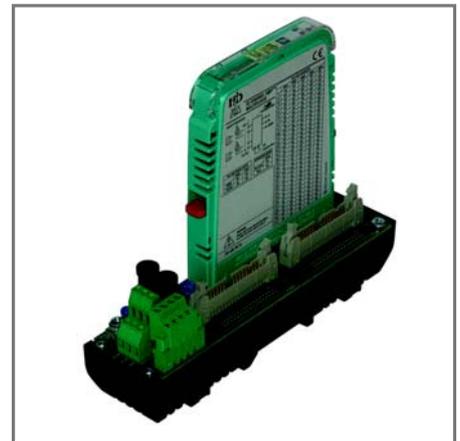


MANUAL

CONFIGURATION HART MULTIPLEXER MASTER HIDMUX2700



With regard to the supply of products, the current issue of the following document is applicable:
The General Terms of Delivery for Products and Services of the Electrical Industry, published by
the Central Association of the "Elektrotechnik und Elektroindustrie (ZVEI) e.V.",
including the supplementary clause: "Extended reservation of title".

1	Introduction	2
1.1	Aim of the manual	2
1.2	Responsibilities of the user	2
2	Safety instructions	3
2.1	General safety instructions	3
2.2	Used symbols	3
2.3	Declaration of Conformity.	3
2.4	Intended use.	4
3	Configuration	5
3.1	PACT _{ware} TM introduction	5
3.2	Installing the software components	5
3.3	Connection with the device	6
3.4	Adding the Communications DTM.	8
3.5	Adding the HART Multiplexer.	10
3.6	Setting the parameters of the HART Multiplexer	11
4	Appendix	26
4.1	Literature	26
4.2	Glossary	26

1 Introduction

1.1 Aim of the manual

This manual should enable the user to configure the HART Multiplexer Master HiDMux2700. It provides all the information required on system prerequisites, installation and operation of the software.



Note

The manual provides only information related to configuration of the HART Multiplexer Master HiDMux2700 and is only valid in conjunction with the manual of HART Multiplexer Master HiDMux2700. For safety instructions, product specification, installation, commissioning, operation as well as diagnosis and fault elimination one must refer to the manual of HART Multiplexer Master HiDMux2700.

The appendix also explains many terms and abbreviations used in this manual.

1.2 Responsibilities of the user

In order to avoid damage, incorrect operation and equipment failures, the user must make himself acquainted with the equipment and must have read and understood the manual before undertaking its installation and commissioning.



Warning

Repairs to the device must only be undertaken by specialist personnel and in compliance with the relevant regulations.

We strongly recommend that repairs are undertaken by the manufacturer. No guarantee claims will be accepted by Pepperl+Fuchs GmbH resulting from improper repair work.

2 Safety instructions

2.1 General safety instructions

The operator of the system is responsible in terms of planning, mounting, commissioning, operating and maintenance.

Installation and commissioning of all devices must be performed by a trained professional only.

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended purpose.

Laws and regulations applicable to the usage or planned purpose of usage must be observed. Devices are only approved for proper usage in accordance with intended purpose. Improper handling will result in voiding of any warranty or manufacturer's responsibility.

The Declaration of Conformity, Certificate of Compliance and data sheets are an integral part of this document. The data sheet contains the electrical data of the Declaration of Conformity and the Certificate of Compliance.

The documents mentioned are available from <http://www.pepperl-fuchs.com> or contact your local Pepperl+Fuchs representative.

2.2 Used symbols



Warning

This symbol indicates a warning about a possible danger. Failure to observe this warning may result in personal injury or death, or property damage or destruction.



Attention

This symbol warns of a possible fault. If the instruction given in this warning is not heeded, the device and any plants or systems connected to it could develop a fault or even fail completely.



Note

This symbol brings important information to your attention.

2.3 Declaration of Conformity

All products have been developed and manufactured taking into consideration applicable European standards and regulations



Note

A Declaration of Conformity can be requested from the manufacturer.

The manufacturer of this product, Pepperl+Fuchs GmbH in D-68301 Mannheim, Germany, has a certified quality assurance system in conformity with ISO 9001.



2.4 Intended use

The HiDMux2700 (referred to as "Multiplexer" in the following sections) provides full HART access to up to 32 field devices and hence operation with the conventional 4 mA ... 20 mA current loops. It thus acts as a transparent gateway between the service station (PC or PCS (**P**rocess **C**ontrol **S**ystem)) and the transmitters.

The Multiplexer can be used within zone 2 hazardous areas or in the safe area. Power is provided by a 24 V (nominal voltage) DC power supply. Connection to the PCS or PC is via an RS 485 interface.



Warning

It should be stressed that the Multiplexer is approved for use in zone 2 and therefore may not be used in zone 0 or 1 hazardous areas. If the equipment is used in conjunction with intrinsically safe or associated apparatus, then this use must take place in front of the Ex-barrier (e. g. transmitter power supply device).

Reference should be made to the statement of conformity.

Identification

The following identification is affixed to the Multiplexer:

Pepperl+Fuchs GmbH

68301 Mannheim/Germany

HiDMux2700

 II 3G EEx nAL IIC T4

3 Configuration

3.1 PACT_{ware}TM introduction

PACT_{ware}TM is Pepperl+Fuchs latest generation of configuration software that makes it easy to program Pepperl+Fuchs's equipment. In addition to becoming single configuration tool, **PACT_{ware}TM** interfaces with HART capable field instruments as well as bus systems such as PROFIBUS, Modbus and ControlNet.

PACT_{ware}TM offers many features that allow users to simplify plant documentation, generate trend curves, and monitor signals using HART data. Our software uses **Device Tool Managers (DTM)** to provide the interface into **PACT_{ware}TM**. Pepperl+Fuchs has created DTMs for HART capable instruments by converting their Device Description (DD) into the appropriate DTM for use with **PACT_{ware}TM**.

3.2 Installing the software components

In order to be able to configure the device by means of a PC operating program, the following software components are required:

1. **Microsoft® .NET Framework 1.1**
2. **PACT_{ware}TM 3.0 (Process Automation Configuration Tool)** or later
PACT_{ware}TM is used according to FDT Specification 1.2 (Field Device Tool Specification) as a framework program for the DTM (**Device Type Manager**), which is supplied by manufacturers of field devices as configuration software.
3. **DTM Collection HART Multiplexer**
The DTM Collection comprises all Device DTMs required to parameterize the HART Multiplexer. The DTM are used to establish the communication with field devices using protocols, such as the HART or PROFIBUS protocol.
4. **HART Comm DTM**
This package contains the HART communication DTMs which is necessary to establish communication between the HOST and the HART Multiplexer DTM.
5. **Generic HART DTM**
The Generic HART DTM provides basic HART functionalities for field devices. It can be used for basic parameterization in case that no field device specific DTM is available. Therefore this DTM is recommended also in addition to field device specific DTMs.
6. **Field device specific DTMs**
Vendors of field devices provide specific DTM for those. These DTMs allow access to all functions of the devices and therefore a detailed parameterization. For further information please refer to the specific vendors.

The software components are rendered available on CD or on the Internet at www.pepperl-fuchs.com in the product selector via **Software > PACTware**.

*For the **latest** software component, please access the product selector via **Software > PACTware**.*



For the HART Multiplexer DTM a licence is necessary. Without licence only one HART Multiplexer with one field device can be used. For getting a licence please refer to Pepperl+Fuchs.





Installing the software components

The installation of the software components is described in the "PACTware™ Installation Instructions" manual. Please observe the sequence of the installation steps and the instructions in the installation instructions.

- ▶ Install **Microsoft® .NET Framework**.
- ▶ Install **PACTware™**.
- ▶ Install the **DTM Collection HART Multiplexer**.
- ▶ Install **HART Comm DTM**.
- ▶ Install **Generic HART DTM**.
- ▶ Install field devices specific DTMs as necessary.

The cross-device properties of the software are described in the "PACTware™ Process Automation Configuration Tool" manual. For the free manual written in several languages, please access our website at www.pepperl-fuchs.com/pa via **Software > PACTware**.

Below please find the device-specific settings for HART Multiplexer HiDMux2700 only.

3.3 Connection with the device



Connect the PC to the device

- ▶ Mount the device on the Termination Board (see manual HART Multiplexer Master HiDMux2700).
- ▶ Connect the device to the power supply.
- ▶ Use the RS232 / RS485 converter to connect the PC up to the device.
RS 232 side: COM interface on the PC
RS 485 side: corresponding terminals on the Termination Board
- ▶ Start the **PACTware™** as described in the "PACTware™ Process Automation Configuration Tool" manual.
↳ The **PACTware™** main window is indicated.

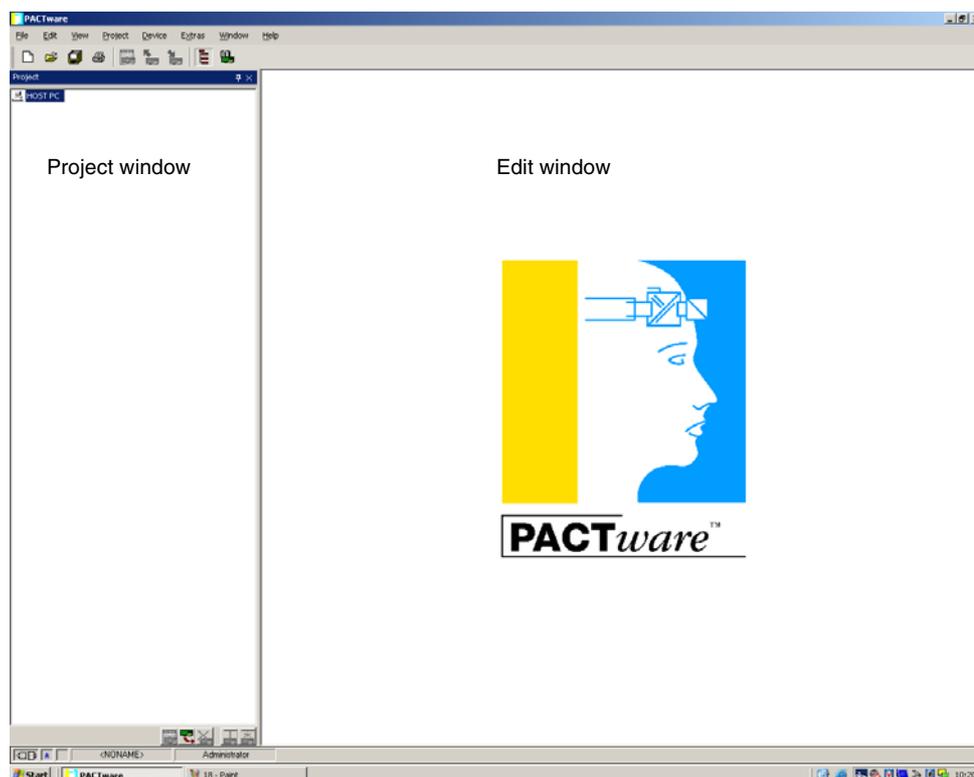


Figure 3.1 PACTware™ main window

The main window is divided into the project window and the edit window.

Project window The current project tree for your system is constructed in the project window by adding the various components. Three buttons for adding, removing and editing components appear at the bottom of the window. Select the device you wish to edit, monitor, diagnose or simulate in the project manager. The selected object will be highlighted in different color.

Edit window Various windows which are required for editing your system appear in the edit window. The edit process begins with the appearance of the selection window containing the drives and devices or the device catalog for setting up the system. The configuration and parameterization tabs for the drives and devices also appear in the edit window. During subsequent operation, the diagnostic, measured variable, trend and simulation menus appear in the edit window. The communication monitor for the communication protocol can also be opened in this window.



Note

For more information to **PACT_{ware}TM**, please refer to the "**PACT_{ware}TM** Process Automation Configuration Tool" manual.

In conjunction with the DTMs for HART Multiplexer, it is advisable to activate the **Memory-Optimized Operation** option.



Activate Memory-Optimized Operation

- ▶ Open the **Options** menu via **Device > Extras > Options**.
- ▶ Activate the **Memory-Optimized Operation** option.

The **Online-Parameter** window is indicated.

3.4 Adding the Communications DTM

In a **PACT^{ware}**™ project the HART Multiplexer HiDMux2700 can be addressed by Communications DTM **HART Communication** only. Please refer to the "**PACT^{ware}**™ Process Automation Configuration Tool" manual to read how to create and edit a project.

*Do not use the Communications DTM **HARD Driver FDT**. This is an outdated IDL DTM.*



Note

If such a driver is not available in your project yet, use the device catalog to add it to the project



Adding the Communications DTM

- ▶ Click with right mouse button on **HOST PC**.
- ▶ Select **Add Device** in the context menu.
- ▶ Select the DTM **HART Communication** from the list.
 - ↳ The Communications DTM is in the project.

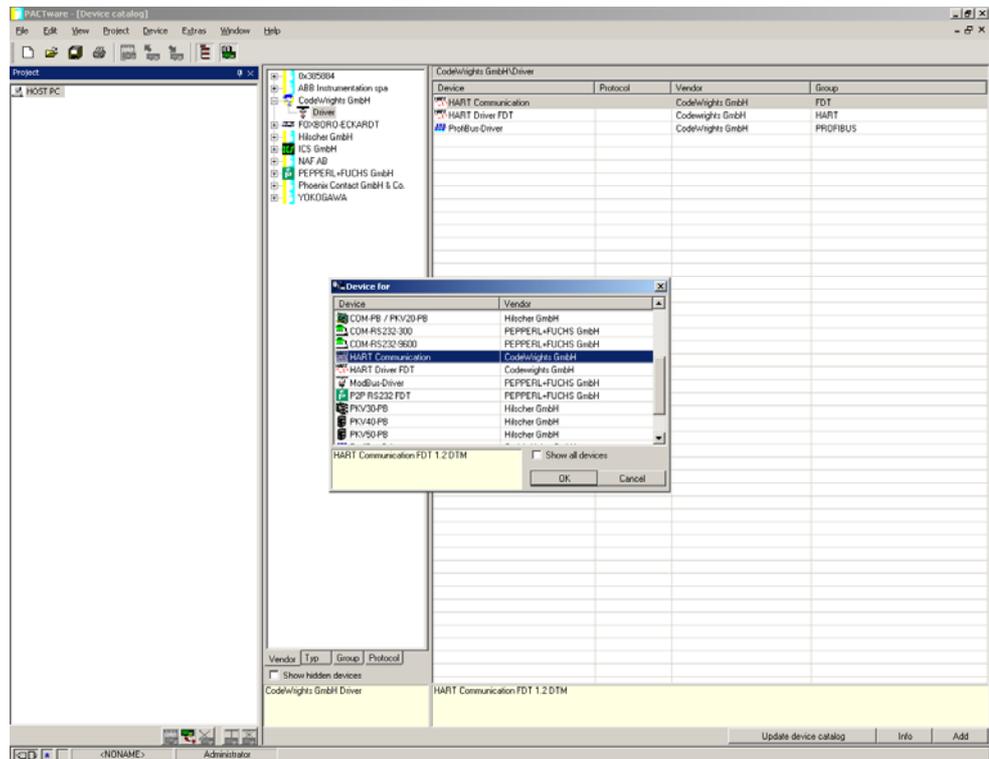


Figure 3.2 Device catalog



Setting the parameters

- ▶ In the project window, use the mouse to double-click on the Communications DTM **HART Communication**.
 - ↳ The **Parameter** window is indicated.
- ▶ Use the **OK** button to close the **Parameter** window.

The following parameters are adjustable:

- **Communication interface:** Select the option **HART Multiplexer** as communications means.
- Set as **Port** the interface, to which the HART Multiplexer has been connected.
- Select the **Baudrate** according to the settings of the DIP switches on the HART Multiplexer.
- **RTS Control:** Depending on the RS 232/RS 485 converter used, it may be necessary to switch on or off the request-to-send control in order to be able to switch over correctly between reception and transmitting mode.
- **Master:** Masters may be connected to one HART loop whereby the Masters have to be differentiated as primary and secondary Master by the parameterization. This setting is carried out here.
- **Preamble:** In keeping with the HART standard, a corresponding number of **FF characters** have to be sent in advance as preamble. The number of characters is defined here.
- **Number of communication retries:** The number of repeats of contact attempts in case of an error.
- **Address Scan – Start and End address:** Here the address range is set, in which the HART Communication DTM is to search for the HART Multiplexers connected to the RS 485 bus.

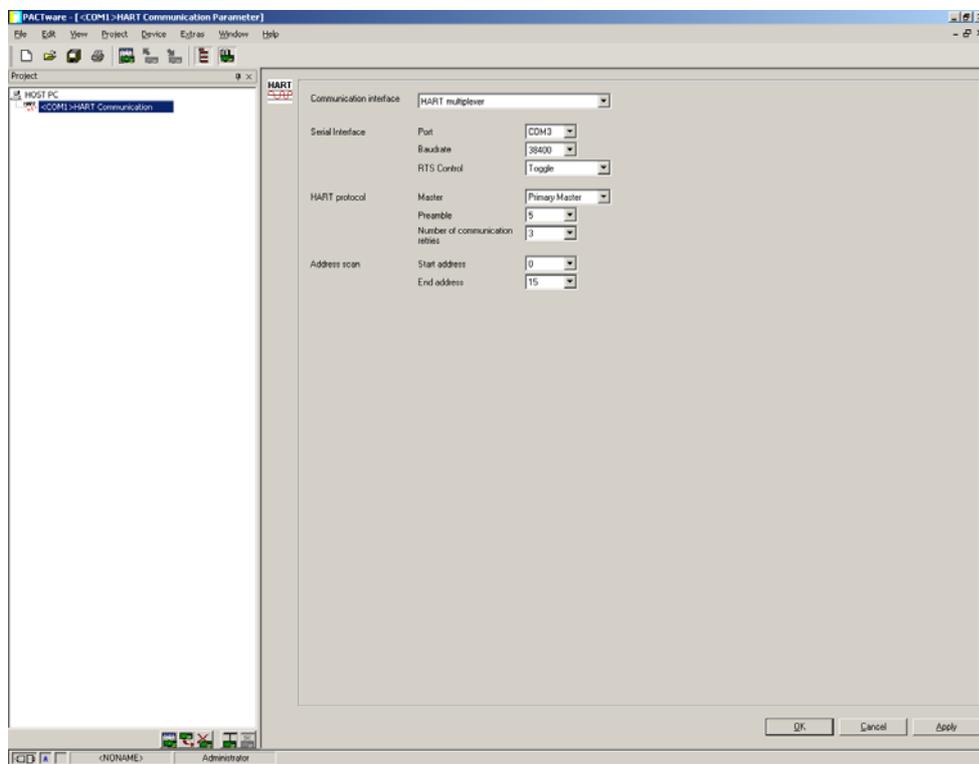


Figure 3.3 HART Communication Parameter window

3.5 Adding the HART Multiplexer

In the Communications DTM, the function **Additional functions > Scan list** can be used to scan the connected HART Multiplexer.



Update Scan list

- ▶ Click in the project window with right mouse button on **HART Communication**.
- ▶ Select **Additional Function** in the context menu.
- ▶ Select **Scan list**.
- ▶ Start the scan with **Refresh**.

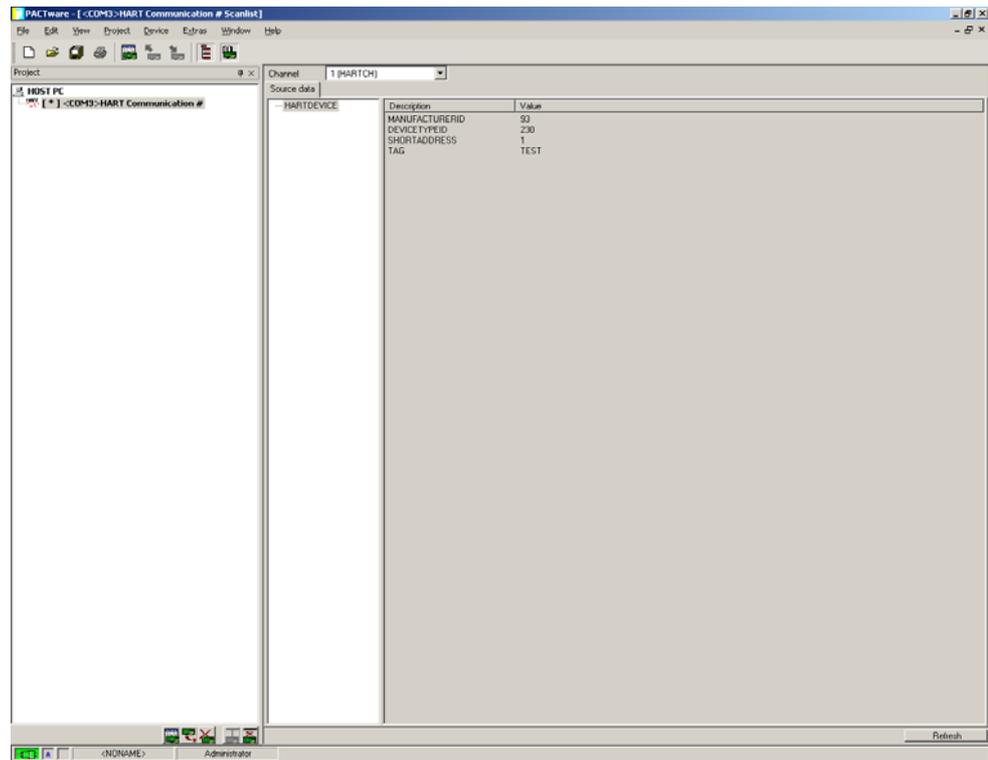


Figure 3.4 HART Communication window, Scan list



Note

At present, the addresses 0 ... 15 only are supported. Future versions will however support the entire address range from 0 ... 31.



Adding the HART Multiplexer

The HART Multiplexers now have to be manually added to the project.

- ▶ Use drag-and-drop to drag the suitable DTM from the device catalog to the HART Communication DTM.
- or
- ▶ Click in the project window with right mouse button on **HART Communication**.
 - ▶ Select **Add Device** in the context menu.
 - ▶ Select the DTM **HiDMux2700** in the list.
 - ↳ The Communications DTM is in the project.

3.6 Setting the parameters of the HART Multiplexer

3.6.1 Parameterizing parameters off-line



Adjust the parameter of the Master

- ▶ Double-Click in the project window with mouse button on Multiplexer.
- ▶ Open the **Master** menu.
 - ↳ The **Master** window is indicated.

The following parameters are adjustable:

- **RS485 address:** The RS485 address of the HART Multiplexer is set here.
- **Long-Address:** The distinct unchangeable long address of the HART Multiplexer is set here.
- **Master-Type:** One HART loop may include two Masters whereby the parameterization has to be set to differentiate between primary Master and secondary Master. These settings have to be carried out here.

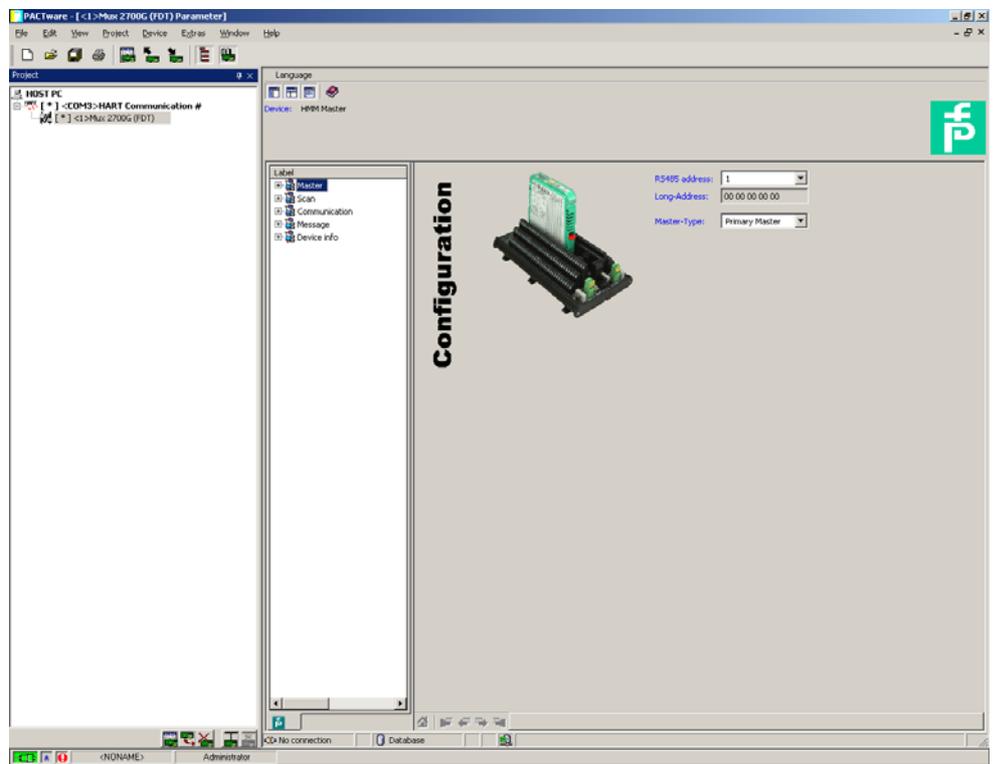


Figure 3.5 Multiplexer Parameter window

3.6.2 Read-out the data

Use **Load from device** to read the parameters of the Multiplexer in order to establish a connection.

Is no standard online/off-line view as usually used for FDT DTMs.



Note

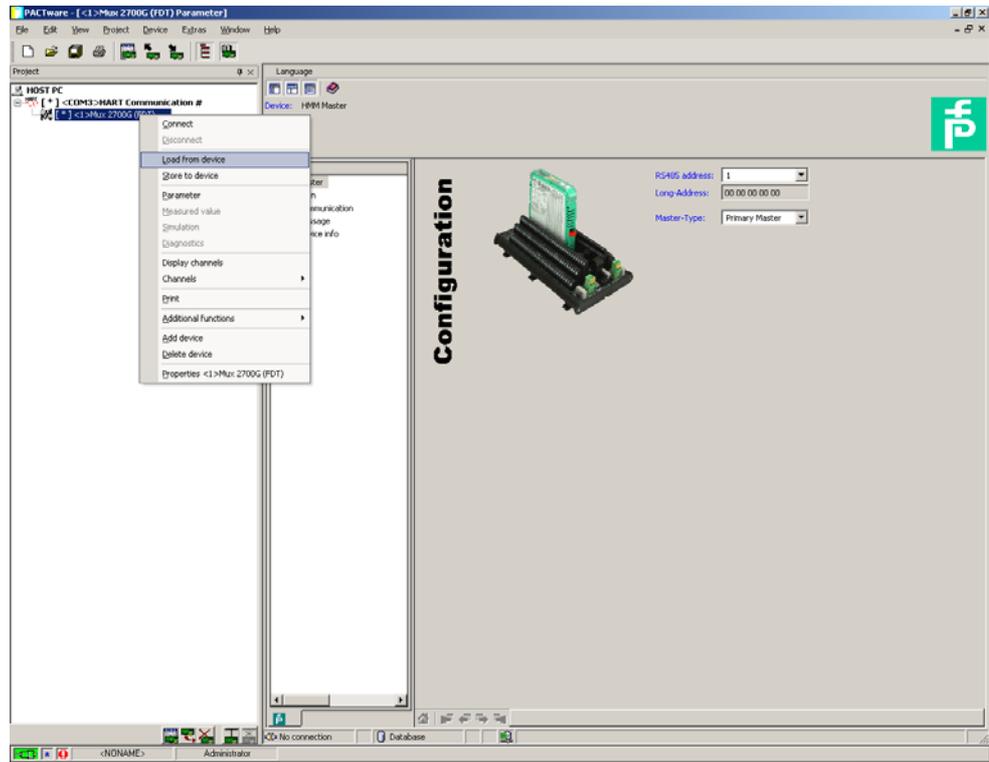


Figure 3.6 Read-out the Data



Parameterizing of the scan function

- ▶ Double-Click in the project window with mouse button on Multiplexer.
- ▶ Open the **Scan** menu.
 - ↳ The **Scan** window is indicated.

The scan function is used by the HART Multiplexer to cyclically retrieve data from the connected field devices which are saved in the memory. When these values are queried by the control system, they can be retrieved faster because the device need not be read out as the values can be taken directly from the memory.

The following parameters are adjustable:

- **Mode:** The wireless scan is switched on or off here.
- **Command:** Here select which values are to be read from the field devices:
 - **Primary variable:** Now the primary variable only will be read-out.
 - **Current value:** The current value is read-out in mA.
 - **All variables:** All variables of the field device are read-out.

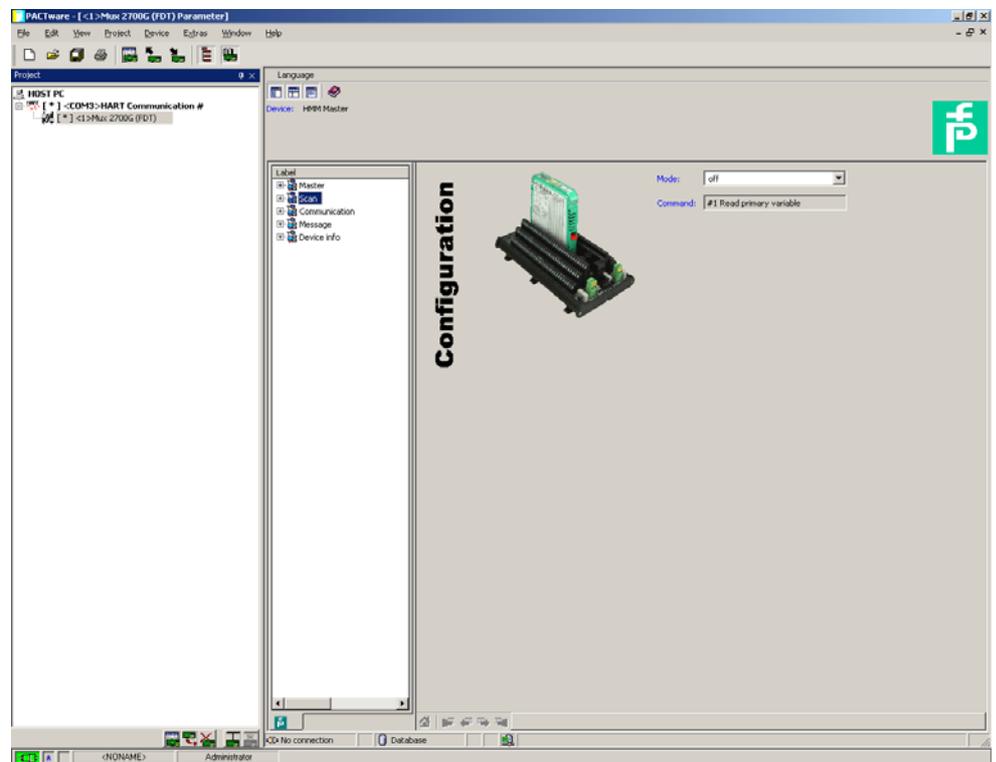


Figure 3.7 Scan function window



Parameterizing of the communication

- ▶ Double-Click in the project window with mouse button on Multiplexer.
- ▶ Open the **Communication** menu.
 - ↳ The **Communication** window is indicated.

The **Communication** menu is used to set the communication parameters between the HART Multiplexer and the field device.

The following parameters are adjustable:

- **Retries on "Busy"**: Repeat attempts to establish a communication with the field device, if the field device transmits **Busy**.
- **Retries on error**: Repeat attempts to establish a communication with the field device, if an error occurs.
- **Searchmode**: Here the mode is determined which is used to search for other devices:
 - **single analog**: The HART Multiplexer uses only poll address 0 to search for connected devices.
 - **single unknown**: The HART Multiplexer searches for all short addresses between 0 and 7 and identifies the first device which responds.

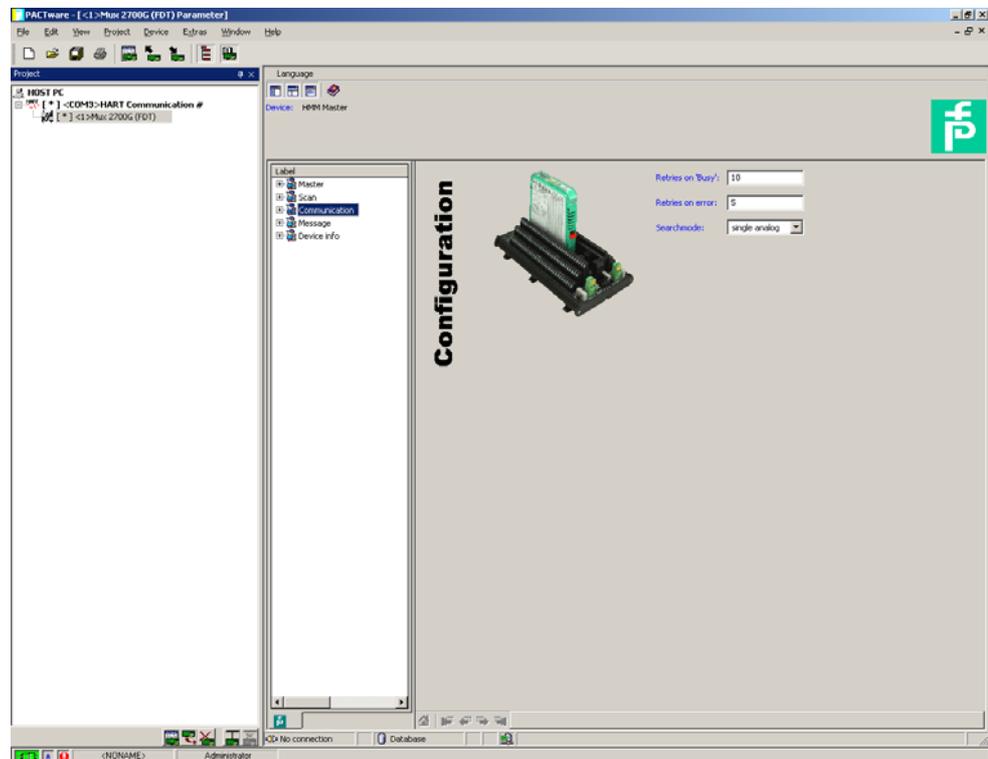


Figure 3.8 Communication window



Message menu

- ▶ Double-Click in the project window with mouse button on Multiplexer.
- ▶ Open the **Message** menu.
 - ↳ The **Message** window is indicated.

The **Message** menu can be used to give the HART Multiplexer an identification name.

- **Message:** Here a string can be defined, with which the HART Multiplexer can be identified.

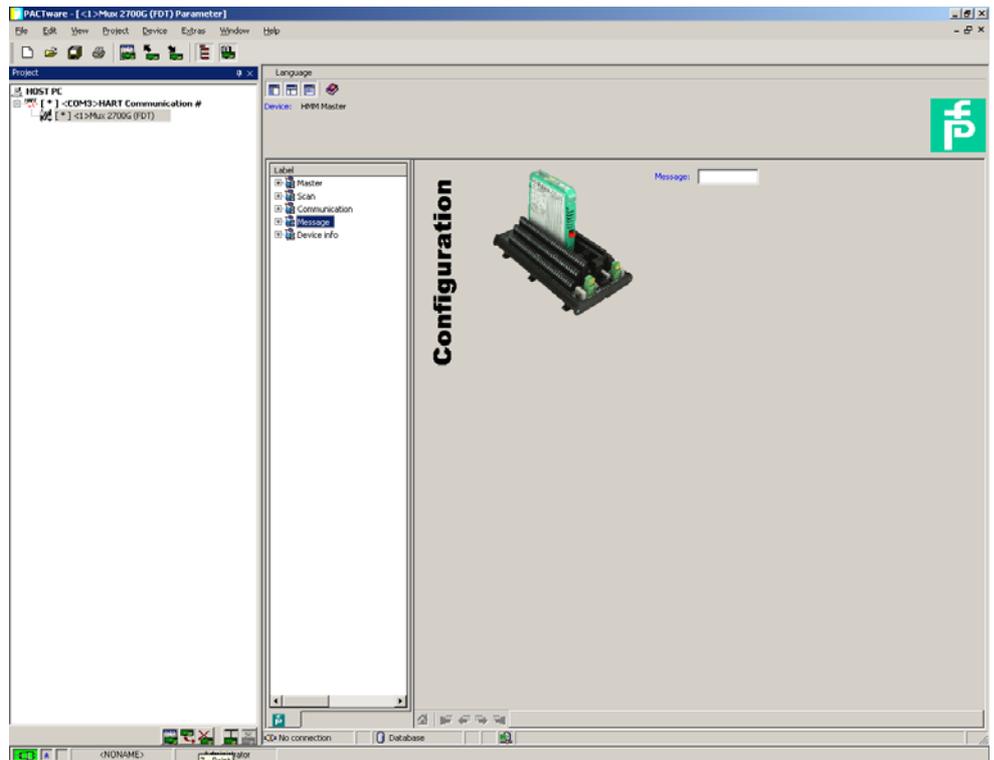


Figure 3.9 Message window



Device info menu

- ▶ Double-Click in the project window with mouse button on Multiplexer.
- ▶ Open the **Device info** menu.
 - ↳ The **Device info** window is indicated.

The **Device info** menu renders general information on the device:

- **Tag:** Tag to identify the HART Multiplexers
- **Description:** Description of the HART Multiplexer
- **Day of last parameterization** (read only): Day, on which the device parameter was changed last.
- **Serial number:** Serial number of the device
- **Universal revision:** Revision of the universal HART commands supported
- **Special revision:** Revision of the special HART commands supported
- **Software revision:** Firmware revision of the HART Multiplexers
- **Hardware revision:** Hardware revision of the HART Multiplexers
- **Preamble count:** Number of preambles

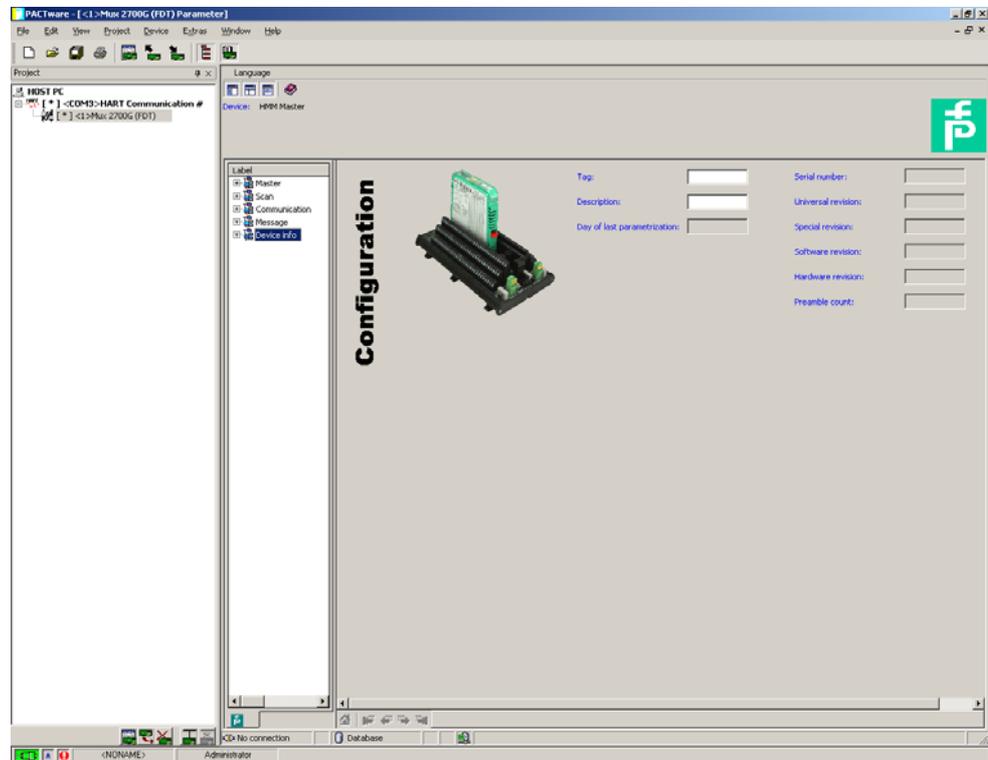


Figure 3.10 Device info window



Active modules menu

- ▶ Apart from the standard activated Master, select the Slave to be able to access all 32 channels of the Multiplexer.
- ▶ Open the **Active modules** menu via **Device > Additional functions > Active modules**.
 - ↳ The **Active modules** window is indicated.
- ▶ Activate the Slave.
- ▶ Confirm the selection with **Download active modules**.

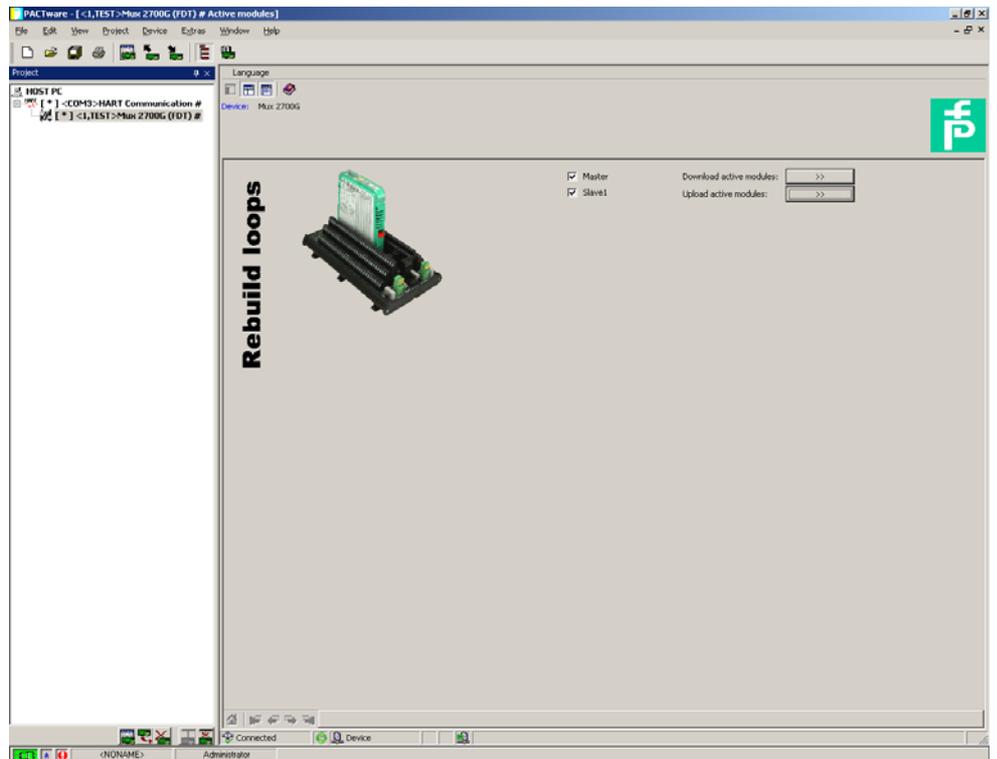


Figure 3.11 Active modules window

3.6.3 HART Scan

Use a HART Scan to read in the entire project structure connected to the serial interface:

- HART Multiplexer Master
- HART Multiplexer Slaves
- Field devices



Start HART Scan function

- ▶ Select the Multiplexer Master in the project window.
- ▶ Start the **HART Scan** via **Device > Additional functions > HART Scan**.
 - ↳ The **HART Scan** window is indicated.

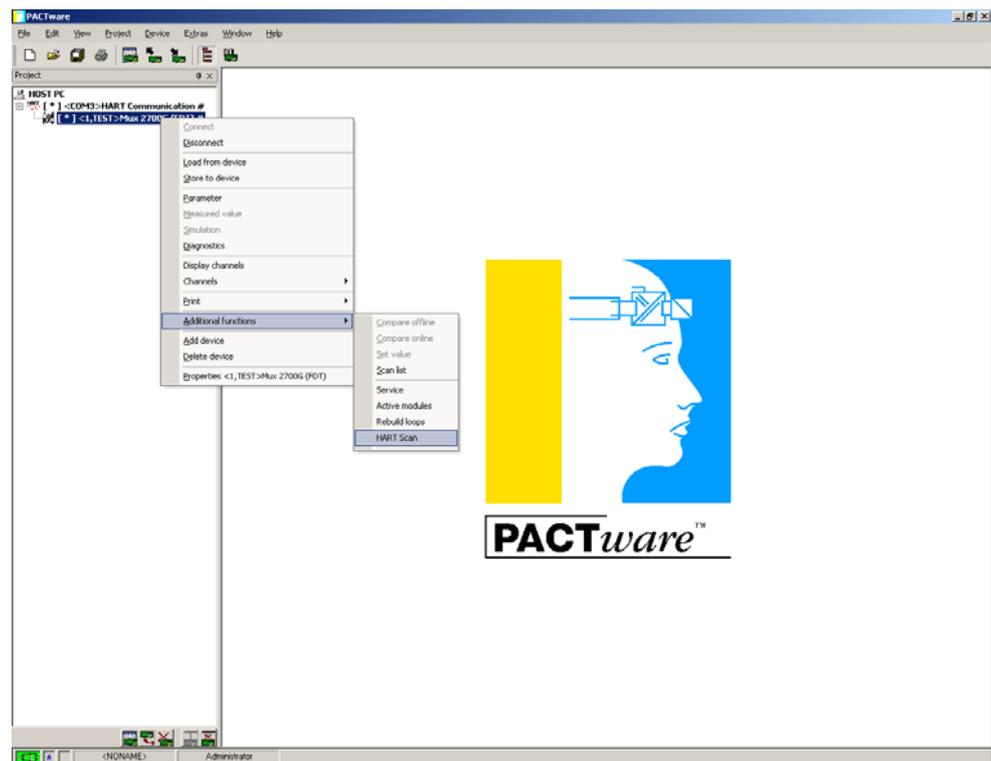


Figure 3.12 Activate HART Scan function



Note

The HART scan function might not be supported by all frames or underly some limitations.

Before start the HART Scan select the desired options:



Setting Scan functions

- ▶ Open the Scan parameters via **Settings** folder.
 - ↳ The **Settings** window is indicated.

The following parameters are adjustable:

- **Start Scanning for active slaves:** This option is used to determine whether a search for connected Slaves is to be run.
- **Add found slaves:** This option is used to determine that the Slaves found are added to the project.
- **Connect found slave DTMs:** An automatic connection is established to the Slaves found.
- **Make scanning for HART devices:** This option is used to determine whether a search for connected HART devices is to be run.
- **Automatically add found devices to project:** This option is used to determine that the HART devices found are added to the project.
- **Use generic HART DTM (In case if after scan no device DTM was assigned):** If no HART DTM has been installed for the device found, the generic HART DTM will be added instead.
- **Use first available device DTM (In case if after scan more then on device DTM was assigned):** If several DTMs have been installed for a device found, the first DTM found will be added to the project.

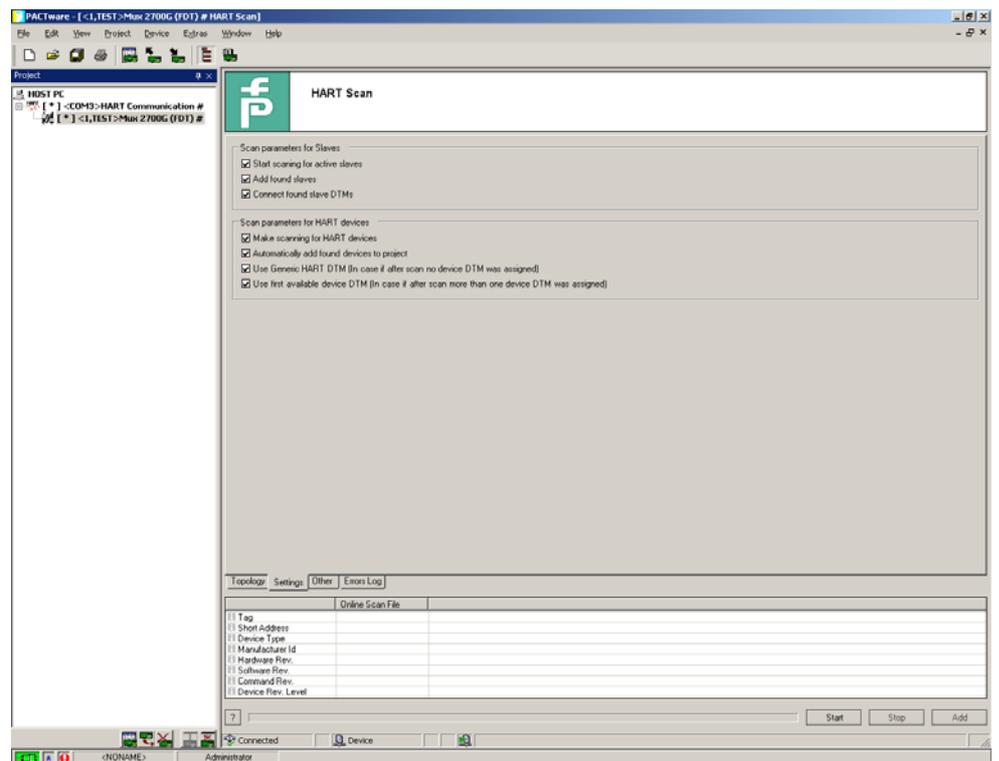


Figure 3.13 Parameterization of HART Scan function



Setting of further Scan functions

- ▶ Open further Scan functions via the **Other** folder.
 - ↳ The **Other** window is indicated.

For some field devices (e. g. from VEGA) it may be necessary to render available additional information by means of an XML file. This can be added to the **Other** folder.

- ▶ Activate the **Use Additional .XML file to identify SubDeviceType** option.
- ▶ Open an explorer menu via the **Load** button.
- ▶ Select the requested XML file.
- ▶ To remove an XML file from the list, mark it and delete via the **Delete** button.

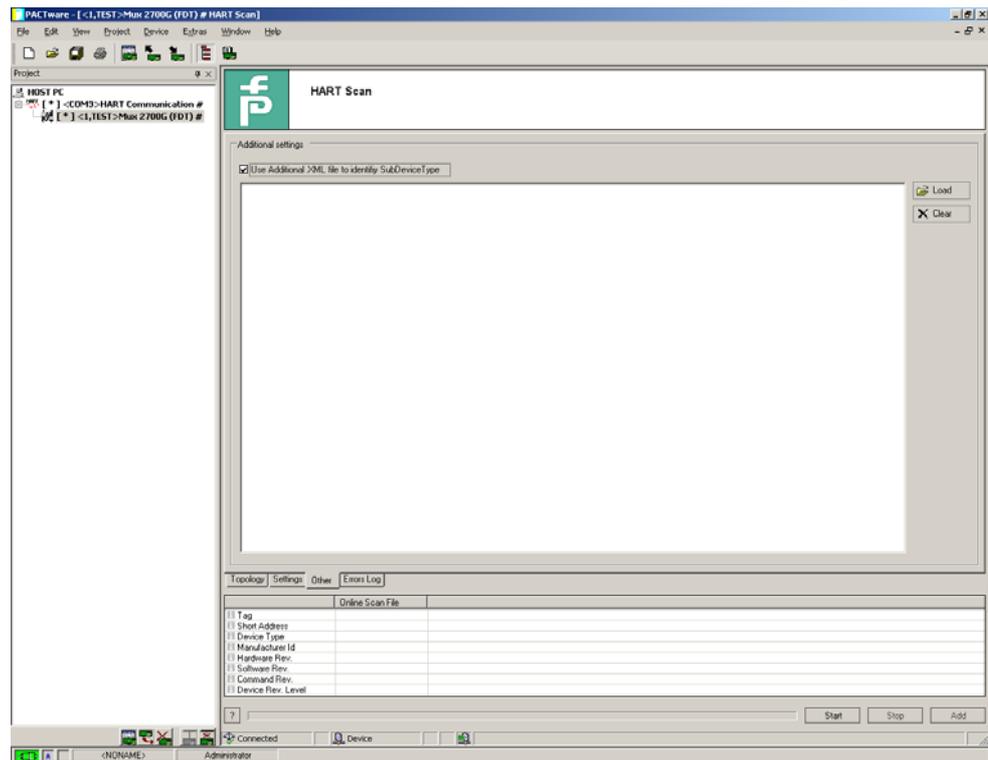


Figure 3.14 Parameterization of HART Scan function

The HART Scan queries the allocation table of the HART Multiplexer. The allocation table contains the loop number and the long frame address of the device connected to this loop. This is built up during the power on of the HART Multiplexer. If after the power on of the HART Multiplexer another device is connected, the allocation table can be built by means of the **Rebuild loops** option.

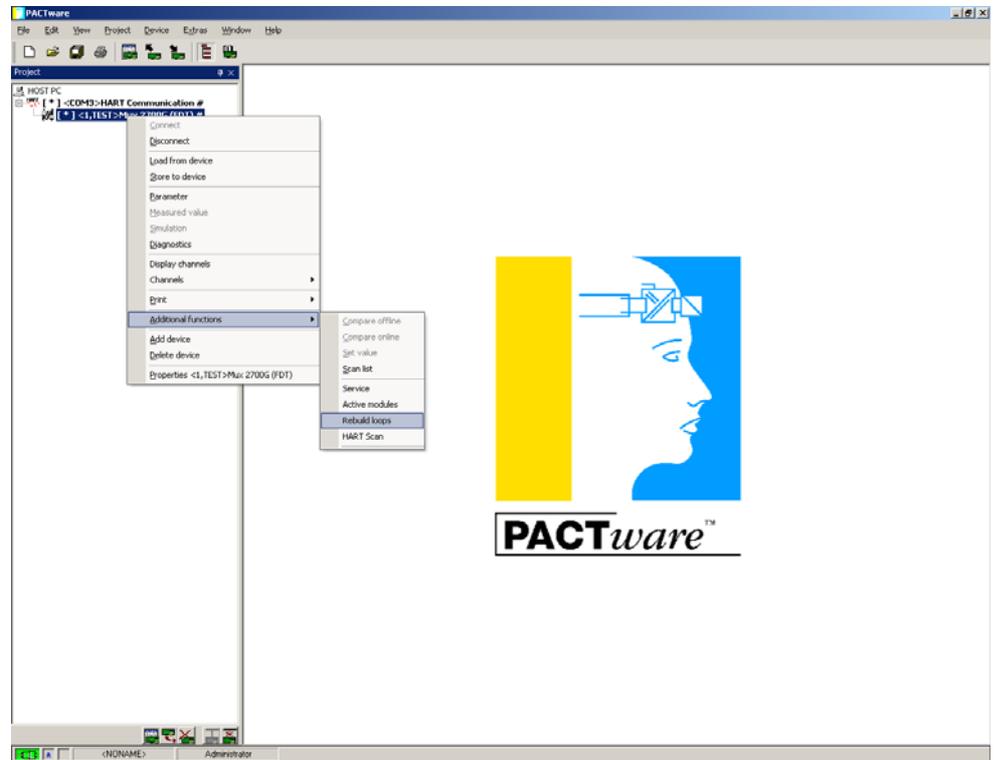


Figure 3.15 Activate Rebuild loops function

After the scan, the right table will show the following information on the DTM suggested:

- Manufacturer ID
- Device type
- Sub Device Type
- Name of the DTMs
- Manufacturer of the DTMs
- Description of the DTMs
- Extended description of the DTMs (e. g. version number)



Note

Some DTMs do not provide this information, due to which an automatic allocation is not possible.

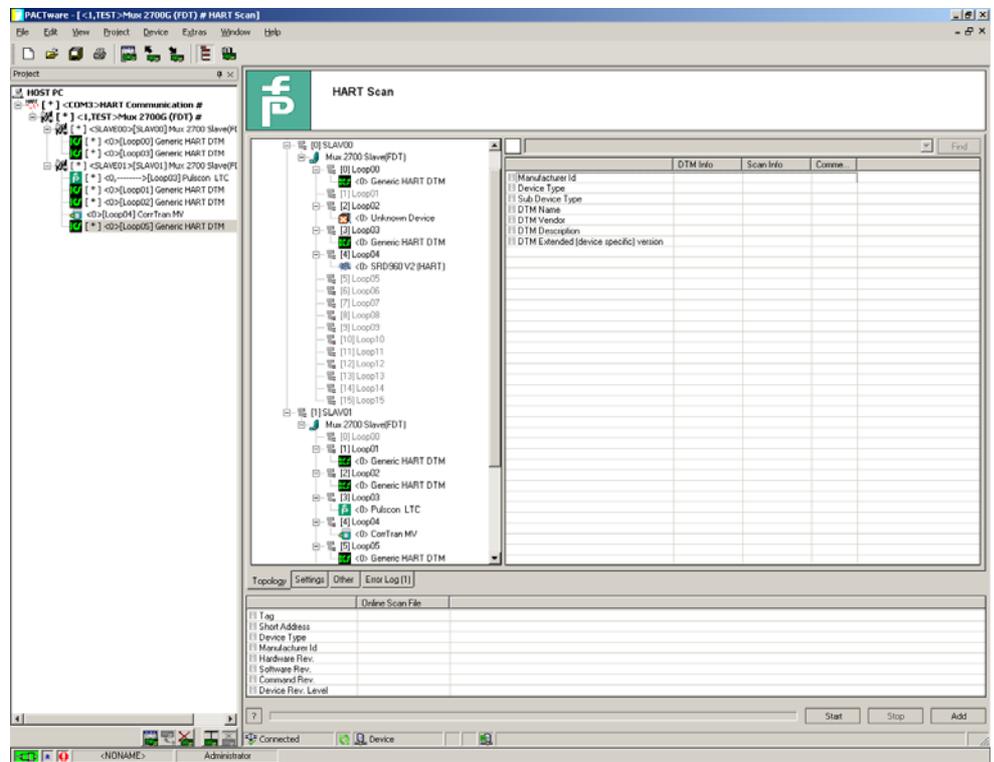


Figure 3.17 Result of HART Scan

- ▶ Now the DTMs can be added to the project by using the **Add** button
- It is also possible to add DTMs manually in the project tree.



Manual adding of DTMs

- ▶ Use the right mouse button to click on the Slave unit where the new device shall be added.
- ▶ Select the device which shall be added.
- ▶ Select the loop the device will be connected to.



Read-out of parameters

- ▶ Read-out the device parameters via **Project > Upload**.

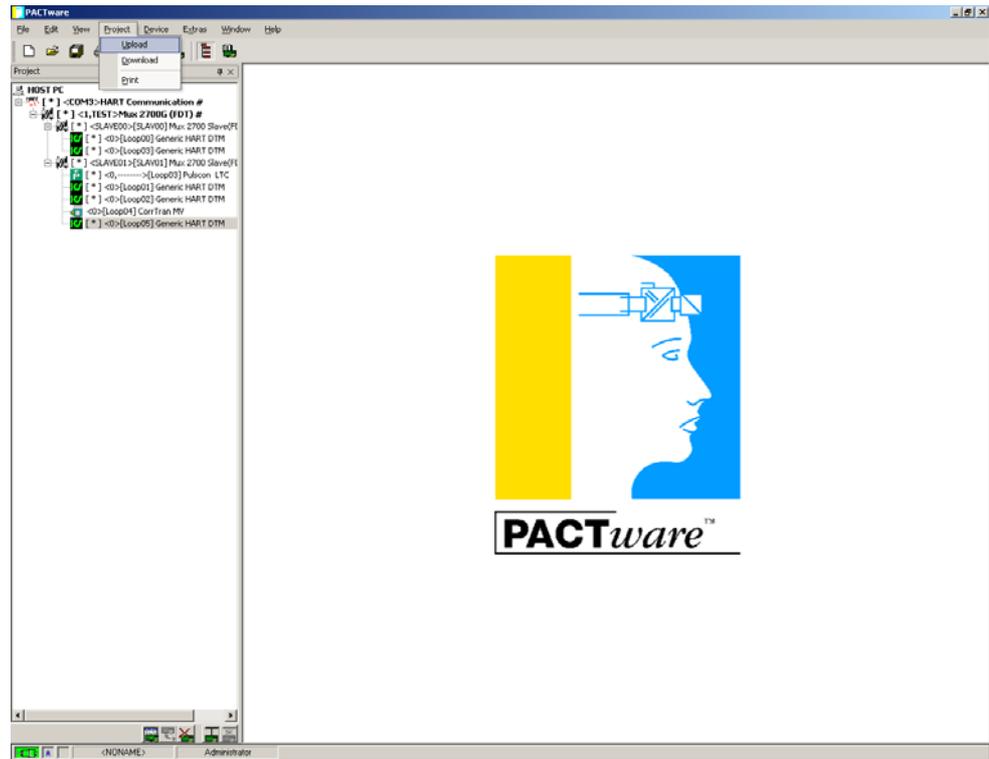


Figure 3.18 Read-out of parameters

The project is now complete and contains all required information.

If other Slaves are added later, the already existing Slaves can be excluded from the scan.

- ▶ Use the right mouse button to click on the Slave to be excluded.
- ▶ Activate the **Exclude** option.

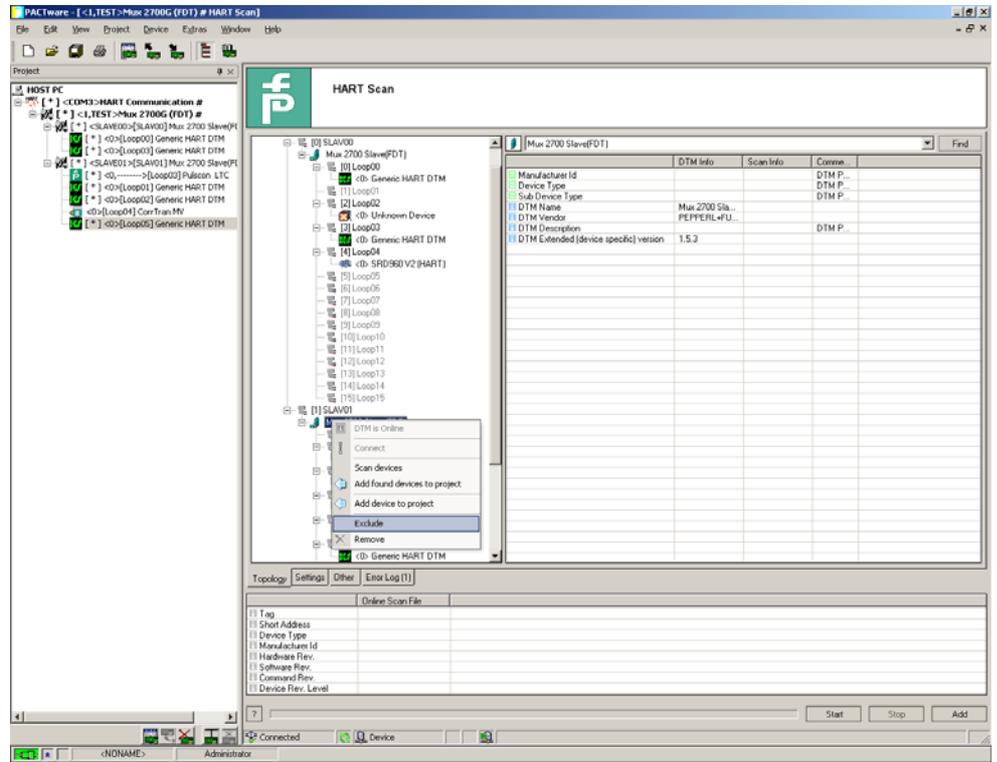


Figure 3.19 Exclude existing Slaves from the scan

4 Appendix

4.1 Literature

- /1/ HART Communication Foundation:
HART – SMART Communications Protocol Specification
HCF SPEC-11, Revision 5.9
www.hartcomm.org
- /2/ HART Communication Foundation:
HART Application Guide
HCF LIT 34
www.hartcomm.org
- /3/ Romilly Bowden, Fisher-Rosemount:
HART- A technical Overview, August 1997
Fisher-Rosemount

4.2 Glossary

Address

In communications technology, the address of a device is used to identify that device, so that messages can be delivered correctly. HART uses two forms of addressing: a polling address in the range 0 to 15, and a unique identifier (long frame format address) of 38 bits. The polling address 0 is reserved for 4 mA ... 20 mA analogue transmitters in → point-to-point networks, polling addresses 1 ... 15 for transmitters in → multidrop networks.

Broadcast Mode

→ Burst Mode

Burst Mode

A communication mode in which a Master device instructs Slave devices to continuously broadcast process values (e. g. the → primary variable) until the Master instructs it to stop. The Multiplexer recognizes and supports this mode, but itself does not instruct field devices to use this mode.

FSK

Abbrev. for **F**requency **S**hift **K**eying. Method of coding the two digital signals "0" and "1" with two different frequencies.

HART

Abbrev. for **H**ighway **A**ddressable **R**emote **T**ransducer. Used to describe communications that complies to the HART specification. HART is a → Master-Slave system.

Host

Higher layer system, e. g. service station, PC or process control system.

Long frame address

→ Address

Master

A device (e. g. the process control system) in a → Master-Slave system that initiates all transactions and commands.

Master-Slave system

A communication system in which all message transactions and commands are always initiated by a → Master device and → Slave devices only respond to requests received.

Multidrop

In contrast to → point-to-point, more than two (field) devices are connected together to one segment (pair of wires) in a multidrop system. To correspond to each single device it must have a unique → address. Because communication can only be established to one field device, cycle times are increasing proportional to the number of field devices. In HART multidrop operation the current through each field device is fixed at 4 mA to allow parallel operation of more than one device (up to 15 devices are possible).

Multimaster

HART allows connection of two Masters, a primary and a secondary Master. A high level station is configured as primary Master, usually this is the process control system or the main service station. A lower level station is configured as secondary Master, this may be a hand terminal or a service station. The difference between primary and secondary Master is the priority of the bus access: the primary Master has a higher priority than the secondary Master. Messages sent by the Masters are characterized by a Master bit, so that the Masters can recognize which responses are intended for them.

Point-to-point

In a point-to-point communication system, only two communicating devices are connected together to one segment (pair of wires). A point-to-point system is for example the Master-Slave system Multiplexer-field device.

Primary Master

→ Multimaster

Primary variable

Process value measured by a field device. The unit depends on the used HART command (see commands 1, 2 and 3). The primary variable of a pressure sensor could contain for example the measured process pressure in the unit "bar".

Secondary Master

→ Multimaster

Secondary variable

Additional value (measured in the process) of a field device (up to four additional values are supported by HART). This variable can only be read by HART command 3.

Slave

A device (e. g. transmitter or valve) in a → Master-Slave system that receives commands from a → Master device. A Slave is not able to initiate a transaction.

"Smart" field device

Microprocessor-based device that can be programmed, has memory, is capable of performing calculations and self-diagnostics and reporting faults, and can be communicated with from a remote location.

Tag

Unique tag (designation of the control engineering point) of the field device within the process plant.



With regard to the supply of products, the current issue of the following document is applicable:
The General Terms of Delivery for Products and Services of the Electrical Industry, published by
the Central Association of the "Elektrotechnik und Elektroindustrie (ZVEI) e.V.",
including the supplementary clause: "Extended reservation of title".

PROCESS AUTOMATION – PROTECTING YOUR PROCESS



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