FieldKey NHU200
Wireless adapter

ABB

FieldKey NHU200
Wireless adapter

Operating Instruction
OI/NHU200-EN

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Original instruction

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1 Safety

1.1 General information and notes for the reader

You must read these instructions carefully prior to installing and commissioning the device.

These instructions are an important part of the product and must be kept for future reference.

These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.

For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.

This product is built based on state-of-the-art technology and is operationally safe. It has been tested and left the factory in perfect working order from a safety perspective. The information in the manual must be observed and followed in order to maintain this state throughout the period of operation. Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Only by observing all of the safety instructions and all safety / warning symbols in these instructions can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured. Information and symbols directly on the product must be observed. They may not be removed and must be fully legible at all times.

1.2 Intended use

The FieldKey is designed for the transmission of information (Process - Configuration - Diagnosis) from the target 4 ... 20 mA HART instrument to a WirelessHART gateway. The approved usage of the target instrument and the gateway can be taken from corresponding parts of their operating instructions.

— The maximum operating temperature must not be exceeded.
— The permitted operating temperature must not be exceeded.
— The housing degree of protection must be observed.

1.3 Target groups and qualifications

Installation, commissioning and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator to do so. The specialist personnel must have read and understood the manual and comply with its instructions.

The operators must strictly observe the applicable national regulations with regards to installation, function tests, repairs, and maintenance of electrical products.

1.4 Plates and symbols

DANGER – Serious damage to health / risk to life!
This symbol in conjunction with the signal word "Danger" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

DANGER – Serious damage to health / risk to life!
This symbol in conjunction with the signal word "Danger" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – Body injury!
This symbol in conjunction with the signal word "Warning" indicates a possibly dangerous situation. Failure to observe this safety information may result in death or severe injury.

WARNING – Body injury!
This symbol in conjunction with the signal word "Warning" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.

CAUTION – Minor injury!
This symbol in conjunction with the signal word "Caution" indicates a possibly dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This may also be used for property damage warnings.

ATTENTION – Property damage!
The symbol indicates a potentially damaging situation.
Failure to observe this safety information may result in damage to or destruction of the product and / or other system components.

IMPORTANT (NOTE)
This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. It does not indicate a dangerous or damaging situation.

1.5 Device designation / name plate

The device designation, together with some other important device related information, is to be found on the name plate fixed to the side of the adapter.
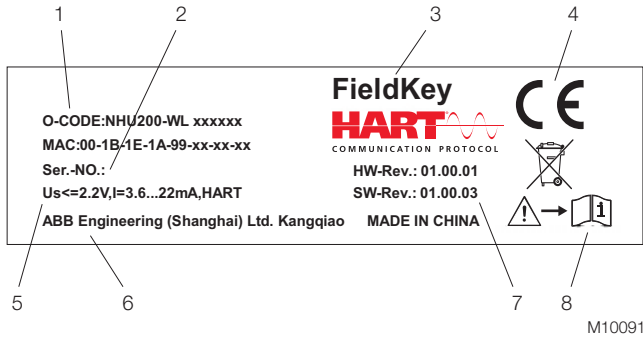

Fig. 1: name plate
1 Ordering code | 2 Serial number |
3 Model name | 4 CE mark |
5 Max. loop voltage drop and typical current range, protocol |
6 Manufacturer |
7 Hardware revision number and Software revision number |
8 Refer to product documentation

1.6 Transport and storage

After unpacking the adapter, check the device for transport damage. Check the packaging material for accessories. During intermediate storage or transport, store and transport the adapter in the original packaging only. See chapter "Technical Data" for permissible ambient conditions regarding storage and transport. The storage time is indefinite; however, the warranty conditions stipulated in the order confirmation of the supplier are valid.

1.7 Device recycling

Recycling of device and packaging should be taken into consideration and disposed of in accordance with local and national legislation / regulations.

1.8 Device disposal

i | **IMPORTANT (NOTICE)**
The following only applies to European customers.

ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible. The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002 / 96 / EC) that came into force on August 13 2005 aims to reduce the arising from electrical and electronic equipment; and improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment.

IMPORTANT (NOTICE)
In conformity with European local and national regulations (EU Directive 2002 / 96/ EC stated above), electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005.

i | **IMPORTANT (NOTICE)**
For return for recycling, please contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

2 Function and System Design

2.1 General description

The majority of installed 4 … 20 mA HART instruments have no communications pathway back to a HOST systems for process monitoring or asset management, the result is that information is left stranded in the field. The FieldKey is ABB's wireless adapter which adds remote access to 4 … 20 mA HART instruments unlocking the stranded information.

The main features of the FieldKey are:
— Energy harvesting means no battery to maintain.
— Simple to use, simple set up, small size and rotating antenna makes it easy to install.
— Full access to instrument information.

2.2 WirelessHART

The FieldKey wireless adapter has WirelessHART built in and so can become part of a WirelessHART mesh network as shown in Fig. 2. Here the FieldKey is shown connected to different instrument types within a wireless mesh network to a gateway and then to host systems such as Asset Vision or System 800xA.
Network features such as security and coexistence are built into the WirelessHART which also allows devices from other vendors, using this standard, to work together.
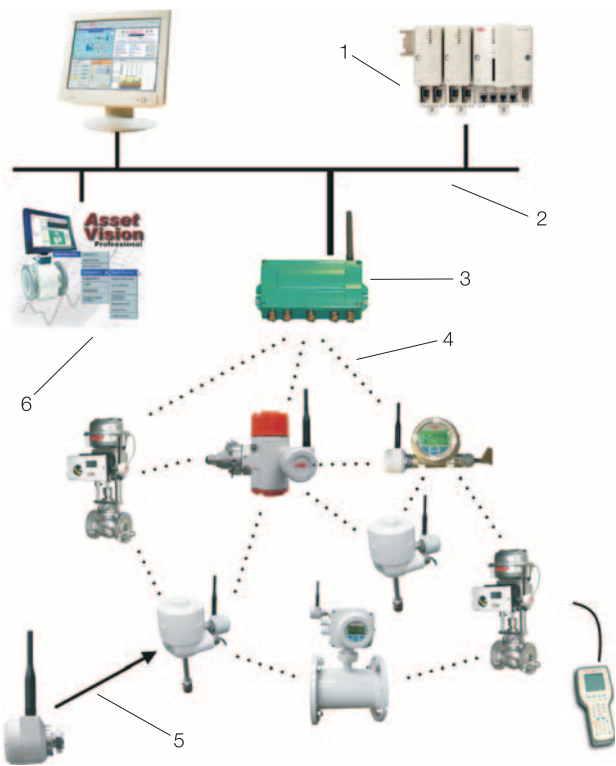
Fig. 2:   WirelessHART mesh network
1 System 800xA | 2 High speed bus | 3 Gateway |
4 WirelessHART network | 5 FieldKey Wireless Adapter |
6 Stand alone Asset Management application

2.3   Energy harvesting

The adapter takes its power form the 4 … 20 mA loop and as a result there is no internal battery to maintain. The FieldKey automatically adjusts the power taken depending upon the loop current (the voltage drop across the adapter is reduced when the loop current is low). This feature simplifies installation where the voltage levels are low.

2.4   Simple to use

The small size of the FieldKey makes it easy to connect to field instruments even in the most challenging environments. The antenna can be easily rotated to obtain the best radio signal. The FieldKey is provided with default parameters allowing process monitoring and asset management. The network joining parameters can be set prior to installation with standard HART tools such as handheld-terminals or a PC using Device Descriptor (DD) or Device Type Manager (DTM).

2.5   Full access to instrument information

The FieldKey will provide wireless remote access to the HART information available within the connected instrument. This information would normally include:

Process values

A HART instrument can have up to four process values available depending upon the instrument type. For example a flowmeter could contain pressure, density and temperature values (configure via Burst Messages - default provides a maximum four process variable from the target instrument).

Maintenance information

The level and value of maintenance information held within an instrument will depend upon its type and application it is used for. A pressure transmitter may have information about plugged impulse lines or if it has been over pressured recently.

Configuration management

Remote access to field instruments would allow you to maintain a central database of instrument configuration. It would also be possible to carry out remote configuration changes (for example alter pressure range) via the FieldKey wireless network.
The FieldKey will allow you to manage instrument configuration from a remote location. It will now be possible to alter instrument configuration without a visit to the plant or even opening the instrument cover to attach data leads.

2.6   Correct usage

The FieldKey can be used in the following ways:

Connected to the target instrument at a spare cable entry gland

Here the small size of the adapter and ability to temporarily remove the antenna will make it easy to install even if there is nearby plant infrastructure making conditions cramped.

Connected remotely from the target instrument along the 4 … 20 mA loop

If the target instrument is in a location where radio reception is likely to be poor or installation is difficult. Then the FieldKey can be installed anywhere along the 4 … 20 mA loop. The FieldKey will have to be connected at suitable junction box.

Used as a network repeater

Connect the FieldKey to an available instrument or power supply. The FieldKey will now act as a network repeater to either extend the network range or cover radio blind spots.

3 Typical Applications

3.1 Introduction
The FieldKey wireless adapter has three distinct applications for HART instruments, these are:
— Asset Management
— Process monitoring
— Network repeater / extender

3.2 Asset Management
The FieldKey allows full remote access to the information left stranded within HART instruments and this includes configuration and maintenance information.
The FieldKey will relay commands from an Asset Management tool such as Asset Vision (Basic or Professional) to the field instrument and back.
Typical Asset Management functions would include: Configuration, calibration and condition monitoring.

3.3 Asset Vision Basic (DAT200)
Asset Vision Basic provides configuration, diagnostic and maintenance tasks for Instruments connected via HART or WirelessHART. It is an FDT frame and so open for certified Device Type Managers (DTMs) from any vendor.

Asset Vision Basic can be used to commission WirelessHART devices, such as FieldKey, and for remote access to the target instrument
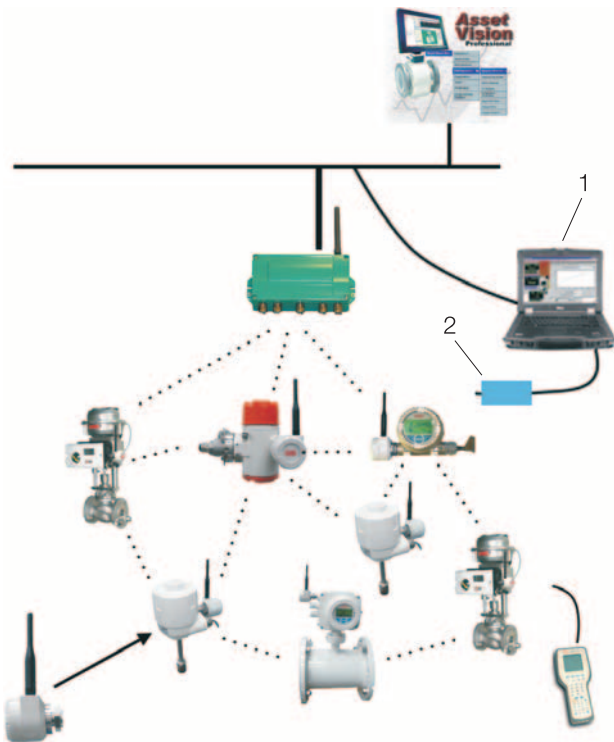
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Fig. 3
1 Asset Vision Basic | 2 Modem

3.3.1 Applications
— Provides the FDT frame for DTMs (device DTMs, communication DTMs, remote I/O DTMs, etc.).
— Straightforward tool for quick device parameterization (point-to-point wizard).
— Visual device overview that maps device communication links in systems (project tree).
— Storage / management of device data.
— Device measuring point planning and management.

3.3.2 Management
— Management of devices and networks in projects.
— Display and management of all installed DTMs (device catalogue), incl. a filter function for sorting according to: Device Type, Manufacturer, Group, Protocol.
— Assignment of measuring point names in the project manager (network).
— Assignment of device / DTM addresses in the project manager (network) via the communication DTMs.
— Device recognition via device TAG number or address.
— Simultaneous communication (online) with several devices.
— Scanning of devices connected via communication DTMs.
— Automatic generation of a project tree in the project manager (network) via communication DTMs.

3.3.3 Archiving
— Back up and load project-related data
— Print project related data
— Point-to-point (Tool Mode) wizard
— The wizard guides you in opening a project for a device.
— The wizard assists in configuring communication interfaces, finding the device, and selecting the right DTM.
— The wizard with three modes:
    — Online: Automatic device selection, connection to device, and reading of device data.
    — Offline: Manual device selection and display of device instance data.
    — Open file: Opens a previously saved point-to-point project in Off-line or On-line mode

3.3.4 Other features
— Password protection available for user accounts with fixed roles.
— Language settings.
— Configuration of Tool Mode wizard.
— Configuration of frame window and shortcuts.
— Option of opening FDT and error monitor.
— Customizable tool bar.
— Application view can be switched to a tab or window.
— Comprehensive online help available throughout the tool.
— Minimum Windows operating system (e.g. SP) see "Important Information".

3.4 Asset Vision Professional

Asset Vision Professional is a software application from ABB that runs on a standalone desktop or laptop PC. Intended for engineering and maintenance personnel, Asset Vision Professional supports ABB and 3rd party devices communicating via HART (including WirelessHART ™ with Asset Vision Professional version 5.1, PROFIBUS, and FOUNDATION Fieldbus. As a comprehensive asset optimization tool, it provides on-line and off-line device configuration, parameter setting functions, online monitoring and tuning, diagnostic alerts, asset monitoring, and integral work order processing.

WirelessHART device connection is made via an Ethernet connection to the WirelessHART gateway. This connection can be used for pre-commissioning device set-up as well as for device configuration and on-line monitoring and diagnostics. Parameter information from the wireless devices, including those attached to the FieldKey wireless adapter is accessed via FDT / DTM technology. Using the FDT / DTM open standard allows Asset Vision Professional to connect to any device that also supports FDT / DTM technology.

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3.4.1 Product offering

Asset Vision Professional leverages off of ABB's existing 800xA System software by re-using its powerful device management capabilities. Greater integration at the field instrument level allows customers to start with a standalone application like Asset Vision Professional and grow it into a larger 800xA control system using the same configuration data and navigation methods. In addition to support of the three major fieldbuses, Asset Vision Professional supports a number of other options including asset condition monitoring, CMMS interface, and SMS messaging to cell phones and pagers.

3.4.2 Integrated system environment

With Asset Vision Professional, Fieldbus topology design and field device configuration, diagnostics, performance monitoring, document management, and maintenance is performed as an integrated part of the device management environment. Through the use of context sensitive menus, Asset Vision Professional provides easy navigation through the entire project or plant. Device management aspects provide the means for device configuration and parameterization of the connected devices.

3.4.3 Diagnostics

During plant operation, it is important to identify and analyze abnormal situations quickly and undertake the corresponding actions. Asset Vision Professional offers detailed diagnostic functions for communication networks and their associated field devices. Devices are monitored cyclically. The user is informed of degrading performance through Asset Vision Professional's alarm and events features. Detailed device status information is accessed directly from the alarm or on demand. In addition to presenting alarms to the system user interface, the system's SMS and email messaging service notifies key plant personnel via mobile telephones, email accounts, and pagers. Fault tracking capabilities help identify the fault severity and the cause of the malfunction. Comprehensive fault reports including relevant corrective action procedures are provided and assist in root cause analysis. Additionally, the fault report can be transmitted to a Computerized Maintenance Management System (CMMS) to initiate the work order process.

3.4.4 Device integration library

The device integration library contains a large portfolio of tested and certified ABB and third-party device objects. Therefore the effort to integrate field devices is minimized. This paves the way for smooth device integration. On a continuous basis, the Device Integration Library is extended with devices from ABB and different manufacturers. Testing and certification at the ABB Device Integration Center means more than proving interoperability. It means that each successfully integrated device will contain all needed functions such as asset monitors, DTMs, and device documentation.

3.5 Process monitoring

All 4 … 20 mA HART instruments have the ability to report up to four process variables via the wireless network. The type and value of the variables would depend upon the target instrument. Here are some examples:

Mass flowmeter: mass flow, density, temperature, volumetric flow

Differential pressure transmitter: differential pressure, static pressure, sensor temperature

Dual-input temperature transmitter: temperature 1, temperature 2, calculated temperature

Positioner: set point, valve feedback

Connect the FieldKey to any HART instrument and you can unlock the process information to be read back at a host system.

3.6 Network repeater / extender

It is likely that the wireless mesh network is unable to reach all the areas on your process plant as a result of infrastructure attenuating the signal or simply too great a distance between nodes. The FieldKey can be used to extend the range of the wireless network. Simply install the FieldKey to a suitable HART instrument or provide it with a 4 … 20 mA loop and it will act as a network repeater adding up to another 300 m range between nodes.

> ℹ **IMPORTANT (NOTICE)**
> For more information, go to www.abb.com/instrumentation and follow the "Device Management and Fieldbus" link.

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4 Pre installation

4.1 FieldKey overview

The FieldKey wireless adapter adds WirelessHART network capability to new or existing 4 … 20 mA HART instruments (target instruments) from any vendor. The FieldKey can be configured via existing HART tools (handheld-terminals or PC based) using standard DD (device description), DOF file or DTM (Device Type Manager); Fig. 4 and Fig. 5.

4.2 FieldKey setup

The FieldKey can be configured before or after installation in the field. Using default settings will allow the FieldKey to provide a maximum of four process variables from the target instrument and also full access to configuration and diagnostic information.

If the FieldKey default settings are acceptable, then there are only three parameters to enter and these are:

— FieldKey Long Tag (32 characters) to allow it to be recognised within the gateway.
— Network ID (decimal number 8 digits) to associate it with one gateway.
— Join Key (32 characters in hexadecimal set in four parts) used for secure connection to the wireless network.

4.3 FieldKey setup before field installation

The FieldKey will require power from an external source to allow configuration on a bench.

The power source could be from an Instrument (with 4 … 20 mA loop power) or from a 24 V DC power supply with limiting load resistor (1.2 kΩ, 0.25 W) in place. Allow three minutes for energy harvesting to store enough power such that the FieldKey can start up.

With a bench installation as described there will be no WirelessHART network however you can enter the three parameters described above.

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Fig. 4: Connection with Hand Held Terminal
1 Quick Connector | 2 4 … 20 mA Loop | 3 HART Hand Held |
4 Instrument Housing | 5 FieldKey Wireless Adapter

4.4 Target device set up

The target device is the 4 … 20mA HART instrument to which the FieldKey will be connected to. To allow the target device to be identified in the WirelessHART you must enter a "tag" in the instrument message field. The message field tag can be entered using the HART engineering tool and should be set before the FieldKey is connected.
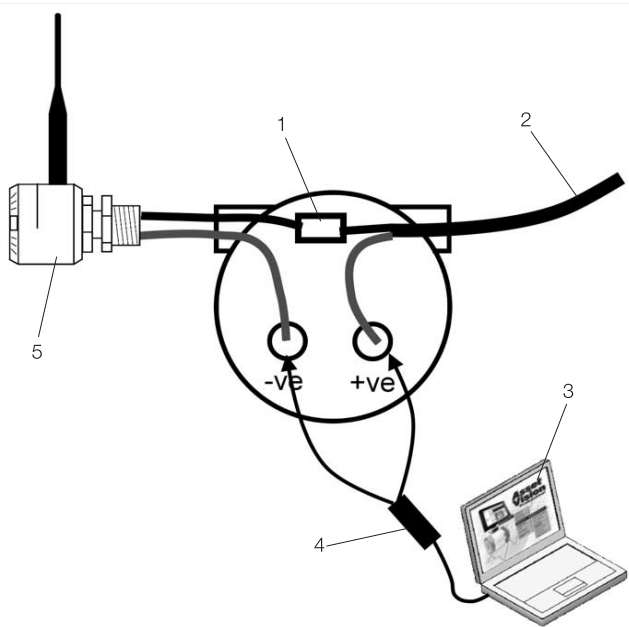
M10094

Fig. 5:   Connection with PC
1 Quick Connector | 2 4 … 20 mA Loop | 3 Asset Vision |
4 HART Modem | 5 FieldKey Wireless Adapter

4.5   Setup in the field

After the FieldKey is connected to the target instrument in the field, and the loop power on, allow three minutes for energy harvesting to store enough power such that the FieldKey can start up.

Connect the HART tool (handheld-terminal or PC) to the target instrument as normal. Select connection via polling. You should now be able to select the target instrument of the FieldKey. The FieldKey has a default HART address of 15.

4.6   Electrical Connection

The FieldKey has no internal battery as it takes power from the 4 … 20 mA loop using an energy harvesting technique. As a result of energy harvesting there is a maximum voltage drop across the FieldKey of 2.3 V at 4 mA which reduces as the loop current approaches 20 mA. Check that there is sufficient voltage at the target field instrument to accommodate a 2.3 V drop.

4.7   Wireless environment

The FieldKey can only be used within a WirelessHART network and with other devices using the same standard. This standard provides a secure and reliable network with several strategies to allow co existence with other nearby wireless networks.

The FieldKey has a maximum range of 200 m (clear field of view) and 50 m in medium to high density process buildings and needs to be within range of at least one other wireless device. A strong mesh network would require each wireless device to be within range of three others which can offer a redundant pathway back to the gateway.

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i   IMPORTANT (NOTICE)
All wireless devices must comply to the WirelessHART standard. Power up the gateway (1) first, then the instruments closest to the gateway.

4.8   Location

The adapter can be located at a convenient location anywhere along the 4 … 20 mA loop however the most common location will be at a spare cable entry gland at the field instrument. If there is no spare cable entry gland then the options are to use a T-piece at the instrument or use an existing junction box on the 4 … 20 mA loop.

5 Mounting

5.1 Mechanical installation

5.1.1 Adapter mounting

The adapter can be mounted on the field instrument via a spare cable gland entry or via a T-piece if no spare gland is available. It would also be possible to connect the adapter at another convenient point in the 4 … 20 mA loop, for example at a junction box.
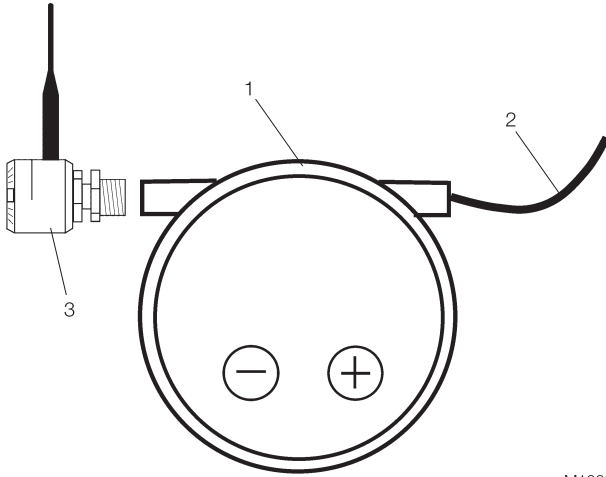

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Fig. 6: Direct connection via spare cable gland
1 Double Gland Instrument | 2 4 … 20 mA Loop |
3 FieldKey Wireless Adapter

Feed the adapter cables through the spare cable gland.
Attach the adapter to the instrument by tightening the gland locking nut with a wrench.

> **i IMPORTANT (NOTICE)**
> Do not tighten the adapter by gripping and rotating the housing, this may cause internal damage in extreme cases.

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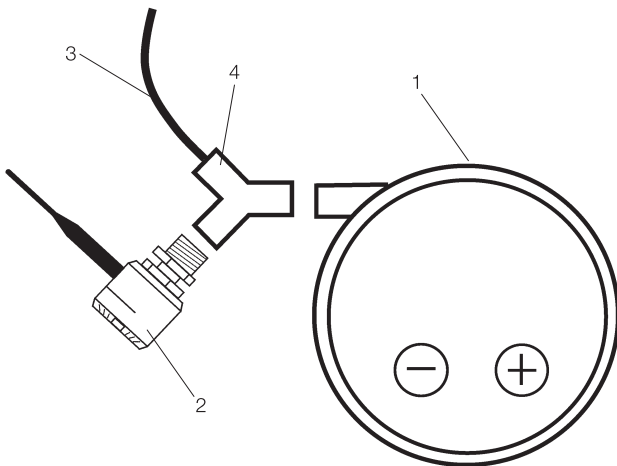
Fig. 7: Direct connection via a T-piece
1 Single Gland Instrument | 2 FieldKey Wireless Adapter |
3 4 … 20 mA Loop | 4 T-Piece

Feed the adapter cables through of T-piece to single cable gland.
Attach the adapter to T-piece and then T-piece to the instrument by tightening the gland locking nut with a wrench.

> **i IMPORTANT (NOTICE)**
> Do not tighten the adapter or / and the T-piece by gripping and rotating the housing, this may cause internal damage in extreme cases.

5.1.2 Antenna rotation and locking

The antenna is positioned by rotating the adaptor housing until the antenna is in the best position (normally in a vertical direction). There is a locking mechanism to stop the housing rotating through 360deg.

Locking the antenna position
Loosen the rotation locking nut at the adaptor.
This will make it easy to rotate the housing.
Rotate the housing until the antenna is in a vertical position.
Tighten the rotation locking nut at the adaptor.
The housing can also be locked by using the allen key to rotate the grub / set screw on the locking nut.

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Fig. 8: Antenna position
1 Rotation locking nut | 2 Gland locking nut

5.1.3 Remote connection at a junction box

The FieldKey can be installed anywhere along the 4 … 20 mA loop of the target instrument. This option may be used where it is difficult to install the FieldKey at the instrument or the radio reception is poor at the instrument location.
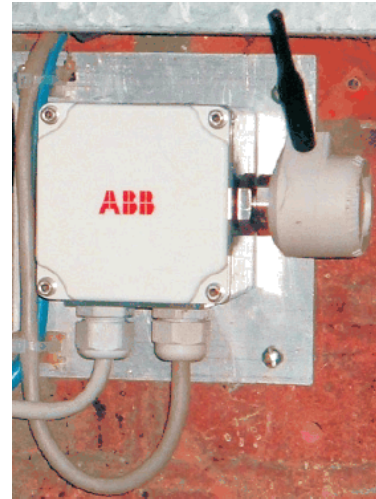

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Fig. 9: Installation

6 Electrical connections

6.1 Direct connection
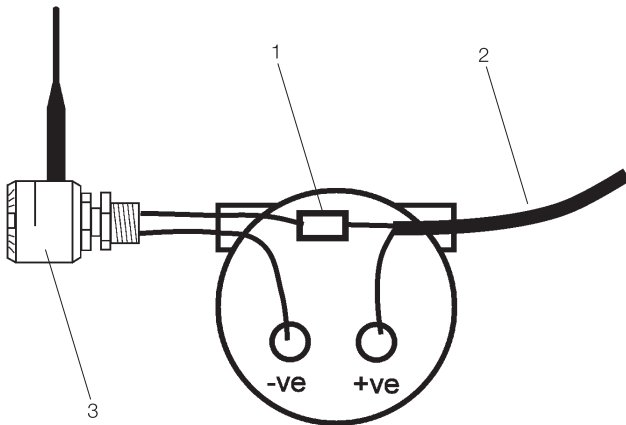
M10099

Fig. 10: For use with measurement instruments
(pressure, temperature, flow)
1 Quick Connector | 2 4 … 20 mA Loop | 3 FieldKey Wireless Adapter

The adapter requires connection in series with the 4 … 20 mA loop, therefore ensure that site procedures are in place for the loop to be accessed during installation. (e. g. permits in place – loop in manual – loop isolated).

A quick connector (Fig. 12) is provided with the FieldKey to allow connection of the loop negative to FieldKey negative. There is no requirement to add a 250 Ohm HART load resistor as this is already provided within the FieldKey.
 It may take up to 3 minutes for the adapter to charge its internal circuits and go on-line.
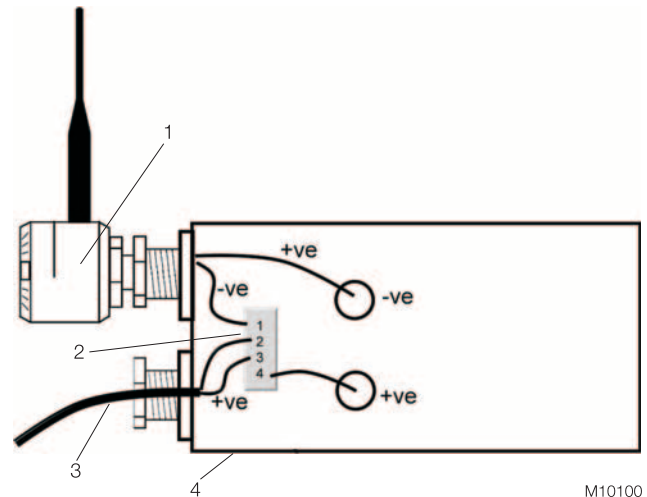
M10100

Fig. 11: For use with positioners
1 FieldKey Wireless Adapter | 2 AO Coupler | 3 4 … 20 mA Loop | 4 Positioner housing

Where the FieldKey is to be used with a positioner then the AO Coupler is required. The AO Coupler can be connected at the positioner as shown in this diagram.

Pin assignment AO Coupler

Pin	Description
T1	FieldKey negative (Black)
T2	Loop negative
T3	Loop positive
T4	Instrument positive

Another option, for connecting the AO coupler, is to install it closer to the loop power source instead of at the instrument. Connect at the I/O card or in the marshalling cabinet.
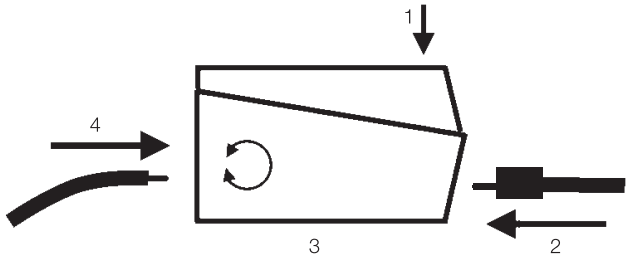
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Fig. 12: Use of the Quick Connector
1 Push to insert FieldKey wire | 2 FieldKey | 3 Quick Connector |
4 Insert Loop Wire

6.2 Remote location
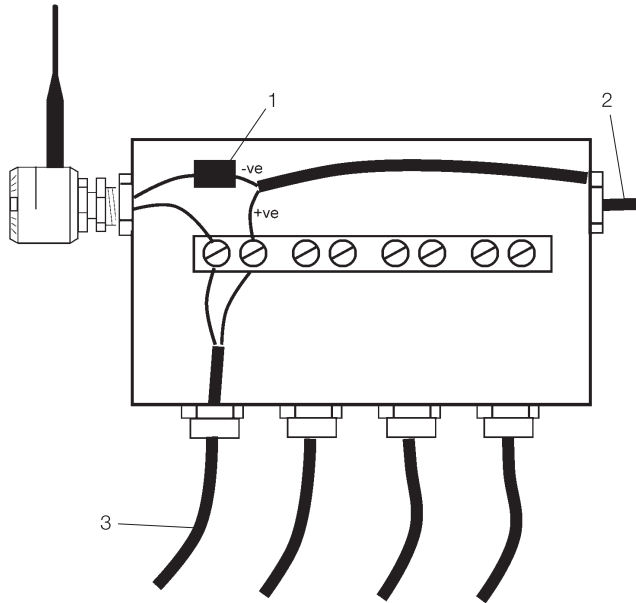
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Fig. 13: Using an existing junction box
1 Quick Connector | 2 Multicore field cable |
3 to Target Instrument

Make sure the intended junction box is in a suitable location (radio reception is likely to be good and the antenna can be orientated suitably) and that there is a spare cable entry gland.

The FieldKey is installed in series with the use of the quick connector as shown in this diagram.
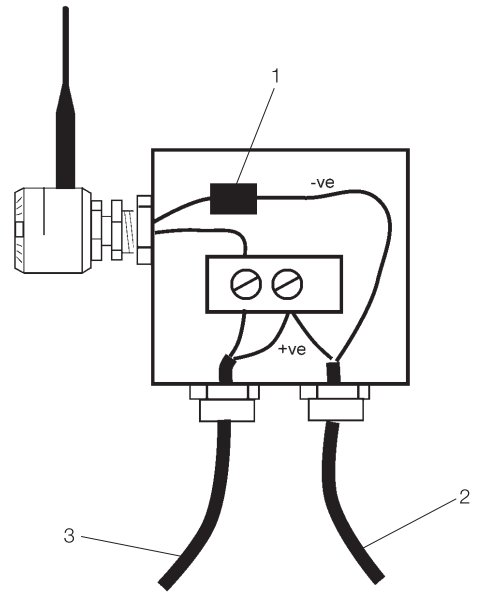
M10103

Fig. 14: Using a new Junction box
1 Quick Connector | 2 4 … 20 mA loop to control room |
3 4 … 20 mA to Target Instrument

Select a suitable junction box with at least three cable entry glands.

The FieldKey is installed in series with the use of the quick connector as shown in this diagram.

7   Commissioning

7.1   General
The FieldKey can be commissioned via standard HART tools including
— ABB HART Hand held DHH801-MFC (DOF file).
— ABB Asset Vision Basic (FieldKey DTM).
— ABB Asset Vision Professional (FieldKey DTM).
— Other tools supporting HART DD, DOF or DTM files.

These tools can be connected to the target instrument and FieldKey as shown in Chapter 4.

7.2   Use of hand-held terminal supporting DD or DOF files
The hand held terminal will allow you to set all the relevant information to allow the adapter to join a WirelessHART network.
— Ensure the Adapter DD or DOF has been loaded into the HART handheld-terminal.
— Connect the HART hand-held configurator to the instrument at the instrument or junction box.
— Set the handheld-terminal to polling (multidrop) mode and scan for devices. The FieldKey has a default polling address of 15.
— Once connected you can edit the adapter.

7.2.1   Editing the wireless adapter with the handheld-terminal
Chapter 7.3 describes the menu tree provided by the DD or DOF file used by the handheld-terminal. There are many parameters which can be set, however the default settings are often all that is required, apart from three, which identify the FieldKey in the network.

7.2.2   Default functions
— Read target instrument process values (up to four) every 60 seconds.
— Read the instrument device diagnostics every 60 seconds.
— Read the FieldKey diagnostics every 60 seconds.
— Adapter long tag = FieldKey "serial number" (e.g. FieldKey123xyz).

The three parameters you need to confirm are the wireless adapter long tag, join key (set in 4 parts) and the network ID. The join key and the network ID are also set in the gateway and must be the same as that entered in the FieldKey.
.

7.2.3   Quick set-up
1.   Connect the handheld-terminal and select the FieldKey from the polling list.
2.   Go to Device - Configuration - Long Tag.
2a. Enter the Long Tag. 32 character tag which will be visible at the WirelessHART gateway to identify this FieldKey.
3.   Go to Device - Configuration - Network.
3a. Set the Join Key (in four parts). This should be the same key as entered into the WirelessHART gateway.
4.   Go to Device - Configuration - Network.
4a. Set the Network ID. This is a decimal number and must be the same as that entered at the WirelessHART gateway.
5.   Go to Device - Configuration - Network.
5a. view Join Mode. Set to Join Now.
6.   Go to Device - Diagnosis - WirelessHART connection.
6a. Read the join status.

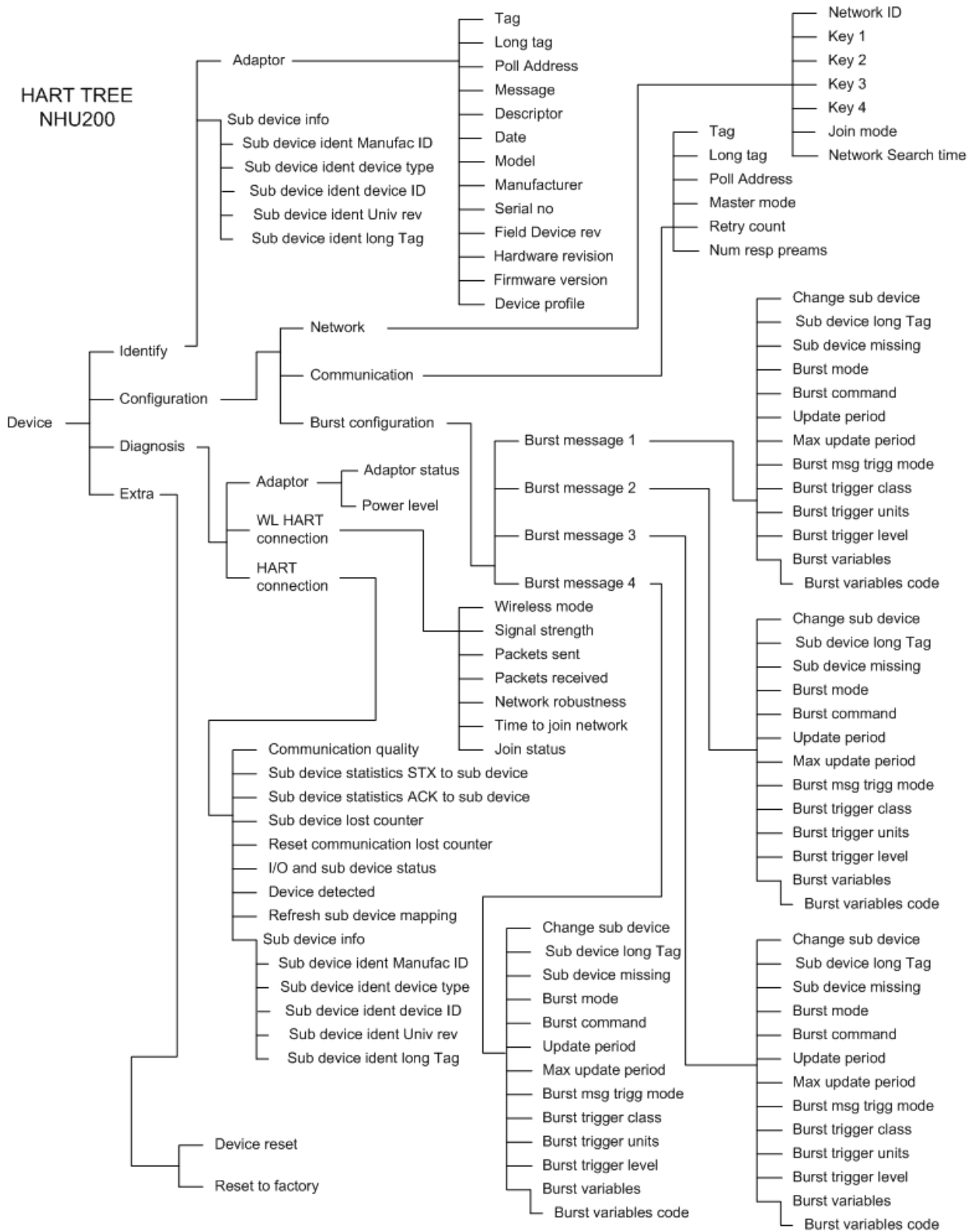---

i   **IMPORTANT (NOTICE)**
Some handheld-terminals require the Join Key to be entered in decimal. The ABB DHH801-MFC requires the join key in decimal.
The Join Key cannot be read back at the handheld-terminal to ensure it remains secure.
Make sure the target instrument has a tag entered into its message field before the FieldKey is connected to it.

7.3 DD Menu tree

Fig. 15

7.4 Device Identify
7.4.1 FieldKey Wireless Adapter

Parameter	Description	Notes
Tag	Eight (8) character text field that is associated with the Field Device installation. This text can be used by the user in any way. A recommended use is as a unique label to a plant that correlates to a Field Device label: a plant drawing, or on a Control System.	Default = Adapter
Long Tag	32 character (ASCII) text field just like Tag except the size is larger. This tag is used by the WirelessHART network to identify the device and should be unique.	Default = FieldKey "Serial Number"
Poll address	This is the address the FieldKey has when connected to the target 4 ... 20 mA instrument and can be set from 0 to 63. The default value is 15 and it is not usually required to change it from this value. The polling address is not used by the WirelessHART network so all FieldKeys could use the same default address of 15.	Default = 15
Message	32 character text message field for the FieldKey.	Default = ABB FieldKey Wireless Adapter
Descriptor	32 character text descriptor field for the FieldKey.	Default = WirelessHART
Date	The date must be displayed in 'MM-DD-YYYY' format Date - Gregorian calendar date that is stored in the Field Device. This date can be used by the user in any way. There is no specific recommended use.	
Model	This field should show the Device type (Model) of the device, i.e. NHU200 FieldKey	
Manufacturer	Manufacture responsible for the device type should be shown here i.e. ABB.	
Serial Number	Serial no of device must be shown here.	
Field Device revision number	Transmitter revision is shown here.	
Hardware version	Hardware version is shown here.	
Firmware	Firmware version is shown here.	
Device profile	The type of device the host is communicating is shown here.	

7.4.2 Sub Device Information (Visible if a sub device (Target instrument) is connected)

Parameter	Description	Notes
Sub device ident manufac ID	Manufacturer ID of the sub device attached to this system is shown here.	
Sub device ident device type	The device type is shown here.	
Sub device ident device ID	The sub device ID is shown here.	
Sub device ident Univ Rev	The sub device Universal Revision must be shown here.	
Sub device ident long tag	The sub device Long Tag (Message field) is shown here. This is how the sub device is identified in the wireless network. Make sure the sub device has a unique message set to identify it in the network.	

7.5 Device Configuration
7.5.1 Network

Parameter	Description	Notes
Network ID	The network identification allows the FieldKey to be associated with one WirelessHART network. The Network ID should be identical to that set in the WirelessHART gateway. This is entered as a decimal number	
Key 1	This is the first key word of the join key. It should be 8 characters and entered in Hexadecimal. It must match the first key word in the Gateway. You cannot read this key with a HART communicator.	
Key 2	This is the second key word of the join key. It should be 8 characters and entered in Hexadecimal. It must match the second key word in the Gateway. You cannot read this key with a HART communicator.	
Key 3	This is the third key word of the join key. It should be 8 characters and entered in Hexadecimal. It must match the third key word in the Gateway. You cannot read this key with a HART communicator.	

Parameter	Description	Notes
Key 4	This is the fourth key word of the join key. It should be 8 characters and entered in Hexadecimal. It must match the fourth key word in the Gateway. You cannot read this key with a HART communicator.	
Join mode	Changing the Join Mode will allow you to force the FieldKey into active join mode, options available are: 0 - Don't attempt to join 1 - Join now 2 - Attempt to join immediately on powerup or reset	Default = option 2
Network search time	This is the Minimum time a device must stay in active search mode when forced to join a network, after the time expired the device may go to Deep Sleep / Ultra Lower Power Mode.	

7.5.2 Communication

Parameter	Description	Notes
Tag	Eight (8) character text field that is associated with the Field Device installation. This text can be used by the user in any way. A recommended use is as a unique label to a plant that correlates to a Field Device label: a plant drawing, or on a Control System.	
Long tag	32 character (ASCII) text field just like Tag except the size is larger. This tag is used by the WirelessHART network to identify the device and should be unique.	
Polling addres	This is the address the FieldKey has when connected to the target 4 ... 20 mA instrument and can be set from 0 to 63. The default value is 15 and it is not usually required to change it from this value. The polling address is not used by the WirelessHART network so all FieldKeys could use the same default address of 15.	
Master mode	This sets the I/O System's Data Link Layer operation on all channels as either primary or secondary master mode.	
Retry count	This sets the number of times that the I/O System must retry a command to a field device if a valid response is not received. The value should be in between 2-5.	
Num Res preams	Number of Response Preambles - Number of Preambles to be sent in the response message from the Field Device to the Host.	

7.5.3 Burst Configuration

There are four configurable Burst Modes used for process monitoring	Burst mode = FieldKey continues to repeat communications to the sub device, for example to read the process variable.	Default values Burst message 1 = FieldKey adapter device diagnostics every 60 seconds Burst message 2 = Deactivated Burst message 3 = target device Process values every 60 seconds Burst message 4 = target device diagnostics every 60 seconds

Parameter	Description	Notes
Change sub device	Allows you to change the sub device.	
Sub device long Tag	Read the Long Tag of Sub device connected to the FieldKey.	
Sub device missing	Indicates that the sub device is not communicating with the FieldKey.	
Burst mode	Allows you enable burst mode. Options available for Burst mode are: 0 - Off 1 - Wired HART Enabled, Enabled on Wired HART device connection only. 2 - WirelessHART Enabled Enabled on WirelessHART device connection only. 3 - Both Wired and WirelessHART Enabled, Enabled on both Wired and WirelessHART connections.	

Parameter	Description	Notes
Burst command	Options available for Bursts are: 1 - Cmd 1: PV 2 - Cmd 2: % range / current 3 - Cmd 3: Dyn vars / current 4 - Cmd 9: Device vars w / status 5 - Cmd 33: Device variables 6 - Cmd 48: Read Additional Device Status, Read Additional Device - This command reads additional device status information.	
Update period	This parameter is meant to set the value of min and max update period of burst message; The device must publish data at this rate as long as the trigger conditions are met. The unit should be in second.	
Max update period	This parameter is meant to set the value of Maximum update period of burst message; the Device must publish data at this rate when the trigger conditions configured are not met.	
Burst msg trigg mode	Burst Message Trigger Mode. Allows you to change the condition when the burst message is sent. Options available are: 0 - Continuous: The Burst Message is Published continuously at (worst case) the Min Update Period. 1 - Windowed: The Burst Message is triggered when the source value deviated more than the specified trigger value. 2 - Rising: The Burst Message is triggered when source value rises above the specified trigger value. 3 - Falling: The Burst Message is triggered when source value falls below the specified trigger value. The default is Continuous.	
Burst trigger class	Options available are: 1 Device variable not classified 18 Frequency 2 Temperature 19 Analytical 3 Pressure 20 Capacitance 4 Volumetric flow 21 Emf 5 Velocity 22 Current 6 Volume 23 Resistance 7 Length 24 Angle 8 Time 25 Conductance 9 Mass 26 Volume per volume 10 Mass flow 27 Volume per mass 11 Mass per volume 28 Concentration 12 Viscosity 29 Valve actuator 13 Angular velocity 30 Level 14 Area 31 Vortex flow 15 Energy (work) 32 Mag flow 16 Force 33 Coriolis flow 17 Power 34 Acceleration	
Burst trigger units	The Unit of device variable selected.	
Burst trigger level	The trigger value which the burst message will be sent.	
Burst variables	This Group only visible if Burst command is 33 or 9	

Parameter	Description	Notes
Burst variables code 0	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 1	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 2	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 3	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 4	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 5	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 6	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	
Burst variables code 7	Burst Variable Slot - Device variable code assigned to the slot to be read in burst mode.	

7.6 Diagnosis

7.6.1 FieldKey Wireless Adapter

Parameter	Description	Notes
Adapter status	General status of the adapter 1 - OK 2 - Maintenance required 3 - Failure 4 - Off specification 5 - Function check	
Power level	0 - Good 1 - Ok 2 - Bad 3 - Critical 4 - Fatal 5 - Unknown	

7.6.2 WirelessHART Connection

Parameter	Description	Notes
Wireless mode	Indication of the join procedure status: 0 - Idle 1 - Active search - Looking for neighbours 2 - Negotiating 3 - Quarantined 4 - Operational 5 - Suspended 6 - Deep sleep, Ultra-low power	
Signal strength	5 - Excellent, "-50 dBm - +INF" 4 - Good, "-60 dBm - -50 dBm" 3 - Medium, "-70 dBm - -60 dBm" 2 - Poor, "-80 dBm - -70 dBm" 1 - Bad, "-INF - -80 dBm"	
Packets sent	This Parameter shows the Number of packets sent via WirelessHART since the last reset.	
Packets received	This Parameter shows the Number of packets received via WirelessHART since the last reset.	
Network robustness	Indication of network robustness: 5 - Excellent 4 - Good 3 - Medium 2 - Poor 1 - Bad	
Time to join network	This Parameter shows the time needed to join the network.	

7.7 HART connection

Parameter	Description	Notes
Communication quality	An indication of transmit and receive quality. 5 - Excellent, "100 % packets received" 4 - Good, "93 - 100 % packets received" 3 - Medium, "69 - 93 % packets received" 2 - Poor, "31 - 69 % packets received" 1 - Bad, "less than 31 % packets received"	
Sub device statistics STX to sub device	Message counter of communications between FieldKey and Target Instrument since last reset.	
Sub device statistics ACK to sub device	Acknowledge message counter between FieldKey and Target Instrument since last reset.	
Sub device lost counter	Counts the number of times connection with the Target Instrument is lost.	
Reset communication lost counter	Resets the Target Instrument lost counter.	
I/O and sub device status	Shows the I/O and sub device status. Options available are: 1 - Sub device list changed 2 - Duplicate master detected	
Device detected	Number of Sub devices connected to the instrument.	
Refresh sub device mapping	Force the sub-device mapping information to be re-read from the field device for all supported burst and event messages.	

7.7.1 Sub device Information (This group is visible if an instrument is connected to the FieldKey)

Parameter	Description	Notes
Sub device ident manufac ID	Manufacturer of the sub device attached to the FieldKey	
Sub device ident device type	Device type of the sub device	
Sub device ident device ID	Sub device ID	
Sub device ident Univ Rev	Sub device Universal Revision	
Sub device ident long tag	Sub device Long Tag	

7.8 Extra

Parameter	Description	Notes
Device reset	FieldKey Reset. This is equivalent to cycling the power off and then back on for the FieldKey.	
Reset to factory	Reset to factory default settings. After setting defaults the FieldKey will automatically carry out a Device Reset.	

8   Maintenance / Repair

8.1   Trouble shooting

Symptom	Recommended action
Wireless Network	
FieldKey cannot be seen by the HART hand-held terminal	The FieldKey uses energy harvesting to store power in an internal capacitor, this can take up to three minutes depending upon the loop current. Check if you can see the HART 5 instrument listed in the handheld-terminal. If you cannot see it then then check that there is sufficient voltage to drive the field instrument. Check to see if other HART masters are being used in the loop.
FieldKey cannot be seen in the gateway	The join procedure can take several minutes depending upon the mesh size and location of the FieldKey in the mesh (distance to neighbouring devices). The most likely cause is a mismatch between the network ID and / or Join Key in the gateway and FieldKey. Check the Network ID and Join Key in the FieldKey. Note Network ID is entered in decimal and Join Key is entered in hex. Note the Join Key cannot be read back at the handheld-terminal.
Field instrument cannot be seen in the gateway	If the FieldKey can be seen in the gateway and not the HART 5 slave (field instrument) then the WirelessHART network is probably OK. The most likely cause is the FieldKey is taking time to collect information from the HART 5 slave or unable to collect this information. Use the HART handheld-terminal and connect to the instrument to confirm you can read information from the instrument. If you can read information, then give the FieldKey more time to complete its task.
The adapter is frequently missing from the Network Manager Live List	The most likely cause is poor radio reception. When the FieldKey is seen in the live list check to see how many neighbours it has and the reported signal strength. Check the FieldKey antenna is at a suitable position (normally vertical). Check the FieldKey has at least two neighbours (provides a strong MESH with redundant paths). You may need to add a repeater to increase the number of neighbours.

8.2   Adapter replacement

Apart from replacing the antenna there are no FieldKey components which can be maintained in the field. If a FieldKey adapter has failed then it should be replaced with a new one.

The replacement FieldKey will require the same parameters to be set:
— Long Tag
— Network ID
— Join Key
— Other set up parameters (burst mode)

9 Technical Data

9.1 Electrical specifications

Communication type
HART

Protocol version
HART Version 7.0 wired and wireless
HART Version 5.9 wired

Transmission range
up to 200 m outside

Device loop power

Power consumption	9 ... 51 mW
	(@ 3.6 ... 22 mA)
Loop voltage drop	max 2,3 V (no external
	250 Ω resistor required)

Diagnosis
Device status NE107
Wired communication quality and statistics
Wireless communication quality and statistics
Join status
Sub device status
Sub device information

9.2 Ambient Specifications

Ambient temperature
-40 … 85 °C (-40 … 185 °F)

Transport / Storage temperature
-40 … 85 °C (-40 … 185 °F)

Climate class
CX, -40 … 85 °C (-40 … 185 °F)
5 … 95 % relative humidity (acc. with DIN EN 60654)

Relative humidity
max. 100 %, condensation permitted (acc. with IEC 68-2-6)

Vibration resistance
10 ... 2000 Hz at 5g in acc. with IEC 60068-2-6
during operation and transport

Shock resistance
gn = 30 in acc. with IEC 60068-2-27
during operation and transport

Type of protection
IP 67 NEMA 4X

9.3 Mechanical specifications

Weight
220 g

Housing material
Polycarbonate, grey RAL9002

Gland connection size
M20 x 1.5 (AISI 316 SST) or 1/2 in. NPT (AISI 316 SST)

Connection cable
0.75 mm^2 / AWG 20
0.3 m

Antenna
Omnidirectional antenna with vertical polarization, height: 88 mm, diameter: 11 mm

10 Dimensions

M10104

Fig. 16: Dimensions FielKey Wireless Adapter - mm (inch)

M10147

Fig. 17: Dimensions T-piece - mm (inch)

11 Certificates and Approvals

11.1 Declaration of conformity (CE)

In attaching the CE mark, ABB confirms that the FieldKey Wireless Adapter NHU200-NL conforms to all relevant EU directives.

11.2 Telecommunication compliance

— ETSI (R&TTE)
— FCC Part 15.247 for wireless applications in the area of 2.4 GHz
— EN 300 328 FCC and IC compliance

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i **IMPORTANT (NOTE)**

All documentation, declarations of conformity and certificates are available on ABB´s download area.

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