PARTICLE INSTRUMENTS

Mass Flowmeter

Model 3063
Thermal Mass Flowmeter

RS-232 Serial Command Set Manual

1930102, Revision C
June 2010

TRUST. SCIENCE. INNOVATION.

PARTICLE INSTRUMENTS

Mass Flowmeter

Model 3063
Thermal Mass Flowmeter

RS-232 Serial Command Set Manual

1930102, Revision C
June 2010

U.S.
Sales and Customer Service:
1-(800) 874-2811 USA/
001-(651) 490-2811

Fax:
001-(651) 490-3824

MAIL TO:
TSI Incorporated
500 Cardigan Road
Shoreview, MN 55126-3996
USA

E-mail address:
particle@tsi.com
Website:
http://www.tsi.com

TRUST. SCIENCE. INNOVATION.

Part Number
1930102

Address
TSI Incorporated / 500 Cardigan Road / Shoreview, MN 55126 / USA

Fax Number
651-490-3824

LIMITATION OF WARRANTY AND LIABILITY. Seller warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment.

b. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment.

c. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies.

d. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is IN LIEU OF all other warranties and is subject to the LIMITATIONS stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE**.

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI Customer Service at 1-800-874-2811 (USA) or +1-651-490-2811 (International).

CONTENTS

Chapters

Chapter 1

Flowmeter Identification

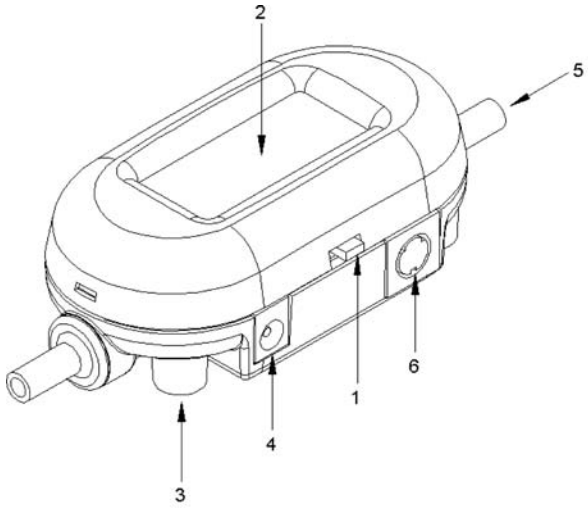

Figure 1-1 Model 3063 Mass Flowmeter

1. On/Off Switch
2. Display
3. Mounting Inserts (2)
4. DC Power Input
5. Flow Inlet
6. Interface Connector and Optional Power Input

Chapter 2

Connecting PC to Flowmeter

Flowmeter Interface

TSI offers an optional mini-DIN to 9-pin D-sub cable (TSI PN 1303583) for communicating through a standard computer RS-232 serial port to the Model 3063 Mass Flowmeter. An analog cable (TSI PN 1303584) with tinned leads is also available. The analog cable can be used to connect to the analog output of the Flowmeter, as well as to supply power and connect to the RS-232 bus. When using these cables, line up the arrow on the connector with the bottom side of the Flowmeter. Flowmeter connector pin-out designations are shown below.

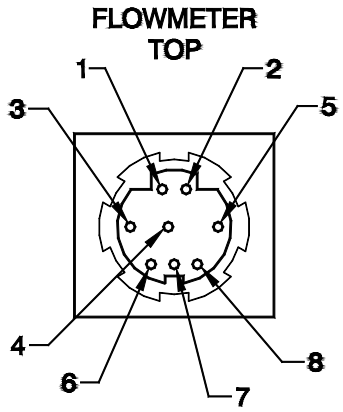

Table 1. List of Connector Pin-Outs and Cable Color Code Designations

Pin	Function	Cable Color Code for TSI Cable 1303584
1	Power Input (+)	Black
2	Power Ground (-)	Green
3	Analog Output (+)	Red
4	Analog Ground (-)	Brown
5	(no connection)	Blue
6	RS-232 Receive (in)	White
7	RS-232 Transmit (out)	Yellow
8	Logic Ground	Gray

Chapter 3

Serial Interface Protocol

Data Format

The RS-232 port settings are fixed in the Model 3063 Flowmeter as follows:

Baud Rate 38,400
Data Bits 8
Parity .....None
Stop Bits 1
Flow Control.....None

Buffering

The Model 3063 Flowmeter has an internal software buffer for both transmit and receive operations. Both buffers are 50 bytes long.

Command Format

The serial interface commands in this manual are designated by the bold font (for example: **DmFTPnnnn**). The commands are case sensitive. Upper case letters are used throughout the command set except as designated.

The TSI Model 3063 Flowmeter uses ASCII characters as the input command set. Each command sent to the Flowmeter must be terminated by a carriage return (CR = 0x0d). Line feeds (LF = 0x0a) are ignored.

Select commands allow you to choose either ASCII or binary format for the returned data. Binary data transfers allow for faster operation.

The Model 3063 allows some operating parameters to be stored in non-volatile memory to serve as the new power-on defaults (example: sample rate, gas calibration, etc). After selecting the new operating parameter value, initiate the **SAVE** command to permanently store this new value. If the **SAVE** command is not initiated, the change to the operating parameter will be lost when the Flowmeter is turned off. The factory default operating parameters can always be reset by initiating the **DEFAULT** command. See Appendix B for a list of the factory default parameters.

The Model 3063 sends an acknowledge sequence to confirm that the command was received. For ASCII commands, the acknowledge sequence is “OK” CR LF. For binary commands, a single byte, 0x00, is returned.

Chapter 4

Command Set

Command Set Summary

Commands for Flowrate, Temperature, Pressure, and Volume	
DmFTPnnnn	Returns flowrate, temperature, and pressure data at an interval equal to the sample rate.
Vmnnnn	Returns a volume measurement by integrating flowrate over time.

Measurement Setup Commands	
SBTx±nnn.nn	Sets the begin-trigger level for starting data acquisition.
SETx±nnn.nn	Sets the end-trigger level for stopping data acquisition.
CBT	Clears the begin-trigger level.
CET	Clears the end-trigger level.
SSRnnnn	Sets the sample rate at which the data is returned.
SUn	Selects either standard or volumetric units of flow.

Setup Commands for Analog Output	
SASnnn	Sets the full-scale flowrate of the analog output.
SAZnnn	Sets the zero intercept for the analog output.
SSRnnnn	Sets the sample rate at which the analog output is averaged and updated.

Miscellaneous Commands	
Rxx	Reads the current values of the changeable operating parameters.
SAVE	Saves the current values of changeable operating parameters to nonvolatile memory.
DEFAULT	Restores the values of changeable operating parameters to factory default settings.
SN	Returns the serial number of the Flowmeter.
MN	Returns the model number of the Flowmeter.
REV	Returns the internal firmware revision of the Flowmeter.
DATE	Returns the date of the last calibration.

Miscellaneous Commands (*continued*)	
?	Returns “OK” to tell if the Flowmeter is communicating.

Display Commands	
SURnnnn	Sets the update rate for the LCD display.

DmFTPnnnn

Returns Flow, Temperature, and Pressure data at an interval equal to the sample rate.

The data is returned in the order of Flow, Temperature, and Pressure. All three measurements may be requested or a combination of the three as indicated below.

D Denotes data transfer

m Denotes data format: A = ASCII, B = binary, C = ASCII followed by CR and LF

F Requests a flow reading (replace with lower case “x” if a flow reading is not desired)

T Requests a temperature reading (replace with a lower case “x” if a temperature reading is not desired)

P Requests a pressure reading (replace with a lower case “x” if a pressure reading is not required)

nnnn Denotes maximum number of samples to return, range is 1 to 1000. (“0500” denotes 500 readings, leading zeros must be included)

Example 1) **DAFxP0250**

Requests 250 readings of flow and pressure data in ASCII format.

Example 2) **DBxTx1000**

Requests 1000 readings of temperature in binary format.

Flow data is returned in units of Std L/min or L/min (see **SUn** command).

Temperature data is returned in units of °C.

Pressure data is returned in units of kPa.

Before initiating this command, the sample interval, gas calibration, and flow units should be set.

The sample interval between data points is set using the **SSRnnnn** command.

The units of standard or volumetric flow is set using the **SUn** command.

The data can be returned in either ASCII or binary.

If ASCII mode is chosen, the acknowledge sequence is “OK” CR LF. If the command generated an error, an error code “ERRn” CR LF will be returned where n represents an error code 0 through 9. See Appendix A for a list of possible error codes. The readings returned are separated by commas and the termination sequence is a CR LF. The Model 3063 sends 2 decimal places for flowrate.

If binary mode is chosen, a single byte, 0x00, will be returned as a command acknowledgment. If a command generated an error, then a single byte will be returned in place of the acknowledgment byte. See Appendix A for a list of error codes. Each reading returns two bytes. The most significant byte is returned first. Flowrate data is returned as an unsigned integer (0 to 65535) that has been multiplied by 100. Temperature data is returned as a signed integer (–32768 to 32767) that has been multiplied by 100. Pressure data is returned as an unsigned integer that has been multiplied by 100. To convert the returned data back to its original form, divide the data by 100. Binary transfers terminate by returning two bytes in the form 0xff 0xff. Check the first reading in each block of data returned (flow, temperature, and pressure) from the unit, for the terminating sequence. No termination sequence will be sent if an error condition occurred.

***Note**: A temperature reading of –0.01 ℃ would be transmitted as 0xff 0xff and could signal an early termination if flow readings were disabled.*

If no begin-trigger is set, the data acquisition begins immediately upon processing of the command. If a begin-trigger is set (set with **SBTx±nnn.nn**), the data acquisition begins as soon as the begin-trigger condition is detected. If no end-trigger is set, nnnn samples will be used in the data set. If an end-trigger is set (set with **SETx±nnn.nn**), the acquisition will stop either when the end-trigger condition is detected or when nnnn samples have been acquired, whichever comes first. After the command is finished, a termination sequence is sent to signal the end of the transfer.

Example 3) **SSR0010**

Set sample rate to one average sample every 10 ms

Flowmeter returns OK <CR> <LF>

SG1 Use the oxygen gas calibration

Flowmeter returns OK <CR> <LF>

SBTF+001.00

Begin sample by triggering on increasing flow at 1.0 Std L/min

Flowmeter returns OK <CR> <LF>

DAFxx0005 Request 5 samples of flow in ASCII format.

Flowmeter returns OK <CR> <LF>

Flowmeter returns flow data as follows.

1.10,1.20,1.25,1.23,1.20<CR> <LF>

Example 4) **DBFxx0005**

Request 5 samples of flow in binary format.

An example of the data that could be returned is as follows.

0x00 0x33 0x09 0x33 0x1f 0x33 0x25 0x33 0x2d 0x33 0x2e 0xff 0xff

After conversion, the data would look like:

130.65 130.87 130.93 131.01 131.02

Example 5) **DCFTx0005**

Request 5 samples of flow and temperature in ASCII format but with CR and LF following each data set.

Returns data as follows.

1.10,23.45<CR> <LF>
1.20,23.53<CR> <LF>
1.25,23.48<CR> <LF>
1.23,23.39<CR> <LF>
1.20,23.50<CR> <LF>

Vmnnnn

Returns a volume measurement by integrating flowrate over time.

V Denotes volume measurement.

m Denotes data format: A = ASCII, B = binary.

nnnn Denotes maximum number of flow samples to integrate, range is 1 to 9999 (“0500” denotes 500 readings, leading zeros must be included).

Example 1) **VA2000**

Request a single volume reading by integrating a maximum of 2000 flow samples and return data in ASCII format.

Volume data is returned in units of standard liters or volumetric liters (see **SUn** command).

Before initiating this command, the sample interval, gas calibration, and volume units should be set.

The sample interval between data points is set using the **SSRnnnn** command.

The units of standard or volumetric is set using the **SUn** command. The most common units are volumetric liters.

The data can be returned in either ASCII or binary.

If ASCII mode is chosen, the acknowledge sequence is “OK” <CR>< LF>. If the command generated an error, instead of “OK” CR LF being returned an error code “ERRn” <CR> <LF> will be returned where n represents an error code 0 through 9. See Appendix A for a list of possible error codes. The termination sequence is a CR LF.

If binary mode is chosen, the acknowledge sequence is a single byte 0x00. If the command generated an error, a single byte error code will be returned instead of 0x00. See Appendix A for a list of possible error codes. The reading is represented by 2 bytes. The most significant byte is returned first. The data is represented as an unsigned integer (0 to 65535) that has been multiplied by 100. Therefore, you must divide the integer that is returned by 100 or 1000 to get the correct result. The termination sequence for binary is 0xff 0xff.

If no begin-trigger is set, the data acquisition begins immediately upon processing of the command. If a begin-trigger is set (set with **SBTx±nnn.nn**), the data acquisition begins as soon as the begin-trigger condition is detected. If no end-trigger is set, then nnnn samples will be used in the integral. If an end-trigger is set (set with **SETx±nnn.nn**), then the acquisition will stop either when the end-trigger condition is detected or when nnnn samples has been acquired whichever comes first. After the command is finished, a termination sequence is sent to signal the end of the transfer.

Example 2) **VA1000**

Request volume measurement with at most 1000 samples, data returned in ASCII.

Returns volume data as follows: OK <CR> <LF> 130.651 <CR> <LF>

Example 3) **VB1000**

Request volume measurement with at most 1000 samples, data returned in binary.

Returns data as follows: 0x00 0x33 0x09 0xff 0xff

After conversion, the data would look like: 130.65

SSRnnnn

Sets the sample rate for data returned through the serial port and also controls the update rate of the linearized analog flow output.

SSR Denotes set sample rate.

nnnn Denotes number of milliseconds per sample, range 1 to 1000. ("0005" denotes 5 milliseconds per sample, leading zeros must be included.)

Longer sample rates provide greater flow averaging, whereas shorter sample rates provide greater frequency response.

After the command is processed, an acknowledge sequence of "OK" CR LF is sent. If the command generated an error, an error code of "ERRn" CR LF will be sent. See Appendix A for a list of possible error codes.

Use the **SAVE** command to permanently store the selected sample rate as the new power-on default.

SUn

Select either standard or volumetric units of flow for data displayed on the LCD display and for data received through the serial port.

SU Denotes whether flow is measured in standard units or volumetric units

n Denotes which units
S = standard flowrate, V = volumetric flowrate

The LCD display will indicate Std L/min when the flow is set to standard units. The display will indicate L/min when flow is set to volumetric.

The Model 3063 Flowmeter is designed to measure flow in units of standard L/min. When selecting volumetric flowrate, they perform a flow correction as shown below by measuring gas temperature and pressure. Flow output in volumetric L/min is less accurate due to additional uncertainties encountered when measuring gas temperature and pressure. The following equation is based on applications of the ideal gas law.

$$\text{VolumetricFlow} = (\text{StdFlow})\left[\frac{273.15+\text{Tm}}{273.15+21.11}\right]\frac{101.3}{\text{Pm}}$$

After the command is processed, an acknowledge sequence of "OK" CR LF is sent. If the command generated an error, instead of "OK" CR LF being sent an

error code of “ERRn” CR LF will be sent. See Appendix A for a list of possible error codes.

Use the **SAVE** command to permanently store the selected flow units as the new power-on default.

SBTx±nnn.nn

Sets the begin-trigger level for starting the data acquisition.

SBT Denotes set begin-trigger

x Denotes trigger source: F = flow, P = pressure

± Denotes positive or negative trigger: + = positive, - = negative

nnn.nn Set trigger level (“001.00” would denote 1.00 Std L/min, leading and trailing zeros must be included)

The set trigger level stays in effect until cleared using the **CBT** command. The trigger level is also cleared when the Flowmeter is turned off or the **DEFAULT** command is initiated.

After the command is processed, an acknowledge sequence of “OK” CR LF is sent. If the command generated an error, instead of “OK” CR LF being sent an error code of “ERRn” CR LF will be sent. See Appendix A for a list of possible error codes.

Example 1) **SBTF+002.00**

Sets a begin-trigger level of 2.00 Std L/min with positive slope.

Example 2) **SBTP-110.00**

Sets a begin-trigger level of 110.0 kPa with negative slope.

SETx±nnn.nn

Sets the end-trigger level for stopping data acquisition.

SET Denotes set end-trigger

x Denotes trigger source: F = flow, P = pressure

± Denotes positive or negative trigger: + = positive,– = negative

nnn.nn Sets trigger level (“01.00”would denote 1.00 Std L/min, leading zeros must be included)

The set trigger level stays in effect until cleared using the **CET** command. The trigger level is also cleared when the Flowmeter is turned off or the **DEFAULT** command is initiated.

After the command is processed, an acknowledge sequence of “OK” CR LF is sent. If the command generated an error, instead of “OK” CR LF being sent an error code of “ERRn” CR LF will be sent. See Appendix A for a list of possible error codes.

Example 1) **SETF-002.00**
Sets an end-trigger level of 2.00 Std L/min with negative slope.

Example 2) **SETP+110.00**
Sets an end-trigger level of 110.0 kPa with positive slope.

CBT

Clears the begin-trigger level. Begin-trigger function is disabled. The Flowmeter will return an acknowledge sequence of “OK” CR LF as a response.

CET

Clears the end-trigger level. End-trigger function is disabled. The Flowmeter will return an acknowledge sequence of “OK” CR LF as a response.

SASnnn

Sets the full-scale flowrate scaling factor of the linearized analog output.

SAS Denotes set scaling factor

nnn Sets full-scale flowrate output. Range is 1 to full scale flow rating of the Flowmeter (see Appendix B for factory default values). (“010” denotes 10 Std L/min, leading zeroes must be included.)

The linearized analog output can be configured for various full-scale flowrate values. This value can be changed to improve the resolution of the analog signal by narrowing the range of flow.

After the command is processed, an acknowledge sequence of “OK” CR LF is sent. If the command generated an error, instead of “OK” CR LF being sent an error code of “ERRn” CR LF will be sent. See Appendix A for a list of possible error codes.

Use the **SAVE** command to permanently store the new full-scale flow value as the new power-on default.

SAZnnn

Sets the zero intercept for the linearized analog output.

SAZ Denotes set analog zero intercept

nnn Denotes number of mV for the zero flow intercept. Range is –100 to 100 mV. (Leading zeros must be included.)

The zero intercept nnn is in units of mV. The factory default is 0 mV.
If nnn = 010 then at zero flow, the analog output will be 10 mV. This command will accept a negative offset formatted as SAZ-nnn. The zero adjustment range is –100mV to 100mV. Note that this command sets the zero intercept only and is not a true "zero adjust." The analog output cannot go negative.

Use the **SAVE** command to permanently store the new zero intercept value as the new power-on default.

Example 1) **SAZ030**
Sets zero intercept of zero flow to +30 mV

Example 2) **SAZ-050**
Sets zero intercept of zero flow to –50 mV

Note that the analog output cannot go negative.

SN

Returns the serial number of the Flowmeter in ASCII. The serial number is an alpha-numeric string terminated by a CR LF. The string can be a maximum of 16 characters in length plus the terminating CR LF.

Example: **30639906004**

MN

Returns the model number of the Flowmeter in ASCII. The model number is an alpha-numeric string terminated by a CR LF. The string can be a maximum of 12 characters in length plus the terminating CR LF.

Example: **3063**

REV

Returns the internal firmware revision of the Flowmeter in ASCII. The revision is an alpha-numeric string terminated by a CR LF. The string can be a maximum of 3 characters in length plus the terminating CR LF.

Example: **1.3**

DATE

Returns the date of the last calibration in ASCII. The format of the string is "month/day/year." The date is an alpha-numeric string terminated by a CR LF. The string can be a maximum of 8 characters in length plus the terminating CR LF.

Example: **02/02/00**

SURnnnn

Sets the update rate for the LCD display.

SUR Denotes the set update rate command

nnnn Denotes the number of milliseconds per update. Range is 50 to 5000. ("0050" denotes 50 milliseconds per update, leading zeros must be included.)

Data displayed on the LCD is averaged based on the update rate. If the display rate were set to 1000 ms, the data shown on the display would be averaged for 1 second. This command affects only the LCD display. The update rate for the linearized analog output and the serial output is controlled through the **SSRnnnn** command.

After the command is processed, an acknowledge sequence of "OK" CR LF is sent. If the command generated an error, instead of "OK" CR LF being sent an error code of "ERRn" CR LF will be sent. See Appendix A for a list of possible error codes.

Use the **SAVE** command to permanently store the selected update rate as the new power-on default.

Rxx

Reads the current values for sample rate, gas calibration, standard/volumetric flow units, trigger values, analog output scaling and display update rate.

R Denotes read current values.

xx
- **xx=SR** Denotes sample rate (returns 0 to 1000).
- **xx=U** Denotes flow units (returns S or V).
- **xx=BT** Denotes begin-trigger value (returns xxnnn.nn).
- **xx=ET** Denotes end-trigger value (returns xxnnn.nn).
- **xx=AS** Denotes analog flowrate scaling factor (returns 1 to 300).
- **xx=AZ** Denotes analog zero intercept (returns –100 to 100).
- **xx=UR** Denotes display update rate (returns 50 to 5000).

Returns current settings in ASCII format. Leading zeroes are not returned.

After the command is processed, an acknowledge sequence of “OK” CR LF is sent followed by the data. If the command generated an error, instead of “OK” CR LF being sent an error code of “ERRn” CR LF will be sent. See Appendix A for a list of possible error codes.

?

This is a ping command used to tell if the Flowmeter is communicating. The Flowmeter will return an acknowledge sequence of “OK” CR LF as a response. The serial communications indicator will flash once on the LCD display to indicate that the command was received.

DEFAULT

Returns the values for sample rate, calibration gas/gas mixture, standard/volumetric flow units, display update rate, display mode, analog zero, and full-scale scaling factors to the factory default settings. To make these values the new power-on default, the **SAVE** command must be executed following the **DEFAULT** command. This command also clears both the begin- and end-trigger values. The default values for the Model 3063 operating parameters are listed in Appendix B.

SAVE

Saves the current values for sample rate, calibration gas/gas mixture, standard/volumetric flow units, display update rate, display mode, analog zero, and scaling factors to the internal nonvolatile memory. The Flowmeter will be restored to this configuration when powered on. The following parameters are saved:

- Sample Rate (**SSRnnnn**)
- Flow Units (**SUn**)
- Analog Full-Scale Flowrate (**SASnnn**)
- Update Rate for LCD Display (**SURnnnn**)
- Default Measurement Parameter (**SDMm**)
- Default Set Display Mode Conditions (**SDMFTPn**)
- Default LCD Display Parameter (**SDUn**)

After the command is processed, an acknowledge sequence of “OK” <CR><LF> is sent. If the command generated an error, an error code of “ERRn” <CR><LF> will be sent. See Appendix A for a list of possible error codes.

Chapter 5

Troubleshooting

Table 2 lists the symptoms, possible causes, and recommended solutions for common problems encountered with the Flowmeter. If the symptom is not listed, or if none of the solutions solves the problem, please contact TSI Customer Service at 1-800-874-2811 or 651-490-2811.

Table 2. Troubleshooting

Symptom	Possible Causes	Corrective Action
Communication not working	Selected wrong PC Comm port	Review Comm port selection.
	Cable not connected	See Chapter 2.
	Flowmeter not powered	Turn on Flowmeter.
	Serial communication parameters incorrectly set	See Chapter 3.

Appendix A

Error Codes

1 **Unrecognizable command** – The Flowmeter uses the length of the command and the first few letters (how many letters depends on the command) to recognize a valid command.

2 **Number out of range** – The number entered as the operand to a command was out of the specified range or unrecognizable.

3 **Invalid mode** – One or more requested options to a command were invalid.

4 **Command not possible** – The supplied operands describe a command that is beyond the functional capability of the Flowmeter.

8 **Internal error** – An internal failure was detected.

Appendix B

Factory Default Parameters

Default factory parameter settings of the Model 3063 Flowmeter,

Sample Rate:	10 ms
Gas Calibration:	0 = Air
Flow Units:	Standard
Display Update Rate:	500 ms
Analog Output Scaling:	200 Std L/min
Analog Zero Scaling:	0 mV
Triggers:	Disabled

TSI Incorporated – 500 Cardigan Road, Shoreview, MN 55126 U.S.A

USA	Tel: +1 800 874 2811	E-mail: particle@tsi.com	Website: www.tsi.com
UK	Tel: +44 149 4 459200	E-mail: tsiuk@tsi.com	Website: www.tsiinc.co.uk
France	Tel: +33 491 11 87 64	E-mail: tsifrance@tsi.com	Website: www.tsiinc.fr
Germany	Tel: +49 241 523030	E-mail: tsigmbh@tsi.com	Website: www.tsiinc.de
India	Tel: +91 80 41132470	E-mail: tsi-india@tsi.com	
China	Tel: +86 10 8260 1595	E-mail: tsibeijing@tsi.com	
Singapore	Tel: +65 6595 6388	E-mail: tsi-singapore@tsi.com	

Contact your local TSI Distributor or visit our website www.tsi.com
for more detailed specifications.

P/N 1930102 Rev C

Printed in U.S.A.