

# XHART Driver Manual

Rosemount Hart Revision 4 Field Communications Protocol



## CPKSoft Engineering Process Monitoring and Industrial Automation Software

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# 1. Introduction

CPKSoft Engineering assumes no responsibility for any errors that may appear in this document. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

This driver is included with all unlimited licenses of TAS-HMITalk. It is not sold separately. It requires the TAS-HMITalk ActiveX to work, therefore it cannot be used as a stand-alone driver.

If you use this driver in your applications, you need to include the xhart.tlk in the set of files that you distribute. This file must be located in the same folder where the hmitalk.ocx file is registered in order to be found by the activex when the applications are executed.

The source-code for the xhart.tlk driver is available in plain-C language for additional USD 299 if you own a license of TAS-HMITalk 8.04 or higher.

Refer to the following link to visit the xhart driver page at CPKSoft Engineering website:  
<http://www.cpksoft.com/tabid/55/ProductID/45/PageIndex/1/Default.aspx>.

Visit this link if you want to see a complete list of drivers that are currently available for TAS-HMITak: <http://www.cpksoft.com/Drivers/tabid/55/Default.aspx>.

Also, refer to this link if you are interested in purchasing a license of the most recent version of TAS-HMITalk: <http://www.cpksoft.com/Products/tabid/54/Default.aspx>.

We welcome your comments about this document. You can reach us by e-mail at [contact @ cpksoft.com](mailto:contact@cpksoft.com).

## 2. Driver details

### 2.1. Driver overview

XHART driver allows you to connect to any smart transmitter that supports the Rosemount's HART protocol, revisions 4 or 5.

HART is an acronym for "Highway Addressable Remote Transducer". The HART specification defines the physical form of transmission, the transaction procedures, message structure, data forms and a set of commands.

The description "smart" for a field device is used in the sense of "intelligent", to describe any device which includes a microprocessor. Typically, this would imply extra functionality, above what had previously been provided in similar non-microprocessor-based instruments. In a "smart" field device, the analog signal, digital communication and (generally) power co-exist on the same pair of wires.

#### *Multidrop communication:*

If the measured variable is going to be read by digital communication, the analog 4 to 20 mA signal is no longer required. It then becomes possible to connect multiple field devices to a single pair of wires, and to communicate with each one in turn to read its measurement (or other data). To do this, each device must have an "address", to which it will respond, and each request from the host must include this as a part of the message.

This can significantly reduce the cost of field wiring and of the host's input interface electronics. Note, however, that the use of a cyclic scan means that each measurement is only examined at intervals, and the cycle time for a complete scan may be too long for high-speed control loops.

#### *Commands Supported:*

The following Universal Commands are implemented in this driver,

*both for HART Revision 4 and HART Revision 5 Protocols:*

- Read Unique Identifier (Code 0)
- Read Primary Variable (Code 1)
- Read Current and Percent of Range (Code 2)
- Read Current and 4 Dynamic Variables (Code 3)
- Read Primary Variable Sensor Information (Code 14)
- Read Output Information (Code 15)
- Write Damping Value (Code 34)
- Write Range Values (Code 35)
- Write TRIM DAC Zero (Code 45)
- Write TRIM DAC Gain (Code 46)

In case you don't know which HART Protocol's Revision must be used, you should send the command Read Unique Identifier to the transmitter and read in Channel 03 the Universal Command Revision returned by the field device.

- A value less or equal than 4 in Channel 03 means Universal Command Revision 4 and implies that the Set of Commands for HART Revision 4 should be used to communicate with this transmitter.
- A value greater or equal than 5 in Channel 03 means Universal Command Revision 5 and implies that the Set of Commands for HART Revision 5 should be used to communicate with this transmitter.

## 2.2. Supported devices

---

This driver can communicate with these devices, but is not necessarily limited to this list:

SMAR LD301 Pressure Transmitter  
SMAR TT301 Temperature Transmitter  
ROSEMOUNT 1151S Pressure Transmitter  
ROSEMOUNT 3001C/L Hydrostatic Pressure/Level Transmitter  
ROSEMOUNT 3044 Temperature Transmitter  
ROSEMOUNT 3044C Temperature Transmitter  
ROSEMOUNT 3051 Pressure Transmitter  
ROSEMOUNT 3051C Pressure Transmitter  
ROSEMOUNT 3680 Density Transmitter  
ROSEMOUNT 8712C Magnetic Flow Meter  
ROSEMOUNT 9712 Mass Flow Meter  
ROSEMOUNT 9729 Mass Flow Meter

## 3. Command list

### 3.1. Read Unique Identifier

**Description of this command:**

Reads the Transmitter's Unique Identifier.

In case you don't know which HART Protocol's Revision must be used, you should send this command to the transmitter and read in Channel 03 the Universal Command Revision returned by the field device.

- A value less or equal than 4 in Channel 03 means Universal Command Revision 4 and implies that the Set of Commands HART Revision 4 should be used to communicate with this transmitter.
- A value greater or equal than 5 in Channel 03 means Universal Command Revision 5 and implies that the Set of Commands HART Revision 5 should be used to communicate with this transmitter.

In order to obtain a valid answer from the field device, it must be the only one connected to the main pair of wires. For example, if you're trying to configure a 3 transmitters multidrop the correct procedure is to connect them one at a time and then send a Command 0 to each one separately.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

0

**Meaning of the DriverP3 parameter:**

0

**Meaning of the DriverP4 parameter:**

0

**Meaning of the DriverP5 parameter:**

0

**Values that are returned:**

- Value in PointValue (0) = Manufacturer information code (used as HMITalk1.DriverP0 in HART 5 requests)
- Value in PointValue (1) = Manufacturer's device type code (used as HMITalk1.DriverP1 in HART 5 requests)
- Value in PointValue (2) = Number of preambles
- Value in PointValue (3) = Universal command revision
- Value in PointValue (4) = Transmitter-specific command revision
- Value in PointValue (5) = Software revision
- Value in PointValue (6) = Hardware revision
- Value in PointValue (7) = Device function flags
- Value in PointValue (8) = Device ID number (used as HMITalk1.DriverP2 in HART 5 requests; this number usually coincide with the Serial Number etched in the transmitter's badge)

## 3.2. Read Primary Variable (HART Revision 4)

---

**Description of this command:**

This command returns the Transmitter's Primary Variable and a code representing the physical units of that variable.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-2

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

1

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Primary variable units code
- Value in PointValue (1) = Primary variable

### 3.3. Read Current and Percent of Range (HART Revision 4)

---

**Description of this command:**

This command reads the current flowing through the wires representing the analog variable in a scale from 4 to 20 mA. It also reads the corresponding percent of range.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-2

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

2

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Current expressed in [mA]
- Value in PointValue (1) = Percent of range

## 3.4. Read Current and 4 Dynamic Variables (HART Revision 4)

---

**Description of this command:**

This command reads the current flowing through the wires representing the analog primary variable in a scale from 4 to 20 mA. It also reads four dynamic variables known as PV (Primary Variable, SV (Second V.), TV (Third V.) and FV (Fourth V.).

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

3

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

Value in PointValue (0) = Current expressed in [mA]  
Value in PointValue (1) = PV units code  
Value in PointValue (2) = Primary Variable  
Value in PointValue (3) = SV units code  
Value in PointValue (4) = Second Variable  
Value in PointValue (5) = TV units code  
Value in PointValue (6) = Third Variable  
Value in PointValue (7) = FV units code  
Value in PointValue (8) = Fourth Variable

## 3.5. Read Primary Variable Sensor Information (HART Revision 4)

---

**Description of this command:**

This command returns information related to the Primary Variable Sensor.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

14

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Sensor serial number
- Value in PointValue (1) = Units code for sensor limits and minimum span
- Value in PointValue (2) = Upper sensor limit
- Value in PointValue (3) = Lower sensor limit
- Value in PointValue (4) = Minimum span

## 3.6. Read Output Information (HART Revision 4)

---

**Description of this command:**

This command reads general information related to the transmitter's output.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

15

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Alarm select code
- Value in PointValue (1) = Transfer function code
- Value in PointValue (2) = Primary Variable's range units code
- Value in PointValue (3) = Upper range value
- Value in PointValue (4) = Lower range value
- Value in PointValue (5) = Damping value (expressed in seconds)
- Value in PointValue (6) = Write-protect code
- Value in PointValue (7) = Private-label distributor code

## **3.7. Write Damping Value (HART Revision 4)**

---

**Description of this command:**

This command allows you to write the damping value of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

34

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Damping Value (sec)

---

## 3.8. Write Range Values (HART Revision 4)

---

**Description of this command:**

This command allows you to write the range values of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

3

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

35

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

- Value in PointValue (0) = Range Units Code (0-255)
- Value in PointValue (1) = Upper Range Value
- Value in PointValue (2) = Lower Range Value

### 3.9. Write TRIM DAC Zero (HART Revision 4)

---

**Description of this command:**

This command allows you to write the TRIM DAC Zero of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

45

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Measured Current (mA)

### 3.10. Write TRIM DAC Gain (HART Revision 4)

---

**Description of this command:**

This command allows you to write the TRIM DAC Gain of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

0

**Meaning of the DriverP1 parameter:**

0

**Meaning of the DriverP2 parameter:**

Smart transmitter's short-frame address (0-15).

**Meaning of the DriverP3 parameter:**

46

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Measured Current (mA)

---

## 3.11. Read Primary Variable (HART Revision 5)

---

**Description of this command:**

This command returns the Transmitter's Primary Variable and a code representing the physical units of that variable.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-2

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

1

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

Value in PointValue (0) = Primary variable units code

Value in PointValue (1) = Primary variable

## 3.12. Read Current and Percent of Range (HART Revision 5)

---

**Description of this command:**

This command reads the current flowing trough the wires representing the analog variable in a scale from 4 to 20 mA. It also reads the corresponding percent of range.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-2

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

2

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

Value in PointValue (0) = Current expressed in [mA]

Value in PointValue (1) = Percent of range

## 3.13. Read Current and 4 Dynamic Variables (HART Revision 5)

---

**Description of this command:**

This command reads the current flowing through the wires representing the analog primary variable in a scale from 4 to 20 mA. It also reads four dynamic variables known as PV (Primary Variable, SV (Second V.), TV (Third V.) and FV (Fourth V.).

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

3

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Current expressed in [mA]
- Value in PointValue (1) = PV units code
- Value in PointValue (2) = Primary Variable
- Value in PointValue (3) = SV units code
- Value in PointValue (4) = Second Variable
- Value in PointValue (5) = TV units code
- Value in PointValue (6) = Third Variable
- Value in PointValue (7) = FV units code
- Value in PointValue (8) = Fourth Variable

## 3.14. Read Primary Variable Sensor Information (HART Revision 5)

---

**Description of this command:**

This command returns information related to the Primary Variable Sensor.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

14

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Sensor serial number
- Value in PointValue (1) = Units code for sensor limits and minimum span
- Value in PointValue (2) = Upper sensor limit
- Value in PointValue (3) = Lower sensor limit
- Value in PointValue (4) = Minimum span

## 3.15. Read Output Information (HART Revision 5)

---

**Description of this command:**

This command reads general information related to the transmitter's output.

**Type of data handled by this command:**

Analog Input

**Number of points accepted by this command:**

1-9

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

15

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are returned:**

- Value in PointValue (0) = Alarm select code
- Value in PointValue (1) = Transfer function code
- Value in PointValue (2) = Primary Variable's range units code
- Value in PointValue (3) = Upper range value
- Value in PointValue (4) = Lower range value
- Value in PointValue (5) = Damping value (expressed in seconds)
- Value in PointValue (6) = Write-protect code
- Value in PointValue (7) = Private-label distributor code

## **3.16. Write Damping Value (HART Revision 5)**

---

**Description of this command:**

This command allows you to write the damping value of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

34

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Damping Value (sec)

## 3.17. Write Range Values (HART Revision 5)

---

**Description of this command:**

This command allows you to write the range values of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

3

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

35

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Range Units Code (0-255)

Value in PointValue (1) = Upper Range Value

Value in PointValue (2) = Lower Range Value

---

## 3.18. Write TRIM DAC Zero (HART Revision 5)

---

**Description of this command:**

This command allows you to write the TRIM DAC Zero of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

45

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Measured Current (mA)

## 3.19. Write TRIM DAC Gain (HART Revision 5)

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**Description of this command:**

This command allows you to write the TRIM DAC Gain of the selected transmitter.

**Type of data handled by this command:**

Analog Output

**Number of points accepted by this command:**

1

**Meaning of the DriverP0 parameter:**

Manufacturer Identification Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 00. For example:

- 56 for Rosemount
- 62 for Smar

**Meaning of the DriverP1 parameter:**

Manufacturer's Device Type Code. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 01.

**Meaning of the DriverP2 parameter:**

Smart transmitter's long-frame address. This code can be read from the smart transmitter using the Command 0 (Read Unique Identifier) that returns the proper value in Channel 08. This number usually coincide with the Serial Number etched in the transmitter's badge.

**Meaning of the DriverP3 parameter:**

46

**Meaning of the DriverP4 parameter:**

Number of synchronism bytes (the default 0 means a 5-bytes Preamble)

**Meaning of the DriverP5 parameter:**

Master Address

- 0 = Primary Master
- 1 = Secondary Master

**Values that are sent:**

Value in PointValue (0) = Measured Current (mA)

## 4. Appendices

### 4.1. Error messages

The following list shows all the possible error messages that can be returned by the protocol driver during a failed communication in the 'DriverStatus' property.

This list does not include some error messages that can be returned by the activex component while attempting to establish a connection.

- [1005] DRIVER (Internal): Invalid driver stage
- [1300] PROTOCOL (Timeout): No answer
- [1433] PROTOCOL (Format): Validation error in device response
- [2002] CONFIG (DataType): Digital inputs are not supported by this driver
- [2003] CONFIG (DataType): Digital outputs are not supported by this driver
- [2109] CONFIG (NumValues): Invalid number of channels (must be 3)
- [2149] CONFIG (NumValues): Only one value can be written
- [2153] CONFIG (NumValues): Too many channels requested (max=64)
- [2154] CONFIG (NumValues): Too many channels requested (max=8)
- [2155] CONFIG (NumValues): Too many channels requested (max=9)
- [2254] CONFIG (NumValues): Too many values requested (max=2)
- [2262] CONFIG (NumValues): Too many values requested (max=5)
- [3038] CONFIG (P0): Invalid manufacturer id (must be 0 or a positive number)
- [3552] CONFIG (P1): Invalid device type (must be 0 or a positive number)
- [4113] CONFIG (P2): Invalid transmitter long-frame address (use 0 to 16777215 only)
- [4114] CONFIG (P2): Invalid transmitter short-frame address (use 0 to 15 only)
- [4521] CONFIG (P3): Invalid command code (valid codes are 0, 1, 2, 3, 14 and 15)
- [5028] CONFIG (P4): Invalid number of synchronism characters (0-32)
- [5508] CONFIG (P5): Invalid master address (must be 0 or 1)
- [8012] CONFIG (Remote): Access restricted error
- [8024] CONFIG (Remote): Analog output saturated error
- [8046] CONFIG (Remote): Checksum error
- [8049] CONFIG (Remote): Cold start error
- [8061] CONFIG (Remote): Command not Implemented error
- [8065] CONFIG (Remote): Command-specific or an unknown error
- [8072] CONFIG (Remote): Configuration changed error
- [8104] CONFIG (Remote): Device is busy error
- [8108] CONFIG (Remote): Device malfunction error
- [8149] CONFIG (Remote): Framing error
- [8179] CONFIG (Remote): In write-protect mode error
- [8188] CONFIG (Remote): Invalid answer (too few bytes where received)
- [8199] CONFIG (Remote): Invalid selection error
- [8250] CONFIG (Remote): Output current fixed error
- [8256] CONFIG (Remote): Overrun error
- [8259] CONFIG (Remote): Parity error
- [8260] CONFIG (Remote): Passed parameter too large error

- [8261] CONFIG (Remote): Passed parameter too small error
- [8269] CONFIG (Remote): Primary variable out of limits error
- [8307] CONFIG (Remote): Reserved error
- [8313] CONFIG (Remote): Rxbuffer overflow error
- [8337] CONFIG (Remote): Too few data bytes received error
- [8340] CONFIG (Remote): Transmitter-specific command error
- [8343] CONFIG (Remote): Undefined error
- [8347] CONFIG (Remote): Unknown error
- [8361] CONFIG (Remote): Variable (not primary) out of limits error

## 4.2. Keywords list

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The following list shows a set of words directly related to this driver.

"1151S, 3001C/L, 3044, 3044C, 3051, 3051C, 3680, 8712C, 9712, 9729, Communications, Density, Field, Flow, Hart, Hydrostatic, LD301, Level, Magnetic, Mass, Meter, Pressure, Revision, ROSEMOUNT, SMAR, Temperature, Transmitter, TT301".