



***FORCE**meter™*

HART Protocol Guide



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1. Explanation: HART Reader

1.1 Wiring

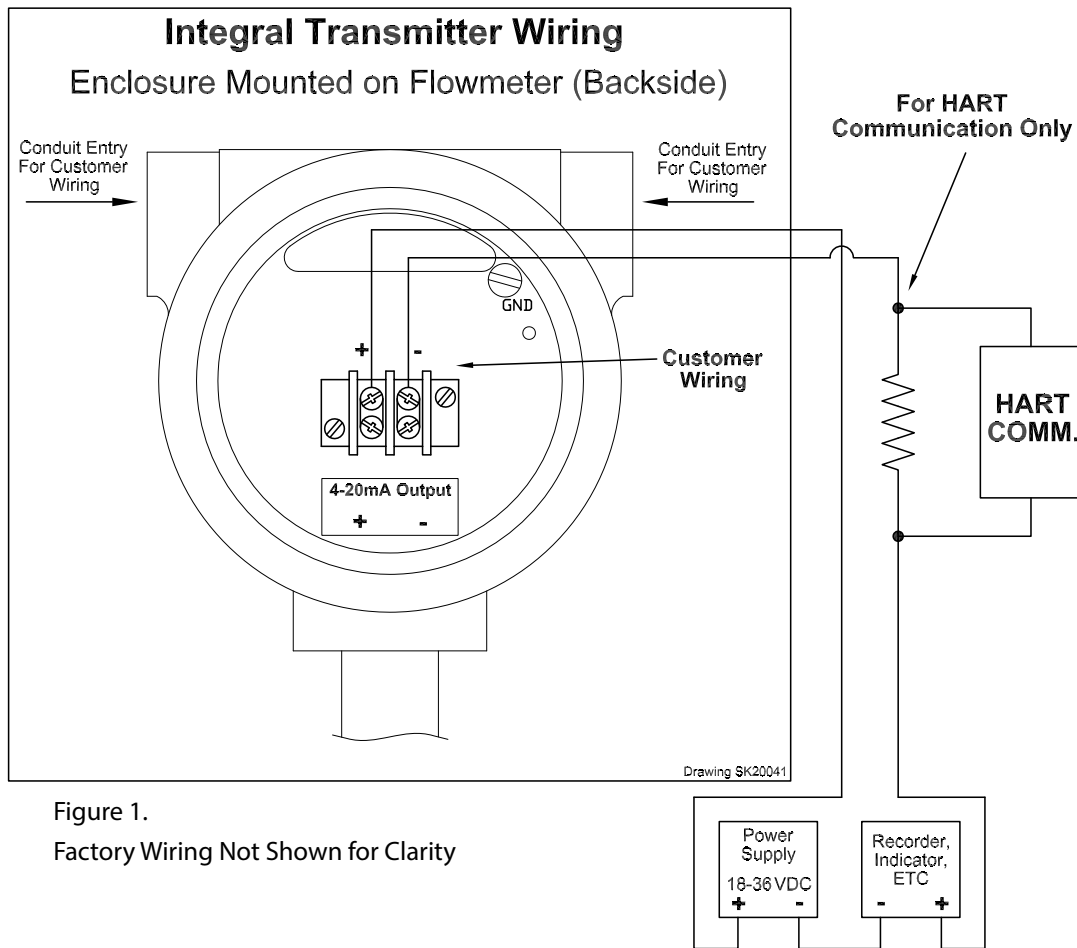


Figure 1.
Factory Wiring Not Shown for Clarity

The ForceMeter™ can be accessed using a HART reader or other device. Please see Figure 1 to wire reader.

The output terminals marked + and -, are generally connected to a power supply that has a nominal 18-36 volt DC voltage and is capable of supplying 100mA for the ForceMeter™. The + and - terminals of the transmitter are connected to the corresponding terminals of the power supply. A load resistor is connected in series with either terminal of the transmitter.

2. Universal HART Commands

Command 0: Read Unique Identifier				
	Byte	Format	Description	
Request Data Bytes	None			
Response Data Bytes	0	Unsigned-8	254	
	1-2	Enum	Expanded Device Type: Byte 1 = 121 for Venture Measurement, and Byte 2 = 239 for Niagara ForceMeter™	
	3	Unsigned-8	Minimum number of preambles from the Master to the Slave: 5	
	4	Unsigned-8	HART Protocol Revision Number: 7	
	5	Unsigned-8	Device Revision Level: 1	
	6	Unsigned-8	Software Revision Level: 1	
	7	Unsigned-5	(Most Significant 5 Bits) Hardware Revision Level: 1	
	7	Enum	Physical Signaling Code: 00 – Bell 202 Current (4 - 20mA)	
	8	Bits Flags	Flags: 1	
	9-11	Unsigned-24	Device ID	
	12	Unsigned-8	Minimum number of preambles from the slave to the master: 5	
	13	Unsigned-8	Maximum Number of Device Variables: 0	
	14-15	Unsigned-16	Configuration Change Counter	
	16	Bits	Extended Field Device Status	
	17-18	Enum	Manufacturer Identification Codes: Byte 17 = 0; Byte 18 = 121	
	19-20	Enum	Private Label Distributor Code: Byte 19 = 0; Byte 20 = 121	
	21	Enum	Device Profile: 1	
		Code	Class	Description
	Response Codes	0	Success	No Command-Specific Errors
		1 - 4		Undefined

Command 1: Read Flow			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0	Enum	Flow HART Unit Code
	1 - 4	Float	Flow
		Code	Class
Response Codes	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

Command 2: Read Loop Current and Percent of Range			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 3	Float	Loop Current: 4 - 20mA
	4 - 7	Float	Flow Percent of Range
	Code	Class	Description
Response Codes	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

Command 3: Read Dynamic Variable and Loop Current			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 3	Float	Loop Current: 4 - 20mA
	4	Enum	Flow HART Unit Code
	5 - 8	Float	Flow
	9	Enum	Fwd Totalizer HART Unit Code
	10 - 13	Float	Fwd Totalizer
	14	Enum	Rev Totalizer HART Unit Code
	15 - 18	Float	Rev Totalizer
	19	Enum	Temperature HART Unit Code
	20 - 23	Float	Temperature
		Code	Class
Response Codes	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

Command 6: Writing Polling Address			
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Polling Address of Device
	1	Enum	Loop Current Mode
Response Data Bytes	0	Unsigned 8	Polling Address of Device
	1	Enum	Loop Current Mode
	Code	Class	Description
Response Codes	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
	13 - 15		Undefined
	16	Error	Access Restricted
	17 - 31		Undefined
	32	Error	Busy
33 - 127		Undefined	

Command 7: Read Loop Configuration			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0	Unsigned 8	Polling Address of Device
	1	Enum	Loop Current Mode
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Restricted
	17 - 127		Undefined

Command 8: Read Dynamic Variable Classifications			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0	Enum	Flow Classification
	1	Enum	Fwd Totalizer Classification
	2	Enum	Rev Totalizer Classification
	3	Enum	Temperature Classification
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Restricted
	17 - 127		Undefined

Command 9: Read Device Variables with Status			
	Byte	Format	Description
Request Data Bytes	0 - 8	Unsigned 8	Device Variable Code
Response Data Bytes	0	Bits	Extended Field Device Status
	1	Unsigned 8	Device Variable Code
	2	Enum	Device Variable Classification
	3	Enum	Units Code
	4 - 7	Float	Device Variable Value
	8	Bits	Device Variable Status
	9	Unsigned 8	Device Variable Code
	10	Enum	Device Variable Classification
	11	Enum	Units Code
	12 - 15	Float	Device Variable Value
	16	Bits	Device Variable Status
	17	Unsigned 8	Device Variable Code
	18	Enum	Device Variable Classification
	19	Enum	Units Code
	20 - 23	Float	Device Variable Value
	24	Bits	Device Variable Status
	25	Unsigned 8	Device Variable Code
	26	Enum	Device Variable Classification
	27	Enum	Units Code
	28 - 31	Float	Device Variable Value
	32	Bits	Device Variable Status
	33	Unsigned 8	Device Variable Code
	34	Enum	Device Variable Classification
	35	Enum	Units Code
	36 - 29	Float	Device Variable Value
	40	Bits	Device Variable Status
	41	Unsigned 8	Device Variable Code
	42	Enum	Device Variable Classification
	43	Enum	Units Code
	44 - 47	Float	Device Variable Value
	48	Bits	Device Variable Status
	49	Unsigned 8	Device Variable Code
50	Enum	Device Variable Classification	
51	Enum	Units Code	
52 - 55	Float	Device Variable Value	
56	Bits	Device Variable Status	
57	Unsigned 8	Device Variable Code	
58	Enum	Device Variable Classification	
59	Enum	Units Code	
60 - 63	Float	Device Variable Value	
64	Bits	Device Variable Status	
65 - 68	Time	Data Time Stamp	

Command 9: Read Device Variables with Status, Continued

	Code	Class	Description
Response Codes	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 Command Error
	7		Undefined
	8	Warning	Update Failure
	9 - 13		Undefined
	14	Warning	Dynamic Variable Returned for Device Variables
	15		Undefined
	16	Error	Access Restricted
	17 - 29		Undefined
	30	Warning	Command Response Truncated
	31 - 127		Undefined

Command 11: Read Unique Identifier Associated With Tag

	Byte	Format	Description	
Request Data Bytes	0 - 5	Packed	Tag, Packed ASCII	
Response Data Bytes	0	Unsigned-8	254	
	1-2	Enum	Expanded Device Type: Byte 1 = 121 for Venture Measurement, and Byte 2 = 239 for Niagara ForceMeter™	
	3	Unsigned-8	Minimum number preambles from the master to the slave: 5	
	4	Unsigned-8	HART Protocol Revision Number: 7	
	5	Unsigned-8	Device Revision Level: 1	
	6	Unsigned-8	Software Revision Level: 1	
	7	Unsigned-5	(Most Significant 5 Bits) Hardware Revision Level: 1	
	7	Enum	Physical Signaling Code: 00 – Bell 202 Current (4 - 20mA)	
	8	Bits Flags	Flags: 1	
	9-11	Unsigned-24	Device ID	
	12	Unsigned-8	Minimum number of preambles from the slave to the master: 5	
	13	Unsigned-8	Maximum Number of Device Variables: 0	
	14-15	Unsigned-16	Configuration Change Counter	
	16	Bits	Extended Field Device Status	
	17-18	Enum	Manufacturer Identification Code: Byte 17 = 0; Byte 18 = 121	
	19-20	Enum	Private Label Distributor Code: Byte 19 = 0; Byte 20 = 121	
	21	Enum	Device Profile: 1	
		Code	Class	Description
	Response Codes	0	Success	No Command-Specific Errors
1 - 127			Undefined	

Command 12: Read Dynamic Variable and Loop Current			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 23	Packed	Message
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 13: Read Tag, Descriptor, Date			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	1 - 5	Packed	Tag
	6 - 17	Packed	Descriptor
	18 - 20	Date	Date: Day, Month, Year
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 14: Read Flow Transducer Information			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 2	Unsigned 24	Transducer Serial Number
	3	Enum	Transducer Limits, Min Span Units Code
	4 - 7	Float	Upper Transducer Limit
	8 - 11	Float	Lower Transducer Limit
	12 - 15	Float	Min Span
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 15: Read Device Information			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0	Enum	Flow Alarm Selection Code
	1	Enum	Flow Transfer Function Code
	2	Enum	Flow Upper and Lower Range Value Units Code
	3 - 6	Float	Flow Upper Range Value
	7 - 10	Float	Flow Lower Range Value
	11 - 14	Float	Flow Damping Value
	15	Enum	Write Protect Code
	16	Enum	Reserved
	17	Bits	Flow Analog Channel Flags
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 16: Read Final Assembly Number			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 2	Unsigned 24	Final Assembly Number
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 17: Write Message			
	Byte	Format	Description
Request Data Bytes	0 - 23	Packed	Message String Used by Master
Response Data Bytes	0 - 23	Packed	Message String
	Code	Class	Description
Response Codes	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 Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 18: Write Tag, Descriptor, Date			
	Byte	Format	Description
Request Data Bytes	0 - 5	Packed	Tag
	6 - 17	Packed	Descriptor Used by the Master For Record Keeping
	18 - 20	Tag	Descriptor Used by the Master For Record Keeping
Response Data Bytes	0 - 5	Packed	Tag
	6 - 17	Packed	Descriptor
	18 - 20	Date	Date Code
	Code	Class	Description
Response Codes	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 Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 19: Write Final Assembly Number			
	Byte	Format	Description
Request Data Bytes	0 - 2	Unsigned 24	Final Assembly Number
Response Data Bytes	0 - 2	Unsigned 24	Final Assembly Number
	Code	Class	Description
Response Codes	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 Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 20: Read Long Tag			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 31	Latin 1	Long Tag
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 15		Undefined
	16	Error	Access Required
	17 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 21: Read Unique Identifier Associated with Long Tag

	Byte	Format	Description	
Request Data Bytes	0 - 31	Latin 1	Long Tag	
Response Data Bytes	0	Unsigned-8	254	
	1-2	Enum	Expanded Device Type: Byte 1 = 121 for Venture Measurement, and Byte 2 = 239 for Niagara ForceMeter™	
	3	Unsigned-8	Minimum number of Preambles from the Master to the Slave: 5	
	4	Unsigned-8	HART Protocol Revision Number: 7	
	5	Unsigned-8	Device Revision Level: 1	
	6	Unsigned-8	Software Revision Level: 1	
	7	Unsigned-5	(Most Significant 5 Bits) Hardware Revision Level: 1	
	7	Enum	Physical Signaling Code: 00 – Bell 202 Current (4 - 20mA)	
	8	Bits Flags	Flags: 1	
	9-11	Unsigned-24	Device ID	
	12	Unsigned-8	Minimum number of preambles from the slave to the master: 5	
	13	Unsigned-8	Maximum Number of Device Variables: 0	
	14-15	Unsigned-16	Configuration Change Counter	
	16	Bits	Extended Field Device Status	
	17-18	Enum	Manufacturer Identification Code: Byte 17 = 0; Byte 18 = 121	
	19-20	Enum	Private Label Distributor Code: Byte 19 = 0; Byte 20 = 121	
	21	Enum	Device Profile: 1	
		Code	Class	Description
	Response Codes	0	Success	No Command-Specific Errors
		1 - 127		Undefined

Command 22: Write Long Tag

	Byte	Format	Description
Request Data Bytes	0 - 31	Latin 1	Long Tag
Response Data Bytes	0 - 31	Latin 1	Long Tag
	Code	Class	Description
Response Codes	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	Error	DR Initiated
	34	Error	DR Running
	35	Error	DR Dead
	36	Error	DR Conflict
	37 - 127		Undefined

Command 38: Reset Configuration Changed Flag			
	Byte	Format	Description
Request Data Bytes	0 - 1	Unsigned 16	Configuration Change Counter
Response Data Bytes	0 - 1	Unsigned 16	Configuration Change Counter
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device Specific Command Error
	7	Error	In Write Protect Mode
	8		Undefined
	9	Error	Configuration Change Counter Mismatch
	10 - 15		Access Restricted
	16	Error	Access Restricted
	17 - 127		Undefined

Command 48: Read Additional Device Status				
	Byte	Format	Description	
Request Data Bytes	0 - 5	Enum	Device Specific Status	
	6	Bits	Extended Device Status	
	7	Bits	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	
	13 - 24	Bits/Enum	Device Specific Status	
	Response Data Bytes	0 - 5	Enum	Device Specific Status
		6	Bits	Extended Device Status
		7	Bits	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	
13 - 24		Bits/Enum	Device Specific Status	
		Code	Class	Description
Response Codes		0	Success	No Command-Specific Errors
		1 - 5		Undefined
	6	Error	Device Specific Command Error	
	7		Undefined	
	8	Warning	Updated in Progress	
	9 - 15		Undefined	
	16	Error	Access Restricted	
	17 - 127		Undefined	

3. Specific

Command 132: Simulate Fixed Current Value			
Classification	Description		
0	4mA		
1	8mA		
2	12mA		
3	16mA		
4	20mA		
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	Fixed Current Classification As Per Table Above
Response Data Bytes	0	Unsigned-8	Fixed Current Classification As Per Table Above
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 133: Set Zero Meter			
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	0
	1	Unsigned-8	0
Response Data Bytes	0	Unsigned-8	0
	1	Unsigned-8	0
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1		Undefined
	2	Error	Invalid Selection
	3 - 5		Undefined
	6	Error	Device-Specific Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 134: Reset Totalizer			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 3	Float	Updated Fwd Totalizer
	0 - 3	Float	Updated Rev Totalizer
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device-Specific Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 135: Change Device Specific Settings			
Classification	Description	Unit Code	
1	Rate Unit	XX HART unit code	
2	Total Unit	XX HART unit code	
4	Decimal Points	0 None, 1 One decimal, 2 Two decimals	
5	Display Settings	0 Total Only, 1 Rate Only, 2 Rate and Total	
6	Failsafe Settings	0 Low, 1 High, 2 Other	
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	Device Classification As Per Table Above
	1	Unsigned-8	Device Unit Code As Per Table Above
Response Data Bytes	0	Unsigned-8	Device Classification As Per Table Above
	1	Unsigned-8	Device Unit Code As Per Table Above
	Above	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 136: Set Range Value			
Classification	Description		
0	4mA		
1	20mA		
2	CUT OFF		
3	MAX RANGE		
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	Range Classification As Per Table Above
	1 - 4	Float	Range Value
Response Data Bytes	0	Unsigned-8	Range Classification As Per Table Above
	1 - 4	Float	Range Variable Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 137: Write Device Specific Byte			
Classification	Description		
0	Custom Scale Value		
1	Damping Value		
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	Classification As Per Table Above
	1	Unsigned-8	Value
Response Data Bytes	0	Unsigned-8	Classification As Per Table Above
	1	Unsigned-8	Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 138: Default - Reset All Settings to Factory Defaults			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	None		
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device Specific Command Error
	7 - 31		Undefined
	32	Error	Busy (A DR Could Not Be Started)
	33 - 127		Undefined

Command 140: Set Trim Value			
Classification	Description		
0	4mA		
1	12mA		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Trim Classification As Per Table Above
	1 - 4	Float	Trim Value
Response Data Bytes	0	Unsigned 8	Trim Classification As Per Table Above
	1 - 4	Float	Trim Value
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1		Undefined
	2	Error	Invalid Selection
	3 - 4		Undefined
	5	Error	Passed Parameter Too Small
	6	Error	Too Few Data Bytes Received
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 141: Read Float Calibration Variable			
Classification	Description		
0	CAL 1		
1	CAL 2		
2	CAL 5		
3	CAL 7		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Calibration Variable Classification As Per Table Above
Response Data Bytes	0	Unsigned 8	Calibration Variable Classification As Per Table Above
	1 - 4	Float	Calibration Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 142: Read Integer Calibration Variable			
Classification	Description		
0	CAL 3		
1	CAL 4		
2	CAL 6		
3	CAL 8		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Calibration Variable Classification As Per Table Above
Response Data Bytes	0	Unsigned 8	Calibration Variable Classification As Per Table Above
	1 - 2	Unsigned 16	Calibration Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 143: Read Device Specific Settings			
Classification	Description		
0	Flow Type	00 Volume, 01 Mass	
1	Rate Unit	XX HART unit code	
2	Total Unit	XX HART unit code	
3	Direction	0 Unidirectional, 1 Bidirectional	
4	Decimal Points	0 None, 1 One decimal, 2 Two decimals	
5	Display Settings	0 Total Only, 1 Rate Only, 2 Rate and Total	
6	Failsafe Settings	0 Low, 1 High, 2 Other	
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Device Classification As Per Table Above
Response Data Bytes	0	Unsigned 8	Device Classification As Per Table Above
	1	Unsigned 8	Device Unit Code As Per Table Above
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1		Undefined
	2	Error	Invalid Selection
	3 - 4		Undefined
	4	Error	Passed Parameter Too Small
	5	Error	Too Few Data Bytes Received
	6	Error	Device-Specific Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 144: Read Range Value			
Classification	Description		
0	4mA		
1	20mA		
2	CUT OFF		
3	MAX RANGE		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Range Classification As Per Table Above
	0	Unsigned 8	Range Classification As Per Table Above
Response Data Bytes	1 - 4	Float	Range Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 145: Read Custom Scale Value			
Classification	Description		
0	Custom Scale Value		
1	Damping Value		
	Byte	Format	Description
Request Data Bytes	0	Unsigned-8	Device Classification As Per Table Above
Response Data Bytes	0	Unsigned-8	Device Classification As Per Table Above
	1	Unsigned-8	Device Value As Per Table Above
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 147: Read Trim Value			
Classification	Description		
0	4mA		
1	12mA		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Trim Classification As Per Table Above
Response Data Bytes	0	Unsigned 8	Trim Classification As Per Table Above
	1 - 4	Float	Trim Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 149: Read Device Specific Information			
Classification	Description		
0	Model Number		
1	Serial Number		
2	Firmware Version		
3	Hardware Version		
4	MFR Date		
5	TX Type		
6	SpGrv/Vol		
7	High Range		
8	Low Range		
9	Temperature		
10	Pressure		
11	Target		
12	Force Fac.		
13	FS Force		
14	FS Output		
15	Mech Stop		
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	Device Information Variable Classification As Per Table Above
Response Data Bytes	0	Unsigned 8	Device Information Variable Classification As Per Table Above
	1 - 10	Latin - 1	Information Data
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 153: Clear Fault			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	None		
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device-Specific Command Error
	7 - 31		Undefined
	32	Error	Busy
	33 - 127		Undefined

Command 154: Set Failsafe Other			
	Byte	Format	Description
Request Data Bytes	0	Unsigned 8	mA Value
Response Data Bytes	0	Unsigned 8	mA Value
	Code	Class	Description
Response Codes	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 Command Error
	7 - 31		Undefined
	32	Error	Busy (A DR Could Not Be Started)
	33 - 127		Undefined

Command 155: Read Failsafe Other			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0	Unsigned 8	mA Value
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device Specific Command Error
	7 - 31		Undefined
	32	Error	Busy (A DR Could Not Be Started)
	33 - 127		Undefined

Command 156: Read Faults			
	Byte	Format	Description
Request Data Bytes	None		
Response Data Bytes	0 - 3	Long	Fault Code: Please refer Fault Code table for detail
	Code	Class	Description
Response Codes	0	Success	No Command-Specific Errors
	1 - 5		Undefined
	6	Error	Device Specific Command Error
	7 - 31		Undefined
	32	Error	Busy (A DR Could Not Be Started)
	33 - 127		Undefined

4. Fault Codes

Fault Codes	Description
0x00000001	1 AD421 2.5 VREF error
0x00000002	2 AD421 1.25 VREF error
0x00000004	3 Bridge Excitation Voltage error
0x00000008	4 System Supply Voltage error- Not implemented
0x00000010	5 Bridge Connector error
0x00000020	6 Bridge General error
0x00000040	7 DAC16 Communication error-Not implemented
0x00000080	8 ADC12 Communication error
0x00000100	9 DPOT communication error
0x00000200	10 Flash read/write error-Not implemented
0x00000400	11 ADC24 COMM ERROR
0x00000800	Not Used
0x00001000	Not Used
0X00002000	14 Flash Read Error
0X00004000	15 Flash Write Error
0X00008000	Not Used
0x00010000	17 System High frequency clock warning
0x00020000	18 System Low frequency clock warning
0x00040000	19 Internal over/under Temperature warning -Not implemented
0x00080000	20 AD421 2.5 VREF out of tolerance warning
0x00100000	21 AD421 1.25 VREF out of tolerance warning
0x00200000	22 Bridge RTD warning
0X00400000	23 Process variable over flow
0X00800000	24 Bridge RTD error

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