Sensor Products

Mainstream™

Mainstream Communicator

V1.11

User Guide

Doc: SP-030331

Warranty

Sensor Products warrants that the Mainstream Communicator V1.11 software operates substantially as described in this user manual.

If, during the warranty period specified below, the Mainstream Communicator V1.11 software is shown to the reasonable satisfaction of Sensor Products to be faulty and not to operate substantially as described in this manual, Sensor Products will replace the software.

Sensor Products will not be in any event be liable for any loss, consequential or otherwise, caused by any error, defect, or failure of the Mainstream Communicator V1.11 software, howsoever arising, including but not limited to loss of use, loss of data, loss of profit or loss of contract.

The warranty period is 12 months from the date of shipment.

Contents

1. Overview

Mainstream Communicator V1.11 is a PC software package that operates with the Mainstream Flowmeter for Open Channels and Part-filled Pipes.

Communication between the PC and the Mainstream flowmeter is via a serial data link. A data cable which connects the Mainstream serial port to the PC serial port is supplied with each Mainstream flowmeter.

The Mainstream Communicator software supplies functions to configure the Mainstream flowmeter according to the requirements of the measurement application, to test the flowmeter and associated equipment, to extract diagnostic information from the flowmeter, to view flow measurement data in real time, and to retrieve recorded data.

This User Guide explains how to install and operate the software. It is not intended to act as guide to the operation of the Mainstream flowmeter. For information relating to operation of the flowmeter consult the Mainstream User Manual.

2. Installation

2.1 Compatibility

Mainstream Communicator V1.11 runs on PC platforms under Windows 98, Me, 2000 and XP.

The software is compatible with the following Mainstream products -

Product Description	Serial Number
Fixed Installation Flowmeter with 4:20 mA Output Option	OCFM7000-OCFM7199
Fixed Installation Flowmeter	OCFM7300-OCFM7399
Portable Flowmeter	OCFM7900-OCFM7999

2.2 Directories and Files

By default, the Mainstream Communicator software will install to the c: drive of your PC. The root directory of the installation is c:\Mainstream. Installation also creates several sub-directories as follows -

c:\Mainstream\Program Files - this contains executable files. Installation will create this directory if it does not exist. Installing Mainstream Communicator will not overwrite any software other than previous installations of Mainstream Cummunicator with the same version number.

c:\Mainstream\Documentation - this contains user documentation for the Mainstream Communicator software and Mainstream flowmeter hardware in the form of .pdf files. Installing Mainstream Communicator may overwrite previous versions of obsolete Mainstream documentation with more recent issues.

c:\Mainstream\Backup - this contains stored Mainstream configuration data (see sections 4.2 and 4.3). Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any backup information.

c:\Mainstream\Data - this contains information retrieved from the Mainstream flowmeter data logger (see sections 10.3). This data is stored in the form of spreadsheet compatible .CSV files. Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any stored data.

c:\Mainstream\Archive - this contains information retrieved from the Mainstream flowmeter data logger and held in the form of compressed binary files for processing by optional Sensor Products software components. Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any archive files.

c:\Mainstream\Signal - this contains stored records of doppler signals (see section 8.2). Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any signal files.

c:\Mainstream\Histogram - this contains stored records of velocity histograms (see section 8.3). Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any histogram files.

c:\Mainstream\Sections - this is the default directory for pipe and channel cross-section definitions stored as level-to-area conversion tables (see sections 5.2 and 5.3). Installing the Mainstream Communicator software may create this directory if it does not exist. Installation will not modify or delete any cross-section files.

2.3 Floppy Diskette Installation

Mainstream Communicator software will usually be supplied on one or more 3.5" diskettes.

To install the Mainstream Communicator software, double click on the My Computer icon on the desktop to start Windows Explorer. Insert the software diskette into the floppy drive then double click on the 3½ Floppy icon (usually A:). Select the Setup.exe icon and double click to start the installation process. Follow the on screen prompts to complete the installation, then remove the Mainstream Communicator diskette from the drive and store in a safe place.

To activate Mainstream Communicator double click on the Mainstream Communicator icon which the installation process places on the desktop.

3. Communication Functions

3.1 Local Connection

The Local Connection function provides information to the PC which it needs in order to establish communication with the Mainstream system unit via the Mainstream serial port.

To execute the Local Connection function click Connection → Local. A form showing the Comms Port, Comms Mode, Baud Rate and Diagnostic status is displayed.

The PC serial communication port to be used for the physical link to the Mainstream system unit is selected by clicking the appropriate button in the PC Comms Port box.

The Comms Mode can be Automatic or Fixed Baud. If the Comms Mode is Fixed Baud, the correct Baud Rate to match the Mainstream system unit must be set by clicking the appropriate button in the PC Baud Rate box. If the Comms Mode is Automatic, the PC Baud Rate box is disabled and the PC software will cycle through all possible baud rates in order to determine the baud rate in use by the Mainstream system unit.

Diagnostics can be enabled or disabled by clicking the check box in the Diagnostics box. For normal operation Diagnostics should be disabled. Enabling diagnostics produces a series of on screen messages reporting on each stage of operation of the connection and subsequent communications processes. These messages will usually indicate the cause of any failure to establish or maintain a connection.

Once the Comms Port, Comms Mode, Baud Rate and Diagnostic status are set, click the Connect button to initiate the connection. Commentary showing the state of the connection is displayed in the Mainstream Communicator information bar at the bottom right of the window.

Clicking the Abandon button will abort an attempt to make a connection and the Mainstream Communicator software will revert to the start-up screen.

3.2 Disconnect

The Disconnect function terminates the connection to the Mainstream system unit.

To execute the Disconnect function click Connection → Disconnect. The start-up screen is displayed and the message 'Comms Disconnected' appears in the Mainstream Communicator information bar at the bottom right of the window.

4. System Functions

4.1 Identify System

The Identify System function provides basic information about the Mainstream system unit and installed software.

To identify the Mainstream system unit click System → Identify. A System Identification box is displayed which shows the Mainstream Serial Number, the Manufacture Date and Programming Date in DD-MM-YY format, and the Code Version.

Click the OK button to leave the Identify System function.

4.2 System Backup

The System Backup function reads the configuration information from the Mainstream system unit and stores this in a file on the PC.

To execute the System Backup function click System → Backup. Check boxes naming the various configuration data are displayed.

To generate a backup file click the Backup button. Mainstream Communicator then reads the configuration data and writes this to the PC file system. The file is located in the directory c:\Mainstream\Backup and is named OCFMXXXX.MS1 where XXXX is the serial number of the Mainstream system unit. If the directory c:\Mainstream\Backup does not already exist is created automatically. Any previous file OCFMXXXX.MS1 is renamed OCFMXXXX.MS2 and any previous file OCFMXXXX.MS2 is renamed OCFMXXXX.MS3.

Click the OK button to leave the System Backup function.

4.3 System Restore

The System Restore function selectively recovers configuration data stored in the PC file system and writes this data to the configuration memory of the Mainstream system unit.

To execute the System Restore function click System → Restore. Check boxes naming the various configuration data are displayed.

To restore the Mainstream configuration from the data stored on the

PC, check the items to be restored and then click the Restore button. The configuration data is read from the PC file system and written to the Mainstream System unit. The source of the configuration data is the file c:\Mainstream\Backup\OFMXXXX.MS1 where XXXX is the serial number of the Mainstream system unit.

Click the OK button to leave the System Restore function.

Hint: It is possible to copy configuration information (e.g pipe/channel cross-section definitions) from one Mainstream system unit to another. This is achieved by doing a System Backup from the source Mainstream System unit, renaming the resulting PC file with the name of the destination Mainstream System unit, and then executing the System Restore function with the destination Mainstream System unit connected.

4.4 Set Baud Rate

The Set Baud Rate function is used to set the baud rate of the Mainstream system unit.

To execute the Set Baud Rate function click System $\rightarrow$ Baud Rate. A Mainstream Comms Configuration box is displayed to indicate the existing baud rate.

To change the Mainstream baud rate, click the button to select the required rate and then click the Apply button. This configures the Mainstream system unit to operate at the new baud rate. Commentary showing the operation of the PC software as it re-establishes connection at the new baud rate is displayed in the Mainstream Communicator information bar at the bottom right of the window.

Click the OK button to leave the Set Baud Rate function.

5. Site Functions

5.1 Edit Site Data

The Edit Site Data function displays the site name, site reference, site location, pipe/channel description, contact details and a comments field that are stored in the Mainstream system unit. The user may edit this information and store it in the Mainstream.

To execute the Edit Site Data function click Site → Site Data. A Site Data box containing edit boxes showing the Site Name, Site Reference, Site Location, Pipe/Channel, Contact and Comments are displayed.

To edit the site data, click on the edit box and enter the new data.

To clear all the edit boxes click the Clear button.

To save site data click the Apply button. This transmits the site data to the Mainstream system unit. The previous site data is lost.

Click the OK button to leave the Edit Site Data function.

5.2 Edit Pipe Cross-Section

The Edit Pipe Section function provides a means to specify the geometry of the pipe cross-section to the Mainstream system unit.

The pipe cross-section may be expressed graphically as a drawing, or as text in the form of a level-to-area conversion table.

To execute the Edit Pipe Cross-Section function click Site → Pipe Section. This recovers the installed pipe cross-section drawing or level-to-area conversion table from the Mainstream system unit.

If the cross-section is defined by a drawing it is presented with an information bar indicating the dimensions of the drawing area, a description of the cross-section, and the coordinates of the drawing cursor. If the cross-section is defined by a level-to-area conversion table it is presented as scrollable text. The engineering units used are as defined by the Configure Measurement Units function (see section 9.2).

Pipe cross-section drawings may be edited graphically. To modify an existing pipe section move the drawing cursor close to the

section and press the left mouse button. The drawing snaps to the drawing cursor. Moving the drawing cursor whilst holding down the left mouse button modifies the drawing. Use the cross-section description and the cursor position in the drawing information bar to aid precise editing.

Initially, the origin of the drawing cursor coordinates is the lower left corner of the drawing area. To change the origin, click the Set Origin button, move the drawing cursor to the location of the new origin and click the left mouse button. The coordinates of the drawing cursor in the information bar become zero.

To modify the size of the drawing area click the + or - button as required. The new size of the drawing area is shown on the information bar and the cross-section is redrawn with the appropriate scaling.

To generate a new pipe cross-section, first click the Clear button to clear the drawing area or level-to-area table text. Then click one of the Circle, Ellipse, Rectangle, Freehand or Import buttons as appropriate.

For circular, elliptical and rectangular sections the drawing appears automatically. Edit the dimensions to suit the application.

To enter a freehand cross-section, which is constructed from up to 50 line segments, locate the drawing cursor at the start position of the first line segment and click the left mouse button. Move the cursor to the end of this segment and click the left mouse button. Move the cursor to the end of the next segment and again click the left mouse button. Repeat this procedure until all segments are defined, then click the right mouse button to produce a closed pipe cross-section.

To import a level-to-area conversion table select the appropriate data file. The data is checked as it is loaded.

Note: When a level-to-area conversion table is loaded using the pipe section editor, Mainstream assumes that the last entry in the table consists of the maximum vertical dimension of the pipe and the corresponding cross-sectional area when the pipe is full. If, in operation, the level measurement is greater than the maximum vertical dimension (i.e. under surcharge conditions) Mainstream will make flow calculations using the cross-sectional area of the full pipe. Different behaviour will result if the same level-to-area conversion data is loaded using the channel section editor.

Click the Apply button to install the pipe section. This sends a copy of the drawing or level-to-area data file name to the Mainstream system unit and generates a database for converting level measurements into cross-sectional areas. The new pipe section takes effect immediately and any previous pipe or channel section is lost.

To leave the Edit Pipe Cross-Section function click the OK button.

5.3 Edit Channel Cross-Section

The Edit Channel Cross-Section function provides a means to specify the geometry of the channel cross-section to the Mainstream system unit.

The channel cross-section may be expressed graphically as a drawing, or as text in the form of a level-to-area conversion table.

To execute the Edit Channel Cross-Section function click Site → Channel Section. This recovers the installed channel cross-section drawing or level-to-area conversion table from the Mainstream system unit.

If the cross-section is defined by a drawing it is presented with an information bar indicating the dimensions of the drawing area, a description of the cross-section, and the coordinates of the drawing cursor. If the cross-section is defined by a level-to-area conversion table it is presented as scrollable text. The engineering units used are as defined by the Configure Measurement Units function (see section 9.2).

Channel cross-section drawings may be edited graphically. To modify an existing channel section move the drawing cursor close to the section and press the left mouse button. The drawing snaps to the drawing cursor. Moving the drawing cursor whilst holding down the left mouse button modifies the drawing. Use the cross-section description and the cursor position in the drawing information bar to aid precise editing.

Initially, the origin of the drawing cursor coordinates is the lower left corner of the drawing area. To change the origin, click the Set Origin button, move the drawing cursor to the location of the new origin and click the left mouse button. The coordinates of the drawing cursor in the information bar become zero.

To modify the size of the drawing area click the + or - button as required. The new size of the drawing area is shown on the information bar and the cross-section is redrawn with the appropriate scaling.

To generate a new channel cross-section, first click the Clear button to clear the drawing area or level-to-area table text. Then click one of the Rectangle, Trapezoid, Semi-Circle, Freehand or Import buttons as appropriate.

For rectangular, trapezoidal, and semi-circular sections the drawing appears automatically. Edit the dimensions to suit the application.

To enter a freehand cross-section, which is constructed from up to 50 line segments, locate the drawing cursor at the start position of the first line segment and click the left mouse button. Move the cursor to the end of this segment and click the left mouse button. Move the cursor to the end of the next segment and again click the left mouse button. Repeat this procedure until all segments are defined, then click the right mouse button to complete the channel cross-section.

To import a level-to-area conversion table select the appropriate data file. The data is checked as it is loaded.

Note: When a level-to-area conversion table is loaded using the channel section editor, Mainstream assumes that if the level measurement in operation is greater than the maximum level in the level-to-area conversion table, then the flow cross-sectional area will also be greater than the maximum cross-section given in the table. In these circumstances Mainstream will make flow calculations using a cross-sectional area extrapolated from the level-to-area table data. Different behaviour will result if the same level-to-area conversion data is loaded using the pipe section editor.

Click the Apply button to install the channel section. This sends a copy of the drawing or level-to-area data file name to the Mainstream system unit and generates a database for converting level measurements into cross-sectional areas. The new pipe section takes effect immediately and any previous pipe or channel section is lost.

To leave the Edit Channel Cross-Section function click the OK button.

6. Measurement Functions

6.1 Configure Measurements

The Configure Measurements function determines which parameters are to be measured and at what intervals.

To execute the Configure Measurements function click Measurements → Configure. This generates a Measurement Configuration box in which the measurement mode and measurement interval are displayed.

To select the required Measurement Mode, click the appropriate button - OFF, Level Only, Velocity Only, or Level and Velocity. Note that level measurements can also be turned ON or OFF using the Configure Level Measurement function (see section 7.1) and velocity measurements can be turned ON or OFF using the Configure Velocity Measurement function (see section 8.1).

To select the frequency at which measurements are to be made, click the appropriate button in the Measurement Interval box.

Clicking the Apply button transmits the configuration to the Mainstream system unit. The previous configuration is overwritten and all changes take immediate effect.

Note: A side effect of altering the Measurement Mode or Measurement Interval is the creation of a new data logger record.

To leave the Configure Measurements function click the OK button.

6.2 Display Measurements

The Display Measurements function provides a real time display of the the liquid level and the ultrasound signal quality and velocity measurements, along with the flow cross-sectional area, flow rate and total quantity data derived from these measurements.

To execute the Display Measurements function click Measurements → Display. This generates a Measurements box. The information contained in the Measurements box is updated at intervals of approximately ten seconds. The engineering units used in the display are as defined by the Configure Measurement Units function (see section 9.2).

Clicking the Reset button will set the hour quantity and total quantity to zero.

Note: To prevent accidental zeroing of the total quantity, a confirmation of the clear instruction is requested.

To leave the Display Measurements function click the OK button.

7. Level Measurement Functions

7.1 Configure Level Measurement

The Configure Level Measurement function provides the means to set the level offset, the level sensor warm-up time, and various parameters of the 4:20 mA level signal analog to digital conversion processing in the Mainstream system unit.

To execute the Configure Level Measurement function click Level → Configure. A Level Configuration box giving the level measurement mode and level offset is generated. The engineering units of the level offset are as defined by the Configure Measurement Units function (see section 9.2).

To switch the level measurement ON or OFF click the appropriate button in the Level Mode box. Note that the level measurement mode may also be modified by the Configure Measurement function (see section 6.1).

To alter the level offset click the Level Offset display and type in the new offset. Terminate the input by hitting <return>.

For access to the level sensor warm-up time and the analog to digital conversion parameters click the Advanced button and a Level Configuration (Advanced) box appears. To return to the original Level Configuration box display click the OK button.

To change the level sensor warm-up time, from the basic Level Configuration box click the Advanced button to activate the Level Configuration (Advanced) box and then click the up-down button in the Sensor Warm-Up Time box. Click the OK button to return to the basic Level Configuration box.

Parameters of the level signal analog to digital conversion process are changed by clicking the Advanced button to activate the Level Configuration (Advanced) box and then clicking the appropriate up-down button. Click the OK button to return to the basic Level Configuration box.

Warning: Changing ADC parameters will destroy the level calibration.

Whilst the Level Configuration (Advanced) box is displayed, clicking the Defaults button will restore the factory settings of the sensor warm-up time and the ADC parameters.

Clicking the Apply button in the basic Level Configuration box transmits the level configuration data to the Mainstream system unit. The previous configuration is overwritten and all changes take immediate effect.

To leave the Configure Level Measurement function click the OK button.

7.2 Calibrate Level Measurement

The Calibrate Level Measurement function displays a table of calibration data which links the data from the level signal analog to digital conversion processing in the Mainstream system unit to the level measurement. The function also provides the means to delete old calibration points and insert new calibration data into the table.

To invoke the Calibrate Level Measurement function click Level → Calibrate. This generates a Level Calibration box containing the calibration data.

To add a new calibration point click the Insert button and key in the liquid level. Terminate the input by hitting the <return> key. Note that the engineering units are as defined by the Configure Measurement Units function (see section 9.2). After a few seconds, the analog to digital conversion data and level measurement are inserted into the table of calibration data.

To delete an item from the calibration table, click the item, then click the Delete button.

To install the calibration data click the Apply button. This transmits the calibration data to the Mainstream system unit which then takes immediate effect. The previous calibration data is lost.

To leave the Calibrate Level Measurement function click the OK button.

8. Velocity Measurement Functions

8.1 Configure Velocity Measurement

The Configure Velocity Measurement function sets the velocity measurement range and response time, and gives access to several parameters of the velocity measurement algorithm.

To execute the Configure Velocity Measurement function click Velocity → Configure. This displays a Velocity Configuration box indicating the velocity measurement mode, velocity range, and measurement response time.

To switch the velocity measurement ON or OFF click the appropriate button in the Velocity Mode box. Note that the velocity measurement mode may also be modified by the Configure Measurement function (see section 6.1).

To select the velocity range click the button adjacent to the velocity range required. Note that the units of velocity are as defined by the Configure Measurement Units function (see section 9.2).

To select the measurement response time click on the 5 second, 10 second or 20 second button in the Response Time box.

Click on the Default button to set all the velocity configuration parameters to their default values. If the flowmeter Measurement interval is set to Continuous (see the Configure Measurements function - section 6.1) the default values will be optimised for measurement performance. Otherwise, the default values will be optimised for power conservation.

For access to additional velocity measurement configuration parameters click the Advanced button and a Velocity Configuration (Advanced) box appears. To return to the original Velocity Configuration box display click the OK button.

To select the histogram interpretation algorithm click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the Histogram Mean or Histogram Peak button. Click the OK button to return to the basic Velocity Configuration box.

To enter a new velocity probe scale factor click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the text in the Probe Scale Factor box. Enter the new value

terminating the input by hitting the <return> key. Click the OK button to return to the basic Velocity Configuration box.

To enter a new signal quality to fail parameter click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the text in the Signal Quality to Fail box. Enter the new value terminating the input by hitting the <return> key. Click the OK button to return to the basic Velocity Configuration box.

To turn bi-direction measurement ON or OFF click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the appropriate button in the Bidirectional Measurement box. Click the OK button to return to the basic Velocity Configuration box.

To turn energy distribution ON or OFF click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the appropriate button in the Energy Distribution box. Click the OK button to return to the basic Velocity Configuration box.

To turn histogram averaging ON or OFF click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the appropriate button in the Histogram Averaging box. Click the OK button to return to the basic Velocity Configuration box.

To alter the Doppler signal sample rate, click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the up-down button in the Sample Rate box. Note that the sample rate affects the velocity measurement range. Data in the basic Velocity Configuration box is therefore changed accordingly. Click the OK button to return to the basic Velocity Configuration box.

To change the number of records per measurement click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the up-down button in the Records per Measurement box. Click the OK button to return to the basic Velocity Configuration box.

To change the noise suppression parameter, click the Advanced button to activate the Velocity Configuration (Advanced) box and then click the up-down button in the Noise suppression box. Click the OK button to return to the basic Velocity Configuration box.

Whilst the Velocity Configuration (Advanced) box is displayed, clicking the Defaults button restores all the velocity configuration parameters to their original factory settings.

Clicking the Apply button transmits the velocity configuration data to the Mainstream system unit. This overwrites the previous configuration which is lost. The new configuration takes effect immediately.

To leave the Configure Velocity Measurement function click the OK button.

8.2 Display Doppler Signals

The Display Doppler Signals function gives access to data captured from the Mainstream velocity probe.

To execute the Display Doppler Signals function click Velocity → Signals. This creates a Velocity Signal box simulating a storage oscilloscope in which the Doppler signals are displayed.

Clicking the left-right button moves the viewing window across the stored signal data.

Clicking the Refresh button discards the stored data which is replaced by a new data from the velocity probe.

Clicking the Save button writes the signal data to the PC file system. The file is located in the c:\Mainstream\Signal directory. The file name is OCFMXXXX_YYMMDD_HHMMSS.SIG where OCFMXXXX is the serial number of the Mainstream system unit, and YYMMDD and HHMMSS are the date and time that the signal was captured. This file may be used by Sensor Products for diagnostic purposes.

To leave the Display Doppler Signals function click the OK button.

8.3 Display Velocity Histogram

The Display Velocity Histogram function gives access to the velocity histogram data computed by the Mainstream system unit.

To execute the Display Histogram function click Velocity → Histogram. This creates a Velocity Histogram box in which the histogram data is displayed. The data is updated at approximately 15 second intervals.

Clicking the left-right button moves the viewing window across the histogram data. Note that the velocity units of the histogram

abscissa are as determined by the Configure Measurement Units function described in section 9.2.

Click the Hold button to prevent the automatic update of the histogram data. The button is then renamed Refresh. Clicking this Refresh button restarts the automatic update procedure and the button caption reverts to Hold.

Clicking the Save button writes the velocity histogram data to the PC file system. The file is located in the c:\Mainstream\Histogram directory. The file name is OCFMXXXX_YYMMDD_HHMMSS.HST where OCFMXXXX is the serial number of the Mainstream system unit, and YYMMDD and HHMMSS are the date and time that the velocity histogram was captured. This file may be used by Sensor Products for diagnostic purposes.

To leave the Display Histogram function click the OK button.

9. LCD Functions

9.1 Configure LCD

The Configure LCD function determines which parameters, if any, are displayed by the LCD.

To execute the Configure LCD function click LCD → Configure. This creates an LCD Configuration box in which the LCD status and program are displayed.

The LCD status can be set to ON or OFF by clicking tha appropriate button in the LCD Status box.

The parameters to be displayed by the LCD are determined by checking or unchecking entries in the LCD Program box.

Clicking tha Apply button transmits the LCD configuration to the Mainstream system unit.

To leave the Configure LCD function click the OK button.

9.2 Configure Measurement Units

The Configure Measurement Units function sets the engineering units used by the Mainstream system unit and the Mainstream Communicator software.

To execute the Configure Measurement Units function click LCD → Units. This generates a Measurement Units Configuration box in which the engineering units for Level, Area, Velocity, Flow Rate and Quantity are displayed. A new choice of engineering unit is selected by clicking the appropriate button.

Clicking tha Apply button transmits the measurement units to the Mainstream system unit and activates the selection.

To leave the Configure Measurement Units function click the OK button.

10. Data Logger Functions

10.1 Set Date and Time

The Set Date and Time function displays the PC and Mainstream system unit date and time and allows synchronisation of the Mainstream system unit real time clock with the PC clock.

To execute the Set Date and Time function click System → Date/Time. Boxes showing the PC and Mainstream system unit date and time are displayed. Note that although the PC date and time is updated continuously the Mainstream date and time is only updated at 5 second intervals.

To synchronise the Mainstream system unit to the PC click the Apply button. After a few seconds delay the Mainstream date and time will begin to track the PC date and time. To leave the Set Date and Time function click the OK button.

Note: A side effect of setting the date and time is the creation of a new data logger record.

10.2 Configure Data Logger

The Configure Data Logger function sets the data logger recording interval and enables or disables the creation of new data records on a daily basis.

To execute the Configure Data Logger function click Logger → Configure. This generates a Logger Configuration box showing the recording interval and daily record status.

To set the recording interval click the appropriate button in the Recording Interval box. Note that it is only possible to set the recording interval when the Measurement Interval, set by the Configure Measurements function (see section 6.1), is Continuous. In all other cases the recording interval is the same as the measurement interval (see section 6.1) and the Recording Interval box is disabled.

To enable or disable daily records click the check box in the Daily Records box. If daily records are enabled the data record start time may be set by clicking the Start Time up-down button.

Click the Apply button to activate the logger configuration.

To exit from the Configure Data Logger function click the OK button.

10.3 Retrieve Data

The Retrieve Data function transfers recorded flow information from the data logger in the Mainstream system unit to a spreadsheet compatible data file on the PC.

To execute the Retrieve Data function click Logger → Retrieve. This generates a Data Retrieval box which indicates the start date and time and other details of each of the data records stored within the Mainstream system unit.

To transfer a single data record from the Mainstream system unit to the PC, click on the record to be retrieved and then click the Retrieve button. A data file OCFMXXXX_YYMMDD_HHMM.CSV is created in the directory C:\Mainstream\Data, where OCFMXXXX is the Mainstream system unit ID number, YYMMDD is the year, month and date of the start of the data record, and HHMM is the data record start time. If the file already exists, because the data has already been retrieved, a request for permission to overwrite the target file is made. Retrieved data is always in the engineering units set by the Configure Units function (see section 9.2).

Hint: Flow computations for the data file are performed at the time the data is retrieved and are independent of the flow calculations performed in real time by the Mainstream system unit. Thus, changing the pipe or channel cross-section prior to retrieving the data (e.g. to correct for errors or uncertainties at the time of the flowmeter installation) results in corrected data files.

To transfer several data records from the Mainstream system unit to the PC, hold down the <control> key and click on each of the records to be retrieved. Then click the Retrieve button.

To transfer all of the recorded data from the Mainstream system unit to the PC click the Retrieve All button.

Clicking the Delete button clears the data logger memory in the Mainstream system unit. All recorded data is permanently erased. For this reason a request for confirmation is issued before actioning the delete operation.

To exit from the Retrieve Data function click the OK button.

10.4 Specimen .CSV Data

The data below was generated by a Mainstream flowmeter configured for a 1.6 metre diameter pipe. The level and velocity were 1000 mm and 753 mm/S respectively.

Three different flowmeter configurations were employed and four data records were retrieved. The retrieved data was then loaded into a spreadsheet.

First record OCFM7024_010112_1518.CSV - the flowmeter was configured for Continuous measurement of Level Only and the logger was set to record at 2 minute intervals.

Second record OCFM7024_010112_1612.CSV – the flowmeter was configured for Continuous measurement of Velocity Only and the logger was set to record at 30 second intervals.

Third record OCFM7024_010112_1648.CSV – the flowmeter was configured for Continuous measurement of Level and Velocity and the logger was set to record at 12 minute intervals.

Fourth record OCFM7024_010112_1648.CSV – this is the same as the third record but retrieved after changing the velocity and flow rate units.

Data File OCFM7024_010112_1518.CSV

Date	Time	Level	Area	Velocity	Flow Rate	Hour Quantity	Total Quantity
dd/mm/yy	hh:mm:ss	mm	m^2	mm/S	m^3/hr	m^3	m^3
12/01/01	15:18:00	1000	1.324				
12/01/01	15:20:00	1000	1.324				
12/01/01	15:22:00	1000	1.324				
12/01/01	15:24:00	1000	1.324				
12/01/01	15:26:00	1000	1.324				
12/01/01	15:28:00	1000	1.324				
12/01/01	15:30:00	1000	1.324				
12/01/01	15:32:00	1000	1.324				
12/01/01	15:34:00	1000	1.324				
12/01/01	15:36:00	1000	1.324				
12/01/01	15:38:00	1000	1.324				
12/01/01	15:40:00	1000	1.324				
12/01/01	15:42:00	1000	1.324				
12/01/01	15:44:00	1000	1.324				

Data File OCFM7024_010112_1612.CSV

Date	Time	Level	Area	Velocity	Flow Rate	Hour Quantity	Total Quantity
dd/mm/yy	hh:mm:ss	mm	m^2	mm/S	m^3/hr	m^3	m^3
12/01/01	16:12:30			752			
12/01/01	16:13:00			752			
12/01/01	16:13:30			752			
12/01/01	16:14:00			752			
12/01/01	16:14:30			753			
12/01/01	16:15:00			752			
12/01/01	16:15:30			753			
12/01/01	16:16:00			752			
12/01/01	16:16:30			753			
12/01/01	16:17:00			753			
12/01/01	16:17:30			752			
12/01/01	16:18:00			753			
12/01/01	16:18:30			753			
12/01/01	16:19:00			753			

Data File OCFM7024_010112_1648.CSV

Date	Time	Level	Area	Velocity	Flow Rate	Hour Quantity	Total Quantity
dd/mm/yy	hh:mm:ss	mm	m^2	m/S	m^3/day	m^3	m^3
12/01/01	16:48:00	1000	1.324	0.753	86120	0	
12/01/01	17:00:00	1000	1.324	0.752	86005	718	718
12/01/01	17:12:00	1000	1.324	0.753	86120	717	
12/01/01	17:24:00	1000	1.324	0.752	86005	1434	
12/01/01	17:36:00	1000	1.324	0.752	86005	2151	
12/01/01	17:48:00	1000	1.324	0.753	86120	2868	
12/01/01	18:00:00	1000	1.324	0.752	86005	3585	4303
12/01/01	18:12:00	1000	1.324	0.752	86005	717	
12/01/01	18:24:00	1000	1.324	0.753	86120	1433	
12/01/01	18:36:00	1000	1.324	0.753	86120	2151	
12/01/01	18:48:00	1000	1.324	0.753	86120	2869	
12/01/01	19:00:00	1000	1.324	0.753	86120	3586	7890
12/01/01	19:12:00	1000	1.324	0.753	86120	718	
12/01/01	19:24:00	1000	1.324	0.753	86120	1435	
12/01/01	19:36:00	1000	1.324	0.753	86120	2153	
12/01/01	19:48:00	1000	1.324	0.752	86005	2871	
12/01/01	20:00:00	1000	1.324	0.752	86005	3587	11477
12/01/01	20:12:00	1000	1.324	0.752	86005	717	

Data File OCFM7024_010112_1648.CSV

Date dd/mm/yy	Time hh:mm:ss	Level mm	Area m^2	Velocity mm/S	Flow Rate m^3/hr	Hour Quantity m^3	Total Quantity m^3
12/01/01	16:48:00	1000	1.324	753	3588	0	
12/01/01	17:00:00	1000	1.324	752	3584	718	718
12/01/01	17:12:00	1000	1.324	753	3588	717	
12/01/01	17:24:00	1000	1.324	752	3584	1434	
12/01/01	17:36:00	1000	1.324	752	3584	2151	
12/01/01	17:48:00	1000	1.324	753	3588	2868	
12/01/01	18:00:00	1000	1.324	752	3584	3585	4303
12/01/01	18:12:00	1000	1.324	752	3584	717	
12/01/01	18:24:00	1000	1.324	753	3588	1433	
12/01/01	18:36:00	1000	1.324	753	3588	2151	
12/01/01	18:48:00	1000	1.324	753	3588	2869	
12/01/01	19:00:00	1000	1.324	753	3588	3586	7890
12/01/01	19:12:00	1000	1.324	753	3588	718	
12/01/01	19:24:00	1000	1.324	753	3588	1435	
12/01/01	19:36:00	1000	1.324	753	3588	2153	
12/01/01	19:48:00	1000	1.324	752	3584	2871	
12/01/01	20:00:00	1000	1.324	752	3584	3587	11477
12/01/01	20:12:00	1000	1.324	752	3584	717	

11. Switch Functions

11.1 Configure Switch 1

The Configure Switch 1 function determines the operation of the switch by setting the parameters to which it is to respond.

To execute the Configure Switch 1 function click Switches → Configure SW1. This creates a Switch 1 Configuration box in which the switch mode and any additional numeric parameters are displayed. The engineering units of these parameters are as defined by the Set Measurement Units function (see section 9.2).

The switch mode may be set to OFF, Level, Signal Quality, Velocity, Flow Rate or Quantity by clicking the appropriate button in the Switch Mode box.

The parameters governing the selected mode of operation are modified by clicking on the parameter, typing the new value and terminating the input by hitting <return>.

Clicking tha Apply button transmits the switch configuration data to the Mainstream system unit and activates the new configuration..

To leave the Configure Switch 1 function click the OK button.

11.2 Configure Switch 2

The Configure Switch 2 function determines the operation of switch 2 by setting the parameters to which it is to respond.

To execute the Configure Switch 2 function click Switches → Configure SW2. This creates a Switch 2 Configuration box in which the switch mode and any additional numeric parameters are displayed. The engineering units of these parameters are as defined by the Set Measurement Units function (see section 9.2).

The switch mode may be set to OFF, Level, Signal Quality, Velocity, Flow Rate or Quantity by clicking the appropriate button in the Switch Mode box.

The parameters governing the selected mode of operation are modified by clicking on the parameter, typing the new value and terminating the input by hitting <return>.

Clicking tha Apply button transmits the switch configuration data to the Mainstream system unit.

To leave the Configure Switch 2 function click the OK button.

11.3 Test Switches

The Test Switches function provides a means to monitor the states of the two switches during normal flowmeter operation and a method of overriding the switch states in order to test the operation of equipment attached to the switches.

To execute the Test Switches function click Switches $\rightarrow$ Test. This generates a Switch States box in which the the condition of the two switches, Open or Closed, is indicated.

To alter the state of either switch click the appropriate button in the Switch 1 or Switch 2 box. This communicates a request to the Mainstream system unit which modifies the switch state within approximately 2 seconds. Note that after a 5 minute delay measured by an internal timer within the Mainstream system unit the switches will automatically be restored to their normal operating states.

To leave the Test Switches function click the OK button. The switches will be restored to their normal operating states. Note that if the switch state is indeterminate because the measurement to which the switch is configured to respond lies within the switch hysterisis band, the final switch state may differ from the original state.

12. 4:20 mA Output Functions

12.1 Configure 4:20 mA Outputs

The Configure 4:20 mA Outputs function is used to define the operating characteristics of the four Mainstream system unit current outputs. If the Mainstream system unit is not fitted with 4:20 mA outputs this function will be inaccessible.

To execute the Configure 4:20 mA Outputs function click 4:20 mA Outputs → Configure. This generates a 4:20 mA Output Configuration box in which the configuration parameters are displayed.

In the 4:20 mA Output box click on the Level, Signal Quality, Velocity or Flow rate button to select the output to be configured.

To enable or disable the selected output click the ON or OFF button as appropriate.

To set the measurements corresponding to the 4 mA and 20 mA output currents, click on the appropriate parameter and type in the required value terminating the input by hitting <return>. The engineering units of these parameters are as defined by the Set Measurement Units function (see section 9.2).

To activate the configuration click the Apply button. This transmits the configuration data to the Mainstream system unit which adjusts the 4:20 mA output currents accordingly.

To exit from the Configure 4:20 mA Outputs function click the OK button.

12.2 Calibrate 4:20 mA Outputs

The Calibrate 4:20 mA Outputs function provides the mechanism to adjust the 4 mA and 20 mA currents from the Mainstream system unit 4:20 mA output circuits. This function will be inaccessible if the Mainstream system unit is not fitted with 4:20 mA outputs.

To execute the Calibrate 4:20 mA Outputs function click 4:20 mA Outputs → Calibrate. This generates a 4:20 mA Configuration box in which the DAC code for each of the 4:20 mA outputs is displayed.

To adjust the output current at one of the 4 mA or 20 mA output points, click on the 4 mA or 20 mA button for the required output. The current is increased or decreased by clicking the up-down button. The DAC code display is updated accordingly and the current from the selected Mainstream 4:20 mA output is adjusted.

Clicking the Defaults button resets the calibration data to the original factory settings.

To install the calibration data click the Apply button. This transmits the calibration data to the Mainstream system unit.

To exit from the Calibrate 4:20 mA Outputs function click the OK button. The 4:20 mA outputs will revert to operating as configured (see section 12.1) with the currents adjusted according to the new calibration data.

12.3 Test 4:20 mA Outputs

The Test 4:20 mA Outputs function provides the means to set the four Mainstream system unit current outputs in order to check their calibration and test the operation of equipment attached to them. If the Mainstream system unit is not fitted with 4:20 mA outputs this function will be inaccessible.

To execute the Test 4:20 mA Outputs function click 4:20 mA Outputs → Test. This generates a 4:20 mA Output Test box in which the output currents are displayed.

Clicking the up-down button corresponding to any of the outputs will increment or decrement that output current in 0.5 mA steps. Note that after a 5 minute delay measured by an internal timer within the Mainstream system unit the 4:20 mA outputs will automatically revert to operating as defined by the Configure 4:20 mA Outputs function (see section 12.1).

To leave the Test 4:20 mA Outputs function click the OK button. The output currents will be restored to their normal operating values.