HART® Field Device Specification:

Siemens SITRANS LUT400 revision 1

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1. INTRODUCTION

1.1 Scope

The Siemens level transmitter, model SITRANS LUT400, revision 1 complies with HART Protocol Revision 7.2. This document specifies all the device specific features and documents HART Protocol implementation details (e.g., the Engineering Unit Codes supported). The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART capable Host Applications.

1.2 Purpose

This specification is designed to compliment other documentation (e.g., the *SITRANS LUT400 Operating Instructions*) by providing a complete, unambiguous description of this Field Device from a HART Communication perspective.

1.3 Who should use this document?

The specification is designed to be a technical reference for HART capable Host Application Developers, System Integrators and knowledgeable End Users. It also provides functional specifications (e.g., commands, enumerations and performance requirements) used during Field Device development, maintenance and testing. This document assumes the reader is familiar with HART Protocol requirements and terminology.

1.4 Abbreviations and definitions

ADC	Analog to Digital Converter
CPU	Central Processing Unit (of microprocessor)
DAC	Digital to Analog Converter
EEPROM	Electrically-Erasable Read-Only Memory
ROM	Read-Only Memory

1.5 References

HART Smart Communications Protocol Specification. HCF_KIT-13. Available from the HCF.

SITRANS LUT400 Operating Instructions, Document 7ML19985MV01. Available from the Siemens Industry Mall Website.

2. DEVICE IDENTIFICATION

Manufacturer Name:	Siemens	**Model Name(s):**	SITRANS LUT400
Manufacture ID Code:	42 (2A Hex)	**Device Type Code:**	52 (34 Hex)
HART Protocol Revision	7.2	**Device Revision:**	1
Number of Device Variables	6		
Physical Layers Supported	FSK		
Physical Device Category	Transmitter, Non-DC-isolated Bus Device		

The SITRANS LUT400 is designed to mount on a wall, pipe or DIN-rail and with a remote display mount. The name plate is located on the housing body and indicates the model name and revision.

3. PRODUCT OVERVIEW

The SITRANS LUT400 is a high quality ultrasonic controller, configured to meet the needs of different applications, from medium range solids applications to liquids management with open channel measurement capability, with a 4-to-20mA output.

SITRANS LUT400 is offered in three different models

- Basic controller (LUT420)
- Pump and flow control (LUT430)
- High accuracy and full features (LUT440)

The analogue output of this device is linearly proportional with selected device variable over the working range.

4. PRODUCT INTERFACES

4.1 Process Interface

4.1.1 Sensor Input Channels

The device measures level using a shielded two-wire connection to a transducer and an optional temperature sensor. Refer to the Operating Instructions for details.

4.2 Host interface

4.2.1 Analog mA Output/HART: Process Level

The two-wire 4-to-20mA current loop is connected on two terminals marked number 22 and 23 for active mode and 23 and 24 for passive mode. Refer to the Operating Instructions for connection details.

The output from this transmitter, represents the selected device variable measurement. The output is linearized and scaled according to the configured range of the instrument. The mAmp output corresponds to the Primary Variable. The HART Communication protocol is supported on this loop.

A guaranteed linear over-range is provided. Device malfunction can be indicated by down-scale or up-scale current. The direction is selectable by the user; see the Operating Instructions.

4.2.2 Relays

The LUT400 supports up to 3 relays. Terminal numbers 15, 16 & 17 are used for Relay 1. Numbers 18 & 19 for Relay 2 and Numbers 20 & 21 for Relay 3. Refer to the Operating Instructions for connection details.

Relays can be used for customer alarms, Pump or Control Devices.

4.2.3 Sync

Other Siemens instruments can be synchronized with the SITRANS LUT400 using terminal number 11. Refer to the Operating Instructions for details.

4.2.4 Discrete Inputs

The SITRANS LUT400 has a 24V power bias (terminal 10) for use with two discrete inputs, or the discrete input can be wired using external power. Refer to the Operating Instructions for details.

4.3 Local Interfaces, Jumpers and Switches

4.3.1 Local Controls and Displays

The device has a removable or remote display, up to 5 m from the device, (Local Display Interface) with a 4-button interface. See Operating Instructions for details.

4.3.2 Internal Jumpers and Switches

This device has no internal jumpers or switches.

4.3.3 USB connection

The LUT400 supports a 5 pin USB Mini-B cable for a service port connection.

Device Malfunction

The direction of indication of a detected malfunction by the analog current output is user-selectable to one of several options by means of the Local Display Interface or other interface. Refer to the Operating Instructions for details. See also Section 4.2.1

Write Protection
The Local Display Interface provides a write-protect function. See Operating Instructions for details. See also Section 12.10.

5. DEVICE VARIABLES

Six statically mapped Device Variables are supported. The default setting is to map the first device variable (level) to all four dynamic variables PV, SV, TV and QV. The six supported Device Variables are

	Meaning	Units
Level	Height of material measured from process empty level	m, cm, mm, ft, in
Space	Distance to material surface measured from process full level	m, cm, mm, ft, in
Distance	Distance to material surface measured from Sensor reference point	m, cm, mm, ft, in
Volume	Volume of material in volumetric units (based on level)	L, USGAL, IMGAL, CUM and User defined
Flow	Flow rate in an open channel in Flowrate Units (referenced from zero head)	L/SEC, L/MIN, CUFT/SEC, CUFT/DAY, USGAL/MIN, USGAL/DAY, IMPGAL/MIN, IMPGAL/DAY, CUM/HOUR, CUM/DAY, User Defined
Head	Distance to material surface measured from zero head	m, cm, mm, ft, in

6. DYNAMIC VARIABLES

Four Dynamic Variables are implemented. PV, SV, TV and QV. The default is LEVEL in all 4 cases.

The PV, SV, TV and QV are derived from the time of flight distance to a material surface (see Operating Instructions for details).

All dynamic variables can be smoothed. (See Section 12.1)

7. STATUS INFORMATION

7.1 Device Status

Bit 7 ("Field Device Malfunction") is set whenever a hardware or processing error or failure has been detected and the measurement is considered inaccurate. (e.g. Failsafe)

Bit 6 ("Configuration Changed") is set whenever a non-volatile configuration parameter, (e.g. Low Calibration Point), is written.

Bit 5 ("Cold Start") is set at startup and cleared after reception of a valid command.

Bit 4 ("More Status Available") is set whenever any fault is detected but the measurement is still considered valid. Command #48 gives further detail. (See Section 7.2.)

Bit 3 ("Analog Output Fixed") is set whenever the mA value has been set to a fixed value, either temporarily or permanently.

Bit 2 ("Analog Output Saturated") is set whenever the mA value is clipped at the min/max limits due to the PV being out of normal operating range.

7.2 Extended Device Status

The Field Device sets the “maintenance required bit” (0x01) if the firmware detects that maintenance is required due to device or sensor lifetime limits exceeded, or if the device period recalibration limits are exceeded, or if it is time to clean the sensor.

"Device Variable Alert" (bit 0x02) is set if any of the dynamic variables are reporting a POOR or BAD reading.

7.3 Additional Device Status (Command #48)

Command #48 returns 16 bytes of data (the first 48 faults are reported in bytes 0-5, and the remaining, 88 faults, 11 bytes, in bytes 14 thru 24) with the following status information:

Byte	Bit	Fault Code	Meaning	Class	Device Status Bits Set
0	0	0	Loss of Echo	Error	7
	1	1	Cable Fault	Error	7
	2				
	3	3	Device Lifetime Reminder 1	Warning	4
	4	4	Device Lifetime Reminder 2	Warning	4
	5	5	Saving Parameters	Warning	4
	6	6	Sensor Lifetime Reminder 1	Warning	4
	7	7	Sensor Lifetime Reminder 2	Warning	4
1	0	8	Service Schedule Reminder 1	Warning	4
	1	9	Service Schedule Reminder 2	Warning	4
	2	10	Configuration Parameters are incorrect	Warning	4
	3				
	4				
	5				
	6				
	7				
2	0				
	1	17	Calibration Schedule Reminder 1	Warning	4
	2	18	Calibration Schedule Reminder 2	Warning	4
	3				
	4				
	5				
	6				
	7				
3	0				
	1	25	Internal Error	Error	4
	2	26	Submergence detected	Error	7

Byte	Bit	Fault Code	Meaning	Class	Device Status Bits Set
	3	27	Incorrect Product Model	Error	4
	4				
	5				
	6				
	7				
4	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7	39	Transducer Temperature Sensor	Error	7
5	0				
	1				
	2				
	3				
	4				
	5				
	6	46	TS-3 Temperature Sensor	Error	7
	7	47	Poor Signal from application or Poor Installation or high noise level	Warning	4
14	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Byte	Bit	Fault Code	Meaning	Class	Device Status Bits Set
15	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
16	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
17	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
18	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Byte	Bit	Fault Code	Meaning	Class	Device Status Bits Set
19	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
20	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
21	0				
	1				
	2				
	3				
	4				
	5				
	6				
	7				
22	0				
	1				
	2				
	3				
	4				
	5				
	6				

Byte	Bit	Fault Code	Meaning	Class	Device Status Bits Set
	7				
23	0				
	1	121	Flow calculations are not configured properly	Error	4
	2	122	Flow calculations encountered an Error	Error	4
	3	123	Flow log could not restore the settings	Error	4
	4	124	Flow log is not configured properly	Error	4
	5	125	Flow log error	Error	4
	6	126	Failed to open log file	Error	4
	7	127	Failed to close log file	Error	4
24	0	128	Log file read error	Error	4
	1	129	Log file write error	Error	4
	2	130	Configuration error	Error	4
	3	131	Parameter backup did not succeed	Error	4
	4	132	User input required	Error	4
	5	133	Simulation Enabled	Error	4
	6				
	7				

"Not used" bits are always set to 0.

All bits used in this transmitter indicate more status available by setting bit 4 of the Device Status byte.

These bits are set or cleared following a reset or self-test command. They are also set and some of them possibly cleared by the continuous background self-testing firmware.

8. UNIVERSAL COMMANDS

Command #3 returns PV, SV, TV and QV for a total of 24 bytes of response data. See Section 6.

Command #14: Units for sensor limits and minimum span may be one of, m (45), cm (48), mm (49), ft (44), in (47). The device serial number is returned in the first 3 bytes.

9. COMMON-PRACTICE COMMANDS

9.1 Supported Commands

The following common-practice commands are implemented:

33 Read Device Variables

34 Write Damping Value

35 Write PV Range Values

40 Enter/Exit Fixed Current Mode

41 Perform Device Self-Test

42 Perform Device Reset

44 Write PV Units

45 Trim Loop Current Zero

46 Trim Loop Current Gain

50 Read Dynamic Variable Assignments

51 Write Dynamic Variable Assignments

53 Write Device Variable Units

54 Read Device Variable Information

59 Write Number of Response Preambles

89 Set Real-Time Clock

90 Read Real-Time Clock

9.2 Burst Mode

This Field Device does not support Burst Mode.

9.3 Catch Device Variable

This Field Device does not support Catch Device Variable.

10. DEVICE-SPECIFIC COMMANDS

The following device-specific commands are implemented:

128 Read “Write Locking”

129 Write “Write Locking”

130 Read Remaining Device Lifetime Status

131 Read Powered Hours

132 Read Device Maintenance Limits

133 Write Device Maintenance Limits

134 Read Device Maintenance Lifetime Acknowledge

135 Write Device Maintenance Lifetime Acknowledge

136 Read Remaining Sensor Lifetime Status

137 Read Powered Days and Power On Resets

138 Read Sensor Maintenance Limits

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140 Read Sensor Maintenance Lifetime Acknowledge

141 Write Sensor Maintenance Lifetime Acknowledge

142 Read Service Maintenance Timer

143 Write Service Maintenance Timer

144 Read Service Status Acknowledge

145 Read Product Capabilities Code

146 Read Service Limits

147 Write Service Limits

148 Read Service Interval Acknowledge

149 Write Service Interval Acknowledge

150 Read Echo Profile Summary

151 Read Hart Echo Profile Section

152 Read Sensor Range HI/LO

153 Write Sensor Range HI/LO

154 Read Auto Velocity Offset and Sensor Offset

155 Write Auto Velocity Offset and Sensor Offset

156 Read Daylight Saving Time Settings

157 Write Daylight Saving Time Settings

158 Read Failsafe Settings

159 Write Failsafe Settings

160 Read mA Setpoints

161 Write mA Setpoints

162 Read Tank Shape and Dimensions

163 Write Tank Shape and Dimensions

164 Read Volume Breakpoint Table

165 Write Volume Breakpoint Table

166 Read mA Function

167 Write mA Function

168 Read Level/Time to Spill

169 Write Level to Spill

170 Read User Defined Units

171 Write User Defined Units

172 Read TVT Type/Mode

173 Write TVT Type/Mode

174 Read TVT Shaper Points

175 Write TVT Shaper Points

176 Read Cal HI/LO, Sensor offset, Blanking

177 Write Cal HI/LO, Sensor offset, Blanking

178 Read Temp Sensor Min/Max, Velocity, Temperature

179 Write Temp Sensor Min/Max

180 Read Temperature Settings

181 Write Temperature Settings

182 Read Transducer Settings

183 Write Transducer Settings

184 Read Echo Confidence

185 Write Echo Confidence Threshold

186 Read Shots Enabled

187 Write Shots Enabled

188 Read TVT Parameters

189 Write TVT Parameters

190 Read Echo Parameters

191 Write Echo Parameters

192 Read Comms Relay Parameters

193 Write Comms Relay Parameters

194 Read OCM Auto Zero Head

195 Write OCM Auto Zero Head

196 Read Fill/Empty Rate

197 Write Fill/Empty Rate

198 Read Alarms Parameters

199 Write Alarms Parameters

200 Read Flow Logger Parameters

201 Write Flow Logger Parameters

202 Read Backup Level Override and Logging Parameters

203 Write Backup Level Override and Logging Parameters

204 Read Pumped Volume Total

205 Write Pumped Volume Total

206 Read Application Type

207 Write Application Type

208 Read Language

209 Write Language

210 Read Display Operation

211 Write Display Operation

215 Reset Totalizers

216 Read Relay and DI states

218 Read Elapsed Time Relay

219 Write Elapsed Time Relay

220 Read External Totalizer

221 Write External Totalizer

222 Read Response Rate and Transducer

223 Write Response Rate and Transducer

224 Read Vessel Pump

225 Write Vessel Pump

226 Read Relay Pump

227 Write Relay Pump

228 Read Pump Parameters

229 Write Pump Parameters

230 Read Calibration Maintenance Timer

231 Write Calibration Maintenance Timer

232 Read Calibration Status Acknowledge

233 Read Date of Birth

234 Read Calibration Limits

235 Write Calibration Limits

236 Read Calibration Interval Acknowledge

237 Write Calibration Interval Acknowledge

238 Read Product Order Code

240 Read Revisions

241 Table Reset

242 Read OCM Type

243 Write OCM Type

244 Read OCM Parameters

245 Write OCM Parameters

246 Read OCM Breakpoint Table

247 Write OCM Breakpoint Table

248 Read OCM Flow Information

249 Write OCM Flow Information

250 Read DI/PUMP Parameters

251 Write DI/PUMP Parameters

252 Read Totalizer Parameters

253 Write Totalizer Parameters

10.1 Command #128: Read "Write Locking"

Read the "write locking" setting..

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Uint16	"write locking" setting

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.2 Command #129: Write "Write Locking"

Write the "write locking" setting.

Request Data Bytes

Byte	Format	Description
0-1	Uint16	"write locking" setting

Response Data Bytes

Byte	Format	Description
0-1	Uint16	"write locking" setting

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
8-127		Undefined

10.3 Command #130: Read Remaining Device Lifetime Status

Read the remaining device lifetime and status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Remaining device lifetime in hours.
4	Enum	Maintenance Status (see table 11.2 Maintenance Status)
5	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.4 Command #131: Read Powered Hours

Read the remaining device lifetime and status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Device Powered Hours

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.5 Command #132: Read Device Maintenance Limits

Read the device maintenance limits.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.6 Command #133: Write Device Maintenance Limits

Write the device maintenance limits.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.7 Command #134: Read Device Maintenance Lifetime Acknowledge

Read the device maintenance lifetime and acknowledge.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected Lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.8 Command #135: Write Device Maintenance Lifetime Acknowledge

Write the device maintenance lifetime and acknowledge.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.9 Command #136: Read Remaining Sensor Lifetime Status

Read the remaining sensor lifetime and status.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Remaining Lifetime in seconds
4	Enum	Status (see table 11.2 Maintenance Status)
5	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.10 Command #137: Read Powered Days and Power On Resets

Write Powered Days and Power On Resets.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-2	Uint16	Powered Days
3-4	Uint16	Power On Resets

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.11 Command #138: Read Sensor Maintenance Limits

Read the sensor maintenance limits.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.12 Command #139: Write Sensor Maintenance Limits

Write the sensor maintenance limits.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.13 Command #140: Read Sensor Maintenance Lifetime Acknowledge

Read the sensor maintenance lifetime and acknowledge and operating seconds.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected Lifetime in seconds
4-7	Uint32	Operating Seconds
8	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.14 Command #141: Write Sensor Maintenance Lifetime Acknowledge

Write the sensor maintenance lifetime and acknowledge.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4-7	Uint32	Operating Hours
8	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4-7	Uint32	Operating Hours
8	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.15 Command #142: Read Service Maintenance Timer

Read the service maintenance timer.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Service Maintenance Timer in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.16 Command #143: Write Service Maintenance Timer

Write the service maintenance timer.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Service Maintenance Timer in seconds

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Service Maintenance Timer in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.17 Command #144: Read Service Status Acknowledge

Read the service status and acknowledge.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Status (see table 11.2 Maintenance Status)
1	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)
2-5	Uint32	Remaining Lifetime in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.18 Command #145: Read Product Capabilities Code

Read the Read Product Capabilities Code.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Product Capabilities Code (see table 11.5 Product Capabilities Codes)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.19 Command #146: Read Service Limits

Read the service limits.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.20 Command #147: Write Service Limits

Write the service limits.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.21 Command #148: Read Service Interval Acknowledge

Read the service interval and acknowledge.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected Lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.22 Command #149: Write Service Interval Acknowledge

Write the service interval and acknowledge.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected lifetime in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.23 Command #150: Read Echo Profile Summary

Read the echo profile summary.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Uint8	DB Start (min. y axis value)
1	Uint8	DB End (max. y axis value)
2	Uint8	x axis Units
3-6	Float32	x axis start value (float)
7-10	Float32	x axis end value (float)
11-14	Float32	Sample increment (increment between y axis values)
15-18	Float32	Reading Value (x axis value that indicates the current reading)
19-22	Float32	TVT increment (increment between y axis values)
23	Uint8	Window Sill
24	Uint8	Echo Lock Window
25	Uint8	Confidence
26	Uint8	Echo Strength

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-31		Undefined
32	Error	Busy
33-127		Undefined

10.24 Command #151: Read Hart Echo Profile Section

Read the HART echo profile section.

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction number
1	Uint8	Echo or TVT

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction number
1	Uint8	Echo or TVT
2-34	Uint8	Chunk (32 bytes) of the echo profile data or TVT data

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.25 Command #152: Read Sensor Ranges HI/LO

Read the Sensor Ranges Hi and Lo.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Sensor Range HI
4-7	Float32	Sensor Range LO

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.26 Command #153: Write Sensor Ranges HI/LO

Write the Sensor Ranges Hi and Lo.

Request Data Bytes

Byte	Format	Description
0-3	Float32	Sensor Range HI
4-7	Float32	Sensor Range LO

Response Data Bytes

Byte	Format	Description
0-3	Float32	Sensor Range HI
4-7	Float32	Sensor Range LO

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.27 Command #154: Read Auto Sound Velocity and Sensor Offset

Read Auto Sound Velocity and Sensor Offset – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Auto Sound Velocity

Read Auto Sound Velocity and Sensor Offset – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-4	Float32	Auto Sensor Offset

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.28 Command #155: Write Auto Sound Velocity and Sensor Offset

Write Auto Sound Velocity and Sensor Offset. – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Auto Sound Velocity

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Auto Sound Velocity

Write Auto Sound Velocity and Sensor Offset. – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-4	Float32	Auto Sensor Offset

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-4	Float32	Auto Sensor Offset

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error

Code	Class	Description
7	Error	In Write Protect Mode
8-127		Undefined

10.29 Command #156: Read Daylight Saving Time Settings

Read Daylight Saving Time Settings

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Uint8	DST enabled
1	Uint8	DST week of month start
2	Uint8	DST day start
3	Uint8	DST month start
4	Uint8	DST week of month end
5	Uint8	DST day end
6	Uint8	DST month end

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.30 Command #157: Write Daylight Saving Time Settings

Write Daylight Saving Time Settings

Request Data Bytes

Byte	Format	Description
0	Uint8	DST enabled
1	Uint8	DST week of month start
2	Uint8	DST day start
3	Uint8	DST month start
4	Uint8	DST week of month end
5	Uint8	DST day end
6	Uint8	DST month end

Response Data Bytes

Byte	Format	Description
0	Uint8	DST enabled
1	Uint8	DST week of month start
2	Uint8	DST day start
3	Uint8	DST month start
4	Uint8	DST week of month end
5	Uint8	DST day end
6	Uint8	DST month end

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.31 Command #158: Read Failsafe Settings

Read the Failsafe Settings

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Failsafe Timer in seconds
4	Enum	Failsafe Material (see table 11.15 Failsafe Material)
5-8	Float32	Failsafe Material Value
9	Enum	Failsafe NE43 mode (see table 11.14 True/False)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.32 Command #159: Write Failsafe Settings

Write the Failsafe Settings.

Request Data Bytes

Byte	Format	Description
0-3	Float32	Failsafe Timer in seconds
4	Enum	Failsafe Material (see table 11.15 Failsafe Material)
5-8	Float32	Failsafe Material Value

Response Data Bytes

Byte	Format	Description
0-3	Float32	Failsafe Timer in seconds
4	Enum	Failsafe Material (see table 11.15 Failsafe Material)
5-8	Float32	Failsafe Material Value
9	Enum	Failsafe NE43 mode (see table 11.14 True/False)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.33 Command #160: Read mA Setpoints

Read mA Setpoints.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	4 mA Setpoint
4-7	Float32	20 mA Setpoint
8-11	Float32	PV mA at 0%
12-15	Float32	PV mA at 100%

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.34 Command #161: Write mA Setpoints

Write mA Setpoints.

Request Data Bytes

Byte	Format	Description
0-3	Float32	4 mA Setpoint
4-7	Float32	20 mA Setpoint
8-11	Float32	PV mA at 0%
12-15	Float32	PV mA at 100%

Response Data Bytes

Byte	Format	Description
0-3	Float32	4 mA Setpoint
4-7	Float32	20 mA Setpoint
8-11	Float32	PV mA at 0%
12-15	Float32	PV mA at 100%

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.35 Command #162: Read Tank Shape and Dimensions

Read Tank Shape and Dimensions.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Tank Shape (see table 11.6 Tank Shape)
1	Enum	Lin Type (volume algorithm) (see table 11.6 Tank Shape)
2-5	Float32	Lin Volume (max volume)
6-9	Float32	Tank Dimension A
10-13	Float32	Tank Dimension L

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.36 Command #163: Write Tank Shape and Dimensions

Write Tank Shape and Dimensions.

Request Data Bytes

Byte	Format	Description
0	Enum	Tank Shape (see table 11.6 Tank Shape)
1	Enum	Lin Type (volume algorithm) (see table 11.6 Tank Shape)
2-5	Float32	Lin Volume (max volume)
6-9	Float32	Tank Dimension A
10-13	Float32	Tank Dimension L

Response Data Bytes

Byte	Format	Description
0	Enum	Tank Shape (see table 11.6 Tank Shape)
1	Enum	Lin Type (volume algorithm) (see table 11.6 Tank Shape)
2-5	Float32	Lin Volume (max volume)
6-9	Float32	Tank Dimension A
10-13	Float32	Tank Dimension L

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.37 Command #164: Read Volume Breakpoint Table

Read Volume Breakpoint Table.

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction number (0 thru 7) (x, y = trans. number * 4)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction number (0 thru 7) (x, y = trans. number * 4)
1-4	Float32	Volume Breakpoint – Level x
5-8	Float32	Volume Breakpoint – Volume y
9-12	Float32	Volume Breakpoint – Level x + 1
13-16	Float32	Volume Breakpoint – Volume y + 1
17-20	Float32	Volume Breakpoint – Level x + 2
21-24	Float32	Volume Breakpoint – Volume y + 2
25-28	Float32	Volume Breakpoint – Level x + 3
29-32	Float32	Volume Breakpoint – Volume y + 3

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.38 Command #165: Write Volume Breakpoint Table

Write Volume Breakpoint Table.

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction number (0 thru 7) (x, y = trans. number * 4)
1-4	Float32	Volume Breakpoint – Level x
5-8	Float32	Volume Breakpoint – Volume y
9-12	Float32	Volume Breakpoint – Level x + 1
13-16	Float32	Volume Breakpoint – Volume y + 1
17-20	Float32	Volume Breakpoint – Level x + 2
21-24	Float32	Volume Breakpoint – Volume y + 2
25-28	Float32	Volume Breakpoint – Level x + 3
29-32	Float32	Volume Breakpoint – Volume y + 3

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction number (0 thru 7) (x, y = trans. number * 4)
1-4	Float32	Volume Breakpoint – Level x
5-8	Float32	Volume Breakpoint – Volume y
9-12	Float32	Volume Breakpoint – Level x + 1
13-16	Float32	Volume Breakpoint – Volume y + 1
17-20	Float32	Volume Breakpoint – Level x + 2
21-24	Float32	Volume Breakpoint – Volume y + 2
25-28	Float32	Volume Breakpoint – Level x + 3
29-32	Float32	Volume Breakpoint – Volume y + 3

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received

Code	Class	Description
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.39 Command #166: Read mA Function

Read mA Function.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	mA Function (see table 11.7 mA Function)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.40 Command #167: Write mA Function

Write mA Function.

Request Data Bytes

Byte	Format	Description
0	Enum	mA Function (see table 11.7 mA Function)

Response Data Bytes

Byte	Format	Description
0	Enum	mA Function (see table 11.7 mA Function)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.41 Command #168: Read Level/Time to Spill

Read Level/Time to Spill.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Level to Spill
4-5	Uint16	Time to Spill

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.42 Command #169: Write Level to Spill

Write Level to Spill.

Request Data Bytes

Byte	Format	Description
0-3	Float32	Level to Spill

Response Data Bytes

Byte	Format	Description
0-3	Float32	Level to Spill

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.43 Command #170: Read User Defined Units

Read User Defined Units.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-15	Latin-1(16)	User Defined Units

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.44 Command #171: Write User Defined Units

Write User Defined Units.

Request Data Bytes

Byte	Format	Description
0-15	Latin-1(16)	User Defined Units

Response Data Bytes

Byte	Format	Description
0-15	Latin-1 (16)	User Defined Units

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.45 Command #172: Read TVT Type/Mode

Read TVT Type/Mode.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	TVT Type (see table 11.8 TVT type)
1	Enum	TVT Shaper Mode (see table 11.12 On/Off)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.46 Command #173: Write TVT Type/Mode

Write TVT Type/Mode.

Request Data Bytes

Byte	Format	Description
0	Enum	TVT Type (see table 11.8 TVT type)
1	Enum	TVT Shaper Mode (see table 11.12 On/Off)

Response Data Bytes

Byte	Format	Description
0	Enum	TVT Type (see table 11.8 TVT type)
1	Enum	TVT Shaper Mode (see table 11.12 On/Off)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.47 Command #174: Read TVT Shaper Points

Read TVT Shaper Points.

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (x = trans. Number * 20)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (x = trans. Number * 20)
1-2	Uint16	TVT Shaper Point x
3-4	Uint16	TVT Shaper Point x + 1
5-6	Uint16	TVT Shaper Point x + 2
7-8	Uint16	TVT Shaper Point x + 3
9-10	Uint16	TVT Shaper Point x + 4
11-12	Uint16	TVT Shaper Point x + 5
13-14	Uint16	TVT Shaper Point x + 6
15-16	Uint16	TVT Shaper Point x + 7
17-18	Uint16	TVT Shaper Point x + 8
19-20	Uint16	TVT Shaper Point x + 9
21-22	Uint16	TVT Shaper Point x + 10
23-24	Uint16	TVT Shaper Point x + 11
25-26	Uint16	TVT Shaper Point x + 12
27-28	Uint16	TVT Shaper Point x + 13
29-30	Uint16	TVT Shaper Point x + 14
31-32	Uint16	TVT Shaper Point x + 15
33-34	Uint16	TVT Shaper Point x + 16
35-36	Uint16	TVT Shaper Point x + 17
37-38	Uint16	TVT Shaper Point x + 18
39-40	Uint16	TVT Shaper Point x + 19

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

Code	Class	Description
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.48 Command #175: Write TVT Shaper Points

Write TVT Shaper Points.

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (x = trans. Number * 20)
1-2	Uint16	TVT Shaper Point x
3-4	Uint16	TVT Shaper Point x + 1
5-6	Uint16	TVT Shaper Point x + 2
7-8	Uint16	TVT Shaper Point x + 3
9-10	Uint16	TVT Shaper Point x + 4
11-12	Uint16	TVT Shaper Point x + 5
13-14	Uint16	TVT Shaper Point x + 6
15-16	Uint16	TVT Shaper Point x + 7
17-18	Uint16	TVT Shaper Point x + 8
19-20	Uint16	TVT Shaper Point x + 9
21-22	Uint16	TVT Shaper Point x + 10
23-24	Uint16	TVT Shaper Point x + 11
25-26	Uint16	TVT Shaper Point x + 12
27-28	Uint16	TVT Shaper Point x + 13
29-30	Uint16	TVT Shaper Point x + 14
31-32	Uint16	TVT Shaper Point x + 15
33-34	Uint16	TVT Shaper Point x + 16
35-36	Uint16	TVT Shaper Point x + 17
37-38	Uint16	TVT Shaper Point x + 18
39-40	Uint16	TVT Shaper Point x + 19

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (x = trans. Number * 20)
1-2	Uint16	TVT Shaper Point x
3-4	Uint16	TVT Shaper Point x + 1
5-6	Uint16	TVT Shaper Point x + 2

7-8	Uint16	TVT Shaper Point x + 3
9-10	Uint16	TVT Shaper Point x + 4
11-12	Uint16	TVT Shaper Point x + 5
13-14	Uint16	TVT Shaper Point x + 6
15-16	Uint16	TVT Shaper Point x + 7
17-18	Uint16	TVT Shaper Point x + 8
19-20	Uint16	TVT Shaper Point x + 9
21-22	Uint16	TVT Shaper Point x + 10
23-24	Uint16	TVT Shaper Point x + 11
25-26	Uint16	TVT Shaper Point x + 12
27-28	Uint16	TVT Shaper Point x + 13
29-30	Uint16	TVT Shaper Point x + 14
31-32	Uint16	TVT Shaper Point x + 15
33-34	Uint16	TVT Shaper Point x + 16
35-36	Uint16	TVT Shaper Point x + 17
37-38	Uint16	TVT Shaper Point x + 18
39-40	Uint16	TVT Shaper Point x + 19

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.49 Command #176: Read Cal HI/LO, Sensor offset, Blanking

Read Cal HI/LO, Sensor offset, Blanking.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Low Calibration Point
4-7	Float32	High Calibration Point
8-11	Float32	Sensor Offset
12-15	Float32	Near Blanking

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.50 Command #177: Write Cal HI/LO, Sensor offset, Blanking

Write Cal HI/LO, Sensor offset, Blanking..

Request Data Bytes

Byte	Format	Description
0-3	Float32	Low Calibration Point
4-7	Float32	High Calibration Point
8-11	Float32	Sensor Offset
12-15	Float32	Near Blanking

Response Data Bytes

Byte	Format	Description
0-3	Float32	Low Calibration Point
4-7	Float32	High Calibration Point
8-11	Float32	Sensor Offset
12-15	Float32	Near Blanking

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.51 Command #178: Read Temp Sensor Min/Max, Velocity, Temperature

Read the Temp Sensor Min/Max, Velocity, Temperature.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Temperature Sensor Max
4-7	Float32	Temperature Sensor Min
8-11	Float32	Velocity
12-15	Float32	Filtered Temperature

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.52 Command #179: Write Temp Sensor Min/Max

Write Temp Sensor Min/Max.

Request Data Bytes

Byte	Format	Description
0-3	Float32	Temperature Sensor Max
4-7	Float32	Temperature Sensor Min

Response Data Bytes

Byte	Format	Description
0-3	Float32	Temperature Sensor Max
4-7	Float32	Temperature Sensor Min

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.53 Command #180: Read Temperature Settings

Read the Temperature Settings.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Read Temperature Source (see table 11.9 Temperature Source)
1-4	Float32	Fixed Temperature
5-8	Float32	Velocity at 20 C
9-12	Float32	Transducer Temperature
13-16	Float32	TS3 Temperature

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.54 Command #181: Write Temperature Settings

Write the Temperature Settings.

Request Data Bytes

Byte	Format	Description
0	Enum	Read Temperature Source (see table 11.9 Temperature Source)
1-4	Float32	Fixed Temperature
5-8	Float32	Velocity at 20 C

Response Data Bytes

Byte	Format	Description
0	Enum	Read Temperature Source (see table 11.9 Temperature Source)
1-4	Float32	Fixed Temperature
5-8	Float32	Velocity at 20 C

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.55 Command #182: Read Transducer Settings

Read the Transducer Settings

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Long Shot Frequency
4-7	Float32	Long Shot Transmit Width
8-11	Float32	Short Shot Transmit Width
12	Enum	Sync (see table 11.12 On/Off)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.56 Command #183: Write Transducer Settings

Write the Transducer Settings

Request Data Bytes

Byte	Format	Description
0-3	Float32	Long Shot Frequency
4-7	Float32	Long Shot Transmit Width
8-11	Float32	Short Shot Transmit Width
12	Enum	Sync (see table 11.12 On/Off)

Response Data Bytes

Byte	Format	Description
0-3	Float32	Long Shot Frequency
4-7	Float32	Long Shot Transmit Width
8-11	Float32	Short Shot Transmit Width
12	Enum	Sync (see table 11.12 On/Off)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.57 Command #184: Read Echo Confidence

Read Echo Confidence

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Int16	Long Shot Echo Confidence Threshold
2-3	Uint16	Figure of Merit
4-5	Int16	Echo Confidence Long
6-7	Int16	Echo Strength
8-9	Int16	Average Noise
10-11	Int16	Peak Noise
12-13	Int16	Window Sill

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.58 Command #185 Write Echo Confidence Threshold

Write Echo Confidence Threshold

Request Data Bytes

Byte	Format	Description
0-1	Int16	Long Shot Echo Confidence Threshold

Response Data Bytes

Byte	Format	Description
0-1	Int16	Long Shot Echo Confidence Threshold

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.59 Command #186: Read Shots Enabled

Read Shots Enabled

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Shots (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.60 Command #187: Write Shots Enabled

Write Shots Enabled

Request Data Bytes

Byte	Format	Description
0	Enum	Shots (see table 11.13 Enable/Disable)

Response Data Bytes

Byte	Format	Description
0	Enum	Shots (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.61 Command #188: Read TVT Parameters

Read TVT parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Auto Near TVT Mode (see table 11.16 Auto TVT Modes)
1-4	Float32	Auto Near TVT Range
5	Uint8	TVT Hover

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.62 Command #189 Write TVT Parameters

Write TVT parameters

Request Data Bytes

Byte	Format	Description
0	Enum	Auto Near TVT Mode (see table 11.16 Auto TVT Modes)
1-4	Float32	Auto Near TVT Range
5	Uint8	TVT Hover

Response Data Bytes

Byte	Format	Description
0	Enum	Auto Near TVT Mode (see table 11.16 Auto TVT Modes)
1-4	Float32	Auto Near TVT Range
5	Uint8	TVT Hover

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.63 Command #190: Read Echo Parameters

Read Echo Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Echo Algorithm (see table 11.10 Echo Algorithm)
1-2	Int16	Window Sill Set
3	Enum	Echo Position (see table 11.11 Echo Position)
4-5	Uint16	Narrow Echo Filter
6	Uint8	Reform Echo
7	Enum	Submergence Transducer (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.64 Command #191 Write Echo Parameters

Write Echo Parameters

Request Data Bytes

Byte	Format	Description
0	Enum	Echo Algorithm (see table 11.10 Echo Algorithm)
1-2	Int16	Window Sill Set
3	Enum	Echo Position (see table 11.11 Echo Position)
4-5	Uint16	Narrow Echo Filter
6	Uint8	Reform Echo
7	Enum	Submergence Transducer (see table 11.13 Enable/Disable)

Response Data Bytes

Byte	Format	Description
0	Enum	Echo Algorithm (see table 11.10 Echo Algorithm)
1-2	Int16	Window Sill Set
3	Enum	Echo Position (see table 11.11 Echo Position)
4-5	Uint16	Narrow Echo Filter
6	Uint8	Reform Echo
7	Enum	Submergence Transducer (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.65 Command #192: Read Comms Relay Parameters

Read Comms Relay Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Uint8	Comms Relay 1 Request
1	Uint8	Comms Relay 2 Request
2	Uint8	Comms Relay 3 Request
3	Uint8	Comms Relay 1 State
4	Uint8	Comms Relay 2 State
5	Uint8	Comms Relay 3 State

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.66 Command #193 Write Comms Relay Parameters

Write Comms Relay Parameters

Request Data Bytes

Byte	Format	Description
0	Uint8	Comms Relay 1 Request
1	Uint8	Comms Relay 2 Request
2	Uint8	Comms Relay 3 Request
3	Uint8	Comms Relay 1 State
4	Uint8	Comms Relay 2 State
5	Uint8	Comms Relay 3 State

Response Data Bytes

Byte	Format	Description
0	Uint8	Comms Relay 1 Request
1	Uint8	Comms Relay 2 Request
2	Uint8	Comms Relay 3 Request
3	Uint8	Comms Relay 1 State
4	Uint8	Comms Relay 2 State
5	Uint8	Comms Relay 3 State

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.67 Command #194: Read OCM Auto Zero Head

Read OCM Auto Zero Head

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	OCM Auto Zero Head

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.68 Command #195 Write OCM Auto Zero Head

Write OCM Auto Zero Head

Request Data Bytes

Byte	Format	Description
0-3	Float32	OCM Auto Zero Head

Response Data Bytes

Byte	Format	Description
0-3	Float32	OCM Auto Zero Head

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.69 Command #196: Read Fill/Empty Rate

Read Fill/Empty Rate

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Fill Rate Limit
4-7	Float32	Empty Rate Limit

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.70 Command #197: Write Fill/Empty Rate

Write Fill/Empty Rate

Request Data Bytes

Byte	Format	Description
0-3	Float32	Fill Rate Limit
4-7	Float32	Empty Rate Limit

Response Data Bytes

Byte	Format	Description
0-3	Float32	Fill Rate Limit
4-7	Float32	Empty Rate Limit

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.71 Command #198: Read Alarms Parameters

Read Alarms Parameters – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Alarm 1 Upper Level
5-8	Float32	Alarm 2 Upper Level
9-12	Float32	Alarm 3 Upper Level
13-16	Float32	Alarm 1 Lower Level
17-20	Float32	Alarm 2 Lower Level
21-24	Float32	Alarm 3 Lower Level
25-28	Float32	Alarm Upper Temperature
29-32	Float32	Alarm Lower Temperature
33-36	Float32	Alarm Upper Flow Rate
37-40	Float32	Alarm Lower Flow Rate

Read Alarms Parameters – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Alarm Logical DI (1, 2)
2	Enum	Alarm DI State (see table 11.12 On/Off)

3	Enum	Alarm Logical DO 1 (see table 11.17 Alarm Logical DO)
4	Enum	Alarm Logical DO 2 (see table 11.17 Alarm Logical DO)
5	Enum	Alarm Logical DO 3 (see table 11.17 Alarm Logical DO)
6	Enum	Alarm Logical DO 4 (see table 11.17 Alarm Logical DO)
7	Enum	Alarm Logical DO 5 (see table 11.17 Alarm Logical DO)
8	Enum	Alarm Logical DO 6 (see table 11.17 Alarm Logical DO)
9	Enum	Alarm Logical DO 7 (see table 11.17 Alarm Logical DO)
10	Enum	Alarm Logical DO 8 (see table 11.17 Alarm Logical DO)
11	Enum	Alarm Logical DO 9 (see table 11.17 Alarm Logical DO)
12	Enum	Alarm Logical DO 10 (see table 11.17 Alarm Logical DO)
13	Enum	Alarm Invert Relay 1 (see table 11.18 Invert Relay)
14	Enum	Alarm Invert Relay 2 (see table 11.18 Invert Relay)
15	Enum	Alarm Invert Relay 3 (see table 11.18 Invert Relay)
16	Enum	Alarm Enabled 1 (see table 11.13 Enable/Disable)
17	Enum	Alarm Enabled 2 (see table 11.13 Enable/Disable)
18	Enum	Alarm Enabled 3 (see table 11.13 Enable/Disable)
19	Enum	Alarm Enabled 4 (see table 11.13 Enable/Disable)
20	Enum	Alarm Enabled 5 (see table 11.13 Enable/Disable)
21	Enum	Alarm Enabled 6 (see table 11.13 Enable/Disable)
22	Enum	Alarm Enabled 7 (see table 11.13 Enable/Disable)
23	Enum	Alarm Enabled 8 (see table 11.13 Enable/Disable)
24	Enum	Alarm Enabled 9 (see table 11.13 Enable/Disable)
25	Enum	Alarm Enabled 10 (see table 11.13 Enable/Disable)
26	Enum	Alarm State 1 (see table 11.19 Active/Inactive)
27	Enum	Alarm State 2 (see table 11.19 Active/Inactive)
28	Enum	Alarm State 3 (see table 11.19 Active/Inactive)
29	Enum	Alarm State 4 (see table 11.19 Active/Inactive)
30	Enum	Alarm State 5 (see table 11.19 Active/Inactive)
31	Enum	Alarm State 6 (see table 11.19 Active/Inactive)
32	Enum	Alarm State 7 (see table 11.19 Active/Inactive)
33	Enum	Alarm State 8 (see table 11.19 Active/Inactive)

34	Enum	Alarm State 9 (see table 11.19 Active/Inactive)
35	Enum	Alarm State 10 (see table 11.19 Active/Inactive)

Read Alarms Parameters – Transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-4	Float32	Alarm Upper Level Off
5-8	Float32	Alarm Lower Level Off
9-12	Float32	Alarm Upper Temperature Off
13-16	Float32	Alarm Lower Temperature Off
17-20	Float32	Alarm Upper Flowrate Off
21-24	Float32	Alarm Lower Flowrate Off

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.72 Command #199: Write Alarms Parameters

Write Alarms Parameters – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Alarm 1 Upper Level
5-8	Float32	Alarm 2 Upper Level
9-12	Float32	Alarm 3 Upper Level
13-16	Float32	Alarm 1 Lower Level
17-20	Float32	Alarm 2 Lower Level
21-24	Float32	Alarm 3 Lower Level
25-28	Float32	Alarm Upper Temperature
29-32	Float32	Alarm Lower Temperature
33-36	Float32	Alarm Upper Flow Rate
37-40	Float32	Alarm Lower Flow Rate

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-4	Float32	Alarm 1 Upper Level
5-8	Float32	Alarm 2 Upper Level
9-12	Float32	Alarm 3 Upper Level
13-16	Float32	Alarm 1 Lower Level
17-20	Float32	Alarm 2 Lower Level
21-24	Float32	Alarm 3 Lower Level
25-28	Float32	Alarm Upper Temperature
29-32	Float32	Alarm Lower Temperature
33-36	Float32	Alarm Upper Flow Rate
37-40	Float32	Alarm Lower Flow Rate

Write Alarms Parameters – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Alarm Logical DI (1, 2)
2	Enum	Alarm DI State (see table 11.12 On/Off)
3	Enum	Alarm Logical DO 1 (see table 11.17 Alarm Logical DO)
4	Enum	Alarm Logical DO 2 (see table 11.17 Alarm Logical DO)
5	Enum	Alarm Logical DO 3 (see table 11.17 Alarm Logical DO)
6	Enum	Alarm Logical DO 4 (see table 11.17 Alarm Logical DO)
7	Enum	Alarm Logical DO 5 (see table 11.17 Alarm Logical DO)
8	Enum	Alarm Logical DO 6 (see table 11.17 Alarm Logical DO)
9	Enum	Alarm Logical DO 7 (see table 11.17 Alarm Logical DO)
10	Enum	Alarm Logical DO 8 (see table 11.17 Alarm Logical DO)
11	Enum	Alarm Logical DO 9 (see table 11.17 Alarm Logical DO)
12	Enum	Alarm Logical DO 10 (see table 11.17 Alarm Logical DO)
13	Enum	Alarm Invert Relay 1 (see table 11.18 Invert Relay)
14	Enum	Alarm Invert Relay 2 (see table 11.18 Invert Relay)
15	Enum	Alarm Invert Relay 3 (see table 11.18 Invert Relay)
16	Enum	Alarm Enabled 1 (see table 11.13 Enable/Disable)
17	Enum	Alarm Enabled 2 (see table 11.13 Enable/Disable)
18	Enum	Alarm Enabled 3 (see table 11.13 Enable/Disable)
19	Enum	Alarm Enabled 4 (see table 11.13 Enable/Disable)
20	Enum	Alarm Enabled 5 (see table 11.13 Enable/Disable)
21	Enum	Alarm Enabled 6 (see table 11.13 Enable/Disable)
22	Enum	Alarm Enabled 7 (see table 11.13 Enable/Disable)
23	Enum	Alarm Enabled 8 (see table 11.13 Enable/Disable)
24	Enum	Alarm Enabled 9 (see table 11.13 Enable/Disable)
25	Enum	Alarm Enabled 10 (see table 11.13 Enable/Disable)
26	Enum	Alarm State 1 (see table 11.19 Active/Inactive)
27	Enum	Alarm State 2 (see table 11.19 Active/Inactive)

28	Enum	Alarm State 3 (see table 11.19 Active/Inactive)
29	Enum	Alarm State 4 (see table 11.19 Active/Inactive)
30	Enum	Alarm State 5 (see table 11.19 Active/Inactive)
31	Enum	Alarm State 6 (see table 11.19 Active/Inactive)
32	Enum	Alarm State 7 (see table 11.19 Active/Inactive)
33	Enum	Alarm State 8 (see table 11.19 Active/Inactive)
34	Enum	Alarm State 9 (see table 11.19 Active/Inactive)
35	Enum	Alarm State 10 (see table 11.19 Active/Inactive)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Alarm Logical DI (1, 2)
2	Enum	Alarm DI State (see table 11.12 On/Off)
3	Enum	Alarm Logical DO 1 (see table 11.17 Alarm Logical DO)
4	Enum	Alarm Logical DO 2 (see table 11.17 Alarm Logical DO)
5	Enum	Alarm Logical DO 3 (see table 11.17 Alarm Logical DO)
6	Enum	Alarm Logical DO 4 (see table 11.17 Alarm Logical DO)
7	Enum	Alarm Logical DO 5 (see table 11.17 Alarm Logical DO)
8	Enum	Alarm Logical DO 6 (see table 11.17 Alarm Logical DO)
9	Enum	Alarm Logical DO 7 (see table 11.17 Alarm Logical DO)
10	Enum	Alarm Logical DO 8 (see table 11.17 Alarm Logical DO)
11	Enum	Alarm Logical DO 9 (see table 11.17 Alarm Logical DO)
12	Enum	Alarm Logical DO 10 (see table 11.17 Alarm Logical DO)
13	Enum	Alarm Invert Relay 1 (see table 11.18 Invert Relay)
14	Enum	Alarm Invert Relay 2 (see table 11.18 Invert Relay)
15	Enum	Alarm Invert Relay 3 (see table 11.18 Invert Relay)
16	Enum	Alarm Enabled 1 (see table 11.13 Enable/Disable)
17	Enum	Alarm Enabled 2 (see table 11.13 Enable/Disable)
18	Enum	Alarm Enabled 3 (see table 11.13 Enable/Disable)
19	Enum	Alarm Enabled 4 (see table 11.13 Enable/Disable)

20	Enum	Alarm Enabled 5 (see table 11.13 Enable/Disable)
21	Enum	Alarm Enabled 6 (see table 11.13 Enable/Disable)
22	Enum	Alarm Enabled 7 (see table 11.13 Enable/Disable)
23	Enum	Alarm Enabled 8 (see table 11.13 Enable/Disable)
24	Enum	Alarm Enabled 9 (see table 11.13 Enable/Disable)
25	Enum	Alarm Enabled 10 (see table 11.13 Enable/Disable)
26	Enum	Alarm State 1 (see table 11.19 Active/Inactive)
27	Enum	Alarm State 2 (see table 11.19 Active/Inactive)
28	Enum	Alarm State 3 (see table 11.19 Active/Inactive)
29	Enum	Alarm State 4 (see table 11.19 Active/Inactive)
30	Enum	Alarm State 5 (see table 11.19 Active/Inactive)
31	Enum	Alarm State 6 (see table 11.19 Active/Inactive)
32	Enum	Alarm State 7 (see table 11.19 Active/Inactive)
33	Enum	Alarm State 8 (see table 11.19 Active/Inactive)
34	Enum	Alarm State 9 (see table 11.19 Active/Inactive)
35	Enum	Alarm State 10 (see table 11.19 Active/Inactive)

Write Alarms Parameters – Transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-4	Float32	Alarm Upper Level Off
5-8	Float32	Alarm Lower Level Off
9-12	Float32	Alarm Upper Temperature Off
13-16	Float32	Alarm Lower Temperature Off
17-20	Float32	Alarm Upper Flowrate Off
21-24	Float32	Alarm Lower Flowrate Off

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-4	Float32	Alarm Upper Level Off
5-8	Float32	Alarm Lower Level Off
9-12	Float32	Alarm Upper Temperature Off
13-16	Float32	Alarm Lower Temperature Off
17-20	Float32	Alarm Upper Flowrate Off
21-24	Float32	Alarm Lower Flowrate Off

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.73 Command #200: Read Flow Logger Parameters

Read Flow Logger Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Enum2	Flow Logger Mode (see table 11.20 Flow Logger Mode)
2-3	Uint16	Flow Logger Standard Rate
4-7	Float32	Flow Logger Standard Set Point
8-9	Uint16	Flow Logger Rapid Rate
10-13	Float32	Flow Logger Rapid Set Point

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.74 Command #201 Write Flow Logger Parameters

Write Flow Logger Parameters

Request Data Bytes

Byte	Format	Description
0-1	Enum2	Flow Logger Mode (see table 11.20 Flow Logger Mode)
2-3	Uint16	Flow Logger Standard Rate
4-7	Float32	Flow Logger Standard Set Point
8-9	Uint16	Flow Logger Rapid Rate
10-13	Float32	Flow Logger Rapid Set Point

Response Data Bytes

Byte	Format	Description
0-1	Enum2	Flow Logger Mode (see table 11.20 Flow Logger Mode)
2-3	Uint16	Flow Logger Standard Rate
4-7	Float32	Flow Logger Standard Set Point
8-9	Uint16	Flow Logger Rapid Rate
10-13	Float32	Flow Logger Rapid Set Point

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.75 Command #202: Read Backup Level Override and Logging Parameters

Read Backup Level Override and Logging Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	Backup Level Override Value
4	Enum	Backup Level Override DI Number (1, 2)
5	Enum	Backup Level Override Enable (see table 11.13 Enable/Disable)
6-7	Uint16	PV Logging Rate
8	Enum	PV Log Enable (see table 11.13 Enable/Disable)
9	Enum	Alarm Log Enable (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.76 Command #203 Write Backup Level Override and Logging Parameters

Write Backup Level Override and Logging Parameters

Request Data Bytes

Byte	Format	Description
0-3	Float32	Backup Level Override Value
4	Enum	Backup Level Override DI Number (1, 2)
5	Enum	Backup Level Override Enable (see table 11.13 Enable/Disable)
6-7	Uint16	PV Logging Rate
8	Enum	PV Log Enable (see table 11.13 Enable/Disable)
9	Enum	Alarm Log Enable (see table 11.13 Enable/Disable)

Response Data Bytes

Byte	Format	Description
0-3	Float32	Backup Level Override Value
4	Enum	Backup Level Override DI Number (1, 2)
5	Enum	Backup Level Override Enable (see table 11.13 Enable/Disable)
6-7	Uint16	PV Logging Rate
8	Enum	PV Log Enable (see table 11.13 Enable/Disable)
9	Enum	Alarm Log Enable (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.77 Command #204: Read Pumped Volume Total

Read Pumped Volume Total

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Pumped Actual Total High
4-7	Uint32	Pumped Actual Total Low
8	Enum	Pumped Totalizer Scale (see table 11.21 Totalizer Scale)
9	Enum	Pumped Totalizer Decimal Points (0, 1, 2, 3)
10	Enum	Pumped Volume Adjustment (see table 11.22 Pumped Volume Adjustment)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.78 Command #205: Write Pumped Volume Total

Write Pumped Volume Total

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Pumped Actual Total High
4-7	Uint32	Pumped Actual Total Low
8	Enum	Pumped Totalizer Scale (see table 11.21 Totalizer Scale)
9	Enum	Pumped Totalizer Decimal Points (0, 1, 2, 3)
10	Enum	Pumped Volume Adjustment (see table 11.22 Pumped Volume Adjustment)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Pumped Actual Total High
4-7	Uint32	Pumped Actual Total Low
8	Enum	Pumped Totalizer Scale (see table 11.21 Totalizer Scale)
9	Enum	Pumped Totalizer Decimal Points (0, 1, 2, 3)
10	Enum	Pumped Volume Adjustment (see table 11.22 Pumped Volume Adjustment)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.79 Command #206: Read Application Type

Read Application Type

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Application Type (see table 11.23 Application Type)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.80 Command #207 Write Application Type

Write Application Type

Request Data Bytes

Byte	Format	Description
0	Enum	Application Type (see table 11.23 Application Type)

Response Data Bytes

Byte	Format	Description
0	Enum	Application Type (see table 11.23 Application Type)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.81 Command #208: Read Language

Read Language

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Language (see table 11.24 Language)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.82 Command #209 Write Language

Write Language

Request Data Bytes

Byte	Format	Description
0	Enum	Language (see table 11.24 Language)

Response Data Bytes

Byte	Format	Description
0	Enum	Language (see table 11.24 Language)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.83 Command #210: Read Display Operation

Read Display Operation

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Display Operation Primary (see table 11.23 Operation)
1	Enum	Display Operation Secondary (see table 11.23 Operation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.84 Command #211 Write Display Operation

Write Display Operation

Request Data Bytes

Byte	Format	Description
0	Enum	Display Operation Primary (see table 11.23 Operation)
1	Enum	Display Operation Secondary (see table 11.23 Operation)

Response Data Bytes

Byte	Format	Description
0	Enum	Display Operation Primary (see table 11.23 Operation)
1	Enum	Display Operation Secondary (see table 11.23 Operation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.85 Command #215: Reset Totalizers

Reset Totalizers

Request Data Bytes

Byte	Format	Description
0	Enum	Reset Totalizer 1 (see table 11.25 Yes/No)
1	Enum	Reset Totalizer 2 (see table 11.25 Yes/No)
2	Enum	Reset Totalizer 3 (see table 11.25 Yes/No)

Response Data Bytes

Byte	Format	Description
0	Enum	Reset Totalizer 1 (see table 11.25 Yes/No)
1	Enum	Reset Totalizer 2 (see table 11.25 Yes/No)
2	Enum	Reset Totalizer 3 (see table 11.25 Yes/No)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7-127		Undefined

10.86 Command #216: Read Relay and DI states

Read Relay and DI states

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Relay 1 Programmed State (see table 11.13 Enable/Disable)
1	Enum	Relay 2 Programmed State (see table 11.13 Enable/Disable)
2	Enum	Relay 3 Programmed State (see table 11.13 Enable/Disable)
3	Enum	Relay 1 State (see table 11.12 On/Off)
4	Enum	Relay 2 State (see table 11.12 On/Off)
5	Enum	Relay 3 State (see table 11.12 On/Off)
6	Enum	DI 1 Programmed State (see table 11.13 Enable/Disable)
7	Enum	DI 2 Programmed State (see table 11.13 Enable/Disable)
8	Enum	DI 1 Scaled State (see table 11.12 On/Off)
9	Enum	DI 2 Scaled State (see table 11.12 On/Off)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.87 Command #218: Read Elapsed Time Relay

Read Elapsed Time Relay

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Elapsed Time Enabled (see table 11.13 Enable/Disable)
1-4	Float32	Elapsed Time Interval
5-6	Uint16	Elapsed Time Duration
7	Enum	Elapsed Time DO (see table 11.26 Elapsed Time DO)
8	Enum	Elapsed Invert Relay (see table 11.18 Invert Relay)
9	Enum	Time Relay Enable (see table 11.13 Enable/Disable)
10-11	Uint16	Time Relay Duration
12	Enum	Time Relay DO (see table 11.26 Elapsed Time DO)
13	Enum	Time Relay Invert (see table 11.18 Invert Relay)
14-29	Latin-1(16)	Time Relay Time String
30-33	Float32	Time Relay TIme

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.88 Command #219 Write Elapsed Time Relay

Write Elapsed Time Relay

Request Data Bytes

Byte	Format	Description
0	Enum	Elapsed Time Enabled (see table 11.13 Enable/Disable)
1-4	Float32	Elapsed Time Interval
5-6	Uint16	Elapsed Time Duration
7	Enum	Elapsed Time DO (see table 11.26 Elapsed Time DO)
8	Enum	Elapsed Invert Relay (see table 11.18 Invert Relay)
9	Enum	Time Relay Enable (see table 11.13 Enable/Disable)
10-11	Uint16	Time Relay Duration
12	Enum	Time Relay DO (see table 11.26 Elapsed Time DO)
13	Enum	Time Relay Invert (see table 11.18 Invert Relay)
14-29	Latin-1(16)	Time Relay Time String

Response Data Bytes

Byte	Format	Description
0	Enum	Elapsed Time Enabled (see table 11.13 Enable/Disable)
1-4	Float32	Elapsed Time Interval
5-6	Uint16	Elapsed Time Duration
7	Enum	Elapsed Time DO (see table 11.26 Elapsed Time DO)
8	Enum	Elapsed Invert Relay (see table 11.18 Invert Relay)
9	Enum	Time Relay Enable (see table 11.13 Enable/Disable)
10-11	Uint16	Time Relay Duration
12	Enum	Time Relay DO (see table 11.26 Elapsed Time DO)
13	Enum	Time Relay Invert (see table 11.18 Invert Relay)
14-29	Latin-1(16)	Time Relay Time String

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large

Code	Class	Description
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.89 Command #220: Read External Totalizer

Read External Totalizer

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	External Totalizer Enabled (see table 11.13 Enable/Disable)
1-4	Float32	External Totalizer Multiplier
5-8	Float32	External Totalizer Duration
9	Enum	External Totalizer DO (see table 11.26 Elapsed Time DO)
10	Enum	External Totalizer Invert (see table 11.18 Invert Relay)
11	Enum	External Sampler Enabled (see table 11.13 Enable/Disable)
12-15	Float32	External Sampler Multiplier
16-20	Float32	External Sampler Interval
21-24	Float32	External Sampler Duration
25	Enum	External Sampler DO (see table 11.26 Elapsed Time DO)
26	Enum	External Sampler Invert (see table 11.18 Invert Relay)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.90 Command #221 Write External Totalizer

Write External Totalizer

Request Data Bytes

Byte	Format	Description
0	Enum	External Totalizer Enabled (see table 11.13 Enable/Disable)
1-4	Float32	External Totalizer Multiplier
5-8	Float32	External Totalizer Duration
9	Enum	External Totalizer DO (see table 11.26 Elapsed Time DO)
10	Enum	External Totalizer Invert (see table 11.18 Invert Relay)
11	Enum	External Sampler Enabled (see table 11.13 Enable/Disable)
12-15	Float32	External Sampler Multiplier
16-20	Float32	External Sampler Interval
21-24	Float32	External Sampler Duration
25	Enum	External Sampler DO (see table 11.26 Elapsed Time DO)
26	Enum	External Sampler Invert (see table 11.18 Invert Relay)

Response Data Bytes

Byte	Format	Description
0	Enum	External Totalizer Enabled (see table 11.13 Enable/Disable)
1-4	Float32	External Totalizer Multiplier
5-8	Float32	External Totalizer Duration
9	Enum	External Totalizer DO (see table 11.26 Elapsed Time DO)
10	Enum	External Totalizer Invert (see table 11.18 Invert Relay)
11	Enum	External Sampler Enabled (see table 11.13 Enable/Disable)
12-15	Float32	External Sampler Multiplier
16-20	Float32	External Sampler Interval
21-24	Float32	External Sampler Duration
25	Enum	External Sampler DO (see table 11.26 Elapsed Time DO)
26	Enum	External Sampler Invert (see table 11.18 Invert Relay)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

Code	Class	Description
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.91 Command #222: Read Response Rate and Transducer

Read Response Rate and Transducer – Transaction Number 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1	Enum	Response Rate (see table 11.27 Response Rate)

Read Response Rate and Transducer – Transaction Number 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Transducer (see table 11.28 Transducer)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.92 Command #223: Write Response Rate and Transducer

Write Response Rate and Transducer – Transaction Number 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1	Enum	Response Rate (see table 11.27 Response Rate)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1	Enum	Response Rate (see table 11.27 Response Rate)

Write Response Rate and Transducer – Transaction Number 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Transducer (see table 11.28 Transducer)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1	Enum	Transducer (see table 11.28 Transducer)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined

Code	Class	Description
7	Error	In Write Protect Mode
8-127		Undefined

10.93 Command #224: Read Vessel Pump

Read Vessel Pump

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Vessel Regime (see table 11.29 Vessel Regime)
1	Enum	Pump 1 DO (2, 3)
2	Enum	Pump 2 DO (2, 3)
3-6	Float32	Control Functions 1 ON Setpoint
7-10	Float32	Control Functions 2 ON Setpoint
11-14	Float32	Control Functions 1 OFF Setpoint
15-18	Float32	Control Functions 2 OFF Setpoint
19	Enum	Vessel Enabled (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.94 Command #225 Write Vessel Pump

Write Vessel Pump

Request Data Bytes

Byte	Format	Description
0	Enum	Vessel Regime (see table 11.29 Vessel Regime)
1	Enum	Pump 1 DO (2, 3)
2	Enum	Pump 2 DO (2, 3)
3-6	Float32	Control Functions 1 ON Setpoint
7-10	Float32	Control Functions 2 ON Setpoint
11-14	Float32	Control Functions 1 OFF Setpoint
15-18	Float32	Control Functions 2 OFF Setpoint
19	Enum	Vessel Enabled (see table 11.13 Enable/Disable)

Response Data Bytes

Byte	Format	Description
0	Enum	Vessel Regime (see table 11.29 Vessel Regime)
1	Enum	Pump 1 DO (2, 3)
2	Enum	Pump 2 DO (2, 3)
3-6	Float32	Control Functions 1 ON Setpoint
7-10	Float32	Control Functions 2 ON Setpoint
11-14	Float32	Control Functions 1 OFF Setpoint
15-18	Float32	Control Functions 2 OFF Setpoint
19	Enum	Vessel Enabled (see table 11.13 Enable/Disable)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.95 Command #226: Read Relay Pump

Read Relay Pump

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Uint8	Pump 1 Run Time Ratio Setpoint
1	Uint8	Pump 2 Run Time Ratio Setpoint
2-5	Uint32	Relay 2 Runtime S (in hours)
6-9	Uint32	Relay 3 Runtime S (in hours)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.96 Command #227 Write Relay Pump

Write Relay Pump

Request Data Bytes

Byte	Format	Description
0	Uint8	Pump 1 Run Time Ratio Setpoint
1	Uint8	Pump 2 Run Time Ratio Setpoint
2-5	Uint32	Relay 2 Runtime S (in hours)
6-9	Uint32	Relay 3 Runtime S (in hours)

Response Data Bytes

Byte	Format	Description
0	Uint8	Pump 1 RRS
1	Uint8	Pump 2 RRS
2-5	Uint32	Relay 2 Runtime S (in hours)
6-9	Uint32	Relay 3 Runtime S (in hours)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.97 Command #228: Read Pump Parameters

Read Pump Parameters – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1	Enum	Pump Run On Enabled (see table 11.13 Enable/Disable)
2-5	Float32	Pump Run On Interval
6-7	Uint16	Pump 1 Run On Duration
8-9	Uint16	Pump 2 Run On Duration
10-11	Uint16	Pump Start Delay
12-13	Uint16	Power Resumption Delay
14	Enum	Wall Cling Enabled (see table 11.13 Enable/Disable)
15-18	Float32	Wall Cling Value
19	Enum	Energy Enabled (see table 11.13 Enable/Disable)
20-21	Uint16	Peak Lead
22-25	Float32	Peak 1 On
26-29	Float32	Peak 2 On
30-33	Float32	Peak 1 Off
34-37	Float32	Peak 2 Off

Read Pump Parameters – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

1-16	Latin-1(16)	Peak 1 Start String
17-32	Latin-1(16)	Peak 1 End String
33-36	Float32	Peak 1 Start
37-40	Float32	Peak 1 End

Read Pump Parameters – Transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-16	Latin-1(16)	Peak 2 Start String
17-32	Latin-1(16)	Peak 2 End String
33-36	Float32	Peak 2 Start
37-40	Float32	Peak 2 End

Read Pump Parameters – Transaction 3

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)
1-16	Latin-1(16)	Peak 3 Start String
17-32	Latin-1(16)	Peak 3 End String
33-36	Float32	Peak 3 Start
37-40	Float32	Peak 3 End

Read Pump Parameters – Transaction 4

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)
1-16	Latin-1(16)	Peak 4 Start String
17-32	Latin-1(16)	Peak 4 End String
33-36	Float32	Peak 4 Start
37-40	Float32	Peak 4 End

Read Pump Parameters – Transaction 5

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)
1-16	Latin-1(16)	Peak 5 Start String
17-32	Latin-1(16)	Peak 5 End String
33-36	Float32	Peak 5 Start
37-40	Float32	Peak 5End

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.98 Command #229 Write Pump Parameters

Write Pump Parameters – Transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1	Enum	Pump Run On Enabled (see table 11.13 Enable/Disable)
2-5	Float32	Pump Run On Interval
6-7	Uint16	Pump 1 Run On Duration
8-9	Uint16	Pump 2 Run On Duration
10-11	Uint16	Pump Start Delay
12-13	Uint16	Power Resumption Delay
14	Enum	Wall Cling Enabled (see table 11.13 Enable/Disable)
15-18	Float32	Wall Cling Value
19	Enum	Energy Enabled (see table 11.13 Enable/Disable)
20-21	Uint16	Peak Lead
22-25	Float32	Peak 1 On
26-29	Float32	Peak 2 On
30-33	Float32	Peak 1 Off
34-37	Float32	Peak 2 Off

Write Pump Parameters – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-16	Latin-1(16)	Peak 1 Start String
17-32	Latin-1(16)	Peak 1 End String

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-16	Latin-1(16)	Peak 1 Start String
17-32	Latin-1(16)	Peak 1 End String

Write Pump Parameters – Transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-16	Latin-1(16)	Peak 2 Start String
17-32	Latin-1(16)	Peak 2 End String

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-16	Latin-1(16)	Peak 2 Start String
17-32	Latin-1(16)	Peak 2 End String

Write Pump Parameters – Transaction 3

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)
1-16	Latin-1(16)	Peak 3 Start String
17-32	Latin-1(16)	Peak 3 End String

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)
1-16	Latin-1(16)	Peak 3 Start String
17-32	Latin-1(16)	Peak 3 End String

Write Pump Parameters – Transaction 4

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)
1-16	Latin-1(16)	Peak 4 Start String
17-32	Latin-1(16)	Peak 4 End String

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)
1-16	Latin-1(16)	Peak 4 Start String
17-32	Latin-1(16)	Peak 4 End String

Write Pump Parameters – Transaction 5

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)
1-16	Latin-1(16)	Peak 5 Start String
17-32	Latin-1(16)	Peak 5 End String

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)
1-16	Latin-1(16)	Peak 5 Start String
17-32	Latin-1(16)	Peak 5 End String

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined

Code	Class	Description
7	Error	In Write Protect Mode
8-127		Undefined

10.99 Command #230: Read Calibration Maintenance Timer

Read Calibration Maintenance Timer

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Calibration Maintenance Timer in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.100 Command #231 Write Calibration Maintenance Timer

Write Calibration Maintenance Timer

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Calibration Maintenance Timer in seconds

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Calibration Maintenance Timer in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.101 Command #232: Read Calibration Status Acknowledge

Read the calibration status acknowledge.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Status (see table 11.2 Maintenance Status)
1	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)
2-5	Uint32	Remaining time until next calibration in seconds

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.102 Command #233: Read Date of Birth

Read Date of Birth.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-15	Latin-1(16)	Date of Birth

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.103 Command #234: Read Calibration Limits

Read the calibration limits.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.104 Command #235: Write Calibration Limits

Write the calibration limits.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Limit 1 in seconds
4-7	Uint32	Limit 2 in seconds
8	Enum	Activation (see table 11.4 Device Activation)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.105 Command #236: Read Calibration Interval Acknowledge

Read the calibration interval and acknowledge.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected time before next calibration in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.106 Command #237: Write Calibration Interval Acknowledge

Write the calibration interval and acknowledge.

Request Data Bytes

Byte	Format	Description
0-3	Uint32	Expected time before next calibration in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Response Data Bytes

Byte	Format	Description
0-3	Uint32	Expected time before next calibration in seconds
4	Enum	Acknowledge (see table 11.3 Maintenance Acknowledge)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.107 Command #238: Read Product Order Code

Read Product Order Code.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-31	Latin-1(32)	Product Order Code

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.108 Command #240: Read Revisions

Read Revisions – Transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-16	Latin-1(16)	Software Revision

Read Revisions – Transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-16	Latin-1(16)	Loader Revision

Read Revisions – Transaction 3

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (3)
1-16	Latin-1(16)	Alternate Revision

Read Revisions – Transaction 4

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (4)
1-16	Latin-1(16)	Hardware Revision

Read Revisions – Transaction 5

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (5)
1-16	Latin-1(16)	Device Serial Number

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.109 Command #241 Table Reset

Table Reset

Request Data Bytes

Byte	Format	Description
0	Uint8	Table Reset Code (see table 11.1 Factory Reset Codes)

Response Data Bytes

Byte	Format	Description
0	Uint8	Table Reset Code (see table 11.1 Factory Reset Codes)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.110 Command #242: Read OCM Type

Read OCM Type

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-1	Enum2	OCM Type (see table 11.29 OCM Type)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.111 Command #243 Write OCM Type

Write OCM Type

Request Data Bytes

Byte	Format	Description
0-1	Enum2	OCM Type (see table 11.29 OCM Type)

Response Data Bytes

Byte	Format	Description
0-1	Enum2	OCM Type (see table 11.29 OCM Type)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6		Undefined
7	Error	In Write Protect Mode
8-127		Undefined

10.112 Command #244: Read OCM Parameters

Read OCM Parameters – transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-2	Enum2	OCM Type (see table 11.29 OCM Type)
3-6	Float32	OCM Exponent
7	Enum	OCM Method (see table 11.30 OCM Method)
8-11	Float32	OCM K Factor
12-15	Float32	OCM V Notch
16-19	Float32	OCM Slope
20-23	Float32	OCM Roughness Coeff

Read OCM Parameters – transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-4	Float32	OCM Dimension 1
5-8	Float32	OCM Dimension 2
9-12	Float32	OCM Dimension 3
13-16	Float32	OCM Dimension 4
17-20	Float32	OCM Dimension 5
21-24	Float32	OCM Dimension 6

Read OCM Parameters – transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-4	Float32	OCM Dimension 7
5-8	Float32	OCM Dimension 8
9-12	Float32	OCM Dimension 9
13-16	Float32	OCM Dimension 10
17-20	Float32	OCM Dimension 11
21-24	Float32	OCM Dimension 12

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.113 Command #245 Write OCM Parameters

Write OCM Parameters – transaction 0

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (0)
1-2	Enum2	OCM Type (see table 11.29 OCM Type)
3-6	Float32	OCM Exponent
7	Enum	OCM Method (see table 11.30 OCM Method)
8-11	Float32	OCM K Factor
12-15	Float32	OCM V Notch
16-19	Float32	OCM Slope
20-23	Float32	OCM Roughness Coeff

Write OCM Parameters – transaction 1

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (1)
1-4	Float32	OCM Dimension 1
5-8	Float32	OCM Dimension 2
9-12	Float32	OCM Dimension 3
13-16	Float32	OCM Dimension 4
17-20	Float32	OCM Dimension 5
21-24	Float32	OCM Dimension 6

Write OCM Parameters – transaction 2

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number (2)
1-4	Float32	OCM Dimension 7
5-8	Float32	OCM Dimension 8
9-12	Float32	OCM Dimension 9
13-16	Float32	OCM Dimension 10
17-20	Float32	OCM Dimension 11
21-24	Float32	OCM Dimension 12

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.114 Command #246: Read OCM Breakpoint Table

Read OCM Breakpoint Table

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number - 0 thru 7 (x = 3 * tranNum + 1)

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number - 0 thru 7 (x = 3 * tranNum + 1)
1-4	Float32	OCM Breakpoint Table – Head Point x
5-8	Float32	OCM Breakpoint Table – Flow Point x
9-12	Float32	OCM Breakpoint Table – Head Point x + 1
13-16	Float32	OCM Breakpoint Table – Flow Point x + 1
17-20	Float32	OCM Breakpoint Table – Head Point x + 2
21-24	Float32	OCM Breakpoint Table – Flow Point x + 2
25-28	Float32	OCM Breakpoint Table – Head Point x + 3
29-32	Float32	OCM Breakpoint Table – Flow Point x + 3

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3-4		Undefined
5	Error	Too few data bytes received
6	Error	Device Specific Error
7-127		Undefined

10.115 Command #247 Write OCM Breakpoint Table

Write OCM Breakpoint Table

Request Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number - 0 thru 7 (x = 3 * tranNum + 1)
1-4	Float32	OCM Breakpoint Table – Head Point x
5-8	Float32	OCM Breakpoint Table – Flow Point x
9-12	Float32	OCM Breakpoint Table – Head Point x + 1
13-16	Float32	OCM Breakpoint Table – Flow Point x + 1
17-20	Float32	OCM Breakpoint Table – Head Point x + 2
21-24	Float32	OCM Breakpoint Table – Flow Point x + 2
25-28	Float32	OCM Breakpoint Table – Head Point x + 3
29-32	Float32	OCM Breakpoint Table – Flow Point x + 3

Response Data Bytes

Byte	Format	Description
0	Uint8	Transaction Number - 0 thru 7 (x = 3 * tranNum + 1)
1-4	Float32	OCM Breakpoint Table – Head Point x
5-8	Float32	OCM Breakpoint Table – Flow Point x
9-12	Float32	OCM Breakpoint Table – Head Point x + 1
13-16	Float32	OCM Breakpoint Table – Flow Point x + 1
17-20	Float32	OCM Breakpoint Table – Head Point x + 2
21-24	Float32	OCM Breakpoint Table – Flow Point x + 2
25-28	Float32	OCM Breakpoint Table – Head Point x + 3
29-32	Float32	OCM Breakpoint Table – Flow Point x + 3

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection
3	Error	Value too large
4	Error	Value too small

Code	Class	Description
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.116 Command #248 Read OCM Flow Information

Read OCM Flow Information

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float32	OCM Max Head
4-7	Float32	OCM Max Flow
8-11	Float32	OCM Zero Offset
12	Enum	OCM Flow Rate Decimals (0, 1, 2, 3)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.117 Command #249 Write OCM Flow Information

Write OCM Flow Information

Request Data Bytes

Byte	Format	Description
0-3	Float32	OCM Max Head
4-7	Float32	OCM Max Flow
8-11	Float32	OCM Zero Offset
12	Enum	OCM Flow Rate Decimals (0, 1, 2, 3)

Response Data Bytes

Byte	Format	Description
0-3	Float32	OCM Max Head
4-7	Float32	OCM Max Flow
8-11	Float32	OCM Zero Offset
12	Enum	OCM Flow Rate Decimals (0, 1, 2, 3)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.118 Command #250: Read DI/PUMP Parameters

Read DI/PUMP Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Pump 1 Interlock Enabled (see table 11.13 Enable/Disable)
1	Enum	Pump 1 Interlock DI (1, 2)
2	Enum	DI 1 Inversion Enabled (see table 11.18 Invert Relay)
3	Enum	Pump 2 Interlock Enabled (see table 11.13 Enable/Disable)
4	Enum	Pump 2 Interlock DI (1, 2)
5	Enum	DI 2 Inversion Enabled (see table 11.18 Invert Relay)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.119 Command #251 Write DI/PUMP Parameters

Write DI/PUMP Parameters

Request Data Bytes

Byte	Format	Description
0	Enum	Pump 1 Interlock Enabled (see table 11.13 Enable/Disable)
1	Enum	Pump 1 Interlock DI (1, 2)
2	Enum	DI 1 Inversion Enabled (see table 11.18 Invert Relay)
3	Enum	Pump 2 Interlock Enabled (see table 11.13 Enable/Disable)
4	Enum	Pump 2 Interlock DI (1, 2)
5	Enum	DI 2 Inversion Enabled (see table 11.18 Invert Relay)

Response Data Bytes

Byte	Format	Description
0	Enum	Pump 1 Interlock Enabled (see table 11.13 Enable/Disable)
1	Enum	Pump 1 Interlock DI (1, 2)
2	Enum	DI 1 Inversion Enabled (see table 11.18 Invert Relay)
3	Enum	Pump 2 Interlock Enabled (see table 11.13 Enable/Disable)
4	Enum	Pump 2 Interlock DI (1, 2)
5	Enum	DI 2 Inversion Enabled (see table 11.18 Invert Relay)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

10.120 Command #252: Read Totalizer Parameters

Read Totalizer Parameters

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Uint32	LCD Daily Totalizer High
4-7	Uint32	LCD Daily Totalizer Low
8-11	Uint32	LCD Actual Totalizer High
12-15	Uint32	LCD Actual Totalizer Low
16	Enum	LCD Totalizer Scale (see table 11.21 Totalizer Scale)
17	Enum	LCD Totalizer Decimal Points (0, 1, 2, 3)
18-21	Float32	Totalizer Low Flow Cutoff

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device Specific Error
7-127		Undefined

10.121 Command #253 Write Totalizer Parameters

Write Totalizer Parameters

Request Data Bytes

Byte	Format	Description
0-3	Uint32	LCD Daily Totalizer High
4-7	Uint32	LCD Daily Totalizer Low
8-11	Uint32	LCD Actual Totalizer High
12-15	Uint32	LCD Actual Totalizer Low
16	Enum	LCD Totalizer Scale (see table 11.21 Totalizer Scale)
17	Enum	LCD Totalizer Decimal Points (0, 1, 2, 3)
18-21	Float32	Totalizer Low Flow Cutoff

Response Data Bytes

Byte	Format	Description
0-3	Uint32	LCD Daily Totalizer High
4-7	Uint32	LCD Daily Totalizer Low
8-11	Uint32	LCD Actual Totalizer High
12-15	Uint32	LCD Actual Totalizer Low
16	Enum	LCD Totalizer Scale (see table 11.21 Totalizer Scale)
17	Enum	LCD Totalizer Decimal Points (0, 1, 2, 3)
18-21	Float32	Totalizer Low Flow Cutoff

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-2		Undefined
3	Error	Value too large
4	Error	Value too small
5	Error	Too few data bytes received
6	Error	Device Specific Error
7	Error	In Write Protect Mode
8-127		Undefined

11. TABLES

11.1 Factory Reset Codes

1	Master Reset
42	Table Reset

11.2 Maintenance Status

1	Maintenance Required
2	Maintenance Demanded

11.3 Maintenance Acknowledge

1	Maintenance Required Ack
2	Maintenance Demanded Ack

11.4 Device Activation

0	Warnings OFF
1	Warnings Limit 1 ON
2	Warnings Limit 2 ON
3	Warning Limits 1 & 2 ON

11.5 Product Capabilities Codes

0	Level
1	Pump
2	OCM

11.6 Tank Shape / Linearization Type

0	None
20	Cylinder
21	Sphere
240	Linear Tank
241	Cone
242	Parabola Bottom
243	Half Sphere Bottom
244	Flat Sloped Bottom
245	Parabola Ends
246	Curve Table
247	Linearization Table

11.7 mA Function

0	Manual
1	Level
2	Space
3	Distance
4	Volume
5	Flow
6	Head

11.8 TVT Types

1	ShortCurved
2	ShortFlat
3	LongFlat
4	LongSmoothFront
5	LongSmooth
6	Slopes
7	LongSmooth2
10	ShortCurved2

11.9 Temperature Source

1	Transducer
2	Fixed
3	TS3
4	Average

11.10 Echo Algorithm

1	ALF
3	L
8	bLF
12	tF
13	tracker

11.11 Echo Position

3	Center of Mass
4	Hybrid
5	CLEF
7	Rising
13	TCOS

11.12 On/Off

0	Off
1	On

11.13 Enable/Disable

0	Disable
1	Enable

11.14 True/False

0	False
1	True

11.15 Failsafe Material

1	Hi
2	Low
3	Hold
4	Value

11.16 Auto TVT Modes

0	Off
1	On
2	Learn

11.17 Alarm Logical DO

0	No relay
1	Relay 1
2	Relay 2
3	Relay 3

11.18 Invert Relay

0	Normally Open
1	Normally Closed

11.19 Active/Inactive

0	Inactive
1	Active

11.20 Flow Logger Mode

0	Off
1	Log Fixed rate
2	Log Variable Percent Changed
3	Log Variable Percent Flow
4	Log Variable Percent Head

11.21 Totalizer Scale

0	“0.001”
1	“0.01”
2	“0.1”
3	“1”
4	“10”
5	“100”
6	“1,000”
7	“10,000”
8	“100,000”
9	“1,000,000”
10	“10,000,000”

11.22 Pumped Volume Adjustment

0	none
1	Rate Estimate
2	Pump Cycle

11.23 Application Type / Operation

0	Level
1	Space
2	Distance
3	Volume
4	Flow
5	Head

11.24 Language

0	English
1	German
2	French
3	Spanish
4	Chinese

11.25 Yes/No

0	No
1	Yes

11.26 Elapsed Time DO

1	Relay 1
2	Relay 2
3	Relay 3

11.27 Response Rate

1	Slow
2	Medium
3	Fast

11.28 Vessel Regime

1	Alternate Duty Assist
2	Alternate Duty Backup
3	Service Ratio Duty Assist
4	Service Ratio Duty Backup
5	Fixed Duty Assist
6	Fixed Duty Backup

11.29 OCM Type

0	Off
1	Exponential Devices
2	Rectangular Flume BS-3680
3	Round Nose Horizontal Crest Weir BS-3680
4	Trapezoidal Flume BS-3680
5	U Flume BS-3680
6	Finite Crest Weir BS-3680
7	Thin Plate Rectangular Weir BS-3680
8	Thin Plate V Notch Weir
9	Rectangular Weir Contracted
10	Round Pipe
11	Palmer Bowlus Flume
12	H Flume
13	Universal Head Flow

11.30 OCM Method

0	Absolute
1	Ratiometric

12. PERFORMANCE

12.1 Sampling Rates

See Operating Instructions for measurement update rates.

12.2 Power-Up

On power up, the transmitter begins to take ultrasonic shots. Until a valid measurement is made, the display will show dashes, and LOE will be displayed on the LUI. The device will respond to HART commands during this time.

12.3 Reset

Command 42 ("Device Reset") causes the device to reset its microprocessor. The resulting restart is identical to the normal power up sequence. (See Section 12.2)

12.4 Self-Test

The self-test procedure is executed at power up, or following Command 41 ("self-test"). The self-test includes:

- Power up tests only

During the self-test command the device responds normally to HART commands.

12.5 Command Response Times

Minimum	58ms
Typical	62ms
Maximum	65ms

12.6 Busy and Delayed-Response

The device does not support "busy" status except for command 150.

Delayed-response is not used.

12.7 Long Messages

The largest data field used is in the response to Command 9: 71 bytes including the two status bytes.

The largest fixed data field used is in cmds 174, 198, 199 & 228. 42 bytes including the two status bytes.

12.8 Non-Volatile Memory

Non-volatile memory is used to hold the device's configuration parameters. New data is written to this memory periodically after execution of a write command. When Fault code 5 (saving parameters) clears, then non-volatile memory has finished writing.

12.9 Modes

Fixed current mode is implemented, using Command 40.

12.10 Write Protection

Write-protection is provided via the Local User Interface. See Operating Instructions for details.

12.11 Damping

Damping is standard, affecting only the PV and the loop current signal.

ANNEX A. CAPABILITY CHECKLIST

Manufacturer, model and revision	Siemens. SITRANS LUT400, rev. 1
Device type	Transmitter
HART revision	7.2
Device Description available	Yes
Number and type of sensors	1
Number and type of actuators	0
Number and type of host side signals	1: 4 - 20mA analog
Number of Device Variables	6
Number of Dynamic Variables	4
Mappable Dynamic Variables?	Yes
Number of common-practice commands	16
Number of device-specific commands	121
Bits of additional device status	200
Alternative operating modes?	No
Burst mode?	No
Write-protection?	Yes

ANNEX B. DEFAULT CONFIGURATION

Parameter	Default value
Lower Range Value	0 %
Upper Range Value	100 %
PV Units	m
Sensor type	Level Ultrasonics
Number of wires	4
Damping time constant	See manual
Fault-indication jumper	N/A
Write-protect jumper	N/A
Number of response preambles	5

ANNEX C. REVISION HISTORY

Original version. Jan 30, 2012, FD

Updated with Review Comments – Feb 7, 2012, FD