CGEO INTERNATIONAL LIMITED

Model CGEO-PR-VW

Vibrating Wire Portable Readout

Operation Manual（REV B）

Forward

This instruction manual, describes the technique required for the installation of centre hole load cells. It is important that the materials and equipment covered by this manual should be installed by competent and suitably qualified personnel. They must READ AND UNDERSTAND the procedures outlined in this manual before attempting installation of the equipment on site.

CGEO INTERNATIONAL LIMITED will not accept for repair under guarantee, instruments/materials neglected or mishandled in any way.

The techniques described are intended to serve as a general guide and may vary to suit particular site conditions.

Section 1 : Introduction

The CGEO Vibrating Wire Readout has been designed for the measurement of vibrating wire sensors as manufactured by CGEO INTERNATIONAL LIMITED and of some other manufacturers.

1.01 Main Features:

1. The complete sealed and portable construction, water-resistant panel and a large backlit LCD allows the readout box work under any weather conditions.
2. Can be operated by hand or automatically.
3. Shortcut keys as allow improve working efficiency.
4. The data storage has the capacity to store over 1900 measurements.
5. By using the RS-232C communication port the readout box can be programmed measuring parameters, data communicating etc.
6. High accuracy and stability.
7. Automatically turn-off if unused for fifteen minutes.
8. The powerful lithium battery ensures long periods of use.

1.02 Front Panel:
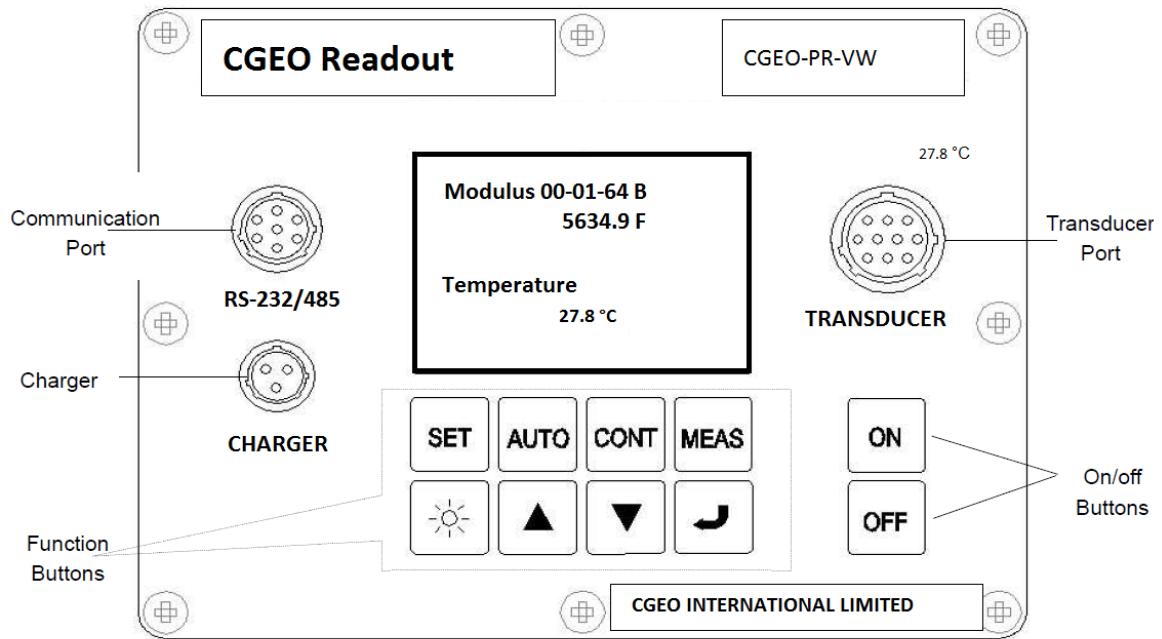
1. The CGEO VW Readout Box uses membrane keys.

2. 128×64 lattice LCD, which can show four rows of characters.

3. "TRANSDUCER" is for connection of the transducers.

4. "CHARGER" is for charging the battery or power supply.

5. "RS-232/485" is for the connection to laptop or PC.

6. "ON" "OFF "to turn power on and off.

7. "SET" for setting parameters.

8. "AUTO" is for automatic measuring and storing data.

9. "MODE" to set the frequency sweep range of different sensors.

10. "MEAS" is for normal reading conditions and when data storage is required.

11. "   ": press once to turn the LCD on and again to turn it off.

12. "▲ ▼" are for addressing the stored data and also used when setting the mode or the menu.

13. "   " is the "enter "key confirm data storage in normal condition, as well as confirm choices in "set" mode.

Section 2 : Getting Started

Turn on and press any key, the inner buzzer will sound, and the information will be displayed on the LCD.

Note: The panel of the CGEO-PR-VW uses membrane keys. Do not use a nail or other sharp implements to press the keys.

2.01. Transducer Port

The CGEO Readout Box is equipped with a jumper cable to read the transducer. One end is a five-core aero-jack which is connected to "TRANSDUCER" port. The other end has alligator clips with leads of five colours of which the "red" and "black" leads are connected to the VW signal, and "green" and "white" leads are temperature.

When using CGEO instruments, all the clips are connected to the wire with the same colour.

2.02. Communication Port

The CGEO Readout Box has RS-232C and RS485 port, and there is an obvious sign "RS-232/485" in the corresponding position on the panel.

The cable allows,

a.) RS 232C connected to PC or nine-core of RS232；

b.) RS 485 connection if required

2.03. Charging the Battery

The CGEO Readout Box has a port for charging the battery.

When mains power is in use there will be a signal of "" will be displayed on LCD. If the battery is in use, there will be a signal of " "will be displayed.

When the mains power is connected, it will charge the battery until to the upper limit of the voltage and turn off automatically to protect the battery from over-charging.

There will be no difference to the readings if mains power or the battery is used.

Getting Started Continued

Press "ON" and CGEO VW Readout Box will start, the following screen will be displayed. (If it has already been connected to a sensor before starting, it will immediately display the reading.)

```
          CGEO
       VW Readout Box

       2004-03-21

       15-34-52            ▮
```
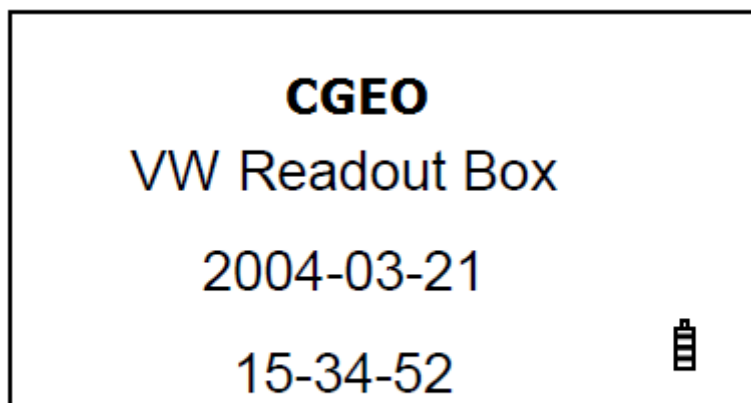
Disply After Powering Up

Next a self-check will automatically begin. This check will include; storage capabilities, battery voltage and real time clock. When the battery is not enough and no mains power, the following screen will be displayed and the readout box will turn off automatically within 15 minutes. It should then be recharged.

```
     Please charge the battery

               ▯

       Turn off in 15minutes
```
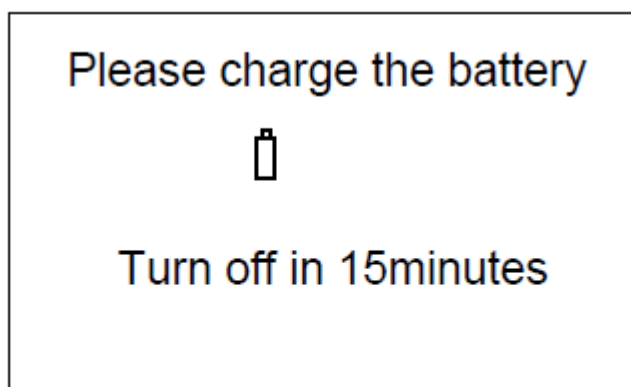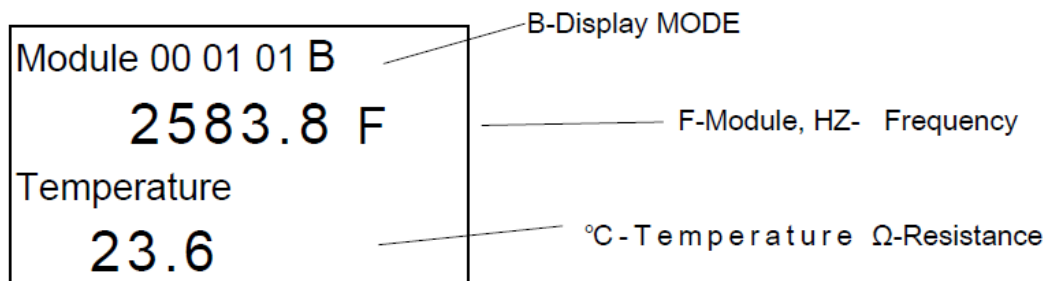
LCD Screen Indicating

Battery Requires Charging

The readout box will turn off automatically given one of the following conditions:
a) If there is no key operation after 15 minutes.
b) If the battery voltage is low.

In normal conditions, the self-check will be completed within one second. Within this time the CGEO VW Readout will automatically identify if there is any transducers connected. If no transducer is connected screen will remain the same until changed by the operator. If a sensor is connected then it will default to the reading screen.

```
Head site of storage

P. No.–Box. No.–Point. No.
```

```
Module 00 01 01 B ─────── B-Display MODE

       2583.8 F  ─────────── F-Module, HZ-  Frequency

Temperature

   23.6  ─────────── °C-Temperature  Ω-Resistance
```

Reading Screen

If the transducer has been connected after the self-checking mode then the screen will be as above for CGEO transducers. If another manufacturer's transducer is being read it may be necessary to reset the mode.

Section 3 : Transducers Type and Setting the "Mode" **(Frequency Range)**

In order to read different types of transducers, there are six DISPLAY MODES in the CGEO-RO-VW which can be set at any time.

After getting started, choose DISPLAY MODE to select the correct frequency range.

Table 1 - DISPLAY MODE options (A-F)

DISPLAY MODE	Calculation	Units	Frequency Sweep (Hz)
A			450-5000
B			1200-3500
C	$f^2 \times 10^{-3}$	F or Digits	400-1200
D			1800-3500
E			2500-6000
F			2500-4000

Operation method: Press "MEAS", the following screen appears:

```
00 01 01 B
Module

2583.8 F

Temperature

23.6°C
```
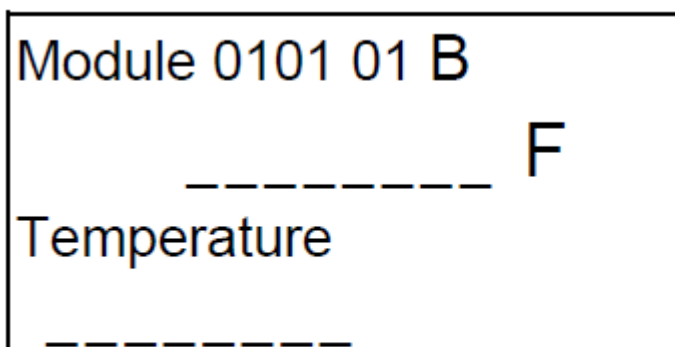
Standard Screen When Taking Readings

Press "MODE" to choose the right DISPLAY MODE, and the display the readings.

If it is required to store the current reading simply press "SET". Then press "MANS" to return to the measuring mode.
Even if the readout box is turned off it will still measure in this mode when turned on again.

3.01 Shortcut Measuring

Standard Manual Measuring "MEAS" Mode.
Press "MEAS".

To operate manually and store data follow the following steps:
1) Press "MEAS" the following screen will appear:

```
Module 0101 01 B
              _____ F
Temperature
  _____
```

Standard Screen in Measuring Mode

2) Press "MODE" to choose frequency range.
3) Connect transducer and readout box the following screen will appear:

```
Module 00 01 01 C
        924.2 F
Temperature
    24.3
```
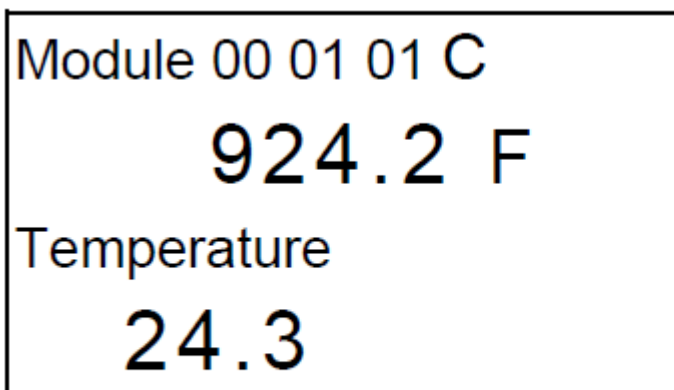
Standard Screen When Sensor Connected

4) Store current readings (if need to store manually, please press "↵") in 00 01 01, the following screen will be displayed.

Data has been stored,
Please connect next instrument.

5) Press "▲" ☐ "▼" scroll the stored readings simply press "▲" ☐ "▼" once.

If you need to scroll rapidly, hold down "▲" ☐ "▼".

6) Connect other transducers and repeat Step 4.

Section 4 : Main Menu

4.01 Main Menu Display

After getting started, press "SET" to go to the main menu, and the following screen will appear. Press "▲" or "▼" to select, and the cursor, the black rectangle will move accordingly. Then press " ↵ " to make your selection.
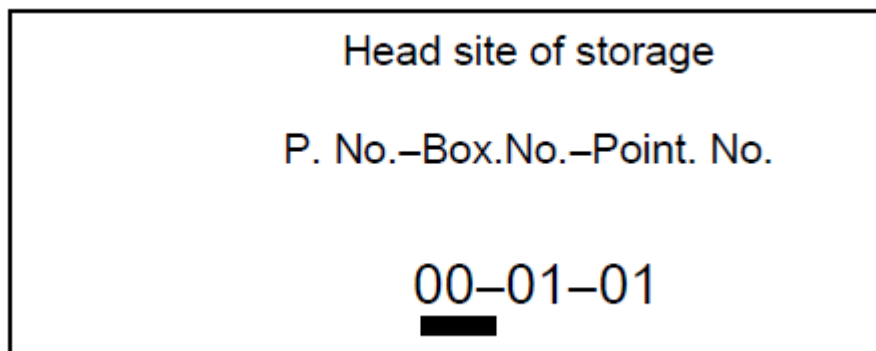
```
Main Menu  SET

1.  Address of storage    ▊

2.  Page   of  storage

3.  Clean up the data
```
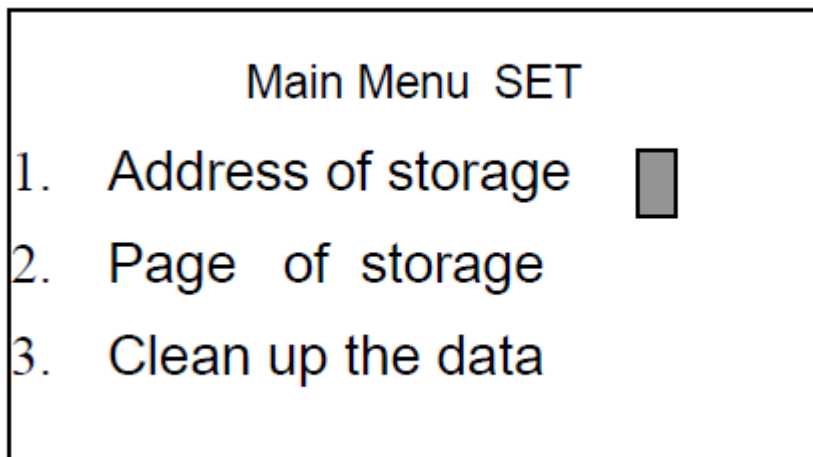
4.02 Menu Selection

There are the following sections: "Storage Address"; "Storage Page"; "Data Clean-up"; "Data Renewing"; "Timing; Turnoff"; "Data View"; "Date/Time Setting"; "Mode Display"; "Instruments Type";and "Exit".

4.02.1 Storage Address

Used when you need to store data.

```
Head site of storage

P. No.–Box.No.–Point. No.


00–01–01
    ▬▬▬
```

Initially, the cursor will be at "Box No.". When you press " ↵ " each time, the cursor will move between "Box No." and "Channel No.".

Press "▲" or "▼"to change the data; And if there is no need to change, simply 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";

In this screen, if you press "SET", the data will not be stored and the system exits to the main menu.

Note: After setting the box number and the channel number, only by pressing " ↵ " can you store these settings.
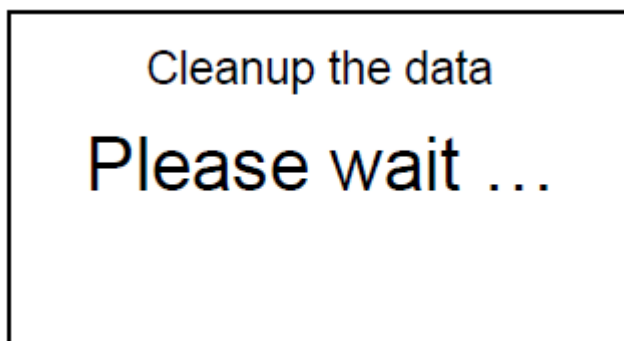
4.02.2 Storage Page

When you select the Storage Page, the following screen will show:
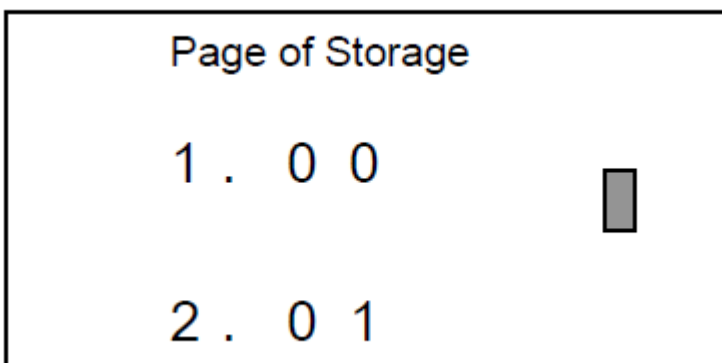
By pressing "▲" or"▼" the cursor move. Then press " ↵ "to store the information in SRAM. Then the system will return to the main menu.
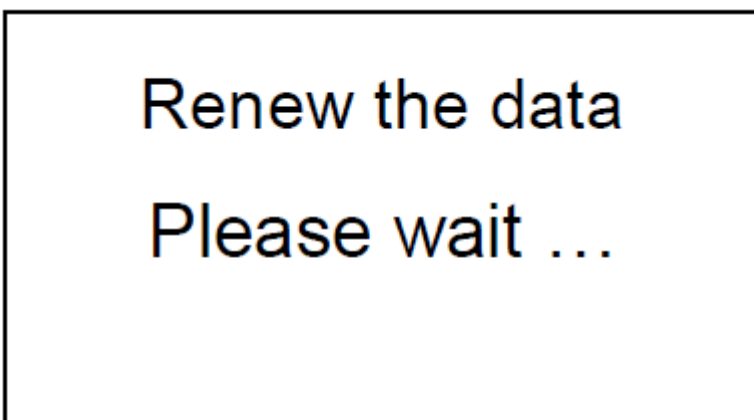
4.02.3 Data Clean-up

When you select the Data Clean-up Page, the following screen will show:

In this screen, all stored data in SRAM will be marked with "delete" sign. Thus in "Data View" it will show "No Storage", and in "Data Updating" it will "not update". After finishing "Data Clean-up", the system will exit to main menu automatically.

4.02.4 Data Renewing

When you select the Data Renewing Page, the following screen will show:

In this screen, all stored data in SRAM that is marked with "delete" sign will renew. Thus in "Data View" it will show data completely, and in "Data Updating" it will update normally. After finishing "Data Renewing", the system will exit to main menu automatically.

4.02.5 Timing Turnoff

When you select the Timing Turnoff Page, the following screen will show:

```
┌─────────────────────────────────────┐
│                                     │
│      Timing Turnoff                 │
│                                     │
│     1.   Enable      ▊              │
│                                     │
│     2.   Disable                    │
│                                     │
└─────────────────────────────────────┘
```
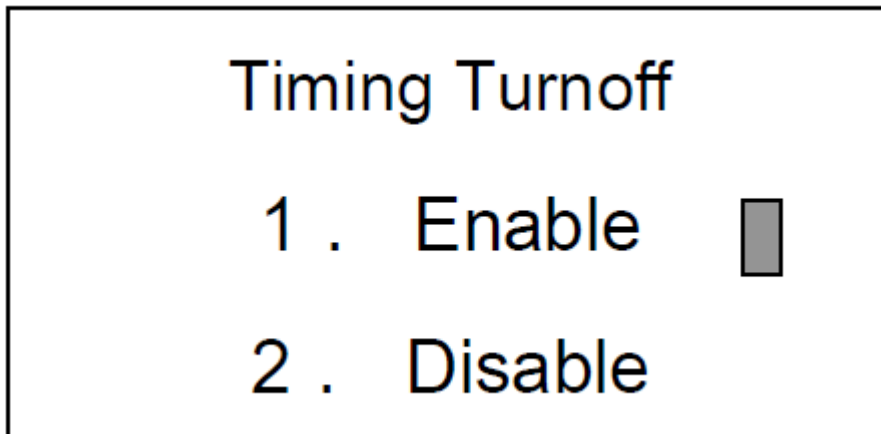
Press "▲" or "▼" to select this screen, then press "↵" to start and operate "Timing Turnoff". The information is stored in SRAM. Then the system returns to the main menu.
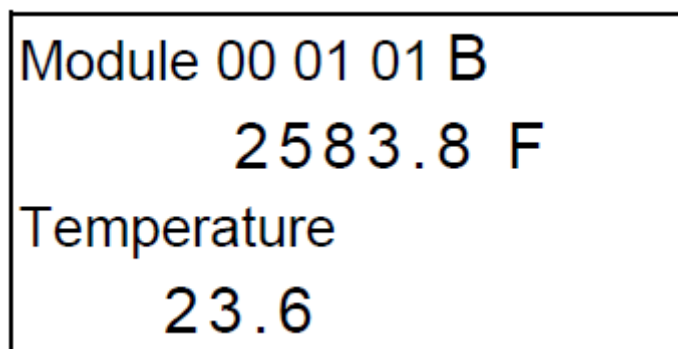
Note:

1) "Timing Turnoff" is imperative and should be enabled
2) After setting, the system will turn off in 15m automatically

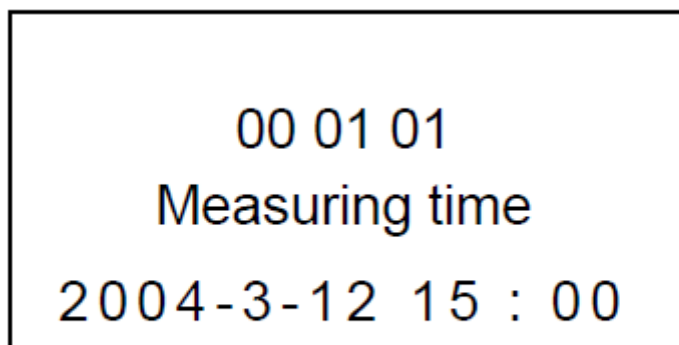### 4.02.6 Data View

All data stored can be viewed.

When you select the Data View Page, the following screen will be displayed:

```
┌─────────────────────────────────────┐
│  Module 00 01 01 B                  │
│               2583.8 F              │
│  Temperature                        │
│               23.6                  │
└─────────────────────────────────────┘
```

The information shown includes the current Page-Box No.-Channel No.

Model A F Modulus F² or frequency, Unit: Hz² and Temperature °C or resistance, Unit: Ω. If the mode is "Frequency and Resistance", the display information is: Frequency: ******. **Hz, Resistance *****Ω.If the mode is "Modulus and Temperature", the display information is: Modulus ******.*F,

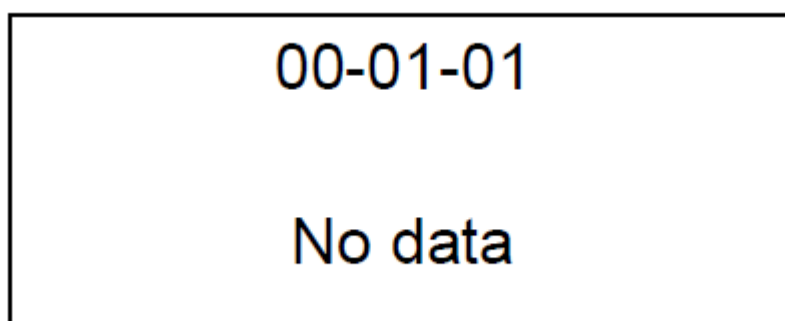Temperature ****°C. (Note: If the used temperature sensor is not from CGEO there may be some error.

If the selected screen is empty or has been deleted, in "Frequency and Resistance" Mode the display is: Frequency: -------Hz, Resistance: ----Ω; or

the display will be: Frequency: -------F, Resistance: ----Ω. Now press"⤶ ",
"No Data"will show.

```
┌─────────────────────────────┐
│                             │
│      00 01 01               │
│                             │
│    Measuring time           │
│                             │
│  2004-3-12  15 : 00         │
│                             │
└─────────────────────────────┘
```

Screen Showing Time of Reading

In the display 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 the data was
stored "YY-MM-DD H: M". If the selected note is empty or has been deleted, "No
Data" will be displayed).

```
┌─────────────────────────────┐
│                             │
│       00-01-01              │
│                             │
│                             │
│       No data               │
│                             │
└─────────────────────────────┘
```

Display for "No data"

If the Box No needs to be changed, it should be changed before increasing
to "64" or decreasing to "01". If you need to change the Box No from 01 to

02 press"▲" continue to change the box number, that is from 00 01 64 to
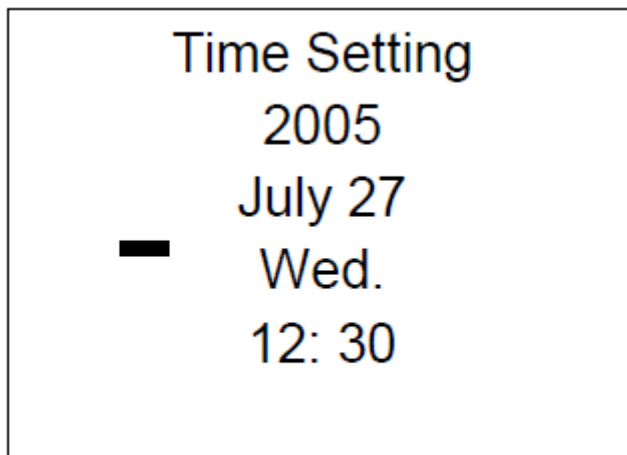
00 02 01; Whereas, press "▼".

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 data 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 data will decrease rapidly.

4.02.7Date/Time Setting

When you select the Date/Time Setting Page, the following screen will be displayed:

```
┌─────────────────────────────┐
│         Time Setting        │
│            2005             │
│          July 27           │
│     ▬      Wed.            │
│          12: 30            │
│                             │
└─────────────────────────────┘
```

Time Setting Display

The display information 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", press " ↵ " 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; if there is no need

to change, just press " ↵ " to move the cursor to the next one.

To change the date:
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 "Time Setting "mode, press "Menu", the date or time will not change,
and system exits to main menu.

4.02.8 Display Model

When you select the Display Model page, the following screen will be displayed:
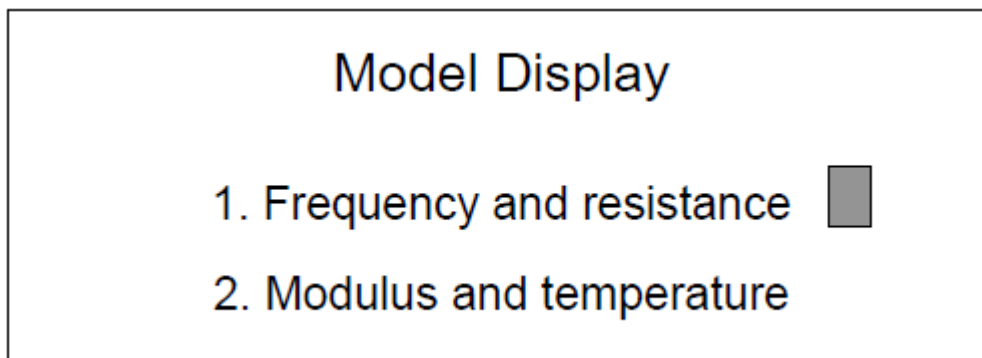
Screen for Display Model

Press "▲" or"▼" to select required field; Then press " ↵ " to enter that field.

The information is stored in SRAM. The system then 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 sensor Unit:Hz,
Range:400Hz—5000Hz.
b.)Resistance: the inherent resistance of the measured sensor (Unit:Ω; Range:
300Ω—30KΩ);
c.)Module: 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: °C; Range:-30°C— +85°C) for CGEO products.

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

In which: T = Temperature
LnR = logarithm of resistance
A=1.4051×10^{-3}(the temperature is from -50 to +150°C)
B=2.369×10^{-4}
C=1.019×10^{-7}
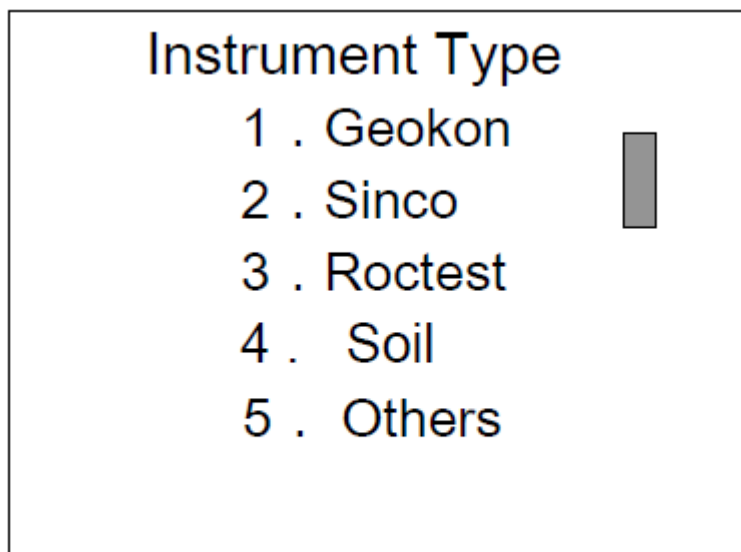
Note: Please refer to the instruction manual of the other manufacturers for their calculations.

4.02.9 Instruments Type

When you enter Instruments Type field, the following be displayed:

```
Instrument Type
    1 . Geokon
    2 . Sinco
    3 . Roctest
    4 .  Soil
    5 .  Others
```

Display for Instruments Type mode

Press "▲" or "▼" to select manufacturer, Then press " ↵ " to start, the information is stored in SRAM. Then the system returns to the main menu. When using some brands of instruments, the display mode must be "Frequency and Resistance" rather than "Module and Temperature". Otherwise, the temperature will be incorrect.

4.02.10 Exit

When selected the Readout will return to the main menu.

Section 5 : Maintenance

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

5.01 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) Prevent any liquid entering into the connection ports on the panel.

5.02 Charging

CGEO Readout Box is equipped with a high volume Lithium cell, if it is not operated correctly, the life of the battery will be shortened unless the following steps are taken:
a) The new battery is undercharged, and only about 20% of the rated volume. The new readout box can be used at once without charging but must be charged immediately when the following display appears "*The* Voltage is not enough; Please Charge".
b) The first-time charge should be longer than 48 hours. Then at least 24hours. when charged for 24 hours, the battery will be charged to 80%, and be full for 48hours operation.
c) You can charge the readout box when it is in use. Of course it will take longer to reach a full charge.
d) If the readout box is not in use for a long time, it should be discharged fully before storing. It is still suggested to charge and discharge completely every other half year.

5.03 Calibration

The readout should be returned to the factory for servicing and calibration periodically (approximately every 24 months depending on usage).

5.04 Trouble Shooting

Listed below are a few commonly experienced problems and remedial action. Contact the factory should a problem arise not explained herein.
5.04.1 Unit will not come on
Internal battery is probably dead, please use mains power.
5.04.2 After charging, battery stays powered for very short time
Internal Lead-acid battery is dead. Consult the factory to schedule battery replacement.
4.04.3 Stored readings are not retained at power-off
Check Alligator Clip connections to vibrating wire gage leads. If ok, check gauge resistance with Ohmmeter. It should read between 90 and 180 ohms. If gauge resistance is ok, check the DISPLAY MODE in the order of D→E→F→A→B→C, This should then be ok. If the problem persists try

another gauge. Repeat the steps, if the result is ok, it shows that the first gauge is not operational; and if still doesn't work consult the factory to schedule return and repair of Readout Box.

4.04.4 The Reading is unstable or no reading

Improper DISPLAY MODE 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.

4.04.5 RS232 is not operational

Please check the following items：

a.) The communication format of the software is 8 data (no odd or even), 1 stop bit, 9600 bps;

b.)The hardware of RS232, including connection lead Export/Import;

c.) The length of connecting lead is no longer than 10m. If the above checks do not resolve the situation, please consult the factory to schedule return and repair.

Section 6 : Guarantee and Warranty

CGEO Readout Box is designed for CGEO instruments; thus, we guarantee use with instruments from other manufacturers, and we only guarantee to supply reliable operation instruction for CGEO sensors.

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

CGEO INTERNATIONAL LIMITED warrants that they will be responsible for any manufacturing defects for the period of 12 months from the date of the invoice. CGEO will not be held be responsible for any liquidated damages of any kind that may occur due to any problems of any kind that may arise from the use of this product.

6.01 Period of Warranty

Warranty period is for 12 months from the date of invoice.

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