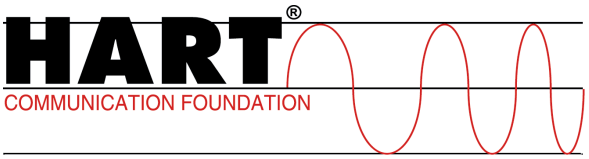
HART Protocol Specification

Field Communications



Command Response Code Specification

HCF_SPEC-307, Revision 5.0

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Preface

This preface is included for informational purposes only.

Previous versions of this document were included in the complete HART Protocol specification only as an appendix. With introduction of the HART 6, the previous title of this document, *Appendix 1: Command Specific Response Code Definitions*, was replaced with the more appropriate title, *Command Response Code Specification*.

From Revision 4.1 to 5.0, this document was reformatted to conform to other specifications of the HART Communication Foundation. The layout of the chapters has been reviewed and reorganized.

In addition to functional changes, the document as a whole has been reformatted to include new sections: Preface, Introduction, Scope, References, Definitions, Symbols/Abbreviations, and Data Format. The additional sections and the new format improves the clarity and consistency of the specifications.

Introduction

In the HART Protocol, a slave device supplies information to a master in its message response about the execution of a particular command. This information is specified for Universal and Common Practice Commands as either a warning or an error. The type of warning or error communicated is determined by a Response Code embedded in the message response.

Most commonly, responses will convey only the message that a command was executed without error. However, when some difficulty is encountered, any error or warning response should supply as much detail as possible to simplify correction of any malfunction or misinterpretation of data. The purpose of the *Command Response Code Specification* is to uniformly define all responses available to manufacturers for inclusion in their HART compatible devices.

Since the assignment of response codes for device-specific commands is not handled anywhere else in the protocol specification, this information is also included in this document.

1. SCOPE

This document 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.

Response Codes indicate command completion status that may be returned by a Field Device in response to a host application's HART command. The most significant bit of the Response Code is always set to zero to differentiate the Response Code from a Communication Error summary (see the *Command Summary Specification*). As a result, the Response Code is encoded as a 7-bit enumeration (i.e., as an enumeration between 0 and 127).

This document specifies all requirements pertaining to the assignment, classification, definition and application of Response Codes. Response Codes in all commands, whether defined by the Protocol Specifications or device-specific commands defined by a manufacturer, must follow the requirements in this document.

2. REFERENCES

2.1 HART Field Communications Protocol Specifications

HART Field Communications Protocol Specification. HCF_SPEC-12

Command Summary Specification. HCF_SPEC-99

Universal Command Specification. HCF_SPEC-127

Common Practice Command Specification. HCF_SPEC-151

2.2 Related HART Documents

The HART Protocol Specifications frequently reference the manufacturers' device-specific document. Device-specific documents are developed and controlled by the respective manufacturer and should follow the requirements of the following HART Communication Foundation document:

Field Device Specification Guide. HCF_LIT-18

3. DEFINITIONS

Definitions for terms can be found in *HART Field Communications Protocol Specification.* Terms used in this document include: Data Link Layer, Delayed Response, Delayed Response Mechanism, Device Variable, Busy, Dynamic Variable, Fixed Current Mode, Floating Point, ISO Latin-1, Multi-drop, Not-A-Number, Packed ASCII, Preamble, Request Data Bytes, Response Data Bytes, Units Code

4. SYMBOLS/ABBREVIATIONS

DR	**D**elayed **R**esponse
HCF	**H**ART **C**ommunication **F**oundation
RC	**R**esponse **C**ode

5. RESPONSE CODES

Response Codes are a 7 bit enumerations with all 128 values controlled by the HCF. All devices and all commands must use Response Codes exactly as specified in this document. This section classifies the Response Codes and defines requirements governing their use in commands.

5.1 Response Code Classifications

Response Codes are classified two ways. The first is by the severity of the exception encountered in the Field Device's execution of the command (see Table 1). Response Codes provide a Notification, Warning or Error indication to the host.

Table 1. Response Code Severity Levels

Response Code Class	Definition
Notification	Command executed properly with no exceptions. The Response Code equals zero (0) and the Response Data Bytes are returned.
Warning	Command executed with the deviation as described in response (e.g., a value was set to its nearest legal value). The Response Data Bytes are returned and indicate the data actually used by the Field Device.
Error	Command execution was not properly completed and the Response Code indicates the reason (e.g., the device is in Write Protect mode). While the Extended Command number is included (if appropriate) in the slave response, the Response Data Bytes are NOT returned.

In addition to classification by severity level, some Response Codes have a single, universal definition and some may have different definitions for different commands. Single-definition Response Codes have the same meaning independent of the command that uses them. Multiple-definition Response Codes have several meanings. However, all Response Codes have a single meaning for a given command at all times. The only legal Response Codes for a command are documented in the HART Protocol Command Specification or, for device-specific commands, the manufacturer's device-specific documentation. Reserved Response Codes must not be used by any device.

All 128 possible Response codes are assigned and classified. The classification of Response Codes is specified in Table 2 and Figure 1. To assure proper interpretation of response codes by hosts, these assignments must be observed whenever new response codes are allocated for existing commands or when allocating response codes for new commands.

All single definition Response Codes must use the definitions exactly as specified in this document. Manufacturers may assign a new meaning to multiple definition codes in their device-specific commands. However, for a given command, the meaning of its Response Codes must not change without the Field Device's Device Type number being changed as well (see the *Command Summary Specification* for complete Field Device revision rules).

Table 2. Response Code Classification

Response Codes	Definition Type	Number of Definitions
1-7, 16-23, 32-64	Error	Single
9-13, 15, 28, 29, 65-95	Error	Multiple
24-27, 96-111	Warning	Single
8, 14, 30, 31, 112-127	Warning	Multiple

Note: Response Code #0 indicates that the command was executed without any exception (error or Warning).

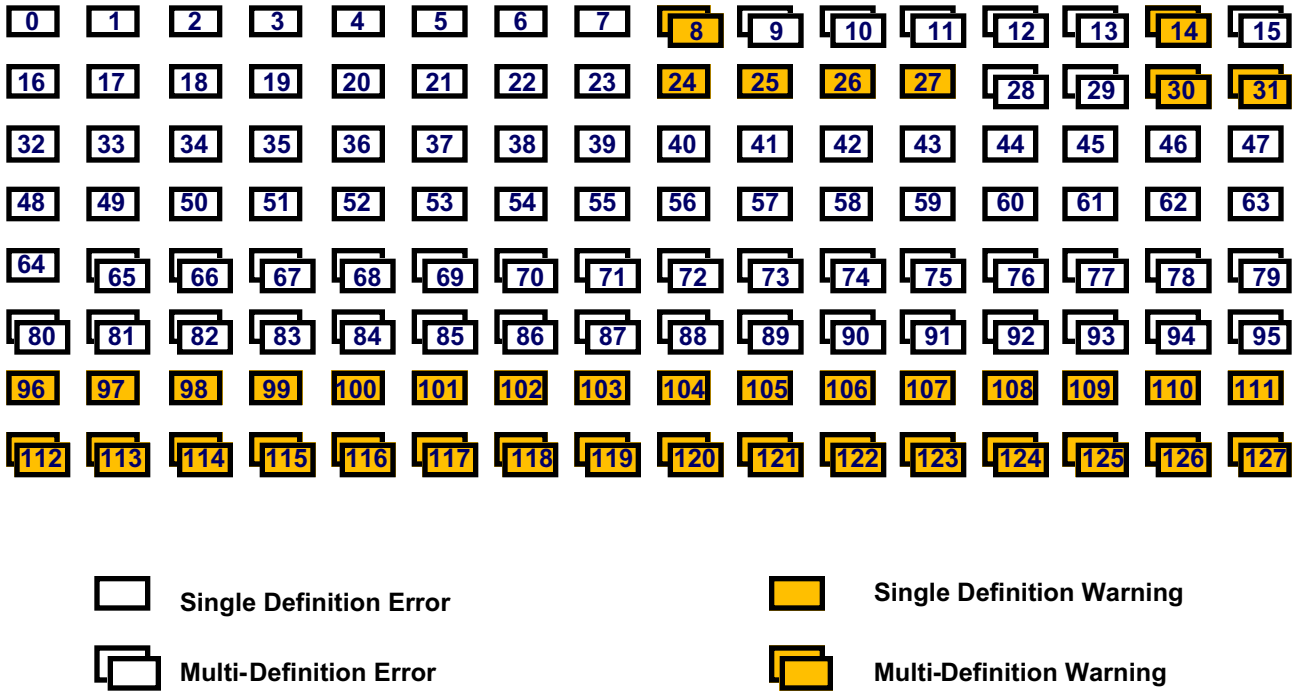

Figure 1. Response Code Classification

5.2 Command Not Implemented

All HART compatible field devices must answer all commands addressed to them. All HART compatible devices must implement all Universal Commands. For any other command, Response Code #64, Command Not Implemented may be returned by the field device.

This is the only Response Code that may be returned by a field device even though it is not listed in the command specification. Any other Response Code may only be returned by the field device if it is explicitly defined in the command specification.

5.3 Busy

If indicated in the command specification, Response Code #32, Busy may be returned in response to a master request. Response Code #32, Busy, indicates to the host application that the field device cannot begin its execution of the command due to other functions being performed. `READ` commands must not return this Response Code. When receiving a Busy response from a slave, Host applications should continuously retry their request until the field device can execute the command.

New commands should not be designed to return Busy. Instead they should be designed to use the more efficient Delayed Response Mechanism (see the *Command Summary Specification*).

5.4 Command Requirements

All command specifications must indicate the Response Codes that are allowed in a field device's response to the host application's request. Furthermore, a field device may only return a Response Code that is defined in the command specification. There is no fixed number of Response Codes that must be specified for a command. However, sufficient Response Codes must be defined to allow the host application to:

- Clearly determine the status of the command's execution by the field device;
- Diagnose the root cause of the exception (if any) encountered by the field device; and
- Allow the command to be corrected and re-transmitted to the field device.

Since only one Response Code may be returned at a time from the field device, each potential error or warning should be indicated by a separate enumeration.

5.4.1 WRITE Commands

Write commands should only contain a single property or data item (see *Command Summary Specification*) as only one Response Code can be reported in a Field Device reply. If more then one property is written with a single command, then the Command's Response Codes must include definitions that combine possible simultaneous exception cases (e.g. see RC #13 Upper and Lower Range Values Out Of Limits).

5.4.2 Indexed Commands

Index Commands allow a single command access to an array of data items (e.g., properties, Dynamic Variables, or Device Variables). Each Response Code must have a single definition for any value of the index. All Response Codes must be valid for any value of the index.

5.4.3 Multi-Transaction Commands

Multi-transaction commands allow a sub command number to be placed in the Request and Response Data field. Each transaction is treated as a separate command. As a result, the command specification must include a separate Response Code specification for each transaction. Response Code requirements for a transaction are identical to those for a normal HART command (e.g., the definition of a Response Code is constant for a given transaction at all times).

5.5 Choosing Response Codes for New Commands

All Commands must specify a single-definition Response Code wherever possible. Multiple-definition Response Codes may be recycled and used in command specifications when no single definition Response Code is applicable. In other words, multiple-definition Response Codes may be used as needed to return command completion information when no single definition codes are applicable. For multiple-definition Response Codes used in this manner, the definition of the Response Code must be included in the manufacturer's device-specific documentation.

The following requirements must be adhered to when defining a new command specification:

1. Identify the exceptions that may be produced when executing the command.

2. Classify each exception as a warning or an error. A warning indicates that the command was successful, although the field device's execution of the command varied somewhat from the host application's actual request (e.g., a value was rounded of or changed)

3. For each exception determine whether a single definition Response Code is applicable. If so, use that Response Code.

4. If the exception does not match a single definition code, then use a multi-definition code adding the new command-specific definition to the command specification. Start re-using the multi-definition Response Codes sequentially from the lowest valued code available.

Unassigned or reserved Response Codes may not be used in any Command.

6. RESPONSE CODE DEFINITIONS

This section provides the actual definition associated with each Response Code. For single definition codes all devices must use the definition indicated in this section.

For multi-definition codes a variety of example definitions found in the Protocol specifications are included. Command specifications may use these definitions or provide their own definition for multi-definition codes. The actual definition for a multi-definition Response Code must be included in the command specification and published to allow proper interpretation by host applications.

Unassigned single definition Response Codes may only be assigned by the HCF and must not be used by any manufacturer. These codes include: 21-27, 37-63, and 96-111.

6.1 RC #0 Success

This code must have the following exact meaning for any command that utilizes this response code.

No Command-Specific Errors	No errors or warnings were found in verifying the parameters for this command.

6.2 RC #1 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Undefined	Not defined at this time. This code was used in earlier versions of the Protocol and must not be used in any field device. The definition prior to HART Revision 5 was: "Type Code Mismatch", i.e., "The Field Device Type Code in Data Byte #0 of a Device-Specific command did not match the Type Code of the field device".

NEXT
Single Definition Error

6.3 RC #2 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Selection — The code or index was not allowed in this command or for this field device.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.4 RC #3 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Passed Parameter Too Large — The value of a parameter was too large and the command could not be executed in the field device.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.5 RC #4 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Passed Parameter Too Small	The value of the parameter was too small and the command could not be executed in the field device.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.6 RC #5 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Too Few Data Bytes Received	The number of bytes contained in the message was less than required to execute the command.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.7 RC #6 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Device-Specific Command Error	An error has occurred for which a Command-Specific Response Code has not been defined. Further information on this response code must be available in the device-specific documentation. In addition, Command 48, Read Additional Device Status, should allow the identification of the specific error source (e.g., the device may be performing a self test).

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.8 RC #7 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

In Write Protect Mode	The field device is Write Protected and cannot accept this write command.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.9 RC #8 (Multi-Definition Warning)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

The command was executed but, a deviation from the host application's request was necessary to complete the command successfully. The values actually used are returned in the field device's Response Data Bytes.

Update Failure	The real-time data returned from the field device has not changed since the last time it was read.
Set to Nearest Possible Value	The data sent to the field device has been rounded or truncated due to limitations within the field device. The command has been accepted.
All but running delayed responses flushed	A delayed response is being performed by the field device that may not be interrupted or canceled by Command 106, Flush Delayed Responses.

NEXT
Multi-Definition Warning

6.10 RC #9 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Lower Range Value Too High	Lower Range Value was above the Upper Transducer Limit or some other physical device limitation is exceeded.
Applied Process Too High	The process applied to the field device was too high.
Not In Proper Current Mode	The field device is not in Fixed Current Mode or the current has not been set to the proper value.

NEXT
Multi-Definition Error

6.11 RC #10 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates the command was not executed. No Response Data Bytes are returned from the field device.

Lower Range Value Too Low	Lower Range Value was below the Lower Transducer Limit or some other physical device limitation is exceeded.
Applied Process Too Low	The process applied to the field device was too low.
Invalid Local Panel Lock Code	The code received by the field device is not supported or is not a legal code.

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.12 RC #11 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Upper Range Value Too High	Upper Range Value was above Upper Transducer Limit.
In Multi-drop Mode	The device is in multi-drop and, as a result, the command cannot be executed.
Invalid Device Variable Code	This Device Variable is not supported by the requested command or operation. In other words, the Device Variable is valid but you cannot use it with this command.
Trim Error, Excess Correction Attempted	The difference between the measured and actual value is so large that the field device is unable to correct the value in its calculation.
Cannot Lock Panel	The field device is in a mode that does not allow the local panel to be locked (e.g., the operator is already using the local panel).

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.13 RC #12 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Upper Range Value Too Low	Upper Range Value was below the Lower Transducer Limit.
Invalid Units Code	The requested units code is not supported within the context of this command, Device Variable, or Dynamic Variable.
Invalid Slot Number	The requested slot code to capture the Dynamic Variable or Device Variable is not valid for the designated Command Number.
Invalid Mode Selection	The requested (e.g., loop current) mode is not valid.

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.14 RC #13 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Transfer Function Code	The requested transfer function is not supported for this Analog Channel or Dynamic Variable.
Upper and Lower Range Values Out Of Limits	The Upper and Lower Range Values are outside the transducer limits or some other physical device limitation has been exceeded.
Computation Error	An arithmetic error was encountered while the field device was attempting to apply the new values in the host application's command request.
Command Number Not Supported	The requested command number to be captured is not supported in this field device.

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.15 RC #14 (Multi-Definition Warning)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

The command was executed but, a deviation from the host application's request was necessary to complete the command successfully. The values actually used are returned in the field device's Response Data Bytes.

Span Too Small	The Span, as determined from the Upper and Lower Range Values, was below the Minimum Span.
New Lower Range Value Pushed Upper Range Value Over Transducer Limit	The field device used the Lower Range Value requested and modified the Upper Range value accordingly. Unfortunately, the Upper Range Value saturated and the span was not maintained.

PREVIOUS Multi-Definition Warning

NEXT Multi-Definition Warning

6.16 RC #15 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Analog Channel Code Number	The analog channel does not exist in this field device.

PREVIOUS Multi-Definition Error

NEXT Multi-Definition Error

6.17 RC #16 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Access Restricted — The command was rejected due to a condition within the field device that would prevent proper execution.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.18 RC #17 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Device Variable Index — The requested Device Variable does not exist in this field device.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.19 RC #18 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Units Code	The requested units code is not supported within the context of this command, Device Variable, or Dynamic Variable.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.20 RC #19 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Device Variable Index Not Allowed	This Device Variable is not supported by the requested command or operation. In other words, the Device Variable is valid but you cannot use it with this command.

PREVIOUS
Single Definition Error

NEXT
Single Definition Error

6.21 RC #20 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Extended Command Number	The Extended Command Number was less then 512.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.22 RC #21-#23 (Single Definition Error)

Reserved for future definition by the HCF. These codes may not be used by any manufacturer.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.23 RC #24-#27 (Single Definition Warning)

Reserved for future definition by the HCF. These codes may not be used by any manufacturer.

NEXT Single Definition Warning

6.24 RC #28 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Invalid Range Units Code The units code included in the command are not supported by the field device for this Analog Channel or Dynamic Variable.

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.25 RC #29 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

No specific definition at this time.

PREVIOUS
Multi-Definition Error

NEXT
Multi-Definition Error

6.26 RC #30-#31(Multi-Definition Warning)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of these codes indicate that the command was executed but, a deviation from the host application's request was necessary to complete the command successfully. The values actually used are returned in the field device's Response Data Bytes.

No specific definition at this time.

PREVIOUS Multi-Definition Warning

NEXT Multi-Definition Warning

6.27 RC #32 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Busy

This code can be caused by one of two conditions: (1) the device is busy performing a function that cannot be interrupted by this command; or (2) the command requested needs the delayed response mechanism. Unfortunately, all delayed response buffers are used.

In either case the host application should retry its request a large number of times (e.g., more than 30 times) until the field device can execute the command.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.28 RC #33 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Delayed Response Initiated	The command could not be serviced in the time given by the Data Link Layer. A delayed response was initiated. The host application should retry the exact same request after a time delay (e.g., after delaying several seconds). When communicating via a multiplexer this delay could be as little as half a second.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.29 RC #34 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Delayed Response Running	The execution of the delayed response is not yet finished. The process is still running in the field device.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.30 RC #35 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Delayed Response Dead — This response is valid for intelligent bridging devices only. This code indicates that the field device did not reply to the request.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.31 RC #36 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Delayed Response Conflict — The requested command would cause a conflict with a delayed response currently executing in the Field Device.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.32 RC #37-#63 (Single Definition Error)

Reserved for future definition by the HCF. These codes may not be used by any manufacturer.

PREVIOUS Single Definition Error

NEXT Single Definition Error

6.33 RC #64 (Single Definition Error)

This code must have the following exact meaning for any command that utilizes this response code.

Use of this code indicates that the command was not executed. No Response Data Bytes are returned from the field device.

Command Not Implemented	The requested command is not implemented. This response is not valid for Universal Commands. For any other command this code may be returned by the field device even if Response Code #64 is not defined in the command specification itself.

PREVIOUS
Single Definition Error

6.34 RC #65-#95 (Multi-Definition Error)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of these codes indicate the command was not executed. No Response Data Bytes are returned from the field device's.

No specific definitions at this time

PREVIOUS
Multi-Definition Error

6.35 RC #96-#111 (Single-Definition Warning)

Reserved for future definition by the HCF. These codes may not be used by any manufacturer.

PREVIOUS
Single Definition Warning

6.36 RC #112-#127 (Multi-Definition Warning)

The exact meaning of this response code varies by command. See the command specification for exact meaning. Manufacturers may define another meaning for this code when used by their device specific commands as long as only one meaning is applicable for a given command.

Use of these codes indicate the command was executed, but a deviation from the host application's request was necessary to complete the command successfully. The values actually used are returned in the field device's Response Data Bytes.

No specific definition at this time.

PREVIOUS
Multi-Definition Warning

ANNEX A. REVISION HISTORY

A1. Changes From 4.1 - Final to 5.0

The document was reformatted to align with the standards of the HCF. The response codes for the Delayed Response Mechanism were added. The wording was changed to accommodate slaves other than transmitters.

Some response codes were removed since they are not applicable anymore:

#30 Warning: end of transmission (slave to master)

Entries added to response codes:

#13 Computation Error

A2. Changes From 4.0 - Final to 4.1

The document was translated from an ASCII text document to Microsoft Word. As a result of this translation, the document format was altered. No other modifications were made.

A3. Changes From 3.0 - Final to 4.0A - Preliminary

Summarized Release Notes from Rev 2 to Rev 3.0 - Final.

Page	Line	Change	Text
TP	4	Replace	"3.0 - Final" by "4.OA - Prel."
TP	5	Replace	"11 February" by "18 October"
TP	6	Replace	"11 February 1990" by "18 October 1990"
TP	7	Replace	"PRINTED: 15 February" by "PRINTED: 18 October"
4	15	Insert	"Not In Proper Analog Output Mode - The field..."
4	37	Insert	"Invalid Level Units Filter Auto-Adjust Error..."
5	33	Insert	"Trim Location Not Set To User - Trim Location..."
6	24	Insert	"Invalid Base Flow Units Code - The Base Flow..."
6	35	Insert	"Invalid Transmitter Variable Code Invalid..."
7	34	Insert	"Invalid Units Code Invalid Sensor Connection..."
8	26	Insert	"Invalid Transfer Function Code. Invalid..."
9	2	Insert	"#15"
9	4	Insert	"Invalid Analog Output Number Code. Invalid Analog..."
9	18	Replace	"#15, #28," by "3.8. RESPONSE CODE"
11	38	Insert	"Warning: Default Value Set For User Trim..."
11	44	Insert	"#30"
11	46	Insert	"Warning: End Of Transmission (Slave to Master)..."
11	54	Replace	"#30, #31," by "5.5. RESPONSE CODE"
20	19	Move	"Data Byte" from page 18 line 17

A4. Major Modifications Rev 2 to Rev 3.0 - Final

1. Expanded the Command-Specific Response Code space to 127.

2. Added information indicating that the Command-Specific Response Codes have been changed from Bit #0 - #3 to Bit #0 - #6.

3. Added summary information to the beginning of the document. Included information contained in the opening paragraphs, deleted information referring to Block Number and Device Type, assigned codes for Single and Multiple Error and Warning definitions, added summary table, and clarified description.

4. Changed titles of sections to include Error and Warning definition types and assigned response codes accordingly.

5. Added response codes for 3044c, 8712, and 3680.

(Refer to document Revision 3, D8900077, for detailed information)

A5. Major Modifications from Rev 1 to Rev 2

1. Added description for response codes that begin with "Warning:"

2. Added response codes for the 3044 and the 9712.

   (Refer to document Revision 2, D8900076, for detailed information.)

A6. Major Modifications Incorporated into Rev 1

3. Added information indicating which codes have only one description and which codes may have multiple descriptions.

   (Refer to document Revision 1, D8800002, for detailed information.)