

PROCEDURE



HART Product Registration Procedure

FCG PD20012, Revision 2.4

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1. Purpose

The purpose of this document is to provide the process and procedures a device manufacturer must complete to advertise their device as HART-Registered.

This document provides information on the registration process, guides manufacturers through registration and defines the requirements to use “HART Registered” logo. This procedure is designed to ensure the interoperability of HART enabled devices in the field. Any product claiming HART compliance must meet all requirements in the HART Communication Protocol Specification, be tested to demonstrate compliance, and registered with the FieldComm Group. In the event there is not a standardized test defined, the manufacturer must prove the device meets the intent of the HART Protocol Specification.

EDD and FDI Package Testing and Registration requirements are referenced in this document, see the separate HART EDD Registration Policy (FCG PD20018) and FDI Package Registration Policy (FCG PD10028) documents for additional information.

2. References

2.1 HART Communication Protocol Specifications

The revision of the Protocol and the specifications comprising a Protocol Revision is indicated by the revision level of the following document:

HART Communication Protocol Specification. HCF_SPEC-013/FCG TS20013

2.2 HART Communication Protocol Test Specifications

The following documents are standardized Test Specifications available from the FieldComm Group:

Slave Token Passing Data Link Layer Test Specification. HCF_TEST-001/FCG TT20001

FSK Physical Layer Test Specification. HCF_TEST-002/FCG TT20002

Slave Universal Command, Test Specification. HCF_TEST-003/FCG TT20003

Slave Common Practice Command, Test Specification. HCF_TEST-004/FCG TT20004

2.3 Device Support File Specifications

The following documents are the standardized specifications for integration of a HART device into host systems:

FDI Specifications:

FIELD DEVICE INTEGRATION (FDI) – Part 1: Overview, FCG TS62769-1

FIELD DEVICE INTEGRATION (FDI) – Part 2: FDI Client, FCG TS62769-2

FIELD DEVICE INTEGRATION (FDI) – Part 3: FDI Server, FCG TS62769-3

FIELD DEVICE INTEGRATION (FDI) – Part 4: FDI Packages, FCG TS62769-4

FIELD DEVICE INTEGRATION (FDI) – Part 5: FDI Information Model, FCG TS62769-5
FIELD DEVICE INTEGRATION (FDI) – Part 6: Technology Mapping, FCG TS62769-6
FIELD DEVICE INTEGRATION (FDI) – Part 7: Communication Devices, FCG TS62769-7

Profiles (protocol annexes):

FIELD DEVICE INTEGRATION (FDI) – PROFILES – Part 109-1: HART® and WirelessHART®, FCG TS62769-109-1

Style Guide:

FDI Usability Style Guide, FCG TS12080

Electronic Device Description Language:

Device Description Language Specification. FCG TS20500

Device Description Language - Method Standard Library Specification. FCG TS20501

EDDL Syntax and Semantics, FCG TS61804-3

EDD Interpretation, FCG TS61804-4

EDDL Builtin Library, FCG TS61804-5

2.4 Other FieldComm Group Documents

These documents published by the FieldComm Group are referenced:

HART EDD Registration Policy. FCG PD20018

FDI Device Package Registration Process. FCG PD10028

Field Device Specific Specification. FCG TS20018

Editable Test Records. HCF_FRM_156/FCG FR20156

FieldComm Group Style Guide, FCG PD10002

3. Definitions

Definitions for terms can be found in HART Communication Protocol Specification, Electronic Device Description Specification, and FDI Specification.

Some of the following definitions are included in the HART Communication Protocol Specification. However, these definitions are critical to the understanding of this specification. As a result, they are included and their meaning amplified.

DD Application	A DD Application is a Host Application that supports the HART Device Description Language.
Device Revision	The integer returned in byte 5 of Identity Commands (see the <i>Command Summary Specification</i>). This defines the revision level of the command set supported by the field device including the device-specific commands.
Device Type	The integer returned in byte 1 and 2 of Identity Commands (see the <i>Command Summary Specification</i>). This defines the command set supported by a field device. New Device Types are controlled and must be allocated by the FieldComm Group.
Field Device	A process connected device that supports the HART Protocol and answers Master requests.
Host Application	One of (possibly) several applications that can be executed sequentially or simultaneously on or through a Master .
Interface	A HART interface is hardware or software that supports only a HART Physical Layer.
Manufacturer ID	An integer used to construct the Unique Identifier used in long frame addresses and, together with the Expanded Device Type and Device Revision, indicates a unique field device command set. New Manufacturer IDs are controlled and must be allocated by the FieldComm Group.
Master	A device that initiates communication activity on a HART network by issuing commands to a Field Device .
Unique Identifier	The concatenation of the Manufacturer ID, Device Type and Device ID used in constructing the long frame address (see the <i>Token Passing Data Link Layer Specification</i>). These three data, when combined, uniquely identify a specific field device. No two devices manufactured may have the same combination of these three data.

4. ACRONYMS

The following acronyms are used throughout this process description:

Acronym	Meaning
EDD	Electronic Device Description
EDDL	Electronic Device Description Language
DPCTT	Device Package Conformance Test Tool
DSFT	Device Support File Test
DUT	Device Under Test
FDI	Field Device Integration
UIP	User Interface Plug-in

5. Requirements Terminology

The following keywords define requirements levels as defined in RFC 2119.

MUST	This word, or the terms “REQUIRED” or “SHALL”, means that the definition is an absolute requirement of the specification.
MUST NOT	This phrase, or the phrase “SHALL NOT”, means that the definition is an absolute prohibition of the specification.
SHOULD	This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
SHOULD NOT	This phrase, or the phrase “NOT RECOMMENDED” means that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
MAY	This word, or the adjective “OPTIONAL”, means that an item is truly optional. One manufacturer may choose to include the item because a particular marketplace requires it or because the manufacturer feels that it enhances the product while another manufacturer may omit the same item. An implementation that does not include a particular option MUST be prepared to interoperate with another implementation that does include the option, though perhaps with reduced functionality. In the same vein an implementation that does include a particular option MUST be prepared to interoperate with another implementation that does not include the option (except, of course, for the feature the option provides.)

6. Device Registration Policy

The HART-Registered Mark on a product is the manufacturer's representation that a sample of the product has successfully completed all test requirements specified in the FieldComm Group's HART Product Registration Procedure. Devices that do not complete the registration process cannot claim to be "HART Registered".

HART, WirelessHART, and FDI are registered trademarks of the FieldComm Group. The FieldComm Group is committed to protecting and ensuring the integrity of these trademarks. Products that do not comply with HART Communication Protocol requirements will not be allowed to represent themselves as HART compliant.

The HART Product Registration Procedure defines a series of test requirements for a particular device profile. The test requirements may include one or more test campaigns that are performed by the manufacturer, an approved third party testing facility or FieldComm Group's laboratories. FieldComm Group audits each product as it completes the process and permits those that conform to the Product Registration Policy to carry the HART-Registered Mark. Placing the mark on a product that has not completed the Registration Process is a trademark violation.

Optional device features may be implemented. The test specifications summarize a set of features that a product supports. Those features trace back to specific test requirements approved by the FieldComm Group's specification approval process. A device must pass all required test specifications related to the feature when implemented. The list of tested features are identified within the registration documentation provided by FieldComm Group.

HART Compliance Testing and Registration rules:

- No new **HART 5** devices (defined as a new Device Type) will be accepted for Compliance Registration.
- Existing HART 5 devices (defined as a HART 5 Device Type that is both on the market and has a Registered DD/EDD effective on or before 31 March 2011) will be accepted for Compliance Registration.
- Devices built to HART 6 or 7 will be accepted for Compliance Registration.
- DD/EDD and/or FDI Device Package Registrations for new products (new Device Type and/or new Device Revision) are required as an add-on to the device (device type, device revision) that is Registered.
- DD/EDD and/or FDI Device Package revisions (including HART 5) will be accepted for Re-Registration provided that a DD/EDD and/or FDI Device Package for that Device Type and Device Revision is already Registered.

7. INTRODUCTION

The *HART Product Registration Procedure* (FCG PD20012) provides the compliance testing and registration policy and process for HART devices. In addition, WirelessHART Product Registration (FCG PD20014) will be used for devices using WirelessHART™ technology. HART hosts (including EDDL and/or FDI) host applications should use HART Host Registration Process (FCG PD20016). FDI Package Registration (FCG PD10028) outlines the process for FDI Package registrations. The EDD registration will follow HART EDD Registration Policy (FCG PD20018).

The purpose of the *HART Product Registration Procedure* is to increase the assurance that devices registered with the FieldComm Group will be interoperable and meet the requirements of the HART Communication Protocol and supporting specifications.

The *HART Product Registration Procedure* defines procedures for testing the compliance of HART devices. This procedure is intended to guide the submitter through the compliance testing and registration process.

The balloted and approved test specifications standardize and eliminate the need for each manufacturer to develop their own test plans to confirm compliance. In addition, test automation and check lists are provided to further reduce the manufacturer's burden for testing.

Manufacturers have the responsibility to confirm the test results through the FieldComm Group's *HART Product Registration Procedure*. Manufacturers must perform the tests and certify the results. Complete documentation must be provided to the FieldComm Group (or its designees) for verification. A manufacturer may elect to contract with the FieldComm Group (or its designees) to perform the compliance tests on their behalf.

The *HART Product Registration Procedure* requires that FieldComm Group (or its' designee) independently test and verify that the device meets requirements consistent with the intent of the HART Communication Protocol and supporting specifications. Devices that successfully complete the Compliance Registration process will be recognized as "HART Registered" and the manufacturer will be authorized to use and display the "HART Registered" mark with that product.

8. Protocol Revision

Any product claiming compliance with the HART Communication Protocol must adhere to all Specifications referenced in the HART Communication Protocol revision the device is compliant to. Collectively, those documents and their revisions comprise a HART Communication Protocol revision that is known to function as a set. Mixing Protocol Specification revisions not collectively identified in a Protocol Revision is not allowed. New manufacturers of HART devices must use the latest HART Protocol revision.

Table 1. Protocol Revisions for Testing

HART Communication Protocol Revision	Product Submissions Accepted	
	Initial Registration	Re-Registration
HART 5		★
HART 6	★	★
HART 7	★	★

The HART Test System tests all HART Communication Protocol Revisions.

Various products utilize different elements of the HART Communication Protocol. For example, an interface that translates a serial RS-232 signal to a HART FSK signal might only support the HART Physical Layer and, thus, require limited testing to demonstrate compliance.

Table 2 summarizes elements of the HART Communication Protocol as they apply to various products.

9. Test Specifications

The product manufacturer is responsible for demonstrating HART Protocol Compliance. Several standardized test specifications are available to the manufacturer addressing the FSK Physical Layer (all devices); Slave Token Passing Data Link Layer; Slave Universal Command; and Slave Common Practice Commands. These Test Specifications represent the test minimums for Protocol Requirements covered in their scope. Manufacturers must perform any additional testing required to ensure conformance. In the event there is not a standardized test defined, the manufacturer must prove the device meets the intent of the HART Protocol Specification.

All products not covered by HART Test Specifications shall document, in their test plans, all tests and test cases necessary to demonstrate conformance with all HART Protocol, EDDL, and FDI Requirements. This test plan must be submitted to the FieldComm Group for approval at least 60 days prior to performing compliance tests. Only those test plans that have been approved by the FieldComm Group shall be used to demonstrate compliance to the Specifications.

Table 2. Summary of Requirements for Products

Product	Applicable Requirements				
	Physical	TPDLL	Application	DDL	FDI
Field device	★	★	★	★ ¹	★ ¹
WirelessHART Product ²	★	★	★	★ ¹	★ ¹
Interface	★				
Master	★	★			
Host Application (DCS) ³	★	★	★		
EDD Enabled Application ³	★	★	★	★	
FDI Enabled Application ³	★	★	★	★	★

- 1 For Field device EDD and FDI Device Package testing requirements refer to the FieldComm Group's HART EDD Registration Policy (FCG PD20018) and FDI Device Package Registration Policy (FCG PD10028).
- 2 See WirelessHART Device Registration Procedure (FCG PD20014) for WirelessHART™ based field device
- 3 See HART Host Registration Procedure (FCG PD20016) for HART Host Registration

9.1 Physical Layer Tests

Minimum test requirements for the HART FSK Physical Layer are defined in the *FSK Physical Layer, Test Specification*. All products supporting an FSK Physical Layer must pass these tests and document any alternate tests used or tailoring of the existing tests that occur. Products supporting the HART C8PSK Physical Layer must receive approval from the FieldComm Group for their Physical Layer Test Plan prior to testing.

9.2 Token Passing Data Link Layer

Compliance of the Token Passing Data Link Layer of the field device must be demonstrated. Standardized minimum test requirements for field devices are provided in the *Slave Token Passing Data Link Layer, Test Specification*. Devices must pass all tests to be considered HART compliant.

9.3 Application Layer

Compliance of the Universal and Common Practice Application Layer of the field device must be demonstrated. Standardized minimum test requirements for field devices are provided in the *Slave Universal Command, Test Specification*; and the *Slave Common Practice Command, Test Specification*. Devices must pass all Universal tests to be considered HART compliant. Devices must pass all relevant Common Practice tests associated with the chosen set of optional commands to be considered HART compliant. All testcases must be executed, however some Common Practice tests will result in the final verdict of “not applicable” for commands that are not implemented.

Field device manufacturers must also supply the Field Device Specification (see *Field Device Specific Specification* HCF_LIT-18/FCG TS20018).

10. Device Support Files

All Field devices are required to support an EDD and/or FDI Device Package. The EDD and FDI Device Package (if available) must be registered concurrently with the device at FieldComm Group. The EDD and FDI Device Package registration process is governed by FieldComm Group EDD and FDI Device Package Registration Policy (FCG PD20018 and PD10028)

11. Test Campaign Overview

Any product or product revision claiming HART compliance must be registered with the FieldComm Group. To register a device with the FieldComm Group, a manufacturer must request a Test Campaign. The requirements of a Test Campaign are listed below:

- Devices must be tested to demonstrate compliance with all applicable HART Protocol requirements (e.g., a HART device must demonstrate conformance to Physical Layer, Data Link Layer, and Application Layer requirements for a complete set of HART Communication Protocol Specifications).
- The manufacturer must provide Device Support Files (EDD and/or FDI Device Package). The Device Support Files must be tested and registered with the FieldComm Group concurrent to the device registration process.
- A registration form and a complete registration package (including any Device Support Files) must be supplied to the FieldComm Group (or its designees).
- The FieldComm Group will review the registration package and assess compliance.
- The FieldComm Group (or its designees) will verify conformance by conducting a 100% verification of tests.
- The FieldComm Group will affirm the device compliance by issuance of a registration certificate to the manufacturer.
- Once receiving the certificate, the product's manufacturer is strongly encouraged to display the "HART Registered" mark on the registered device and documentation.
- The FieldComm Group will maintain and publish the list of devices that are "HART Registered". Product identification information including revision information will be publicly available.
- The FieldComm Group will retain and publish the registered Device Support Files including EDD and/or FDI Device Packages. The Device Support Files will be publicly available.

11.1 Demonstrating Compliance of a Device

To be "HART Registered," a product must demonstrate compliance to the HART Communication Protocol. Standardized tests are used whenever available. For all products, test data must be captured using the approved versions of the HART Test System (FCG TT20192). A list of approved versions is available from the FieldComm Group website.

Test reports must be created using available templates (HCF_FRM-156.x/FCG FR20156.x). This test data will be used by the FieldComm Group (or its designees) to assess compliance with the HART Communication Protocol and for comparison with the results of tests run by the FieldComm Group (or its designees).

11.2 Demonstrating Compliance of a Device Support File

Device manufacturers must provide Device Support Files (EDD and/or FDI Device Package) for registration in addition to the device submission. A Device Support File will be accepted for testing without the device only if the device is already HART-Registered or in the process of a compliance assessment.

11.3 Demonstrating Compliance of an Updated Device Support File

Device manufacturers can provide Device Support Files (EDD and/or FDI Device Package) for re-registration if the Device Support Files (either EDD or FDI Device Package) were previously registered. A device submission is required with the submission of the re-registration of FDI Packages.

12. Test Campaign Submission

The manufacturer must supply the FieldComm Group with all required documentation to complete the Test Campaign submission.

- Online submission form(support.fieldcommgroup.org) as checklist for submittal.
- HCF_FRM-156.2/ FCG FR20156.2 (submit scope captures with required documentation)
- HART Test System files from Data Link Layer Tests include the .qa.log and .OUT files
- HCF_FRM-156.1/ FCG FR20156.1
- HART Test System files from Universal Application Layer Tests include the .qa.log files
- HCF_FRM-156.3/ FCG FR20156.3
- FCG FR20156.4/ FCG FR20156.4 HART Test System files from Common Practice Application Layer Tests include the .qa.log
- HART Test System files from DLL039a and DLL039b include .qa.log files.
- HART Field Device Specification (HCF_LIT-18)

- User and device specific, technical documentation
- FCG FR20110 HART Product Exhibits
- One representative, fully functional sample of the product for testing. This sample will be returned at the conclusion of the test campaign.
- Return label with pre-paid shipping account or return shipment information.
- Payment method for testing and registration fees: Credit Card or Purchase Order

To avoid delays in device testing careful attention must be provided to ensure the completeness of the Test Campaign Submission.

Product components that can operate as independent HART slave devices must be registered separately.

12.1 Test Campaign Shipments

The test documentation, log files, supporting files and the payment method covering the testing and registration fees must be submitted in complete electronic form to the FieldComm Group via the Test Campaign Submission form <https://support.fieldcommgroup.org/en/support/tickets/new> The sample of the product for testing must be shipped to the FieldComm Group (or its designees). Please contact the FieldComm Group prior to submitting oversize devices or devices weighing in excess of 40 lbs (18 kg).

The address for submission to the FieldComm Group test lab in Austin, Texas, USA is:

FieldComm Group
9430 Research Blvd., Suite 1-120
Austin, Texas 78759 USA
Attn: HART Product Registration

The address for submission to the ITEI test lab in Beijing, China is:

ITEI
397A Guanganmenwai St.
Beijing, China. 100055
Attn: HART Product Registration

Product samples will be returned to the manufacturer after their evaluation by the FieldComm Group (or its designees) provided that shipping costs are paid for by the submitter. If submissions are not claimed from the FieldComm Group for longer than 180 days, the submitted devices may be destroyed.

12.2 FieldComm Group Review of Registration Submission

The FieldComm Group will review all submissions to assess their completeness and assess the compliance of the product. In general, this review will include the following:

- Review and record submission package from the manufacturer;

- Confirm information provided meets the minimum submittal requirements;
- Verify the test data, plans and reports submitted are consistent with HART Communication Protocol requirements;
- Conduct 100% test verification to confirm the submitted product is compliant to the HART Product Registration Procedure requirements
- Record the assessments performed and findings produced
- Notify the manufacturer of findings
- Return sample of submission product to the manufacturer

Any discrepancies or deficiencies will be brought to the manufacturer's attention and must be resolved prior to completing product registration. Additional test campaigns may be required at additional cost.

12.3 Affirmation of Compliance

Products successfully completing the registration process will receive a Certificate of Registration and authorization for manufacturer to display the official "HART REGISTERED" mark on products and documentation (see Section 12.4).

The FieldComm Group will publish the affirmed compliant product along with the FieldComm Group list of other HART Registered products (e.g., on the FieldComm Group's website). HART Registered products will be listed along with their product identification data and revision information.

12.4 Registration MARK Usage

The "HART Registered" mark signifies a products performance is consistent with HART Communication Protocol requirements. Manufacturers successfully registering products are encouraged to display the mark on products and documentation achieving the status.

- When at all possible, the mark must appear on product and product documentation with a size large enough to be readily identifiable
- Mark must be produced in accordance with the FieldComm Group Style Guide (FCG_Style_Guide_FCG_PD10004)



Figure 1 HART Registered mark.

This mark signifies to end users that the product, after an independent review, has successfully demonstrated HART Protocol compliance. Artwork is available upon request from the FieldComm Group.

13. Reports of Product Non-Conformance

In the event that FieldComm Group receives information that a product asserted by a manufacturer as compliant or HART-Registered to the HART Communication Protocol does not comply with the HART Specifications, the FieldComm Group will notify the manufacturer and present any data substantiating the claim. The manufacturer will have 60 days to respond to the FieldComm Group. Based on the response from the manufacturer the FieldComm Group HART Technology Director will make a recommendation to the President.

The recommendation would be to either remove the Product Registration from the FieldComm Group website, develop a plan of bringing the product into compliance, or not to take further action. Should a manufacturer indicate that it is not willing to make the necessary changes to the product found to be non-conformant; the issue will be sent to the FieldComm Group President and possibly to the Board of Directors for further action.

In such case, if the FieldComm Group President reasonably decides that the product is not conforming to the HART Communication Protocol and conformance test specifications, upon such President's decision the manufacturer agrees; (a) to cease all representation that the product is HART conforming, (b) that FieldComm Group may remove the Device Registration from its files, and (c) that the President may take other actions as the President deems necessary. The FieldComm Group retains the right to prohibit any company from claiming conformance, if products are found to be non-conforming, in order to protect the HART trademark.

Annex A. Revision History

A1. Changes from Revision 2.3 to 2.4

Added requirement for Device Support Files to be submitted concurrently with a device for registration.

References to HCF_LIT-1 and HCF_LIT-5 were removed as those documents are now obsolete.

Added FDI Device Package and EDD Registration clarifications.

Removed ambiguous statements and coverage of products other than HART Field Devices.

Added FieldComm Group document number references.

A2. Changes from Revision 2.2 to 2.3

The Registration Policy was clarified with respect to Compliance Registration and DD/EDD Registration. Existing HART 5 devices defined as HART 5 device that is both on the market and has Registered DD/EDD on 31 March 2011 was added with some clarification to Compliance Testing and Registration Policy Rules. Minor improvements were also made in the Preface and Scope text for consistency.

A3. Changes from Revision 2.1 to 2.2

Document updated to reflect that registration is mandatory to represent a device as compliant. Added HCF Board of Directors Registration Policy update and timeline. Changed document to reflect that the HCF will independently conduct 100% of the tests to verify the submitted test results submitted. Provides a cutoff date after which HART 5 devices will no longer be accepted for registration. Additionally information is added to help clarify the minimum requirements for different conformance classes of host testing.

A4. Changes From Revision 2.0 to 2.1

Document updated to reflect the new HCF logo and copyright information.

A5. Changes From Revision 1.3 to 2.0

This document has been updated with Revision 2.0 to reflect changes in the HCF Quality Assurance and Registration Program. With 2.0 the requirement for manufacturers to register their devices is in force. No longer will manufacturers be able to tout HART compliance if they have not performed the tests and certified compliance.

Minor changes in procedure have been adopted that will allow for a more informed information flow. New logos and documents have been added to the registration procedure. Updated documents include the "Device Registration Form" in Appendix A and the "Certificate of Registration" in Appendix B have been modified to work with the new program. The Device Registration Form has been modified to include details on slave/device or master/host and a fee structure has been laid out.

A6. Changes From Revision 1.2 to 1.3

This document has been updated with Revision 1.3 to reflect modifications to referenced documents. In addition, the "Device Registration Form" in Appendix A has been modified to reflect that the Common Tables are used as specified. This change was directed by the Common Tables Working Group to address identified implementations that had deviated from the Common Tables as specified.