Supplemental Manual for Brooks®
A-protocol over RS485 for GF40/GF80 Series
Mass Flow Controllers and Meters

Brooks® GF40/GF80 Series
with RS485 A-protocol Communications
Dear Customer,

We recommend that you read this manual in its entirety as this will enable efficient and proper use of the A-protocol over RS485 thermal mass flow controllers and meters. Should you require any additional information concerning the A-protocol over RS485 thermal mass flow controllers and meters, please feel free to contact your local Brooks Sales and Service Office; see back cover for contact information, or visit us on the web at www.BrooksInstrument.com.

We appreciate this opportunity to service your fluid measurement and control requirements, and trust that we will be able to provide you with further assistance in future.

Yours sincerely,
Brooks Instrument
Section 1 Introduction
1.1 Introduction

Section 2 Definition of Terms
2.1 Definition of Terms

Section 3 Before Starting
3.1 Background & Assumptions
3.2 Numbers

Section 4 Quick Start
4.0 Quick Start
4.1 Supported Baud Rates
4.2 Character Coding
4.3 Bus and Device LEDs
4.4 Device Wiring
4.4.1 Electrical Connections
4.4.2 Multi Drop

Section 5 Message Protocol Structure
5.1 Introduction
5.2 Request Message
5.2.1 Start Character
5.2.2 Addressing Concept
5.2.3 Command
5.2.4 Data
5.2.5 End Character
5.3 Response Message
5.4 Response Without Data
5.4.1 OK (Acknowledgement)
5.4.2 NG (Negative Acknowledgement)
5.5 Response With Data
5.5.1 Status
5.5.2 Data
5.6 Broadcast

Section 6 Communicating With Slave
6 Start Communicating With Slave
6.1 Examples
Brooks® GF40/GF80 A-protocol over RS485

Section 7 ID Related Commands
7.1 ID Related Commands ................................................................. 7-1

Section 8 Read Commands
8.1 Read Commands .......................................................................... 8-1

Section 9 Set Commands
9.1 Set Commands ........................................................................... 9-1

Warranty, Local Sales/Service Contact Information ................................ Back Cover
1.1 Introduction

The A-protocol is a digital communication protocol which provides a reliable, transaction oriented service between a master device, such as a PC, and one or more Brooks® Digital Series Mass Flow Controllers and Meters. The protocol is designed to allow a centralized controller to acquire measurement data from a Mass Flow device and, in case of Mass Flow Controllers, send setpoint values.

The Brooks RS485 on GF40/GF80 MFCs/MFMs support digital communications as defined by this manual. Communication is ASCII based and uses a command start and end byte. The physical layer supported is RS485 only.

This document is intended to give a user the means to implement the protocol structure into his own control system in order to establish communication between the control system and the RS485 based GF40/GF80 Series devices. It does not cover the non-communication functionality of these devices. For this description please refer to Installation and Operation Manual for this specific device.

The remaining sections of this document are summarized below:

• **Section 2 – Definition of Terms**
• **Section 3 – Before Starting** covers backgrounds and assumptions.
• **Section 4 – Quick Start** defines how to properly configure and wire RS485 on GF40/GF80 Series MFCs/MFMs for digital communications.
• **Section 5 – Message Protocol Structure** describes the AKT message protocol.
• **Section 6 – Communicating With Slave** describes the requirements of the Master.
• **Section 7 – ID Related Commands** describes the commands needed to retrieve the address ID of the device.
• **Section 8 – Read Commands** describes the set of commands to read device attributes.
• **Section 9 – Set Commands** describes the set of commands to configure device attributes.
• **Back Cover – Warranty and Contact Information**
2.1 Definition of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFC/MFM</td>
<td>Mass Flow Controller/Meter Device</td>
</tr>
<tr>
<td>MSB</td>
<td>Most Significant Bit</td>
</tr>
<tr>
<td>LSB</td>
<td>Least Significant Bit</td>
</tr>
</tbody>
</table>
3 Before Starting

3.1 Background & Assumptions

This manual is a supplement to the Brooks GF40/GF80 Series installation and operation manual. It is assumed that the owner of this RS485 GF40/GF80 MFC/MFM is thoroughly familiar with the theory and operation of this device. If not, it is recommended that the owner reads the installation and operation manual first before continuing with this supplement.

3.2 Numbers

Numeric values used throughout this manual will be clearly denoted as to the base numeric system it represents. All hexadecimal numbers (base 16) will be prefixed with a 0x, like 0xA4. All binary numbers (base 2) will be suffixed with a b, like 1001b. All other numbers not annotated this way will be assumed decimal (base 10).
THIS PAGE WAS INTENTIONALLY LEFT BLANK
4 Quick Start

This section assumes the owner of the Digital Series device has a fully operational and trouble-free RS485 communications network with appropriate power supplies.

4.1 Supported Baud Rates

Data communication can be performed at a number of baud rates: 9600, 19.2K and 38.4K baud. The baud rate can be changed using the SBR command. The device is shipped with the baud rate set to 19.2K baud.

4.2 Character Coding

A-protocol messages are coded as a series of 8-bit characters or bytes. These are transmitted serially, using a conventional UART (Universal Asynchronous Receiver/ Transmitter). As in normal RS232 and other asynchronous communication links, a start bit, a parity bit and a stop bit are added to each byte. These allow the receiving UART to identify the start of each character and to detect bit errors due to electrical noise or other interference. An A-protocol character is built up from:

- 8 Databits
- No parity bit
- 1 Stop bit

4.3 Bus and Device LEDs

The device supports a Bus and Device LED to indicate the status of network communication and the device.

The Bus LED will indicate the following:

<table>
<thead>
<tr>
<th>Flash Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No Network Connected</td>
</tr>
<tr>
<td>Solid Green</td>
<td>Communication Established at least once, resets after power cycle (no periodic check)</td>
</tr>
</tbody>
</table>
Section 4 Quick Start

Brooks® GF40/GF80 A-protocol over RS485

The Device LED will indicate the following:

<table>
<thead>
<tr>
<th>Flash Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing Red/Green</td>
<td>The device is in the Self-Test/initializing mode</td>
</tr>
<tr>
<td>Solid Green</td>
<td>All self-tests/initialization have passed. No faults have been detected</td>
</tr>
<tr>
<td>Flashing Red</td>
<td>A recoverable fault has been detected. ex.: low/high flow alarm</td>
</tr>
<tr>
<td>Solid Red</td>
<td>An unrecoverable fault has occurred. ex.: internal power supply failure</td>
</tr>
</tbody>
</table>

4.4 Device Wiring

4.4.1 Electrical Connections

The RS485 on GF40/GF80 Series device has a 15-pin D-sub connector, for analog I/O, power supply and digital communication signals. See Table 4-3 for the pin-outs. For more detailed information refer to the instruction and operations manual.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function at Remote Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Setpoint Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>Flow Voltage Output</td>
</tr>
<tr>
<td>3</td>
<td>Alarm Output</td>
</tr>
<tr>
<td>4</td>
<td>Flow Current Output</td>
</tr>
<tr>
<td>5</td>
<td>Positive Supply Voltage</td>
</tr>
<tr>
<td>6</td>
<td>Not Used</td>
</tr>
<tr>
<td>7</td>
<td>Setpoint Current Input</td>
</tr>
<tr>
<td>8</td>
<td>Setpoint Voltage Input</td>
</tr>
<tr>
<td>9</td>
<td>Power Supply Common</td>
</tr>
<tr>
<td>10</td>
<td>Flow Signal Ground</td>
</tr>
<tr>
<td>11</td>
<td>Not Used</td>
</tr>
<tr>
<td>12</td>
<td>Valve Override Input</td>
</tr>
<tr>
<td>13</td>
<td>Auxiliary input</td>
</tr>
<tr>
<td>14</td>
<td>RXD/A-</td>
</tr>
<tr>
<td>15</td>
<td>TXD/A+</td>
</tr>
</tbody>
</table>
4.4.2 Multi Drop

The RS485 communications interface is a multi drop connection making it possible to connect up to 32 devices to a computer on a single multi drop line as shown Figure 4-2. Most Computers are NOT equipped with RS485 ports. In order to connect an RS485 to a computer, one will need an RS485 to RS232 converter. Figure 4-2 shows the interconnection diagram of an RS485 on GF40/GF80 MFC/MFM via an RS485 bus and an RS485 to RS232 converter to the RS232 serial port of a typical computer. The RS485 bus requires two matching resistors of 120W, one at the end of the bus and one at the beginning, near the converter. Note the control line from the PC to the converter necessary to control the data direction of the RS485 buffers. The RTS (“Request To Send”) line shown in Figure 4-2 because this line is used to control data direction in many of the commercially available converters. The actual line used depends on the converter selected.

Table 4-4 D-Connector Communication Pins

<table>
<thead>
<tr>
<th>D-Connector Pin Number</th>
<th>RS485</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin #14</td>
<td>B (inverted driver side)</td>
</tr>
<tr>
<td>Pin #15</td>
<td>A (non-inverted driver side)</td>
</tr>
</tbody>
</table>

Figure 4-2 RS485 Multi Drop Interconnection DMFM/C and PC
5 Message Protocol Structure

5.1 Introduction

The A-protocol is a “master-slave” protocol: each message transaction is originated by the master (central) station, whereas the slave (field) device only replies when it receives a command message addressed to it. The reply from the slave device will acknowledge that the command has been received and it may contain the data requested by the master.

5.2 Request Message

The request message, sent from master to slave, consists of the fields indicated in Figure 5-1, these fields will be described in the sections below.

<table>
<thead>
<tr>
<th>[STX]</th>
<th>ID</th>
<th>Command</th>
<th>Data</th>
<th>[CR]</th>
</tr>
</thead>
</table>

*Figure 5-1 A-protocol Command Request Structure*

5.2.1 Start Character

The start transmission character, [STX] 0x02, signals that a communication transaction is beginning.

5.2.2 Addressing Concept

The ID field is the unit network address set by software. The unit ID is a 2 byte ASCII field and indicates a hexadecimal number in the range 0x00-0x63 (0-100). ID 0x00 is used as a broadcast address. In case the broadcast address is used, all MFCs in the network will execute the command, but no MFCs will send a response. This doesn’t yield for commands SID and RID.

5.2.3 Command

The Command field consists of three ASCII bytes. Read commands start with R and the Set commands start with S. For more information on commands see Section 7 ID related commands, Section 8 Read commands and Section 9 Set commands.

5.2.4 Data

The Data field varies in length depending upon the command and will be empty if there is no data.
5.2.5 End Character
Carriage return is a single byte, [CR] 0x0D, which signals that the communication transaction is complete. If there is no data, [CR] immediately follows the command field.

5.3 Response Message
There are two possible responses to a transmission packet:
- a response that contains no data (an acknowledgement or negative acknowledgement)
- a response that contains data.

5.4 Response Without Data

5.4.1 OK (Acknowledgement)
If the response packet contains the 2 bytes ASCII text OK, then the transmission packet has been received and the command acknowledged.

5.4.2 NG (Negative Acknowledgement)
If the response packet contains the 2 bytes ASCII text NG, then the transmission has not been received, or the transmission ordered or requested an action or reading that is out of parameters.

5.5 Response With Data
A data response contains both a Status field and a Data field.
5.5.1 Status

The status field is a single ASCII byte, possible notations are:
N = No alarm or error
Z = Executing zero point calibration
A = Alarm exists
E = Error exists
X = Alarm(s) and error(s) exist

Note: The Status field is indicated as [Status] in the communication command tables starting at Section 7 ID Related Commands.

5.5.2 Data

The Data field contains the data requested by the read command.

5.6 Broadcast

It is possible to transmit the same command to all MFCs by using ID 0x00. All MFCs in the system, regardless of their network address, will execute the command, but none of the networked MFCs will send a response. The SID and RID commands are special in that they will address the device using the serial nr, passed along as data. Only the device with the specified serial number will respond, irrespective of the ID passed along with the command.
6 Start Communicating With Slave

In order to start communicating with a slave device the first thing to do is to retrieve the IDs of the connected devices. The RID command shall be used to perform this task. It accepts a serial number (max 12 digits) as data and the broadcast ID. This serial number is derived from the serial number of the device, it will contain the last 12 (or less) numerical [0..9] digits of the device’s serial number.

6.1 Examples

Figure 6-1 RID Command Request shows the hexadecimal byte sequence of the RID command issued by a master application.

Figure 6-2 RID Command Response shows the hexadecimal byte response transmitted by the slave device on the RID command request.
### 7.1 ID Related Commands

#### Table 7-1 ID and Serial Number Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Command Descriptions</th>
</tr>
</thead>
</table>
| **SID** set unit ID | Sets the unit ID number. The ID consists of 2 ASCII bytes indicating a hexadecimal number in the range [0x00..0x63] (0-100). To set the unit ID, you must address the command to all MFCs on the network (ID field = 00) and enter the serial number followed by the new unit ID number.  
  Format = [STX] 00SID [serial number] [new two-digit unit ID] [CR]  
  Response data = OK [CR] |
| **RID** read unit ID | Reads the unit ID number. The ID consists of 2 ASCII bytes indicating a hexadecimal number in the range [0x00..0x63] (0-100). To read the unit ID, you must address the command to all MFCs on the network (ID field = 00) and enter the serial number.  
  Format = [STX] 00RID [serial number] [CR]  
  Response data = [Status] xx [CR] |
| **RSR** read serial number | Read the serial number.  
  Format = [STX] idRSR [CR]  
  Response data = [serial number] [CR] |

---

*This serial number is derived from the serial number of the device, it will contain the last 12 (or less) numerical [0..9] digits of the device’s serial number.*
# Section 8 Read Commands

## 8.1 Read Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>READ Command Descriptions</th>
</tr>
</thead>
</table>
| **RBR** read baud rate | Reads the baud rate of the communication interface.  
  Format = [STX] idRBR [CR]  
  Response data = [Status] x [CR]  
  x=0 for baud rate is 9600  
  x=1 for baud rate is 19200  
  x=2 for baud rate is 38400 |
| **RVM** read valve control mode | Reads the valve control mode (open, closed, or controlled).  
  Format = [STX] idRVM [CR]  
  Response data = [Status] x [CR]  
  O = Valve open  
  C = Valve closed  
  N = Valve controlled by set point |
| **RMD** read set point mode | Reads the set point input mode (digital or analog).  
  Format = [STX] idRMD [CR]  
  Response data = [Status] x [CR]  
  D = Digital mode  
  A = Analog mode |
| **RFX** read flow output | Reads flow output as a percentage of full-scale flow. Range is from 0% to 100% (in 0.01% increments).  
  Format = [STX] idRFX [CR]  
  Response = [Status] ±xxxx x.xx [CR] |
| **RDC** read set point | Reads the flow set point as a percentage of full scale flow. Range is from 0 to 100 (in 0.01 increments).  
  Format = [STX] idRDC [CR]  
  Response data = [Status] xxx x.xx [CR] |
| **RVD** read valve voltage | Reads the valve voltage as a percentage of full rated valve voltage. Range is 0% to 100% (in 1% increments).  
  Format = [STX] idRVD [CR]  
  Response = [Status] xxx [CR] |
| **RFK** read user full scale flow | Reads the user full scale flow (in sccm).  
  Format = [STX] idRFK [CR]  
  Response data = [Status] ±xxxx x.xx [CR] |
| **RGN** read gas name | Reads the gas name. Range is from 1 to 20 characters.  
  Format = [STX] idRGN [CR]  
  Response data = [Status] 1 to 20 characters [CR] |
| **RGT** read gas table | Sets the gas table number. Range is from 1 to 8.  
  Format = [STX] idRGT [CR]  
  Response data = [Status] 1 to 8 characters [CR] |
| **RFW** read flow alarm range | Reads the flow alarm range as a percentage of full-scale flow. Range is 0% to 98% (in 0.01% increments).  
  Format = [STX] idRFW [CR]  
  Response data = [Status] ±xxxx x.xx [CR] |
| **RFT** read flow alarm latch time | Reads the flow alarm latch time. Range is 0 s to 99 s (in 1s increments).  
  Format = [STX] idRFT [CR]  
  Response data = [Status] xx [CR] |
### Section 8 Read Commands

**Brooks® GF40/GF80 A-protocol over RS485**

**Table 8-1 Read Commands (Continued)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Format</th>
<th>Response Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFT</td>
<td>Read flow alarm latch time</td>
<td>([\text{STX]} \text{idRFT} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{[CR]})</td>
</tr>
<tr>
<td>RFI</td>
<td>Read flow alarm state</td>
<td>([\text{STX]} \text{idRFI} \text{[CR]})</td>
<td>([\text{Status}] \text{x} \text{[CR]})</td>
</tr>
<tr>
<td>RVA</td>
<td>Read valve alarm set point</td>
<td>([\text{STX]} \text{idRVA} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{x} \text{[CR]})</td>
</tr>
<tr>
<td>RVW</td>
<td>Read valve alarm set point</td>
<td>([\text{STX]} \text{idRVW} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{x} \text{[CR]})</td>
</tr>
<tr>
<td>RVT</td>
<td>Read valve alarm latch time</td>
<td>([\text{STX]} \text{idRVT} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{[CR]})</td>
</tr>
<tr>
<td>RVI</td>
<td>Read valve alarm state</td>
<td>([\text{STX]} \text{idRVI} \text{[CR]})</td>
<td>([\text{Status}] \text{x} \text{[CR]})</td>
</tr>
<tr>
<td>RAS</td>
<td>Read alarm status</td>
<td>([\text{STX]} \text{idRAS} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{[CR]})</td>
</tr>
<tr>
<td>RER</td>
<td>Read error status</td>
<td>([\text{STX]} \text{idRER} \text{[CR]})</td>
<td>([\text{Status}] \text{xx} \text{[CR]})</td>
</tr>
</tbody>
</table>

- **RFT** reads the flow alarm latch time. Range is 0 s to 99 s (in 1s increments).
- **RFI** reads the flow alarm enable state.
- **RVA** reads the valve alarm set point as a percentage of full-scale flow. Range is 0% to 100% (in 1% increments).
- **RVW** reads the valve alarm bandwidth as a percentage of full-scale flow. Range is 0% to 98% (in 1% increments).
- **RVT** reads the valve alarm latch time. Range is 0 s to 99 s (in 1s increments).
- **RVI** reads the valve alarm enable state.
- **RAS** reads the alarm status. The response data is in a hexadecimal ASCII format representing bit flags. If a bit is set (i.e., = 1), then the corresponding condition is true.
- **RER** reads the error status. The response data is in a hexadecimal ASCII format representing bit flags. If a bit is set (that is, = 1), then the corresponding condition is true.
### 9.1 Set Commands

#### Table 9-1 Set Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Set Command Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SBR</strong></td>
<td>Set the baud rate&lt;br&gt;Formats: STX idSBR x[CRLF] &lt;br&gt;Response: OK[CRLF]&lt;br&gt;x=0 for 9600&lt;br&gt;x=1 for 19200&lt;br&gt;x=2 for 38400</td>
</tr>
<tr>
<td><strong>SVO</strong></td>
<td>Open valve&lt;br&gt;Format: STX idSVO [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SVC</strong></td>
<td>Close valve&lt;br&gt;Format: STX idSVO [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SVN</strong></td>
<td>Enable valve control&lt;br&gt;Format: STX idSVN [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SDM</strong></td>
<td>Set digital set point control&lt;br&gt;Format: STX idSDM [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SAM</strong></td>
<td>Set analog set point control&lt;br&gt;Format: STX idSAM [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SDC</strong></td>
<td>Set flow set point&lt;br&gt;Format: STX idSDC [xxxx]x.xx [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SZP</strong></td>
<td>Start zero point adjustment&lt;br&gt;Format: STX idSZP [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SGN</strong></td>
<td>Set gas name&lt;br&gt;Format: STX idSGN [1 to 20 characters] [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SGT</strong></td>
<td>Set gas table&lt;br&gt;Format: STX idSGT x [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SAF</strong></td>
<td>Enable flow alarm&lt;br&gt;Format: STX idSAF [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td><strong>SFI</strong></td>
<td>Disable flow alarm&lt;br&gt;Format: STX idSFI [CRLF] &lt;br&gt;Response: OK [CRLF]</td>
</tr>
<tr>
<td>Command</td>
<td>Set Command Descriptions</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **SFW** set flow alarm range | Sets the flow alarm range as a percentage of full-scale flow. Range is 0% to 98% (in 0.01% increments). An alarm will occur when the flow is not within \( \pm \left( \frac{\text{range}}{2} \right) \) of the alarm set point.  
  Format = [STX] idSRW xx.xx [CR]  
  Response data = OK [CR] |
| **SFT** set flow alarm latch time | Sets the flow alarm latch time. Range is 0 s to 99 s (in 1 s increments). The alarm will not occur until the flow exceeds the specified limits for the flow alarm latch time period.  
  Format = [STX] idSFT xx [CR]  
  Response data = OK [CR] |
| **SVA** set valve alarm set point | Sets the valve alarm set point as a percentage of full scale flow. Range is 0% to 100% (in 1% increments).  
  Format = [STX] idSVA xxx [CR]  
  Response data = OK [CR] |
| **SVW** set valve alarm bandwidth | Sets the valve alarm bandwidth as a percentage of full-scale flow. Range is 0% to 98% (in 1% increments). The alarm will occur when the valve voltage is not within \( \pm \left( \frac{\text{bandwidth}}{2} \right) \) of the valve alarm value.  
  Format = [STX] idSVW xxx [CR]  
  Response data = OK [CR] |
| **SVT** set valve alarm latch time | Sets the valve alarm latch time. Range is 0 s to 99s (in 1s increments). The alarm will not occur until the flow exceeds the specified limits for the flow alarm latch time period.  
  Format = [STX] idSVT xx [CR]  
  Response data = OK [CR] |
| **SAC** Clear alarm(s) | Clears the flow alarm.  
  Format = [STX] idSAC [CR]  
  Response data = OK [CR] |
| **SEC** Clear error(s) | Clears the error status.  
  Format = [STX] idSEC [CR]  
  Response data = OK [CR] |
| **SAV** Enable valve alarm | Enables the valve alarm.  
  Format = [STX] idSAV [CR]  
  Response data = OK [CR] |
| **SVI** Disable valve alarm | Disables the valve alarm.  
  Format = [STX] idSVI [CR]  
  Response data = OK [CR] |
LIMITED WARRANTY

Seller warrants that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and service and that the Software will execute the programming instructions provided by Seller until the expiration of the earlier of twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller.

Products purchased by Seller from a third party for resale to Buyer (“Resale Products”) shall carry only the warranty extended by the original manufacturer.

All replacements or repairs necessitated by inadequate preventive maintenance, or by normal wear and usage, or by fault of Buyer, or by unsuitable power sources or by attack or deterioration under unsuitable environmental conditions, or by abuse, accident, alteration, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer’s expense.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller.

BROOKS SERVICE AND SUPPORT

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit www.BrooksInstrument.com to locate the service location nearest to you.

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required.

For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons.

Please contact your nearest sales representative for more details.

HELP DESK

In case you need technical assistance:

USA ☎ 888 275 8946
Netherlands ☎+31 (0) 318 549 290
Germany ☎ +49 351 215 2040
Japan ☎ +81 3 5633 7100

Korea ☎ +82 31 708 2521
Taiwan ☎ +886 3 5590 988
China ☎ +86 21 5079 8828
Singapore ☎ +6297 9741

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

TRADEMARKS

Brooks ................................................................. Brooks Instrument, LLC
HART .............................................................. HART Communications Foundation

ISO 9001 QUALITY SYSTEM