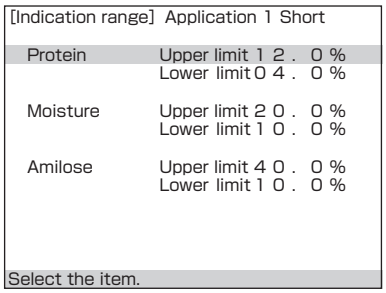
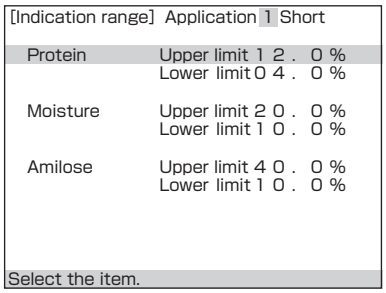
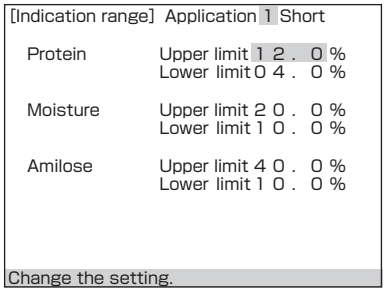
Operation	Display	Explanation
1. When performing repeated measurements the number of times measured increase. (1~9)	[Measurement] Application 1 Short Brown Number of measurement times = 1 Q. E. V 74 Protein 6.3 % Protein CM @ 15.0 6.3 % Protein DM 7.3 % Moisture 14.2 % Amilose 21.5 % Display the average.	Following the 9th measurement, the counter will automatically reset and start over at 1. In addition, at the times when you press the ◀ key or ▶ keys, the next measurement will become the first.
2. Press the ▶ key, the average value based on those repeated measurements will be displayed.	[Measurement] Application 1 Short Brown Average Number of measurement times =1 Q. E. V 75 Protein 6.2 % Protein CM @ 15.0 6.1 % Protein DM 7.2 % Moisture 14.1 % Amilose 21.1 % Displaying the average.	On this screen, if the Enter key is pressed, a new measurement can be performed. When the average value is displayed, the counter resets and the next measurement becomes the first one. If the ◀ key is pressed, the initial screen will be displayed.

6-3-1. Setup the Dislay Conditions

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Display” setting.		
2. Press the Enter key. And select a item you want to change by using ▲▼ keys.		In case “Display” is ON.
3. Press the Enter key, and select either the “Display” or “Don’t Display” choice for each item by using ▲▼ keys.		In case “Display” is OFF.
4. Press the Enter key.		If you want to set another choices, repeat operation procedure 2~4. If you press the ◀ key, the initial screen will be displayed.
In addition to the protein CM ON, pressing Enter key will allow you to set the “@ moisture %” for calculating the protein CM by using ▲▼ key. And press the Enter key.		“@ Moisture %” is changeable. While you press the ▶ key, you can increase and decrease the values quickly with ▲▼ keys.

CM(Constant Moisture basis)
DM(Dry Moisture basis)

6-3-2. Setup the Indication Range

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Indication range” setting.		
2. Press the Enter key.		
3. By using ▲▼ keys, and choose items, and press the Enter key.		In case “Protein Upper” is selected.
4. Change the value by using ▲▼ keys until the fixed and press the Enter key.		If you want to set another choices, repeat operation procedure 2~4. If you press the ◀ key, the initial screen will be displayed.

(1) Protein CM Display (CM : Constant Moisture basis)

AN-820 's protein content shows the percentage contain in terms of whole grain, including moisture. This altenative is convenient at times, when you are, for example, calculating the weight of protein inside grain that was measured. But when you compare proteins among many different moisture is contained, there are times when it is convenient to assume the fixed moisture content. This consideration is "CM Protein" which is displayed as protein conversion by assuming the fixed moisture content (with AN-820, this is the same as the "@ Moisture %" is specified). When the fixed moisture content is assumed to be " 0% ", this is referred to as a "dry conversion" (DM : Dry Moisture Basis)
The conversion formula is as follows, so if Protein, Moisture, and / or "@ Moisture %" are set incorrectly, The "CM Protein" conversion value will not be displayed correctly.

$$\text{Protein CM} = \frac{\text{Protein} \times (100 - @\ \text{Moisture}\ \%)}{100\text{-Moisture}}$$

(2) Calculation of Q.E.V. (Quality Evaluation Value)

Calculation of Q.E.V is based on moisture and Protein (as is) when "Protein CM" is not set.
When moisture is set under 10% and "Protein CM" , Q.E.V is calculated based on Moisture and CM (as is). When Moisture is set over 10%, and "Protein CM" , Q.E.V is calculated based on preset Moisture and Protein (CM).

6-4. BIAS Adjustment

With a rice-analysis device that applies Near-Infrared method like this unit, there are times when the extended use of light-emitting parts, sensors, etc. experiences minor changes that happen over time that can cause the measurement value to change. The difference between AN-820 's measurement value and composition values of standard samples (The known sample from the previous correct composition value) is referred to as the bias.

To adjust bias of the unit, there are two models manual or automatic.
To set unit manually, prepare several standard samples which should be different values per each composition, performing measurement as usually several times. And then calculate requested bias per composition by manual.
To set unit automatically, prepare one standard sample, and as you measure according to display, the automatic bias adjustment should run smoothly.

Note : With the automatic adjustment, you need only one standard sample, so it is often convenience to do, but you need to be careful of doing the adjustment incorrectly when making mistakes with standard sample or doing other things to throw off the results.

(1) Manual adjustment mode

With manual setting, prepare 3 or 5 samples and calculate the difference between average value of AN-820 and average value of standard samples for each composition. Because this alternative uses multiple samples to perform the bias adjustment, it is able to perform more accurate bias adjustment than automatic adjustment.

Example of calculating Protein value and Performing Manual setting

In case of 3 type of sample (as Standard Samples)

• Measure samples to be tested 3 times each by AN-900 and culculation

Protein Values	A	B	C
1th time	6.3	5.4	7.0
2th time	6.4	5.3	7.0
3th time	6.2	5.3	7.1
Average	6.3	5.3	7.0

Average of 3 sample' s average (6.3+5.3+7.0)/3= **6.2**

• Calculate average of standard sample' s values (as standard samples)

	A	B	C
Protein of standard sample	6.8	5.6	7.4

Average of satandard sample' s (6.8+5.6+7.4)/3= **6.6**

• Calculate BIAS value

BIAS value = AV. standard samples - AV. measurements

0.4 = 6.6 - 6.2

0.4 is diecided as BAIS value

BIAS procedure is shown on the next page

When you can not prepare more than one standard sample

In order to perform accuracy and successful bias adjustment, we recommend the alternative where you need 3 or 5 samples as standard samples, as is mentioned above. However, in case that you only have one standard sample, as s simple alternative, you measure it three time, and calculate average, and decide BIAS value.

• Measure samples to be tested 3 times each by AN-900 and culculation

Protein average of measured values by AN-900 **6.3**

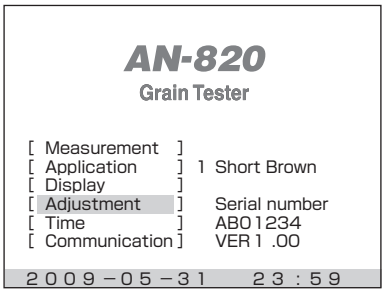
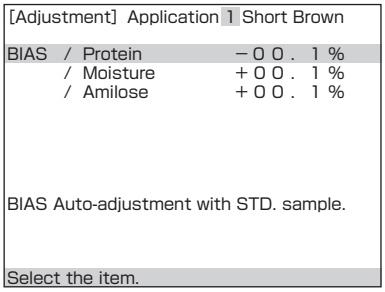
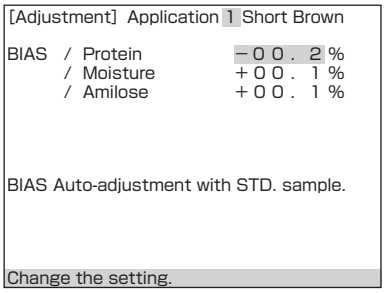
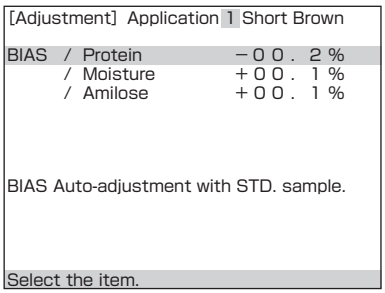
• Refer to standard sample protein value **6.8**

• Calculation bias value

BIAS value = Standard value of sample - AV. measurements

0.5 = 6.8 - 6.3

0.5 is diecided as BAIS value

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Adjustment” setting.		
2. Press the Enter key. And select item by using ▲▼ key.		
3. Press the Enter key. And change bias value by using ▲▼ keys.		While you press the ▶ key, you can increase and decrease the values quickly with ▲▼ keys.
4. Press the Enter key.		If you want to set another choices, repeat operation procedure 2~4. If you press the ◀ key, the initial screen will be displayed.

Note : Sometimes, BIAS adjustment doesn’t run correctly - For example when the windows on sample case is dirty or when the sample becomes rather damaged. If it get dirty, measure after wiping the dirt off of it. In case that the sample is damaged, you would be replaced new standard sample.

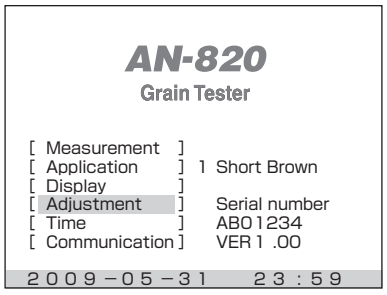
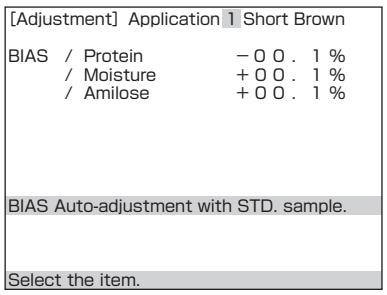
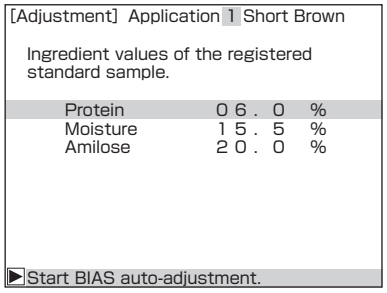
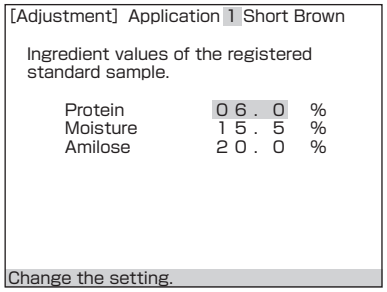
Note : BIAS value is also acceptable with minus, instead of plus.

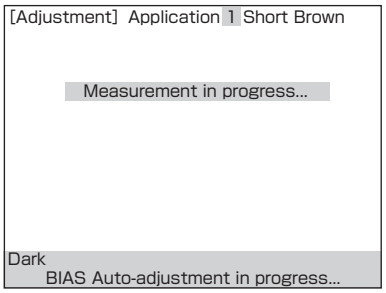
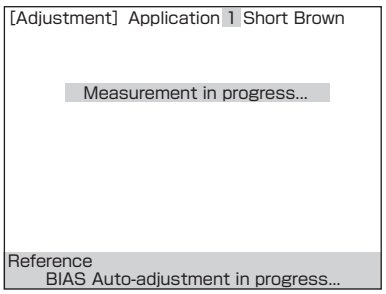
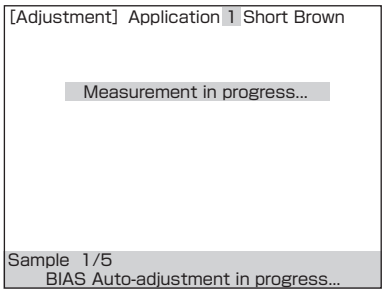
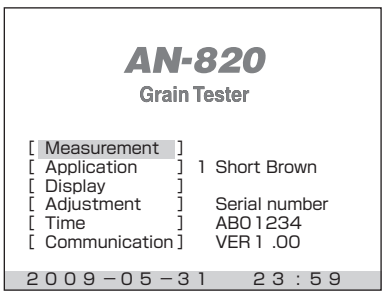
BIAS = AV. Standard - AV. Measurements

- 0.5 = 6.1 - 6.6

In case of BIAS value is mius -0.5

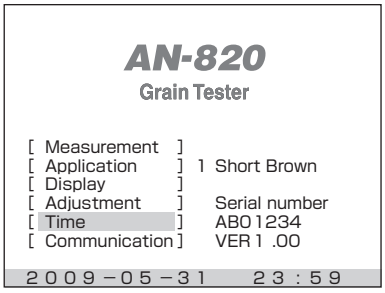
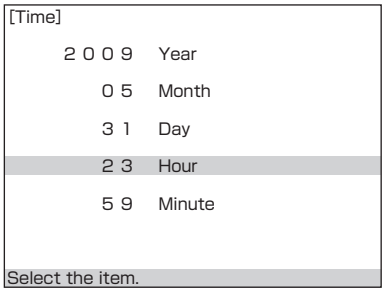
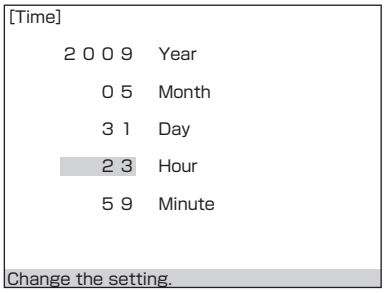
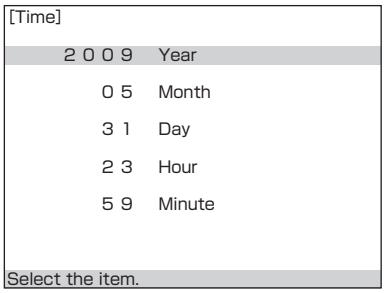
(2) Automatic adjustment mode

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Adjustment” setting.		
2. Press the Enter key, and select “Automatic adjustment” by using ▲▼ keys.		
3. Press the Enter key.		
When you want to adjust individual composition values,use ▲▼ keys, and change the highlighted composition. Then press the Enter key. Using ▲▼ keys, you will be able to revise the values. When they are to your selection, press the Enter key.		While you press the ▶ key, you can increase and decrease the values quickly with ▲▼ keys.

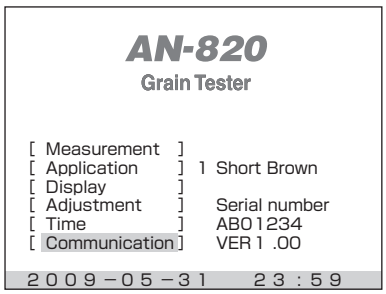
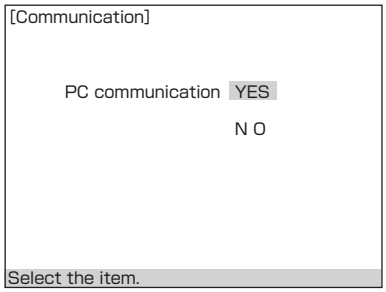
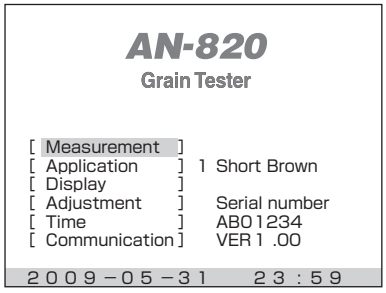
Operation	Display	Explanation
4. After confirming both composition values are correct, and press the ▶ key.		Never open the cover during Measurement.
		Measurement of built-in standard is in progress.
		Measurement of sample grain is in progress. Five different parts of sample grain should be measured at one measurement.
		After completing Auto Adjustment, the screen will be back to initinal screen.

Note : Sometimes, BIAS adjustment doesn't run correctly - For example when the windows on sample case is dirty or when the sample becomes rather damaged. If it get dirty, measure after wiping the dirt off of it. In case that the sample is damaged, you would be replaced new standard sample.

7. Time settings

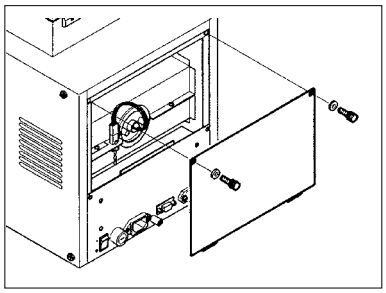
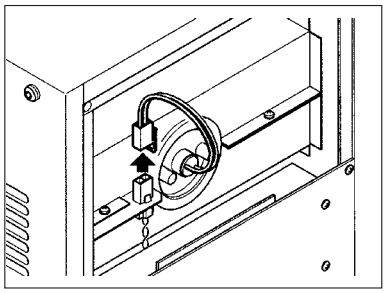
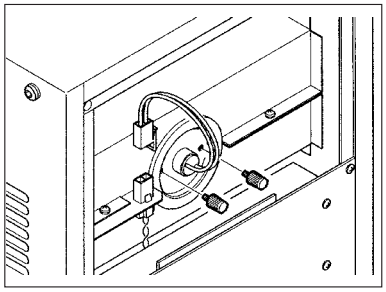
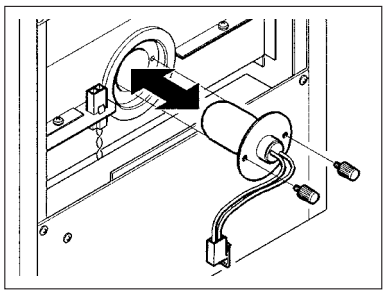
Operation	Display	Explanation
1. By using ▲▼ keys, select the “Time” setting.		
2. Press the Enter key. And select item by using ▲▼ key.		
3. Press the Enter key. And change bias value by using ▲▼ keys.		While you press the ▶ key, you can increase and decrease the values quickly with ▲▼ keys.
4. Press the Enter key.		If you want to set another choices, repeat operation procedure 2~4. If you press the ◀ key, the initial screen will be displayed.

8. Communication

Operation	Display	Explanation
1. By using ▲▼ keys, select the “Communication” setting.		
2. Press the Enter key. Select “YES” by using ▲▼ keys.		If the “YES” is selected, RS-232C port which is located rear-side on chamber is available to use PC.
3. Press the Enter key. The initial screen will be displayed.		

9. Replacment for lamp

AN-820 uses tangsten lamp as an optical power.
In case that lamp goes defective, replace lamp according to the following procedure.

Operation	Display	Explanation
1. Turn the power switch “OFF”.	 [○] means, turn [OFF]	
2. Remove cover behind main body by loosing two screws.		
3. Remove lamp connector .		
4. Remove two lamp fix screws.		
5. Put new lanp into the correct position and fix two lamp fixing screws. Connect lamp connector and put cover and two cover screws.		

Note : Whenever the lamp is replaced, Bias adjust should be done.

10. Cleaning

When the surface of AN-820 is found dirty, wipe it by soft cloth. If extremely dirty, wipe with wet cloth.

Note : Do not use any volatile chemicals such as a thinner or benzene.

Note : While measurement is in progress, some grain sample may be spilt out and is dropping on the tray of the bottom of AN-820.
From time to time, remove the tray and dump spilt sample grain.

<Appendix >Guidelines for using AN-820 with Maximum Accuracy

1. Preface

In order to keep the minor changes' effects on the measurement to a minimum, please be sure to carry out the standard check based on the standard sample at times again when, for example, the multiple people take the measurements or there is a power failure during the measurements or when you believe the results to be doubtful or in accurate.

2. Check for standard sample

(1) Standard sample

As a standard sample, short brown and milled rice are included.

(2) Standard value

Before supplying standard samples, the composition values of standard samples have been recorded were tested at company to confirm the values and then decided upon.

(3) Storage condition of Standard Sample

Standard samples should be stored in cool, dark area like a refrigerator at between 5°C~10°C. The sample we have supplied has a usable priod, but this presupport its being stored in cold storage are. It is possible that storing the date in an warm or room temperature area will cause the standard value changes so please be sure to store it in cool, dark area. Also, be aware of the mentioned valid period of time concerning the life of the standard sample, and try to use extremely new grain as the standard sample.

Note : Don' t freeze standarad sample and put them in freezing-cold strage are like a freezer.

(4) Measure the standard sample

More than half a day before performing the measurements, take standard sample out of the cold, dark area and put it in the same environment as AN-820. After the sample returns to normal temperature, perform measurements. Measure the standard sample 3 or 5 times, find th average values for each composition, and then compensation of each. For example, in case of moisture as follows.

	Standard	AV. measurement	Difference
Standard sample	16.0%	16.2%	0.2%

Here, the difference is 0.2%, so if it is in th normal use mode, there is no need to run the bias adjustment. If the difference exceeds 0.2%, however, perform the comparrison again with the same formula. If after doing that the result are again exceeding 0.2%, perform a bias adjustment. Refere to "6-4 BIAS Adjustment" on P16.

Composition	Difference of limit (if value exceeds this, perform BIAS)
Protein	0.3%
Moisture	0.2%
Amylose (Ref)	1.0%

To the best of our abiliies, we have deemed the limit values printed above to be sandard. Selectable limit values that you will perform fixed bais adjustments on depending on the type of room in which you are using it.h

Notes

- Copying some or all of the contents of this user manual without prior written consent is strictly prohibited.
- The contents of this user manual may be changed at any time in the future without any prior notice.
- The appearance and/or representations of the products and parts depicted in this user manual may not appear exactly as their actual counterparts, but this does not affect their operation or functionality.
- This user manual was intended to be written as clearly and accurately as possible. However, if you are unclear about anything in this user manual or notice any missing information, please contact us directly.
- We cannot be held responsible for any actions or effects resulting from the execution of any operations outlined in this user manual.

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