OPTICHECK Handbook

In-situ verification for field devices (electromagnetic, mass and vortex flowmeters and level devices)

Electronic revision: ER1.1.0_; SW 4.0.0_

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1.1 Version history

The version is defined:

- for the hardware by the ER (Electronic Revision) mark on the verification box
- for the software by the version indication on the start page of the software on the tablet / laptop

The version indication is divided into a prefix and 3 position, which are separated by points, followed by a suffix:
(prefix)(position 1).(position 2).(position 3)(suffix)
Example: ER1.0.0_

- the prefix indicates an Electronic Revision (ER) or Software Version (Version)
- the first position: indicates an incompatible change
- the second position: indicates a functional enhancement, which is backward compatible
- the third position: indicates a bug fix, which does not change anything to this handbook
- The suffix is an underscore or space for all released versions. Trial versions or development versions may have different suffixes

Release date	Electronic revision	Changes and compatibility	Documentation
2014	ER 1.0.0_; SW 1.0.0_	-	MA OPTICHECK R01
05/2015	ER 1.0.0_; SW 2.0.1_	Mass flowmeter verification added	MA OPTICHECK R02
09/2016	ER 1.1.0_; SW 3.0.1_	Vortex flowmeter verification added	MA OPTICHECK R03
03/2017	ER 1.1.0_; SW 4.0.0_	Radar level verification added	MA OPTICHECK R04

1.2 Intended use

INFORMATION!
This device is a Group 1, Class A device as specified within CISPR11:2009. It is intended for use in industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

INFORMATION!
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

OPTICHECK is a portable testing and verification tool for field devices. It allows the operator to check the functionality and accuracy of the field device, without the need to remove the device from the process. The OPTICHECK operates on the power supply from tablet/laptop and needs no other power supply. It is intended to be operated for a short duration of measuring time only. If RF transmitters are used in close proximity, the equipment may be disturbed.

A tablet is a sensitive equipment. For charging use surge protection equipment MNT-1 D (Phoenix Contact). In case of OPTICHECK operating with a laptop, ensure that laptop and charger are suited for the industrial electromagnetic environment.

OPTICHECK is not meant or able to perform tests on communication interfaces such as HART®, Profibus®, Foundation Fieldbus®, Modbus or other buses. It is built to perform tests on current output, pulse and frequency outputs and status outputs as well as control and current inputs.

Faulty installation

To measure accurately both the field device and the signal converter must be installed correctly. Measurement errors caused by faulty installation (mechanical and/or electrical) or minor defects on the sensor, may not be detected by the OPTICHECK.

An electromagnetic or vortex field device that has been verified by the OPTICHECK will measure within ±1% of the original factory calibration. Please note that on site verification with the OPTICHECK is not intended to replace a full wet calibration on a calibration rig.

DANGER!
OPTICHECK is not Ex certified and must not be used in areas with an explosive atmosphere. Do not connect the OPTICHECK to a sensor or a signal converter if an explosive atmosphere may exist. Signal converters intended for Ex configurations can only be verified in a safe area.

LEGAL NOTICE!
OPTICHECK is not designed to verify devices used in custody transfer applications. To perform a verification, the seals of the device have to be broken. There is no approval of OPTICHECK for these types of applications.

WARNING!
Only use OPTICHECK on signal converters that are listed as compatible. Using OPTICHECK on field devices that are not compatible may cause damage to the signal converter or OPTICHECK. If the device is not used according to the operating conditions (refer to chapter "Technical data") the intended protection could be affected.

1.3 Certification

CE marking

The device fulfils the statutory requirements of the following EU directives:

- For devices with electrical installations: EMC directive

The manufacturer certifies successful testing of the product by applying the CE mark.
An EU declaration of conformity regarding the directives in question and the associated harmonised standards can be downloaded from our website.

1.4 Safety instructions from the manufacturer

1.4.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.4.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.4.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.4.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.4.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

DANGER!
This warning refers to the immediate danger when working with electricity.

DANGER!
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

DANGER!
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator's plant.

INFORMATION!
These instructions contain important information for the handling of the device.

LEGAL NOTICE!
This note contains information on statutory directives and standards.

- HANDLING
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

1.5 Safety instructions for the operator

WARNING!
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

2.1 Device description

This measuring tool is designed for the fully automated analysis and verification of field devices in combination with signal converters.

Your measuring tool is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

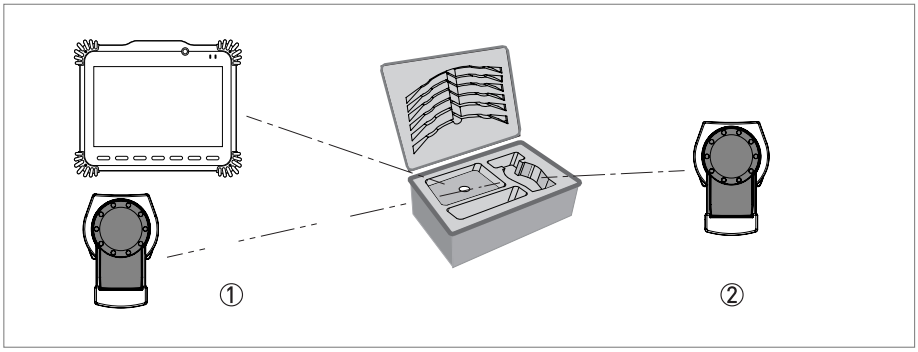


Figure 2-1: Available versions

① Complete version (incl. tablet)
② Version with ONLY the verification box (incl. suitcase with cabling)

INFORMATION!
For details on specific demands or choice of version please contact the manufacturer.

2.2 Theory of operation

Design and connection of the device

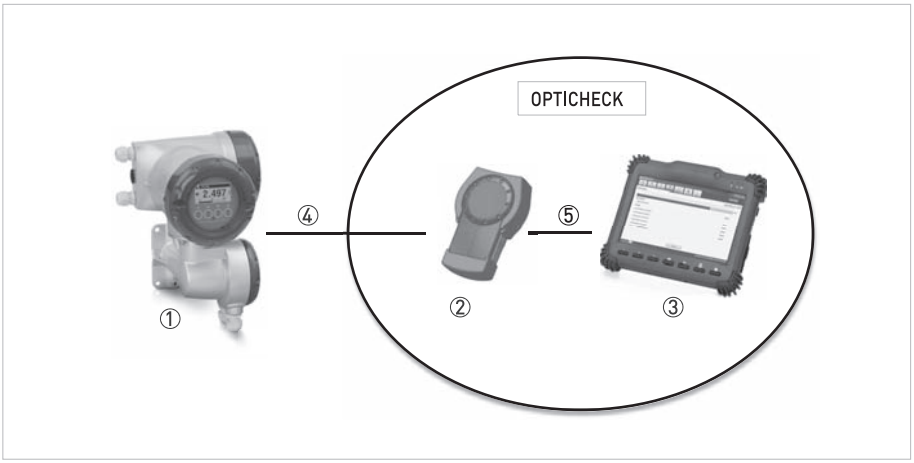


Figure 2-2: Connection diagram

① Device Under Test (DUT)
② Verification box
③ Tablet
④ Adapter
⑤ USB

The OPTICHECK consists of:

- Verification box including all the electronic hardware and software for the measurements
- Rugged tablet or PC with a USB connection to the verification box including the control and evaluation software (for the sequential tests performed by the verification box)
- USB connection cable to connect the verification box with the tablet / laptop
- Different adapters to connect various KROHNE field devices (DUT) to the verification box

Verification box

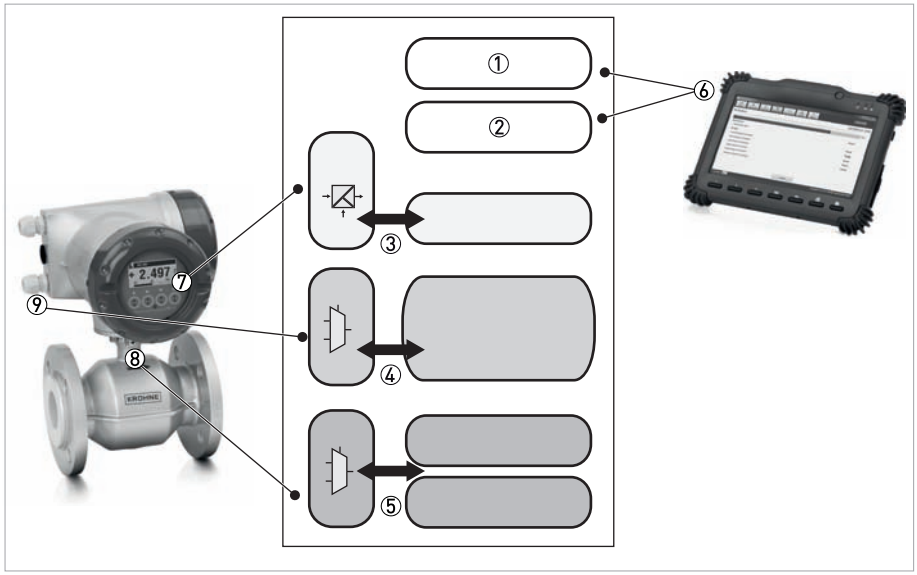


Figure 2-3: Block diagram of verification box

① Serial <-> USB
② Galvanically isolated power supply (via the USB interface from the tablet)
③ GDC connection (galvanically isolated)
- interface connects the OPTICHECK to the internal communication interface of the field device

④ I/O connections
- connects (and if required supplies) to the I/O circuitry of the field device via a multiplexer
- I/O measurement and supply, up to 4 different I/O channels
- voltage, current, and frequency measurement possible
- voltage or current supply possible

⑤ Sensor connection
- sensor simulation; supplies calibrated test signals to the sensor input of the signal converter
- sensor measurement; connects to the sensor and is able to perform different measurements

⑥ Tablet
⑦ GDC terminal on field device position (depends on field device)
⑧ Sensor connection on field device (depends on field device)
⑨ I/O connection on field device (depends on field device)

2.3 Scope of delivery

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

Complete version

The complete version of the OPTICHECK is delivered with all connection cables, adapting tools and all necessary software installed on the tablet, together with the documentation, in a shock-proof suitcase which is specially designed for the OPTICHECK.

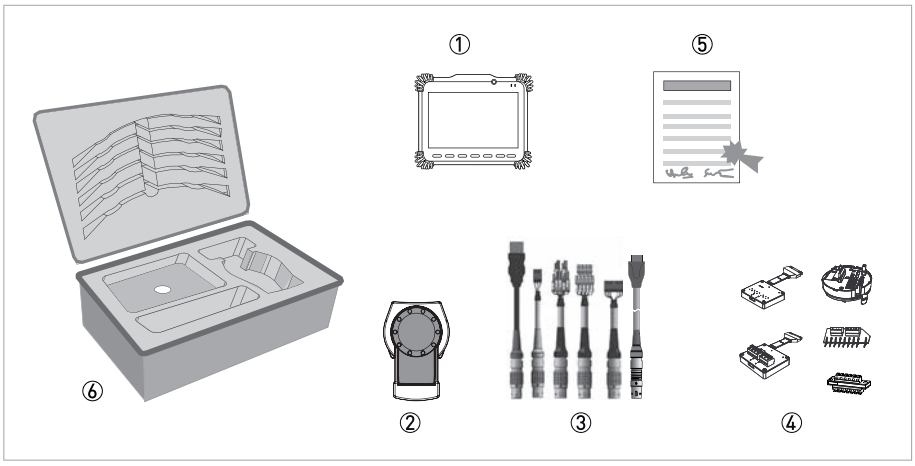


Figure 2-4: Scope of delivery (complete version)

① Ordered tablet (optional)
② Verification box
③ Adapter cables
④ I/O parking plug and measurement device specific adapters
⑤ Certificates (additional software and information)
⑥ Shock-proof suitcase

INFORMATION!
Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

2.4 Example nameplate

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

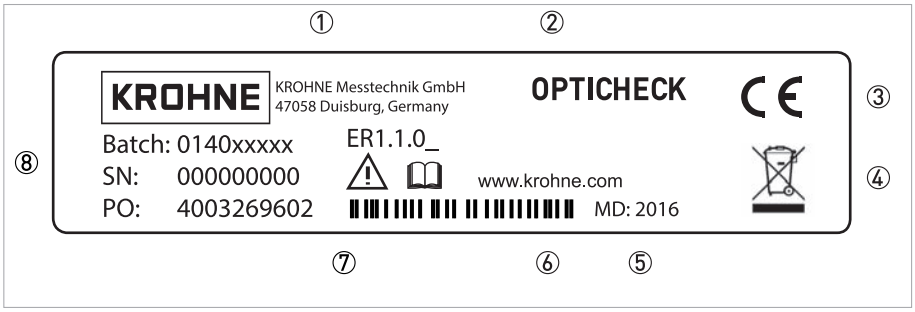


Figure 2-5: Example nameplate

① Name and address of the manufacturer
② Product name
③ CE marking (EU conformity)
④ Electronic/electric device waste marking (WEEE dustbin symbol)
⑤ Year of manufacturing
⑥ Website of manufacturer
⑦ Electronic revision, reference to documentation and bar code
⑧ Information about production batch, serial number and production order

3.1 Storage

- Store the device in a dry and dust free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packaging.
- Storage temperature: -20...+60°C / -4...+140°F
- Humidity: 0...90% non-condensing

3.2 Transport and usage

- Use the included suitcase to transport the OPTICHECK.

Notes on handling the device

- Do not carry the device by the connected wires.
- Avoid heavy vibrations.
- Avoid heavy mechanically shocks or impacts on the device.

3.3 Pre-installation requirements

Make sure that you have all necessary tools available:

- Allen key (4 mm)
- Philips screwdriver (No. 2)
- Small screwdriver

3.3.1 General notes on installation

INFORMATION!
The installation of the OPTICHECK verification tool always has to be done on the signal converter side.

CAUTION!
Avoid extensive humidity and/or direct entry of rain, when measuring / working with the OPTICHECK, during the verification process or when the housing of the signal converter is open.

Installation of the OPTICHECK verification tool and the tablet, mechanically and electrically, together with the use of software and installation of special drivers, is only permitted to specially trained personal.

The service engineer and/or operator has to know the correct handling of the OPTICHECK tool, as well as servicing and operating sensor/signal converter combinations.

Please contact the manufacturer or your local sales office, for the availability of training and information tools.

For a reliable and high accuracy measurement, it is essential to follow the installation requirements as specified in the manual of the related field device. Neither wet calibration in a calibration rig nor OPTICHECK are able to include verification of installation/application conditions.

Take special care of:

- Grounding conditions of the field device

3.3.2 Magnetic field

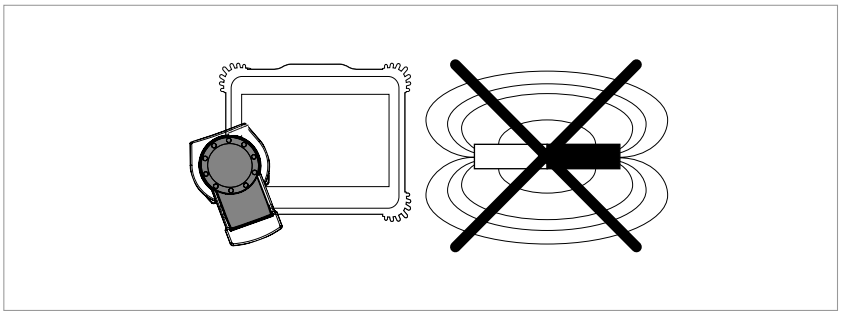


Figure 3-1: Avoid magnetic fields

CAUTION!
In order to use OPTICHECK with compatible field devices, their housing has to be opened for required cable connections. In this case, OPTICHECK and the connected field device are to some extend sensitive to high electromagnetic radiation. If this temporary disturbance influences the operation or verification process, a device reset or power cycle can become necessary to restore normal operation.

3.3.3 Impacts and vibration

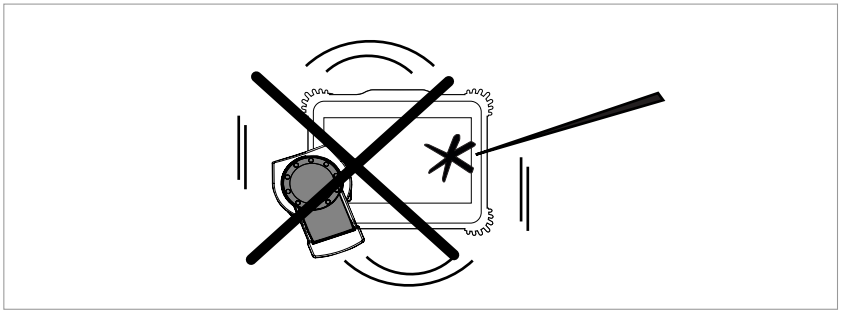


Figure 3-2: Avoid high impacts or vibration

CAUTION!
The OPTICHECK setup has been designed to be as robust as possible. To ensure reliability, accuracy and long life time the following has to be respected:
Be careful, not to drop the device and take special attention on the way the device is attached and/or placed on a particular surface.

3.3.4 Electrostatic discharge

CAUTION!
The OPTICHECK is connected to the signal converter of the field device. The housing of the field device has to be opened for these connections.
Extensive humidity and direct rain has to be avoided during verification.

The signal converter is to some extend sensitive to ESD (electrostatic discharge). To prevent a failing verification or even damage:

- Do not touch any electrical contact directly!
- Make sure to discharge yourself by wearing a wrist strap.
- If no wrist strap is available, ground yourself by touching a metal surface that is grounded.

3.3.5 Software installation

The tablet delivered with OPTICHECK comes with a pre-installed Windows and the OPTICHECK application and drivers.

If OPTICHECK should be used with a different tablet or notebook, 32 bit or 64 bit versions for Microsoft Windows© can be selected depending on the target system. The recent version is available via the KROHNE Downloadcenter.

Start the Windows install wizard with a double-click on the setup file (administrator rights required). The user will be guided through the installation process. Follow the instructions given.

The following components are installed:

- OPTICHECK application software
- USB driver for OPTICHECK

3.3.6 Signal converter specific information

For more detailed information regarding basic instructions on how to operate signal converters, please consult applicable manual of addendum of the IFC 050, IFC 070, IFC 100, IFC 300, MFC 300, MFC 400, VFC 200 and RLC 400 signal converters, respectively. The same applies for the following signal converter related topics:

- connection diagram (electrical and I/O and detailed information regarding electrical connection)
- cable requirements, cable preparation and lengths
- explanation of data and markings on nameplates or CG numbering
- mechanical mounting of signal converters
- software and electronics versions and revisions
- menu and operating actions

The OPTICHECK is suited to be used with the electromagnetic flowmeter families OPTIFLUX, TIDALFLUX and WATERFLUX, the vortex flowmeter family OPTISWIRL, the mass flowmeter family OPTIMASS as well as the radar level family OPTIWAVE.

There is no need for an external power connection since the OPTICHECK verification box itself is fully powered over USB. However, the device under test (DUT) must be externally powered during verifications (except the battery powered device IFC 070 and the loop-powered devices).

The OPTICHECK can perform a fully automated verification of all compatible field devices in order to verify the accuracy of the signal converter. Depending on the field device type, the sensor is verified – either by physical check of its electric characteristics or by firmware-internal diagnostic functions. Therefore, it is not necessary to remove the field device from the process environment (except cabling) for the verification.

Different types of verifications are available which provide different depths of verification depending on the type of the DUT – ranging from device-internal diagnostics to full electrical verification of, for instance, input and output circuits. For all levels, a detailed test report and certificate can be generated after verification. For more information refer to *Description of the verification report* on page 86.

OPTICHECK is supplied with all the connection cables and adapters for the signal converters of the afore-mentioned field device series and a USB cable for connection to the tablet. The following sections describe how to connect the OPTICHECK verification box to the supported signal converter variants.

4.1 Safety instructions

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.

DANGER!
Observe the national regulations for electrical installations!

DANGER!
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

4.2 Connection to the tablet

CAUTION!
The tablet/laptop shall not be connected to its charger when connected to a measurement device.

INFORMATION!

- *A tablet is a sensitive equipment. For charging use surge protection equipment MNT-1 D (Phoenix Contact). In case of OPTICHECK operating with a laptop, ensure that laptop and charger are suited for the industrial electromagnetic environment.*
- *The USB connection shall be connected to electrical circuits that ensure a safe separation only (e.g. acc. to IEC 60950-1).*
- *The HDMI cable and connectors shall not be used with other equipment than the OPTICHECK verification box (e.g. TVs)*

The OPTICHECK verification box is connected via USB to the delivered tablet or a Windows based laptop.

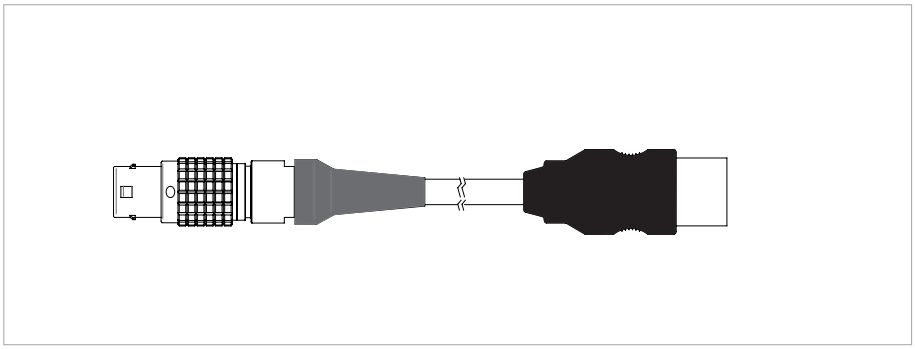


Figure 4-1: USB connection cable (blue marking)

4.3 Connection of device

The only mandatory connection to a DUT is the connection cable with green marking to ground and to the service interface:

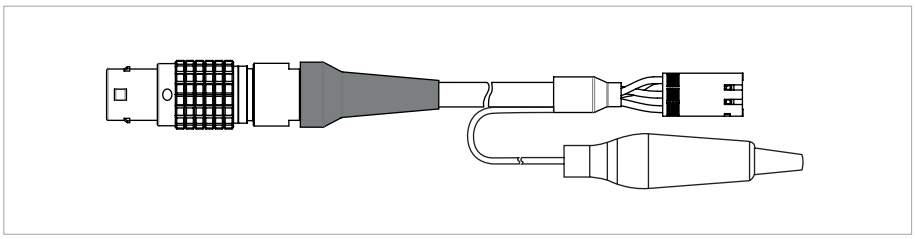


Figure 4-2: Service interface connection cable (green marking)

The necessity of the other connection cables depends on the field device variant and the desired verification depth.

The next figure depicts the included I/O cables (red marking) for connecting a signal converter's inputs and outputs:

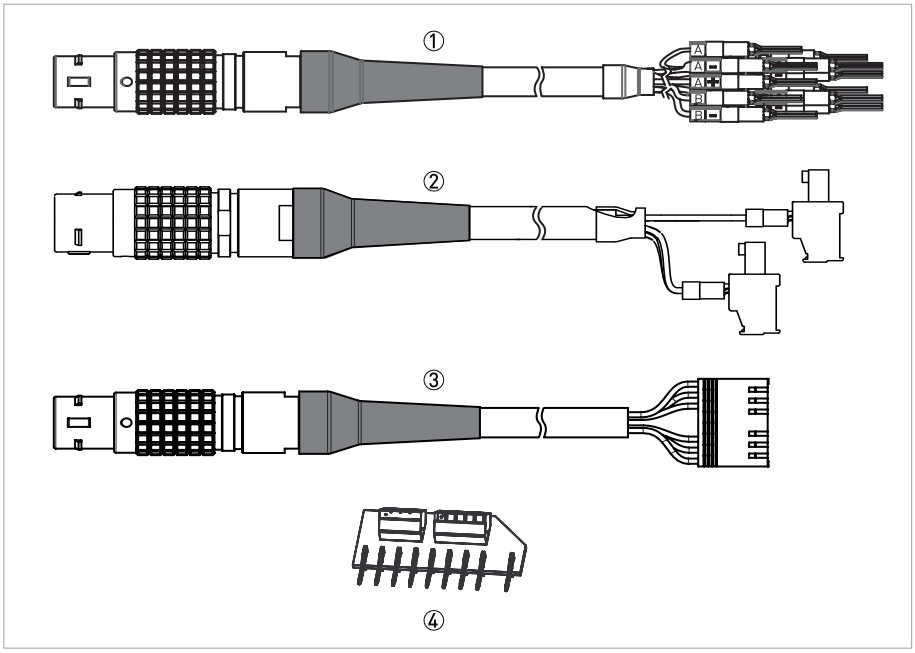


Figure 4-3: I/O connection cables (red marking)

① Standard I/O connection cable with separate pins (IFC 070 / 100 / 300, VFC 200, MFC 300 / 400 and RLC 400)
② I/O connection cable for wall version (IFC 300 and MFC 300)
③ I/O connection cable for built-in diagnostic interface (IFC 050)
④ I/O adapter for IFC 300 and MFC 300 / 400

In order to connect OPTICHECK to the sensor and sensor electronics (if supported by the measurement device) the standard sensor connection cable (black marking) is connected to one of the device specific sensor adapters:

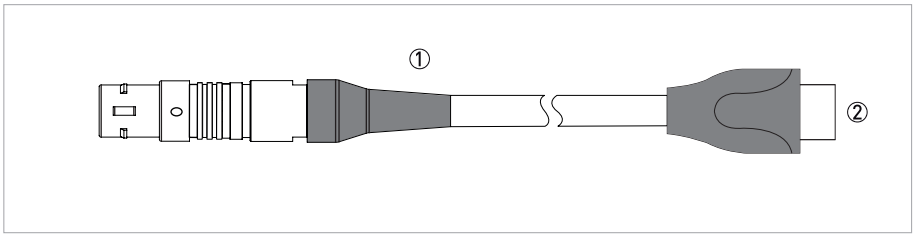


Figure 4-4: Standard sensor connection cable

① Standard sensor connection cable
② HDMI connector for connection of measurement device specific adapters

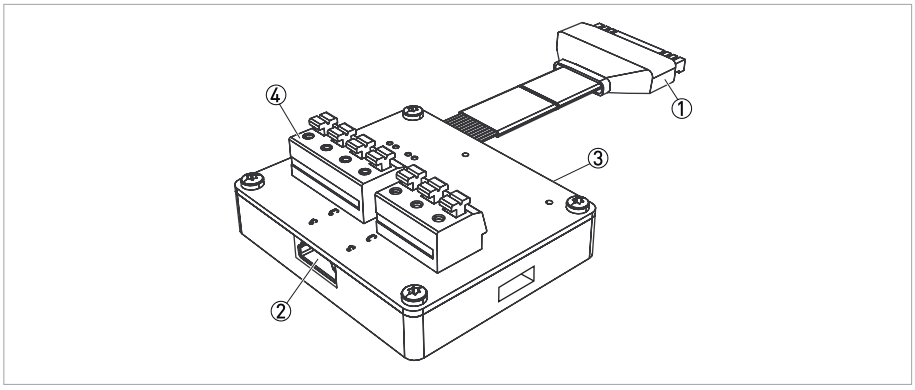


Figure 4-5: EMF sensor connection adapter for IFC 050, IFC 070, IFC 100 and IFC 300

① Female connector (blue) for connecting to sensor terminal of the IFC 050 (variant 1) and IFC 070, IFC 100 as well as IFC 300 (variant 2)
② HDMI connector for connection of the standard sensor connection cable
③ Male connector (black) for connecting to female connector (blue) of sensor cable (of the measurement device)
④ Connectors for remote versions (field and wall-mounted)

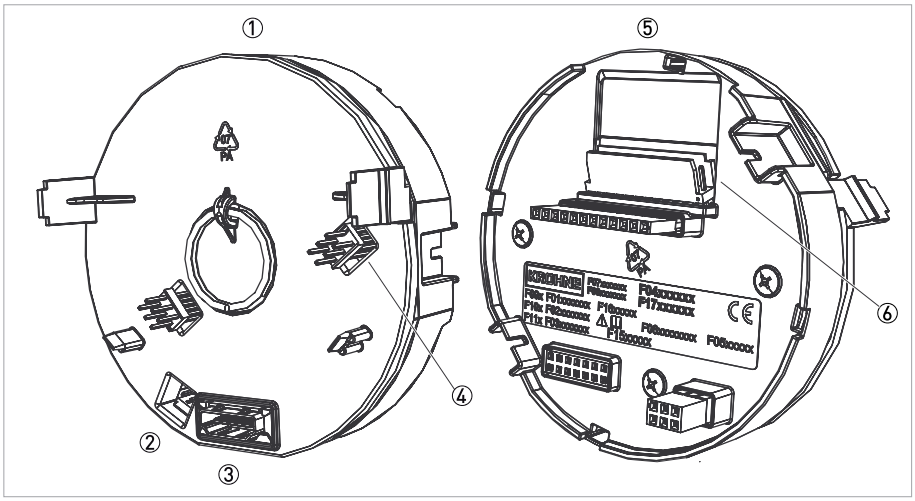


Figure 4-6: Vortex flowmeter sensor connection adapter

① Sensor adapter for VFC 200 (front)
② Connector for service interface connection cable (green marking)
③ HDMI connector for standard sensor connection cable (black marking)
④ Connectors for the display unit of the VFC 200
⑤ Sensor adapter for VFC 200 (back)
⑥ Connection for the sensor cable of the measurement device

Additionally there is the I/O "parking" adapter for the I/O cables, which are removed from a DUT. It is used to protect against short circuiting and to mark the cables for easier reconnection:

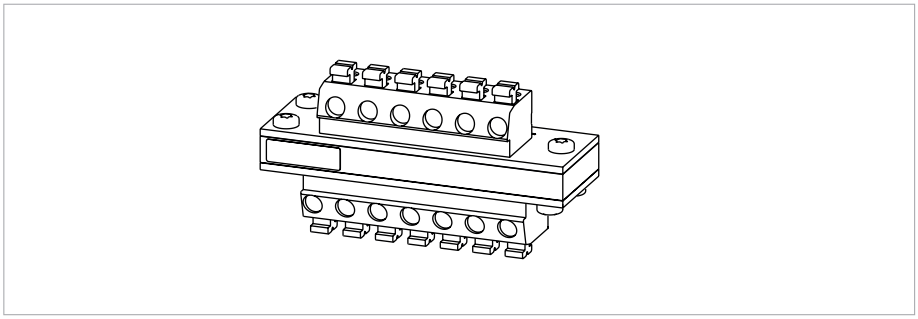


Figure 4-7: I/O parking plug

The required signal converter-specific instructions are described separately in the following sections, which are structured as follows:

- Step 1: Overview and access to the housing versions (compact, remote and wall)
- Step 2: Cabling instructions for signal converter / sensor combinations
- Step 3: Conducting the verification
- Step 4: Reconnecting the device after verification

4.4 Connection of OPTIFLUX / TIDALFLUX / WATERFLUX flowmeters

The electromagnetic flowmeter families OPTIFLUX and TIDALFLUX equipped with IFC 050 / IFC 100 / IFC 300 signal converters can be verified in three different depths: either verification is performed via device-internal diagnostic functions without the need of disconnecting any electrical connection (level 0 and level 1) or with a full electrical verification of the signal converter and flow sensor (level 2).

A **level 0 verification** (if supported by the connected signal converter) performs a number of tests without the requirement of removing the flowmeter from the process environment or removing electrical connections to the control station. The signal converter is also not disconnected from the flow sensor. The only required connection to the flowmeter is the GDC service interface. In this case, the depth of verification is limited, but the measurement will not be interrupted.

In addition to a level 0 verification a **level 1 verification** also performs signal simulations (if supported by the connected signal converter). No additional connections are required, but the measurement is interrupted.

A **level 2 verification** is possible if all electrical connections of the signal converter (except IFC 050) are removed from the process environment and the flow sensor, including installations of the electronic inserts (IFC 300). In this case, OPTICHECK connects to all terminals (GDC, flow sensor and I/O's) in order to perform a full electrical verification of the signal converter's measurement accuracy.

4.4.1 Connection of IFC 050

Electromagnetic flowmeters equipped with IFC 050 signal converters can be verified with OPTICHECK in the following versions:

- Compact version (the signal converter is mounted directly on the flow sensor)
- Remote version (electrical connection to the flow sensor via field current and signal cable)

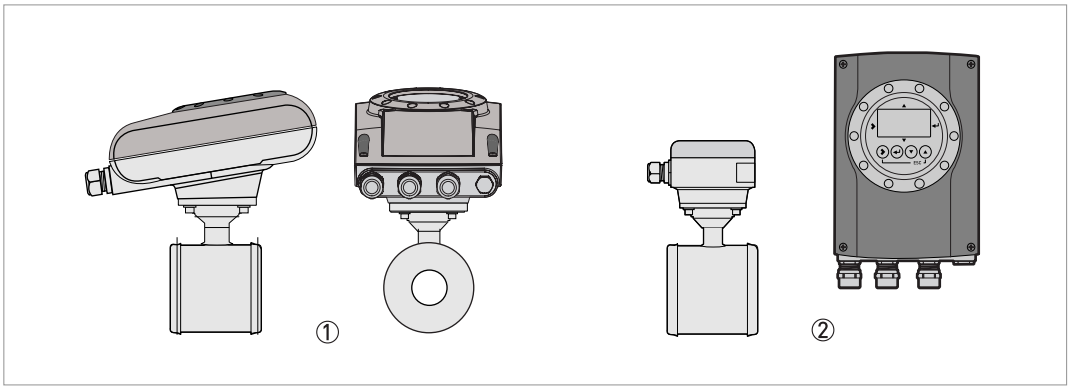


Figure 4-8: IFC 050 – available versions

① Compact version
② Remote version

In combination with the available OPTIFLUX and WATERFLUX flow sensor types, the following combinations of signal converter and flow sensor can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter IFC 050	
	Compact	Remote wall-mounted housing
OPTIFLUX 1000	OPTIFLUX 1050 C	OPTIFLUX 1050 W
OPTIFLUX 2000	OPTIFLUX 2050 C	OPTIFLUX 2050 W
OPTIFLUX 4000	OPTIFLUX 4050 C	OPTIFLUX 4050 W
OPTIFLUX 6000	OPTIFLUX 6050 C	OPTIFLUX 6050 W
WATERFLUX 3000	WATERFLUX 3050 C	WATERFLUX 3050 W

Connecting to OPTICHECK

To connect the required OPTICHECK test cables on the IFC 050 (remote and compact version), the housing has to be opened. The following steps illustrate how to open the housing of the IFC 050 and connect/disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

- Open the IFC 050 housing by unscrewing the 4 Phillips screws (PH2 screw head).

The next figures show the electronics module of the IFC 050 and in detail the terminals necessary for all connections:

Figure 4-9: IFC 050 electronics module

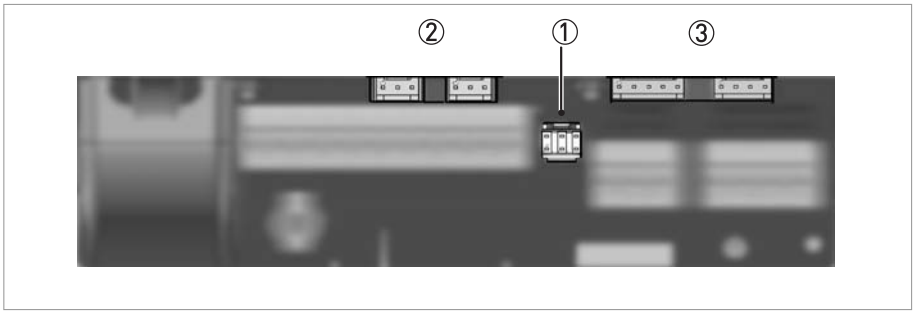


Figure 4-10: IFC 050 electronics – connector overview

① GDC connector
② I/O diagnostic connector
③ Sensor diagnostic connector

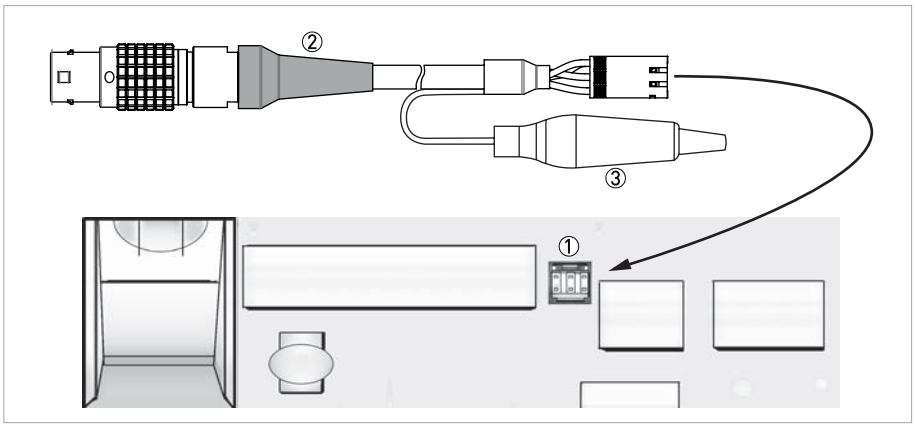


Figure 4-11: IFC 050 – connection of GDC cable

① GDC connectors
② GDC connection cable (green marking)
③ Grounding clip

- Connect the grounding clip ③ of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal of the electronics ①.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

In combination with the IFC 050 the OPTICHECK supports two different options for sensor verification which can be chosen in the OPTICHECK application.

1. Verification **without** dedicated sensor tests (only internal diagnostic functions are used)
2. Verification with dedicated sensor tests

Continue with the following procedures to connect the flowmeter's sensor electronics and the flow sensor with OPTICHECK:

OPTION 1 (without sensor tests)

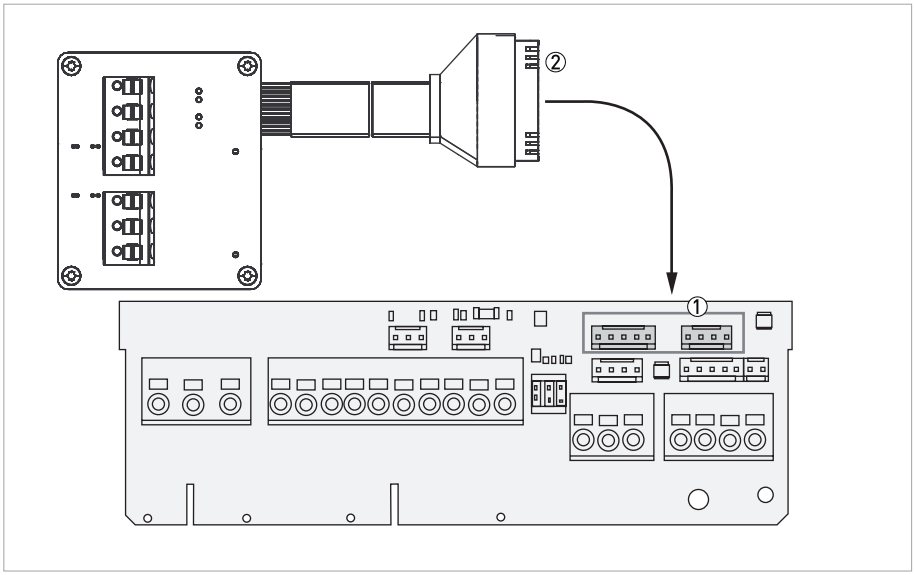


Figure 4-12: IFC 050 – connection of sensor cable (OPTION 1)

① Connector for built-in sensor diagnostic
② IFC 050 sensor connection adapter

- Connect the IFC 050 sensor connection adapter ② to the connection terminal of the electronics ①.
- Connect the standard sensor connection cable (black marking) with the IFC 050 sensor connection adapter.

OPTION 2 (with sensor tests)

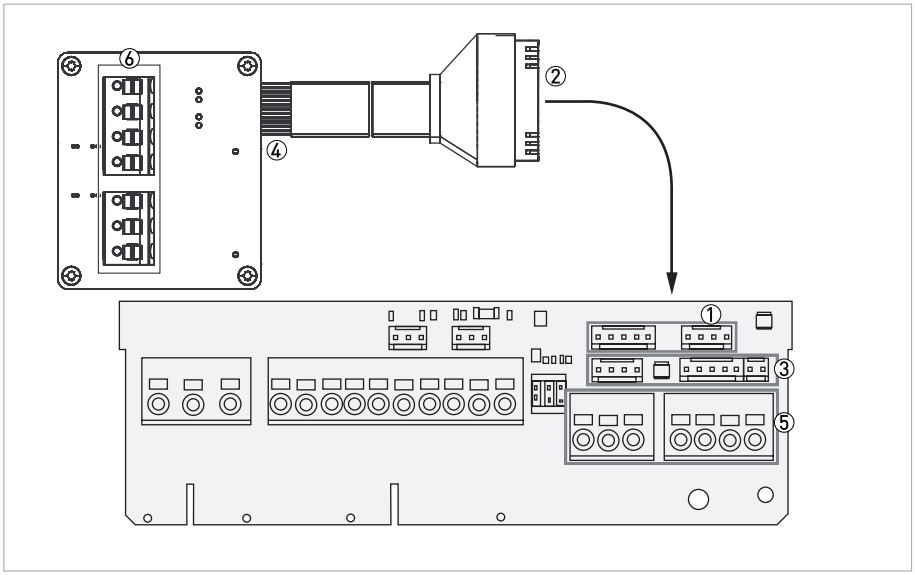


Figure 4-13: IFC 050 – connection of sensor cable (OPTION 2)

① Connector for built-in sensor diagnostic
② IFC 050 sensor connection adapter
③ Connector for flow sensor cable (compact version)
④ Sensor cable connector of the IFC 050 adapter (compact version)
⑤ Connector for flow sensor cable (remote version)
⑥ Sensor cable connector of the IFC 050 (remote version)

- Connect the IFC 050 sensor connection adapter ② to the connection terminal of the electronics ①.
- Connect the flow sensor cable from connector ③ (compact) or ⑤ (remote) to the sensor cable connector of the IFC 050 adapter ④ (compact) or ⑥ (remote)
- Connect the standard sensor connection cable (black marking) with the IFC 050 sensor connection adapter.

INFORMATION!
If OPTION 2 is used the OPTICHECK application will force the user to detach the flow sensor cable from the IFC050 adapter (④/⑥) and attach it to the sensor connection of the IFC 050 (③/⑤), again.

Continue with the following procedure to connect the flowmeter's input / output connections with OPTICHECK:

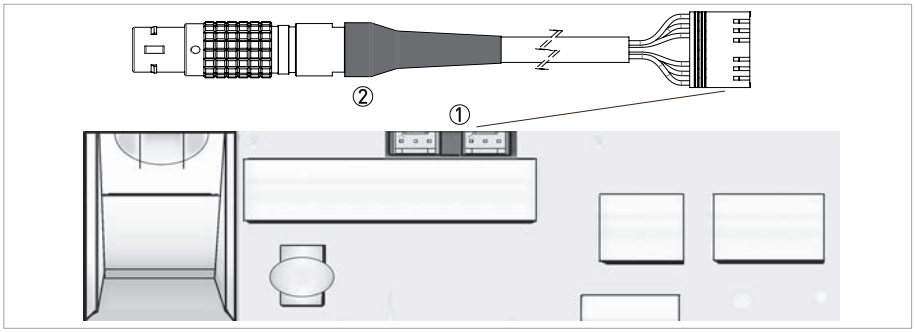


Figure 4-14: IFC 050 – connection of I/O cable

① Connector for built-in I/O diagnostic
② IFC 050 I/O connection cable (red marking)

- Connect the IFC 050 I/O connection cable ② to the connection terminal of the electronics ①.

STEP 3: Verification

- After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

Perform the following steps to restore the initial cable connections:

- Remove the OPTICHECK I/O cable (red marking) and the OPTICHECK sensor cable (black marking).
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.4.2 Connection of IFC 070

Electromagnetic flowmeters equipped with IFC 070 signal converters can be verified with OPTICHECK in the following versions:

- Compact version (the signal converter is mounted directly on the flow sensor
- Remote version (electrical connection to the flow sensor via field current and signal cable)

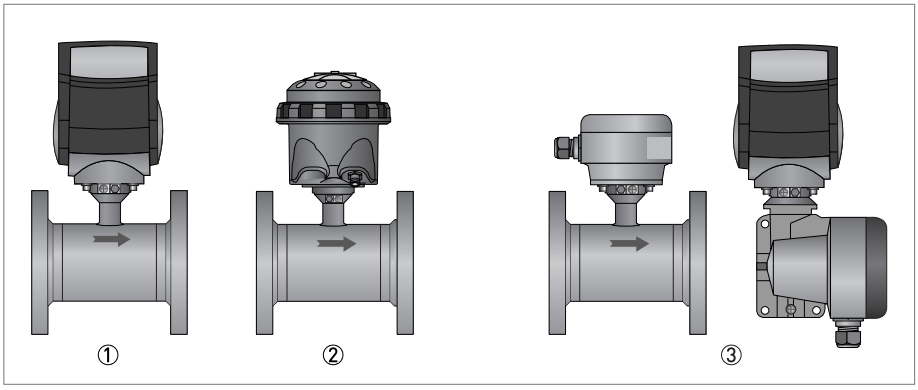


Figure 4-15: IFC 070 – available versions

① Compact version in aluminium (IP67) housing
② Compact version in polycarbonate (IP68) housing
③ Remote version

In combination with the available OPTIFLUX and WATERFLUX flow sensor types, the following combinations of signal converter and flow sensor can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter IFC 070	
	Compact	Remote field housing
OPTIFLUX 2000	OPTIFLUX 2070 C	OPTIFLUX 2070 F
WATERFLUX 3000	WATERFLUX 3070 C	WATERFLUX 3070 F

INFORMATION!
OPTICHECK only supports IFC 070 signal converters with electronic revision ER 4.0.0 and above.

Connecting to OPTICHECK

CAUTION!
The IFC 070 in custody transfer operation can't be verified without breaking the seal.

To connect the required OPTICHECK test cables and adapters on the IFC 070 (remote and compact version), the housing has to be opened. The following steps illustrate how to open the housing of the IFC 070 and connect / disconnect the necessary cables and adapters for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

- Open the IFC 070 (IP68) housing by unscrewing the 4 Allen bolts (4 mm key/Allen key).
- Open the IFC 070 (IP67) housing by unscrewing the locking ring (with special wrench).
- Remove the containment system (2 black plastic holders).
- Disconnect the connector of the battery, the power is switched off.
- Remove the battery holder with battery (in case of internal battery).
- Unscrew the 2 Phillips screws (PH2 screw head) at the bottom of the signal converter insert.
- Remove the signal converter insert.

The next figure shows the removable module (signal converter insert) of the IFC 070 and in detail the terminals necessary for all connections:

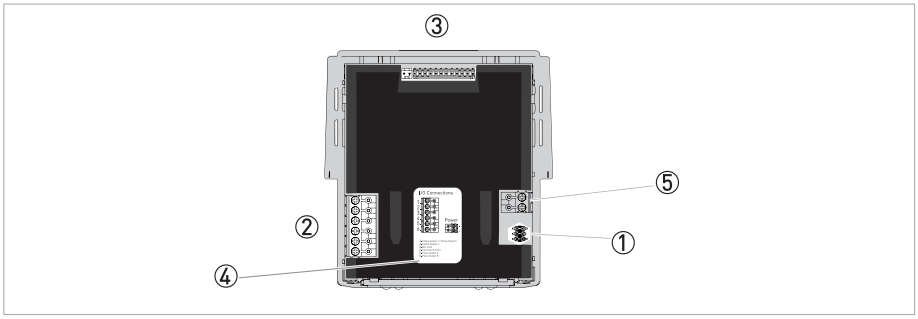


Figure 4-16: IFC 070 electronics – connector overview

① GDC connector
② I/O connectors
③ Sensor connector
④ I/O connection overview
⑤ Power connection (battery)

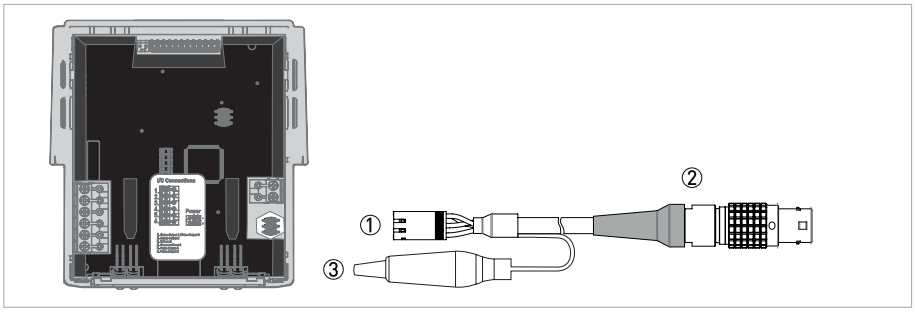


Figure 4-17: IFC 070 – connection of GDC cable

① GDC connectors
② GDC connection cable (green marking)
③ Grounding clip

- Connect the grounding clip ③ of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal of the electronics.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedure to connect the flowmeter's sensor electronics and the flow sensor with OPTICHECK:

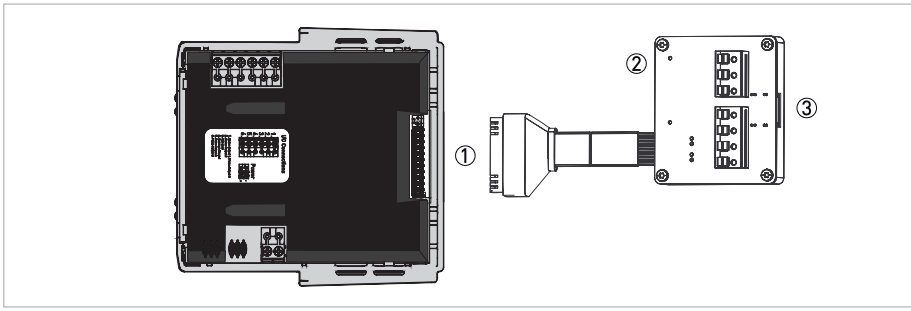


Figure 4-18: IFC 070 – connection of sensor cable

① Blue female sensor connector
② Black male sensor connector
③ HDMI connector for connection of the standard sensor connection cable (black marking)

- Pull out the blue sensor connector from its terminal on the signal converter electronics.
- Attach the blue connector of the sensor cable coming out of the IFC 070 signal converter to the black connector of OPTICHECK's IFC 070 / 100 / 300 adapter ②.
- Plug the blue female connector ① of OPTICHECK's IFC 070 / 100 / 300 adapter into the sensor terminal of the signal converter insert.
- Connect the standard sensor connection cable (black marking) with the IFC 070 / 100 / 300 sensor connection adapter ③.

Continue with the following procedure to connect the flowmeter's input / output connections with OPTICHECK:

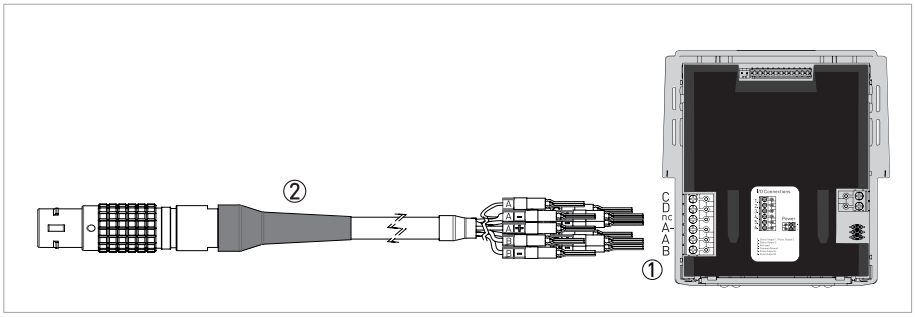


Figure 4-19: IFC 070 – connection of I/O cable

① I/O connectors
② Standard I/O connection cable (red marking)

- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs to connect to the I/O terminals of the IFC 070 signal converter with the following assignment:

OPTICHECK I/O cable	IFC070 I/O connection
C	Status output 1 / Pulse output C
D	Status output 2
-	Not used
A-	Common ground
A	Pulse output A
B	Pulse output B

STEP 3: Verification

- After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

Perform the following steps to restore the initial cable connections:

- Remove the OPTICHECK I/O cable (red marking) and the OPTICHECK sensor cable (black marking) as well as the connected adapters.
- Connect back the I/O and sensor cabling from the process environment to the terminals.
- Mount the signal converter insert as well as the battery back in the signal converter housing.
- Reconnect the battery to the signal converter insert.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!

For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.4.3 Connection of IFC 100

Electromagnetic flowmeters equipped with IFC 100 signal converters can be verified with OPTICHECK in the following versions:

- Compact version (the signal converter is mounted directly on the flow sensor)
- Remote version (electrical connection to the flow sensor via field current and signal cable)

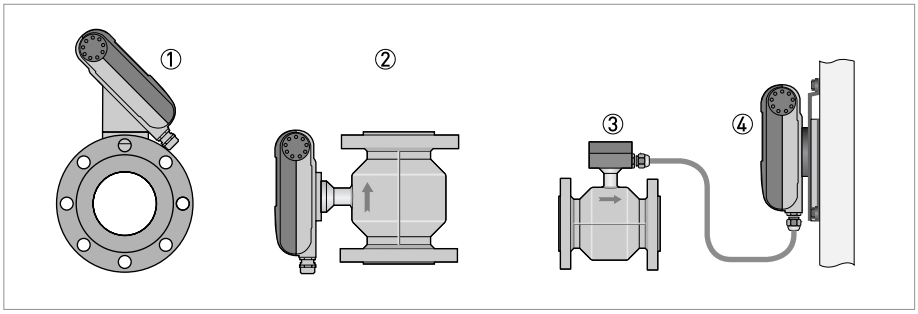


Figure 4-20: IFC 100 – available versions

① Compact version as 45° version
② Compact version as 0° version
③ Flow sensor with connection box
④ Wall-mounted housing

In combination with the available OPTIFLUX and WATERFLUX flow sensor types, the following combinations of signal converter and flow sensor can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter IFC 100	
	Compact (0°/45° version)	Remote wall-mounted housing
OPTIFLUX 1000	OPTIFLUX 1100 C	OPTIFLUX 1100 W
OPTIFLUX 2000	OPTIFLUX 2100 C	OPTIFLUX 2100 W
OPTIFLUX 4000	OPTIFLUX 4100 C	OPTIFLUX 4100 W
OPTIFLUX 5000	OPTIFLUX 5100 C	OPTIFLUX 5100 W
OPTIFLUX 6000	OPTIFLUX 6100 C	OPTIFLUX 6100 W
WATERFLUX 3000	WATERFLUX 3100 C	WATERFLUX 3100 W

Connecting to OPTICHECK

To connect the required OPTICHECK test cables and adapters on the IFC 100 (remote and compact version), the housing has to be opened. The following steps illustrate how to open the housing of the IFC 100 and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

- Open the IFC 100 housing by unscrewing the 4 Phillips screws (PH2 screw head).

The next figures show the electronics module of the IFC 100 and in detail the terminals necessary for all connections:

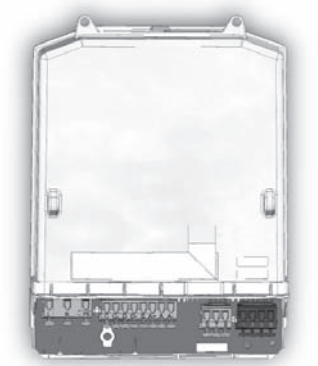


Figure 4-21: IFC 100 electronics module

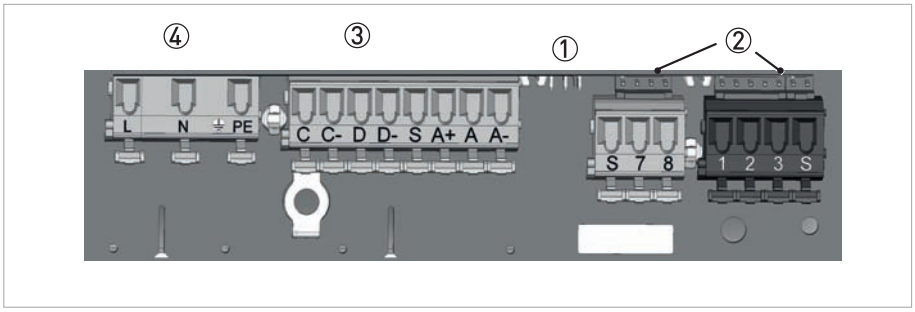


Figure 4-22: IFC 100 electronics – connector overview

① GDC connector
② Sensor connector
③ I/O connector
④ Power connector

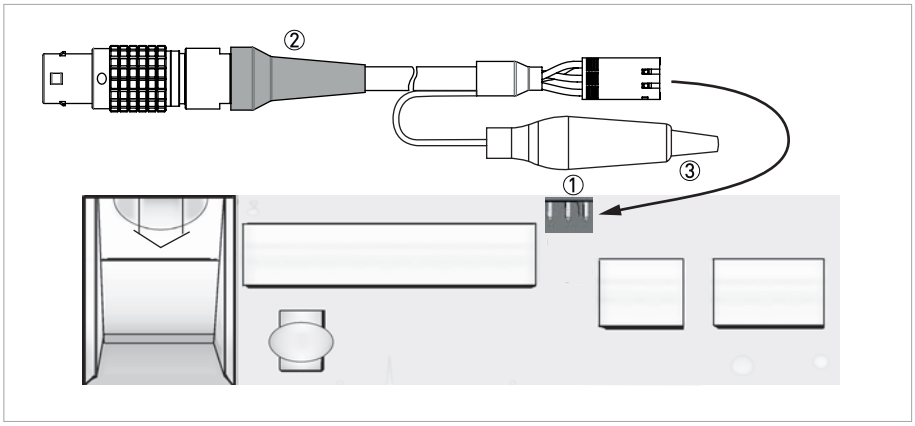


Figure 4-23: IFC 100 – connection of GDC cable

① GDC connectors
② GDC connection cable (green marking)
③ Grounding clip

- Connect the grounding clip ③ of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal of the electronics ①.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedure to connect the flowmeter's sensor electronics and the flow sensor with OPTICHECK:

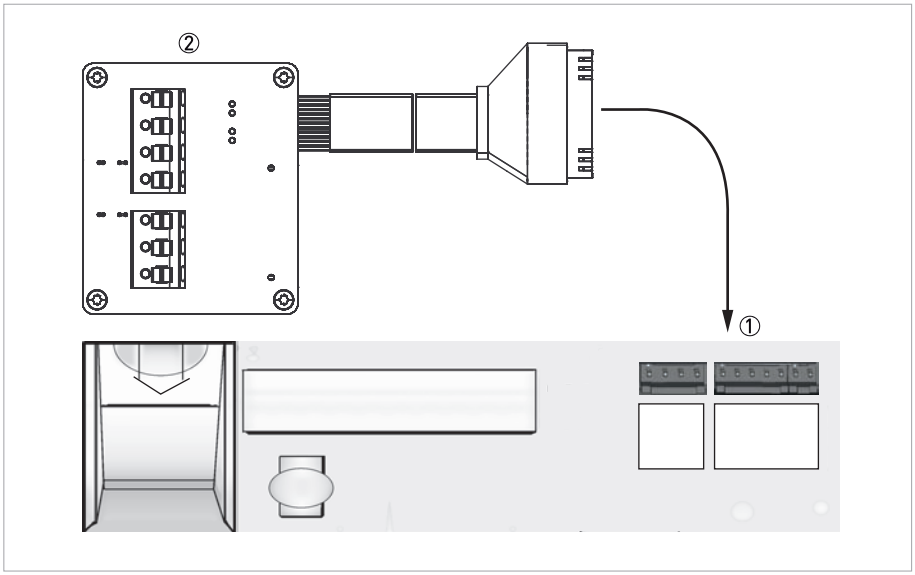


Figure 4-24: IFC 100 – connection of sensor cable

① Blue female sensor connector and black male sensor connector
② Sensor adapter for IFC 070, IFC 100 and IFC 300

For IFC 100 compact versions, the sensor is directly connected by a Dubox connector with the signal converter electronics:

- Power off the flowmeter.
- Remove the blue Dubox sensor connector from the signal converter electronics.
- Attach the blue connector of the sensor cable coming out of the IFC 100 signal converter to the black connector of OPTICHECK's IFC 070 / 100 / 300 adapter.
- Connect the blue female connector of OPTICHECK's IFC 070 / 100 / 300 adapter into the sensor terminal of the signal converter electronics.
- Connect the standard sensor connection cable (black marking) with the IFC 070 /100 / 300 sensor connection adapter.

For IFC 100 wall-mounted remote versions, the sensor is connected with single wires to the signal converter electronics:

- Power off the flowmeter.
- Disconnect the sensor cables and connect with the terminal blocks on the IFC 070 / 100 / 300 sensor connection adapter.
- Connect the blue female connector of OPTICHECK's IFC 070 / 100 / 300 adapter into the sensor terminal of the signal converter electronics.
- Connect the standard sensor connection cable (black marking) with the IFC 070 / 100 / 300 sensor connection adapter.

Continue with the following procedure to connect the flowmeter's input / output connections with OPTICHECK:

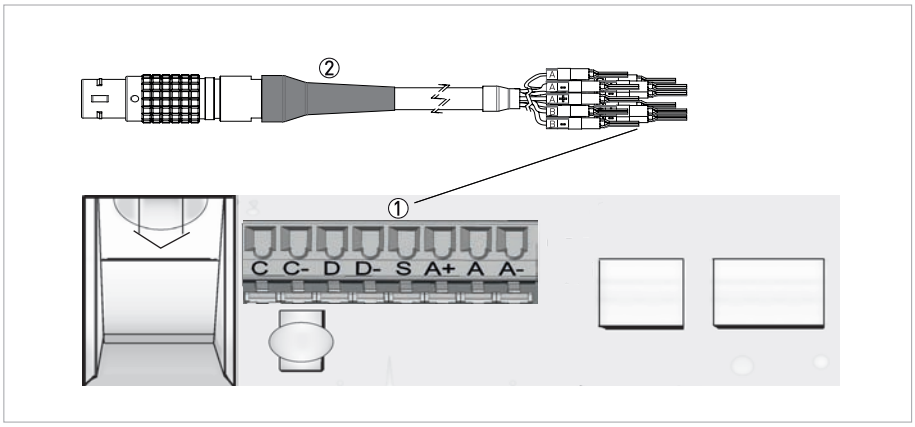


Figure 4-25: IFC 100 – connection of I/O cable

① I/O connectors
② Standard I/O connection cable (red marking)

- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs to connect to the I/O terminals of the IFC 100 signal converter. The indication on the separate pin plugs must match the indication on the I/O connection terminals.

STEP 3: Verification

- After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

DANGER!
After completion of the verification, make sure to switch off the power before starting to dismount any cabling.

Perform the following steps to restore the initial cable connections:

- Power off the flowmeter.
- Remove the OPTICHECK I/O cable (red marking) and the OPTICHECK sensor cable (black marking) as well as the connected adapters.
- Connect back the I/O and sensor cabling from the process environment to the terminals.
- Switch power on.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.4.4 Connection of IFC 300

Electromagnetic flowmeters equipped with IFC 300 signal converters can be verified with OPTICHECK in the following versions:

- Compact version (the signal converter is mounted directly on the flow sensor)
- Field version (electrical connection to the flow sensor via field current and signal cable)
- Wall version (electrical connection to the flow sensor via field current and signal cable)
- 19" rack-mounted housing (only level 0/1 tests are supported)

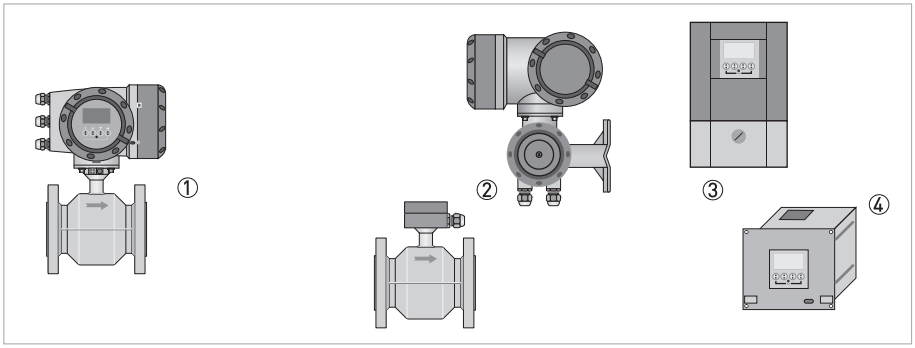


Figure 4-26: IFC 300 – available versions

① Compact version
② Flow sensor with connection box & field housing
③ Wall-mounted housing
④ 19" rack-mounted housing

In combination with the available OPTIFLUX, TIDALFLUX and WATERFLUX flow sensor types, the following combinations of signal converter and flow sensor can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter IFC 300			
	Compact	Remote field housing	Remote wall-mounted housing	Remote rack-mounted housing (28 TE)*
OPTIFLUX 1000	OPTIFLUX 1300 C	OPTIFLUX 1300 F	OPTIFLUX 1300 W	OPTIFLUX 1300 R/RL
OPTIFLUX 2000	OPTIFLUX 2300 C	OPTIFLUX 2300 F	OPTIFLUX 2300 W	OPTIFLUX 2300 R/RL
OPTIFLUX 4000	OPTIFLUX 4300 C	OPTIFLUX 4300 F	OPTIFLUX 4300 W	OPTIFLUX 4300 R/RL
OPTIFLUX 5000	OPTIFLUX 5300 C	OPTIFLUX 5300 F	OPTIFLUX 5300 W	OPTIFLUX 5300 R/RL
OPTIFLUX 6000	OPTIFLUX 6300 C	OPTIFLUX 6300 F	OPTIFLUX 6300 W	OPTIFLUX 6300 R/RL
TIDALFLUX 2300	-	TIDALFLUX 2300 F	-	-
WATERFLUX 3000	WATERFLUX 3300 C	WATERFLUX 3300 F	WATERFLUX 3300 W	WATERFLUX 3300 R/RL

* Please contact your local KROHNE service for further information!

4.4.5 Connection of IFC 300 compact and field versions

INFORMATION!
The IFC 300 in custody transfer operation can't be verified without breaking the seal.

To connect the required OPTICHECK test cables on the IFC 300 (compact and field version), the housing has to be opened, and the signal converter electronics insert has to be partially disconnected. The location of the connection terminals is exemplarily depicted for the remote version. The compact version is connected in the same way.

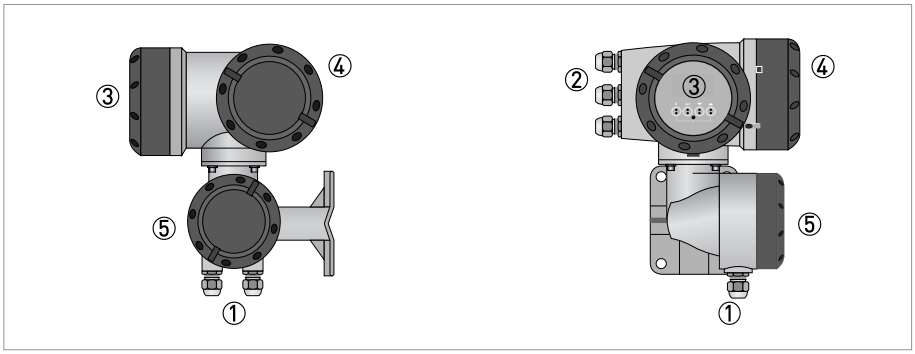


Figure 4-27: IFC 300 field version – side and front view

① Cable entry for sensor connections
② Cable entry for inputs / output and power supply connections
③ Section of the display and GDC connection
④ Section of inputs / outputs and power supply terminals
⑤ Section with the sensor terminals

The housing of the compact version is identical to the field version, except of the missing sensor part ⑤.

The following steps illustrate how to open the housing of the IFC 300 and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

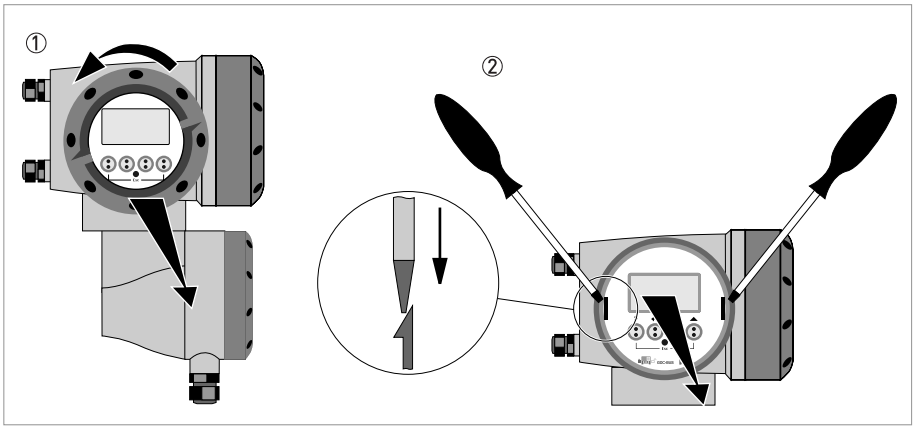


Figure 4-28: IFC 300 field version – removing cover and display

- Open the display section by turning the cover counter-clockwise by hand ①.
- Remove the display by using two screwdrivers ②. Do not disconnect the display cabling at this point.

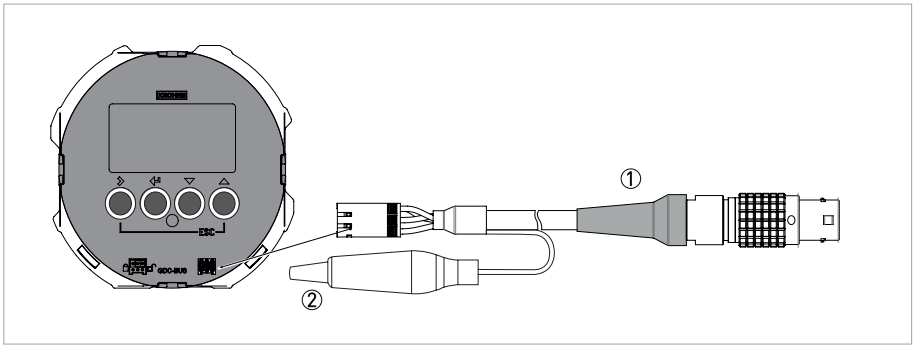


Figure 4-29: IFC 300 compact and field version – connection of GDC cable

① GDC connection cable (green marking)
② Grounding clip

- Connect the grounding clip ② of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal on the display.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedure to connect the flowmeter's sensor electronics and the flow sensor with OPTICHECK:

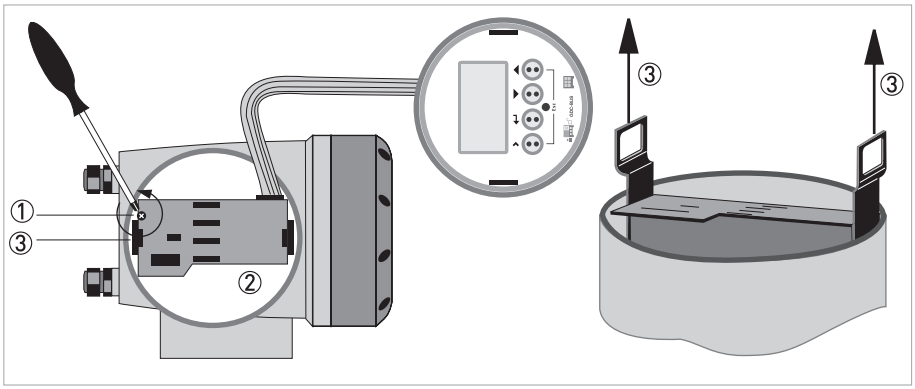


Figure 4-30: IFC 300 compact and field version – remove signal converter electronics

- Power off the flowmeter.
- Unscrew the two Ph head screws ① at the electronics unit ②.
- Pull the two metal pullers ③ at the left and right using a suitable tool to remove the signal converter electronics insert.

CAUTION!
Please pay attention that the same amount of force is applied on both pullers, otherwise the connector at the backside can be damaged.

After removing the signal converter electronics insert, the sensor cable connector can be reached properly:

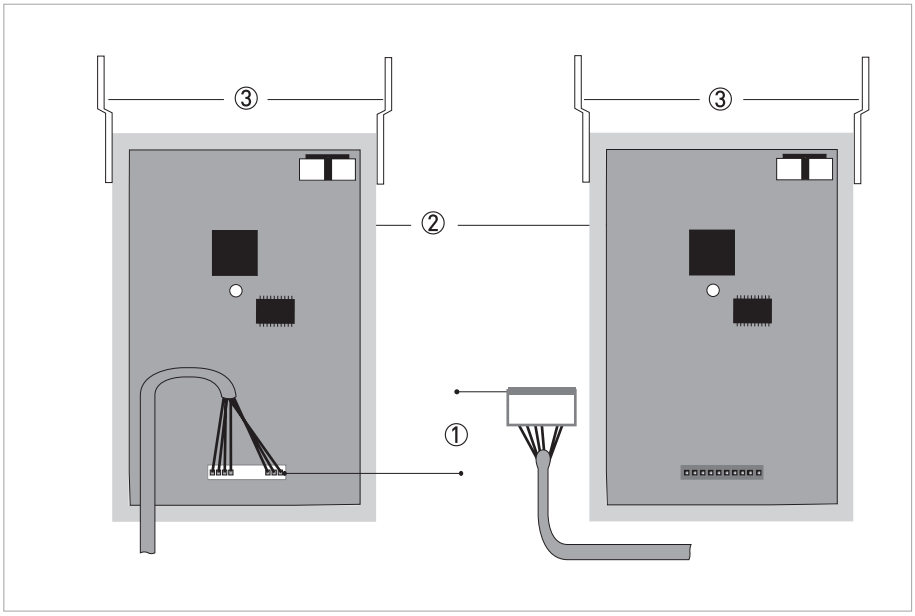


Figure 4-31: IFC 300 – sensor connection on signal converter electronics insert

① Female connector (blue) of sensor cable
② Signal converter electronics insert
③ Metal pullers

- Pull out the blue sensor connector ① from its terminal on the signal converter electronics.

To connect with the OPTICHECK, use the IFC 070 / 100 / 300 sensor connection adapter:

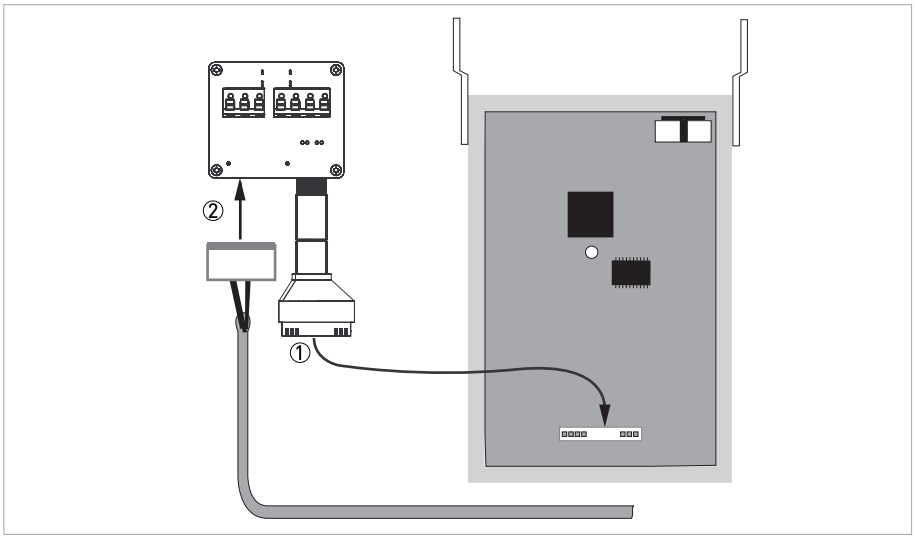


Figure 4-32: IFC 300 – connection of sensor cable

- Plug the blue female connector ① of OPTICHECK's IFC 070 / 100 / 300 adapter into the sensor terminal of the electronics insert.
- Attach the blue connector of the sensor cable coming out of the IFC 300 signal converter to the black connector of OPTICHECK's IFC 070 / 100 / 300 adapter.
- Slide the IFC 300 electronics insert back into the housing while carefully guiding cables.
- Make sure that the IFC 300 insert module is well attached in the terminals.
- Gently tighten the two Ph head screws to lock the module.
- Push both metal pullers back in its original position.
- Connect the standard sensor connection cable (black marking) with the IFC 070 / 100 / 300 sensor connection adapter.

Continue with the following procedures to connect the flowmeter's input / output connections with OPTICHECK:

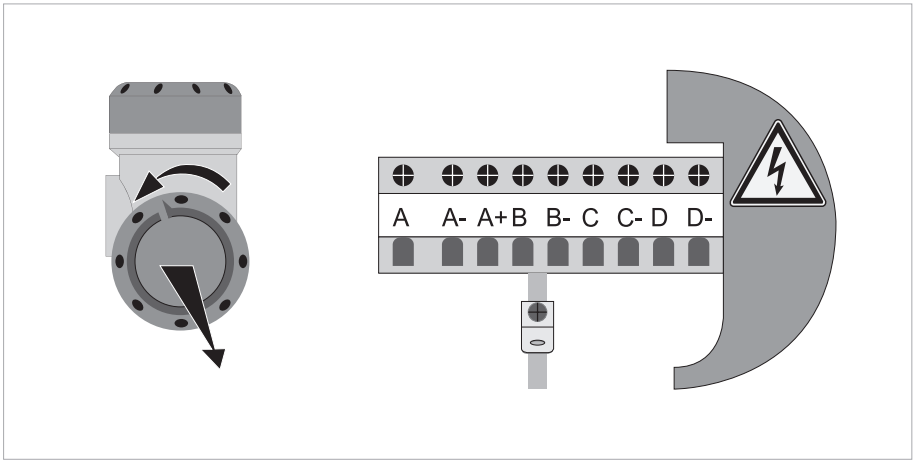


Figure 4-33: IFC 300 compact and field version – I/O terminals

- Open the I/O terminal section by turning the cover counter-clockwise by hand.
- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs or OPTICHECK's XFC I/O adapter to connect to the I/O terminals of the IFC 300 signal converter. The indication on the separate pin plugs must match the indication on the I/O connection terminals.

STEP 3: Verification

- After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Power on the flowmeter.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

DANGER!
After completion of the verification, make sure to switch off the power before starting to dismount any cabling.

Perform the following steps to restore the initial cable connections:

- Remove the OPTICHECK I/O cable (red marking) and the OPTICHECK sensor cable (black marking) as well as the used adapters.
- Connect back the I/O and sensor cabling from the process environment to the terminals.
- Switch power on.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Mount back the display following the instructions in reverse order.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.4.6 Connection of IFC 300 wall version

To connect the required OPTICHECK test cables to the IFC 300 wall version, the housing has to be opened, and the signal converter electronics has to be partially disconnected. The following steps illustrate how to open the housing of the IFC 300 wall version and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

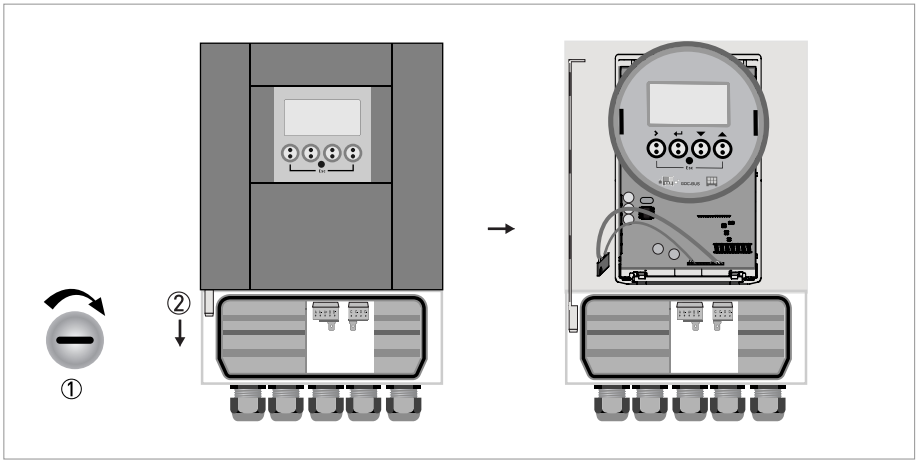


Figure 4-34: IFC 300 wall version – removing cover

① Cover locking screw
② Metal lever

- Turn locking screw ① to the right to open lower cover.
- Slide metal lever ② downwards to unlock the upper cover.
- Open the upper cover.

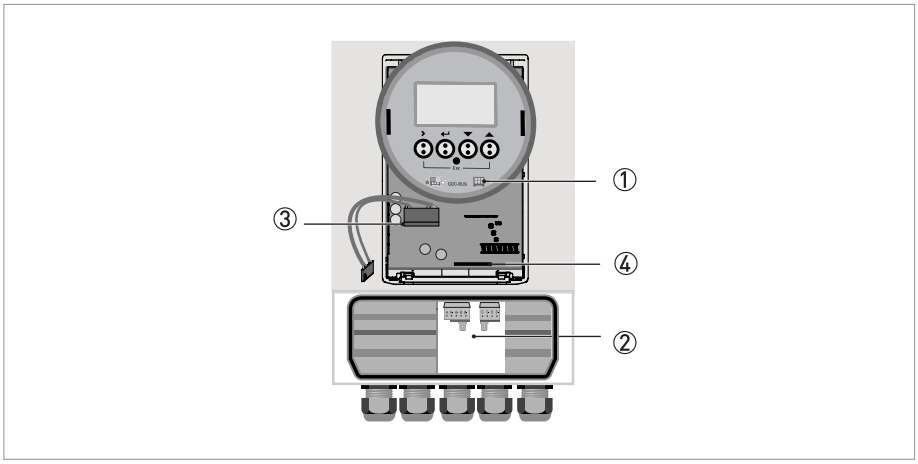


Figure 4-35: IFC 300 wall version – connector overview

① GDC connector
② I/O connector
③ Sensor cable (already disconnected)
④ Sensor connector

The GDC display unit with GDC connection terminal and the connector of the sensor cable can be reached now. Behind the lower cover, the separate compartments with the sensor and power terminals are located – safely covered by plastic lids. Do not open the plastic lids of these compartments!

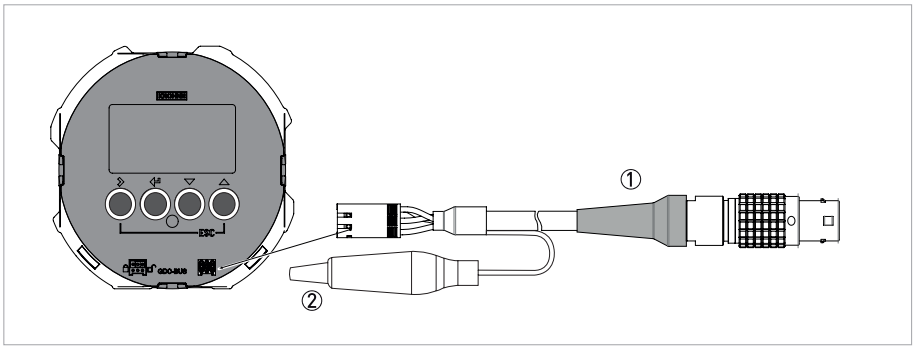


Figure 4-36: IFC 300 wall version – connection of GDC cable

① GDC connection cable (green marking)
② Grounding clip

- Connect the grounding clip ② of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal on the display.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedure to connect the flowmeter's sensor electronics and the flow sensor with OPTICHECK:

- Power off the flowmeter.
- Disconnect the blue female sensor connector from the sensor connector ④ on the signal converter electronics.
- Attach the blue connector of the sensor cable coming out of the IFC 300 signal converter to the black connector of OPTICHECK's IFC 070 / 100 / 300 adapter.
- Connect the blue female connector of the IFC 070 / 100 / 300 sensor connection adapter to the sensor connector of the signal converter electronics ④.
- Connect the standard sensor connection cable (black marking) with the IFC 070 / 100 / 300 sensor connection adapter.

Continue with the following procedure to connect the flowmeter's input / output connections with OPTICHECK:

- Unplug the Phoenix connectors of the I/O connections.
- Connect OPTICHECK's I/O cable for wall versions to the connectors of the signal converters I/O compartment.

STEP 3: Verification

- After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

DANGER!
After completion of the verification, make sure to switch off the power before starting to dismount any cabling.

Perform the following steps to restore the initial cable connections:

- Power off the flowmeter.
- Remove the OPTICHECK I/O cable (red marking) and the OPTICHECK sensor cable (black marking) as well as used adapters.
- Connect back the I/O and sensor cabling from the process environment to the terminals.
- Switch power on.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.5 Connection of OPTIMASS flowmeters

The mass flowmeter family OPTIMASS equipped with MFC 300 / MFC 400 signal converters can be verified in two different depths: either verification is performed via device-internal diagnostic functions without interrupting the flow measurement (level 0/1) or with a deeper verification depth of the signal converter and flow sensor (level 2).

A **level 0 verification** (if supported by the connected signal converter) performs a number of tests without the requirement of removing the flowmeter from the process environment or removing electrical connections to the control station. The signal converter is also not disconnected from the flow sensor. The only required connection to the flowmeter is the GDC service interface. In this case, the depth of verification is limited, but the measurement will not be interrupted.

In addition to a level 0 verification a **level 1 verification** also performs signal simulations (if supported by the connected signal converter). No additional connections are required, but the measurement is interrupted.

A **level 2 verification** is possible if all input and output connections of the signal converter are removed from the process environment. In this case, OPTICHECK connects to the GDC and all I/O terminals in order to perform a full electrical verification of the signal converter's I/O interface accuracy. Additionally, sophisticated sensor electronics and sensor diagnostics are performed to check these components for functionality.

4.5.1 Connection of MFC 300 / MFC 400

Mass flowmeters equipped with MFC 300 and MFC 400 signal converters can be verified with OPTICHECK in the following versions:

- Compact version (the signal converter is mounted directly on the flow sensor)
- Field version (electrical connection to the flow sensor via signal cable)
- Wall version (electrical connection to the flow sensor via signal cable) – MFC 300 only
- 19" rack-mounted housing (only level 0/1 tests are supported) – MFC 300 only

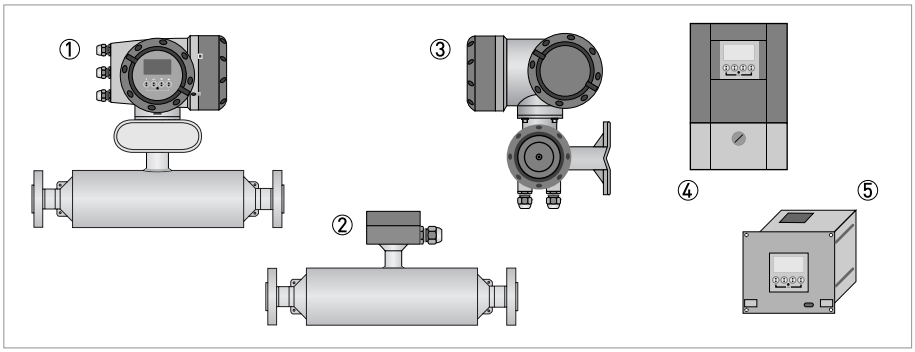


Figure 4-37: MFC 300 – available versions

① Compact version
② Flow sensor with connection box
③ Field housing
④ Wall-mounted housing
⑤ 19" rack-mounted housing

The following combinations of MFC 300 signal converters and flow sensors can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter MFC 300			
	Compact	Remote field housing	Remote wall-mounted housing	Remote rack-mounted housing (28 TE)*
OPTIMASS 1000	OPTIMASS 1300 C	OPTIMASS 1300 F	OPTIMASS 1300 W	OPTIMASS 1300 R/L
OPTIMASS 2000	OPTIMASS 2300 C	OPTIMASS 2300 F	OPTIMASS 2300 W	OPTIMASS 2300 R/L
OPTIMASS 3000	OPTIMASS 3300 C	OPTIMASS 3300 F	OPTIMASS 3300 W	OPTIMASS 3300 R/L
OPTIMASS 7000	OPTIMASS 7300 C	OPTIMASS 7300 F	OPTIMASS 7300 W	OPTIMASS 7300 R/L
OPTIMASS 8000	OPTIMASS 8300 C	OPTIMASS 8300 F	OPTIMASS 8300 W	OPTIMASS 8300 R/L

* Please contact your local KROHNE service for further information!

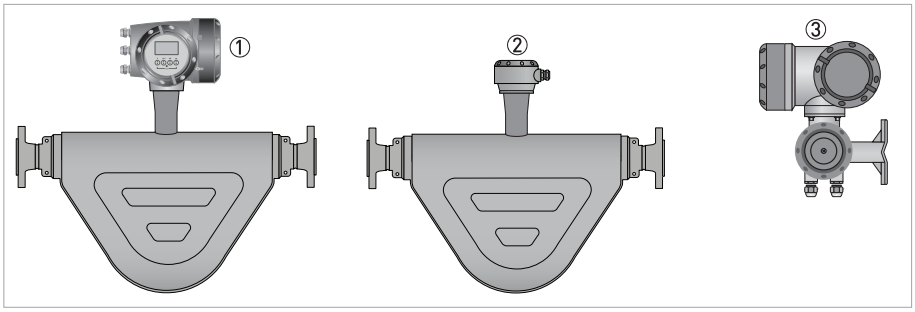


Figure 4-38: MFC 400 – available versions

① Compact version
② Flow sensor with connection box
③ Field housing

The following combinations of MFC 400 signal converters and flow sensors can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter MFC 400	
	Compact	Remote field housing
OPTIMASS 1000	OPTIMASS 1400 C	OPTIMASS 1400 F
OPTIMASS 2000	OPTIMASS 2400 C	OPTIMASS 2400 F
OPTIMASS 3000	OPTIMASS 3400 C	OPTIMASS 3400 C
OPTIMASS 6000	OPTIMASS 6400 C	OPTIMASS 6400 F
OPTIMASS 7000	OPTIMASS 7400 C	OPTIMASS 7400 F

4.5.2 Connection of MFC 300 / MFC 400 compact and field versions

INFORMATION!
The MFC 300 / MFC 400 in custody transfer operation can't be verified without breaking the seal.

To connect the required OPTICHECK test cables to the MFC 300 / MFC 400 (compact and field version), the housing has to be opened, and the signal converter electronics insert has to be partially disconnected. The location of the connection terminals is exemplarily depicted for the remote version. The compact version is connected in the same way.

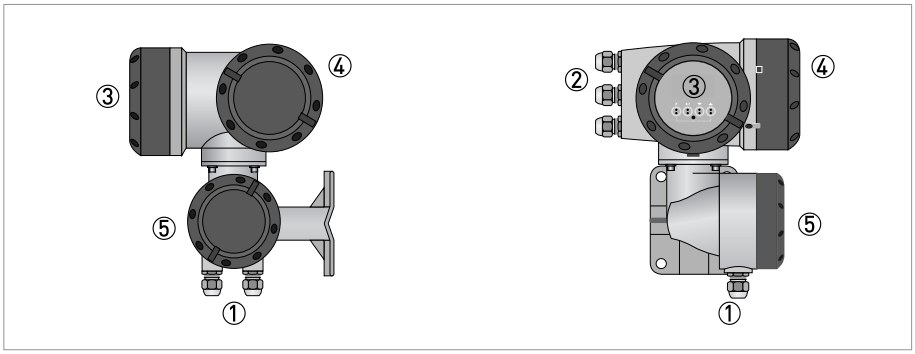


Figure 4-39: MFC 300 field version – side and front view

① Cable entry for sensor connections
② Cable entry for inputs / outputs and power supply connections
③ Section of the display and GDC connection
④ Section of inputs / outputs and power supply terminals
⑤ Section with the sensor terminals

The housing of the compact version is identical to the field version, except of the missing sensor part ⑤.

The following steps illustrate how to open the housing of the MFC 300 / MFC 400 and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

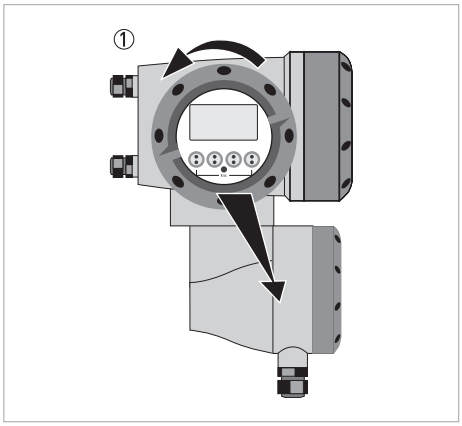


Figure 4-40: MFC 300 / MFC 400 field version – removing cover

- Open the display section by turning the cover counter-clockwise by hand ①.

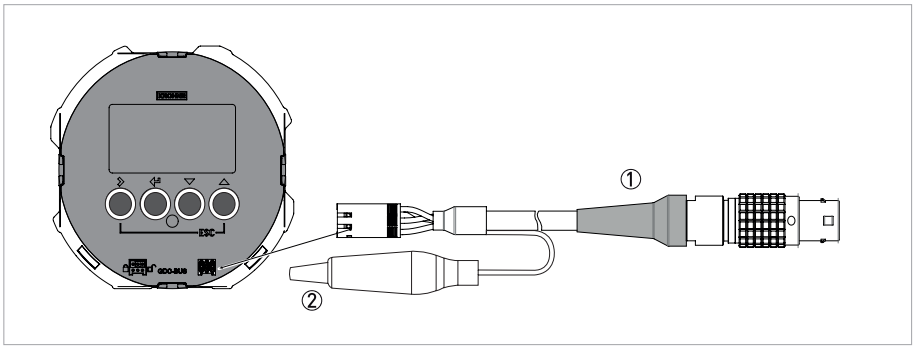


Figure 4-41: MFC 300 / MFC 400 compact and field version – connection of GDC cable

① GDC connection cable (green marking)
② Grounding clip

- Connect the grounding clip ② of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal on the display.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedures to connect the flowmeter's input / output connections with OPTICHECK:

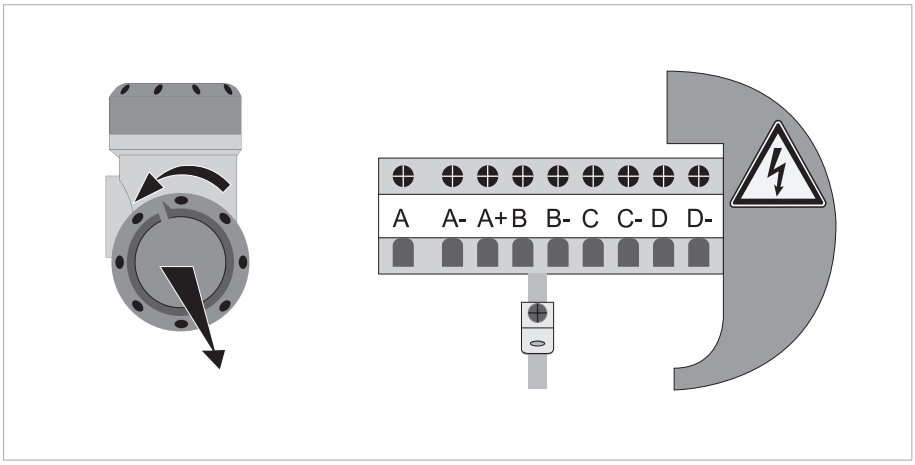


Figure 4-42: MFC 300 / MFC 400 compact and field version – I/O terminals

- Power off the flowmeter.
- Open the I/O terminal section by turning the cover counter-clockwise by hand.
- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs or OPTICHECK's I/O adapter for IFC 300 and MFC 300 / 400 to connect to the I/O terminals of the MFC 300 / MFC 400 signal converter. The indication on the separate pin plugs must match the indication on the I/O connection terminals.

STEP 3: Verification

- After connection of the GDC and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Power on the flowmeter.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!

For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

DANGER!
After completion of the verification, make sure to switch off the power before starting to dismount any cabling.

Perform the following steps to restore the initial cable connections:

- Power off the flowmeter.
- Remove the OPTICHECK I/O cable (red marking).
- Connect back the I/O cabling from the process environment to the terminals.
- Switch power on.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.5.3 Connection of MFC 300 wall version

To connect the required OPTICHECK test cables to the MFC 300 wall version, the housing has to be opened, and the signal converter electronics has to be partially disconnected. The following steps illustrate how to open the housing of the MFC 300 wall version and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

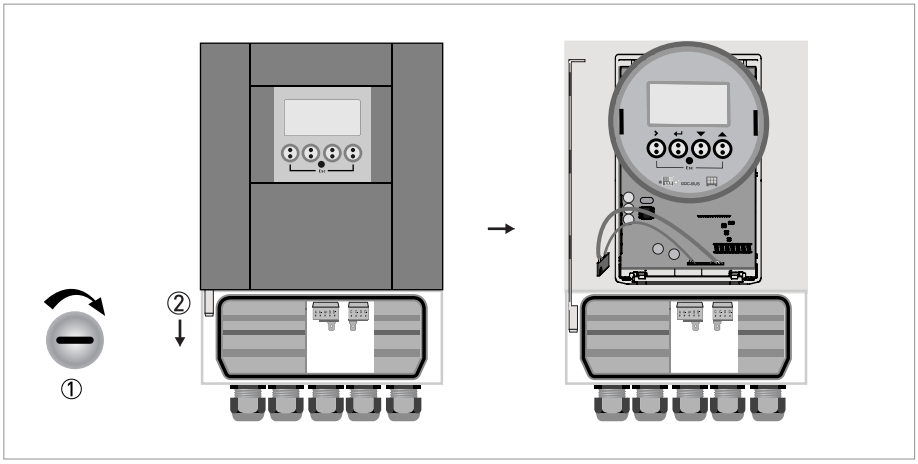


Figure 4-43: MFC 300 wall version – removing cover

① Cover locking screw
② Metal lever

- Turn locking screw ① to the right to open lower cover.
- Slide metal lever ② downwards to unlock the upper cover.
- Open the upper cover.

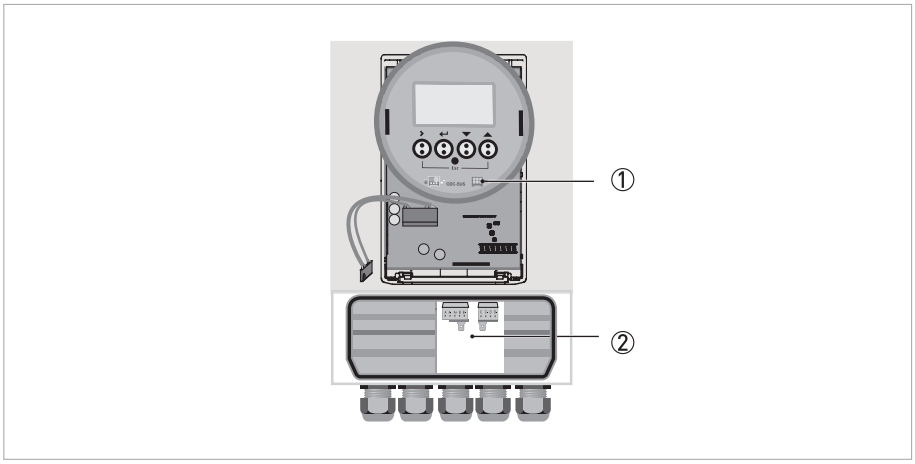


Figure 4-44: MFC 300 wall version – connector overview

① GDC connector
② I/O connector

The GDC display unit with GDC connection terminal can be reached now. The separate compartments with the sensor and power terminal are located behind the lower cover - safely protected by plastic lids. Do not open the plastic lids of these compartments!

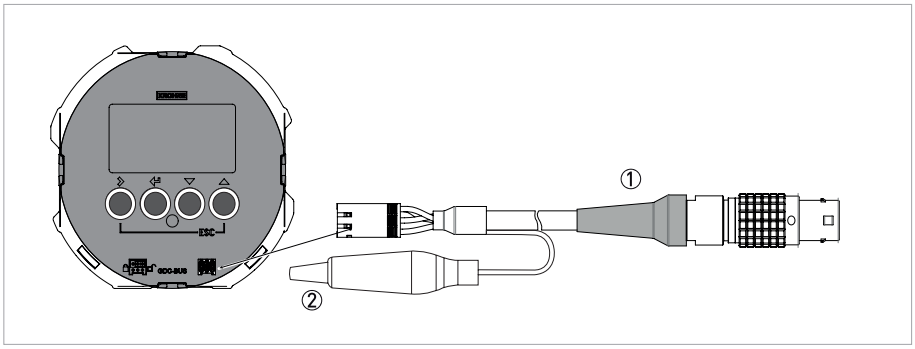


Figure 4-45: MFC 300 wall version – connection of GDC cable

① GDC connection cable (green marking)
② Grounding clip

- Connect the grounding clip ② of the GDC cable (green marking) to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal on the display.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedure to connect the flowmeter's input / output connections with OPTICHECK:

- Power off the flowmeter.
- Unplug the Phoenix connectors of the I/O connections.
- Connect OPTICHECK's I/O cable for wall versions to the connectors of the signal converters I/O compartment.

STEP 3: Verification

- After connection of the GDC and I/O cabling, check if all cables are fitted properly in the terminals.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Connect the GDC, sensor and I/O cables to the OPTICHECK.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!
For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

DANGER!
After completion of the verification, make sure to switch off the power before starting to dismount any cabling.

Perform the following steps to restore the initial cable connections:

- Remove the OPTICHECK I/O cable (red marking).
- Connect back the I/O cabling from the process environment to the terminals.
- Switch power on.
- Press the reconnection button on the PC application.
- Wait until the reconnection process is finished and the connections are successfully checked.
- Remove the GDC cable (green marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!
For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.

4.6 Connection of OPTISWIRL flowmeters

The vortex flowmeter family OPTISWIRL equipped with VFC 200 signal converters can be verified in three different depths: either verification is performed via device-internal diagnostic functions without interrupting the flow measurement (level 0), via device-internal diagnostic functions with interrupting the flow measurement due to sensor simulations (level 1) or with a deeper verification depth of the signal converter and flow sensor (level 2).

A **level 0 verification** (if supported by the connected signal converter) performs a number of tests without the requirement of removing the flowmeter from the process environment or removing electrical connections to the control station. The signal converter is also not disconnected from the flow sensor. The only required connection to the flowmeter is the GDC service interface. In this case, the depth of verification is limited, but the measurement will not be interrupted.

In addition to a level 0 verification a **level 1 verification** also performs signal simulations (if supported by the connected signal converter). No additional connections are required, but the measurement is interrupted.

A **level 2 verification** is possible if all electrical connections of the signal converter are removed from the process environment. In this case, OPTICHECK connects to the GDC service interface and the flow sensor via the OPTISWIRL sensor connection adapter and all I/O terminals in order to perform a full electrical verification of the signal converter's measurement accuracy. Additionally, sophisticated sensor electronics and sensor diagnostics are performed to check these components for functionality.

4.6.1 Connection of VFC 200

Vortex flowmeters equipped with VFC 200 signal converters can be verified with OPTICHECK in following versions:

- Compact version (the signal converter is mounted directly on the flow sensor) with or without pressure sensor

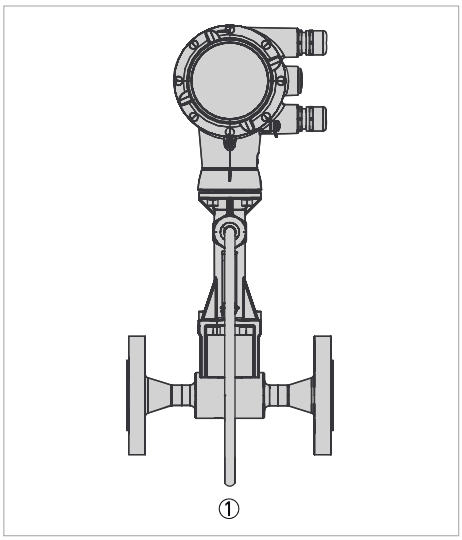


Figure 4-46: VFC 200 – available version

① Compact version

The following combination of VFC 200 signal converter and flow sensor can be verified with OPTICHECK:

Flow sensor	Flow sensor + signal converter VFC 200
	Compact (with and without pressure sensor)
OPTISWIRL 4000	OPTISWIRL 4200 C

4.6.2 Connection of VFC 200 compact version

To connect the required OPTICHECK test cables tothe VFC 200, the housing has to be opened, and the display electronics has to be partially disconnected. The location of the connection terminals is shown in the following figure (exemplarily for the compact version without pressure sensor).

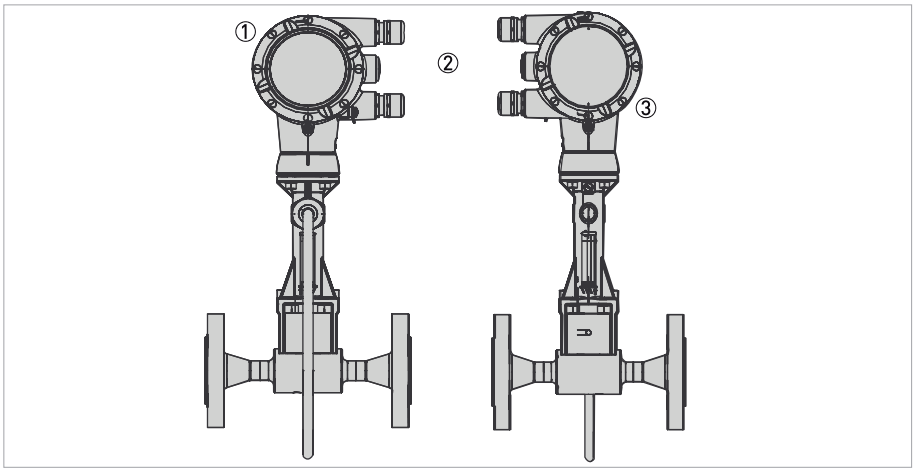


Figure 4-47: VFC 200 compact version: front and back view

① Electronics compartment; section for GDC and sensor connection
② Cable entry for inputs / outputs and power supply connections
③ Terminal compartment; section of inputs / outputs terminals

The following steps illustrate how to open the housing of the VFC 200 and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

- Open the display section by turning the cover counter-clockwise by hand.
- Remove the display unit by using the VFC 200 / RLC 400 display tool.

WARNING!
Be sure to remove the display unit correctly. Otherwise the connectors between display unit and VFC's electronics insert may break.

INFORMATION!
- *The OPTISWIRL offers level 0/1 and level 2 verifications. If only a level 0/1 verification without disconnection of the flow sensor shall be performed, the GDC service cable needs to be connected to the VFC 200 directly without using the OPTISWIRL sensor connection adapter! Also a level 2 verification of the I/O electronics is possible without using the OPTISWIRL sensor connection adapter.*
- *The functionality of the OPTISWIRL 4200 is not influenced by removing the display during measurement.*

Variant A: Level 0/1 verification (without OPTISWIRL sensor connection adapter)

A level 0/1 verification is carried out by using the GDC service interface only.

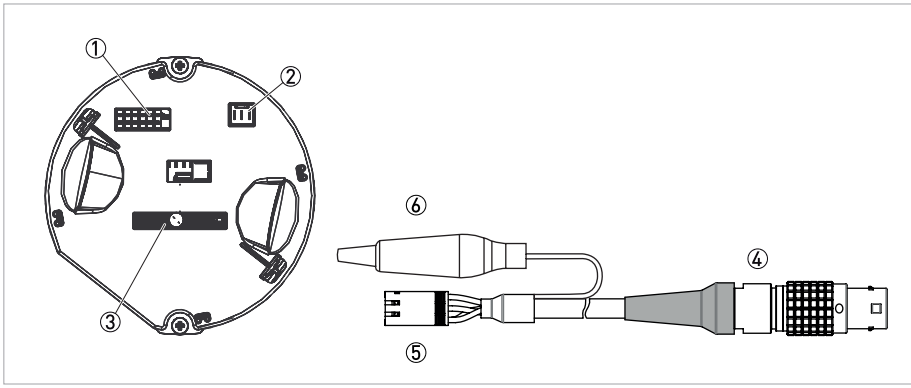


Figure 4-48: Verification without OPTISWIRL sensor connection adapter

① Display connector
② GDC service interface
③ Sensor connector
④ GDC connection cable (green marking)
⑤ GDC connector
⑥ Grounding clip

- Connect the grounding clip ⑥ of the GDC cable (green marking) ④ to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal ② on the electronics insert.
- Re-assemble the display unit carefully.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

Variant B: Level 2 verification (with OPTISWIRL sensor connection adapter)

A level 2 verification including sensor and sensor electronics is carried out by using the OPTISWIRL sensor adapter and cabling.

CAUTION!
The OPTISWIRL sensor connector needs to be handled with care to avoid bending of the connectors and cables.

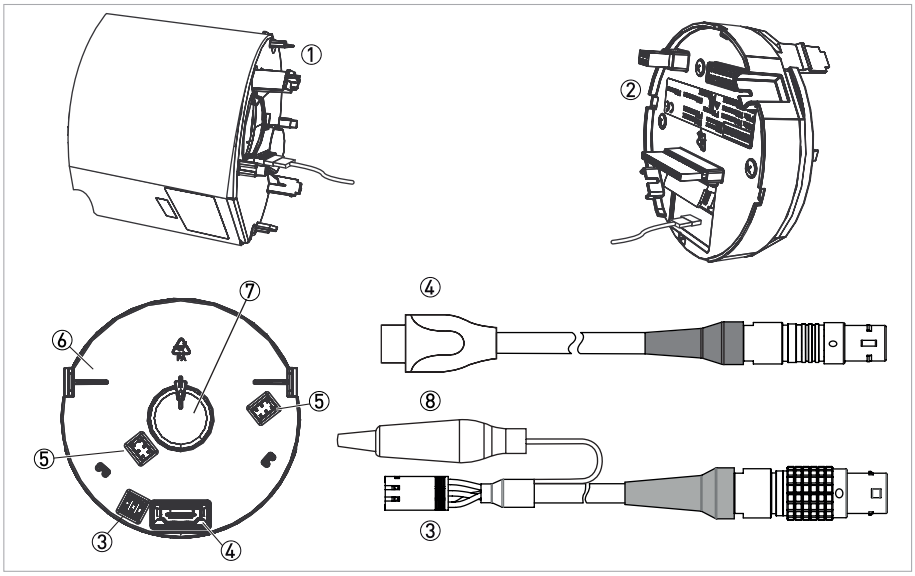


Figure 4-49: Verification with OPTISWIRL sensor connection adapter

① Female connector (blue) of sensor cable
② Connector for sensor cable to the OPTISWIRL sensor adapter
③ Male connector (black) for GDC service connector
④ HDMI connector for standard sensor connection cable (black marking)
⑤ Display connectors
⑥ Guides for display assembly
⑦ Clip for easy removal of the OPTISWIRL sensor adapter
⑧ Grounding clip

- Remove the female connector (blue) of the sensor cable ①.
- Connect the female connector (blue) of the sensor cable to the blue male connector of the OPTISWIRL sensor adapter ②.
- Assemble the OPTISWIRL sensor adapter carefully.
- Connect the ground clip ⑧ of the GDC cable (green marking) to a position suitable for electrical grounding.
- Re-assemble the display unit carefully using the guides of the OPTISWIRL sensor adapter ⑥.
- Connect the GDC cable (green marking) to the connection terminal ③ on the OPTISWIRL sensor adapter.
- Connect the HDMI connector of standard sensor connection cable to the HDMI connector of the OPTISWIRL sensor adapter ④.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedures to connect the flowmeter's input / output connections with OPTICHECK:

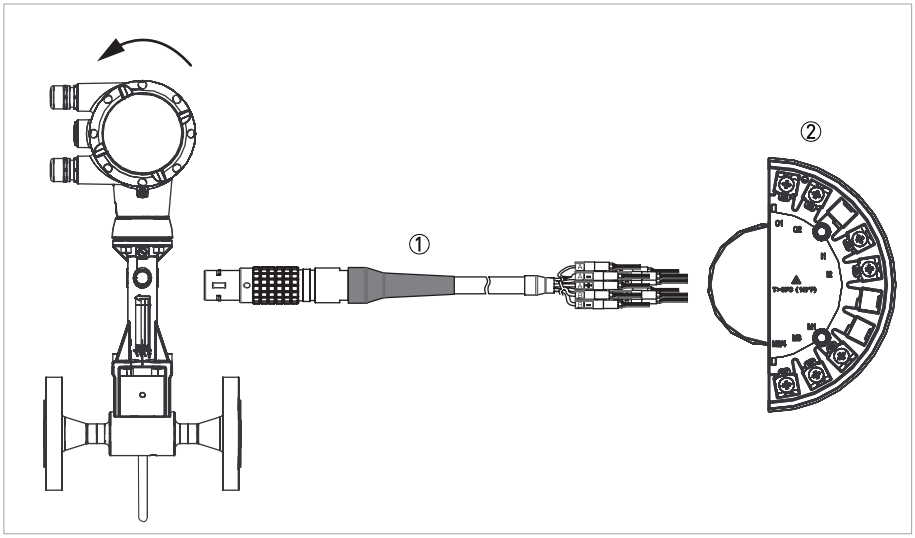


Figure 4-50: VFC 200 – Connection of I/O terminals

① Standard I/O connection cable with pin plugs
② I/O terminal of VFC 200

- Open the I/O terminal section by turning the cover counter-clockwise by hand.
- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs ① to connect to the I/O terminals of the VFC 200 signal converter ②. The indication on the separate pin plugs must match the following pin assignment:

Label on standard I/O connection cable	Label on VFC 200 (if available for the variant)
A	C1
A-	C2
B	I1
B-	I2
D	M3
D-	M2/4
D+	M1

STEP 3: Verification

After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.

- Connect sensor and I/O cables to the OPTICHECK.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!

For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

CAUTION!

- *If removing the display unit from the OPTISWIRL sensor adapter, make sure that the sensor adapter still remains assembled. Otherwise the sensor cable of the OPTISWIRL may be bent or the male connector of the OPTISWIRL sensor adapter may break.*
- *If removing the OPTISWIRL sensor adapter from the VFC 200 electronics insert, make sure to use the removal clip and pull the adapter carefully in a straight direction. Disconnect the OPTISWIRL's sensor cable before removing the OPTISWIRL sensor adapter completely.*

- Remove GDC service cable (green marking).
- Remove standard sensor connection cable (black marking).
- Dismount the display unit carefully.
- Dismount the OPTISWIRL sensor adapter carefully.
- Assemble the display unit.
- Remove the OPTICHECK I/O cable (red marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Connect back the I/O cabling from the process environment to the terminals.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the flowmeter.

INFORMATION!

- *A reconnection test via OPTICHECK is not necessary for two-wire devices.*
- *For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.*

4.7 Connection of OPTIWAVE level meter

The radar level family OPTIWAVE equipped with RLC 400 signal converters can be verified in three different depths: either verification is performed via device-internal diagnostic functions without interrupting the level measurement (level 0), via device-internal diagnostic functions with interrupting the level measurement due to sensor simulations (level 1) or with a deeper verification depth of the signal converter (level 2).

A **level 0 verification** (if supported by the connected signal converter) performs a number of tests without the requirement of removing the field device from the process environment or removing electrical connections to the control station. The signal converter is also not disconnected from the sensor. The only required connection to the field device is the GDC service interface. In this case, the depth of verification is limited, but the measurement will not be interrupted.

In addition to a level 0 verification a **level 1 verification** also performs signal simulations (if supported by the connected signal converter). No additional connections are required, but the measurement is interrupted.

A **level 2 verification** is possible if all electrical connections of the signal converter are removed from the process environment. . In this case, OPTICHECK connects to the GDC service interface and all I/O terminals in order to perform a full electrical verification of the signal converter's measurement accuracy.

4.7.1 Connection of RLC 400

Radar level meters equipped with RLC 400 signal converters can be verified with OPTICHECK in following versions:

- Compact version (the signal converter is mounted directly on the sensor)

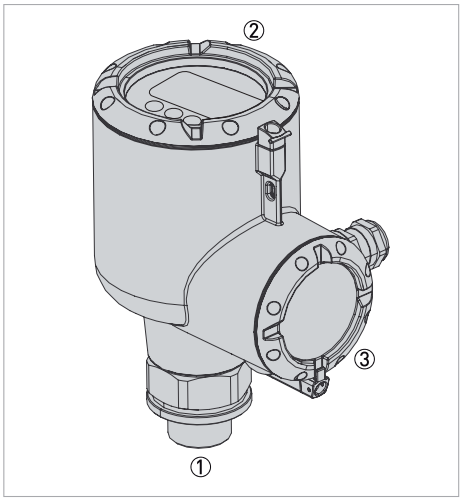


Figure 4-51: RLC 400 – available version

① Compact version
② Display section
③ I/O terminal section

The following combination of RLC 400 signal converter and level sensor can be verified with OPTICHECK:

Radar sensor	Radar sensor + RLC400 signal converter	
	24 GHz	80 GHz
OPTIWAVE 3000	-	OPTIWAVE 3500
OPTIWAVE 5000	OPTIWAVE 5400	-
OPTIWAVE 6000	OPTIWAVE 6400	OPTIWAVE 6500
OPTIWAVE 7000	OPTIWAVE 7400	OPTIWAVE 7500

4.7.2 Connection of RLC 400 compact version

To connect the required OPTICHECK test cables to the RLC 400, the housing has to be opened and the display electronics has to be disconnected. The location of the connection terminals is shown in the following figure.

The following steps illustrate how to open the housing of the RLC 400 and connect / disconnect the necessary cables for all connections.

STEP 1: Start

DANGER!
Before connecting the OPTICHECK to the device, make sure to discharge yourself (e.g. by wearing a wrist strap or touching a metal surface that is grounded). Electrostatic discharge can damage electronic parts.

- Open the display section by turning the cover counter-clockwise by hand.
- Remove the display unit by using the VFC 200 / RLC 400 display tool.

WARNING!
Be sure to remove the display unit correctly. Otherwise the connectors between display unit and RLC's electronics insert may break.

INFORMATION!
- *The OPTIWAVE offers level 0/1 and level 2 verifications.*
- *The functionality of the OPTIWAVE is not influenced by removing the display during measurement.*

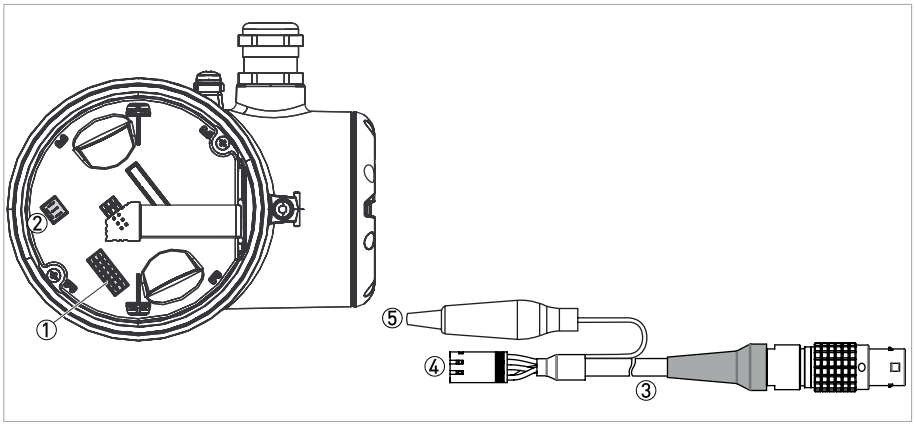


Figure 4-52: RLC 400 - GDC cable connection

① Display connector
② GDC service interface
③ GDC connection cable (green marking)
④ GDC connector
⑤ Grounding clip

- Connect the grounding clip ⑤ of the GDC cable (green marking) ④ to a position suitable for electrical grounding.
- Connect the GDC cable (green marking) to the connection terminal ② on the electronics insert.
- Re-assemble the display unit carefully.
- Press "Connect" on page "Start" on the screen of tablet / laptop if the device identification does not start automatically. The device information and status are then collected and the product image should be displayed.

STEP 2: Configuration

Continue with the following procedures to connect the field device's input / output connections with OPTICHECK:

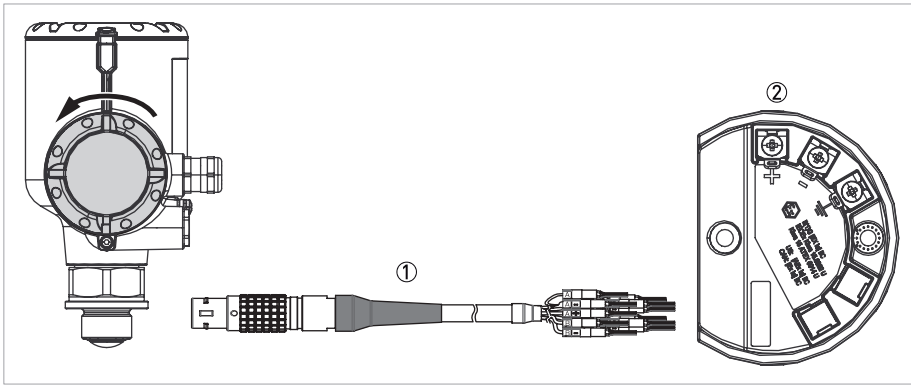


Figure 4-53: RLC 400 – Connection of I/O terminals

① Standard I/O connection cable with pin plugs
② I/O terminal of RLC 400

- Open the I/O terminal section by turning the cover counter-clockwise by hand.
- Disconnect the I/O cables and use the I/O parking plug to safely place the I/O wires and prevent short circuiting.
- Use OPTICHECK's standard I/O cable with the pin plugs ① to connect to the I/O terminals of the signal converter ②. The indication on the separate pin plugs must match the following pin assignment:

Label on standard I/O connection cable	Label on RLC 400 (if available for the variant)
A	+
A-	-

STEP 3: Verification

After connection of the GDC, sensor and I/O cabling, check if all cables are fitted properly in the terminals.

- Connect sensor and I/O cables to the OPTICHECK.
- Make sure that the OPTICHECK verification tool and tablet are placed / mounted securely.
- Follow up instructions shown on the screen of the tablet to perform a verification.

INFORMATION!

For more information concerning the handling of the PC application, refer to sections "Start-up" and "Operation".

STEP 4: Reconnection after verification

- Dismount the display unit carefully.
- Remove GDC service cable (green marking).
- Assemble the display unit.
- Remove the OPTICHECK I/O cable (red marking).
- Dismount the OPTICHECK verification tool (and tablet) and place them in a safe location.
- Connect back the I/O cabling from the process environment to the terminals.
- Close the covers after checking that all connections are properly made.
- Verify normal operation of the field device.

INFORMATION!

- *A reconnection test via OPTICHECK is not necessary for two-wire devices.*
- *For more information about the connection of cables and opening the signal converter housing refer to section "Electrical connections" of the corresponding signal converter handbook.*

5.1 Quick start of software

This section gives an overview on the elements of the OPTICHECK PC application and how to perform verifications. The following table gives an overview about the steps to be performed for a device verification:

Step	Description
Launch application	Start the tablet / laptop and launch the OPTICHECK application.
Start	- Establish USB connection to OPTICHECK verification box. - Establish GDC connection to a field device. - Start device identification.
Configuration	The following data has influence on the verification procedure: - Select the signal converter properties which cannot be automatically detected. - Select the verification level. - Select the process conditions. Additional instructions to connect the cables between the verification box and the field device are shown. The signal converter power has to be switched off (to connect all cables) in most cases. Connect all cables afterwards and power on the signal converter.
Application	Input of non-functional information which is not influencing the verification procedure: - Inspector name (mandatory field) - Device location (mandatory field) - Customer data - Application data
Verification	Performs the verification by processing different test steps and printing the results. Hints how to solve failing tests are shown.
Reconnection (optional)	After reconnecting the field device to the process, basic connection tests can be performed to compare to the initial installation condition.
Result	A certificate can be generated containing the verification results and user actions in case of failures.

These steps of the verification flow are described in detail in the following sections and can be re-discovered in the structure of the OPTICHECK application.

5.2 Launch application

Switch on the tablet or notebook. The icon to launch the OPTICHECK application will be shown up on the desktop. Start the software with a double-click.

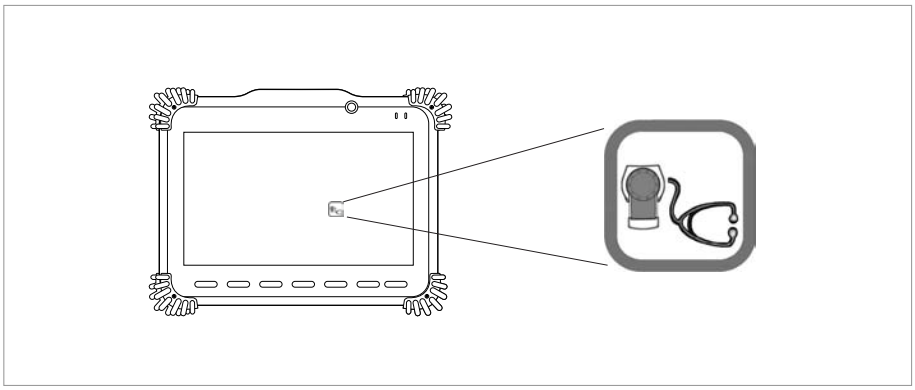


Figure 5-1: Application icon on desktop

After starting the application, the main window (refer to next figure) will be shown.
The navigation tabs ① (from left to right) represent the steps to be performed during the verification work flow. A button with red symbols in the menu bar indicates the active page. All other buttons have blue symbols.

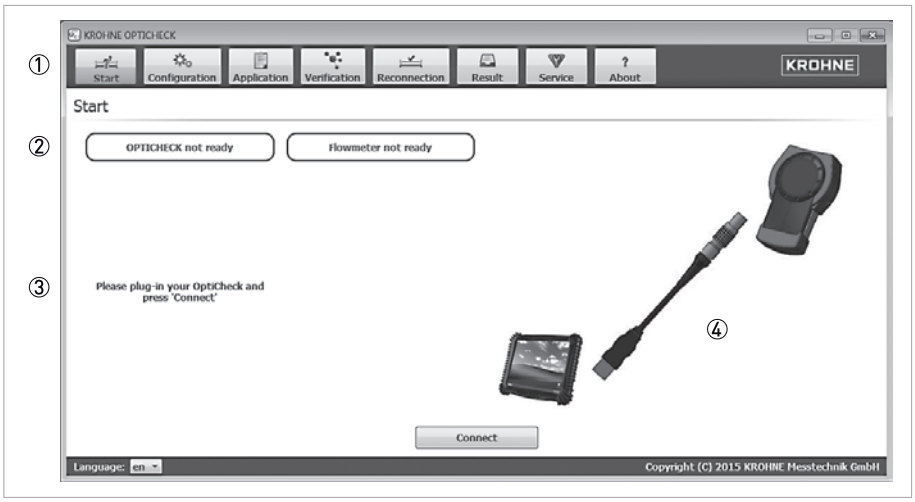


Figure 5-2: Software start window

① Navigation tabs
② Status of device connections
③ Information / instruction area
④ Illustration of required cable connections

5.3 Start page

Initially, page "Start" is activated pointing out which cable connections have to be made. The software automatically checks which of the necessary connections are made and give hints how to establish them.

The initial connections tested are:

- USB connection between tablet and verification box
- GDC connection between verification box and signal converter

Connect the verification box

After the system check, a message ① will inform the user if a connected verification box is recognised and ready for operation. If OPTICHECK is not ready, please establish the USB connection and press "Connect".

After device recognition ② information about the verification box as manufacturer, calibration date, serial number, PC application version and supported field device families are displayed.

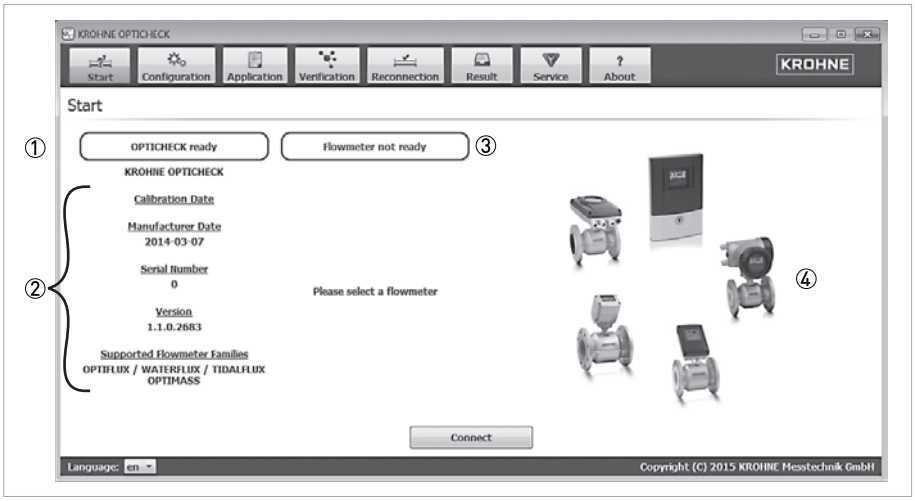


Figure 5-3: Start window with "OPTICHECK ready"

Connect a field device

The user has the opportunity to either connect a field device via GDC or to display an illustration of the required connection step by selecting the type of field device to be connected ④ (in figure before).

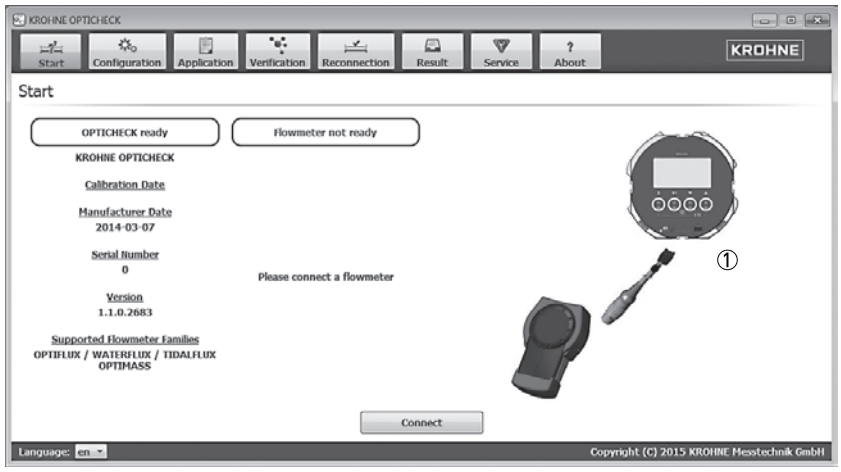


Figure 5-4: GDC connection hint

After selecting a field device, the location of the GDC connector of the corresponding field device is shown ① (in this example IFC 300). Connect the GDC cable (green marking) according to the illustration. The recognition of the field device will automatically start (except IFC 070; press "Connect" to start device recognition in this case).

System ready

After connecting and identifying a field device, a product image of the recognised device will be shown ②. Information such as calibration and manufacturing date, the serial number, the electronic revision as well as the user tag will be shown in ①.

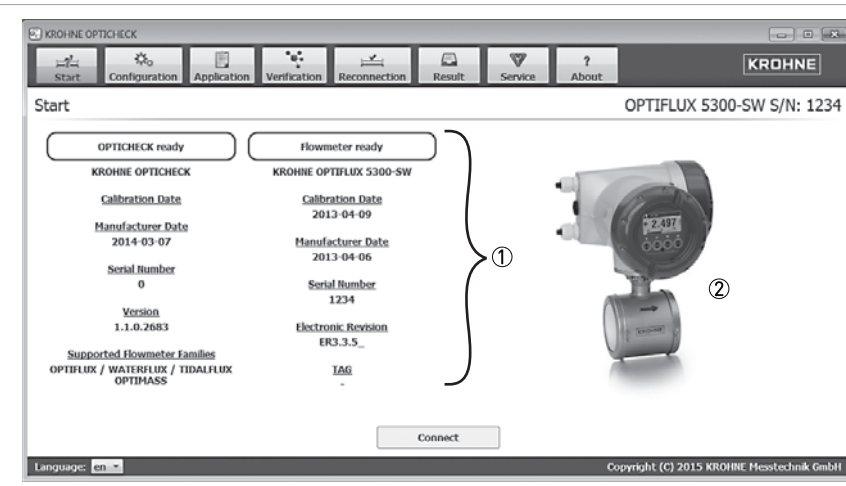


Figure 5-5: System ready

5.4 Configuration page

On this page, the user can configure the verification process and input device data which cannot be detected automatically. The verification depth and additional settings for installation details can be specified. Furthermore, instructions for required cabling are provided if required.

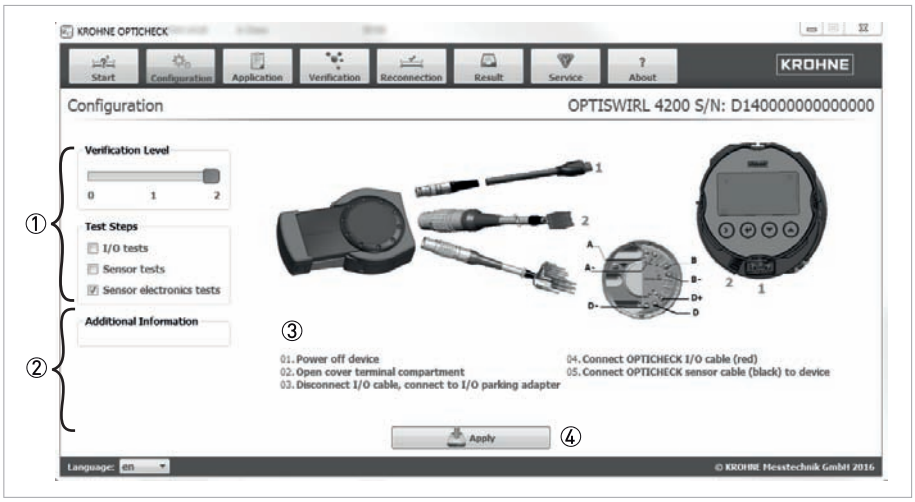


Figure 5-6: Configuration page

Verification level ①

The user can select the verification depth. The following verifications can be performed:

- **Level 0:** Firmware internal diagnostic functions are employed to perform the verification without interrupting the measurement. Only the GDC connection is required, resulting in less reconnection effort, but the depth of verification is also limited.
  Creation of printable certificate including a detailed test report is still possible.
- **Level 1:** In addition to a level 0 verification a level 1 verification also performs signal simulations (if supported by the connected signal converter).
  No additional connections are required, but the measurement is interrupted.
- **Level 2:** Full connection of all terminals as described in section "Electrical connections".
  For IFC 070 / 300 and MFC 300 / 400, removing of the electronics insert is required.
  Offers the maximum possible verification depth including a printable certificate with detailed test report.

Additional information ②

Depending on the connected field device, additional information has to be properly selected:

- Pipe is empty: this field specifies for an EMF if the sensor is empty (or only partially filled). If not selected properly, the sensor electrode tests may fail.
- Terminal X: specifies that the terminal X is connected for an IFC 050
- Zero flow: specifies for a mass flowmeter that there is currently no flow in the sensor tube at all.
- Signal converter type: For IFC 300 and MFC 300 / 400 applications in a W, C or F version, the type has to be selected. This information is important for the connection support printed in ③.

Instructions ③

Depending on selected verification type and connected field device, additional information and pictures will be presented. This will guide the user to connect the remaining required cabling for the verification (incl. supporting help texts).

Apply button ④

Saves the current settings to the database and applies these settings for the tests executed during verification.

5.5 Application page

On this page, the user can select and fill in additional information regarding the customer, the inspector and the application of the field device.

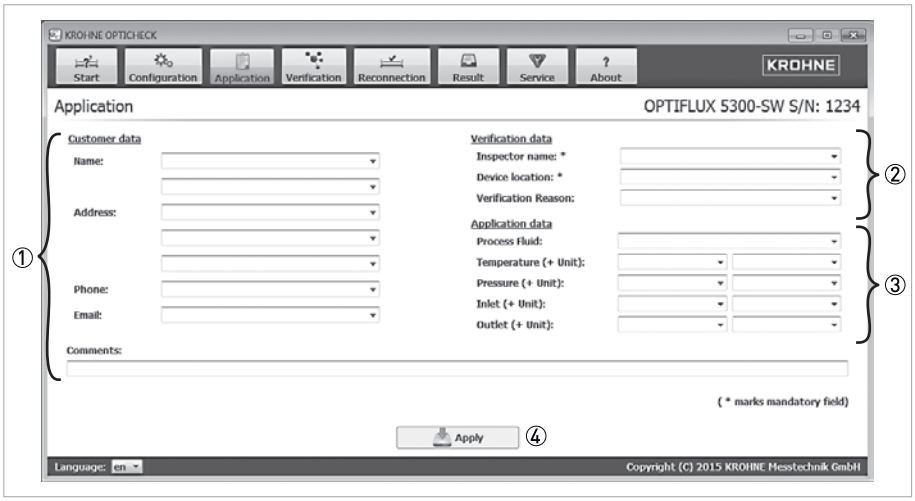


Figure 5-7: Application page

① Input fields for customer data
② Input fields for verification data
③ Input fields for application data
④ Apply and store button

The fields "Inspector name" and "Device location" in ② are mandatory and have to be filled before a certificate can be generated. All other fields are optional. This information does not influence the verification process but is printed on the certificate. The information is applied by pressing button ④.
The data is stored in the internal database of the OPTICHECK and used for the certificate generation.

The content of this page is in the same look and feel as the fields on the certificate. Not filled in fields remain empty on the certificate.

INFORMATION!

- *It is possible to start the verification before filling entries. Filling in all the information can best be done during verification.*
- *The entries of the fields will be stored in the internal database and can be reused for future verifications (e.g. same customer or similar field device) by simply selecting from the drop-down boxes.*

5.6 Verification page

On this page, the user can start the verification and follow the progress of the verification.

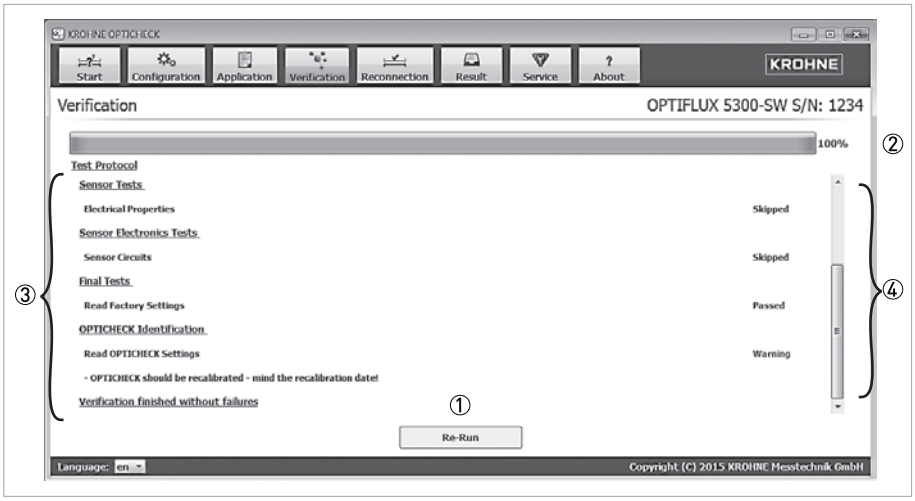


Figure 5-8: Verification page

① Button to start the verification
② Progress bar
③ Information messages
④ Test result

In order to start the verification process, press the "Run / Re-Run" button ①. During a verification is running, the progress bar indicates the advancement of the verification process (a level 2 verification of complex devices will take approx. 10 minutes).

The information area provides information on the steps performed during verification as well as hints on occurred errors on the left-hand side ③. On the right-hand side of the information area, the results of the completed tests are shown ④.

5.7 Reconnection page

On this page, the user can perform a check if the connections have been brought back to the original installation condition of the device. This step is optional before generating a verification certificate.

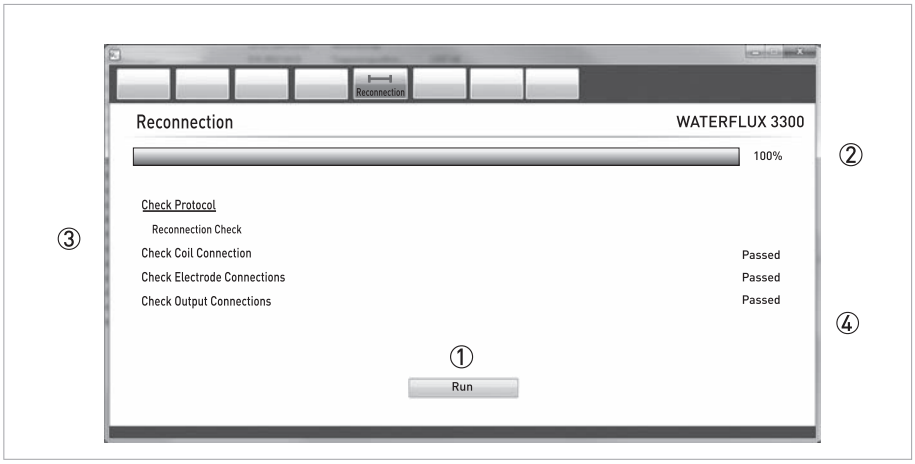


Figure 5-9: Reconnection page

① The "Run" button starts the reconnection check
② The progress bar indicates the progress of the reconnection check
③ The information area will show information on the steps performed during reconnection check as well as hints on occurred errors on the left-hand side.
④ On the right-hand of the information area, the result of the actual tests are shown

If a certain reconnection test is checked OK the remark "Passed" will be printed. If there are wrong connections or connections are not made properly, the points will be marked with "Failed". This means that the corresponding connection was not restored correctly. In this case, please check for proper reconnection.

The related step has to be performed again before it is possible to print the report.

5.8 Result page

On this page, the verification results are shown. Furthermore, the user can perform a comparison of the field device calibration settings with its factory calibration, generate a verification certificate/report or load verifications from the history.

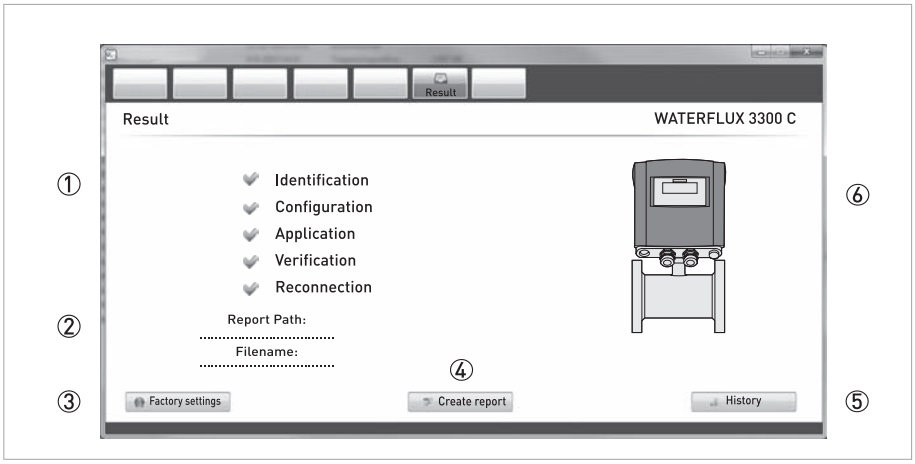


Figure 5-10: Result page

① Completed verification steps
② File location and file name
③ Factory settings button
④ Create report button
⑤ History button
⑥ Product image of connected device

An overview ① of all verification steps is show in the window. The steps will be marked as "Passed" (with green check mark), "Failed" (red cross) or "not performed" (blue minus).

If the mandatory steps "Start", "Configuration", "Application" and "Verification" have been completed, a certificate can be generated by pressing the "Create report" button ④.
The location on the disc drive can be selected and the name of the file can be changed by the user. The final file name and file location on disc drive is shown ②. The generated certificate/report is stored as PDF format and its content is explained in sections 5.8.3 and 5.8.4, respectively.

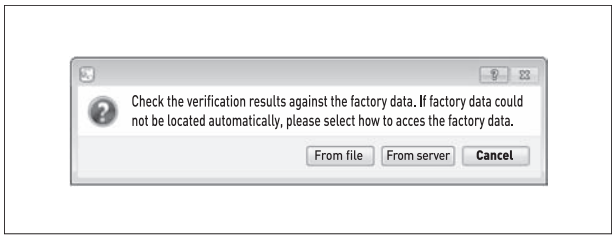
The button "Factory settings" ③ performs a comparison between the signal converter calibration settings and initial factory calibrating data. The "History" button ⑤ can be used if a previously completed verification should be loaded from the database.

For more information about the buttons "Factory settings" and "History" refer to *Factory settings* on page 83 and refer to *Verification history* on page 84.

5.8.1 Factory settings

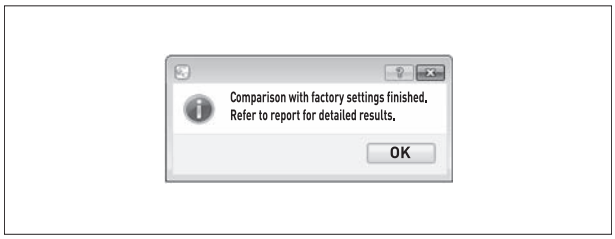
After a verification has been accomplished (and optionally a reconnection check has been performed), an optional comparison of the signal converter calibration settings with the initial factory calibration set, which was determined during production of the field device in the factory, can be performed.

If "Factory settings" is pressed, a dialogue lets the user select how to load the initial factory settings:



- **From Server:** OPTICHECK will automatically load the calibration data from the KROHNE Pick server (internet connection required)
- **From File:** opens a file dialogue to load a file that was previously downloaded from the KROHNE Pick server (http://pick.krohnegroup.com)
- **Cancel:** aborts the factory calibration comparison

If the factory settings have been read successfully, the following message box will appear:



The result of the comparison between the factory settings and the current device settings is printed in the report. The following settings are compared:

- Serial number of the signal converter
- Variant (CG number) of the signal converter
- All sensor calibration values

In case that the factory settings have not been read successfully, the following error message appears:

Possible sources of errors are:

- The PICK server was not available; check internet connection!
- The file format was not correct or wrong file was selected

5.8.2 Verification history

At an arbitrary point of time, the "History" button can load a previously completed verification from the internal database. The following selection dialogue is opened:

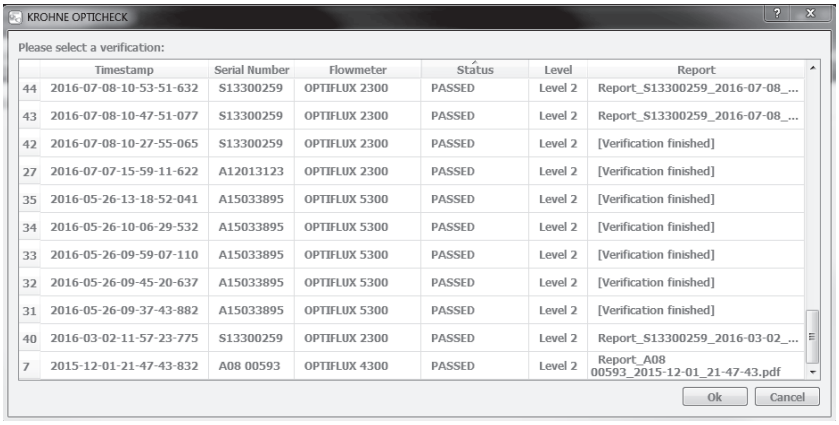


Figure 5-11: Example of a verification history

A field device can be identified by the information listed in the columns "Serial Number" and "Field Device" whereas the different verifications for a field device can be distinguished by its "Timestamp".

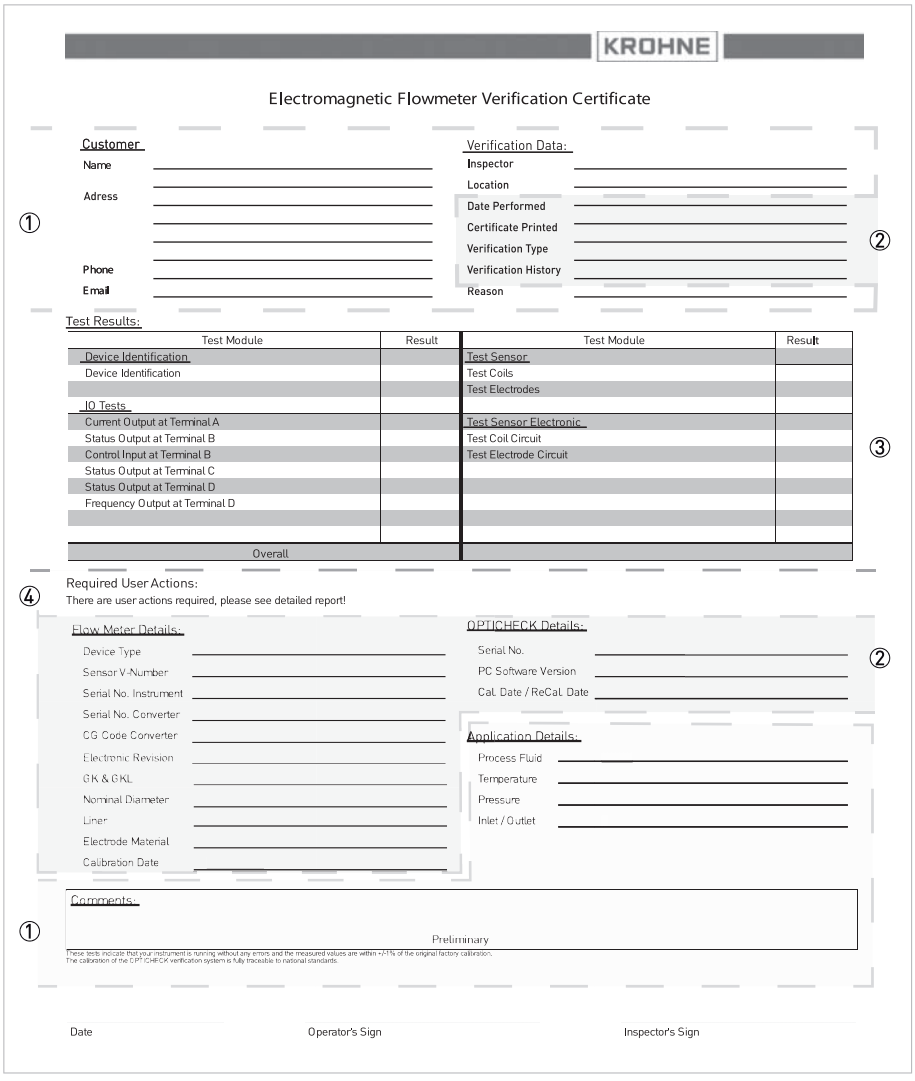
The field "Status" indicates if a verification was successful ("PASSED"), if an error occurred ("FAILED") or if the device was not fully tested (e.g. if only sensor tests were performed).

If a report has already been generated in the past, the column "Report" shows its file name.

By selecting an entry and pressing "OK", the results of a previously accomplished verification can be loaded in order to perform a comparison of the factory settings (for details refer to *Factory settings* on page 83) later on. If an already generated certificate/report exists, the PDF is loaded from the database.

5.8.3 Description of the certificate

The first page of the generated PDF is a (top level) overview of the performed verification. It can be seen as an one page certificate at the same time, if all required actions are executed and a verification was performed.



KROHNE

Electromagnetic Flowmeter Verification Certificate

Customer
Name
Adress
Phone
Email

Verification Data:
Inspector
Location
Date Performed
Certificate Printed
Verification Type
Verification History
Reason

Test Results:

Test Module	Result	Test Module	Result
Device Identification		Test Sensor	
Device Identification		Test Coils	
		Test Electrodes	
IO Tests			
Current Output at Terminal A		Test Sensor Electronic	
Status Output at Terminal B		Test Coil Circuit	
Control Input at Terminal B		Test Electrode Circuit	
Status Output at Terminal C			
Status Output at Terminal D			
Frequency Output at Terminal D			
Overall			

Required User Actions:
There are user actions required, please see detailed report!

Flow Meter Details:
Device Type
Sensor V-Number
Serial No. Instrument
Serial No. Converter
CG Code Converter
Electronic Revision
GK & GKL
Nominal Diameter
Liner
Electrode Material
Calibration Date

OPTICHECK Details:
Serial No.
PC Software Version
Cal. Date / ReCal. Date

Application Details:
Process Fluid
Temperature
Pressure
Inlet / Outlet

Comments:

Preliminary

These tests indicate that your instrument is running without any errors and the measured values are within +/-1% of the original factory calibration.
The calibration of the OPTICHECK verification system is fully traceable to national standards.

Date | Operator's Sign | Inspector's Sign

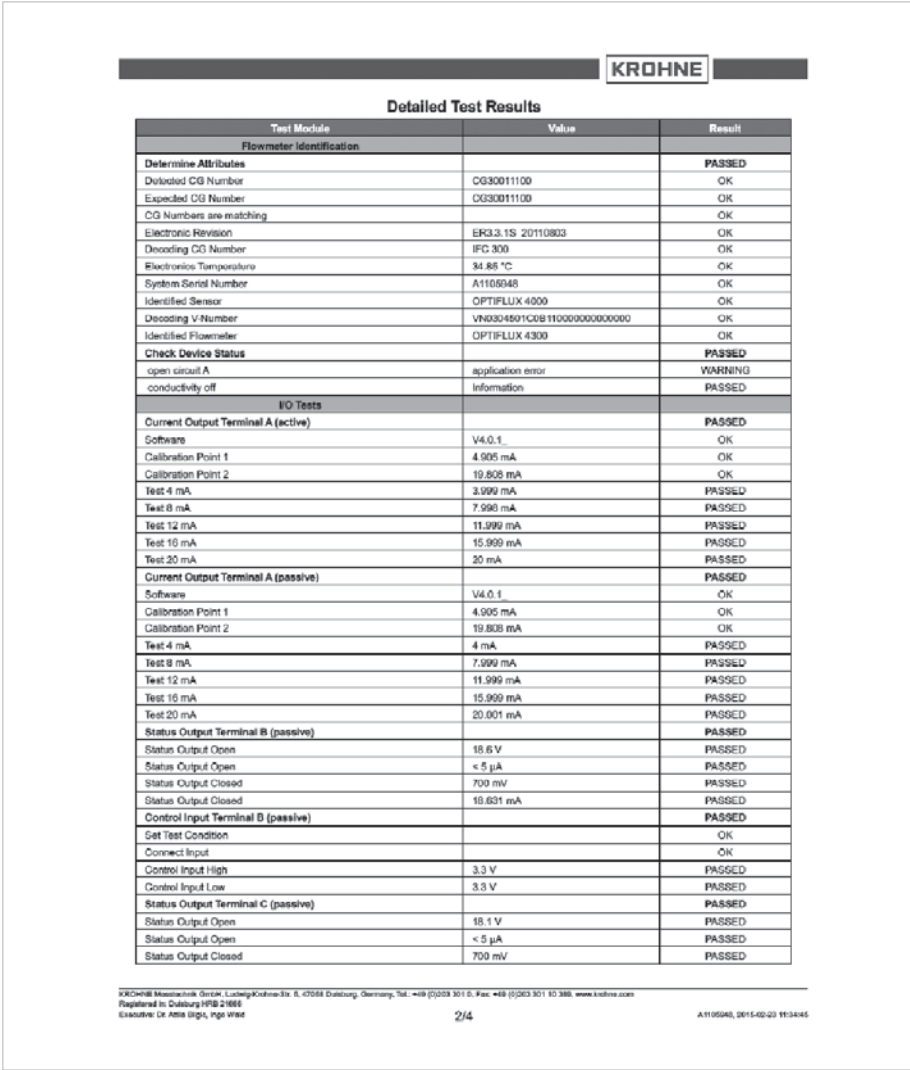
Figure 5-12: Example of a verification certificate

Explanation of the certificate content

① User input specified under "Application" (for details refer to *Application page* on page 79).
② Automatically generated data.
③ OPTICHECK generated databased (for details refer to *Verification page* on page 80) or (refer to *Factory settings* on page 83).
④ Automatically generated messages in case of failures (e.g. additional information for the user in order to clarify the issue or give hints to eliminate the error source).

5.8.4 Description of the verification report

The pages 2 and the following of the generated PDF (refer to next figure for an example) contain a report with a detailed overview of the performed tests and the determined (measurement) values leading to the overall results listed on the certificate. The content depends on the measurement principle and type of the measurement device as well as on the verification conditions.



KROHNE

Detailed Test Results

Test Module	Value	Result
Flowmeter Identification		
Determine Attributes		**PASSED**
Detected CG Number	CG30011100	OK
Expected CG Number	CG30011100	OK
CG Numbers are matching		OK
Electronic Revision	ER3.3.1S 20110803	OK
Decoding CG Number	IFC 300	OK
Electronics Temperature	34.85 °C	OK
System Serial Number	A1105948	OK
Identified Sensor	OPTIFLUX 4000	OK
Decoding V-Number	VN0034501C0B1100000000000000	OK
Identified Flowmeter	OPTIFLUX 4300	OK
Check Device Status		**PASSED**
open circuit A	application error	WARNING
conductivity off	information	PASSED
I/O Tests		
Current Output Terminal A (active)		**PASSED**
Software	V4.0.1	OK
Calibration Point 1	4.005 mA	OK
Calibration Point 2	19.808 mA	OK
Test 4 mA	3.999 mA	PASSED
Test 8 mA	7.998 mA	PASSED
Test 12 mA	11.999 mA	PASSED
Test 16 mA	15.999 mA	PASSED
Test 20 mA	20 mA	PASSED
Current Output Terminal A (passive)		**PASSED**
Software	V4.0.1	OK
Calibration Point 1	4.005 mA	OK
Calibration Point 2	19.808 mA	OK
Test 4 mA	4 mA	PASSED
Test 8 mA	7.999 mA	PASSED
Test 12 mA	11.999 mA	PASSED
Test 16 mA	15.999 mA	PASSED
Test 20 mA	20.001 mA	PASSED
Status Output Terminal B (passive)		**PASSED**
Status Output Open	18.6 V	PASSED
Status Output Open	< 5 µA	PASSED
Status Output Closed	700 mV	PASSED
Status Output Closed	18.631 mA	PASSED
Control Input Terminal B (passive)		**PASSED**
Set Test Condition		OK
Connect Input		OK
Control Input High	3.3 V	PASSED
Control Input Low	3.3 V	PASSED
Status Output Terminal C (passive)		**PASSED**
Status Output Open	18.1 V	PASSED
Status Output Open	< 5 µA	PASSED
Status Output Closed	700 mV	PASSED

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Registered in: Duisburg HRB 21666
Executive: Dr Attila Bilgic, Ingo Wiet

2/4

A1105948, 2015-02-23 11:34:45

Figure 5-13: Example page of a detailed test report

The detailed test results are divided into categories and sub-categories which can also be found on the certificate (front page of the generated PDF) in the table entitled "Test Results" (③ in figure on section before).

The (sub-) categories are as follows:

- Device Identification
  - Check Device Status
- I/O Tests
- Sensor Tests
  - Coils (for EMF)
  - Electrodes (for EMF)
  - Process and Sensor Status (for mass flowmeter)
  - Pickup (for Vortex)
  - Temperature / Pressure Sensor (if available)
- Sensor Electronic Tests
  - Coil Circuit (for EMF)
  - Electrode Circuit (for EMF)
  - Device Condition and Signal Evaluation (for mass flowmeter)
  - Check of Reference Signals (for mass flowmeter)
  - Pickup Circuit (for vortex)
  - Temperature/ Pressure Circuit (if available)
- Final Tests
  - Test against Factory Calibration (if available)
  - Check Reconnection

The detailed test result table is divided into three columns:

- Test Module: Name of the test / test case (including test values)
- Value: Measured test result / read value
- Result: Evaluation of the column "Value":
  - Passed: The performed test or evaluation passed the test criteria successfully
  - OK: The execution of the test step was successful, but no result evaluation is performed
  - Failed: The performed test or evaluation has been performed, but the test criteria failed
  - Skipped: The listed test case step has not been executed
  - Not Tested: The listed test case is not supported by the device
  - Warning: Action of the user is necessary, but does not influence the overall test result
  - Remark: The performed test passed the test criteria successfully, but is near specification limits

5.9 About page

On this page, standard information regarding copyright, data protection and disclaimer as well as the contact information for the customer is listed. Furthermore, the version of the application and a button to check for updates is available.

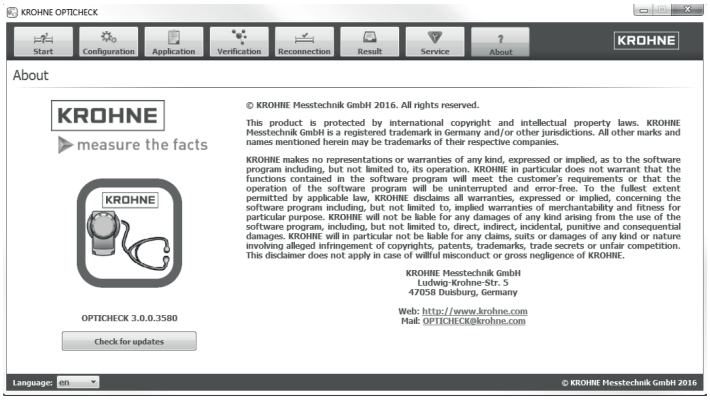

Figure 5-14: About page

This chapter gives an overview on service-related topics which should be regarded for a proper functionality and reliable verification results when using OPTICHECK.

6.1 Software update

Software updates will be provided to add support for additional measurement principles, new KROHNE devices or other languages. Furthermore they can integrate additional features, improvements or bug fixes.

These updates can be obtained via
1. the "Check for updates" button on the "About" page in the OPTICHECK application or
2. the KROHNE Downloadcenter at the KROHNE website (http://krohne.com/en/dlc).

6.2 Calibration of the verification box

The verification box must be calibrated annually. Otherwise, proper measurement results and thus verification results cannot be guaranteed. Please contact KROHNE for calibration service.

The recalibration date can be found as sticker on the backside of the verification box. The date is also printed on page "Start" in the PC application.

Figure 6-1: Example of calibration sticker (next calibration in July 2016)

For calibration and inspection please send back the complete OPTICHECK (incl. tablet, cables and suitcase).

6.3 Spare parts

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

The following table shows spare parts available for OPTICHECK:

Part number	Description
Cables	
XG16010020	Cable-4P-2950-USB-BLUE
XG16010021	Cable-4P-450-GDC-GREEN
XG16010022	Cable-12P-700-I/O-RED
XG16010023	Cable-9P-450-Phoenix-RED
XG16010072	Cable-19P-1000-Sensor-BLACK
Adapters	
XG16010018	Parking card I/O
XG16010073	Adapter interface OPTISWIRL
XG16010074	Adapter interface IFCXX0
XG16010075	Adapter interface IFC050
XG16010070	Adapter XFC300/400 IO
Tablet accessories (Panasonic FZ-G1)	
XG16010063	Tablet 10" Rugged (Panasonic)
XG16010062	Power supply for rugged tablet - Europe (Panasonic)
XG16010065	X-handstrap (Panasonic)
XG16010066	Display foil 10" (Panasonic)
XG16010076	Power cable Italy (Panasonic)
XG16010077	Power cable US (Panasonic)
XG16010078	Power cable Australia (Panasonic)
XG16010079	Power cable UK (Panasonic)
XG16010060	Battery 10.8 V 4400 mAh (Panasonic)
XG16010061	Battery 10.8 V 9300 mAh (Panasonic)
XG16010064	Pen for Touchpad (Panasonic)
XG16010068	Tether/cord for pen (Panasonic)
XG16010067	Desktop cradle for tablet (Panasonic)
Suitcase	
XG16010011	Hard case 480x185x390 with inserts and shoulder belt
XG16010012	Shoulder belt 1200x 40
XG16010013	Case insert bottom (OPTICHECK V1/2)
XG16010014	Case insert lid
XG16010080	Case insert bottom (OPTICHECK V3)

Part number	Description
XG16010081	Case insert protection (OPTICHECK V3)
XG16010082	Case insert U-adapter (OPTICHECK V3)

6.4 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local sales office.

INFORMATION!
In case a verification fails or generates "Remark" as result you may consult KROHNE service to perform additional tests to confirm the actual status of the device under test in addition to the verification results.

6.5 Repairs

Repairs must be carried out exclusively by the manufacturer or the manufacturer authorised specialist companies.

6.6 Defect components

For waste management and environmental reasons, it is advised to send defect components back to the manufacturer – especially parts such as the tablet, its accumulator, the OPTICHECK verification box etc.

6.7 Returning the device to the manufacturer

6.7.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

WARNING!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

WARNING!
If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

6.7.2 Form (for copying) to accompany a returned device

CAUTION!
To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:
Department:		Name:
Tel. no.:		Fax no. and/or Email address:
Manufacturer's order no. or serial no.:		
The device has been operated with the following medium:		
This medium is:		radioactive
		water-hazardous
		toxic
		caustic
		flammable
		We checked that all cavities in the device are free from such substances.
		We have flushed out and neutralized all cavities in the device.
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.		
Date:		Signature:
Stamp:		

6.8 Disposal

LEGAL NOTICE!
Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

7.1 Technical data

INFORMATION!

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

Design

Product contents	The OPTICHECK verification system consists of a verification box and connection cables included in a suitcase. It is available with or without a rugged tablet.
Compatibility for electromagnetic flowmeters	
Compact version	IFC 050, IFC 070, IFC 100 & IFC 300 signal converters
Field version	IFC 070 & IFC 300 signal converters
Wall version	IFC 050, IFC 100 & IFC 300 signal converters
19" rack version (28 TE)	IFC 300 signal converter
Flow sensors	OPTIFLUX, TIDALFLUX & WATERFLUX series
Compatibility for mass flowmeters	
Compact version	MFC 300 & MFC 400 signal converters
Field version	MFC 300 & MFC 400 signal converters
Wall version	MFC 300 signal converters
19" rack version (28 TE)	MFC 300 signal converters
Flow sensors	OPTIMASS series
Compatibility for vortex flowmeters	
Compact version	VFC 200 signal converter
Flow sensors	OPTISWIRL series
Compatibility for radar level meters	
Compact version	RLC 400 signal converter
Level sensors	OPTIWAVE series
Calibration	
Standard	Factory calibrated
Period	Annual calibration

Specifications of operating system

Windows 7	32 / 64 bit
Windows 8 / 8.1	32 / 64 bit (except RT)
Windows 10	32 / 64 bit
Proper functionality of OPTICHECK is guaranteed if the included tablet is used. Other combinations of tablet / laptop and Windows operating systems should work very likely, but proper functionality cannot be guaranteed.	
Report output	
PDF	To display a generated certificate / report, a PDF reader is required (e.g. Adobe Acrobat Reader).
Printing	A printer is required to print the generated certificate / report.

Rugged tablet Panasonic FZ-G1 (optional)	
AC/DC adapter	Input: 100...240 VAC
	Output: 16 VDC, 4.06 A
Battery pack	Lithium ion (11.1 V, 4200 mAh)
Water and dust resistance	IP65
Vibration and shock resistance	MIL-STD-810G

Operating conditions

Temperature	
Ambient and operating temperature	-20...+50°C / -4...+122°F
Storage temperature	-20…+60°C / -4…+140°F
Relative humidity	0...90%, non-condensing
Other conditions	
Duration of a verification	< 10 minutes (level 0, 1 & 2)

Installation conditions

Installation	Always secured with strapped band.
Dimensions	
Nominal size	204 mm x 137 mm x 68 mm / 8.3" x 5.4" x 2.7"
Nominal weight	0.905 kg / 2 lb
Dimensions suitcase	490 mm x 185 mm x 390 mm / 19.3" x 17.3" x 15.4"

Electrical connections

GDC	Connection cable with green marking
I/O	Connection cable with red marking
	I/O adapter for IFC 100 and MFC 300/400
	Standard: wire-end sleeve
	Variant 1: Phoenix connectors
	Variant 2: IFC 050 specific connectors
Flow sensor	Connection cable with black marking
	Adapters: Variant 1: Sensor adapter for IFC 050 Variant 2: Sensor adapter for IFC 070 / IFC 100 / IFC 300 Variant 3: Sensor adapter for VFC 200
USB	Cable with blue marking
	USB 2.0, 500 mA
	Connection to a passive USB hub is not recommended.

Approvals and certificates

CE	This device fulfils the statutory requirements of the relevant EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.
	For full information of the EU directives & standards and the approved certifications, please refer to the EU declaration of conformity or the manufacturer website.

KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

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www.krohne.com

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