HART Universal Command

Serial number	Command nubmber	Description
1	**0**	**Read Unique Identifier**
2	**1**	**Read Primary Variable**
3	**2**	**Read Loop Current And Percent Of Range**
4	**3**	**Read Dynamic Variables And Loop Current**
5	**6**	**Write Polling Address**
6	**7**	**Read Loop Configuration**
7	**8**	**Read Dynamic Variable Classifications**
8	**9**	**Read Device Variables with Status**
9	**11**	**Read Unique Identifier Associated With Tag**
10	**12**	**Read Message**
11	**13**	**Read Tag, Descriptor, Date**
12	**14**	**Read Primary Variable Transducer Information**
13	**15**	**Read Device Information**
14	**16**	**Read Final Assembly Number**
15	**17**	**Write Message**
16	**18**	**Write Tag, Descriptor, Date**
17	**19**	**Write Final Assembly Number**
18	**20**	**Read Long Tag**
19	**21**	**Read Unique Identifier Associated With Long Tag**
20	**22**	**Write Long Tag**
21	**38**	**Reset Configuration Changed Flag**
22	**48**	**Read Additional Device Status**

HART Special Command

Serial number	Command number	Description
1	**132**	**Read TT Sensor Correlation Parameter**
2	**133**	**Set TT Sensor Correlation Parameter**
3	**134**	**Read R0 Correction Factor**
4	**135**	**Set R0 Correction Factor**
5	**136**	**Two-wire Zero Calibration**
6	**138**	**Set Calibration Points - Sensor Linear Calibration**
7	**139**	**Write the Target Value and Measured Value for a Particular Point**
8	**141**	**Calibrate Liquid Level High and Low Value**
9	**142**	**Read Liquid Level High and Low Value**
10	**187**	**Write Protect and Simulation**
11	**188**	**Device parameter recovery**
12	**216**	**Set or Read the Low Saturation Current Value**
13	**217**	**Set or Read the High Saturation Current Value**
14	**218**	**Set Alarm Type（Low Alarm/High Alarm）**
15	**219**	**Set or Read the Low Alarm Current Value**
16	**220**	**Set or Read the High Alarm Current Value**
17	**224**	**Download Calibration Standard Values**
18	**228**	**Modify Device ID**

HART Universal Commamd Data Frame Parsing

3.1 Command #0: Read Unique Identifier

Read Unique Identifier.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Usign8	"254"
1-2	Enum	Expanded Device Type
3	Usign8	Minimum number of Preambles required for the request message from the Master to the Slave. This number includes the two preambles used in asynchronous Physical Layers (along with the Delimiter) to detect the start of message.
4	Usign8	HART Protocol Major Revision Number implemented by this device. For HART Revision 7, this value must be the number 7.
5	Usign8	Device Revision Level
6	Usign8	Software Revision Level of this device.
7	Usign -5	(Most Significant 5 Bits) Hardware Revision Level of the electronics in this particular device.
7	Enum	(Least Significant 3 Bits) Physical Signaling Code
8	Bits	Flags
9-11	Usign -24	Device ID.
12	Usign8	Minimum number of preambles to be sent with the response message from the slave to the master.

13	Usign8	Last Device Variable code
14-15	Usign16	Configuration Change Counter
16	Bits	Extended Field Device Status
17-18	Enum	Manufacturer Identification Code
19-20	Enum	Private Label Distributor Code
21	Enum	Device Profile

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

3.2 Command #1: Read Primary Variable

Read Primary Variable.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Primary Variable Units
1-4	Float	Primary Variable

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device-Specific Command Error
7		Undefined
8	Warning	Update Failure
9-15		Undefined
16	Error	Access Restricted
1-127		Undefined

Primary Variable Units

32	℃
33	℉
34	R
35	K
36	mV
37	Ohms

3.3 Command #2: Read Loop Current And Percent Of Range

Read Loop Current And Percent Of Range.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Primary Variable Loop Current (units of milliamps[1])
4-7	Float	Primary Variable Percent of Range (units of percent)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-5		Undefined
6	Error	Device-Specific Command Error
7		Undefined
8	Warning	Update Failure
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

3.4 Command #3: Read Dynamic Variables And Loop Current

Read Dynamic Variables And Loop Current.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Primary Variable Loop Current (units of milliamps)
4	Enum	Primary Variable Units Code
5-8	Float	Primary Variable
9	Enum	Secondary Variable Units Code
10-13	Float	Secondary Variable
14	Enum	Tertiary Variable Units Code
15-18	Float	Tertiary Variable
19	Enum	Quaternary Variable Units Code
20-23	Float	Quaternary Variable

Command-Specific Response Codes

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

8	Warning	Update Failure
9-15		Undefined
16	Error	Access Restricted
17-127		Undefined

3.5 Command #6: Write Polling Address

Write Polling Address.

Request Data Bytes

Byte	Format	Description
0	Usign8	Polling Address of Device

Response Data Bytes

Byte	Format	Description
0	Usign8	Polling Address of Device
1	Enum	Loop Current Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Poll Address Selection
3-4		Undefined
5	Error	Too Few Data Bytes Received
6	Error	Device-Specific Command Error
7	Error	In Write Protect Mode
8-11		Undefined
12	Error	Invalid Mode Selection[3]
13-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.6 Command #7: Read Loop Configuration

Read Loop Configuration.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Usign8	Polling Address of Device
1	Enum	Loop Current Mode

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Poll Address Selection
3-4		Undefined
5	Error	Too Few Data Bytes Received
6	Error	Device-Specific Command Error
7	Error	In Write Protect Mode
8-11		Undefined
12	Error	Invalid Mode Selection[3]
13-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.7 Command #8: Read Dynamic Variable Classifications

Read Dynamic Variable Classifications.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Primary Variable Classification
1	Enum	Secondary Variable Classification
2	Enum	Tertiary Variable Classification
3	Enum	Quaternary Variable Classification

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-127		Undefined

3.8 Command #9: Read Device Variables with Status

Read Device Variables with Status.

Request Data Bytes

Byte	Format	Description
0	Usign8	Slot 0: Device Variable Code
1	Usign8	Slot 1: Device Variable Code
2	Usign8	Slot 2: Device Variable Code
3	Usign8	Slot 3: Device Variable Code
4	Usign8	Slot 4: Device Variable Code
5	Usign8	Slot 5: Device Variable Code
6	Usign8	Slot 6: Device Variable Code
7	Usign8	Slot 7: Device Variable Code

Response Data Bytes

Byte	Format	Description
0	Bits	Extended Field Device Status
1	Usign8	Slot 0: Device Variable Code
2	Enum	Slot 0: Device Variable Classification
3	Enum	Slot 0: Units Code
4-7	Float	Slot 0: Device Variable Value
8	Bits	Slot 0: Device Variable Status
9	Usign8	Slot 1: Device Variable Code
10	Enum	Slot 1: Device Variable Classification
11	Enum	Slot 1: Units Code
12-15	Float	Slot 1: Device Variable Value
16	Bits	Slot 1: Device Variable Status
17	Usign8	Slot 2: Device Variable Code
18	Enum	Slot 2: Device Variable Classification
19	Enum	Slot 2: Units Code
20-23	Float	Slot 2: Device Variable Value
24	Bits	Slot 2: Device Variable Status
25	Usign8	Slot 3: Device Variable Code
26	Enum	Slot 3: Device Variable Classification
27	Enum	Slot 3: Units Code

28-31	Float	Slot 3: Device Variable Value
32	Bits	Slot 3: Device Variable Status
33	Usign8	Slot 4: Device Variable Code
34	Enum	Slot 4: Device Variable Classification
35	Enum	Slot 4: Units Code
36-39	Float	Slot 4: Device Variable Value
40	Bits	Slot 4: Device Variable Status
41	Usign8	Slot 5: Device Variable Code
42	Enum	Slot 5: Device Variable Classification
43	Enum	Slot 5: Units Code
44-47	Float	Slot 5: Device Variable Value
48	Bits	Slot 5: Device Variable Status
49	Usign8	Slot 6: Device Variable Code
50	Enum	Slot 6: Device Variable Classification
51	Enum	Slot 6: Units Code
52-55	Float	Slot 6: Device Variable Value
56	Bits	Slot 6: Device Variable Status
57	Usign8	Slot 7: Device Variable Code
58	Enum	Slot 7: Device Variable Classification
59	Enum	Slot 7: Units Code
60-63	Float	Slot 7: Device Variable Value
64	Bits	Slot 7: Device Variable Status
64	Bits	Slot 7: Device Variable Status
65-68	Time	Slot 0 data timestamp

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1		Undefined
2	Error	Invalid Selection (i.e., Device Variable Code = {251-255})
3 - 4		Undefined
5	Error	6 Too Few Data Bytes Received
6	Error	Device-Specific Command Error
7		Undefined
8	Warning	Update Failure
9-13		Undefined

Code	Class	Description
14	Warning	Dynamic Variables Returned for Device Variables
15		Undefined
16	Error	Access Restricted
17-29		Undefined
30	Warning	Command Response Truncated.
31 -127		Undefined

3.9 Command #11: Read Unique Identifier Associated With Tag

Read Unique Identifier Associated With Tag.

Request Data Bytes

Byte	Format	Description
0-5	Packed	Tag

Response Data Bytes

Byte	Format	Description
0	Usign8	"254"
1-2	Enum	Expanded Device Type
3	Usign8	Minimum number of Preambles required for the request message from the Master to the Slave. This number includes the two preambles used in asynchronous Physical Layers (along with the Delimiter) to detect the start of message.
4	Usign8	HART Protocol Major Revision Number implemented by this device. For HART Revision 7, this value must be the number 7.
5	Usign8	Device Revision Level
6	Usign8	Software Revision Level of this device.
7	Usign -5	(Most Significant 5 Bits) Hardware Revision Level of the electronics in this particular device.
7	Enum	(Least Significant 3 Bits) Physical Signaling Code
8	Bits	Flags
9-11	Usign -24	Device ID.
12	Usign8	Minimum number of preambles to be sent with the response message from the slave to the master.
13	Usign8	Last Device Variable code
14-15	Usign16	Configuration Change Counter
16	Bits	Extended Field Device Status

17-18	Enum	Manufacturer Identification Code
19-20	Enum	Private Label Distributor Code
21	Enum	Device Profile

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-37		Undefined
38	Error	Tag Mismatch Error. Tag in request does not match device and Transport Layer "Acknowledged" bit is set.
39-127		Undefined

3.10 Command #12: Read Message

Read Message.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-23	Packed	Message

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.11 Command #13: Read Tag, Descriptor, Date

Read Tag, Descriptor, Date.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-5	Packed	Tag
6-17	Packed	Descriptor
18-20	Date	Date Code

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.12 Command #14: Read Primary Variable Transducer Information

Read Primary Variable Transducer Information.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-2	Usign8	PV Transducer Serial Number
3	Enum	PV Transducer Limits and Minimum Span Units Code
4-7	Float	PV Upper Transducer Limit
8-11	Float	PV Lower Transducer Limit
12-15	Float	PV Minimum Span

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.13 Command #15: Read Device Information

Read Device Information.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	PV Alarm Selection Code.
1	Enum	PV Transfer Function Code
2	Enum	PV Upper and Lower Range Values Units Code
3-6	Float	PV Upper Range Value
7-10	Float	PV Lower Range Value
11-14	Float	PV Damping Value (units of seconds)
15	Enum	Write Protect Code.
16	Enum	Reserved. Must be set to "250", Not Used.
17	Bits	PV Analog Channel Flags

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.14 Command #16: Read Final Assembly Number

Read Final Assembly Number.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-2	Usign8	Final Assembly Number

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.15 Command #17: Write Message

Write Message.

Request Data Bytes

Byte	Format	Description
0-23	Packed	A Message String Used By The Master For Record Keeping

Response Data Bytes

Byte	Format	Description
0-23	Packed	Message String

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 Command Error
7	Error	In Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.16 Command #18: Write Tag, Descriptor, Date

Write Tag, Descriptor, Date.

Request Data Bytes

Byte	Format	Description
0-5	Packed	Tag
6-17	Packed	Descriptor Used By The Master For Record Keeping
18-20	Date	A Date Code Used By The Master For Record Keeping

Response Data Bytes

Byte	Format	Description
0-5	Packed	Tag
6-17	Packed	Descriptor
18-20	Date	Date Code

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 Command Error
7	Error	In Write Protect Mode
8		Undefined
9	Error	Invalid Date Code Detected
10-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.17 Command #19: Write Final Assembly Number

Write Final Assembly Number.

Request Data Bytes

Byte	Format	Description
0-2	Usign8	Final Assembly Number

Response Data Bytes

Byte	Format	Description
0-2	Usign8	Final Assembly Number

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 Command Error
7	Error	In Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.18 Command #20: Read Long Tag

Read Long Tag.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-31	Latin-1	Long Tag

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy
33-127		Undefined

3.19 Command #21: Read Unique Identifier Associated With Long Tag

Read Unique Identifier Associated With Long Tag.

Request Data Bytes

Byte	Format	Description
0-31	Latin-1	Long Tag

Response Data Bytes

Byte	Format	Description
0	Usign8	"254"
1-2	Enum	Expanded Device Type
3	Usign8	Minimum number of Preambles required for the request message from the Master to the Slave. This number includes the two preambles used in asynchronous Physical Layers (along with the Delimiter) to detect the start of message.
4	Usign8	HART Protocol Major Revision Number implemented by this device. For HART Revision 7, this value must be the number 7.
5	Usign8	Device Revision Level
6	Usign8	Software Revision Level of this device.
7	Usign -5	(Most Significant 5 Bits) Hardware Revision Level of the electronics in this particular device.
7	Enum	(Least Significant 3 Bits) Physical Signaling Code
8	Bits	Flags
9-11	Usign -24	Device ID.
12	Usign8	Minimum number of preambles to be sent with the response message from the slave to the master.
13	Usign8	Last Device Variable code
14-15	Usign16	Configuration Change Counter
16	Bits	Extended Field Device Status

17-18	Enum	Manufacturer Identification Code
19-20	Enum	Private Label Distributor Code
21	Enum	Device Profile

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-37		Undefined
38	Error	Tag Mismatch Error . Long Tag in request does not match device and Transport Layer "Acknowledged" bit is set..
39-127		Undefined

3.20 Command #22: Write Long Tag

Write Long Tag.

Request Data Bytes

Byte	Format	Description
0-31	Latin-1	Long Tag

Response Data Bytes

Byte	Format	Description
0-31	Latin-1	Long Tag

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 Command Error
7	Error	In Write Protect Mode
8-15		Undefined
16	Error	Access Restricted
17-31		Undefined
32	Error	Busy (A DR Could Not Be Started)
33	Error	DR Initiated
34	Error	DR Running
35	Error	DR Dead
36	Error	DR Conflict
37-127		Undefined

3.21 Command #38: Reset Configuration Changed Flag

Reset Configuration Changed Flag.

Request Data Bytes

Byte	Format	Description
0 - 1	Usign8	Configuration Change Counter

Response Data Bytes

Byte	Format	Description
0 - 1	Usign8	Configuration Change Counter

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 Command Error
7	Error	2 In Write Protect Mode
8		Undefined
9	Error	Configuration Change Counter Mismatch
10 - 15		Undefined
16	Error	Access Restricted
17 -127		Undefined

3.22 Command #48: Read Additional Device Status

Read Additional Device Status.

Request Data Bytes

Byte	Format	Description
0 - 5	Bits or Enum Only	Device-Specific Status
6	Bits	Extended Field Device Status
7	Enum	Device Operating Mode
8	Bits	Standardized Status 0
9	Bits	Standardized Status 1
10	Bits	Analog Channel Saturated
11	Bits	Standardized Status 2
12	Bits	Standardized Status 3
13	Bits	Analog Channel Fixed
14 - 24	Bits or Enum Only	Device-Specific Status

Response Data Bytes

Byte	Format	Description
0 - 5	Bits or Enum Only	Device-Specific Status
6	Bits	Extended Field Device Status
7	Enum	Device Operating Mode
8	Bits	Standardized Status 0
9	Bits	Standardized Status 1
10	Bits	Analog Channel Saturated
11	Bits	Standardized Status 2
12	Bits	Standardized Status 3
13	Bits	Analog Channel Fixed
14 - 24	Bits or Enum Only	Device-Specific Status

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1 - 4		Undefined

Code	Class	Description
5	Error	18 Too Few Data Bytes Received
6	Error	Device-Specific Command Error
7		Undefined
8	Warning	Update In Progress
9 - 13		Undefined
14	Warning	Status bytes mismatch
15		Undefined
16	Error	Access Restricted
17 -127		Undefined

一. HART Special Command Data Frame Parsing

4.1 Command #132: Read TT Sensor Correlation Parameter

Read TT Sensor Correlation Parameter.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0	Enum	Sensor type code
1	Enum	Sensor wire check code
2	Enum	Number of wires
3	Enum	Two wire zero calibrate code
4	Enum	Cold compensate code
5	Enum	Channel status code
6-9	Float	Channel value
10-13	Float	External temperature of cold compensate
14-17	Float	Internal temperature of cold compensate

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

Sensor Type Codes

1	0~500R
2	0~4000R
3	Cu50
4	Cu50_GOST
5	Cu100
6	Cu100_GOST
7	Pt50_GOST
8	Pt100
9	Pt100_GOST
10	Pt200
11	Pt500
12	Pt1000
13	-100~+100mV
14	Thermocouple type B
15	Thermocouple type E
16	Thermocouple type J
17	Thermocouple type K
18	Thermocouple type N
19	Thermocouple type R
20	Thermocouple type S
21	Thermocouple type T
22	Thermocouple type L

Sensor Wire Check Codes

0x01	Channel open check enable
0x02	Channel short check enable

Number of Wires Codes

2	Two wires
3	Three wires
4	Four wires

Two Wire Zero Calibrate Codes

0	Disable
1	Enable

Cold Compensate Codes

0	Disable
1	Internal measurement
2	External Input measurement
3	External PT100 measurement

Channel Status Codes

0x00	IO_SUCCESS
0x01	IO_UNDER_RANGE
0x02	IO_OVER_RANGE
0x04	IO_CHANNEL_OPEN
0x08	IO_SHORT_CIRCUIT
0x10	IO_CFG_ERROR
0x20	IO_UNSUP_DATA
0x40	IO_COLD_TEMP_ERROR
0x80	IO_AD_DA_ERROR

4.2 Command #133: Set TT Sensor Correlation Parameter

Set TT Sensor Correlation Parameter.

Request Data Bytes

Byte	Format	Description
0	Enum	Reserved
1	Enum	Sensor type code (see Section 11.1)
2	Enum	Number of wires (see Section 11.3)
3	Enum	Cold compensate code (see Section 11.5)
4-7	Float	External temperature of cold compensate

Response Data Bytes

Byte	Format	Description
0	Enum	Reserved
1	Enum	Sensor type code (see Section 11.1)
2	Enum	Number of wires (see Section 11.3)
3	Enum	Cold compensate code (see Section 11.5)
4-7	Float	External temperature of cold compensate

Command-Specific Response Codes

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

Sensor Type Codes

1	0~500R
2	0~4000R
3	Cu50
4	Cu50_GOST
5	Cu100
6	Cu100_GOST
7	Pt50_GOST
8	Pt100
9	Pt100_GOST
10	Pt200
11	Pt500
12	Pt1000
13	-100~+100mV
14	Thermocouple type B
15	Thermocouple type E
16	Thermocouple type J
17	Thermocouple type K
18	Thermocouple type N
19	Thermocouple type R
20	Thermocouple type S
21	Thermocouple type T
22	Thermocouple type L

Number of Wires Codes

2	Two wires
3	Three wires
4	Four wires

Cold Compensate Codes

0	Disable
1	Internal measurement
2	External Input measurement
3	External PT100 measurement

4.3 Command #134: Read R0 Correction Factor

Read R0 Correction Factor.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Sensor R0 value (Range：0.9-1.1)

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

4.4 Command #135: Set R0 Correction Factor

Set R0 Correction Factor.

Request Data Bytes

Byte	Format	Description
0	Enum	Reserved
1-4	Float	Sensor R0 value (Range：0.9-1.1)

Response Data Bytes

Byte	Format	Description
0	Enum	Reserved
1-4	Float	Sensor R0 value (Range：0.9-1.1)

Command-Specific Response Codes

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

4.5 Command #136: Two Wire Zero Calibration

Enable two wire zero calibration.

Request Data Bytes

Byte	Format	Description
0	Enum	Reserved
1	Enum	Two wire zero calibrate code

Response Data Bytes

Byte	Format	Description
0	Enum	Reserved
1	Enum	Two wire zero calibrate code

Command-Specific Response Codes

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

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-4		Undefined
5		Too Few Data Bytes Received
6		Device Specific Command Error

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

Two Wire Zero Calibrate Codes

0	Disable
1	Enable

4.6 Command #138: Set Calibration Points - Sensor Linear Calibration

Sensor Linear Calibration, Set Calibration Point.

Request Data Bytes

Byte	Format	Description
0	Enum	Point index code
1	Unsigned Char	Total point

Response Data Bytes

Byte	Format	Description
0	Enum	Point index code
1	Unsigned Char	Total point

Command-Specific Response Codes

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

Point Index Code

0	Read
1	Write

4.7 Command #139: Write the Target Value and Measured Value for a Particular Point

Write the Target Value and Measured Value for a Particular Point.

Request Data Bytes

Byte	Format	Description
0	Enum	Point index code (see Section 11.13)
1	Unsigned Char	Operation point number
0	Enum	Point index code (see Section 11.13)
1	Unsigned Char	Operation point number
2-5	Float	Target value
6-9	Float	Measure value

Response Data Bytes

Byte	Format	Description
0	Enum	Point index code (see Section 11.13)
1	Unsigned Char	Operation point number
2-5	Float	Target value
6-9	Float	Measure value

Command-Specific Response Codes

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

Re：Red Color is Request Data Bytes of Reading Calibration Data. Green Color is Request Data Bytes of Setting Calibration Data.

Point Index Code

0	Read
1	Write

4.8 Command #141: Calibrate Low and High Levels Values

Calibrate Low and High Levels Values.

Request Data Bytes

Byte	Format	Description
0	Enum	Level index code
1-4	Float	Level value

Response Data Bytes

Byte	Format	Description
0	Enum	Level index code
1-4	Float	Level value

Command-Specific Response Codes

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

Level Index Code

0	Write Calibration Level Low Value
1	Write Calibration Level Up Value
2	Restore Default Level Value

4.9 Command #142: Read Liquid Level High and Low Value

Read Calibration Level High and Low Values.

Request Data Bytes

Byte	Format	Description
None		

Response Data Bytes

Byte	Format	Description
0-3	Float	Calibration R1
4-7	Float	Calibration level low value
8-11	Float	Calibration R2
12-15	Float	Calibration level up value

Command-Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
1-127		Undefined

4.10 Command #187: Write Protect and Simulation

This command is used to write protect or simulation.

Request Data Bytes

Byte	Format	Description
0	Enum	Cmd187 index code (see Section 11.8)
1	Enum	Cmd187 function code (see Section 11.9)

Response Data Bytes

Byte	Format	Description
0	Enum	Cmd187 index code (see Section 11.8)
1	Enum	Cmd187 function code (see Section 11.9)

Command-Specific Response Codes

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

Cmd187 Index Codes

0	For write protect
1	For simulation

Cmd187 function Codes

For write protect	
0	Write protect off
1	Write protect on
For simulation	
0	Exit simulation
1	Clear More Status Bit and Write Protect off
2	Set the Primary Variable close to the Lower Range Value
3	Set PV to 1 percent of range
4	Set PV to mid-sensor range
5	Set PV close to (but not greater than) the Upper Transducer Limit
6	Set PV below the Lower Transducer Limit
7	Set PV above the Upper Transducer Limit
8	Set the PV too low to re-zero
9	Set PV equal to the Upper Transducer Limit
10	Set PV to 0.0
11	Please alter device condition to set the “More Status Available status bit”
12	Place device into write protect

4.11 Command #188: Device parameter recovery

This command is used to restore factory default value, save as factory value and restore factory setting.

Request Data Bytes

Byte	Format	Description
0	Enum	Restore function code (see Section 11.10)

Response Data Bytes

Byte	Format	Description
0	Enum	Restore function code (see Section 11.10)
0	Enum	Restore function code (see Section 11.10)
1-12	Unsigned Char	Sensor version number

Command-Specific Response Codes

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

Re: Red Color is Response Data Bytes of Returning the instrument card version number.

Restore Function Codes

0x08	Restore to factory default value
0x18	Restore to factory setting
0x28	Save as factory value
0x00	Return the instrument card version number
0x17	Primary variable zero restores the default value

4.12 Command #216: Set or Read the Low Saturation Current Value

Set or Read the Low Saturation Current Value.

Request Data Bytes

Byte	Format	Description
0	Enum	Saturation index code
1-4	Float	Low Saturation current value (Only for write)

Response Data Bytes

Byte	Format	Description
0	Enum	Saturation index code
1-4	Float	Low Saturation current value (Only for write)

Command-Specific Response Codes

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

Saturation index code

0	Read
1	Write

4.13 Command #217: Set or Read the High Saturation Current Value

Set or Read the High Saturation Current Value.

Request Data Bytes

Byte	Format	Description
0	Enum	Saturation index code
1-4	Float	High Saturation current value (Only for write)

Response Data Bytes

Byte	Format	Description
0	Enum	Saturation index code
1-4	Float	High Saturation current value (Only for write)

Command-Specific Response Codes

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

Saturation index code

0	Read
1	Write

4.14 Command #218: Set Alarm Type （Low Alarm/High Alarm）

This command is used to read or write alarm type by index.

Request Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1	Enum	Alarm type (Only for write)

Response Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1	Enum	Alarm type

Command-Specific Response Codes

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

Alarm Index Codes

0	Read
1	Write

Alarm type

0	High Alarm
1	Low Alarm

4.15 Command #219: Set or Read the Low Alarm Current Value

This command is used to read or write low alarm current by index.

Request Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1-4	Float	Low alarm current value (Only for write)

Response Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1-4	Float	Low alarm current value

Command-Specific Response Codes

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

Alarm Index Codes

0	Read
1	Write

4.16 Command #220: Set or Read the High Alarm Current Value

This command is used to read or write high alarm current by index.

Request Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1-4	Float	High alarm current value (Only for write)

Response Data Bytes

Byte	Format	Description
0	Enum	Alarm index code (see Section 11.11)
1-4	Float	High alarm current value

Command-Specific Response Codes

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

Alarm Index Codes

0	Read
1	Write

4.17 Command #224: Download Calibration Standard Values

Download Standard Values for Calibration (0 ohm, 400 ohm, 3800).

Request Data Bytes

Byte	Format	Description
0-3	Float	400R value
4-7	Float	3200R value
8-11	Float	mv signal value
12-15		Reserved

Response Data Bytes

Byte	Format	Description
0-3	Float	400R value
4-7	Float	3200R value
8-11	Float	mv signal value

Command-Specific Response Codes

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

Re: When Request Data Bytes are 12, Setting 400R Value 3200R Value and mv Signal Value. When Request Data Bytes are more than 12, Reading 400R Value 3200R Value and mv Signal Value.

4.18 Command #228: Modify Device ID

Modify Device ID.

Request Data Bytes

Byte	Format	Description
0	Enum	Device ID index code (see Section 11.22)
0	Enum	Device ID index code (see Section 11.22)
1-3	Unsigned Char	Device ID

Response Data Bytes

Byte	Format	Description
0	Enum	Device ID index code (see Section 11.22)
1-3	Unsigned Char	Device ID

Command-Specific Response Codes

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

Re: Red Color is Request Data Bytes of Reading Device ID. Green Color is Request Data Bytes of Writting Device ID.