ientek 3000S Smart-IN™

Smart Interface Software

User Manual

TYPE : 3000S Series

ientek Co., Ltd.

Factor 2 (P)153-803
Daeryung Technotown 5th #407 493, Gasan-dong
Gumcheon-Gu, Seoul, Korea
TEL : +82-2-2107-7999 FAX : +82-2-2107-7990

Head Office & Factory 1 (P) 425-791
4th Engineering B/D ansan Technopark #401
1271, Sa 1-dong, ansan, Kyonggi-do, Korea
TEL: +82-31-416-2228 FAX : +82-31-416-2338
http:// www.flowcountry.com , E-mail : master@flowcountry.com

Table of Contents

Warnings and Cautions

Warning! Agency approval for hazardous location installations varies between flow meter models. For specific details on the approval of the flow meter, refer to the name plate before installing it in a hazardous area.

Warning! Hot tap must be performed by a trained professional. The hot tap maker should specify that it should be installed by a skilled technician and should not be held responsible if such requirement is not observed.

Warning! All wiring procedures must be performed with the power Off.

Warning! To avoid potential electric shock, follow National Electric Code safety practices or your local code when wiring this unit to a power source and to peripheral devices.
Failure to do so could result in injury or death.
All AC power connections must be in accordance with published CE and KS directives.

Warning! Remove the pressure on the line before repairing the flow meter.

Warning! Turn power off before disassembling any component of the flow meter.

Caution! Before making adjustments to the Smart Electronics device, verify the flow meter is not actively monitoring or reporting to any master control system. Adjustment on the electronic part may directly influence flow control setting parameters.

Caution! All flow meter connections, isolation valves and fittings for hot tap must have the same or higher pressure rating as the main pipeline.

Caution! Changing the length of cables or interchanging sensors or sensor wiring will affect the accuracy of the flow meter. Recalibrate the flow meter after changing the length of the cable or replacing the cable.

Caution! When using toxic or corrosive gases, purge the line with inert gas for a minimum of four hours at full gas flow before installing the meter.

Caution! The AC wire insulation temperature rating must meet or exceed 71°C (158°F).

Caution! Printed circuit boards are sensitive to electrostatic discharge. To avoid damaging the board, follow these precautions to minimize the risk of damage :

- before handling the assembly, discharge your body by touching a grounded, metal object
- Keep any electronic board not related to the flow meter away from the flow meter.
- when possible, use grounded electrostatic discharge wrist straps when handling sensitive components

Caution! Before connecting a signal from the flow meter to outside, read pages 17, 18, 19 and 20 carefully and make connection to the right terminal suitable for the site condition.

Series 3000S Smart-IN™ High Mass Flow Meter Software

ientek's Series 3110S Smart Insertion Mass Flow Meter provides a reliable solution for gas flow measurement applications. Low-flow sensitivity, fast response and outstanding range ability have made this model the instrument of choice for many critical gas flow applications.
The smart interface for ientek is a software program that allows the user to monitor and configure the settings of Smart-IN™ Mass Flow Meter.

The flow meter can be easily set up and tested within the measuring instrument or at the site.
The flow volume (speed) can be measured through communication using RS-232 directly connected to a computer and can also be adjusted using up to three at the measuring instrument.
Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2 x 16 LCD display.

The gauge indicates 2 alarm output, voltage and electric current. The programmable transmitter is easily configured via RS-232 and ientek's Smart Interface software or through three push buttons built into the device.

The Series 3000S is suitable for insertion into pipes or ducts from three inches up to 72 inches.
The Series 3000S Mass Flow Meter's simple installation combines with an easy-to-use interface that provides quick set up, long term reliability and accurate mass flow measurement over a wide range of flows and conditions.

Using This Manual

This manual provides information needed to install and operate the Smart Insertion mass flow meter.
The five chapters of this manual cover these areas :

- Chapter 1 Series 3000S Smart-IN™ High Mass Flow Meter Software Introduction
- Chapter 2 Series 3000S Smart-IN™ High Mass Flow Meter Software Installation
- Chapter 3 About the Main Screen
- Chapter 4 About the Graph/Print Screen
- Chapter 5 About the Information Screen

For product specifications, please refer to the catalog.

Note and Safety Information

We use alarm signs to arouse attention on important information.

Warning!

This reference represent very important information for prevention to damage of item and human life.

Caution!

This reference represent very important information for protection of performance and item.

Reference!

This reference represent for inform to important detail data.

Receipt of System Components

When receiving a ientek mass flow meter, carefully check the outside packing carton for damage incurred in shipment.
If the carton is damaged, notify the local carrier and submit a report to the factory or distributor.
Remove the packing slip and check that all ordered components are present. Make sure any spare.
parts or accessories are not discarded with the packing material.
Consult ientek before returning the product.

Technical Assistance

If any problem arises with the flow meter, check each step of installation and operation and confirm that you set and adjusted the flow meter according to the guideline of the manufacturer.
For detail information and actions, refer to Chapter 5. Fault Diagnosis of the instruction manual.
If the problem persists in spite of the fault diagnosis procedure in Chapter 5, consult ientek by fax or email (see our website) or call +82-02-2107-7997 from 9AM till 6PM.

When contacting Technical Support, make sure to include this information :

- The flow range, serial number and ientek order number (All marked on the meter nameplate)
- The software version (Visible at start up)
- The problem you are encountering and any corrective action taken
- Application information (Fluid, Pressure, Temperature and piping configuration)

Chapter 1. Series 3000S Software Introduction

User Full Scale Flow Rate

Field-configure from 40% to 80% of the factory full scale setting (factory full scale is normally set to 125% of the user-specified maximum flow rate). This adjustment can be made for each flow range.

Alarms

Program high and low or window alarm limits independently for each flow range.
The terminal contacts are isolated with one common.

Alarms Deadband

A deadband value can be entered to set the alarm.

K-Factor Correction

Change the calibration correction factor to compensate for flow profile disturbances or specific application conditions.
The K-factor is a multiplication factor applied to the linear zed flow signal. You may set the K-factor individually for each flow range.

Output Signals

The smart flow meter provides two separate outputs of 0-10V and 4-20mA proportional to flow.
The 4-20mA output can be loop-powered by the flow meter or externally powered for isolation.

Totalize

With the optional LCD display, actual mass flow appears on line 1 and the totalized flow on line 2 both in the user-specified engineering units. The totalize counts only the selected range and when ranges are switched, the value of the non-selected range is stored in memory.
The buttons on the equipment are used to reset added value.

Zero and Span Outputs

Validate and adjust the settings to ensure output circuits are correct.

Time Response Delay

You select a slow response time for smooth output or a fast response for rapid reading.

Zero cut-off setting

It is used to adjust the low flow sensitivity to remove erroneous readings from the flowing medium’s convection effects or pipe leaks.

Changing unit

Unit can be changed if necessary.
The user setup range (USER FS value) can be changed if the unit is changed.

Chapter 2. Series 3000S Software Installation

1. Connecting the flow meter to a computer

Before installing the software provided, first connect the flow meter to the computer.

1. Connect to COM1 or COM2 in the computer
2. The standard model comes with a three-pin connector that can be used to connect to the RS-232 port.
   The three-pin connector can be found under the cover after removing four screws.
   The explosion-proof model has the RS-232 port under the back cover.
3. Once the computer port and the flow meter port are connected, supply power to the flow meter.
4. Once the serial number of the provided software is determined to be consistent with (the same as) the serial number of the flow meter, just follow the setup instructions.

   (If the serial number of the software is not consistent with (the same as) the serial number of the flow meter, calibration data cannot be confirmed but other functions still work.)

Note!

If a communication port related error message is displayed on the screen, check the cable from/to RS-232.

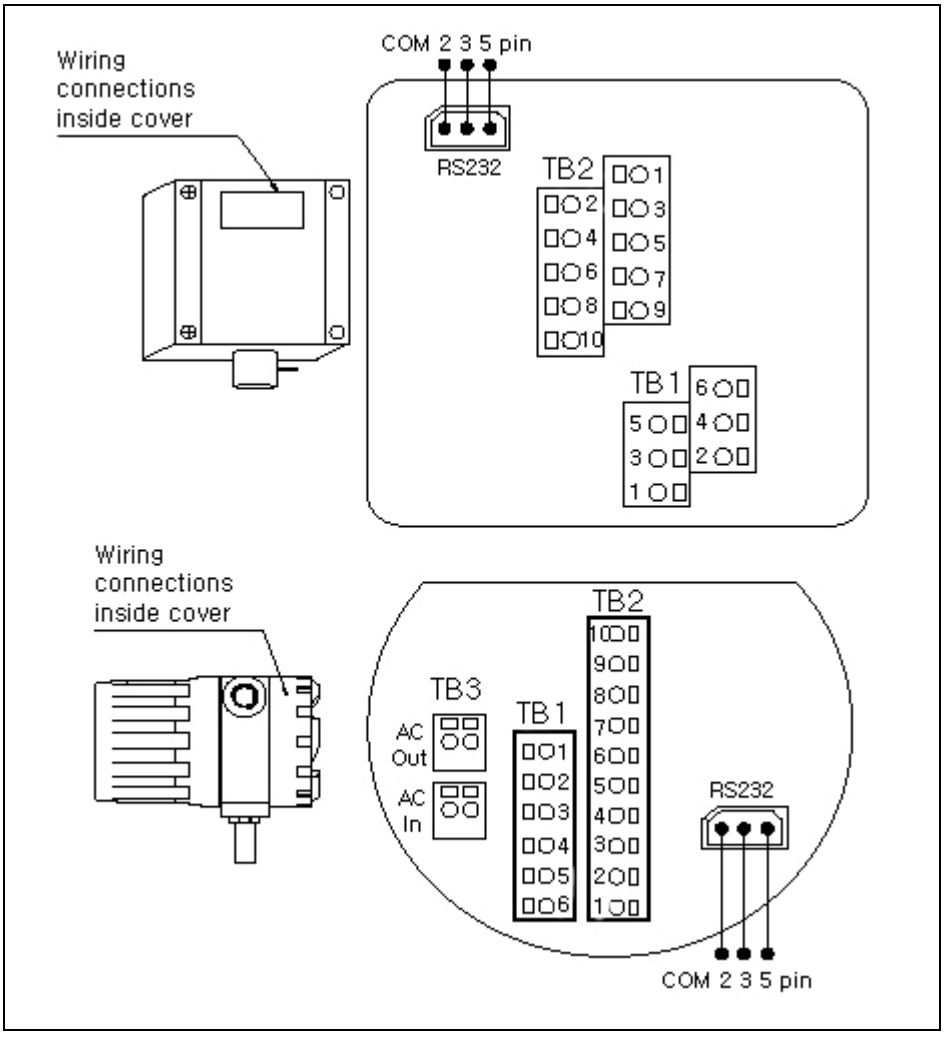
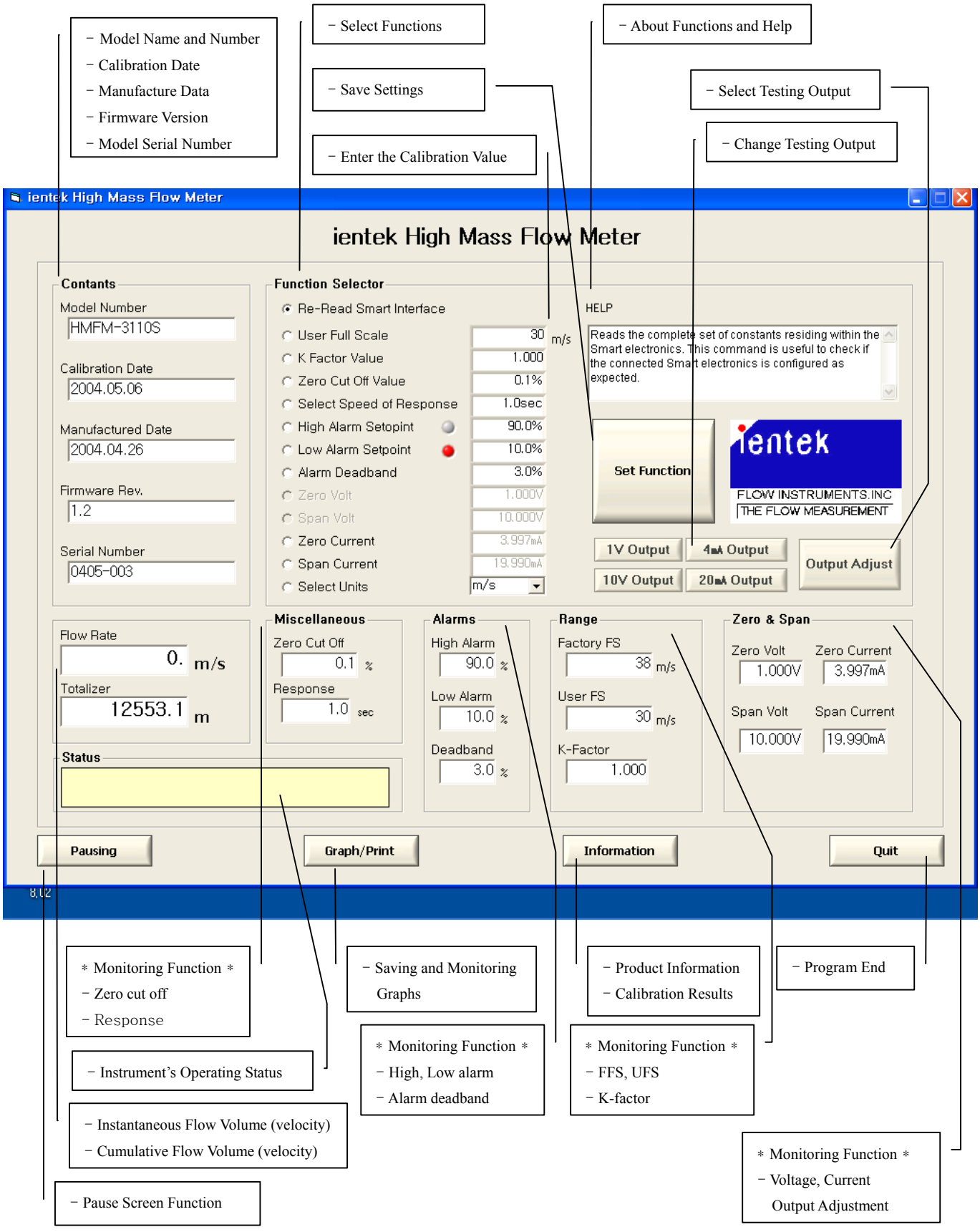


Figure 2-1. RS-232 Connection

Chapter 3. About the Main Screen



How to Use the Main Screen

This section describes how to enter the flow meter's basic setup parameters.

- Contents
- Function Selector
- Function
- Help
- Set Function
- Output Adjust
- Flow Rate as well as Totalize
- Miscellaneous
- Alarms
- Range
- Zero & Span
- Status

Caution!

The measurement by the flow meter must be stopped before changing the settings, because the flow measurement is affected by the setting changes.

Contents

The basic setup parameters for the instrument are displayed.

- **Model Number**
  The model name and number are displayed.
- **Calibration Date**
  The Calibration Date are displayed.
- **Manufactured Date**
  The Manufacture Data are displayed.
- **Firmware Rev.**
  The Firmware Version are displayed.
- **Firmware Rev.**
  The Model Serial Number are displayed.

Function Selector

By selecting its functions, the user controls how the instrument is used.
To save the function selected, simply push the Set Function button.
Once the Set Function button is pushed, the instrument starts to operate after the settings are saved in memory (10 seconds).

- **Re-Read Smart interface**
  The settings currently saved in the instrument are retrieved and displayed.
  By selecting Re-Read Smart interface and pushing the Set Function button, the user can retrieve data.

- **User Full Scale**
  Using institution range (UFS) can be set within 40% to 80% of manufacture institution flow range (FFS). Or, UFS can be set within 50% to 100% of the maximum UFS.
  Using this function, measurement instructions or output settings can be implemented according to different measurement settings.

  To save settings, Select User Full Scale, enter the setting values and then push the Set Function button.

- **K-Factor Value.**
  To compensate for the instrument's output level without affecting FFS, the user can enter an appropriate K-Factor value.
  The compensation data is added to the flow volume reading using the K-Factor setting.
  (The instrument's flow volume has been properly calibrated by the manufacturer.)
  With the K-Factor value set at 1.000, the output reading is directly displayed without being affected by the factory settings.
  You can enter a value between 0.001 and 5.000.

  To save settings, Select K-Factor Value, enter the setting values and then push the Set Function button.

- **Zero Cut Off Value**
  To get rid of any erroneous reading data from the air's convection effect when there is no flow, the setting can be 0-10% of the UFS value.
  Even if the flow meter outputs an erroneous reading due to external factors, the measuring instrument reads 0 per this setting.

  To save settings, Select Zero Cut Off Value, enter the setting values and then push the Set Function button.

- **Select Speed of Response**
  The user can select a slow response time for prompt tracking or a fast response time for smooth output.
  The user can select the response time from 1 second to 9.9 seconds.

  To save settings, Select Speed of Response, enter the setting values and then push the Set Function button.

- **High Alarm Set point**
  The range for high alarm can be set or adjusted.
  The high alarm can be set from 0 to 100% of USER FS.

  To save settings, Select High Alarm Set point, enter the setting values and then push the Set Function button.

  Note: It is recommended that there is at least a 10% gap between the high alarm and the low alarm. When you do not want to use any alarm settings, it is recommended that you set the low alarm at 0% and the high alarm at 100% of USF.

- **Low Alarm Set point**
  The range for low alarm can be set or adjusted.
  The low alarm can be set from 0 to 100% of USER FS.

  To save settings, Select Low Alarm Set point, enter the setting values and then push the Set Function button.

- **Alarm Deadband**

  To get rid of the flow's hysteresis and tracking problem, the user can enter a deadband value.
  The deadband range can be 0.1 – 10% of USER FS.
  We recommend that the deadband range be set at least 3%.

  To save settings, Select Alarm Deadband, enter the setting values and then push the Set Function button.

- **Zero Volt , Span Volt**

  The voltage output can be compensated for. Because 0V is not accurate, we compensate for 1V and 10V.

  By selecting Zero Volt, installing a voltage multimeter at the voltage output terminals, and then pushing the 1V Output button on the main screen, the user should see a reading close to 1V displayed on the multimeter.
  Put this value in the input field and save it by pushing the Output Adjust button and then the Set Function button.

  To compensate for Span Volt, select the Span Volt option. When the 10V Output button on the main screen is pushed, the voltage reading on the multimeter should be a number close to 10V.
  Put this value in the input field and save it by pushing the Output Adjust button and then the Set Function button.

- **Zero Current , Span Current**

  The current output can be compensated for. We compensate for 4mA and 20mA.

  By selecting Zero Current, installing a voltage multimeter at the voltage output terminals, and then pushing the 4mA Output button on the main screen, the user should see a reading close to 4mA displayed on the multimeter.
  Put this value in the input field and save it by pushing the Output Adjust button and then the Set Function button.

  To compensate for Span Current, select the Span Current option. When the 20mA Output button on the main screen is pushed, the voltage reading on the multimeter should be a number close to 20mA.
  Put this value in the input field and save it by pushing the Output Adjust button and then the Set Function button.

  Please note that, once the output is selected to be either voltage or current, the other cannot be changed.

- **Select Units**

  For the user's convenience, we have designed the flow meter to measure in a number of units.
  The unit for the flow volume can be expressed in n㎥/h, n㎥/m, n㎥/s, ℓ/h, ℓ/m, ℓ/s, ft^3/h, ft^3/m, ft^3/s.
  An appropriate unit should be used.
  The flow speed can be expressed in nm/s or ft/m.

  Once a measuring unit is selected as shown above, all readings are expressed using the new unit, but the new unit does not apply to the cumulative unit (Totalize) and FFS.
  Two above measurement units come in two fixed units and will be explained later.

  When the measurement unit is changed, the previous USER FS setting can also be changed.
  If the measurement unit for USF is changed from the previous unit, the UFS value doe not change as long as the USF setting is in 40% to 80% of FFS. The UFS value will automatically change to 40% or 80% of FFS, if it is below 40% or above 80% of FFS.
  UFS is automatically changed, and a program message is displayed.
  The user should use appropriate setting values when using this information.
  The user should verify the settings, since they affect the alarm, alarm deadband, zero cutoff value, etc.

To save settings, Select Units, enter the setting units and then push the Set Function button.
In the save procedure, a message about UFS is displayed, and in some cases the setting is automatically changed and entered.
In such a case, the user can still enter an appropriate value for UFS.

Help

Once the user selects the operational functions on the measuring instrument, the Help section explains about acceptable ranges for input values and other information on how to use the instrument.

Set function

Whenever problems are encountered, the user should refer to the Help section.
The Set Function button is used to select the operational functions of the measuring instrument and save the setting changes. It takes about 10 seconds to save the changes in memory.

Output Adjust

1V, 10V Output, 4~ 20mA Output, and Output Adjust buttons are used to compensate for the reading outputs, as explained previously.

Flow Rate and Totalize

The instantaneous flow volume and accumulated flow volume are displayed.

- **Flow Rate**
  The instantaneous flow volume currently being measured is displayed once every 0.5 second.
  The measurement unit currently being used is automatically changed when the measurement unit is changed.
- **Totalize**
  The accumulative volume up till now is calculated and displayed once every 1 second.
  The measurement unit is fixed in **nm^3** for the flow meter and **nm** for the tachometer.
  To initialize the accumulative volume, the user can use the initialize button for accumulative volume on the measuring instrument.

Miscellaneous

The settings saved from the above selected function can be monitored.

- **Zero Cut Off**
  From the above selected function, Zero Cut Off Value can be seen.
- **Response**
  From the above selected function, Select Speed of Response Low Rate Value can be seen.

Alarms

The settings saved from the above selected function can be monitored.

- **High Alarm**
  From the above selected function, High Alarm Set point Value can be seen.
- **Low Alarm**
  From the above selected function, Low Alarm Set point Value can be seen.
- **Deadband**
  From the above selected function, Alarm Deadband Value can be seen.

Range

The settings saved from the above selected function can be monitored.

- **Factory FS**
  The Factory FS value is expressed in up to 125% of the flow volume range the user defines and is then used. The measurement unit for the flow meter is fixed in nm^3/h, and the measurement unit for the tachometer is fixed in nm/s.
  The user cannot change the Factory FS value.
- **User FS**
  From the above selected function, User Full Scale Value can be seen.
- **K- Factor**
  From the above selected function, K- Factor Value can be seen.

Zero & Span

The settings saved from the above selected function can be monitored.

- **1V Output, 10V Output, 4mA Output, 20mA Output**
  From the above selected function, 1V Output, 10V Output, 4~20mA Output Value can be seen.

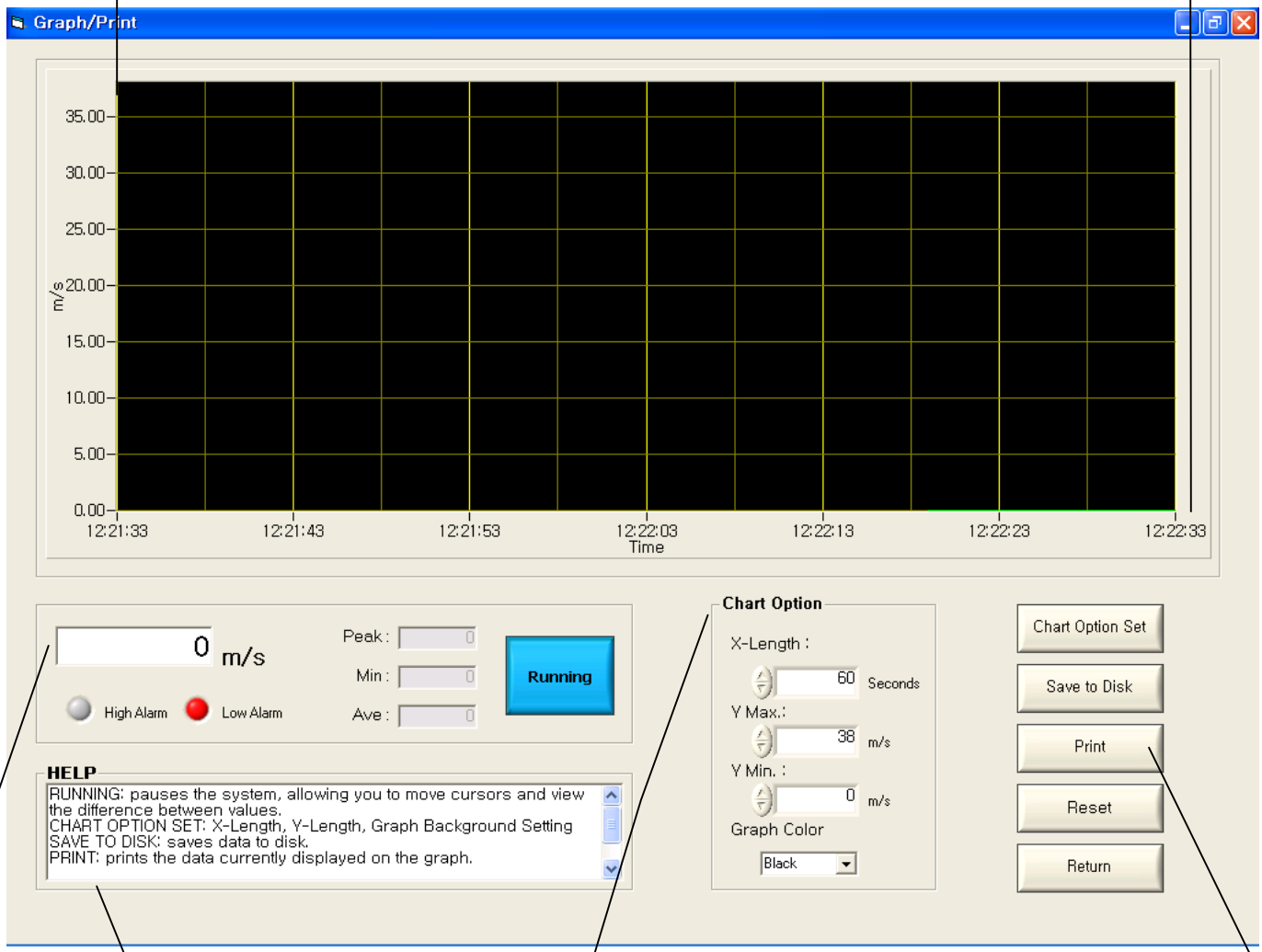
Status

Any malfunctioning status and the current status of the measuring instrument are indicated.

Chapter 4. About the Graph/Print Screen

- The flow volume (velocity) currently being measured can be displayed in a graph form.
  - X Axis: Current measurement time
  - Y Axis: Currently measured flow volume (velocity)

- Current time



- Help for the Graphic Screen

- Currently measured instantaneous flow volume (velocity)
- High-Low alarm indicator
- Peak: The maximum reading measured up till now
- Min: The minimum reading measured up till now
- Ave: The average reading up till now
- Running, Pausing: Stop and start the screen

- X-Length: The measurement time axis
  - can be set from 60 to 3600 seconds
- YMax: The maximum value for the flow volume (velocity) in a graph
  - can be set below the manufacturer's setting
- YMin: The minimum value for the flow volume (velocity) in a graph
  - can be set below the manufacturer's setting
- Graph Color: Adjusts the background color for a graph

- Chart option start: Saves the settings
- Save to Disk: Saves the currently measured data in a text file format
- Print: Prints the graph currently shown on the screen
- Reset: Resets the current screen
- Return: Restores to the main screen

About Graph/Print Screen Illustration and Usage

This section describes how to enter the flow meter's basic setup parameters.

• Graph

• Contents

• Help

• Chart Option

• Chart Option start

• Save to Disk

• Print

• Reset

• Return

Graph

The flow volume (velocity) is displayed according to time in a graph form.

- X Axis: Current measurement time.
  The right most of the time axis represents the current time. As time passes, a graph is generated while moving toward the left.
- Y Axis: Currently measured flow volume (velocity) is shown.

Contents

The current flow volume (velocity) is shown per the settings.

- **Instantaneous Flow Volume (Velocity)**
  Currently measured instantaneous flow volume (velocity) is displayed.
- **Peak**
  The maximum values from the flow volume (velocity) readings up till now are shown.
- **Min**
  The minimum values from the flow volume (velocity) readings up till now are shown.
- **Ave**
  The average value of the flow volume (velocity) readings up till now is displayed.
- **Running, Pausing**
  Stops and Starts the current screen.

Help

Provides helpful information about the graph/print functions.

Chart Option

Adjusts the graph axes and the graph background color.

- **X-Length**
  Displays the time axis from 60 seconds to 3600 seconds in a graph.
- **Y-Max**
  Sets the maximum value for the flow volume (velocity).
- **Y-Min**
  Sets the minimum value for the flow volume (velocity).

  Please note that the axis scales are displayed in rounded numbers, not decimals, when the interval between maximum and minimum cannot be divided.
- **Graph Color.**
  Selects the background color for a graph.
  This is a convenient option when printing a graph.

Save to Disk

Collects flow volume (velocity) data per measurement time and saves data in text files.

Print

Prints the graph shown on the current screen.
When printing, it is better to pause (stop) the screen.

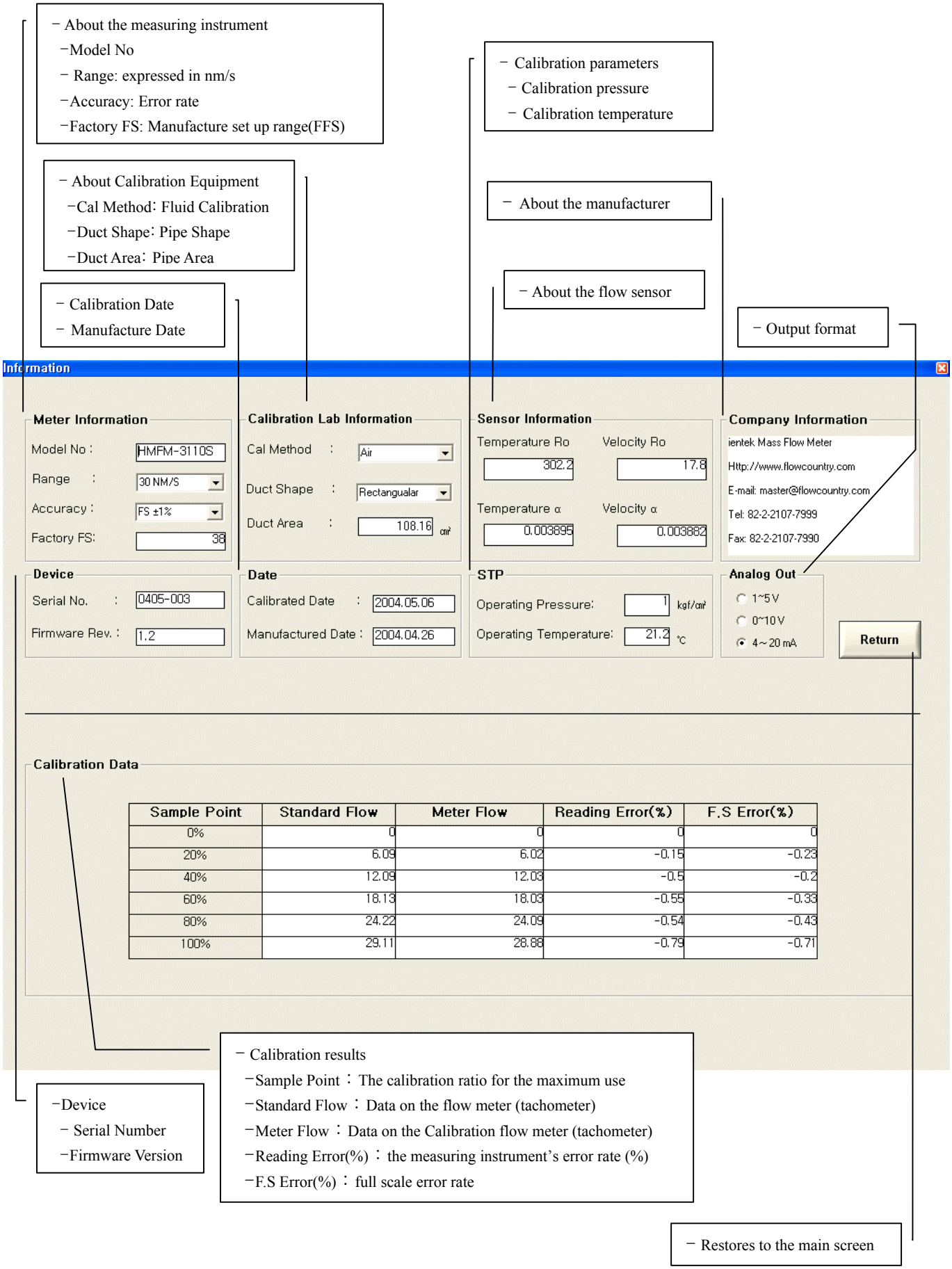
Reset

Can reset the current screen.

Return

Restores to the previous screen, which is the main screen.

Chapter 5. About the Information Screen



About the Information Screen

This section describes the following information.

- Meter Information
- Device
- Calibration Lab Information
- Date
- Sensor Information
- STP
- Company Information
- Analog Output
- Return
- Calibration Data

Meter Information

Lists information about the measuring instrument.

- **Model No**
  The measuring instrument's model name and number.
- **Range**
  This represents the maximum measurement range for the instrument and is converted and displayed as a velocity.
- **Accuracy**
  The measuring instrument's error rate (%)
- **Factory FS**
  These measurement units are set by the manufacturer and expressed in nm/s for the tachometer and nm^3/h for the flow meter as indicated on the instrument label.

Device

Lists information about the measuring instrument.

- **Serial No**
  The measuring instrument's proper number.
- **Firmware Rev**
  The measuring instrument's Firmware Version is displayed.

Calibration Lab Information

Lists information about the facility to be measured.

- **Cal Method**

  Displays the types of the flow fluids.
- **Duct Shape**

  Displays the pipe shape.
- **Duct Area**

  Displays the pipe area.

Date

Indicates the calibration date and manufacture date.

- **Calibration Date**
  Indicates the calibration date.
- **Manufactured Date**
  Indicates the manufacture date.

Sensor Information

Lists information about the flow sensor used.

- **Temperature Ro**
  The temperature sensor resistance at 0℃ (ohm)
- **Temperature α**
  The resistance variation in a temperature sensor due to temperature (ohms/ohm/℃).
- **Velocity Ro**
  The velocity sensor resistance at 0℃ (ohm)
- **Velocity α**
  The resistance variation in a velocity sensor due to temperature (ohms/ohm/℃).

STP

Lists the calibration pressure and temperature.

- **Operating Pressure**
  Calibration pressure (kgf/cm^2)
- **Operating Temperature**
  Calibration pressure (℃)

Company Information

Shows information about the manufacturer.

Please contact us if there are any questions or problems.

Analog Output

Indicates the Output format.

Return

Restores to the main screen.

Calibration Data

Indicates the Calibration results.

- **Sample Point**
  Calibration ratio (%) for the maximum use
- **Standard Flow**
  Flow Meter (Tachometer) Data
  The measurement units used are nm^3/h for the flow meter and nm/s for the tachometer.
- **Meter Flow**
  Calibration Flow Meter (Tachometer) Data
  The measurement units used are nm^3/h for the flow meter and nm/s for the tachometer.
- **Reading Error**
  The measuring instrument's error rate (%)
- **F.S Error**
  Full scale error rate(%)

ientek Co., Ltd.

Factor 2 (p)153-803 Daeryung Technotown 5th #407
493, Gasan-dong Gumcheon-Gu, Seoul, Korea
TEL : +82-2-2107-7999 FAX : +82-2-2107-7990

Head Office & Factory 1 (p) 425-791
4th Engineering B/D ansan Technopark #401
1271, Sa 1-dong, ansan, Kyonggi-do, Korea
TEL: +82-31-416-2228, FAX : +82-31-416-2338
http:// www.flowcountry.com , E-mail : master@flowcountry.com

When returning a component, make sure to include the completed
Calibration/Repair Data Sheet with the shipment.