HART Protocol Specification

Field Communications

HART®

COMMUNICATION FOUNDATION

Common Tables Specification

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1 SCOPE

The *Common Tables Specification* is an Application Layer specification and, accordingly, builds on the Application Layer Requirements found in the *Command Summary Specification*. Conformance to all requirements of the *Command Summary Specification* is a prerequisite to conforming to this specification.

The *Common Tables Specification* contains a collection of standard lookup tables (e.g., Engineering Units, Manufacturer Identification Code, etc.) used throughout the Protocol. Commands defined by the HART Protocol and device-specific commands often reference these tables. When a Common Table is referenced by a command, the table or subset of the table must be used exactly as specified. Furthermore, undefined (i.e., unlisted) codes must not be used in any device.

In addition to listing Common Tables, this specification contains the rules that must be followed when modifying this specification, adding enumerations to an existing Common Table or defining new tables. As required by the *Command Summary Specification*, once a code has been defined, the term and its corresponding code (enumeration) must not be changed or deleted.

2 REFERENCES

2.1 HART Field Communications Protocol Specifications

These documents published by the HART Communication Foundation are referenced throughout this specification:

HART Smart Communications Protocol Specification. HCF_SPEC-12

Data Link Layer Specification. HCF_SPEC-81

Command Summary Specification. HCF_SPEC-99

Universal Command Specification. HCF_SPEC-127

Common Practice Command Specification. HCF_SPEC-151

Device Families Command Specification. HCF_SPEC-160

3 DEFINTIONS

Terms used in this document and defined in *HART Field Communications Protocol Specification* include Enumerations, Fixed Current Mode, Unit Code, Device Variable, Master, and Slave

4 SPECIFICATION CONTROL

The Common Tables Specification is designed to allow the addition of new enumerations. These enumerations are applicable to all slave devices and may be updated frequently. As a result, the change control procedures used by other specifications do not apply to the Common Tables Specification. In other words, balloting of a new or revised Common Tables Specification is not practical.

This section defines procedures and requirements that govern the addition of a table to this specification. Therefore the modification of a table included in a revision of this specification. These requirements are designed to:

- Ensure the technical excellence of each table;
- Provide a fair, open and objective basis for the development of additional tables;
- Alignment of the tables with Protocol requirements and practices; and
- Allow access and participation by all interested parties.

Any changes to this specification, other than additions or changes to a specific table must follow the normal change procedures as defined in the *HART Smart Communications Protocol Specification*.

Common Tables Specification Revision 13.1 must be balloted and follow the normal process for HART Specifications as defined in *HART Field Communications Protocol Specification*.

4.1 Revision Numbers

As per normal Protocol requirements, The *Common Tables Specification* has a major and minor revision number. As a specification is changed, the major and minor revision numbers are incremented as follows:

- The addition of a new table and/or new enumerations to existing tables is a functional change to this specification. The major revision number must be incremented and the minor revision number reset to one.
- Minor changes to an enumeration label where the meaning does not change and/or corrections to misspelled words shall be considered a non-functional change to this specification and the minor revision number must be incremented.
- Any other change to this specification must follow the revision numbering and change control procedures found in the HART Smart Communications Protocol Specification.

4.2 Additions to Common Tables

Any HCF member company or the HCF staff may submit request proposals for the additions to the existing Common Tables. All Request proposals must state the tables affected, changes envisioned and the benefits the changes would provide.

All requests are maintained in a database. This database shall track who and how often specific enumerations are requested.

Note: The frequency of an enumeration request is one acceptance criteria used by the Common Tables Committee.

Proposals are forwarded to members of the Common Tables Committee for review. The Common Tables Committee may reject a proposal, modify the proposal or accept the proposal. Complete and accepted proposals are collected for inclusion in the next revision of the *Common Tables Specification*. Once the Request Proposal for a particular enumeration is approved, the actual numeric value for the enumeration is chosen by members of the Common Tables Committee.

4.2.1 Additions to Common Table 8, Manufacturer Identification Codes

Any additions to Common Table 8, Manufacturer Identification Codes must be performed by the HCF Staff.

4.2.2 Device Identification Code Registration

The owner of a Manufacturer ID may register his device types with the HCF and have them included in the *Common Tables Specification*. Requests for these additions to the specification are made following normal requirements and procedures. The assignment of device type codes must meet the following requirements:

- The device type codes shall be assigned based on the rules specified in the *Data Link Layer Specification*.
- All devices shall follow the revision rules in the *Command Summary Specification*.

4.2.3 Engineering Unit Code Selection

When evaluating unit codes requests, the Common Tables Committee shall make assignments on the following criteria:

- Unit codes that are common to more than one Device Family and are approved for selection shall be assigned in the ranges from 1- 169 and 220 — 239.
- Unit codes that are Device Family specific and are approved for selection shall be assigned in the Unit Code Expansion areas of 170 — 219 for the appropriate Unit Code Expansion Table.
- The Unit Code Expansion Tables include all the existing enumerations from Table 2 (1 - 169 and 220 — 239) along with the Unit Code Expansion areas of 170 — 219.
- Unit codes from 240 — 249 are reserved for manufacturer specific definitions and must not be used in the assignment of Unit Codes.

4.3 Releasing a Common Tables Specification Revision

Accepted change proposals are collected and periodically a new revision of the *Common Tables Specification* is generated. A new revision is (typically) released once or twice a year. The actual release must complete the following steps:

- A proposed revision of the Common Tables Specification is generated and all approved change proposals are incorporated.
- The proposed revision is forwarded to all members of the Common Tables Committee for review and approval.
- Once delivery of the proposed revision is confirmed, committee members have 15 working days to approve or disapprove the modifications. All rejections must include conditions for acceptance. No response will be considered approval by that committee member.
- Unanimous approval by Common Tables Committee membership is required to release the *Common Tables Specification* revision.

4.4 Common Tables Committee

The Executive Committee of the HCF shall appoint the Common Tables Committee to control changes to this specification. The Common Tables Committee shall consist of three to four members. The member should have a minimum of 2 years work experience with the Application Layer of the Protocol. The Common Tables Committee shall:

- Review all proposed changes to the *Common Tables Specification*;
- Ensure the *Common Tables Specification* change procedures are followed;
- Determine Common Tables Specification advancement;

- Document Committee actions; and

- Verify the Common Tables Specification adheres to all requirements of the HART Protocol.

The Chair must keep accurate and complete records of all meetings, design decisions and discussions. The Chair is responsible for publishing meeting minutes. All e-mail and other correspondence must be archived and available to the HCF membership. Common Tables Committee actions may not be implemented prior to the publication of the meeting minutes documenting the action being published to the HCF membership.

5 COMMON TABLES

The following sections list the enumerations for each of the common tables.

5.1 Table 1. Device Type Codes

Table 1.xx (where xx denotes the manufacturer number in decimal), defines the device types enumerations of devices.

Any enumerations in the range from 250-255 are not allowable. Any enumeration not covered is Undefined .

5.1.1 Table 1.03 Ametek Device Type Codes

Code	Description	Notes
4	NEWTHERMOX	

5.1.2 Table 1.10 Brooks Instrument Device Type Codes

Code	Description	Notes
1	TRI20	
2	38XXVA	
3	99XXOVAL	

5.1.3 Table 1.14 Delta Device Type Codes

Code	Description	Notes
1	HT	

5.1.4 Table 1.17 Endress & Hauser Device Type Codes

Code	Description	Notes	Code	Description	Notes
3	FMU860		50	PROMAG33	
4	FMU861		51	PROWIRL70	
5	FMU862		52	PROMASS63	
6	FMR130/Micropilot		53	PROMAG39	
7	CERABS /Cerabar S		54	PROMAG35S	
8	FEC12		55	PROWIRL77	
9	DELTBS/Deltabar S		57	PROMASS60	
10	FMU231/Prosonic T		64	PROSON F	
11	DELTAPS/ Deltapilot		65	PROMAG50	
12	FMR23X		66	PROMAG53	
13	FMP200		70	PROMAG23	
14	Cerabar M		121	TMD833	
15	FMR2xx		124	TMD842	
16	FMR53x		140	MyPro pH	
80	PROMASS80		141	MyPro LFC	
81	PROMASS83		142	MyPro LFI	
83	PROMASS40		181	NMT530	
100	AT70		200	TMT182	
120	TMD832				

5.1.5 Table 1.18 Elsag Bailey Device Type Codes

Code	Description	Notes
7	50XM2000	
8	50XE4000	
14	50VT1000	
15	50VM1000	
25	50XM1000	
26	50SM1000	
66	PTH	
80	TB82PH_pH	
81	TB82PH_ORP	
82	TB82PH_pION	
83	TB82PH_IConc	
84	TB82EC_COND	
85	TB82EC_CONC	
86	TB82TE_COND	
87	TB82TE_CONC	
88	TB82TC_COND	
89	TB82TC_CONC	

5.1.6 Table 1.20 Foxboro Device Type Codes

Code	Description	Notes
41	IMT25	
46	1/A_PRESSURE	
51	TVORTEX/183 Vortex IT	

5.1.7 Table 1.21 Fuji Device Type Codes

Code	Description	Notes
1	FCX	

5.1.8 Table 1.22 ABB Automation Device Type Codes

Code	Description	Notes
3	TEU 471	
4	TEU 421	
5	TEU 211	
6	TS 11	
8	TH 02	
64	TZID	
65	TZIDC	
133	AS800	

5.1.9 Table 1.23 Honeywell Device Type Codes

Code	Description	Notes
1	ST3000	
2	STT25T	
3	HWFLOW/Mage W Plus	
4	STT25H	

5.1.10 Table 1.25 Kay Ray Sensall Device Type Codes

Code	Description	Notes
8	level 4050	
9	density 3680	
10	4790	
15	steam quality 3280	

5.1.11 Table 1.26 ABB Automation Device Type Codes

Code	Description	Notes
1	KSX	
2	600T	
8	KST	
10	658T	
12	652/653S	

5.1.12 Table 1.31 Micro Motion Device Type Codes

Code	Description	Notes
7	RFT9712	
20	RFT9720	
21	RFT9739	
30	9701	
42	Series 2000	

5.1.13 Table 1.32 Moore Industries Device Type Codes

Code	Description	Notes
1	TRZ	
3	THZ	

5.1.14 Table 1.33 Moore Products Device Type Codes

Code	Description	Notes
1	340 A	
2	340_B	
3	344	
5	341	
6	340 A2	
8	340 B2	
9	344 2	
10	340_S	
11	343	
12	760D Valvepac	
13	345	

5.1.15 Table 1.38 Rosemount Device Type Codes

Code	Description	Notes	Code	Description	Notes
1	pressure 3051		23	temperature 544	
2	temperature 3044		24	temperature 644	
3	pressure 1151s		25	temperature 3144	
4	mag flow 8712		26	temperature 3244	
5	pressure 2001		27	level 3700	
6	pressure 3051c		28	level 3750	
7	mass flow 9712	1	29	TRI LOOP	
8	level 4050	2	30	c 3095	
9	density 3680	2	31	mm 3095	
10	ph 1054	3	32	tank 3701	
11	pressure 30011		33	level 3300	
12	mag flow 8712H		34	asu 3702	
13	temperature 3044C		35	pressure 2088s	
14	pressure 3001c		36	probar	
15	pressure 3051clp		37	massprobar	
16	vortex flow 8800		38	prov	
17	htg 3201		39	pressure 2090s	
18	pressure 1152s		40	probar UC	
19	htg 3202		41	2055D	
20	pressure 3001s		42	3095PV	
21	multi 3095FT		45	Sentry	
22	mv 3095		47	ProPlate UC	

Notes

1. VARIABLE micro_motion_model_code 7, mass_flow_9712, implemented in HART Revision 4 when there was no VARIABLE company_identification_code, so 7 must be kept as Reserved for this place holder.
2. VARIABLE kayray_model_code 8, level_4050, and 9, density_3680, were implemented in HART Revision 4 when there was no VARIABLE company_identification_code, so 8 and 9 must be kept as Reserved for this place holder.
3. VARIABLE rosemount_analytical_model_code 10, ph_1054, were implemented in HART Revision 4 when there was no VARIABLE company_identification_code, so 10 must be kept as Reserved for this place holder.

5.1.16 Table 1.39 Peek Measurement Device Type Codes

Code	Description	Notes
0	900 Densitometer	

5.1.17 Table 1.40 Schlumberger Device Type Codes

Code	Description	Notes
1	NEXGEN	

5.1.18 Table 1.42 Siemens Device Type Codes

Code	Description	Notes
1	MICRO_K	
2	SITRANS_L	
3	SIPAN_PH	
4	SITRANS_F	
5	SIPAN_LF	
6	SIPAN_O2	
7	SITRANS_LR	
10	SITRANS_P_HS	
11	SITRANS_P_DS	
12	SITRANS_P_ES	
13	SITRANS_P_MS	
15	SITRANS_T_2K	
16	SITRANS_TW	
18	SITRANS_TK_H	
21	SIPART_PS2	

5.1.19 Table 1.44 Toshiba Device Type Codes

Code	Description	Notes
2	AP3100	
3	AP3110	
4	AP3120	
5	AP3140	
6	AP3150	
7	AP3170	
8	AP3180	
9	AP3190	
10	LF220	

5.1.20 Table 1.46 Rosemount Analytical Device Type Codes

Code	Description	Notes	Code	Description	Notes
6	ph 1181		20	3081-81pH	
7	conductivity 1181		21	3081-81C	
10	ph 1054		22	3081-81con	
11	conductivity 1054		23	3081-81T	
12	Oxymitter 4000		80	54pH/ORP	
14	3081FG		81	54eC	
15	OPM-2000R		82	52epH/ORP	
16	OCX-4000		83	54eA	

5.1.21 Table 1.47 Metso Automation Device Type Codes

Code	Description	Notes
1	PSMART	
60	SMARTPULP	
62	MCAi	

5.1.22 Table 1.48 Flowserve Device Type Codes

Code	Description	Notes
1	Logix 12xx	
2	K mmer C2100	
3	Logix 500	

5.1.23 Table 1.50 Viatran Device Type Codes

Code	Description	Notes
1	970	
46	I/A Pressure	

5.1.24 Table 1.54 Yamatake Device Type Codes

Code	Description	Notes
1	YHWFLOW	
2	ST3000	
4	Thermonex ATT	
5	PTG	

5.1.25 Table 1.55 Yokogawa Device Type Codes

Code	Description	Notes
1	YEWFLO	
2	YT200	
3	UNICOM	
4	EJA	
5	ADMAG_AE	
6	AM11	
8	ADMAG_SE	
9	YTA	
10	YTA70E	
11	DYF	
12	ZR202	
13	ZR402	
21	PH202	
22	SC202	
64	ROTAMASS	

5.1.26 Table 1.59 Meggitt Mobrey Device Type Codes

Code	Description	Notes
19	4301	
20	3301	
21	MSP 100	
41	MLT 100	

5.1.27 Table 1.61 Princo Device Type Codes

Code	Description	Notes
1	L4610	

5.1.28 Table 1.62 Smar Device Type Codes

Code	Description	Notes
1	LD301	
2	TT301	

5.1.29 Table 1.63 Foxboro Eckardt Device Type Codes

Code	Description	Notes
1	TSV175	
2	DMU 130	
3	TI/RTT20	
4	SRD 991	
5	DMU 140	

5.1.30 Table 1.66 Samson Device Type Codes

Code	Description	Notes
249	3780	

5.1.31 Table 1.67 Sparling Instruments Device Type Codes

Code	Description	Notes
238	FM6XX	

5.1.32 Table 1.69 Krohne Device Type Codes

Code	Description	Notes
236	BM102	
237	VFM31	
242	ESKII	
243	IFC110	
244	IFC090	
245	UFC500	
246	IFC010	
247	MFC08x	
248	IFC080	
249	BM70	

5.1.33 Table 1.77 Westlock Controls Device Type Codes

Code	Description	Notes
1	ICOT	
2	SmartCal	

5.1.34 Table 1.78 Drexelbrook Device Type Codes

Code	Description	Notes
2	UNIVERSAL III	

5.1.35 Table 1.79 Saab Tank Control Device Type Codes

Code	Description	Notes
239	TankRadarPro	

5.1.36 Table 1.80 K-TEK Device Type Codes

Code	Description	Notes
103	SPM100 Level	
114	AT100/200 Lvl Vol LCD	
115	AT100/200 2Lvl Vol LCD	
118	AT100/200 Lvl Temp Vol LCD	
119	AT100/200 2Lvl Temp Vol LCD	
120	AT100/200 Lvl	
122	AT100/200 Lvl LCD	
123	AT100/200 2Lvl LCD	
126	AT100/200 Lvl Temp LCD	
127	AT100/200 2Lvl Temp LCD	
152	MT2000 Microwave Level	
203	SPM200 Level	

5.1.37 Table 1.82 Draeger Device Type Codes

Code	Description	Notes
237	POLYTRON2 IR	

Code	Description	Notes
247	POLYTRON2	

5.1.38 Table 1.84 Siemens Milltronics PI Device Type Codes

Code	Description	Notes
249	MST9500	

5.1.39 Table 1.86 Magnetrol Device Type Codes

Code	Description	Notes
235	Model 705 2.x	
236	Model 708	
237	Model 805	
238	Model 705	
239	SMARTEZ	

5.1.40 Table 1.87 Metso Automation Device Type Codes

Code	Description	Notes
238	ND800_PT	
239	ND800	

5.1.41 Table 1.88 Milltronics Device Type Codes

Code	Description	Notes
200	86x PROBE	

5.1.42 Table 1.90 Anderson Instrument Company Device Type Codes

Code	Description	Notes
200	ANDRSN1	

5.1.43 Table 1.91 Inor Device Type Codes

Code	Description	Notes
239	MESO	

5.1.44 Table 1.92 Robertshaw Device Type Codes

Code	Description	Notes
200	Excalibur 7000	

5.1.45 Table 1.94 Accutech Device Type Codes

Code	Description	Notes
239	AI1500	

5.1.46 Table 1.96 Kamstrup Device Type Codes

Code	Description	Notes
238	FLEXBAR HRT	
239	FLEXTOP HRT	

5.1.47 Table 1.97 Knick Device Type Codes

Code	Description	Notes
232	2211 CondI	
234	2211 Cond	
235	2211 Ph	

5.1.48 Table 1.101 Masoneilan-Dresser Device Type Codes

Code	Description	Notes
100	HDLT	
200	SVI	

5.1.49 Table 1.102 Besta Device Type Codes

Code	Description	Notes
239	CLS 4-20	

5.1.50 Table 1.103 Ohmart Device Type Codes

Code	Description	Notes
224	DSTH/LSTH	
225	DSTH/LSTH Comp	

5.1.51 Table 1.104 Harold Beck and Sons Device Type Codes

Code	Description	Notes
1	ESR-D	

5.1.52 Table 1.107 Wika Device Type Codes

Code	Description	Notes
238	UniTrans	
239	T32	

5.1.53 Table 1.108 Bopp & Reuther Heinrichs Device Type Codes

Code	Description	Notes
235	UMC2	
236	ES	
237	VTX	
239	UST 1	

5.1.54 Table 1.109 PR Electronics Device Type Codes

Code	Description	Notes
238	PRetrans 6335	
239	Pretop 5335	

5.1.55 Table 1.113 Apparatebau Hundsbach Device Type Codes

Code	Description	Notes
238	MT115	

5.1.56 Table 1.114 Dynisco Device Type Codes

Code	Description	Notes
223	IPXII	
224	IPX	

5.1.57 Table 1.116 Direct Measurement Device Type Codes

Code	Description	Notes
239	DMC R-1A	

5.1.58 Table 1.120 Buerkert Fluid Control Systems Device Type Codes

Code	Description	Notes
239	8630	

5.1.59 Table 1.124 GLI Device Type Codes

Code	Description	Notes
238	M33-53P	
239	M33-53C	

5.1.60 Table 1.126 Paper Machine Components Device Type Codes

Code	Description	Notes
224	SMT-EL	

5.1.61 Table 1.127 Labom Device Type Codes

Code	Description	Notes
60	PASCAL CI	
224	IPX	

5.1.62 Table 1.129 Turbo Device Type Codes

Code	Description	Notes
127	Intermag-Transmag	

5.1.63 Table 1.131 SMC Device Type Codes

Code	Description	Notes
239	F793-E701	

5.1.64 Table 1.132 Status Instruments Device Type Codes

Code	Description	Notes
239	SEM 300	

5.1.65 Table 1.133 Huakong Device Type Codes

Code	Description	Notes
127	HK TT01	

5.1.66 Table 1.135 Vortek Instruments, LLC Device Type Codes

Code	Description	Notes
1	Innova-Mass	

5.1.67 Table 1.137 Action Instruments Device Type Codes

Code	Description	Notes
239	T798	

5.1.68 Table 1.140 Magtech Device Type Codes

Code	Description	Notes
136	LTM-100	

5.1.69 Table 1.141 Rueger Device Type Codes

Code	Description	Notes
1	S95 HRT	

5.1.70 Table 1.144 TN Technologies Device Type Codes

Code	Description	Notes
125	NDMi	
126	Accu-Wave	
127	NCMi	

5.1.71 Table 1.145 Dezurik Device Type Codes

Code	Description	Notes
239	Positioner	

5.1.72 Table 1.147 Welltech Device Type Codes

Code	Description	Notes
124	WT2000	

5.1.73 Table 1.154 Milton Roy Co. Device Type Codes

Code	Description	Notes
127	P Series	

5.1.74 Table 1.155 PMV Device Type Codes

Code	Description	Notes
211	D3	

5.1.75 Table 1.156 Turck Device Type Codes

Code	Description	Notes
1	KMU-HLI	

5.2 Table 2. Engineering Unit Codes

This table is included to maintain backward compatibility with HART Revision 5 and earlier. For HART 6, please refer to the expansion tables below. Actual text display of these codes is host dependent.

The enumerations range from 1- 169 and 220 — 239

Temperature

Unit Code	Description	Note
32	Degrees Celsius	
33	Degrees Fahrenheit	
34	Degrees Rankine	
35	Kelvin	

Pressure

Unit Code	Description	Note
1	inches of water at 68 degrees F	
2	inches of mercury at 0 degrees C	
3	feet of water at 68 degrees F	
4	millimeters of water at 68 degrees F	
5	millimeters of mercury at 0 degrees C	
6	pounds per square inch	
7	bars	
8	millibars	
9	grams per square centimeter	
10	kilograms per square centimeter	
11	pascals	
12	kilopascals	
13	torr	
14	atmospheres	
145	inches of water at 60 degrees F	
237	megapascals	

Pressure

Unit Code	Description	Note
238	inches of water at 4 degrees C	
239	millimeters of water at 4 degrees C	

Volumetric Flow

Unit Code	Description	Note
15	cubic feet per minute	
16	gallons per minute	
17	liters per minute	
18	imperial gallons per minute	
19	cubic meter per hour	
22	gallons per second	
23	million gallons per day	
24	liters per second	
25	million liters per day	
26	cubic feet per second	
27	cubic feet per day	
28	cubic meters per second	
29	cubic meters per day	
30	imperial gallons per hour	
31	imperial gallons per day	
121	normal cubic meter per hour	MKS System
122	normal liter per hour	MKS System
123	standard cubic feet per minute	U.S. System
130	cubic feet per hour	
131	cubic meters per minute	
132	barrels per second	1 barrel equals 42 U.S. gallons
133	barrels per minute	1 barrel equals 42 U.S. gallons
134	barrels per hour	1 barrel equals 42 U.S. gallons
135	barrels per day	1 barrel equals 42 U.S. gallons

Volumetric Flow

Unit Code	Description	Note
136	gallons per hour	
137	imperial gallons per second	
138	liters per hour	
235	gallons per day	

Velocity

Unit Code	Description	Note
20	feet per second	
21	meters per second	
114	inches per second	
115	inches per minute	
116	feet per minute	
120	meters per hour	

Volume

Unit Code	Description	Note
40	gallons	
41	liters	
42	imperial gallons	
43	cubic meters	
46	barrels	1 barrel equals 42 U.S. gallons
110	bushels	
111	cubic yards	
112	cubic feet	
113	cubic inches	
124	bbl liq	1 liquid barrel equals 31.5 U.S. gallons

Volume

Unit Code	Description	Note
166	normal cubic meter	MKS System
167	normal liter	MKS System
168	standard cubic feet	U.S. System
236	hectoliters	

Length

Unit Code	Description	Note
44	feet	
45	meters	
47	inches	
48	centimeters	
49	millimeters	

Time

Unit Code	Description	Note
50	minutes	
51	seconds	
52	hours	
53	days	

Mass

Unit Code	Description	Note
60	grams	
61	kilograms	

Mass

Unit Code	Description	Note
62	metric tons	
63	pounds	
64	short tons	
65	long tons	
125	ounce	

Mass Flow

Unit Code	Description	Note
70	grams per second	
71	grams per minute	
72	grams per hour	
73	kilograms per second	
74	kilograms per minute	
75	kilograms per hour	
76	kilograms per day	
77	metric tons per minute	
78	metric tons per hour	
79	metric tons per day	
80	pounds per second	
81	pounds per minute	
82	pounds per hour	
83	pounds per day	
84	short tons per minute	
85	short tons per hour	
86	short tons per day	
87	long tons per hour	
88	long tons per day	

Mass per Volume

Unit Code	Description	Note
90	specific gravity units	
91	grams per cubic centimeter	
92	kilograms per cubic meter	
93	pounds per gallon	
94	pounds per cubic foot	
95	grams per milliliter	
96	kilograms per liter	
97	grams per liter	
98	pounds per cubic inch	
99	short tons per cubic yard	
100	degrees twaddell	
102	degrees baume heavy	
103	degrees baume light	
104	degrees API	
146	micrograms per liter	
147	micrograms per cubic meter	

Viscosity

Unit Code	Description	Note
54	centistokes	
55	centipoise	

Electromagnetic Unit of Electric Potential

Unit Code	Description	Note
36	millivolts	
58	volts	

Electrostatic Unit of Current

Unit Code	Description	Note
39	milliamperes	

Electromagnetic Unit of Resistance

Unit Code	Description	Note
37	ohms	
163	kohms	

Energy (includes Work)

Unit Code	Description	Note
69	newton meter	
89	deka therm	
126	foot pound force	
128	kilo watt hour	
162	mega calorie	1 calorie = 4.184 Joules
164	mega joule	
165	british thermal unit	1Btu=0.2519958kcal Energy

Power

Unit Code	Description	Note
127	kilo watt	
129	horsepower	
140	mega calorie per hour	1 calorie = 4.184 Joules
141	mega joule per hour	
142	british thermal unit per hour	1Btu=0.2519958kcal Energy

Radial Velocity

Unit Code	Description	Note
117	degrees per second	
118	revolutions per second	
119	revolutions per minute	

Miscellaneous

Unit Code	Description	Note
38	hertz	
56	microsiemens	
57	percent	
59	pH	
66	milli siemens per centimeter	
67	micro siemens per centimeter	
68	newton	
101	degrees brix	
105	percent solids per weight	
106	percent solids per volume	
107	degrees balling	
108	proof per volume	
109	proof per mass	
139	parts per million	
143	degrees	
144	radian	
148	percent consistency	
149	volume percent	
150	percent steam quality	
151	feet in sixteeenths	See Note 1 Below
152	cubic feet per pound	
153	picofarads	

Miscellaneous

Unit Code	Description	Note
154	mililiters per liter	
155	microliters per liter	
160	percent plato	
161	percent lower explosion level	
169	parts per billion	

Note

1. There must be 6 digits to the left of the decimal point of the associated numeric value. The format of the most significant two of these digits indicate the number of feet . The adjacent two lesser significant digits indicate the number of additional sixteenths (i.e., 16 sixteenths = 1 inch). If the numeric value is in the floating point format, any digits to the right of the decimal point are discarded by the host.

Generic

Unit Code	Description	Note
240-	Enumeration may be used for manufacturer specific definitions	
250	Not Used	
251	None	
252	Unknown	
253	Special	

Tables 2.64 through 2.90 are the Engineering Unit Code Expansion tables. They include all the existing enumerations from Table 2 (1 - 169 and 220 —239) along with the Unit Code Expansion areas of 170 — 219

5.2.64 Table 2.64 Temperature Unit Codes

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
32	Degrees Celsius	
33	Degrees Fahrenheit	
34	Degrees Rankine	
35	Kelvin	

5.2.65 Table 2.65 Pressure Unit Codes

This is an Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
1	inches of water at 68 degrees F	
2	inches of mercury at 0 degrees C	
3	feet of water at 68 degrees F	
4	millimeters of water at 68 degrees F	
5	millimeters of mercury at 0 degrees C	
6	pounds per square inch	
7	bars	
8	millibars	
9	grams per square centimeter	
10	kilograms per square centimeter	
11	pascals	
12	kilopascals	
13	torr	
14	atmospheres	
145	inches of water at 60 degrees F	
170	centimeters of water at 4 degrees C	
171	meters of water at 4 degrees C	
172	centimeters of mercury at 0 degrees C	
173	pounds per square foot	
174	hectoPascals	
175	pounds per square inch absolute	
176	kilograms per square meter	
177	feet water 4 degrees C	
178	feet water at 60 degrees F	
179	meters of mercury at 0 degrees C	
237	megapascals	
238	inches of water at 4 degrees C	
239	millimeters of water at 4 degrees C	

5.2.66 Table 2.66 Volumetric Flow Unit Codes

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
15	cubic feet per minute	
16	gallons per minute	
17	liters per minute	
18	imperial gallons per minute	
19	cubic meter per hour	
22	gallons per second	
23	million gallons per day	
24	liters per second	
25	million liters per day	
26	cubic feet per second	
27	cubic feet per day	
28	cubic meters per second	
29	cubic meters per day	
30	imperial gallons per hour	
31	imperial gallons per day	
121	normal cubic meter per hour	MKS System
122	normal liter per hour	MKS System
123	standard cubic feet per minute	U.S. System
130	cubic feet per hour	
131	cubic meters per minute	
132	barrels per second	1 barrel equals 42 U.S. gallons
133	barrels per minute	1 barrel equals 42 U.S. gallons
134	barrels per hour	1 barrel equals 42 U.S. gallons
135	barrels per day	1 barrel equals 42 U.S. gallons
136	gallons per hour	
137	imperial gallons per second	
138	liters per hour	
235	gallons per day	

5.2.67 Table 2.67 Velocity Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
20	feet per second	
21	meters per second	
114	inches per second	
115	inches per minute	
116	feet per minute	
120	meters per hour	

5.2.68 Table 2.68 Volume Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
40	gallons	
41	liters	
42	imperial gallons	
43	cubic meters	
46	barrels	1 barrel equals 42 U.S. gallons
110	bushels	
111	cubic yards	
112	cubic feet	
113	cubic inches	
124	bbl liq	1 liquid barrel equals 31.5 U.S. gallons
166	normal cubic meter	MKS System
167	normal liter	MKS System
168	standard cubic feet	U.S. System
236	hectoliters	

5.2.69 Table 2.69 Length Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
44	feet	
45	meters	
47	inches	
48	centimeters	
49	millimeters	
151	feet in sixteeenths	See Note 1 Above

5.2.70 Table 2.70 Time Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
50	minutes	
51	seconds	
52	hours	
53	days	

5.2.71 Table 2.71 Mass Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
60	grams	
61	kilograms	
62	metric tons	
63	pounds	
64	short tons	
65	long tons	
125	ounce	

5.2.72 Table 2.72 Mass Flow Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
70	grams per second	
71	grams per minute	
72	grams per hour	
73	kilograms per second	
74	kilograms per minute	
75	kilograms per hour	
76	kilograms per day	
77	metric tons per minute	
78	metric tons per hour	
79	metric tons per day	
80	pounds per second	
81	pounds per minute	
82	pounds per hour	
83	pounds per day	
84	short tons per minute	
85	short tons per hour	
86	short tons per day	
87	long tons per hour	
88	long tons per day	

5.2.73 Table 2.73 Mass per Volume Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
90	specific gravity units	
91	grams per cubic centimeter	
92	kilograms per cubic meter	
93	pounds per gallon	
94	pounds per cubic foot	
95	grams per milliliter	
96	kilograms per liter	
97	grams per liter	
98	pounds per cubic inch	
99	short tons per cubic yard	
100	degrees twaddell	
102	degrees baume heavy	
103	degrees baume light	
104	degrees API	
146	micrograms per liter	
147	micrograms per cubic meter	
148	percent consistency	

5.2.74 Table 2.74 Viscosity Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
54	centistokes	
55	centipoise	

5.2.75 Table 2.75 Angular Velocity Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
117	degrees per second	
118	revolutions per second	
119	revolutions per minute	

5.2.76 Table 2.76 Area Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note

5.2.77 Table 2.77 Energy (Work) Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
69	newton meter	
89	deka therm	
126	foot pound force	
128	kilo watt hour	
162	mega calorie	1 calorie = 4.184 Joules
164	mega joule	
165	british thermal unit	1Btu=0.2519958kcal Energy

5.2.78 Table 2.78 Force Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
68	newton	

5.2.79 Table 2.79 Power Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
127	kilo watt	
129	horsepower	
140	mega calorie per hour	1 calorie = 4.184 Joules
141	mega joule per hour	
142	british thermal unit per hour	1Btu=0.2519958kcal Energy

5.2.80 Table 2.80 Frequency Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
38	hertz	

5.2.81 Table 2.81 Analytical Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
57	percent	
59	pH	
150	percent steam quality	
160	percent plato	
161	percent lower explosion level	

5.2.82 Table 2.82 Capacitance Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
153	picofarads	

5.2.83 Table 2.83 EMF Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
36	millivolts	
58	volts	

5.2.84 Table 2.84 Current Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
39	milliamperes	

5.2.85 Table 2.85 Resistance Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
37	ohms	
163	kohms	

5.2.86 Table 2.86 Angle Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
143	degrees	
144	radian	

5.2.87 Table 2.87 Conductance Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
56	microsiemens	
66	milli siemens per centimeter	
67	micro siemens per centimeter	

5.2.88 Table 2.88 Volume per Volume Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
149	volume percent	
154	mililiters per liter	
155	microliters per liter	

5.2.89 Table 2.89 Volume per Mass Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
107	degrees balling	
152	cubic feet per pound	

5.2.90 Table 2.90 Concentration Unit Code

This is a Engineering Unit Code Expansion Table that may only be used by Field Devices compatible with Revision 6 or later of the *HART Field Communications Protocol Specification*.

Unit Code	Description	Note
101	degrees brix	
105	percent solids per weight	
106	percent solids per volume	
108	proof per volume	
109	proof per mass	
139	parts per million	
169	parts per billion	

5.3 Table 3. Transfer Function Codes

Code	Transfer FunctionDescription	Note
0	Linear	Equation y=mx+b
1	Square Root	Equation y=sqrt(x)
2	Square Root Third Power	Equation y=sqrt(x^3)
3	Square Root Fifth Power	Equation y=sqrt(x^5)
4	Special Curve	
5	Square	Equation y=x^2
230	Discrete (Switch)	Binary (on/off)
231	Square Root Plus Special Curve	Do Not Use - See Note 1
232	Square Root Third Power Plus Special Curve	Do Not Use - See Note 1
233	Square Root Fifth Power Plus Special Curve	Do Not Use - See Note 1
240-249	Enumeration May Be Used For Manufacturer Specific Definitions	
250	Not Used	
251	None	
252	Unknown	
253	Special	

Note: Codes 231-233 are only listed in the Table for backward compatibility. These Codes should not be used in new devices. Since these codes allow the use of a "special curve", their meaning is not consistent when used in different devices.

5.4 Table 4. Material Codes

The materials in this table should be solids at 72 Degrees Fahrenheit

Material Code	Description	Notes	Material Code	Description	Notes
0	Carbon Steel		24	Kynar	4
1	Stainless Steel 304		25	Aluminium	
2	Stainless Steel 316		26	Nickel	
3	Hastelloy C		27	FEP	5
4	Monel		28	Stainless Steel 316 Ti	
5	Tantalum		30	Hastelloy C276	
6	Titanium		31	Klinger C4401	
7	Pt Ir		32	Thermotork	
8	Alloy 20		33	Grafoil	
9	Co Cr Ni		34	PTFE Coated 316l Sst	
10	PTFE		35	Gold Plated Hastelloy C276	
11	Vito		36	PTFE Glass	
12	Buna N		37	PTFE Graphite	
13	Ethyl Prop		38	Aflas	
14	Urethane		234	PTFE Hastelloy	
15	Gold Monel		235	Stainless Steel CF 8M	
16	Tefzel		236	Hastelloy Nitrile SST	
17	Ryton	1	237	Gold Plated SST	
18	Ceramic		239	Monel 400	
19	Stainless Steel 316L		240-249	Enumeration May Be Used For Manufacturer Specific Definitions	
20	PVC		250	Not Used	
21	Nitrile Rubber		251	None	
22	Kalrez	2	252	Unknown	
23	Inconel	3	253	Special	

Notes

1. Ryton is a registered trademark of Phillips Petroleum Company.
2. Teflon and Kalrez are registered trademarks of E. I. DuPont De Nemours Company.
3. Inconel is a trademark of International Nickel Company.
4. Kynar is a trademark of Pennwalt Incorporated. Hastelloy C is a trademark of Cabot Corporation.
5. Typically a sealing material for O-Ring

5.5 Table 5. NULL

5.6 Table 6. Alarm Selection Codes

These apply to the alarm state of the physical output of an Analog Output

Code	Alarm Selection Description
0	High
1	Low
239	Hold Last Output Value
240-249	Enumeration May Be Used For Manufacturer Specific Definitions
250	Not Used
251	None
252	Unknown
253	Special

5.7 Table 7. Write Protect Codes

Code	Write Protect Description
0	No - Not Write Protected
1	Yes - Write Protected
240-249	Enumeration May Be Used For Manufacturer Specific Definitions
250	Not Used
251	None
252	Unknown
253	Special

5.8 Table 8. Manufacturer Identification Codes

Manufacturer is an improper word to use, since this set of enumerations may be used in variables that describe the OEM company (see Universal Command #15).

Any enumerations in the range from 250-255 are Reserved and must not be used by any Field Device.

Company Identification Code		
Decimal	**Hex**	**Company Name**
1	01	Acromag
2	02	Allen Bradley
3	03	Ametek
4	04	Analog Devices
5	05	Elsag Bailey
6	06	Beckman
7	07	Bell Microsensor
8	08	Bourns
9	09	Bristol Babcock
10	0A	Brooks Instrument
11	0B	Chessell
12	0C	Combustion Engineering
13	0D	Daniel Industries
14	0E	Delta
15	0F	Dieterich Standard
16	10	Dohrmann
17	11	Endress & Hauser
18	12	Elsag Bailey
19	13	Fisher Controls
20	14	Foxboro
21	15	Fuji
22	16	ABB Automation
23	17	Honeywell
24	18	ITT Barton
25	19	Kay Ray/Sensall
26	1A	ABB Automation
27	1B	Leeds & Northrup
28	1C	Leslie
29	1D	M-System Co.
30	1E	Measurex
31	1F	Micro Motion
32	20	Moore Industries
33	21	Moore Products
34	22	Ohkura Electric
35	23	Paine
36	24	Rochester Instrument Systems
37	25	Ronan
38	26	Rosemount

Company Identification Code		
Decimal	**Hex**	**Company Name**
39	27	Peek Measurement
40	28	Schlumberger
41	29	Sensall
42	2A	Siemens
43	2B	Weed
44	2C	Toshiba
45	2D	Transmation
46	2E	Rosemount Analytic
47	2F	Metso Automation
48	30	Flowserve
49	31	Varec
50	32	Viatran
51	33	Delta/Weed
52	34	Westinghouse
53	35	Xomox
54	36	Yamatake
55	37	Yokogawa
56	38	Nuovo Pignone
57	39	Promac
58	3A	Exac Corporation
59	3B	Meggitt Mobrey
60	3C	Arcom Control System
61	3D	Princo
62	3E	Smar
63	3F	Foxboro Eckardt
64	40	Measurement Technology
65	41	Applied System Technologies
66	42	Samson
67	43	Sparling Instruments
68	44	Fireye
69	45	Krohne
70	46	Betz
71	47	Druck
72	48	SOR
73	49	Elcon Instruments
74	4A	EMCO
75	4B	Termiflex Corporation
76	4C	VAF Instruments
77	4D	Westlock Controls
78	4E	Drexelbrook
79	4F	Saab Tank Control
80	50	K-TEK
81	51	Flowdata
82	52	Draeger
83	53	Raytek
84	54	Siemens Milltronics PI

Company Identification Code		
Decimal	**Hex**	**Company Name**
85	55	BTG
86	56	Magnetrol
87	58	Metso Automation
88	59	Milltronics
89	59	HELIOS
90	5A	Anderson Instrument Company
91	5B	INOR
92	5C	ROBERTSHAW
93	5D	PEPPERL+FUCHS
94	5E	ACCUTECH
95	5F	Flow Measurement
96	60	KAMSTRUP
97	61	Knick
98	62	VEGA
99	63	MTS Systems Corp.
100	64	Oval
101	65	Masoneilan-Dresser
102	66	BESTA
103	67	Ohmart
104	68	Harold Beck and Sons
105	69	rittmeyer instrumentation
106	6A	Rossel Messtechnik
107	6B	WIKA
108	6C	Bopp & Reuther Heinrichs
109	6D	PR Electronics
110	6E	Jordan Controls
111	6F	Valcom s.r.l.
112	70	US ELECTRIC MOTORS
113	71	Apparatebau Hundsbach
114	72	Dynisco
115	73	Spriano
116	74	Direct Measurement
117	75	Klay Instruments
118	76	Action Instruments
119	77	MMG Automatiky DTR
120	78	Buerkert Fluid Control Systems
121	79	AALIANT Process Mgt
122	7A	PONDUS INSTRUMENTS
123	7B	ZAP S.A. Ostrow Wielkopolski
124	7C	GLI
125	7D	Fisher-Rosemount Performance Technologies
126	7E	Paper Machine Components
127	7F	LABOM
128	80	Danfoss
129	81	Turbo

Company Identification Code		
Decimal	**Hex**	**Company Name**
130	82	TOKYO KEISO
131	83	SMC
132	84	Status Instruments
133	85	Huakong
134	86	Duon System
135	87	Vortek Instruments, LLC
136	88	AG Crosby
137	89	Action Instruments
138	8A	Keystone Controls
139	8B	Thermo Electric Co.
140	8C	ISE-Magtech
141	8D	Rueger
142	8E	Mettler Toledo
143	8F	Det-Tronics
144	90	TN Technologies
145	91	DeZURIK
146	92	Phase Dynamics
147	93	WELLTECH SHANGHAI
148	94	ENRAF
149	95	4tech ASA
150	96	Brandt Instruments
151	97	Nivelco
152	98	Camille Bauer
153	99	Metran
154	9A	Milton Roy Co.
155	9B	PMV
156	9C	Turck
157	9D	Panametrics
158	9E	Stahl
159	9F	Analytical Technology Inc.
160	A0	Fieldbus International
161	A1	BERTHOLD
162	A2	InterCorr
163	A3	China BRICONTE Co Ltd
164	A4	Electron Machine
165	A5	Sierra Instruments
166	A6	Fluid Components Intl

Company Identification Code		
Decimal	**Hex**	**Company Name**
250	FA	not_used
251	FB	none
252	FC	unknown
253	FD	special

5.9 Table 9. Burst Mode Control Codes

Burst Mode Control Code	Definition
0	Off
1	On
250	Not Used
251	None
252	Unknown
253	Special

5.10 Table 10. Physical Signaling Codes

Enumeration 7 is Reserved , potentially for an expansion indication.

Any enumerations in the range from 8-255 are not allowed.

Physical Signal Code	Definition
0	Bell 202 Current
1	Bell 202 Voltage
2	RS-485
3	RS-232
6	Special

5.11 Table 11. Flag Assignments

Bit# 0x07 is Reserved , potentially for an expansion indication.

Any bit not covered is Undefined .

Flag Assignment Code	Definition
0x01	Multi-Sensor Field Device
0x02	EEPROM Control
0x04	Protocol Bridge Device
0x08-0x20	Reserved
0x40	C8PSK Capable Field Device
0x80	C8PSK In Multi-Drop Only

5.12 Table 12. Transfer Service Function Codes

See Block Data Transfer Specification (HCF_SPEC-190)

5.13 Table 13. Transfer Service Identifier Codes

See Block Data Transfer Specification (HCF_SPEC-190)

5.14 Table 14. Operating Mode Codes

Operating Mode Code	Description
	This Table is Reserved

5.15 Table 15. Analog Output Numbers Codes

Code	Analog Output Number Description
0	Analog Channel 0
1	Analog Channel 1
2	Analog Channel 2
3	Analog Channel 3
4	Analog Channel 4

5.16 Table 16. Loop Current Mode Codes

These codes apply to the loop current signaling state of the device.

Code	Loop Current Mode Description
0	Disabled
1	Enabled
250	Not Used
251	None
252	Unknown
253	Special

5.17 Table 17. Extended Device Status Codes

Any bit not covered is Undefined .

Code	Description
0x01	**Maintenance Required.** This bit is set to indicate that, while the device has not malfunctioned, the Field Device requires maintenance.
0x02	**Device Variable Alert.** This bit is set if any Device Variable is in an Alarm or Warning State. The host should identify the Device Variable(s) causeing this to be set using the Device Variable Status indicators.

5.18 Table 18. Lock Device Codes

These codes indicate whether the device has been placed in locked position to prevent any changes from being made manually or from another master.

Code	Lock Device Description
0	Unlocked
1	Lock — Temporary (i.e., Device Reset or Power Loss releases the Lock)
2	Lock — Permanent (i.e., Device Reset or Power Loss does not affect the Lock)
250	Not Used
251	None
252	Unknown
253	Special

5.19 Table 19. Write Device Variable Codes

These codes indicate whether the Device Variable s engineering value is forced to a fixed value or is in normal operation.

Code	Write Device Variable Command Description
0	Normal
1	Fixed Value
250	Not Used
251	None
252	Unknown
253	Special

5.20 Table 20. Device Variable Family Codes

These codes indicate which family the Device Variable belongs to. If the Device Variable does not support Device Family Commands, then 250, "Not Used" must be returned.

Code	Device Variable Family	Code	Device Variable Family
0-3	Reserved. MUST NOT BE USED		
4	Temperature		
5	Pressure		
6	Valve / Actuator		
7	Simple PID Control		
132 - 249	Reserved. MUST NOT BE USED		
250	Not Used		
251	None		
252	Unknown		
253	Special		

5.21 Table 21. Device Variable Classification Codes

These codes indicate the function performed by the Device Variable. This allows Masters and Host Applications to identify the type of process connection supported by the Device Variable and the Unit Code Expansion table to be used.

Code	Device Variable Classification	Code	Device Variable Classification
0	Device Variable Not Classified	89	Volume Per Mass
1-63	Reserved	90	Concentration
64	Temperature	91	Valve Actuator
65	Pressure		
66	Volumetric Flow		
67	Velocity		
68	Volume		
69	Length		
70	Time	250	Not Used
71	Mass	251	None
72	Mass Flow	252	Unknown
73	Mass Per Volume	253	Special
74	Viscosity		
75	Angular Velocity		
76	Area		
77	Energy (Work)		
78	Force		
79	Power		
80	Frequency		
81	Analytical		
82	Capacitance		
83	Emf		
84	Current		
85	Resistance		
86	Angle		
87	Conductance		
88	Volume Per Volume		

5.22 Table 22. Trim Point Codes

These codes indicate which trim points are supported by the Field Device.

Code	Trim Point Supported
0	Reserved
1	Lower Trim Point Supported
2	Upper Trim Point Supported
3	Lower And Upper Trim Point Supported
250	Not Used
251	None
252	Unknown
253	Special

5.23 Table 23. Capture Mode Codes

These codes indicate whether to capture data using the configuration sent in Command 113 Catch Device Variable

Code	Capture Mode
0	Disabled
1	Enabled - Catch data from specified Field Device
2	Enabled - Catch data from BACK message
250	Not Used
251	None
252	Unknown
253	Special

5.24 Table 24. Physical Layer Type Codes

These codes indicate the kind of Physical Layer sending the message.

Code	Physical Layer Type
0	Asynchronous (e.g., FSK, RS-485)
1	Synchronous (e.g., PSK)
3	Reserved

5.25 Table 25. Lock Device Status

These codes indicate whether the device is locked (see Command 71 Lock Device).

Code	Physical Layer Type
0x01	Device Locked
0x02	Lock is Permanent
0x04	Locked by Primary Master

5.26 Table 26. Analog Channel Flags

These codes are used to clarify Analog Channel functions

Code	Flag Definition
0x01	This Analog Channel is a Field Device analog input channel. In other words, the Field Device has an ADC connected to this channel when this bit is set.

ANNEX A. REVISION HISTORY

A1. Modifications from Revision 12.0 to Revision 13.0

The last revision to the document titled: HART-Smart Communications Protocol, Common Tables , was HCF_SPEC-183, Revision 12.0. For Revision 13.0, the document tables have been updated to reflect the following changes:

Changes to Table 1. Unique (Rosemount and subsidiaries) Device Type Codes
Renamed — "Device Type Codes"

Added Device Type Code tables
- Table 1.03 Ametek Device Type Codes
- Table 1.10 Brooks Instrument Device Type Codes
- Table 1.14 Delta Device Type Codes
- Table 1.17 Endress & Hauser Device Type Codes
- Table 1.18 Elsag Bailey Device Type Codes
- Table 1.20 Foxboro Device Type Codes
- Table 1.21 Fuji Device Type Codes
- Table 1.22 ABB Automation Device Type Codes
- Table 1.23 Honeywell Device Type Codes
- Table 1.25 Kay Ray Sensall Device Type Codes
- Table 1.26 ABB Automation Device Type Codes
- Table 1.31 Micro Motion Device Type Codes
- Table 1.32 Moore Industries Device Type Codes
- Table 1.33 Moore Products Device Type Codes
- Table 1.38 Rosemount Device Type Codes
- Table 1.39 Peek Measurement Device Type Codes
- Table 1.40 Schlumberger Device Type Codes
- Table 1.42 Siemens Device Type Codes
- Table 1.44 Toshiba Device Type Codes
- Table 1.46 Rosemount Analytical Device Type Codes
- Table 1.47 Metso Automation Device Type Codes
- Table 1.48 Flowserve Device Type Codes
- Table 1.52 Viatran Device Type Codes
- Table 1.54 Yamatake Device Type Codes
- Table 1.55 Yokogawa Device Type Codes
- Table 1.59 Meggitt Mobrey Device Type Codes
- Table 1.61 Princo Device Type Codes
- Table 1.62 Smar Device Type Codes
- Table 1.63 Foxboro Eckardt Device Type Codes
- Table 1.66 Samson Device Type Codes
- Table 1.67 Sparling Instruments Device Type Codes
- Table 1.69 Krohne Device Type Codes
- Table 1.77 Westlock Controls Device Type Codes

Table 2.2 Pressure Unit Codes
Table 2.3 Volumetric Flow Unit Codes
Table 2.4 Velocity Unit Code
Table 2.5 Volume Unit Code
Table 2.6 Length Unit Code
Table 2.7 Time Unit Code
Table 2.8 Mass Unit Code
Table 2.9 Mass Flow Code
Table 2.10 Mass per Volume Unit Code
Table 2.11 Viscosity Unit Code
Table 2.12 Angular Velocity Unit Code
Table 2.13 Area Unit Code
Table 2.14 Energy (Work) Unit Code
Table 2.15 Force Unit Code
Table 2.16 Power Unit Code
Table 2.17 Frequency Unit Code
Table 2.18 Analytical Unit Code
Table 2.19 Capacitance Unit Code
Table 2.20 EMF Unit Code
Table 2.21 Current Unit Code
Table 2.22 Resistance Unit Code
Table 2.23 Angle Unit Code
Table 2.24 Conductance Unit Code
Table 2.25 Volume per Volume Unit Code
Table 2.26 Volume per Mass Unit Code
Table 2.27 Concentration Unit Code

Added Enhanced Status tables
Table 16. Loop Current Mode Codes
Table 17. Extended Device Status Codes
Table 18. Lock Device Codes

Added Device Variable tables
Table 19. Write Device Variable Command Codes
Table 20. Device Family Support Codes
Table 21. Device Variable Classification Codes

Changes to Table 1a. Rosemount Device Type Codes
Table re-sequenced:
"1a " changed to "1.38"
Enumeration(s) added:
47
Enumerations(s) modified:
None

Changes to Table 1b. Rosemount Analytical Device Type Codes
Table re-sequenced:
"1b" changed to "1.46"
Enumeration(s) added:
None
Enumerations(s) modified:
None

Changes to Table 1c. KayRay Device Type Codes
Table re-sequenced:
"1c " changed to "1.25"
Enumeration(s) added:
None
Enumerations(s) modified:
None

Changes to Table 1d. Micro Motion Device Type Codes
Table re-sequenced:
"1c " changed to "1.31"
Enumeration(s) added:

Changes to Table 8. Manufacturer Identification Codes
Enumeration(s) added:
141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154
Enumeration(s) modified
22 - changed to "ABB Automation"
26 - changed to "ABB Automation"
121- changed to "AALIANT Process Mgt"

APPENDIX A: Unique (Rosemount and Subsidiaries) Device Type Codes
Deleted

APPENDIX B: Device Description language file
Deleted

A2. Modifications from Revision 11.0 to Revision 12.0

The last revision to the document titled: HART-Smart Communications Protocol, Common Tables , was HCF_SPEC-183, Revision 11.0. For Revision 12.0, the document tables have been updated to reflect the following changes:

Changes to Table 8. Manufacturer Identification Codes

Enumeration(s) added:

141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 160, 161, 162, 163

A3. Modifications from Revision 10.0 to Revision 11.0

The last revision to the document titled: HART-Smart Communications Protocol, Common Tables , was HCF_SPEC-183, Revision 10.0. For Revision 11.0, the document tables have been updated to reflect the following changes:

Changes to Table 1a. Rosemount Device Type Codes.
Enumeration(s) added:
40, 41, 42, 45

Changes to Table 2. Unit Codes.
Enumeration(s) added:
145, 146, 147, 148, 149, 154, 155, 161, 169
Enumerations(s) modified:
None

Changes to Table 3. Transfer Function Codes.
Enumeration(s) added:
230
Enumerations(s) modified:
None

Changes to Table 4. Material Codes.
Enumeration(s) added:
38
Enumerations(s) modified:
None

Changes to Table 8. Manufacturer Identification Codes
Enumeration(s) added:
114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140
Enumeration(s) modified
43 - changed to "Weed"
48 - changed to "Flowserve"
51 - changed to "Delta/Weed"
59 — changed to "Meggitt Mobrey"

A4. Modifications from Revision 9.0 to Revision 10.0

The last revision to the document titled: HART-Smart Communications Protocol, Common Tables , was HCF_SPEC-183, Revision 9.0. For Revision 10.0, the document has been formatted for ease of use. In addition to formatting, the document tables have been updated to reflect the following changes:

Changes to Table 1a. Rosemount Device Type Codes.
Enumeration(s) added:
35, 36, 38, 39

Changes to Table 2. Unit Codes.
Enumeration(s) added:
144
Enumerations(s) modified:
None

Changes to Table 8. Manufacturer Identification Codes
Enumeration(s) added:
79, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113
Enumeration(s) modified
5, 18, 22 - changed to "Elsag Bailey"
63 - changed to "FOXBORO ECKARDT"
87 - changed to "Neles Controls"