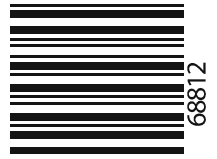# Cond Ind 7100/2(X)H Transmitter Specific Command Specification

using the HART® Communications Protocol

Revision 1.1

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Author: Mettler - Toledo

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1. Reference Documents:

Document Title	Revision	Document Number
HART® - FSK Physical Layer Specification	8.0	HCF_SPEC-54
HART® - Data Link Layer Specification	7.1	HCF_SPEC-81
HART® - Command Summary Specification	7.1	HCF_SPEC-99
HART® - Universal Command Specification	5.2	HCF_SPEC-127
HART® - Common Practice Command Specification	7.1	HCF_SPEC-151
HART® - Common Tables	9.0	HCF_SPEC-183
Appendix 1 - Command Specific Response Code Definitions	4.1	HCF_SPEC-307
Application Layer Guideline on HART Status Information	1.0	HCF_LIT-5

Cond Ind 7100/2(X)H

2. Expanded Device Type Code:

Manufacturer Identification Code:	Mettler	142
Manufacturer's Device Type Code:	Cond Ind 7100/2(X)H	120

3. Physical Layer Information:

Field Device Category	Transmitter Type A	(Sink direct current and receive operating power from the Network)
Capacitance Number (CN)	2	(approx. 2 x 5000 pF)

4. Conformance and Command Class Summary

CONFORMANCE CLASS #1
                                        - UNIVERSAL
0   Read Unique Identifier
1   Read Primary Variable

CONFORMANCE CLASS #1A
                                        - UNIVERSAL
0   Read Unique Identifier
2   Read P. V. Current and Percent of Range

CONFORMANCE CLASS #2
                                        - UNIVERSAL
11   Read Unique Identifier Associated with Tag
12   Read Message
13   Read Tag, Descriptor, Date
14   Read Primary Variable Sensor Information
15   Read Primary Variable Output Information
16   Read Final Assembly Number

CONFORMANCE CLASS #3
  -                                     - UNIVERSAL
 3   Read Dynamic Variables and P. V. Current
                                        - COMMON-PRACTICE
48   Read Additional Transmitter Status
54   Read Transmitter Variable Information

CONFORMANCE CLASS #4
-                                       - COMMON-PRACTICE
35   Write Primary Variable Range Values
36   Set Primary Variable Upper Range Value
37   Set Primary Variable Lower Range Value
38   Reset Configuration Changed Flag
40   Enter/Exit Fixed Primary Variable Current Mode
41   Perform Transmitter Self Test
42   Perform Master Reset

CONFORMANCE CLASS #5
                                        - UNIVERSAL
6   Write Polling Address
17   Write Message
18   Write Tag, Descriptor, Date
19   Write Final Assembly Number
                                        - COMMON-PRACTICE
59   Write Number of Response Preambles
                                        - TRANSMITTER-SPECIFIC
128   Read One Transmitter-Specific Variable
129   Write One Transmitter-Specific Variable

5. Additional Response Code Information

FIRST BYTE

5.1 BUSY
Response Code #32

The Busy Response Code is implemented for Commands #6, #18, #35, #36, #37, #42, #59 and #129. A confirming response is made before execution begins. The Busy Response Code is returned when a command is received during the execution.

SECOND BYTE

5.2 FIELD DEVICE MALFUNCTION
Bit #7

Malfunctions detected by the transmitter:
- CRC-Error in internal Configuration Data of the transmitter.
- After Reset or Power up
  (See HCF_LIT-5: Application Layer Guideline on HART Status Information)

5.3 CONFIGURATION CHANGED
Bit #6

When the Parameter Setting Data changed, this Bit will be set. The Command #38 resets the Flag.

5.4 MORE STATUS AVAILABLE
Bit #4

This Bit is set if more status information can be read with Command #48.

5.5 PRIMARY VARIABLE ANALOG OUTPUT FIXED
Bit #3

This bit is set if output current 1 has been frozen by corresponding operation at the transmitter or if the output has been fixed via HART with the Command #40 or in the case of reset or power failure during startup.

5.6 PRIMARY VARIABLE ANALOG OUTPUT SATURATED
Bit #2

This flag is set whenever the Primary Variable Analog Output saturates below 3.8 milliamperes and above 20.5 milliamperes.

5.7 NON-PRIMARY VARIABLE OUT OF LIMITS
Bit #1

This flag is set whenever the Non-Primary Variable exceeds the transmitter operating limits or Sensocheck Errors occurs. Command #48, Read Additional Transmitter Status, provides additional information.

5.8 PRIMARY VARIABLE OUT OF LIMITS
Bit #0

This flag is set whenever the Primary Variable exceeds the Sensor Limits returned with Command#14, Read Primary Variable Sensor Information.

6. General Transmitter Information

6.1 DAMPING IMPLEMENTATION

The Cond Ind 7100/2(X)H Transmitter has a fixed damping value.

6.2 NONVOLATILE MEMORY DATA STORAGE

The Flags Byte of Command #0 referenced in the Universal Command Specification document, will have Bit #1 (Command #39, EEPROM Control, Required) set to 0, indicating that all data sent to the transmitter will be saved automatically in the nonvolatile memory upon receipt of the Write or Set Command. Command #39, EEPROM Control, is not implemented.

6.3 MULTIDROP OPERATION

This revision of the Cond Ind 7100/2(X)H Transmitter supports Multidrop Operation.

6.4 BURST MODE

This revision of the Cond Ind 7100/2(X)H Transmitter does **not** support Burst Mode.

6.5 UNIT CONVERSIONS

All temperatures are based of degrees Celsius or degrees Fahrenheit. The temperature unit is selected with transmitter-specific variable 10, Byte 1. Command #129, Write One Transmitter-Specific Variable, can write this Byte.

7. Additional Common-Practice Command Specification

The Cond Ind 7100/2(X)H Transmitter implements a subset of the Common-Practice Commands specified in the
Common-Practice Command Specification document. This section contains information pertaining to those commands that require clarification.

7.1 COMMAND #35   WRITE PRIMARY VARIABLE RANGE VALUES

The Primary Variable Range Unit Code accepted by this transmitter is only the current Unit Code for the Primary Variable.

7.2 COMMAND #41   PERFORM TRANSMITTER SELF TEST

The Transmitter Self Test (Device Diagnostics) starts immediately after execution of this command.the transmitter display shows the test progress. No measurement at the execution of Selftest. A Display test, RAM test, EPROM test (internal program) and EEPROM test (parameter memory, transmitter calibration data) are performed. The test takes about 20 seconds.
The result can then be retrieved with Command #48, Read Additional Transmitter Status.

7.3   **COMMAND #48**   **READ ADDITIONAL TRANSMITTER STATUS**

This Command returns the Global Device Status, the Function Mode, Alarms and Errors, the results of a Transmitter Self Test and other transmitter information.

Byte **#0**   Error Status
Bit 0.0	-	Conductivity or salinity value	Err 01
Bit 0.1	-	Conductance value	Err 02
Bit 0.2	-	Temperature value	Err 03
Bit 0.3	-	Current output < 3.8 mA	Err 11
Bit 0.4	-	Current output > 20.5 mA	Err 12
Bit 0.5	-	Current output span	Err 13
Bit 0.6	-	Configuration data	Err 98
Bit 0.7	-	Transmitter calibration data	Err 99

Byte **#1**   *Undefined*

Byte **#2**   Smiley Status
Bit 2.0	-	*Undefined*	
Bit 2.1	-	*Undefined*	
Bit 2.2	-	Sensocheck$^{®}$ Polarization	Err 33
Bit 2.3	-	Sensocheck$^{®}$ Lead	Err 34
Bit 2.4	-	*Undefined*	
Bit 2.5	-	*Zeropoint*	
Bit 2.6	-	Cell constant	
Bit 2.7	-	*Undefined*	

Byte **#3 to 5**   *Undefined*

Byte **#6**   Operating Mode #1   (Refer to Common Table XIV)
Byte **#7**   Operating Mode #2   (Refer to Common Table XIV)

Byte **#8**   Analog Output Saturated
Bit 8.0	-	Analog Output saturated
Bit 8.1 to 7	-	*Undefined*

Byte **#9**   Bit 9.0 to 7   -   *Undefined*
Byte **#10**   Bit 10.0 to 7   -   *Undefined*

Byte **#11**   Analog Output Fixed
Bit 11.0	-	Analog Output fixed
Bit 11.1 to 7	-	*Undefined*

Byte **#12**   Bit 12.0 to 7   -   *Undefined*
Byte **#13**   Bit 13.0 to 7   -   *Undefined*

Byte **#14 to 23**   *Undefined*

Byte **#24**   Transmitter Mode
Bit 24.0	-	*Configuraton*
Bit 24.1	-	*Calibration*
Bit 24.2	-	Sample was taken

8. TRANSMITTER-SPECIFIC COMMANDS

8.1   COMMAND #128   READ ONE TRANSMITTER-SPECIFIC VARIABLE

REQUEST DATA BYTES

DATA BYTES	#0 XMTR VAR CODE

Data Byte #0:   Transmitter Variable, 8-bit unsigned integer, Refer to Transmitter Variable Code Table 9.3.

RESPONSE DATA BYTES

DATA BYTES	#0 XMTR VAR CODE	#1 UNITS		
	#2 DATA MSB	#3	#4	#5 DATA LSB

Data Byte #0   : Transmitter Variable, 8-bit unsigned integer, Refer to Transmitter Variable Code Table 9.3.

Data Byte #1   : Units Code, 8-bit unsigned integer, Refer to Table II; Unit Codes

Data Byte #2 - #5   : Data for selected Transmitter Variable, IEEE 754 or selection data in 4 single bytes, Refer to Transmitter Variable Code Table 9.3.

COMMAND-SPECIFIC RESPONSE CODES

0	No Command-Specific Errors
1	Undefined
2	Invalid Selection
3 - 4	Undefined
5	Too Few Data Bytes Received
6 - 15	Undefined
16	Access Restricted
17 - 127	Undefined

8.2   COMMAND #129   WRITE ONE TRANSMITTER-SPECIFIC VARIABLE

REQUEST DATA BYTES

DATA BYTES	#0 XMTR VAR CODE	#1 UNITS		
	#2 DATA MSB	#3	#4	#5 DATA LSB

Data Byte #0   : Transmitter Variable, 8-bit unsigned integer, Refer to Transmitter Variable
                         Code Table 9.3.

Data Byte #1   : Units Code, 8-bit unsigned integer, Refer to Table II; Unit Codes

Data Byte #2 - #5   : Data for selected Transmitter Variable, IEEE 754 or selection data in 4 single
                         bytes, Refer to Transmitter Variable Code Table 9.3.

RESPONSE DATA BYTES

DATA BYTES	#0 XMTR VAR CODE	#1 UNITS		
	#2 DATA MSB	#3	#4	#5 DATA LSB

Data Byte #0   : Transmitter Variable, 8-bit unsigned integer, Refer to Transmitter Variable
                         Code Table 9.3.

Data Byte #1   : Units Code, 8-bit unsigned integer, Refer to Table II; Unit Codes

Data Byte #2 - #5   : Data for selected Transmitter Variable, IEEE 754 or selection data in 4 single
                         bytes, Refer to Transmitter Variable Code Table 9.3.

COMMAND-SPECIFIC RESPONSE CODES

0	No Command-Specific Errors
1	Undefined
2	Invalid Selection
3	Passed Parameter too Large
4	Passed Parameter too Small
5	Too Few Data Bytes Received
6	Undefined
7	In Write Protect Mode
8 - 11	Undefined
12	Invalid Units Code
13 - 15	Undefined
16	Access Restricted
17 - 127	Undefined

9.   TRANSMITTER-SPECIFIC TABLES

Refer to the Common Tables Document for all references in this section to 'Subset of Table'.

9.1 USED COMMON UNIT CODES
Subset of Table II, Unit Codes

32	-	°C	
33	-	°F	
37	-	Ohm	
39	-	mA	
56	-	uMho	(uS)
57	-	%	
246	-	g/kg (SAL)	
250	-	not used	
251	-	none	
253	-	special	

9.2 USED TRANSMITTER-SPECIFIC UNIT CODES

243	-	%/K	(TC)
246	-	g/kg	(Salinity)

9.3 TRANSMITTER VARIABLE CODES

Var.No.	Description			Unit	Access	Lower Limit	Upper Limit	Note
0	Meas. cond value			uS	Read	0	9.999e6	uS = uMho
1	Concentration			%	Read	0	100.0	
2	Temperature value			°C °F	Read	-20.0°C -4°F	150.0°C 302°F	for Pt100/1000
							130.0°C 266°F	for NTC 30k / 100k
3	Salinity			g/kg	Read	0	45.0	
4	Conductivity without TC			uS	Read	0	9.999e6	
6 to 7	*Undefined*							
8	mA output current			mA	Read	3.8	22.0	
9	Percent value of output			%	Read	-	-	
10	Inputs	10.0 10.1 10.2 10.3	Prim. variable Conc Sol Temperature Temp. sensor	none	R/W			Selections bytewise, see table 9.4
11	TC	11.0 11.1 11.2 11.3	TC selection *Undefined* *Undefined* *Undefined*	none	R/W			Selections bytewise, see table 9.5
12	Linear TC value			%/K	R/W	0	19.99	
13	Output current	13.0 13.1 13.2 13.3	LIN /LOG LOG lower range value LOG upper range value *Undefined*	none	R/W			not used, when PV = salinity! Selections bytewise, see table 9.6
14	Output current (lin), lower range value (4 mA)			uS g/kg %	R/W	0	1999500 45.0 100.0	same Unit as Primary variable
15	Output current (lin), upper range value (20 mA)			uS g/kg %	R/W	0	1999500 45.0 100.0	same Unit as Primary variable
16	Diag	16.0 16.1 16.2 16.3	SensoCheck *Undefined* *Undefined* *Undefined*	none	R/W			Selections bytewise, see table 9.7
17	Cell constant			none	R/W	0.1	19.999	
18	Zero point			none	R/W	-1000	1000	
19	Transfer ratio			mA	R/W	0.1	199.99	
20	Output	20.0 20.1 20.2 20.3	22mA Error HOLD/ Last/Fix *Undefined* *Undefined*	none	R/W			Selections bytewise see table 9.8
21	HOLD Fix value			mA	R/W	3.8	22.0	
30	Sample calibration (Step 2)	Ohm		R/W	0.0	999.9e6	Lab value (Ohm)	Filter time
		uS					Lab value (uS)	
31	Time constant output filter			sec	R/W	0.0	120.0	
32	Alarm delay			sec	R/W	0.0	600.0	
33	33.0 Alarm LED Mode			none	R/W			Selections bytewise, see table 9.9

34	Sensor selection	34.0 Sensor type 34.1 34.2 34.2	none	R/W			Selections bytewise, see table 9.10
20-29 30 - 249	*Undefined*						
250	Not Used						
251-255	*Undefined*						

9.4 INPUT SELECTION CODE

Usage of bytes for input selections in Transmitter-Specific Variable 10

Byte	Description	Selections			Note
10.0	Primary variable and range	0 1 2 3 4 5 6 7 8-255	- - - - - - -	oo.oo mS ooo.o mS oooo mS oo.oo % ooo.o SAL o.ooo mS o.ooo S/m oo.oo S/m *Undefined*	unit is valid also for output current upper and lower range values
10.1	Conc Sol	0 1 2 3 4 5 6 7 8 9 10-255	- - - - - - - - - - -	NaCl HCl *NaOH* *H2SO4* *HNO3* *H2SO4* *HCl* HNO3 *H2SO4* *NaOH* *Undefined*	
10.2	Temperature	0 1 2-255	- - -	°C °F *Undefined*	unit is valid for all read and write commands
10.3	Temperature sensor type	0 1 3 4 4-255	- - - - -	Pt 100 Pt 1000 NTC 100k NTC 30k *Undefined*	

9.5 TC SELECTION CODE

Usage of bytes for TC selections in Transmitter-Specific Variable 11

Byte	Description	Selections			Note
11.0	TC	0 1 2 3-255	- - - -	OFF LIN NLF *Undefined*	
11.1	*Undefined*				
11.2	*Undefined*				
11.3	*Undefined*				

9.6   OUTPUT CURRENT SELECTION CODE

Usage of bytes for output current configuration in Transmitter-Specific Variable 13

Byte	Description	Selections	Note
13.0	LIN / LOG	0 - linear 1 - logarithm 2-255 - *Undefined*	
13.1	LOG lower range value	0 -0.1 mS | 0.001 S/m 1 -1.000 mS | 0.01 S/m 2 -10.00 mS | 0.1 S/m 3 -100.0 mS | 1.0 S/m 4 -1000 mS | 10.0 S/m 5 -0.01 mS | 100.0 S/m 6 -0.001 mS 7-255 -*Undefined*	
13.2	LOG upper range value	0 -0.1 mS | 0.001 S/m 1 -1.000 mS | 0.01 S/m 2 -10.00 mS | 0.1 S/m 3 -100.0 mS | 1.0 S/m 4 -1000 mS | 10.0 S/m 5 -0.01 mS | 100.0 S/m 6 -0.001 mS 7-255 -*Undefined*	
13.3	*Undefined*		

9.7   DIAGNOSTICS CODE

Usage of bytes for diagnostics in Transmitter-Specific Variable 16

Byte	Description	Selections	Note
16.0	Sensocheck	0 - Off 1 - On 2-255 - *Undefined*	
16.1	*Undefined*		
16.2	*Undefined*		
16.3	*Undefined*		

9.8   OUTPUT SELECTION CODE

Usage of bytes for output selections in Transmitter-Specific Variable 20

Byte	Description	Selections	Note
20.0	22 mA on Error	0 - Off 1 - On 2-255 - *Undefined*	
20.1	HOLD Last / Fix	0 - Last value 1 - Fixed current 2-255 - *Undefined*	
20.2	*Undefined*		
20.3	*Undefined*		

9.9   EXTENDED SELECTION CODE

Usage of bytes for extended selections in Transmitter-Specific Variable 33

Byte	Description	Selections	Note
33.0	Alarm LED Mode	0 - Off 1 - On 2-255 - *Undefined*	
33.1	*Undefined*		
33.2	*Undefined*		
33.3	*Undefined*		

9.10   EXTENDED SELECTION CODE

Usage of bytes for extended selections in Transmitter-Specific Variable 34

Byte	Description	Selections	Note
34.0	Sensor selection	0 - SE 655 1 - SE 656 4 - Other 2-255 - *Undefined*	
34.1	*Undefined*		
34.2	*Undefined*		
34.3	*Undefined*		

10   RELEASE NOTES

10.1   Preliminary Release
10.2   Transmitter e functionality added
          Variable #30 - #34, CMD #131, Input Selection Code extended, Output current Selection code for LOG extended

Universal Commands:

Command #0 - Read Unique Identifier

Request Data Bytes	None		
Response Data Bytes	#0	- 254	
	#1	- Manufacturer Id = 142	(Mettler-Toledo)
	#2	- Manufacturer Device Type = 120	(Cond Ind 7100/2(X)H)
	#3	- Number of Preambles	
	#4	- Univ Cmd Rev	
	#5	- Trans Spec Rev	
	#6	- Soft Rev	*(10 for Version 1.0)*
	#7	- Hard Rev (See Universal Command Spec. Cmd #0)	
	#8	- Flags	
	#9 to #11	- Device Id Number (24-bit unsigned int)	
Response Codes	#0	- No Command-Specific Errors	

Command #1 - Read Primary Variable

Request Data Bytes	None		
Response Data Bytes	#0	- PV Units Code (See Common Table II)	(Spec.Var. 10.0)
	#1 to #4	- Primary Variable	(Spec.Var. 0, 1 or 3)
Response Codes	#0	- No Command-Specific Errors	

Command #2 - Read P.V. Current and Percent of Range

Request Data Bytes	None		
Response Data Bytes	#0 to #3	- P.V. Current [mA]	*(Spec.Var. 8)*
	#4 to #7	- P.V. Percent of Range [%]	*(Spec.Var. 9)*
Response Codes	#0	- No Command-Specific Errors	

Command #3 - Read Dynamic Variables and P.V. Current

Request Data Bytes	None		
Response Data Bytes	#0 to #3	- P.V. Current [mA]	
	#4	- P.V. Units Code (See Common Table II)	*(Spec.Var. 10.0)*
	#5 to #8	- Primary Variable	*(Spec.Var. 0, 1 or 3)*
	#9	- S.V. Units Code	
	#10 to #13	- Secondary Variable	*(Spec.Var. 2)*
Response Codes	#0	- No Command-Specific Errors	
Note		- Data String trancates after last variable supported	

Command #6 - Write Polling Address

Request Data Bytes	#0	- Polling Address of Device	
Response Data Bytes	#0	- Polling Address of Device	
Response Codes	#0	- No Command-Specific Errors	
	#2	- Invalid Selection	*(Address > 15)*
	#5	- Too Few Data Bytes Received	
	#32	- Busy	

Command #11 - Read Unique Identifier associated with Tag

Request Data Bytes	#0 to #5	- Tag (6 Byte Packed-ASCII = 8 Char.)	
Response Data Bytes	#0	- 254	
	#1	- Manufacturer Id = 142	(Mettler Toledo)
	#2	- Manufacturer Device Type = 120	(Cond Ind 7100/2(X)H)
	#3	- Number of Preambles	
	#4	- Univ Cmd Rev	
	#5	- Trans Spec Rev	
	#6	- Soft Rev	*(10 for Version 1.0)*
	#7	- Hard Rev (See Universal Command Spec. Cmd #0)	
	#8	- Flags	
	#9 to #11	- Device Id Number (24-bit unsigned int)	
Response Codes	#0	- No Command-Specific Errors	
Note		- Response only if Tag corresponds	
		- Only valid for Broadcast Frames	

Command #12 - Read Message

Request Data Bytes	None		
Response Data Bytes	#0 to #23	- Message (24 Byte Packed-ASCII = 32 Character)	
Response Codes	#0	- No Command-Specific Errors	

Command #13 - Read Tag, Descriptor, Date

Request Data Bytes	None		
Response Data Bytes	#0 to #5	-	Tag (Packed-ASCII = 8 Char.)
	#6 to #17	-	Descriptor (Packed-ASCII = 16 Char.)
	#18 to #20	-	Date [dd.mm.yy]
Response Codes	#0	-	No Command-Specific Errors

Command #14 - Read Primary Variable Sensor Information

Request Data Bytes	None			
Response Data Bytes	#0 to #2	-	P.V. Sensor Serial Number	*(000000)*
	#3	-	P.V. Sensor Units Code	
	#4 to #7	-	P.V. Upper Sensor Limit	
	#8 to #11	-	P.V. Lower Sensor Limit	
	#12 to #15	-	P.V. Minimum Span	
Response Codes	#0	-	No Command-Specific Errors	

Command #15 - Read Primary Variable Output Information

Request Data Bytes	None			
Response Data Bytes	#0	-	Alarm Select Code (See Common Table VI)	
	#1	-	P.V. Transfer Function Code (See Common Table III)	
	#2	-	P.V. Range Units Code	*(Spec.Var. 10.0)*
	)#3 to #6	-	P.V. Upper Range Value	*(Spec.Var. 15)*
	#7 to #10	-	P.V. Lower Range Value	*(Spec.Var. 14)*
	#11 to #14	-	P.V. Damping Value [s]	*(NaN)*
	#15	-	Write Protect Code (See Common Table VII)	
	#16	-	Private Label Distributor Code (See Common Table VIII)	
			Parameters not used:	
			Units Code = FA$_{HEX}$ (not used), Value = 7FA00000$_{HEX}$ (NaN)	
Response Codes	#0	-	No Command-Specific Errors	

Command #16 - Read Final Assembly Number

Request Data Bytes	None	
Response Data Bytes	#0 to #2	- Final Assembly Number (24-bit unsigned int)
Response Codes	#0 -	- No Command-Specific Errors

Command #17 - Write Message

Request Data Bytes	#0 to #23 - Message (24 Byte Packed-ASCII = 32 Character)	
Response Data Bytes	#0 to #23 - Message	
Response Codes	#0 -	- No Command-Specific Errors
	#5 -	- Too Few Data Bytes Received

Command #18 - Write Tag, Descriptor, Date

Request Data Bytes	#0 to #5 - Tag (Packed-ASCII = 8 Character)
	#6 to #17 - Descriptor (Packed-ASCII = 16 Character)
	#18 to #20 - Date [dd.mm.yy]
Response Data Bytes	#0 to #5 - Tag
	#6 to #17 - Descriptor
	#18 to #20 - Date
Response Codes	#0 - No Command-Specific Errors
	#5 - Too Few Data Bytes Received

Command #19 - Write Final Assembly Number

Request Data Bytes	#0 to #2 - Final Assembly Number (24-bit unsigned int)
Response Data Bytes	#0 to #2 - Final Assembly Number
Response Codes	#0 - No Command-Specific Errors
	#5 - Too Few Data Bytes Received

Common Practice Commands:

Command #35 - Write Primary Variable Range Values

Request Data Bytes	#0	- P.V. Range Units Code	*(Must be Units Code of Spec.Var. 10.0)*
	#1 to #4	- P.V. upper range value	*(Spec.Var. 15)*
	#5 to #8	- P.V. lower range value	*(Spec.Var. 14)*
Response Data Bytes	#0	- P.V. Range Units Code	*(Units Code of Spec.Var. 10.0)*
	#1 to #4	- P.V. upper range value	*(Spec.Var. 15)*
	#5 to #8	- P.V. lower range value	*(Spec.Var. 14)*
Response Codes	#0	- No Command-Specific Errors	
	#2	- Invalid Selection	*(wrong Units Code)*
	#5	- Too Few Data Bytes	
	#9	- Lower Range Value too High	
	#10	- Lower Range Value too Low	
	#11	- Upper Range Value too High	
	#12	- Upper Range Value too Low	
	#13	- Upper and Lower Range Values Out of Limits	
	#14	- Span too Small	
	#32	- Busy	

Command #36 - Set Primary Variable Upper Range Value   *(actual value => Upper Range Value)*

Request Data Bytes	None		
Response Data Bytes	None		
Response Codes	#0	-	No Command-Specific Errors
	#32	-	Busy

Command #37 - Set Primary Variable Lower Range Value   *(actual value => Lower Range Value)*

Request Data Bytes	None		
Response Data Bytes	None		
Response Codes	#0	-	No Command-Specific Errors
	#32	-	Busy

Command #38 - Reset Configuration Changed Flag

Request Data Bytes	None		
Response Data Bytes	None		
Response Codes	#0	-	No Command-Specific Errors

Command #40 - Enter/Exit Fixed Primary Variable Current Mode

Request Data Bytes	#0 to #3	-	Fixed P.V. Current Level [mA]
			0.0 = Exits the Fixed P.V. Current Mode
Response Data Bytes	#0 to #3	-	Actual Fixed P.V. Current Level [mA]
Response Codes	#0	-	No Command-Specific Errors
	#3	-	Passed Parameter too Large *(Current > 22mA)*
	#4	-	Passed Parameter too Small *(Current < 3.8mA)*
	#5	-	Too Few Data Bytes Received

Command #41 - Perform Transmitter Self Test

Request Data Bytes	None		
Response Data Bytes	None		
Response Codes	#0	-	No Command-Specific Errors

Command #42 - Perform Master Reset

Request Data Bytes	None		
Response Data Bytes	None		
Response Codes	#0	-	No Command-Specific Errors
	#32	-	Busy

Command #48 - Read Additional Transmitter Status

Request Data Bytes	None		
Response Data Bytes (See 7.3)	#0 to #5	- Transmitter-Specific Status	
	#6	- Operating Mode #1	*(0 = normal)*
	#7	- Operating Mode #2	*(0 = normal)*
	#8 to #10	- Analog Output Saturated	
	#11 to #13	- Analog Output Fixed	
	#14 to #24	- Transmitter-Specific Status	
Response Codes	#0	- No Command-Specific Errors	

Command #54 - Read Transmitter Variable Information

Request Data Bytes	#0	-	Transmitter Variable (See Chap. 9.3)	
Response Data Bytes	#0	-	Transmitter Variable	
	#1 to #3	-	Transmitter Variable Sensor Serial Number	*(000000)*
	#4	-	Units Code for Limits and Minimum Span	
	#5 to #8	-	Upper Limit	
	#9 to #12	-	Lower Limit	
	#13 to #16	-	Damping Value	
	#17 to #20	-	Minimum Span	
Response Codes	#0	-	No Command-Specific Errors	
	#2	-	Invalid Selection	
	#5	-	Too Few Data Bytes Received	

Command #59 - Write Number of Response Preambles

Request Data Bytes	#0	-	Number of Preambles to be sent with the Response message from Slave to the Master	
Response Data Bytes	#0	-	Number of Preambles	
Response Codes	#0	-	No Command-Specific Errors	
	#3	-	Passed Parameter too Large	*(Preambles > 20)*
	#4	-	Passed Parameter too Small	*(Preambles < 2)*
	#5	-	Too Few Data Bytes Received	

Transmitter-Specific Commands:

Command #128 - Read One Transmitter-Specific Variable

Request Data Bytes	#0	-	Transmitter Variable, 8-bit unsigned integer. Refer to Transmitter Variable Code Table 9.3 in this document
Response Data Bytes	#0	-	Transmitter Variable
	#1	-	Units Code for Transmitter Variable
	#2 to #5	-	Data for selected Transmitter Variable, IEEE 754 format or bytewise selections
Response Codes	#0	-	No Command-Specific Errors
	#2	-	Invalid Selection
	#5	-	Too Few Data Bytes Received

Command #129 - Write One Transmitter-Specific Variable

Request Data Bytes	#0	-	Transmitter variable, 8-bit unsigned integer. Refer to transmitter Variable code table 9.3 in this document
	#1	-	Units code for transmitter variable
	#2 to #5	-	Data for selected transmitter variable, IEEE 754 format or bytewise selections
Response Data Bytes	#0	-	Transmitter variable
	#1	-	Units code for transmitter variable
	#2 to #5	-	Data for selected transmitter variable, IEEE 754 format or bytewise selections
Response Codes	#0	-	No Command-Specific Errors
	#2	-	Invalid Selection
	#3	-	Passed parameter too large
	#4	-	Passed parameter too small
	#5	-	Too few data bytes Received
	#7	-	In Write Protect Mode
	#12	-	Invalid Units Code
	#32	-	Busy

Command #131 – start product calibration (Calibration by sampling)

Request Data Bytes	none		
Response Data Bytes	none		
Response Codes	#0		No Command Specific Errors
	#5	-	Too Few Data Bytes Received (< 0)
	#16	-	Access Restricted