

S T A N D A R D



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 DEFINITIONS

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. Expanded Device Type Codes

Table 1. defines the [expanded](#) device types enumerations of devices.

Expanded Device Code (Hex)	Description	Company Name
0304	NEWTHERMOX	Ametek
0A01	TRI20	Brooks Instrument
0A02	38XXVA	Brooks Instrument
0A03	99XXOVAL	Brooks Instrument
0A04	QUANTIM	Brooks Instrument
0D14	Gas USM	Daniel Industries
0D28	Liquid USM	Daniel Industries
0E01	HT	Delta Controls
1103	FMU860	Endress & Hauser
1104	FMU861	Endress & Hauser
1105	FMU862	Endress & Hauser
1106	FMR130/Micropilot	Endress & Hauser
1107	CERABS /Cerabar S	Endress & Hauser
1108	FEC12	Endress & Hauser
1109	DELTBS/Deltabar S	Endress & Hauser
110A	FMU231/FMU13x	Endress & Hauser
110B	DELTAPS/ Deltapilot	Endress & Hauser
110C	FMR23x	Endress & Hauser
110D	FMP200	Endress & Hauser
110E	Cerabar M	Endress & Hauser
110F	FMR2xx	Endress & Hauser
1110	FMR53x	Endress & Hauser
1111	FMU4x	Endress & Hauser
1112	FMP4x	Endress & Hauser
1113	FMG60	Endress & Hauser
1114	NRF590	Endress & Hauser
1117	DeltabarS	Endress & Hauser
1118	CerabarS	Endress & Hauser
111A	DeltapilotS	Endress & Hauser
111B	FMU9x	Endress & Hauser
111D	FMI5x	Endress & Hauser

Expanded Device Code (Hex)	Description	Company Name
111E	FMR25x	Endress & Hauser
111F	FMR54x	Endress & Hauser
1120	FMP4x I	Endress & Hauser
1132	PROMAG33	Endress & Hauser
1133	PROWIRL70	Endress & Hauser
1134	PROMASS63	Endress & Hauser
1135	PROMAG39	Endress & Hauser
1136	PROMAG35S	Endress & Hauser
1137	PROWIRL77	Endress & Hauser
1139	PROMASS60	Endress & Hauser
1140	PROSON F	Endress & Hauser
1141	PROMAG50	Endress & Hauser
1142	PROMAG53	Endress & Hauser
1143	PROMAG51	Endress & Hauser
1144	PROMAG55	Endress & Hauser
1145	PROMAG10	Endress & Hauser
1146	PROMAG23	Endress & Hauser
1150	PROMASS80	Endress & Hauser
1151	PROMASS83	Endress & Hauser
1152	PROMASS84	Endress & Hauser
1153	PROMASS40	Endress & Hauser
1156	PROWIRL72	Endress & Hauser
1157	PROWIRL73	Endress & Hauser
1158	P_FLOW90	Endress & Hauser
1159	P_FLOW93	Endress & Hauser
1161	P_FLOW92	Endress & Hauser
1162	P_FLOW91	Endress & Hauser
1164	AT70	Endress & Hauser
1165	T-MASS65	Endress & Hauser
1178	TMD832	Endress & Hauser
1179	TMD833	Endress & Hauser
117C	TMD842	Endress & Hauser
118C	MyPro Ph	Endress & Hauser
118D	MyPro LFC	Endress & Hauser
118E	MyPro LFI	Endress & Hauser
11B5	NMT530	Endress & Hauser
11B6	NMS530	Endress & Hauser

Expanded Device Code (Hex)	Description	Company Name
11C8	TMT182	Endress & Hauser
11C9	TMT122	Endress & Hauser
11CA	TMT162	Endress & Hauser
11CB	TMT142	Endress & Hauser
1207	50XM2000	ABB
1208	50XE4000	ABB
120E	50VT1000	ABB
120F	50VM1000	ABB
1219	50XM1000	ABB
121A	50SM1000	ABB
1242	PTH	ABB
1250	TB82PH Ph	ABB
1251	TB82PH ORP	ABB
1252	TB82PH pION	ABB
1253	TB82PH IC onc	ABB
1254	TB82EC COND	ABB
1255	TB82EC CONC	ABB
1256	TB82TE COND	ABB
1257	TB82TE CONC	ABB
1258	TB82TC COND	ABB
1259	TB82TC CONC	ABB
1303	DVC6000	Fisher Controls
1305	DVC2000	Fisher Controls
141D	IMV31	Foxboro
141E	Vortex 84	Foxboro
1429	IMT25	Foxboro
142E	I/A Pressure	Foxboro
142F	IMV 25/30	Foxboro
1430	875PH	Foxboro
1433	ITVORTEX	Foxboro
1434	CFT50	Foxboro
1435	875CR	Foxboro
1436	875EC	Foxboro
1438	RTT15	Foxboro
147D	CFT 30 x	Foxboro
1501	FCX-A/C	Fuji
1502	FCX-A2/C2	Fuji

Expanded Device Code (Hex)	Description	Company Name
1581	FRC	Fuji
1603	TEU 471	ABB
1604	TEU 421	ABB
1605	TEU 211	ABB
1606	TS 11	ABB
1608	TH 02	ABB
1640	TZID	ABB
1641	TZIDC	ABB
1685	AS800	ABB
1687	Contrac	ABB
1701	ST3000	Honeywell
1702	STT25T	Honeywell
1703	HWFLOW/Mage W Plus	Honeywell
1704	STT25H	Honeywell
1705	HERCULINE	Honeywell
1706	SmartCET	Honeywell
1707	STT17H	Honeywell
1708	ST2500	Honeywell
1709	STT25S	Honeywell
1750	TWM9000	Honeywell
1908	4050	Thermo MeasureTech
1909	3680 Dens	Thermo MeasureTech
190A	4790	Thermo MeasureTech
190B	Accu-Pulse Pro	Thermo MeasureTech
190F	3280 Steam qual	Thermo MeasureTech
1A01	KSX	ABB
1A02	600T	ABB
1A03	ABB-2600T 268	ABB
1A04	ABB-2600T 262/264	ABB
1A05	2600T-364	ABB
1A07	2600T 266 Pressure	ABB
1A08	KST	ABB
1A09	TH01	ABB
1A0A	658T	ABB
1A0B	TTX300 series	ABB
1A0C	652/653S	ABB
1A0D	TTX200	ABB

Expanded Device Code (Hex)	Description	Company Name
1A0F	665	ABB
1A10	Deltapi KT	ABB
1A18	MagMaster	ABB
1A1A	FVS4000	ABB
1A1B	VA Master FAM540	ABB
1A1C	FMT500iG	ABB
1A1D	FSM4000	ABB
1A1E	FEX300	ABB
1A1F	FEX100	ABB
1A21	2600PH	ABB
1A23	TB82PH-Combined	ABB
1A24	TB82EC-Combined	ABB
1A25	TB82TE-Combined	ABB
1A26	TB82TC-Combined	ABB
1A27	FMT300/350/400	ABB
1A34	AZ200/300	ABB
1A89	263/265, 2000T	ABB
1A8A	2600T 267/269/2010TC	ABB
1A8C	261	ABB
1A8D	EDP300	ABB
1A8E	2600T 266 Multivariable	ABB
1D01	B6U	M-System Co
1D02	B3HU	M-System Co
1D03	27HU	M-System Co
1F07	9712 Mass flo	Micro Motion
1F14	9720 Mass flo	Micro Motion
1F15	9739 Mass flo	Micro Motion
1F1E	9701	Micro Motion
1F24	MVD Series 2000 Config I/O	Micro Motion
1F25	MVD Series 1000 Config I/O	Micro Motion
1F26	MVD Series 2000 IS Output	Micro Motion
1F27	MVD Series 1000 IS Output	Micro Motion
1F29	MVD Series 1000 Analog Output	Micro Motion
1F2A	MVD Series 2000 Analog Output	Micro Motion
1F34	2400S Mass flo	Micro Motion
1F3A	2200S Analog	Micro Motion
1F41	MVD Series 3000	Micro Motion

Expanded Device Code (Hex)	Description	Company Name
2001	TRZ	Moore Industries
2003	THZ	Moore Industries
2004	THZ2	Moore Industries
2005	HTZ	Moore Industries
2006	TCM	Moore Industries
2101	340 A	PRIME Measurement Products
2102	340 B	PRIME Measurement Products
2103	344	PRIME Measurement Products
2105	330	PRIME Measurement Products
2106	340 A2	PRIME Measurement Products
2108	340 B2	PRIME Measurement Products
2109	344 2	PRIME Measurement Products
210A	340 S	PRIME Measurement Products
210B	343	PRIME Measurement Products
210C	760D Valvepac	PRIME Measurement Products
210D	345	PRIME Measurement Products
2502	X96 D	Ronan
2503	X96 L	Ronan
2504	X96 W	Ronan
2505	X96 LD	Ronan
2506	X99 MD	Ronan
2601	3051	Rosemount
2602	3044 Temp	Rosemount
2603	1151	Rosemount
2604	Magmeter	Rosemount
2605	2001	Rosemount
2606	3051C	Rosemount
2607	mass flow 9712	Rosemount
2608	4050	Rosemount
2609	density 3680	Rosemount
260A	ph 1054	Rosemount
260B	3001L HTG	Rosemount
260C	Mag HS	Rosemount
260D	3044C Temp	Rosemount
260E	3001C HTG	Rosemount
260F	3051C LP	Rosemount
2610	Vortex	Rosemount

Expanded Device Code (Hex)	Description	Company Name
2611	3201 SAM	Rosemount
2612	1152	Rosemount
2613	3202 SAM	Rosemount
2614	3001S HTG	Rosemount
2615	3095FT	Rosemount
2616	3095MV	Rosemount
2617	544 Temp	Rosemount
2618	644 Temp	Rosemount
2619	3144 Temp	Rosemount
261A	3244 Temp	Rosemount
261B	3700	Rosemount
261C	3750	Rosemount
261D	Tri-Loop	Rosemount
261E	3095C	Rosemount
261F	3095MM	Rosemount
2620	3701	Rosemount
2621	3300	Rosemount
2622	3702ASU	Rosemount
2623	2088 Smart	Rosemount
2624	ProBar	Rosemount
2625	Mass ProBar	Rosemount
2626	ProV	Rosemount
2627	2090 Smart	Rosemount
2628	ProBar UC	Rosemount
2629	2055D	Rosemount
262A	3095PV	Rosemount
262D	Sentry	Rosemount
262F	ProPlate UC	Rosemount
2636	1810	Rosemount
2637	8712D	Rosemount
2638	4600	Rosemount
263A	8800D	Rosemount
263B	248 Temperature	Rosemount
263C	8732D	Rosemount
2640	2088LP	Rosemount
2641	5600 Radar Level	Rosemount
2642	951	Rosemount

Expanded Device Code (Hex)	Description	Company Name
2643	5400	Rosemount
2644	3051S SIS	Rosemount
2645	3144P SIS	Rosemount
2647	4500	Rosemount
264A	3051S Diag	Rosemount
264B	3051SMV Direct Process Variable Output	Rosemount
2650	3100	Rosemount
2651	5300	Rosemount
2655	2051	Rosemount
2656	2051LP	Rosemount
2657	8712E	Rosemount
2680	Generic	Rosemount
2700	900 Densitometer	Peek Measurement
2801	NEXGEN	Actaris Neptune
2A01	MICRO K	Siemens
2A02	SITRANS L Level	Siemens
2A03	SIPAN pH	Siemens
2A04	SITRANS FUS	Siemens
2A05	SIPAN LF	Siemens
2A06	SIPAN O2	Siemens
2A07	SITRANS LR	Siemens
2A0A	SITRANS P HS	Siemens
2A0B	SITRANS P DS	Siemens
2A0C	SITRANS P ES	Siemens
2A0D	SITRANS P MS	Siemens
2A0F	SITRANS T 2K	Siemens
2A10	SITRANS TW	Siemens
2A12	SITRANS TK H	Siemens
2A13	SITRANS TH300	Siemens
2A15	SIPART PS2	Siemens
2A16	SITRANS FM	Siemens
2A17	SITRANS FVA	Siemens
2A18	SITRANS FM MAGFLO	Siemens
2A19	SITRANS FC MASSFLO	Siemens
2A1A	SITRANS FM IT2 / TM2	Siemens
2A1D	SITRANS P300	Siemens
2A1F	SITRANS TR300	Siemens

Expanded Device Code (Hex)	Description	Company Name
2C02	AP3100	Toshiba
2C03	AP3110	Toshiba
2C04	AP3120	Toshiba
2C05	AP3140	Toshiba
2C06	AP3150	Toshiba
2C07	AP3170	Toshiba
2C08	AP3180	Toshiba
2C09	AP3190	Toshiba
2C0A	LF220	Toshiba
2E06	2081 Ph	Rosemount Analytical
2E07	2081 Cond	Rosemount Analytical
2E0A	2054 Ph	Rosemount Analytical
2E0B	2054 Cond	Rosemount Analytical
2E0C	Oxymitter 4000	Rosemount Analytical
2E0D	WC_3000	Rosemount Analytical
2E0E	3081FG	Rosemount Analytical
2E0F	OPM-2000R	Rosemount Analytical
2E10	OCX-4000	Rosemount Analytical
2E14	3081Ph	Rosemount Analytical
2E15	3081C	Rosemount Analytical
2E16	3081-81con	Rosemount Analytical
2E17	3081-81T	Rosemount Analytical
2E18	5081A	Rosemount Analytical
2E19	5081C	Rosemount Analytical
2E1A	5081Ph	Rosemount Analytical
2E1B	Xmt A	Rosemount Analytical
2E1C	Xmt C/T	Rosemount Analytical
2E1D	Xmt Ph	Rosemount Analytical
2E1E	5081FG	Rosemount Analytical
2E1F	6081-P Wireless pH/ORP	Rosemount Analytical
2E2B	XS-O2	Rosemount Analytical
2E50	54Ph/ORP	Rosemount Analytical
2E51	54Ec	Rosemount Analytical
2E52	52epH/ORP	Rosemount Analytical
2E53	54Ea	Rosemount Analytical
2E55	1056	Rosemount Analytical
2F01	PSMART	Metso Automation

Expanded Device Code (Hex)	Description	Company Name
2F3C	SMARTPULP	Metso Automation
2F3D	SMARTLX	Metso Automation
2F3E	MCAi	Metso Automation
2F3F	SMARTLC	Metso Automation
2F40	MCA	Metso Automation
3001	Logix 12xx	Flowserve
3002	Kämmer C2100	Flowserve
3003	Logix 520	Flowserve
3004	Logix3200-IQ	Flowserve
3005	Logix3200MD	Flowserve
3201	970	Viatran
322E	I/A Pressure	Viatran
3601	MagneW	Yamatake
3602	ST3000	Yamatake
3603	SVP	Yamatake
3604	ThermoPlus ATT	Yamatake
3605	PTG	Yamatake
3608	MagneW 2W	Yamatake
360C	MAGNEW4W	Yamatake
360D	AT9000	Yamatake
3701	YEWFO	Yokogawa
3702	YT200	Yokogawa
3703	UNICOM	Yokogawa
3704	EJA	Yokogawa
3705	ADMAG AE	Yokogawa
3706	AM11	Yokogawa
3707	ADMAG SE	Yokogawa
3708	YTA	Yokogawa
370A	YTA70E	Yokogawa
370B	DYF	Yokogawa
370C	ZR202	Yokogawa
370D	ZR402	Yokogawa
3714	ISC202	Yokogawa
3715	PH202	Yokogawa
3716	SC202	Yokogawa
3718	DO202	Yokogawa
3727	PH150	Yokogawa

Expanded Device Code (Hex)	Description	Company Name
3728	SC150	Yokogawa
372B	PH450	Yokogawa
372C	SC450	Yokogawa
372D	ISC450	Yokogawa
3740	ROTAMASS	Yokogawa
3741	RAMC	Yokogawa
3742	RCCT_F3	Yokogawa
3750	AXFA11	Yokogawa
3751	EJX	Yokogawa
3752	AXFA14	Yokogawa
3753	AV550G	Yokogawa
3754	EJX-MV	Yokogawa
3757	AXR	Yokogawa
3758	FLXA21-PH	Yokogawa
3759	LXA21-SC	Yokogawa
375A	FLXA21-ISC	Yokogawa
375B	FLXA21-DO	Yokogawa
3B13	4301	Mobrey
3B14	3301	Mobrey
3B15	MSP100	Mobrey
3B21	3300	Mobrey
3B29	MLT100	Mobrey
3B2A	4291	Mobrey
3B2B	MSM400	Mobrey
3B2C	MSL600	Mobrey
3B2D	MCU900	Mobrey
3B2E	MSP900	Mobrey
3B2F	MRL700	Mobrey
3B30	MRL800	Mobrey
3B31	MRL850	Mobrey
3D01	L4610	Princo
3E01	LD301	Smar
3E02	TT301	Smar
3E03	FY301	Smar
3E04	LD291	Smar
3E05	TP301	Smar
3E06	DT301	Smar

Expanded Device Code (Hex)	Description	Company Name
3E0A	LD400	Smar
3F01	TSV175	Foxboro Eckardt
3F02	DMU130	Foxboro Eckardt
3F03	TI/RTT20	Foxboro Eckardt
3F04	SRD991	Foxboro Eckardt
3F05	DMU140	Foxboro Eckardt
3F06	SRD960	Foxboro Eckardt
4015	MTL4841 Multiplexer	Measurement Technology
4022	MTL8512 Multiplexer	Measurement Technology
42EF	373X-3	Samson
42F9	3780	Samson
43EE	FM6XX	Sparling Instruments
45D3	TT51C/R	Krohne
45D4	GFC 300 Steam	Krohne
45D5	GFC 300 Gas	Krohne
45D9	IFC 100	Krohne
45DB	TT50C/R	Krohne
45DD	MFC 300	Krohne
45E2	ESK2A	Krohne
45E3	IFC 300	Krohne
45E4	Optiflex 1300C	Krohne
45E5	Optiwave 7300C	Krohne
45E6	M8E	Krohne
45E7	UFC030	Krohne
45E8	MFC05x	Krohne
45E9	IFC040	Krohne
45EA	M10	Krohne
45EB	IFC210	Krohne
45EC	BM102	Krohne
45ED	VFM31	Krohne
45EE	BM100	Krohne
45EF	IFC020	Krohne
45F0	VFM1091	Krohne
45F2	ESKII	Krohne
45F3	IFC110	Krohne
45F4	IFC090	Krohne
45F5	UFC500	Krohne

Expanded Device Code (Hex)	Description	Company Name
45F6	IFC010	Krohne
45F7	MFC08x	Krohne
45F8	IFC080	Krohne
45F9	BM70	Krohne
47E9	RTX1000H Gauge	Druck
47EC	RTX1000H SG	Druck
47EF	RTX1000H ABS	Druck
49EB	AO895	Elcon Instruments
49EC	I895	Elcon Instruments
49ED	Mux 2700-F	Elcon Instruments
49EE	Mux 2700-E	Elcon Instruments
4D01	ICOT	Westlock Controls
4D02	SmartCal	Westlock Controls
4D03	D-EPIC	Westlock Controls
4D04	D-EPIC ESD	Westlock Controls
4E02	UNIVERSAL III	Drexelbrook
4EEB	USonic	Drexelbrook
4FED	5600	Saab Tank Control
4FEF	TankRadarPro	Saab Tank Control
5067	SPM100 Level	K-TEK
5072	AT100/200 Lvl Vol LCD	K-TEK
5073	AT100/200 2Lvl Vol LCD	K-TEK
5076	AT100/200 Lvl Temp Vol LCD	K-TEK
5077	AT100/200 2Lvl Temp Vol LCD	K-TEK
5078	AT100/200 Lvl	K-TEK
507A	AT100/200 Lvl LCD	K-TEK
507B	AT100/200 2Lvl LCD	K-TEK
507E	AT100/200 Lvl Temp LCD	K-TEK
507F	AT100/200 2Lvl Temp LCD	K-TEK
5098	MT2000 Microwave Level	K-TEK
50CB	SPM200 Level	K-TEK
52E9	PIR 7000	Draeger
52EB	Polytron 7000	Draeger
52ED	Polytron2 IR	Draeger
52F7	Polytron2	Draeger
54F8	MSP2002	Siemens Milltronics PI
54F9	MST9500	Siemens Milltronics PI

Expanded Device Code (Hex)	Description	Company Name
55DE	HCM-8000	BTG
56E2	Model R82	Magnetrol
56E3	E3 Modulelevel	Magnetrol
56E4	Model 355	Magnetrol
56E5	Model 705 3.x	Magnetrol
56E6	Model RX5	Magnetrol
56E7	Model 704	Magnetrol
56E8	Jupiter	Magnetrol
56E9	Model TA2	Magnetrol
56EA	Model 707	Magnetrol
56EB	Model 705 2.x	Magnetrol
56EC	Model 708	Magnetrol
56ED	Model 805	Magnetrol
56EE	Model 705	Magnetrol
56EF	SMARTEZ	Magnetrol
57E4	ND9100HT	Metso Automation
57E5	ND9100H	Metso Automation
57EB	ValvGuard	Metso Automation
57EE	ND820/T	Metso Automation
57EF	ND820	Metso Automation
58C8	86x PROBE	Siemens Milltronics PI
58C9	SITRANS LR300	Siemens Milltronics PI
58CA	LR 200	Siemens Milltronics PI
58CC	SITRANS LR400	Siemens Milltronics PI
58CD	Sitrans Probe LU 6m	Siemens Milltronics PI
58CE	Sitrans Probe LU 12m	Siemens Milltronics PI
58CF	Probe LR	Siemens Milltronics PI
58D3	SITRANS LR460	Siemens Milltronics PI
58D4	SITRANS LR260	Siemens Milltronics PI
58D8	SITRANS AW200	Siemens Milltronics PI
5AC8	ANDRSN1	Anderson Instrument Company
5BEB	IPAQ C520/R520 (X)	Inor
5BEF	MESO	Inor
5CC8	Excalibur 7000	Robertshaw
5DE0	P+F WHA-GW	Pepperl Fuchs
5DE2	P+F WHA-UT	Pepperl Fuchs
5DE4	CorrTran	Pepperl Fuchs

Expanded Device Code (Hex)	Description	Company Name
5DE5	LUC M	Pepperl Fuchs
5DE6	MUX2700-G	Pepperl Fuchs
5DE7	RSD-UO-Ex8.H	Pepperl Fuchs
5DE8	RSD-CI-Ex8.H	Pepperl Fuchs
5DE9	KSD2-GW2-PRO	Pepperl Fuchs
5DEA	BARCON M	Pepperl Fuchs
5DEB	LUC+	Pepperl Fuchs
5DEC	PULSCON+	Pepperl Fuchs
5DED	PULSCON	Pepperl Fuchs
5DEE	BARCON	Pepperl Fuchs
5DEF	KFD2-HMM-16	Pepperl Fuchs
5EEE	PRESS/DP XMTR	Accutech
5EEF	AI1500	Accutech
60ED	FLEXBAR 3501	Bourdon-Haenni
60EE	FLEXBAR HRT	Bourdon-Haenni
60EF	FLEXTOP HRT	Bourdon-Haenni
61E8	2211 CondI	Knick
61E9	2211 Oxy	Knick
61EA	2211 Cond	Knick
61EB	2211 pH	Knick
63ED	M-Series	MTS Systems Corp.
6464	ULTRAOVAL	Oval
6465	ExDelta	Oval
646E	9401 Mass flo	Oval
646F	9801 Mass flo	Oval
6470	9201 Mass flo	Oval
647B	9431 Mass flo	Oval
6564	HDLT	Masoneilan-Dresser
65C8	SVI	Masoneilan-Dresser
65C9	SVI2	Masoneilan-Dresser
65CA	SVI II AP	Masoneilan-Dresser
65CB	SVI II ESD	Masoneilan-Dresser
66EF	CLS 4-20	Besta
67E0	DSTH/LSTH	Ohmart
67E1	DSTH/LSTH Comp	Ohmart
6801	ESR-D	Harold Beck and Sons
680A	BECK-DCM	Harold Beck and Sons

Expanded Device Code (Hex)	Description	Company Name
68EF	BECK-MK2	Harold Beck and Son
6BEE	UniTrans	Wika
6BEF	T32	Wika
6CEB	UMC2	Bopp & Reuther Heinrichs
6CEC	ES	Bopp & Reuther Heinrichs
6CED	VTX	Bopp & Reuther Heinrichs
6CEE	DIMF	Bopp & Reuther Heinrichs
6CEF	UST 1	Bopp & Reuther Heinrichs
6DDF	T55	PR Electronics
6DEE	Pretrans 6335	PR Electronics
6DEF	Pretop 5335	PR Electronics
71EE	MT115	Apparatebau Hundsbach
72DE	SPX	Dynisco
72DF	IPXII	Dynisco
72E0	IPX	Dynisco
74EF	DMC R-1A	Direct Measurement
75EF	Klay 2000 Pressure/Level	Klay
78EF	8630	Buerkert Fluid Control Systems
7CEE	M33-53P	GLI
7CEF	M33-53C	GLI
7EE0	SMT-EL	Paper Machine Components
7F3C	PASCAL CI	Labom
7FE0	IPX	Labom
7FEF	Pascal CV	Labom
8003	MAGFLO	Danfoss
817F	Intermag-Transmag	Turbo
827B	FW-9000	Tokyo Keiso
827F	FST-3000	Tokyo Keiso
837D	IP8001	SMC
837E	IP8101	SMC
83EF	F793-E701	SMC
84EF	SEM 300	Status Instruments
857F	HK TT01	Huakong
8661	APT3200	Duon System
866B	APT3100	Duon System
8675	ATT2100S	Duon System
8701	Innova-Mass	Vortek Instruments, LLC

Expanded Device Code (Hex)	Description	Company Name
89EF	T798	Action Instruments
8C88	LTM-100	Magtech
8C89	LTM-300	Magtech
8D01	S95 HRT	Rueger
8D7F	S95.3U_2	Rueger
8E78	CondI7100	Mettler Toledo
8E79	O2 4100e	Mettler Toledo
8E7A	Cond7100	Mettler Toledo
8E7B	Ph 2100	Mettler Toledo
8F76	X2200	Det-Tronics
8F77	X5200	Det-Tronics
8F78	X9800	Det-Tronics
8F79	X3302	Det-Tronics
8F7C	X3301	Det-Tronics
8F7E	OPECL_RX	Det-Tronics
8F7F	Eclipse	Det-Tronics
907D	NDMi	Thermo MeasureTech
907E	Accu-Wave	Thermo MeasureTech
907F	NCMi	Thermo MeasureTech
91EF	Positioner	Dezurik
927F	Analyzer	Phase Dynamics
937C	WT2000	Welltech
9977	METRAN-303PR	Metran
9979	METRAN-150	Metran
997B	METRAN-390	Metran
997C	METRAN-300PRM	Metran
997D	METRAN-49	Metran
997E	METRAN-280	Metran
997F	METRAN-100	Metran
9A7F	P Series	Milton Roy Co.
9BD3	D3	PMV
9C01	KMU-HLI	Turck
9D70	x868	Panametrics
9E01	ICS MUX FBS	Stahl
9E02	ICS 1000	Stahl
9E03	VOS 200	Stahl
9E04	ICS modul 9148	Stahl

Expanded Device Code (Hex)	Description	Company Name
9E05	I.S. 1 Remote I/O	Stahl
9E06	IS pac 9192 16 ch	Stahl
9E07	IS pac 9192 32 ch	Stahl
9F7F	D12	Analytical Technology Inc.
A002	PIR 2000	FINT
A0ED	OXI5000	FINT
A17C	LB466	BERTHOLD
A17D	LB491	BERTHOLD
A17E	LB460	BERTHOLD
A17F	LB490	BERTHOLD
A2EF	SMARTCET 18C	InterCorr
A678	ST98	Fluid Components
A92E	I/A Pressure	Invensys
A934	CFT50	Invensys
AB01	SmartCal	Tyco Valves & Controls
AD00	GasFlowMeter	J-Tec Associates
AD01	LiquidFlowMeter	J-Tec Associates
AE7F	PRI-150	Tracerco
AE9F	Level Combination Unit	Tracerco
B001	MCR-TS-LP	Phoenix Contact
B002	MCR-HT-TS	Phoenix Contact
B003	MACX MCR-S-MUX 16 ch	Phoenix Contact
B004	MACX MCR-S-MUX 32 ch	Phoenix Contact
B27F	Model 32E	Amer. Level Instr.
B401	YT-2300	YTC
B402	YT-2400	YTC
B57F	Series442	Pyromation Inc.
B580	Series642	Pyromation Inc
B67F	V-series	Satron Instruments
B97F	DMD 331-A	BD Sensors
BC7A	LI-24	APLISENS
BC7B	APC-2000ALW	APLISENS
BD01	Primo Advanced	Badger Meter
BF7C	MDL 400	GP:50
C0EF	GT400	Kongsberg Maritime
C101	C/G Asameter /H	ASA S.p.A.
C221	TE 52	Hengesbach

Expanded Device Code (Hex)	Description	Company Name
C374	LSIII Pressure	Lanlian Instruments
C401	I/O Module	Spectrum Controls
C580	KC/3	Kajaani Process Measurements
C581	KC/5	Kajaani Process Measurements
C680	TORRIX	FAFNIR
C780	FLAWSIC 600	SICK-MAIHAK
CA80	SP301	Spirax Sarco Italy
CC80	CH420L	Tecfluid S.A.
CC81	CH420R	Tecfluid S.A.
CE80	EPP300	Roost
CF80	EP1000/SPS200	Koso
CF81	EP1001	Koso
D480	PES	SIC
D482	HVP	SIC
D485	HVP1114	SIC
D486	FLOW MASTER	SIC
D580	SI792P	HACH LANGE
D581	SI792C	HACH LANGE
D582	SI792T	HACH LANGE
D583	SI792E	HACH LANGE
D584	SI792D	HACH LANGE
DB80	SharpEye	Spectrex
DF80	FL4000	General Monitors, Inc.
DF81	S4000CH	General Monitors, Inc.
DF82	S4000TH	General Monitors, Inc.
DF83	IR400	General Monitors, Inc.
DF84	IR4000	General Monitors, Inc.
E080	ESD3000	ExSaf
E081	Sensor Don	Etalon Rus
E082	SDT420	SEOJIN INSTECH
E083	RT-Ex15	TASI FLOW
E084	SS	Daehan Control
E085	3DlevelScanner M	AMP
E086	3DlevelScanner S	AMP
E087	3DlevelScanner L	AMP
E088	EX200H Positioner	ORANGE INST UK
E089	IS200H Positioner	ORANGE INST UK

Expanded Device Code (Hex)	Description	Company Name
E08A	R3x	BARTEC
E08B	700 Bridge	Detcon
E08C	UltimaXL/XT	MSA
E08D	CMM-01 MASS FLOW	METROVAL
E08E	JLT-6000	JOGLER
E08F	SMARTRONIC MA	KSB
E090	CMS Standard	Richter CT
E091	Millennium II	NET SAFETY
E092	HIM1008	SECanada
E093	CXT	SUPCON
E094	CJT	SUPCON
E095	HBM – 165 H	DKK – TOA
E096	HBM – 167 H	DKK – TOA
E097	WBM – 165 H	DKK – TOA
E098	OBM – 165 H	DKK – TOA
E099	OBM – 167 H	DKK – TOA
E09A	MBM – 165 H	DKK – TOA
E09B	MBM – 167 H	DKK – TOA
E09C	Mark Series	Dwyer Instruments
E09D	TR	FineTek
E09E	Millennium 2 Basic	NET SAFETY
E09F	ULTIMAXEH	MSA
E0A0	Position Xmitter	TopWorx Inc.
E0A1	HRT1	Hoffer Flow Controls
E0A2	DN2510 SmartMesh	Dust Networks
E0A3	M2510 SmartMesh	Dust Networks
E0A4	PM2510 SmartMesh	Dust Networks
E0A5	VFM 4097	Forbes Marshall
E0A6	IFC 031	Forbes Marshall
E0A7	IFC 021	Forbes Marshall
E0A8	SMARTPro Cond 8967	Forbes Marshall
E0A9	SMARTPro Ph 8966	Forbes Marshall
E0AA	SMARTPro DO 8968	Forbes Marshall
E0AB	AM-2000	All Measures
E0AC	Wireless Adapter	MACTek
E0AD	CSI 9420	CSI
E0AE	KMS-2	TC Fluid Control

Expanded Device Code (Hex)	Description	Company Name
E0AF	MWT-3905	Rohrback Cosasco Systems
E0B0	UWT-1000	Rohrback Cosasco Systems
E0B1	CWT-9020	Rohrback Cosasco Systems
E0B2	A-1000 H	AirSprite
E0B3	NCS-PT105 II	Microcyber Inc.
E0B4	STF	SEOJIN INSTECH
E0B5	SMF	SEOJIN INSTECH
E0B6	TY-TDS-P	TIG
E0B7	TY-TRANS-F	TIG
E0B8	TY-TRANS-L	TIG
E0B9	TY-TRANS-PS	TIG
E0BA	TY-TRANS-A	TIG
E0BB	PMH	Ifm prover GmbH
E0BC	FlameGard	MSA
E0BD	FLUXUS	FLEXIM
E0BE	MRG-10A	TOCIMEC INC.
E0BF	MRF-10	TOCIMEC INC.
E0C0	ULTRAMATE 136-ULT	SBEM
E0C1	Flow Control System	SkoFlo Industries, Inc.
E0C2	Axiom	StoneL Corporation
E0C3	EUMAG	EUREKA FLOW
E0C4	BA47X/67X SERIES	BEKA Associates
E0C5	MTRT	EUREKA FLOW
E0C6	CAP-30xx	CAPSTAR AUTOMATION
E0C7	Nemesis 1000	Pulsar
E0C8	CVM-01	METROVAL
E0C9	TDM-01	METROVAL
E0CA	Elemer AIR-10H	Elemer
E0CB	Elemer AIR-20H	Elemer
E0CC	Elemer AIR-30H	Elemer
E0CD	Frankenstein	Soft Tech Group
E0CE	4310 Valve Monitor	TopWorx
F980	WirelessHART Network Manager	HCF
F981	WirelessHART Gateway	HCF
F982	Generic	HCF
F983	SDC625	HCF
F984	Analys	HCF

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	
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
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
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	
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	

Mass Flow

Unit Code	Description	Note
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 sixteenths	See Note 1 Below
152	cubic feet per pound	
153	picofarads	
154	mililiters per liter	

Miscellaneous

Unit Code	Description	Note
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
240-249	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 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
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 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
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	
170	beer barrels per second	1 beer barrel equals 31 U.S. gallons
171	beer barrels per minute	1 beer barrel equals 31 U.S. gallons
172	beer barrels per hour	1 beer barrel equals 31 U.S. gallons
173	beer barrels per day	1 beer barrel equals 31 U.S. gallons

Unit Code	Description	Note
174	normal liter per day	at 273.15 degrees Kelvin, 101.325 kilo pascals
175	normal liter per minute	at 273.15 degrees Kelvin, 101.325 kilo pascals
176	normal liter per second	at 273.15 degrees Kelvin, 101.325 kilo pascals
177	standard liter per day	at 20 degrees Celsius, 1 Atmosphere
178	standard liter per hour	at 20 degrees Celsius, 1 Atmosphere
179	standard liter per minute	at 20 degrees Celsius, 1 Atmosphere
180	standard liter per second	at 20 degrees Celsius, 1 Atmosphere
181	normal cubic meter per day	at 273.15 degrees Kelvin, 101.325 kilopascals
182	normal cubic meter per minute	at 273.15 degrees Kelvin, 101.325 kilopascals
183	normal cubic meter per second	at 273.15 degrees Kelvin, 101.325 kilopascals
184	standard cubic feet per day	at 32 degrees Fahrenheit, 1 Atmosphere
185	standard cubic feet per hour	at 32 degrees Fahrenheit, 1 Atmosphere
186	standard cubic feet per second	at 32 degrees Fahrenheit, 1 Atmosphere
187	standard cubic meter per day	at 20 degrees Celsius, 1 Atmosphere
188	standard cubic meter per hour	at 20 degrees Celsius, 1 Atmosphere
189	standard cubic meter per minute	at 20 degrees Celsius, 1 Atmosphere
190	standard cubic meter per second	at 20 degrees Celsius, 1 Atmosphere
235	gallons per day	

5.2.67 Table 2.67 Velocity Unit Code

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
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 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
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
170	beer barrel	31 US gallons
171	standard liter	at 20 degrees Celsius, 1 Atmosphere
172	standard cubic meter	at 20 degrees Celsius, 1 Atmosphere
236	hectoliters	

5.2.69 Table 2.69 Length Unit Code

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
44	feet	
45	meters	
47	inches	
48	centimeters	
49	millimeters	
151	feet in sixteenths	See Note 1 Above

5.2.70 Table 2.70 Time Unit Code

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
50	minutes	
51	seconds	
52	hours	
53	days	

5.2.71 Table 2.71 Mass Unit Code

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
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 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
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 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
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	
170	milligrams per liter	

5.2.74 Table 2.74 Viscosity Unit Code

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
54	centistokes	
55	centipoise	

5.2.75 Table 2.75 Angular Velocity Unit Code

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
117	degrees per second	
118	revolutions per second	
119	revolutions per minute	

5.2.76 Table 2.76 Area Unit Code

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
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5.2.77 Table 2.77Energy (Work) Unit Code

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
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 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
68	newton	

5.2.79 Table 2.79 Power Unit Code

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
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 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
38	hertz	

5.2.81 Table 2.81 Analytical Unit Code

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
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 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
153	picofarads	

5.2.83 Table 2.83 EMF Unit Code

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
36	millivolts	
58	volts	

5.2.84 Table 2.84 Current Unit Code

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
39	milliamperes	

5.2.85 Table 2.85 Resistance Unit Code

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
37	ohms	
163	kilo ohms	
170	mega ohms	

5.2.86 Table 2.86 Angle Unit Code

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
143	degrees	
144	radian	

5.2.87 Table 2.87 Conductance Unit Code

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
56	microsiemens	
66	milli siemens per centimeter	

Unit Code	Description	Note
67	micro siemens per centimeter	

5.2.88 Table 2.88 Volume per Volume Unit Code

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
149	volume percent	
154	mililiters per liter	
155	microliters per liter	

5.2.89 Table 2.89 Volume per Mass Unit Code

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
107	degrees balling	
152	cubic feet per pound	

5.2.90 Table 2.90 Concentration Unit Code

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
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 Function Description	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

Code	Description
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	This Table is Reserved
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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
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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
250	Not Used
251	None
252	Unknown
253	Special

5.8 Table 8. Manufacturer Identification Codes

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

Code		Company Name
Dec.	Hex	
1	0001	Acromag
2	0002	Allen Bradley
3	0003	Ametek
4	0004	Analog Devices
5	0005	ABB
6	0006	Beckman
7	0007	Bell Microsensor
8	0008	Bourns
9	0009	Bristol Babcock
10	000A	Brooks Instrument
11	000B	Chessell
12	000C	Combustion Engineering
13	000D	Daniel Industries
14	000E	Delta
15	000F	Dieterich Standard
16	0010	Dohrmann
17	0011	Endress & Hauser
18	0012	ABB
19	0013	Fisher Controls
20	0014	Foxboro
21	0015	Fuji
22	0016	ABB
23	0017	Honeywell
24	0018	ITT Barton
25	0019	Thermo MeasureTech
26	001A	ABB
27	001B	Leeds & Northrup
28	001C	Leslie
29	001D	M-System Co.
30	001E	Measurix
31	001F	Micro Motion
32	0020	Moore Industries
33	0021	PRIME Measurement Products
34	0022	Ohkura Electric
35	0023	Paine
36	0024	Rochester Instrument Systems
37	0025	Ronan
38	0026	Rosemount
39	0027	Peek Measurement
40	0028	Actaris Neptune
41	0029	Sensall
42	002A	Siemens
43	002B	Weed
44	002C	Toshiba

Code		Company Name
Dec.	Hex	
45	002D	Transmation
46	002E	Rosemount Analytic
47	002F	Metso Automation
48	0030	Flowserve
49	0031	Varec
50	0032	Viatran
51	0033	Delta/Weed
52	0034	Westinghouse
53	0035	Xomox
54	0036	Yamatake
55	0037	Yokogawa
56	0038	Nuovo Pignone
57	0039	Promac
58	003A	Exac Corporation
59	003B	Mobrey
60	003C	Arcom Control System
61	003D	Princo
62	003E	Smar
63	003F	Foxboro Eckardt
64	0040	Measurement Technology
65	0041	Applied System Technologies
66	0042	Samson
67	0043	Sparling Instruments
68	0044	Fireye
69	0045	Krohne
70	0046	Betz
71	0047	Druck
72	0048	SOR
73	0049	Elcon Instruments
74	004A	EMCO
75	004B	Termiflex Corporation
76	004C	VAF Instruments
77	004D	Westlock Controls
78	004E	Drexelbrook
79	004F	Saab Tank Control
80	0050	K-TEK
81	0051	SENSIDYNE, INC
82	0052	Draeger
83	0053	Raytek
84	0054	Siemens Milltronics PI
85	0055	BTG
86	0056	Magnetrol
87	0057	Metso Automation
88	0058	Siemens Milltronics PI

Code		Company Name
Dec.	Hex	
89	0059	HELIOS
90	005A	Anderson Instrument Company
91	005B	INOR
92	005C	ROBERTSHAW
93	005D	PEPPERL+FUCHS
94	005E	ACCUTECH
95	005F	Flow Measurement
96	0060	Bourdon-Haenni
97	0061	Knick
98	0062	VEGA
99	0063	MTS Systems Corp.
100	0064	Oval
101	0065	Masoneilan-Dresser
102	0066	BESTA
103	0067	Ohmart
104	0068	Harold Beck and Sons
105	0069	rittmeyer instrumentation
106	006A	Rossel Messtechnik
107	006B	WIKA
108	006C	Bopp & Reuther Messtechnik
109	006D	PR Electronics
110	006E	Jordan Controls
111	006F	Valcom s.r.l.
112	0070	US ELECTRIC MOTORS
113	0071	Apparatebau Hundsbach
114	0072	Dynisco
115	0073	Spriano
116	0074	Direct Measurement
117	0075	Klay Instruments
118	0076	CiDRA CORP.
119	0077	MMG AM DTR
120	0078	Buerkert Fluid Control Systems
121	0079	AALIAN Process Mgt
122	007A	PONDUS INSTRUMENTS
123	007B	ZAP S.A. Ostrow Wielkopolski
124	007C	GLI
125	007D	Fisher-Rosemount Performance Technologies
126	007E	Paper Machine Components
127	007F	LABOM
128	0080	Danfoss
129	0081	Turbo
130	0082	TOKYO KEISO
131	0083	SMC
132	0084	Status Instruments
133	0085	Huakong
134	0086	Duon System

Code		Company Name
Dec.	Hex	
135	0087	Vortek Instruments, LLC
136	0088	AG Crosby
137	0089	Action Instruments
138	008A	Keystone Controls
139	008B	Thermo Electric Co.
140	008C	ISE Magtek
141	008D	Rueger
142	008E	Mettler Toledo
143	008F	Det-Tronics
144	0090	Thermo MeasureTech
145	0091	DeZURIK
146	0092	Phase Dynamics
147	0093	WELLTECH SHANGHAI
148	0094	ENRAF
149	0095	4tech ASA
150	0096	Brandt Instruments
151	0097	Nivelco
152	0098	Camille Bauer
153	0099	Metran
154	009A	Milton Roy Co.
155	009B	PMV
156	009C	Turck
157	009D	Panametrics
158	009E	R. Stahl
159	009F	Analytical Technology Inc.
160	00A0	FINT
161	00A1	BERTHOLD
162	00A2	InterCorr
163	00A3	China BRICONTE Co Ltd
164	00A4	Electron Machine
165	00A5	Sierra Instruments
166	00A6	Fluid Components Intl
167	00A7	Solid AT
168	00A8	Meriam Instrument
169	00A9	Invensys
170	00AA	S-Products
171	00AB	Tyco Valves & Controls
172	00AC	Micro Matic Instrument A/S
173	00AD	J-Tec Associates
174	00AE	TRACERCO
175	00AF	AGAR
176	00B0	Phoenix Contact
177	00B1	Andean Instruments
178	00B2	Amer. Level Instr.
179	00B3	Hawk
180	00B4	YTC
181	00B5	Pyromation Inc.
182	00B6	Satron Instruments

Code		Company Name
Dec.	Hex	
183	00B7	BIFFI
184	00B8	SAIC
185	00B9	BD Sensors
186	00BA	Andean Instruments
187	00BB	Kemotron
188	00BC	APLISENS
189	00BD	Badger Meter
190	00BE	HIMA
191	00BF	GP:50
192	00C0	Kongsberg Maritime
193	00C1	ASA S.p.A.
194	00C2	Hengesbach
195	00C3	Lanlian Instruments
196	00C4	Spectrum Controls
197	00C5	Kajaani Process Measurements
198	00C6	FAFNIR
199	00C7	SICK-MAIHAK
200	00C8	JSP Nova Paka
201	00C9	MESACON
202	00CA	Spirax Sarco Italy
203	00CB	L&J TECHNOLOGIES
204	00CC	Tecfluid S.A.
205	00CD	Sailsors Instruments
206	00CE	Roost
207	00CF	KOSO
208	00D0	MJK
209	00D1	GE Energy
210	00D2	BW Technologies
211	00D3	HEINRICHS
212	00D4	SIC
213	00D5	HACH LANGE
214	00D6	Exalon Instruments
215	00D7	FAURE HERMAN
216	00D8	STI S.r.l.
217	00D9	Manometr-Kharkiv
218	00DA	Dalian-Instruments
219	00DB	Spectrex
220	00DC	SIPAI Instruments
221	00DD	Advanced Flow
222	00DE	Rexa. Koso America
223	00DF	General Monitors, Inc.
224	00E0	Manufacturer Expansion
249	00F9	HART Communication Foundation
24576	6000	ExSaf

Code		Company Name
Dec.	Hex	
24577	6001	SEOJIN INSTECH
24578	6002	TASI FLOW
24579	6003	Daehan Control
24580	6004	APM
24581	6005	ORANGE INST. UK
24582	6006	BARTEC
24583	6007	Detcon
24584	6008	MSA
24585	6009	METROVAL
24586	600A	Etalon Rus
24587	600B	JOGLER
24588	600C	KSB
24589	600D	Richter CT
24590	600E	NET SAFETY
24591	600F	SECanada
24592	6010	SUPCON
24593	6011	DKK - TOA
24594	6012	Dwyer Instruments
24595	6013	FineTek
24596	6014	TopWorx Inc.
24597	6015	HOFFER FLOW CNTRLs
24598	6016	DUST NETWORKS
24599	6017	Forbes Marshall
24600	6018	All Measures, Ltd.
24601	6019	MACTek
24602	601A	CSI
24603	601B	TC Fluid Control
24604	601C	Rohrback Cosasco
24605	601D	AirSprite
24606	601E	Microcyber Inc.
24607	601F	TIG
24608	6020	ifm prover GmbH
24609	6021	FLEXIM
24610	6022	TOKIMEC.INC
24611	6023	SBEM
24612	6024	SkoFlo Industries, Inc.
24613	6025	StoneL Corporation
24614	6026	EUREKA FLOW
24615	6027	BEKA associates
24616	6028	CAPSTAR AUTOMATION
24617	6029	Pulsar
24618	602A	Elemer
24619	602B	Soft Tech Group

5.9 Table 9. Burst Mode Control Codes

Code	Burst Mode Control Definition
0	Off
1	Enable Burst on Token-Passing Data Link Layer only
2	Enable Burst on TDMA Data-Link Layer only
3	Enable Burst on TDMA and Token Passing Data Link Layers
250	Reserved
251	Reserved
252	Reserved
253	Reserved

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.

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

5.11 Table 11. Flag Assignments

Any bit not covered is 'Undefined'.

Code	Flag Assignment Definition
01	Multi-Sensor Field Device
02	Eeprom Control
04	Protocol Bridge Device
08	IEEE 802.15.4 2.4GHz DSSS with O-QPSK Modulation
10-20	Undefined
40	C8psk Capable Field Device
80	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

Code	Operating Mode Description
------	----------------------------

This Table is Reserved

5.15 Table 15. Analog Channel Number Codes

Code	Analog Channel 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

5.17 Table 17. Extended Device Status Codes

Any bit not covered is 'Undefined'.

Code	Description
------	-------------

01	Maintenance Required. This bit is set to indicate that, while the device has not malfunctioned, the Field Device requires maintenance.
02	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) causing this to be set using the Device Variable Status indicators.
04	Critical Power Failure. For devices that can operate from stored power. This bit is set when that power is becoming critically low. For example, a device scavenging power loosing that power source would set this bit. Devices must be able to sustain their network connection for at least 15 minutes from the when this bit is set. A device may begin gracefully disconnecting from the network if its power level drops too low.

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, from another master, or from any 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)
3	Lock All – No changes in the device's configuration, by any master, are allowed.

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

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
0-3	Reserved. Must Not be Used
4	Temperature
5	Pressure
6	Valve / Actuator
7	Simple PID Control
8	pH
9	Conductivity
10	Totalizer
11	Level
12	Vortex Flow
13	Mag Flow
14	Coriolis Flow
132 - 249	Reserved. Must Not be Used
250	Not Used

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
------	--------------------------------

0	Device Variable Not Classified
---	--------------------------------

1-63	Reserved
------	----------

64	Temperature
----	-------------

65	Pressure
----	----------

66	Volumetric Flow
----	-----------------

67	Velocity
----	----------

68	Volume
----	--------

69	Length
----	--------

70	Time
----	------

71	Mass
----	------

72	Mass Flow
----	-----------

73	Mass Per Volume
----	-----------------

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
----	-------------------

89	Volume Per Mass
----	-----------------

90	Concentration
----	---------------

Code	Device Variable Classification
-------------	---------------------------------------

91	Valve Actuator
92	Level
93	Vortex Flow
94	Mag Flow
95	Coriolis Flow

5.22 Table 22. Trim Point Codes

These codes indicate which trim points that 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

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

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 (Reset if Secondary Master)
0x08	Configuration cannot be changed by any application.
0x10	Locked by Gateway

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.

5.27 Table 27. Analog Channel Saturated Codes

Code	Analog Channel Saturated Description
1	Analog Channel 1
2	Analog Channel 2
4	Analog Channel 3
8	Analog Channel 4

5.28 Table 28. Analog Channel Fixed Codes

Code	Analog Channel Fixed Description
1	Analog Channel 1
2	Analog Channel 2
4	Analog Channel 3
8	Analog Channel 4

5.29 Table 29. Standardized Status 0

Code	Status Description
0x01	Simulation Active. The device is in simulation mode and the level output is not representative of the process.
0x02	Non-Volatile Memory Defect. The Non-Volatile memory check is invalid or maybe corrupt, or the battery of a battery-backed memory is defective.
0x04	Volatile Memory Defect. The RAM memory check is invalid or maybe corrupt.
0x08	Watchdog Reset Executed. A watchdog reset has been performed
0x10	Voltage Conditions Out of Range. A voltage condition is outside its allowable range.
0x20	Environmental Conditions Out of Range. An internal or environmental condition is beyond acceptable limits.
0x40	Electronic Defect. A hardware problem not related to the sensor has been detected.

5.30 Table 30. Standardized Status 1

Code	Description
	This Table is Reserved

5.31 Table 31. Standardized Status 2

Code	Description
0x01	Sub-Device List Changed. When set, the I/O system has lost communication with one of its sub-devices or discovered a new subdevice. This bit is reset by re-reading the sub-device list using Command 84.
0x02	Duplicate Master Detected. The Adapter has discovered another master with the same address connected to its token-passing interface.

5.32 Table 32. Standardized Status 3

The status byte is reserved for WirelessHART standardized status

Code	WirelessHART Status Description
0x01	Capacity Denied. The device was unable to acquire the communication bandwidth required to support the Burst Messaging specified. This must also be set if the Network Manager reduces the bandwidth allocated to the device.
0x02	Duplicate Master Detected. The Adapter has discovered another master with the same address connected to its token-passing interface.
0x04	Bandwidth allocation pending. The device has asked for bandwidth from the Network Manager and is awaiting Network Manager response.
0x08	Block Transfer Pending. The device has a data set (e.g., a waveform) awaiting transfer to the host application or Gateway. The Gateway should open the block transfer port and transfer the data.

5.33 Table 33. Burst Message Trigger Mode

Indicates the trigger condition for bursting a message.

Code	Burst Message Trigger Mode Description
0	Continuous. The Burst Message is published continuously at (worst case) the Minimum Update Period.
1	Window. The Burst Message is triggered when the source value deviates more than the specified trigger value.
2	Rising. The Burst Message is triggered when source value Rises Above the specified trigger value.
3	Falling. The Burst Message is triggered when the source value Falls Below the specified trigger value.
4	On-Change. The burst message is triggered when any value in the message changes.

5.34 Table 34. Device Variable Code

These Device Variable Codes supplements the device's array of Device Variables to allow access to the process measurements and loop current historically returned in Command 3. Since all of these codes are standardized, these Device Variables are not included in the count returned by "Maximum Number of Device Variables" in Command 0. With the exception of "Battery life", devices must support all of these Device Variables. "Battery life" must be supported by all device that is battery powered. The Device Variable Status bits must be supported for all Dynamic Variables and the Loop Current.

The Superset of this table, including the device's Device Variables, must be included in the manufacturer's device-specific document.

Code	Device Variable Code Description
243	Battery life (Float in Days)
244	Percent Range
245	Loop Current
246	Primary Variable
247	Secondary Variable
248	Tertiary Variable
249	Quaternary Variable

5.35 Table 35. Event Notification Control Code

Code	Event Notification Control Code Description
0	Off
1	Enable Event Notification on Token-Passing Data Link Layer
2	Enable Event Notification on TDMA Data-Link Layer
3	Enable Event Notification on TDMA and Token-Passing Data Link Layers

5.36 Table 36. Event Status

Code	Event Status Description
1	Configuration Changed Event Pending
2	Device Status Event Pending
4	More Status Available Event Pending

5.37 Table 37. Trend Control Codes

Code	Trend Control Codes Description
0	Disable
1	Enable Single Data Point Trending
2	Enable Filtered Trending. The sample is filtered using a time constant equal to one-third the trend sample period.
3	Enable Average Trending (optional). In other words, the value obtained by dividing the sum of all samples in the period by the tatl number of samples.

5.38 Table 38. Time-set Code

Code	Time-set Code Description
0	Read Receive Time
1	Write Date and Time

5.39 Table 39. Service Request Flags

Code	Service Request Flags Description
------	-----------------------------------

0x01	Source
0x02	Sink
0x04	Intermittent

5.40 Table 40. Service Application Domain

Code	Service Application Domain Description
------	--

0	Publish
1	Event
2	Maintenance
3	Block Transfer

5.41 Table 41. Synchronous Action Control

Code	Synchronous Action Control Description
------	--

1	Command. When set the indicated command will be executed at the time indicated. When reset a Device Variable is to be sampled.
2, 4, 8	Undefined
16	One-Shot. When set the synchronous action will be performed one time only. When reset the sampling will trigger at the indicated time and repeat continuously there after.
32, 64	Undefined
128	Action Enabled. When set the action is enabled. When action is a "One-Shot" then the enabled bit is reset after the Action occurs.

5.42 Table 42. Real-Time Clock Flags

Code	Real-Time Clock Flags Description
------	-----------------------------------

1	Non-Volatile Clock. When set the device contains a battery-backed clock. In this case, the clock does not need to be reset if there is a power failure.
2	Clock Uninitialized. The real-time clock has never been set with the date and time. For example, the clock is volatile and power was removed from and restored to the device.

5.43 Table 43. Wireless Timer Code

Code	Wireless Timer Code Description
------	---------------------------------

0	Discovery
1	Advertisement
2	Keep-Alive
3	Path Failure
4	Health report
5	Broadcast Reply
6	Maximum PDU Age

5.44 Table 44. Device Power Source

Code	Description
------	-------------

0	Line Power. Device is powered via a hardwired connection to a plant power source
1	Battery Power. Device operates solely off its (internal) battery.
2	Rechargeable Battery Power or Power Scavenging. The device has a short-term supply of energy (must be at least one hour) that is continuously being replenished. The device's power is being replenished by harvesting and converting energy from the environment surrounding the device (e.g., solar, vibration, heat).

5.45 Table 45. Link Type

Code	Link Type Description
------	-----------------------

0	Normal
1	Discovery
2	Broadcast
3	Join

5.46 Table 46. Link Option Flag Codes

Any combination of the following flags may be set. For example, a link can be for both transmit and receive.

Code	Link Option Flag Codes Description
------	------------------------------------

0x01	Transmit
0x02	Receive
0x04	Shared

5.47 Table 47. Superframe Mode Flags

Code	Superframe Mode Flags Description
0x01	Active (reset = inactive)
0x80	Handheld Superframe. This bit should only be set for one superframe in the device.

5.48 Table 48. Session Type Code

Code	Session Type Code Description
0	Unicast
1	Broadcast
2	Join

5.49 Table 49. Service Deletion Reason Codes

Code	Service Deletion Reason Codes Description
0	Requested by peer
1	Service can not be established
2	Network failure

5.50 Table 50. Disconnect Cause Codes

Code	Disconnect Cause Codes Description
0	User-initiated
1	Communication failure

5.51 Table 51. Wireless Operation Mode

This table is used primarily to monitor the join process.

Code	Wireless Operation Mode Description
0	Idle.
1	Active Search.
2	Negotiating.
3	Quarantined.
4	Operational.
5	Suspended
6	Deep sleep/Ultra-low Power/Passive Search
7-15	Reserved

5.52 Table 52. Join Process Status

This table is used primarily to monitor the join process.

Code	Join Status Description
0x001	Network Packets Heard.
0x002	ASN Acquired.
0x004	Synchronized to Slot Time.
0x008	Advertisement Heard.
0x010	Join Requested. Set on transmission of first join request
0x020	Join Retrying. Set after the first join request retry (i.e., when number of join requests > 2). Cleared when device is Authenticated or when Active Search started.
0x040	Join Failed. Set on transition from Active Search mode to Deep Sleep mode. Cleared on transition from Deep Sleep to Active Search.
0x080	Authenticated. Network Key, Network Manager Session Established
0x100	Network Joined. Normal superframe and links obtained.
0x200	Negotiating Network Properties. Gateway session obtained. Initial Bandwidth requirements being negotiated with Network Manager.
0x400	Normal Operation Commencing.

5.53 Table 53. Security Type Codes

Code	Security Type Codes Description
0	Session Keyed
1	Join Keyed
2	Handheld Keyed

5.54 Table 54. SI Units Control Code

Code	SI Units Control Code Description
0	No restrictions (default)
1	Unit codes limited to the SI Units only

5.55 Table 55. Device List Code

Code	Device List Code Description
0	Active Device List
1	Whitelisted Devices (optional)
2	Blacklisted Devices (optional)

5.56 Table 56. Network Access Mode Code

Code	Network Access Mode Code Description
0	Open – accept all devices
1	Use Whitelist for access
2	Use Blacklist
3	Use Whitelist and Blacklist
4	Lockdown – disable join links

5.57 Table 57. Device Profile Code

Code	Device Profile Code Description
1	HART Process Automation Device
2	HART Discrete Device
3	Hybrid: Process Automation + Discrete
4	I/O System
129	WirelessHART Process Automation Device
130	WirelessHART Discrete Device
131	WirelessHART Hybrid: Process Automation + Discrete
132	WirelessHART Gateway
141	WirelessHART Process Adapter
142	WirelessHART Discrete Adapter
144	WirelessHART-Enable Handheld/Portable Maintenance Tool

5.58 Table 58. Device Power Status

Code	Device Power Status Code Description
0	Nominal
1	Low
2	Critically Low
3	Recharging - Low
4	Recharging - High

5.59 Table 59. Neighbor Flags

Code	Neighbor Flags Code Description
0x01	Time Source (can be written using Command 971)

5.60 Table 60. Notification Mask Codes

Code	Network Access Mode Code Description
0x0001	BurstMode
0x0002	EventNotification
0x0004	DeviceStatus
0x0008	DeviceConfiguration
0x0010	NetworkTopology (target device must be Gateway or Network Manager)
0x0020	NetworkSchedule (target device must be Gateway or Network Manager)
0x0040	Undefined
-	
0x8000	

5.61 Table 61. Join Mode Code

Code	Link Type Description
0	Don't attempt to Join
1	Join now (returns to Join Mode 2 after joining)
2	Attempt to join immediately on Powerup or reset.

5.62 Table 62. Device Scheduling Flags

Code	Scheduling Flags Description
0x01	Transient Device
0x02	Non-routing Device

Code	Scheduling Flags Description
0x04	Handheld Device

5.63 Table 63. Network Optimization Flags

Code	Scheduling Flags Description
0x01	Low Latency (reset = Long Battery Life)
0x02	Use Line Powered Devices as Backbone

ANNEX A. REVISION HISTORY

A1. Modifications from Revision 19.0 to Revision 20.0

Table 1 has been modified to reflect the addition of new Device Type Codes. Several existing codes have been corrected.

Table 2.73 has been modified to reflect the assignment of a new unit code – milligrams per liter (170).

Table 2.85 has been modified to reflect the assignment of a new unit code – mega ohms (170). Unit code “KOhms” (163) was changed to “kilo ohms”.

Table 8 has been modified to reflect the assignment of new Manufacturer Codes.

A2. Modifications from Revision 18.0 to Revision 19.0

Table 1 has been modified to reflect the addition of new Device Type Codes.

Table 8 has been modified to reflect the assignment of new Manufacture Codes.

Two Codes are added to Common Table 31, Standardized Status 2: one for I/O Systems to indicate changes in its device list; the other to indicate detection of a master with the same address as the I/O system.

In Common Table 32, the status " Bandwidth allocation pending" was added and use of "Capacity denied" was clarified.

To support bursting of Command 48 an "On-Change" enumeration is added to Common Table 33, Burst Message Trigger Mode.

Device Variable "Battery Life" is added to Common Table 34, Device Variable Code. "Battery Life" is mandatory only for battery-powered devices. In addition, the Code for "Percent Range " was corrected.

In Common Table 51, Wireless Operation Mode, Code 0 was improperly overloaded. This was improved by reserving Code 0 for Idle only. Deep sleep/Ultra-low Power/Passive Search is added as a separate code.

In Common Table 57, Device Profile Code, additional codes for wireless, process automation, and discrete types are added.

In Common Table 59. Neighbor Flags, the Keep-Alive Pending and Path Failure flags were removed.

Front page of the document reformatted to reflect the new HCF logo.

A3. Modifications from Revision 17.0 to Revision 18.0

Addition of Common Tables 27-57 to support HART 7

Updated Expanded Device Type and Manufacturer ID tables as well.

A4. Modifications from Revision 16.0 to Revision 17.0

The last revision to the document titled: 'HART-Smart Communications Protocol, Common Tables' as HCF_SPEC-183, Revision 16.0. For Revision 17.0, the document tables have been updated to reflect the following changes:

Sub-tables in Table 1 (Device Type Codes) have been combined into one table now showing Expanded Device Codes. The following Device Type Codes have been added:

ExpandedDevice Code (Hex)	Description	Company Name
E085	3DLevelScanner M	AMP
E086	3DLevelScanner S	AMP
E087	3DLevelScanner L	AMP
E08A	R3x	BARTEC
E084	SS	Daehan Control
E08B	700 Bridge	Detcon
E080	ESD3000	ExSaf
C680	TORRIX	FAFNIR
141E	Vortex 84	Foxboro
DF80	FL4000	General Monitors, Inc.
68EF	BECK-MK2	Harold Beck and Sons
CF80	EP1000/SPS200	Koso
45E2	ESK2A	Krohne
45E4	Optiflex 1300C	Krohne
45E5	Optiwave 7300C	Krohne
E08D	CMM-01 MASS FLOW	METROVAL
E08C	UltimaXL/XT	MSA
E088	EX200H Positioner	ORANGE INST UK
E089	IS200H Positioner	ORANGE INST UK
B580	Series642	Pyromation Inc.
E082	SDT420	SEOJIN INSTECH
D485	HVP1114	SIC
D480	PES	SIC
3E0A	LD400	Smar
837E	IP8101	SMC
E083	RT-Ex15	TASI FLOW
B003	MACX MCR-S-MUX 16 ch	Phoenix Contact
B004	MACX MCR-S-MUX 32 ch	Phoenix Contact
1A05	2600T-364	ABB
2A19	SITRANS FC MASSFLO	Siemens
	HPort	
3B21	3300	Mobrey

ExpandedDevice Code (Hex)	Description	Company Name
5D01	KFD2	Pepperl Fuchs
5DEF	KFD2-HMM-16	Pepperl Fuchs
65CA	SVI II AP	Masoneilan-Dresser
111A	DeltapilotS	Endress & Hauser
111B	FMU9x	Endress & Hauser
360C	MAGNEW4W	Yamatake
866B	APT3100	Duon System
1161	P FLOW92	Endress & Hauser
1162	P FLOW91	Endress & Hauser
1303	DVC6000	Fisher Controls
1707	STT17H	Honeywell
2004	THZ2	Moore Industries
4901	HPSM	Elcon Instruments
8661	APT3200	Duon System

The following Device Type Codes have been modified:

ExpandedDevice Code (Hex)	Description	Company Name
54F8	MSP2002	Siemens Milltronics PI
54F9	MST9500	Siemens Milltronics PI
57EE	ND820/T	Metso Automation
61EB	2211 pH	Knick

Changes to Table 8. Manufacturer Identification Codes

Enumeration(s) added:

224	00E0	Manufacturer Expansion
249	00F9	HART Communication Foundatio
24576	6000	Ex
24577	6001	SEOJIN INSTECH
24578	6002	TASI FLOW
24579	6003	Daehan Control
24580	6004	APM
24581	6005	ORANGE INST. UK
24582	6006	BARTEC
24583	6007	Detcon
24584	6008	MSA
24585	6009	METROVAL
24586	600A	Etalon Rus

Enumeration(s) modified:

81 51 – changed to Sensidyne

A5. Modifications from Revision 15.0 to Revision 16.0

The last revision to the document titled: ‘HART-Smart Communications Protocol, Common Tables’, was HCF_SPEC-183, Revision 15.0. For Revision 16.0, the document tables have been updated to reflect the following changes:

Added Device Type Code tables

Table 1.71 Druck Device Type Codes
Table 1.130 Tokyo Keiso Device Type Codes
Table 1.146 Phase Dynamics Device Type Codes
Table 1.182 Satron Instruments Device Type Codes
Table 1.191 GP:50 Device Type Codes
Table 1.206 Roost Device Type Codes

Changes to Table 1.20 Foxboro Device Type Codes

Enumeration(s) added:

54

Enumeration(s) modified:

None

Changes to Table 1.22 ABB Device Type Codes

Enumeration(s) added:

135

Enumeration(s) modified:

None

Changes to Table 1.23 Honeywell Device Type Codes

Enumeration(s) added:

5, 6

Enumeration(s) modified:

None

Changes to Table 1.26 ABB Device Type Codes

Enumeration(s) added:

35, 36 37, 38, 140

Enumeration(s) modified:

None

Changes to Table 1.29 M-System Co Device Type Codes

Enumeration(s) added:

3

Enumeration(s) modified:

None

Changes to Table 1.31 Micro Motion Device Type Codes

Enumeration(s) added:

52

Enumeration(s) modified:

None

Changes to Table 1.38 Rosemount Motion Device Type Codes

Enumeration(s) added:

58

Enumeration(s) modified:

None

Changes to Table 1.42 Siemens Device Type Codes

Enumeration(s) added:

19, 29

Enumeration(s) modified:

None

Changes to Table 1.55 Yokogawa Device Type Codes

Enumeration(s) added:

83, 84

Enumeration(s) modified:

None

Changes to Table 1.69 Krohne Device Type Codes

Enumeration(s) added:

227

Enumeration(s) modified:

None

Changes to Table 1.71 Druck Device Type Codes

Enumeration(s) added:

233, 236, 239

Enumeration(s) modified:

None

Changes to Table 1.86 Magnetrol Device Type Codes

Enumeration(s) added:

229

Enumeration(s) modified:

None

Changes to Table 1.87 Metso Automation Device Type Codes

Enumeration(s) added:

228, 229

Enumeration(s) modified:

None

Changes to Table 1.130 Tokyo Keiso Device Type Codes

Enumeration(s) added:

123, 127

Enumeration(s) modified:

None

Changes to Table 1.146 Phase Dynamics Device Type Codes

Enumeration(s) added:

127

Enumeration(s) modified:

None

Changes to Table 1.182 Satron Instriments Device Type Codes

Enumeration(s) added:

127

Enumeration(s) modified:

None

Changes to Table 1.191 GP:50 Device Type Codes

Enumeration(s) added:

124

Enumeration(s) modified:

None

Changes to Table 1.197 Kajaani Process Measurements Device Type Codes

Enumeration(s) added:

129

Enumeration(s) modified:

None

Changes to Table 8. Manufacturer Identification Codes

Enumeration(s) added:

209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223

Enumeration(s) modified

108 - changed to " Bopp and Reuther Messtechnik"

Changes to Table 20. Device Variable Family Codes

Enumeration(s) added:

11, 12, 13, 14

Enumeration(s) removed:

None

Enumeration(s) modified:

None

Changes to Table 21. Device Variable Classification Codes

Enumeration(s) added:

92, 93, 94, 95

Enumeration(s) removed:

None

Enumeration(s) modified:

None

A6. Modifications from Revision 14.0 to Revision 15.0

The last revision to the document titled: 'HART-Smart Communications Protocol, Common Tables', was HCF_SPEC-183, Revision 14.0. For Revision 15.0, the document tables have been updated to reflect the following changes:

Added Device Type Code tables

Table 1.19 Fisher Controls Device Type Codes

Table 1.29 M-System Co Device Type Codes

Table 1.93 Pepperl Fuchs Device Type Codes

Table 1.99 MTS Systems Corp. Device Type Codes

Table 1.100 Oval Device Type Codes

Table 1.117 Klay Device Type Codes

Table 1.128 Danfoss Device Type Codes

Table 1.37 Ronan Device Type Codes

Table 1.142 Mettler Toledo Device Type Codes

Table 1.143 Det-Tronics Device Type Codes

Table 1.157 Panametrics Device Type Codes

Table 1.159 Analytical Technology Inc. Device Type Codes

Table 1.157 FINT Device Type Codes

Table 1.162 InterCorr Device Type Codes

Table 1.166 InterCorr Device Type Codes

Table 1.171 Tyco Valves & Controls Device Type Codes

Table 1.176 Phoenix Contact Device Type Codes

Table 1.178 Amer. Level Instr. Device Type Codes

Table 1.181 Pyromation Inc. Device Type Codes

Table 1.189 Badger Meter Device Type Codes

Table 1.194 Hengesbach Device Type Codes

Table 1.202 Spirax Sarco Italy Device Type Codes

Changes to Table 1.10 Brooks Instrument Device Type Codes

Enumeration(s) added:

4

Enumeration(s) modified:

None

Changes to Table 1.17 Endress & Hauser Device Type Codes

Enumeration(s) added:

23, 24, 30, 67, 69, 82, 87, 88, 89, 182, 201, 202, 203

Enumeration(s) modified:
17, 18, 19, 20

Changes to Table 1.20 Foxboro Device Type Codes

Enumeration(s) added:
53, 56, 125
Enumeration(s) modified:
None

Changes to Table 1.23 Honeywell Device Type Codes

Enumeration(s) added:
5
Enumeration(s) modified:
8

Table 1.25 Thermo Measuretech Device Type Codes

Enumeration(s) added:
11
Enumeration(s) modified:
8, 9, 15

Changes to Table 1.26 ABB Automation Device Type Codes

Enumeration(s) added:
3, 4, 29, 137
Enumeration(s) modified:
None

Changes to Table 1.31 Micro Motion Device Type Codes

Enumeration(s) added:
36, 37, 38, 39, 41, 65
Enumeration(s) modified:
7, 20, 21, 30

Changes to Table 1.33 Moore Products Device Type Codes

Name change from Moore Products to PRIME Measurement Products
Enumeration(s) added:
None
Enumeration(s) modified:
None

Changes to Table 1.38 Rosemount Device Type Codes

Enumeration(s) added:
54, 55, 56, 60, 64, 66, 67, 68, 69, 71
Enumeration(s) modified:
1 - changed to "3051"
2 - change to "3044 Temp"
3 - change to "1151"

- 4 - change to "Magmeter"
- 5 - change to "2001"
- 6 - change to "3051C"
- 8 - change to "4050"
- 11 - change to "3001L HTG"
- 12 - change to " Mag HS"
- 13 - change to "3044C Temp"
- 14 - change to "3001C HTG"
- 15 - change to "3051C LP"
- 16 - change to " Vortex"
- 17 - change to "3201 SAM"
- 18 - change to "1152"
- 19 - change to "3202 SAM"
- 20 - change to "3001S HTG"
- 21 - change to "3095FT"
- 22 - change to "3095MV"
- 23 - change to "544 Temp"
- 24 - change to "644 Temp"
- 25 - change to "3144 Temp"
- 26 - change to "3244 Temp"
- 27 - change to "3700"
- 28 - change to "3750"
- 29 - change to " Tri-Loop"
- 30 - change to "3095C"
- 31 - change to "3095MM"
- 32 - change to "3701"
- 33 - change to "3300"
- 34 - change to "3702ASU"
- 35 - change to "2088 Smart"
- 36 - change to " ProBar"
- 37 - change to " Mass ProBar"
- 38 - change to " ProV"
- 39 - change to "2090 Smart"
- 40 - change to " ProBar UC"
- 41 - change to "2055D"
- 42 - change to "3095PV"
- 45 - change to " Sentry"
- 47 - change to " ProPlate UC"
- 59 - change to " 248 Temperature"
- 65 - change to " 5600 Radar Level"

Changes to Table 1.42 Siemens Device Type Codes

Enumeration(s) added:

24, 26

Enumeration(s) modified:

2 - changed to " SITRANS L Level"

Changes to Table 1.46 Rosemount Analytical Device Type Codes

Enumeration(s) added:

13, 24, 25, 26, 27, 28, 29, 30

Enumeration(s) modified:

6 - changed to "2081 pH"

7 - changed to "2081 Cond"

10 - changed to "2054 pH"

11 - changed to "2054 Cond"

14 - changed to "3081FG"

20 - changed to "3081pH"

21 - changed to "3081C"

80 - changed to "54pH/ORP"

81 - changed to "54eC"

Changes to Table 1.47 Metso Automation Device Type Codes

Enumeration(s) added:

61, 63

Enumeration(s) modified:

None

Changes to Table 1.48 Flowserve Device Type Codes

Enumeration(s) added:

4

Enumeration(s) modified:

3

Changes to Table 1.55 Yokogawa Device Type Codes

Enumeration(s) added:

24, 43, 44, 45, 66, 80, 81, 82

Enumeration(s) modified:

None

Changes to Table 1.62 Smar Device Type Codes

Enumeration(s) added:

none

Enumeration(s) modified:

81 - changed to "LD291"

Changes to Table 1.66 Samson Device Type Codes

Enumeration(s) added:

239

Enumeration(s) modified:

none

Changes to Table 1.69 Krohne Device Type Codes

Enumeration(s) added:

None

Enumeration(s) modified:
230

Changes to Table 1.77 Westlock Device Type Codes

Enumeration(s) added:

4

Enumeration(s) modified:

none

Changes to Table 1.79 Saab Tank Control Device Type Codes

Enumeration(s) added:

237

Enumeration(s) modified:

None

Changes to Table 1.82 Draeger Device Type Codes

Enumeration(s) added:

235

Enumeration(s) modified:

None

Changes to Table 1.87 Metso Automation Device Type Codes

Enumeration(s) added:

235

Enumeration(s) modified:

238, 239

Changes to Table 1.88 Siemens Milltronics PI Device Type Codes

Enumeration(s) added:

202, 205, 206, 207

Enumeration(s) modified:

None

Changes to Table 1.94 Accutech Device Type Codes

Enumeration(s) added:

238

Enumeration(s) modified:

None

Changes to Table 1.97 Knick Device Type Codes

Enumeration(s) added:

233

Enumeration(s) modified:

None

Changes to Table 1.104 Harold Beck and Sons Device Type Codes

Enumeration(s) added:

10

Enumeration(s) modified:

None

Changes to Table 1.108 Bopp & Reuther Heinrichs Device Type Codes

Enumeration(s) added:

238

Enumeration(s) modified:

None

Changes to Table 1.114 Dynisco Device Type Codes

Enumeration(s) added:

222

Enumeration(s) modified:

None

Changes to Table 1.140 Magtech Device Type Codes

Enumeration(s) added:

137

Enumeration(s) modified:

None

Changes to Table 1.141 Rueger Device Type Codes

Enumeration(s) added:

127

Enumeration(s) modified:

None

Changes to Table 1.142 Mettler Toledo Device Type Codes

Enumeration(s) added:

121

Enumeration(s) modified:

None

Changes to Table 1.143 Det-Tronics Device Type Codes

Enumeration(s) added:

124

Enumeration(s) modified:

None

Changes to Table 1.161 BERTHOLD Device Type Codes

Enumeration(s) added:

126

Enumeration(s) modified:

None

Changes to Table 1.169 Invensys Device Type Codes

Enumeration(s) added:

none

Enumeration(s) modified:

46

Changes to Table 1.171 Tyco Valves & Controls Device Type Codes

Enumeration(s) added:

none

Enumeration(s) modified:

1

Changes to Table 1.174 Tracerco Device Type Codes

Enumeration(s) added:

127

Enumeration(s) modified:

none

Changes to Table 1.195 Lanlian Instruments Device Type Codes

Enumeration(s) added:

none

Enumeration(s) modified:

116 – code changed from “1” to “116”

Changes to Table 1.197 Kajaani Process Measurements Device Type Codes

Enumeration(s) added:

none

Enumeration(s) modified:

128 –changed to “KC/3”

Changes to Table 1.202 Spirax Sarco Italy Device Type Codes

Enumeration(s) added:

128

Enumeration(s) modified:

none

Changes to Table 2.66 Volumetric Flow Unit Codes

Enumeration(s) added:

170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186,
187, 188, 189, 190, 250, 252

Enumeration(s) removed:

none

Enumeration(s) modified:

None

Changes to Table 2.68 Volume Unit Code

Enumeration(s) added:

170, 171, 172

Enumeration(s) removed:

none

Enumeration(s) modified:
None

Changes to Table 7. Write Protect Codes

Enumeration(s) added:
250, 252, 253

Enumeration(s) removed:
none

Enumeration(s) modified:
None

Changes to Table 8. Manufacturer Identification Codes

Enumeration(s) added:
200, 201, 202, 203, 204, 205, 206, 207, 208

Enumeration(s) modified
33 - changed to "PRIME Measurement Products"
249 – changed to "HART Communication Foundation"

Changes to Table 9. Burst Mode Control Codes

Enumeration(s) added:
250, 251, 252, 253

Enumeration(s) removed:
none

Enumeration(s) modified:
None

Changes to Table 16. Loop Current Mode Codes

Enumeration(s) added:
None

Enumeration(s) removed:
250-253 ¹

Enumeration(s) modified:
None

Changes to Table 20. Device Variable Family Codes

Enumeration(s) added:
8, 9, 10

Enumeration(s) removed:
none

Enumeration(s) modified:
None

Changes to Table 21. Device Variable Classification Codes

Enumeration(s) added:
None

Enumeration(s) removed:
250-253 ¹

Enumeration(s) modified:
None

Changes to Table 22. Trim Point Codes

Enumeration(s) added:
None
Enumeration(s) removed:
250-253 ¹
Enumeration(s) modified:
None

Changes to Table 23. Capture Mode Codes

Enumeration(s) added:
None
Enumeration(s) removed:
250-253 ¹
Enumeration(s) modified:
None

Notes

1. The use of codes 250-253 was reviewed and rationalized in tables 2, 7-9, 16, and 18-23. In most cases these codes are not applicable to the tables in question.

A7. 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 1.78 Drexelbrook Device Type Codes
Table 1.79 Saab Tank Control Device Type Codes
Table 1.80 K-TEK Device Type Codes
Table 1.82 Draeger Device Type Codes
Table 1.84 Siemens Milltronics PI Device Type Codes
Table 1.86 Magnetrol Device Type Codes
Table 1.87 Metso Automation Device Type Codes
Table 1.88 Milltronics Device Type Codes
Table 1.90 Anderson Instrument Company Device Type Codes
Table 1.91 Inor Device Type Codes
Table 1.92 Robertshaw Device Type Codes
Table 1.94 Accutech Device Type Codes
Table 1.96 Kamstrup Device Type Codes
Table 1.97 Knick Device Type Codes
Table 1.101 Masoneilan-Dresser Device Type Codes
Table 1.102 Besta Device Type Codes
Table 1.103 Ohmart Device Type Codes
Table 1.104 Harold Beck and Sons Device Type Codes
Table 1.107 Wika Device Type Codes
Table 1.108 Bopp & Reuther Heinrichs Device Type Codes
Table 1.109 PR Electronics Device Type Codes
Table 1.113 Apparatebau Hundsbach Device Type Codes
Table 1.114 Dynisco Device Type Codes
Table 1.116 Direct Measurement Device Type Codes
Table 1.120 Buerkert Fluid Control Systems Device Type Codes
Table 1.124 GLI Device Type Codes
Table 1.126 Paper Machine Components Device Type Codes
Table 1.127 Labom Device Type Codes
Table 1.129 Turbo Device Type Codes

Table 1.131 SMC Device Type Codes
Table 1.132 Status Instruments Device Type Codes
Table 1.133 Huakong Device Type Codes
Table 1.135 Vortek Instruments, LLC Device Type Codes
Table 1.137 Action Instruments Device Type Codes
Table 1.140 Magtech Device Type Codes
Table 1.141 Rueger Device Type Codes
Table 1.144 TN Technologies Device Type Codes
Table 1.145 Dezurik Device Type Codes
Table 1.147 WELLTECH SHANGHAI Device Type Codes
Table 1.154 Milton Roy Co. Device Type Codes
Table 1.155 PMV Device Type Codes
Table 1.156 Turck Device Type Codes

Added Unit Code Expansion tables

Table 2.1 Temperature Unit 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

A8. 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

A9. 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"

A10. 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"