



BGK-408
VW Readout Box
Instruction Manual
(Rev E)

China Genkon Instruments Co. Ltd.
www.geokon.cn

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1 .Main Function

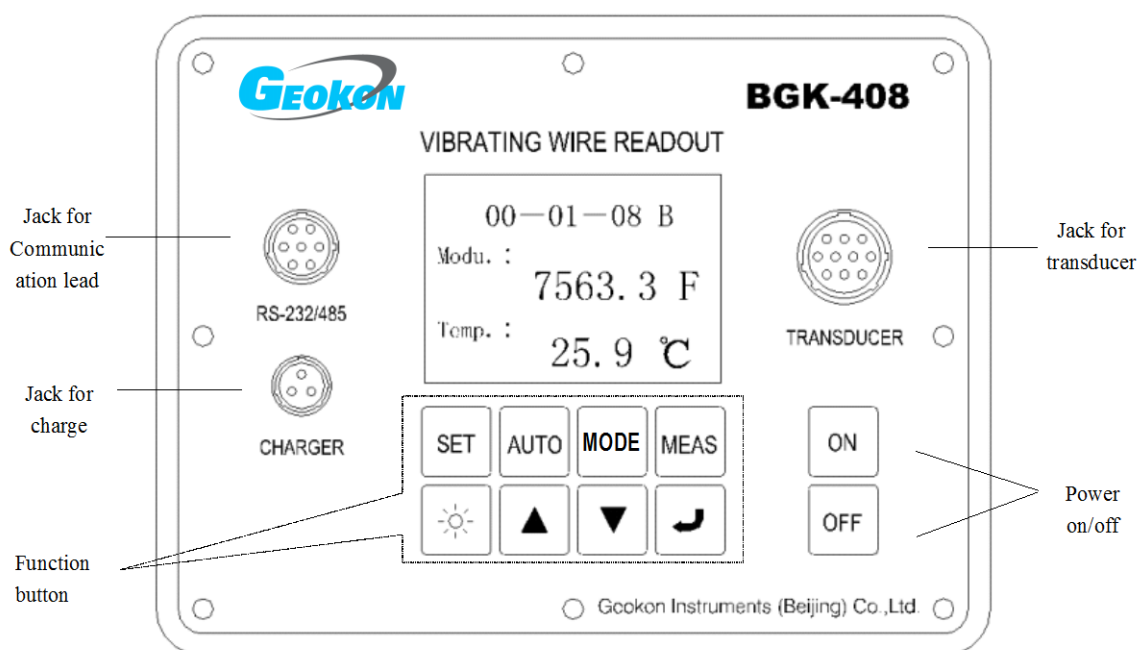
BGK-408VW Readout Box is manufactured by China Genkon Instruments for matching the VW transducers. The main characters are:

- 1) The complete sealed and portable construction, the pellicle and water-proof panel and a big and apheliotropic screen LCD can make the readout box work under any weather condition;
- 2) By alternative operation with hand or machine, the user can set the original parameters and work condition at will according to the suggestion show in the menu;
- 3) Such shortcut keys as **【✱】**, **【MEAS】**, **【POS】**, **【AUTO】** can improve the working efficiency;
- 4) The inner data storage with big capability can store the measurements while displaying the data, and can store 1920 pieces of instruments at most;
- 5) By the computer and the relative communicate software, the RS-232C communication port can realize the readout box controlling, real time measuring, parameter updating, data communicating and some other functions;
- 6) By RS-485 communication port, the readout box can be connected to BGK-AC Terminal Box without any sew;
- 7) The referential information about the outer power, inner battery and the voltage are shown completely and exactly;
- 8) High accuracy and stability;
- 9) Turn off automatically if no operation in a long time;
- 10) The big capability Li-battery can ensure the long and steady work。

1.1 BGK-408 Front Panel

BGK-408 VW Readout Box uses pellicle keys, there are **【ON】**, **【OFF】**, **【✱】**, **【MEAS】**, **【POS】**, **【AUTO】**, **【MENU】**, **【▲】**, **【▼】**, **【SET】**, among which **【✱】**, **【MEAS】**, **【POS】**, **【AUTO】** are shortcut keys, and **【MENU】** can realize the parameters setting, and **【▲】**, **【▼】**, **【SET】** are used as key combination. BGK-408 Front Panel is composed of the following parts; please refer to P-1:

- a) 128×64 lattice LCD, which can show four rows of characters;
- b) “TRANSDUCER” is for connection of the transducers;
- c) “CHARGER” is the charger jack for the inner battery or outer power supply;
- d) “RS-232/485” is for connection of the communication wire and terminal box or PC;
- e) 【ON】【OFF】 is for turning on and off the power;
- f) 【SET】 is for setting the parameter;
- g) 【AUTO】 is for the automatic measuring and storing data after connecting BGK—AC;
- h) 【POS】 is for the range setting of frequency sweep of different sensors;
- i) 【MEAS】 is used in normal condition and when data storing is needed;
- j) 【☀】 press once to turn on the apheliotropic and another to turn off.
- k) 【▲ ▼】 is for address storage and the combination use when setting the mode or the menu;
- l) 【↵】(Enter) is for data storage confirmation under measuring status and is for optional item switch or confirmation under the setting status.



P-1 BGK-408 Operation Panel

Once turning on, press any key the inner buzzer will sound, and meanwhile the information will show on LCD to respond the operation.

Note: Though the operation panel of BGK—408 uses pellicle key, do not use nail or other

hard things to press to avoid the keys distortion or uselessness.

1.2 Port Introduction

1.2.1 Transducer Port

BGK-408VW Readout Box is equipped with special cable, one end is a ten-core aero-jack connected to “TRANSDUCER” and the other end is clips with five colors of leads, among which the “red” and “black” leads are connected to the VW signal output end, and “green” and “white” leads are connected to the temperature signal output end of instruments; And all the leads above are not in polarity division, thus the connection position can be changed. That is, “red” and “black” can be changed and “green” and “white” can be changed. The yellow lead clip is used to connect with the shielding line of instruments.

When use China Genkon Instruments, all the clips are connected to the wire with the same color.

1.2.2 Communication Port




BGK-408VW Readout Box has RS-232C and RS485 port, and there is an obvious sign “RS-232/485” in the corresponding position on the panel.

By the special cable, can realize:

- a.) RS—232C connected to PC or nine-core of RS232;
- b.) RS—485 connected to BGK-AC Terminal Box.

1.2.3 Outer Power Port

BGK-408VW Readout Box has a port for outer power, and there is an obvious sign “CHARGER” in the corresponding position on the panel.

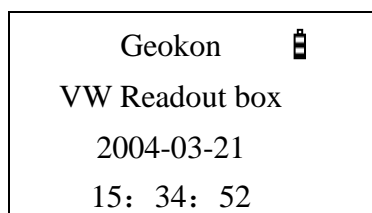
When outer power supplies, there will be a signal of “” shown on LCD, and the inner spare battery supplies, there will be a signal of “” shown on LCD, while the voltage is not enough, there will be “”. When the outer power is connected, it will also charge the inner spare battery until to the upper limit of the voltage and turn off automatically to protect the battery from over-charge.

There will be no difference for the measuring results no matter use the outer power or the battery to supply BGK-408.




2 Beginning

2.1 Getting started

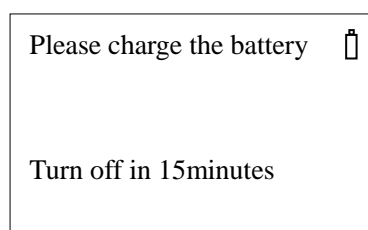
Press “ON” and BGK-408VW Readout Box will start, there will show the following interface on LCD, and if it has been connected to the instruments before started, it will be in measuring function directly.



P-2 Interface after getting started

Once BGK-408 is getting started, the inner system will do self-checking automatically, and the items include storage、battery voltage and real time clock. The sign “” on the upper right corner shows in the model of battery supply (“” means battery under voltage), The sign “” shows the readout box in charging status and outer power is connected.

When the battery is not enough and no outer power, there will show the following interface as P-3, and the readout box will turn off automatically in 15m, now it should be recharged in time.



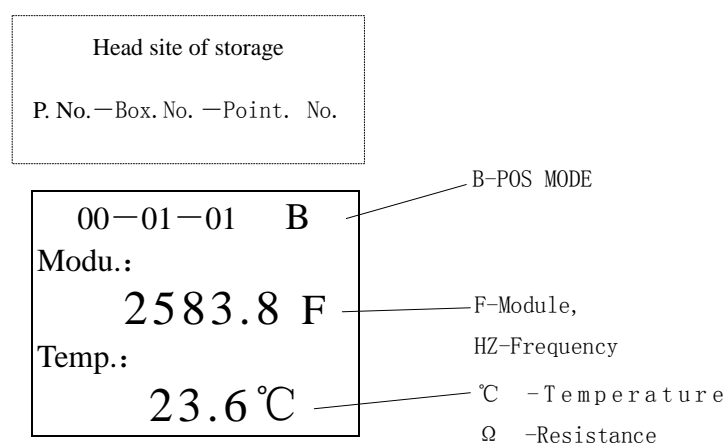
P-3 Interface of lacking battery voltage

The readout box will turn off automatically in the following conditions:

- a) Under power supply condition, if there is no key operation over 15m, it will turn off automatically;
- b) Under battery supply condition, if the battery voltage is not enough, even if there is

key operation, it will turn of automatically in 15m.

In normal condition, the self-checking will be finished in 1s, and after this BGK—408 will self-identify automatically if there is any transducer connected. If there is no transducer or connect transducers after self-checking, the panel will keep on the interface after getting started until switch to other interface or turn off by hand. And if the readout box connects transducers before getting started, it will switch in “measuring” model directly after self-checking and show the current modulus and temperature.



P-4 Interface of measuring mode after self-testing

If transducer has been connected, after self-checking the measuring mode will be the same as the last time, which is suit for most of Geokon transducers. If there is other type of transducers, the mode needs to be resettled after getting started. And if there is no instrument, it is need to press “MEAS” to enter in measuring status. .

2.2 Type of Transducers and its Setting

In order to fit different types of transducers, there are six kinds of POS models in BGK—408, which can be set anytime in normal measuring condition.

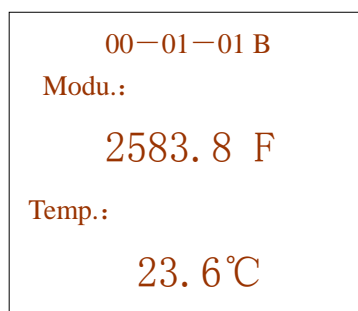
After getting started, no matter in which condition, the corresponding POS models should be chosen for certain instruments. See Table 1 to determine the best mode for China Genkon Instruments.

Table 1 - POS MODEL options (A-F)

POS model	Use with Geokon Model No.	Calculation	Units	Frequency Sweep (Hz)
A	all	$f^2 \times 10^{-3}$	F or	450-5000

B	4300BX,4400, 4500,4600,4700, 4800,4900/11	Digits	1200-3500
C	4000/4200		400-1200
D	4100		1800-3500
E	4300EX		2500-6000
F	others		2500-4000

Operation method: Press “MEAS” to enter in measuring status, there appears the following interface:



P-5 Interface of regular measuring mode

Press “POS”(Incentive mode) to choose the right frequency sweep mode, the model includes A-B-C-D-E-F and the displayed readings are for the instruments.

If it is need to store the current frequency sweep mode, just press “SET”, and then press “MEAS” to the measuring mode. Thus even turn off the readout box, it will still measure in this mode after turning on again.

Note: If the chosen POS MODEL is not equipped with the instruments, the readings might be not stable or no readings, even wrong.

2.3 Shortcut Measuring

2.3.1 Routine Manual “MEAS” Mode

Press “MEAS” in any condition can entry measuring mode.

Routine measuring means in normal condition, operate BGK—408 manually and store data in turn. Take BGK—4000 for example, the operation steps are:

- 1) Press “MEAS” after getting started, and refer P-6:


Module: 00—01—01 B ----- F Temperature: ----- °C

P-6 Interface of regular measuring mode

- 2) Press “POS” to choose proper POS MODEL according to the instruments, for instance, chooses “C”. Press down this button, the POS models can be changed in A-F.
- 3) Connect transducer and the readout box, please refer to P-7:

Module: 00—01—01 C 924.2 F Temperature: 24.3 °C
--

P-7 Interface of regular measuring

- 4) Store current readings (if need to store manually, please press “”) in 00—01—01, and at this moment, there will show the following information as

Data has been stored, Please connect next instruments!

P-8—Indicating interface of data storage

- 5) If the readout box doesn’t connect to another instruments, there will show information as P-9, and pay attention to the storage number has been 00—01—02;

Module: 00—01—02 C ----- F Temperature: ----- °C

P-9—Interface after automatic logging

- 6) Press “▲” 或 “▼” to change the storage address; and if it only needs to change the channel number, just press “▲” 或 “▼” once. And if it needs to change the channel number rapidly, just press “▲” 或 “▼” continuously, and the channel and box number will increase and reduce rapidly in order, stop pressing until meet the requirements. If it needs to change the storage interface, please refer to the Section of Main Menu.

- 7) Connect other transducers and repeat Step 4.

2.3.2 AUTO

Press “AUTO” in any condition can entry “AUTO” Mode (only limit to the case connecting terminal box).

“AUTO” Mode is mainly used for the communication between BGK-408 and BGK—AC to realize the automatic data logging and storing.

In “AUTO” Mode, connect the Readout Box, transducer, and Terminal Box correctly (the special communication lead of the Readout Box and Terminal Box is selected to buy), and then turn on the Readout Box and Terminal Box and press “AUTO” to start automatic measuring.

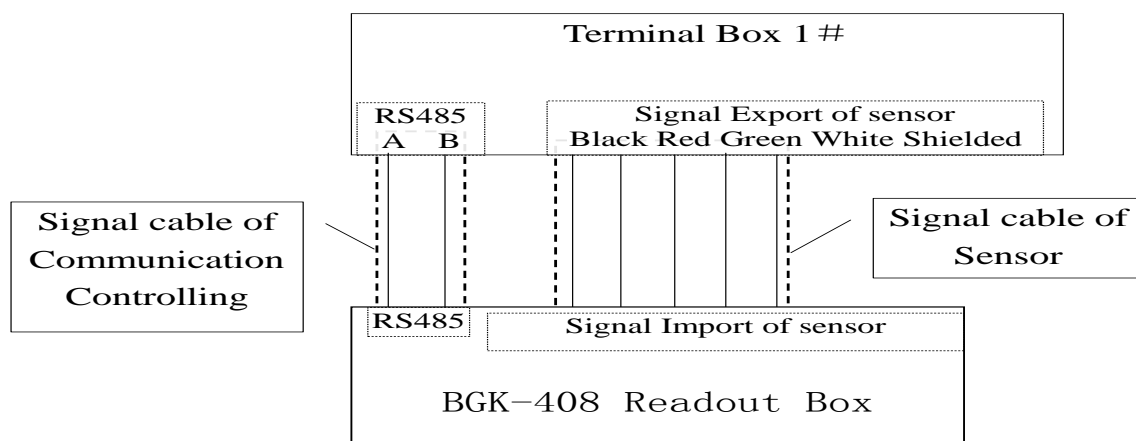
During measuring, the readout box can recognize automatically if there is an instrument connected to the terminal box. Please pay attention that in one channel, there are two transducers, the main one is vibrating wire and the other is thermometer, the testing process is as follows:

- 1) If both transducers are connected, they will be measured and data will be stored;
- 2) If the leads of both transducers are open, the system will skip to next channel directly without measuring;
- 3) If the lead of only one transducer is open, the system will skip this and measure another one;
- 4) If both the transducers are disabled but the lead doesn't open, they will still be measured but the result is no reads or disabled reads;
- 5) If there are no transducers, BGK-408 won't measure and skip to next channel rapidly.

2.3.2.1 Automatic Measuring of Single Terminal Box

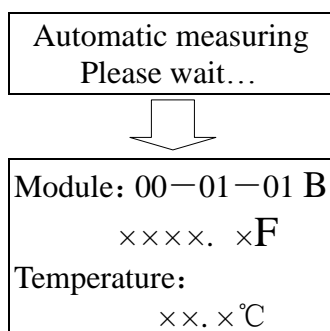
The automatic measuring method of single Terminal Box is:

- 1) Combine with P-1, connect the readout box with the terminal box with a special communication lead as shown in P-10;
- 2) Connect signal cable of the transducer and the terminal box correspondingly;



P10—Automatic measuring of Signal Box

- 3) If the terminal box has been turned off, please turn on.
- 4) Turn on the readout box, and then in “SET” menu press “▲” or “▼” to choose the storage interface 00 or 01 (default interface is 00), and then press “↵” to affirm.
- 5) Press “AUTO”, the following interface will show and measure the transducers, display readings and store automatically.



P-11—Interface of automatic measuring

- 6) Connect another terminal box, and repeat Step 4.

Note:

- 1) The serial number of the terminal box should be selected among 01 to 15 without repeat;
- 2) The quantity of the terminal box in one page should not be more than 15, and if the quantity is more than 15, another page should be selected, and now the serial number can be repeat;
- 3) The communication and signal lead can be extended to 1200m for the remote measuring;
- 4) VW transducers or those with the same type can be connected into one terminal box.

2.3.2.2 Multiple Terminal Boxes

Connect all the communication and signal leads of the terminal boxes (2 to 15 sets) in series or in parallel to form a net. (Please refer to the *Instruction Manual of BGK—AC32/64* for the detailed connection method) Set the serial number of the terminal box from No. 01 to No. 15.

Two same serial numbers in one net are not allowed.

P-12 is the sketch map for the net of multiple terminal boxes.

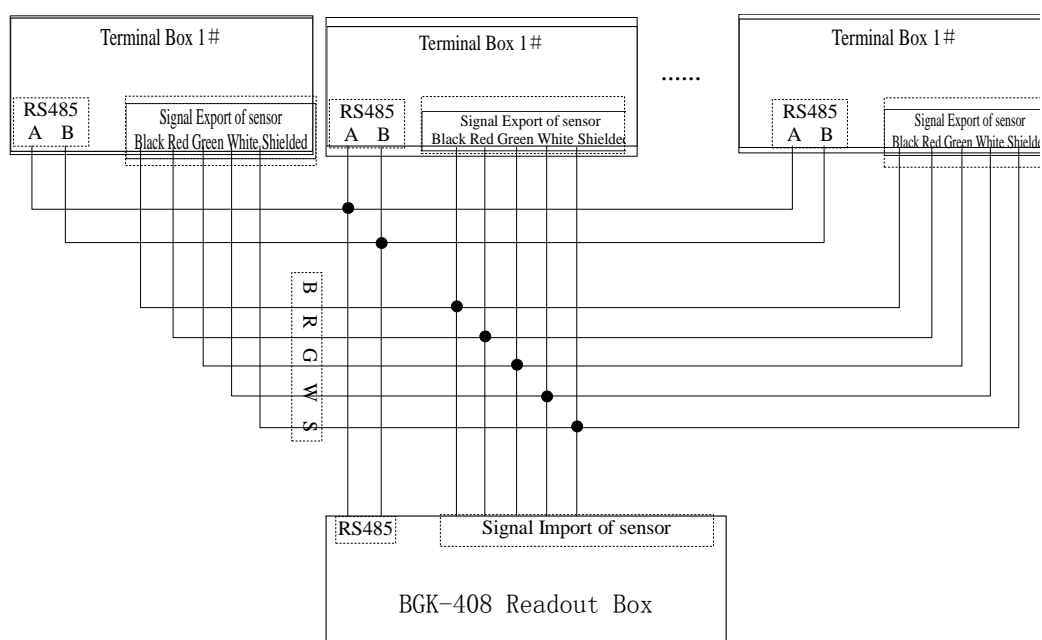
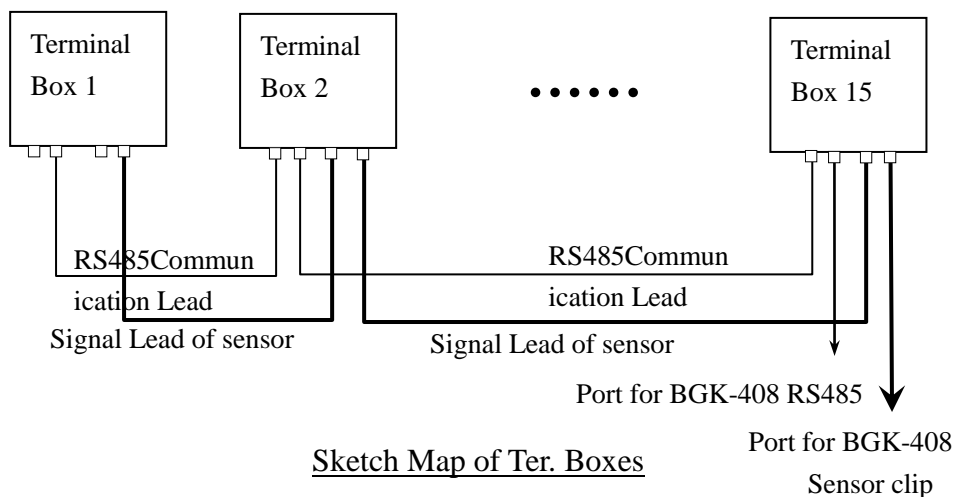


图 12—Measuring Sketch Map of Multiple BGK-AC

In “AUTO” Mode, it is necessary to set in advance the equipped type and mode with the instruments by software.

There are two connection styles for the measuring of multiple terminal boxes, one is early BGK-AC, in which there are two RS communication ports and two transducer signal exports, and these four ports are connected in parallel inside the box. The character of all ports is the same. During the connection, just connect the terminal box one by one, and then connect the readout box to the first or the last terminal box. Please refer to P-13.

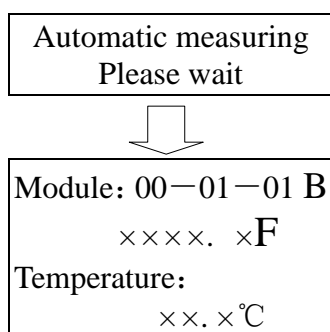


P-13—Net of Terminal Boxes

The newly terminal box has one communication and one signal port. Refer to the above picture and connect the A and B port of adjacent terminal boxes in parallel, then connect signal lead with the same color of each transducer also in parallel, and connect the communication leads and signal leads of the terminal box and readout box respectively.

When connecting, the following items should be ensured:

- 1) The connection between communication and transducer signal lead is correct;
- 2) Power of all terminal boxes is on;
- 3) Turn on the readout box, and then in “SET” menu press “▲” or “▼” to choose the storage interface as 00 or 01 (default interface is 00), and then press “↵” to store and exit the current setting to enter in main menu.
- 4) Press “AUTO”, the following interface will show as in P-14 and measure the transducers in the order of box number and channel number, display readings and store automatically in corresponding areas.



P-14—Interface of automatic measuring

- 5) The readout box will recognize the serial number and channel number of the terminal box automatically and also the exact quantity of the instruments connected; and measure one by one, skip the channel without transducers, show and store the readings. The measuring time of each channel is less than 2s.

Note:

- 1) If the terminal boxes are more than 15, the data should be stored in two pages;
- 2) If there are more than two nets, two readout boxes should be adopted, or the data be transferred to PC to measure again;
- 3) All terminal boxes should be set with in 1200m;
- 4) In remote measuring, the distance between the readout box and the furthest terminal box is not more than 1200m;
- 5) Before connecting, each instruments should be checked by a readout box to make sure the order of communication and signal leads and each transducer is in good condition;
- 6) During measuring, if there is no reading in some terminal box, the power should be checked, and also the communication and signal leads.

3 Main Menu

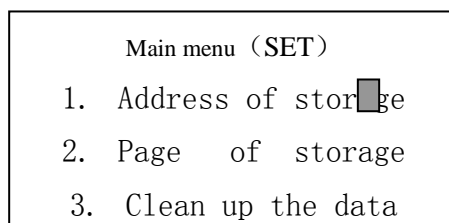
In below introduction, the “box number” or “channel number” are not only referred in the terminal box connection, sometime the “channel number” also can be the instruments number or storage address in manual mode.

3.1 Interface of Main Menu

After getting started, press “SET” to main menu, and the following interface will be shown.

Press “▲” or “▼” to select, and the cursor (the black rectangle in P-15) will move relatively.

Then press “↵” to start and operate the items with the cursor.



P-15—Interface of main menu

3.2 Menu Selection

There are the following items in the menu of BGK-408: ①“Storage Address”; ②“Storage Page”; ③“Data Clean-up”; ④“Data Renewing”; ⑤“Timing Turnoff”; ⑥“Data View”; ⑦“Date/Time Setting”; ⑧“Mode Display”; ⑨ “Exit”.

3.2.1 “Storage Address”

It is used in normal manual measuring condition and need to store data which set the start address. Please choose and execute “head site of storage”, Please refer to P-16.

Head site of storage P. No.—Box. No. —Instru. No. 00—01—01 <div style="text-align: center; width: 20px; height: 10px; background-color: black; margin: 0 auto;"></div>

P16—Interface of “Head site of storage”

At the beginning of this interface, the cursor is at the position of “Box No.”. When press “←” each time, the cursor will move between “Box No.” and “Channel No.”.

At the position of the cursor, press “▲” or “▼” to change the data; And if it’s no need to change, just press “←” to move the cursor to the next one. The rule of changing data is:

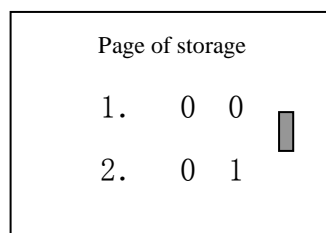
- a) “Box No.” is from “01” to “15”;
- b) “Channel No.” is from “01” to “64”;
- c) Press “▲” quickly each time, the variable on the cursor will increase 1; and if the cursor is under “Box No.” or “Channel No.”, press “▲” for more than 1s, the variable will increase rapidly;
- d) Press “▼” quickly each time, the variable on the cursor will decrease 1; and if the cursor is under “Box No.” or “Channel No.”, press “▼” for more than 1s, the variable will decrease rapidly;

On this “Head site of storage” interface, press “SET”, store and exit out current setting, data cursor is not changed and return to main menu status.

Note: After setting the box number and the channel number, only press” SET” can store this setting; Otherwise, it will not store.

3.2.2 “Storage Page”

Choose and operate “Storage Page”, the following interface will show:



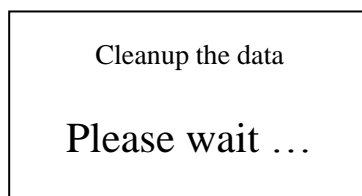
P-17—Interface of “Page of storage”

Press “▲” or “▼” to select, and the cursor (the black rectangle in the above picture) will move relatively; Then press “↵” to start and operate the items with the cursor, and the information is stored in SRAM. Then the system returns to the main menu.

Note: As the system stores the selected items in real time, when it exists to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.

3.2.3 “Data Clean-up”

Choose and operate “Data Clean-up”, the following interface will show:



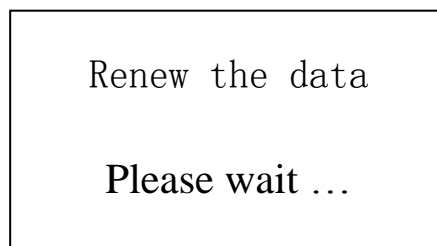
P-18—Interface of “Data Clean-up”

In this interface, all stored data in SRAM will be marked with “delete” sign, thus in “Data View” it will show “No Storage”, and in “Data Upload” it will “not upload”. After finishing “Data Clean-up”, the system will exit to main menu automatically.

Note: As the system stores the selected items in real time, when it exits to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.

3.2.4 “Data Renewing”

Choose and operate “Data Renewing”, the following interface will show:



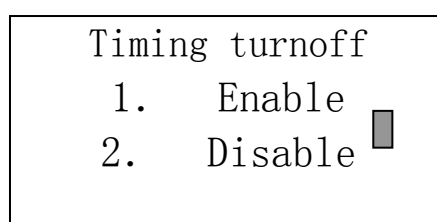
P-19—Interface of “Data Renewing”

In this interface, all stored data in SRAM that marked with “delete” sign will renew, thus in “Data View” it will show data completely, and in “Data Upload” it will upload normally. After finishing “Data Renewing”, the system will exit to main menu automatically.

Note: As the system stores the selected items in real time, when it exits to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.

3.2.5 “Timing Turnoff”

Choose and operate “Timing Turnoff”, the following interface will show:



P-20—Interface of “Timing Turnoff”

Press “▲” or “▼” to select in this interface, and the cursor (the black rectangle in the above picture) will move relatively; Then press “↵” to start and operate “Timing Turnoff” with the cursor, and the information is stored in SRAM. Then the system returns to the main menu.

Note:

- 1) No matter there is any operation or not, “Timing Turnoff” is imperative;
- 2) After setting, the system will turn off in 15m automatically;
- 3) As the system stores the selected items in real time, when it exits to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.



3.2.6 “Data View”


All data stored in BGK-408 can be viewed.

First, it needs to choose the page that you want to view---choose and operate “Page” in the main menu, and then choose “Data View”, the following P-21 will show:

Module: 00—01—01 B
2583.8 F
Temperature:
23.6 °C

P—21—Interface of “Data View”

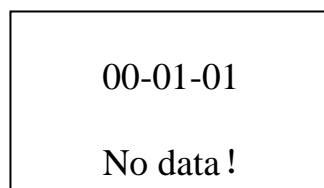
The shown information includes the current Page-Box No.-Channel No., Model (A~F), Modulus F (or frequency, Unit: Hz) and Temperature °C (or resistance, Unit: Ω). If the mode is “Frequency and Resistance”, the displayed information is: Frequency: *****, **Hz, Resistance: *****, Ω; If the mode is “Modulus and Temperature”, the displayed information is: Modulus: *****, *F, Temperature: *****, °C (Note: If the used thermometer is not from China Genkon Instruments, the displayed temperature may wrong. So now it is suggested to set “Frequency and Resistance”). Press “” in this condition, the measuring time can be seen (refer to P-22). Press “” again and the interface will return to P-21.

If the selected note is empty or has been deleted, in “Frequency and Resistance” Mode the displayed is: Frequency: -----Hz, Resistance: ---Ω; or in “modulus and temperature”, the displayed is: Modulus: -----F, temperature --- °C. Now press “”, “No Data” will show (Refer to P-23)

00—01—01
Measuring time
2004-3-12 15 : 00

P-22—Interface of measuring time

In the interface of P-22, the first line is the Head Address 00—01—01. Press “▲” or “▼” to change the channel number, and the last line will be the time when the data stored: “YY-MM-DD H: M”. If the selected note is empty or has been deleted, “No Data” will show (as P-23).



P-23—Interface of “No data”

If the Box No needs to be changed, it should be changed before increasing to “64” or decreasing to “01”, and if it needs to change the Box No from 01 to 02, press “▲” continuously to realize the changing of box number, that is from 00—01—64 to 00—02—01; Whereas, press “▼”.

Note:

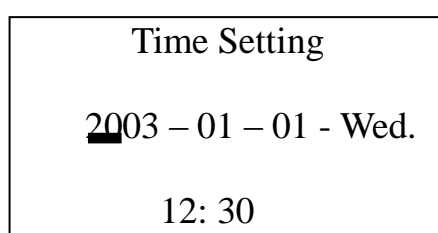
- a) “Box No.” is from “01” to “15”;
- b) “Channel No.” is from “01” to “64”;
- c) Press “▲” quickly each time, the data on the cursor will increase 1; and if the cursor is under “Box No.” or “Channel No.”, press “▲” for more than 1s, the number will increase rapidly;
- d) Press “▼” quickly each time, the data on the cursor will decrease 1; and if the cursor is under “Box No.” or “Channel No.”, press “▼” for more than 1s, the number will decrease rapidly;

In the interface of P-22 or 23, press “Menu”, the system will return to the main menu (as P-15).

Note: As the system stores the selected items in real time, when it exists to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.


3.2.7 “Date/Time Setting”


Choose and operate “Date/Time Setting”, the following interface will show:




P-24—Interface of Time Setting

The display information in P-24 is: Century Code, YY-MM-DD-Week, and Hour: Minute.

Firstly, the cursor is under “Century Code”, and then press “” to move the cursor to YY, press once the cursor will move to the next, and when the cursor move to “Minute”, if you press “SET” in any time item there-among, the system will store the date and the time and exit to “Main Menu”.

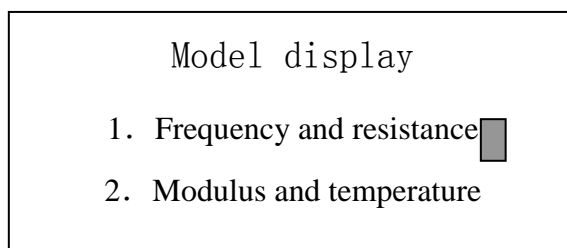
At the position of the cursor, press “▲” or “▼” to change the data; and if there is no need to change, just press “” to move the cursor to the next one. The rule of data changing is:

- a) “Century Code” is from “00” to “99”;
- b) “YY” is from “00” to “99”;
- c) “MM” is from “01” to “12”;
- d) “DD” is from “01” to “31”;
- e) “Week” is changing in {“Mon.”、“Tue.”、“Wed.”、“Thu.”、“Fri.”、“Sat.”、“Sun.”};
- f) “Hour” is from “00” to “23”;
- g) “Minute” is from “00” to “59”;
- h) Press “▲” quickly each time, the data on the cursor will increase 1; and if the cursor is under “Century Code” “YY” “MM” “DD” “Hour” “Minute”, press “▲” for more than 1s, the data will increase rapidly;
- i) Press “▼” quickly each time, the data on the cursor will decrease 1; and if the cursor is under “Century Code” “YY” “MM” “DD” “Hour” “Minute”, press “▼” for more than 1s, the data will decrease rapidly;

In the interface of “Time Setting”, press “”, the cursor will switch in cycle order of “year-month-day-weekday-hour-minute”. **Note:** As the system stores the selected items in real time, when it exits to the main menu, the items or the cursor position may not the same as shown in P-15, but if only all the items belong to the main menu, that will be regarded as normal.)。

3.2.8 “Display Model”

Choose and operate “Display Model”, the following interface will show:



P-25 Interface of “Display Model”

Press “▲” or “▼” to select, and the cursor (the black rectangle in the above picture) will move relatively; Then press “↵”, the item with the cursor is chosen, and the information is stored in SRAM. Then the system returns to the main menu.

When using transducers from other manufacturers, it is suggested to use “Frequency and Resistance” Mode.

The relative definition:

a.)Frequency: the inherent frequency of the measured instruments (Unit: Hz, Range: 400Hz—5000Hz);

b.)Resistance: the inherent resistance of the measured instruments (Unit: Ω , Range: 300 Ω —30K Ω);

c.)Modulus: The square of the frequency of the measured instruments multiplies 10^{-3} , that is,

$$F = f^2 \times 10^{-3} \text{ (Unit: F or Digit, Range: 160F—25000F);}$$

d.)Temperature: the temperature of the environment of the measured instruments (Unit: $^{\circ}\text{C}$, Range: -30°C — $+85^{\circ}\text{C}$), it has the following relationship with the resistance (only for GK YSI-44005):

$$T = \frac{1}{A + B(\text{Ln}R) + C(\text{Ln}R)^3} - 273.15$$

In which: T=Temperature

LnR = logarithm of resistance

A=1.4051 $\times 10^{-3}$ (the temperature is from -50 to $+150^{\circ}\text{C}$)

B=2.369 $\times 10^{-4}$

$$C=1.019\times 10^{-7}$$

Note: Please refer to the Instruction Manual of the other brand of instruments for the calculation.

3.2.9 “Exit”

Choose and operate “Exit”, the system will return to the beginning interface.

4 Maintenance

4.1 Daily Maintenance

BGK-408 Readout Box is designed for all weather fieldwork, but daily maintenance is still needed to maintain the best condition and reliability.

1) Cleaning

Clean the reader periodically with a soft cloth dampened with soap and water.

Note:

- a) DO NOT USE ANY TYPES OF SOLVENTS OR CLEANING AGENTS on the faceplate of the readout;
- b) Do not let any crumb be stained with the panel;
- c) Prevent any liquid entering into the port on the panel.

2) Charging

BGK-408 Readout Box is equipped with high volume of Lithium cell, if it is not operated correctly, the life of the battery will be shortened greatly, even though there is a complete protection circuit.

The following steps should be adopted:

- a) The new battery is undercharge, and only about 20% of the rated volume. The new readout box can be used at once without charge, only to be charged firstly when there appears “The Voltage is not enough; Please Charge” during using, which can excite the volume of the battery;
- b) The time of first-charge should be longer than 48h, and the time of after-charge should be

longer than 24h. When charge for 24h, the battery will be charged to 80%, and be full for 48h.

- c) The charge will be carried out only when there appears “The Voltage is not enough; Please Charge” during using.
- d) It is allowed to charge when the readout box turns on or in use; only the charge time should be longer than the rated time.
- e) If the readout box is not in use for a long time, it should be discharge fully before storing. Still, it is suggested to charge and discharge completely every other half year.

4.2 Calibration

The readout should be sent periodically (every 12 months) back to the manufacturer for inspection, cleaning, and calibration.

4.3 Trouble Shooting

Listed below are a few commonly experienced problems and remedial action. Contact the factory should a problem arise not explained herein.

1) **Unit can not boot up**

Internal battery is probably dead, please use the outside battery. And if it still cannot come on, it should be returned back to the factory; and if it comes on, charge overnight (8-12 hours). Then retract the outside battery, if it can work normally, the trouble releases, if it still cannot work, the internal battery should be changed.

2) **After charging, battery stays powered for very short time**

Internal battery is dead. Consult the factory to schedule battery replacement.

3) **Stored readings are not retained at power-off**

Check Alligator Clip connections to vibrating wire gage leads. If ok, check gage resistance with Ohmmeter. It should read between 90 and 180 ohms. If gage resistance is ok, check the **【POS】** MODEL in the order of D→E→F→A→B→C, if one of the MODES is ok, the troubles releases, and if any **【POS】**MODE can not work, please change another gage. Repeat the steps, if the result is ok, it shows that the first gage is broken; and if still doesn't work consult the factory to schedule return and repair of Readout Box.

4) **The Reading is unstable or no reading**

Improper **【POS】** MODEL switch may be selected. Please change, and check in the order of D→E→F→A→B→C, and if there is stable reading in some MODE, just stop changing.

5) **RS232 is abnormal**

Please check the following items: a.) The communication format of the software is 8 digit data (no odd or even), 1 stop bit, 9600bps; b.)The hardware of RS232, including connecting lead、Export/Import; c.) The length of RS232connecting lead should be not longer than 10m.

If the above checking is in gear and the communication is still abnormal, please consult the factory to schedule return and repair.

4.4 Limits of Liability and Guarantee

BGK-408 Readout Box is designed for GK or BGK instruments; thus, we are not sure it is suit for other instruments from other manufacturers, and we only guarantee to supply reliable operation instruction for GK Instruments.

We reserve the right to amend Instruction Manual and design of the Readout Box without informing the customers.

Period of Warranty

Warranty shall cover troubles that are not factitious for a period of 1 year from the date of purchase, and battery for six months. The System Software will be upgraded for free forever.

Range of Warranty

China Genkon Instruments Co., Ltd takes charge of the warranty for all the trouble or flaw caused by quality problems; and it should cover all electric parts and charger without the consumables, such as communication leads and testing clips.

For the following instance, we will response for the maintenance and charge some fee:

- 1) Over the period of guarantee;
- 2) Normal abrasion and expendable;
- 3) Mangle caused by abusing、improper maintenance and storage;
- 4) Maintain without authorization or by oneself;
- 5) Mangle caused by force majeure;

6) Mangle by man-made.

In addition, if there appears new upgraded software, China Genkon Instruments will response freely for the upgrading of the system software (include communication software, no other software), but the customers should pay for the transport costs.

China Genkon Instruments guarantees that the product is no defects during manufacturing, and won't take any response for the counterclaim of over the purchase price, mangle, destroy caused by proper or improper using directly or indirectly.

5 BGK-408 Specification

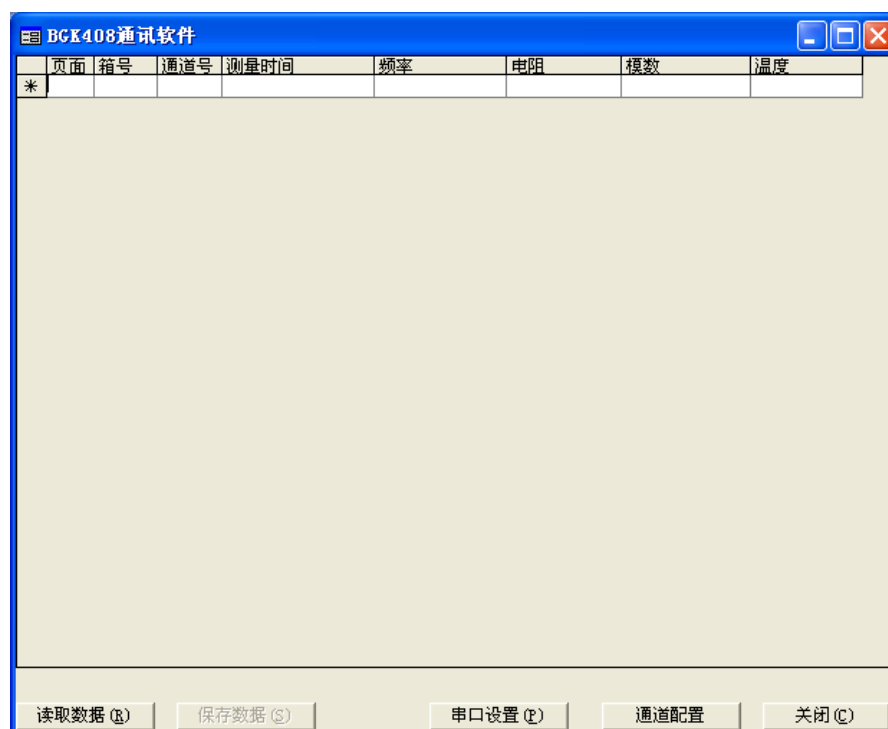
Vibrating readout	Excitation range	400HZ~6000HZ
	Measuring sensitivity	0.25 μ S/255
	Measuring accuracy	0.05%
	Time base accuracy	0.01%
Temperature	Transducer type	YS144005
	Transducer accuracy	$\pm 0.5^{\circ}\text{C}$
	Measuring range	$-50^{\circ}\text{C} \sim +150^{\circ}\text{C}$
	Measuring sensitivity	0.1 $^{\circ}\text{C}$
	Measure accuracy	1.0%FSR
Storage	Attached storage	64K
	Fixed storage	Programmed ROM32K
	Stored data	1920sets at most
Real time clock	Character	Complete calendar ,leap year automatic calibration
	Time format	24 hours
	Date-reveal format	year/month/day
	Accuracy	$\pm 1\text{min/month}$
Communication	Communication style	RS485 or RS232
	Default specifications	9600 baud ,8 data bit, 1 stop bit
	Signal exchange	XON/XOFF
	Transmitted format	ASCII standard
External characteristics	Display	128 \times 64 lattice LCD
	Size	(L)166mm \times (W)126mm \times (H)136mm
	Weight	1.5kg
	Temperature range	$-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$
	Battery	7.2V 4AHr lithium battery
	Working time	24 hours continuously
	Power exhaustion	Less than 1.5W
Outside power	Input voltage	220VAC,47-63Hz
	Output voltage	9VDC,1500mA
	Power exhaustion	Max.15W

Appendix A BGK-408 Use Method of Communication and Setting Software

BGK-408 communication software is used to read the stored data and moreover to set the channel configuration between BGK-408 and BGK-AC terminal box.

A.1 Read the Data Stored in Readout Box

- 1) Using the communication lines RS-232 of BGK-408 to connect computer serial port, from menu “start” to operate COMMTEST408 communication software.



- 2) Click “port setting”, choose readout box communication cables and computer corresponding port (like COM1 or COM2), and confirm port correct.





- 3) Click “read data”, the all data stored in readout box are shown in window

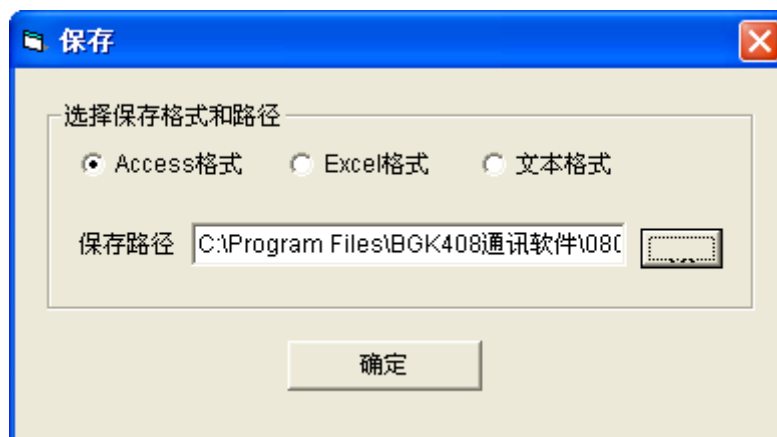
in table list, please note that the readings displayed are all the readings stored in page 00 and 01. unless there are no data in channel or page, the readings can not display.



页面	箱号	通道号	测量时间	频率	电阻	模数	温度
00	01	01	0809231742	2909.12	0	8462.97	
00	01	02	0809231742	3040.81	0	9246.52	
00	01	03	0809231742	3024.97	0	9150.44	
00	01	04	0809231742	2922.93	0	8543.51	
00	01	05	0809231742	2914.66	0	8495.24	
00	01	06	0809231742	3049.88	0	9301.64	
00	01	07	0809231039	3085.4	3142	9519.69	23.89
00	01	08	0809231039	3085.38	3141	9519.56	23.89
00	01	09	0809231039	3085.4	3143	9519.69	23.88
00	01	10	0809231039	3085.35	3139	9519.38	23.91
00	01	11	0809231039	0	0	0	
00	01	12	0809231039	0	0	0	
00	01	13	0809231039	0	0	0	
00	01	14	0809231039	0	0	0	
00	01	15	0809231039	0	0	0	
00	01	16	0809231039	0	0	0	
00	01	17	0809231039	0	0	0	
00	01	18	0809231039	0	0	0	
00	01	19	0809231039	0	0	0	
00	01	20	0809231039	0	0	0	
00	01	21	0809231039	0	0	0	
00	01	22	0809231039	0	0	0	
00	01	23	0809231039	0	0	0	
00	01	24	0809231039	0	0	0	
*							

读取数据 (R) 保存数据 (S) 串口设置 (C) 通道配置 关闭 (C)

4) Click “save data” and an interface of file save format will pop out, three kinds of permitted formats are Access, Excel and Txt, after choosing save format and nominating save path, click “” to store the data profile to the appointed profile folder. If you choose the table format to save and click the “”, it will automatically open and display the just stored profile. The default save format is Access database profile, the default save path is the software installation directory. The stored data profile is named by the last record date in data list, e.g. “0809231039” which expresses the time of last reading on record At 10:39 on September 23, 2008.



5) If you need to view or browse the data, please pay an attention to following:

- If stored as Access database format, your computer should have been installed Microsoft Office Access database to open and browse or link to third party data-process software to process.
- If stored as Excel, computer needs to install office excel to open and browse or link to third party database process software to process;
- If stored as Text format, it can be open and browsed with Notepad or WordPad program. Text profile also can be open and browse with Excel, the data profile format is: each channel as 1 record, the fields of each record is delimited by TAB, and change line with return symbol in the end of record.
- All measuring data profile includes storage page, box number, channel number, measuring time, frequency and resistance, modulus and temperature.

A.2 the channel configuration method of BGK-408 and BGK-AC networking

2.1 the configuration of 1-15 sets of Ac terminal boxes

The method is only suitable to the automation measurement of all GK VW instrument with BGK-408 coordinating BGK terminal Box and not apply to other instruments.

When using BGK-AC terminal Box and BGK-408 to auto-acquire data, due to the

different instruments accessed to the terminal box channels and the readout box self can not identify the types of instruments, if the auto-measuring corresponding channels of readout box have not done the instrument configuration, the readout box will read instruments of each channel in default incentive mode, so it will result in the readout box unstable readings and wrong readings owing to un-matching incentive modes. So it is a must to do a necessary configuration of readout box according to this method, and download the correct configuration parameters to readout box.

- 1) Operate BGK-408 communication software COMMTEST408 and set link port number;
- 2) Click “channel configuration” in appearing interface, the interface below will appear:



- 3) When first operating, set each channel of terminal box in gear “B”, customer needs to set accessed instrument configuration first and then use
- 4) When configuring, first choose terminal box number and channel number scope, first 32 channels choose CH01-Ch32, later 32 channels choose CH33-CH64. The configuration box number is consisting with the actual use box number. It is possible to use one terminal box or 15 sets of terminal boxes. Do the configuration as what it needs.
- 5) In the channel configuration list, do a configuration to each channel, that is, to choose the incentive modes(A-F); The incentive modes are related with the instrument types, please do a configuration according to the table below, please note that the wrong configuration will result in abnormal or unstable readings of readout box, so first make table plan of instruments

configuration and keep in record.

Incentive type (Gear)	GK sensor models	The scope of application
A	All sensors	Not use as much as possible
B	4300BX, 44××, 4210, 45××, 46××, 4700, 48××, 49××	most of instruments
C	4000, 4200	only apply to small range of strainmeter
D	4100, 4150	micro-strainmeter
E	4300EX	Soft interlayer strainmeter
F	others	other types

Note: except specific indication, the XX in above table can be any number, it is ok that only the first two digits of modes are consisting with table, for example, 4580-1 is match with 45XX, that is gear “B”.

If an instrument is not listed in the table above, it can select gear “A” or “F” to measure. Generally speaking, 4000/4200 uses the gear “C”, other GK instruments can use gear “B” to read.

6) After the configuration of all terminal box and each channel, click “download configuration” button, it can download all channel types to readout box and save, it is not changed until next time of download or manual channel setting.

7) During readout box operation, if user changes the gear setting and save manually, it will use the configuration of manual setting in the auto-measurement.

8) There are two storage pages 00 and 01 in BGK-408, the configurations in these two pages are same after download. So the maximum storage in readout box is two times of readings of 15 terminal boxes. For instance, it stores readings in page 00 today and it will store readings in page 01 tomorrow, please make sure storage page setting correct.

9) Under auto-measurement mode, it takes round 1 second to measure each channel, it takes round 15 minutes to measure 64 channels of 15 terminal boxes in networking and save the readings.

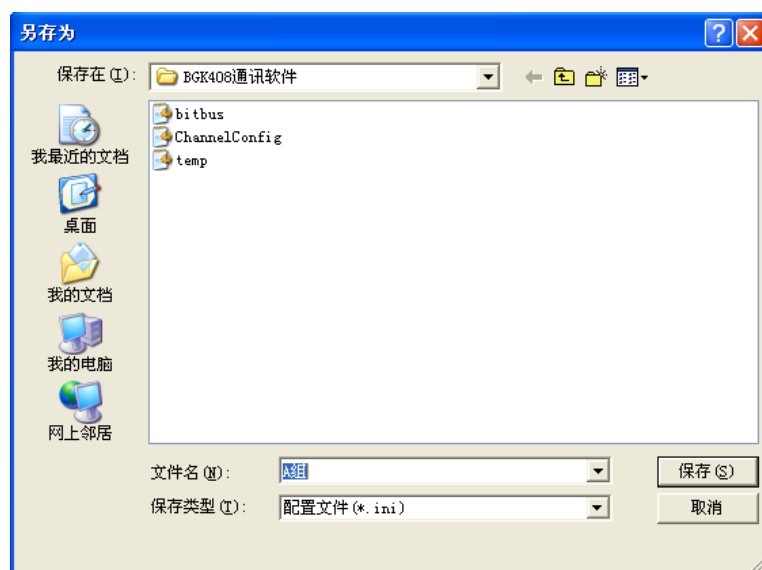
2.2. 16 or more sets of terminal box configuration

In practical application, due to BGK-408 which can only automatically acquire two times of data from the instruments connected to 15 sets of terminal boxes but a project may have more than 16 sets of terminal boxes, then BGK-408 only can measure the first 15 sets of terminal boxes, the rest terminal boxes can not complete the measurement, so the following manner can complete those measurements:

Divide the multi-sets terminal boxes of a project according to each 15 sets of terminal boxes as a group, for example , a project has 56 sets of terminal boxes and are divided into 4 groups which are A, B, C, D group respectively, configure A, B, C group 15 sets of terminal boxes each, D group has 11 sets (also can configure A,B, C, D group 14 sets each), the serial number of terminal boxes are A1, A2, ...A15, B1, B2...B15, C1, C2, ...C15, D1, D2, ..., D11.

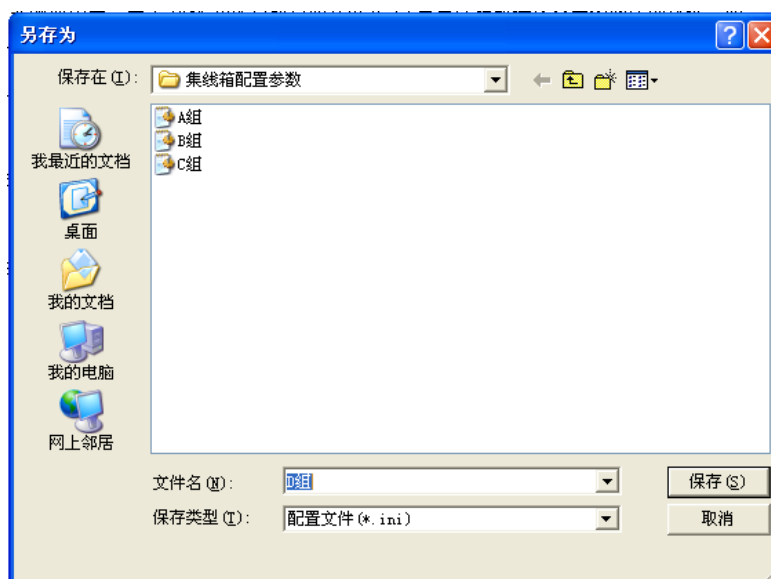
Base on the accessed instrument types to each group of terminal boxes, use soft ware to configure channel according to group, the manner as following:

- a) First configure A group channel, the method is the same as before, complete A group channel configuration , click “save configuration” and save the current configuration of A group, the configuration file name can be nominated as “A group”, after click save to store the file into the computer. The configuration file is saved in extension “.ini”format, please user don't change it otherwise it will lead error.

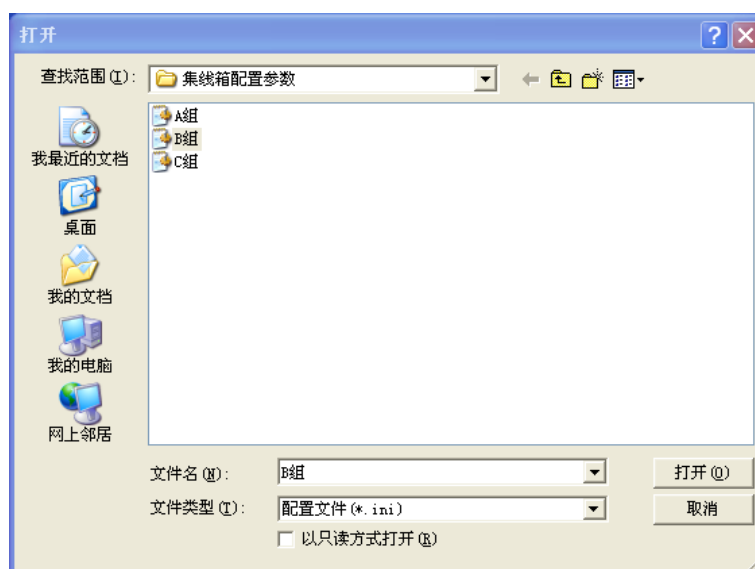


- b) According to the manner above configure B group channel, the configuration file can be nominated as “B group”. Configure C and D group and save the configuration file

according to same manner.



- c) Before every automatically measurement, connect the readout box to computer, run this communication configuration software, call and load the required group configuration as the figure shown, for example, if measuring A group , load A group configuration, if measuring B group, load B group configuration, and then click “download configuration”. The current configuration is loaded to the readout box.



- d) A readout box completes a group of terminal boxes and input the data to a computer, store the data file in the name nominated by the group and time, like “A_2009128” representing that the data file of A group of terminal boxes is the measured data in 28/01/2009.
- e) After storing the measured data in computer, click ”channel configuration” to enter in

configuration interface, click “load configuration”, choose the required group configuration file to computer, and then click “load configuration” to down load the current configuration to the readout box.

- f) Use the readout box to acquire each terminal box data of each group;
- g) Upload the readout box data to computer, repeat the operation to load other group configuration and measure, complete the configuration of all groups. Please note to store the data by group.
- h) Complete the measurement of all groups.

Except the manner above, also can use multi-readout boxes to measure by group configuration, the disadvantage is one set of readout box is corresponding to one group(that is, one readout box is dedicated to one group).

A.3 BGK-408 and BGK-AC measuring method in networking

The measurement operation below is based on the correct channel configuration completion. The method below is only for reference, the connection detail can refer to the terminal box networking connection of BGK-408 readout box manual or the terminal box manual.

1) Single box measurement

The sensor connecting signal line clip of readout box is connected with 5 core output line of terminal box according to the colors, and insert the plugs respectively into the outlets of readout box and terminal box; connect the control signal line RS-485 to R232/R485 outlet of readout box and terminal box. Connect RS-485 control signal line to the RS232/485 signal outlet of readout box and insert another end in another signal output outlet of terminal box. Please note the standard configuration communication cable is shared by RS232 and RS485, there are two core leads, green and white, in DB-9 plug end, that two core lead is RS-485 communication control line specially used for communication control of terminal box.. Thereamong, green line is RS485-B and white line is RS485-A. Please keep the connection consisting with the definition of communication control line of terminal box.

After correct connecting, please confirm power on of terminal box and readout box,, press once on “auto” key, the readout box will auto-measure all instruments according to the box

number.

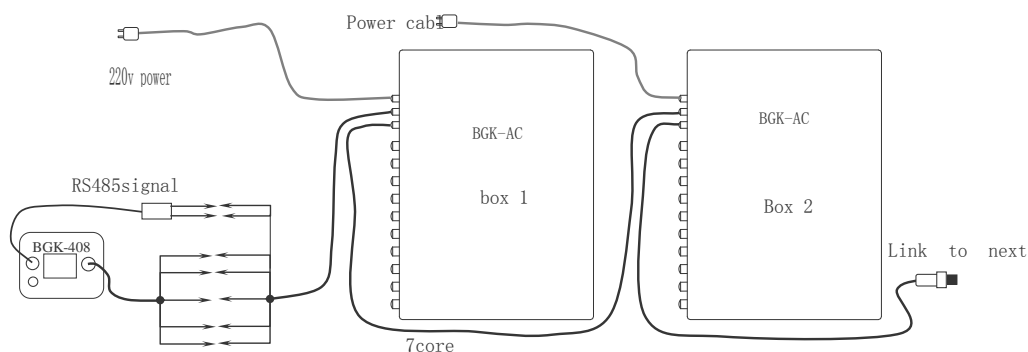
The readout box has a judge function of terminal box number and instruments accessed, it will skip the terminal box which does not exist; if some or part existing channels are not accessed instruments, it will skip and doesn't measure.

As long as confirmed is that each terminal box number of whole system is exclusive, it is allowed to auto-measure box body one by one in many different locations, this operation is automatic, each stored data is saved in readout box according to box number or setting page number and will not cover, when measuring two times or over and store in same page, the new data will cover old one.

Multi-box networking measurement

Multi-box network measurement is that more than two sets of BGK-AC terminal boxes form a network to auto-measure and to reach the purpose of quick and high efficient measurement, but this method only apply to the situation where multi-terminal boxes are close to each other and easy to form a network, the operation steps as follows:

more than two sets of terminal boxes are connected with 7 core communication line which can be made by user basing on the distance of two neighbor terminal boxes and connected one to one according to pin number of 7 pine plug and then insert it in one of two outlets of terminal box (any one of two outlets), for the case of more terminal boxes, use 7 core cable to connect to form a network according to the method above that is head tail connection principle.



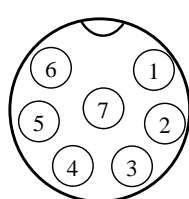
Use R-485 control signal line to connect the vacancy signal output outlet of terminal box, connect the 5 pine signal output line plug of terminal box to the vacancy outlet of first or last terminal box, and connect the sensor signal cable

of readout box to this 5 core signal output line accordingly, please be careful the short circuit between the line clips.

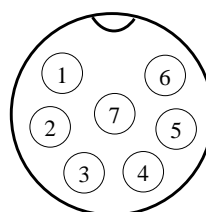
The pin definition of 7-pine plug of terminal box as follows:

pin number	function	remarks
1	Black (1)	Link sensor signal line 1
2	Red (2)	Link sensor signal line 2
3	Green (3)	Link sensor signal line 3
4	White (4)	Link sensor signal line 4
5	Blue (5)	Link sensor signal line 5
6	RS485-A	Communication control line A(D+)
7	RS485-B	Communication control line B(D-)

The substance picture of pin number of 7-pine plug and outlet as follows:



7pin plug



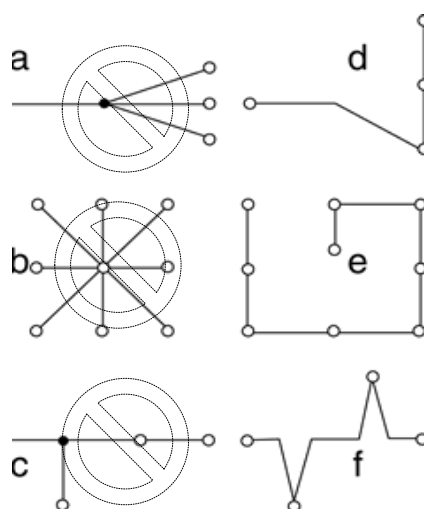
7pinoutlet

In terminal box network forming, please note to use twisted pair line as RS485 control signal line and other 5 core lines are also suggested to use twisted pair shield cable especially for VW instruments.

When the most far distance of terminal box is over 300m, a 120 Ω resistance should be connected to the RS485 interface of the most remote terminal box to avoid

interference. This resistance can be bridge-connected in RS485 ports in terminal box main board (A, B port), the resistor is chosen to use 1/8W metal film resistor. the 120 Ω resistor sometimes is not completely suit to use, the performance is unstable or abnormal communication, the resistance can be chosen between 120–150 Ω and determined by experiment.

In RS485 network connection, please note that the communication control cable must be a head tail connection and to form a string compared to the terminal box but not star or cross connection. As shown in following, a, b, c are wrong connection, but d, e, f are correct. The reading can be done in head or end but not suggested in any middle node when the network is long.



After correct connection, ensure the terminal box and readout box power on and press the Auto key of readout box , the readout box will auto-measure all instruments accessed to terminal box according to the box number and channel number.

The detail of related cable connection can refer to the front content of this manual or consult with BGK Company.