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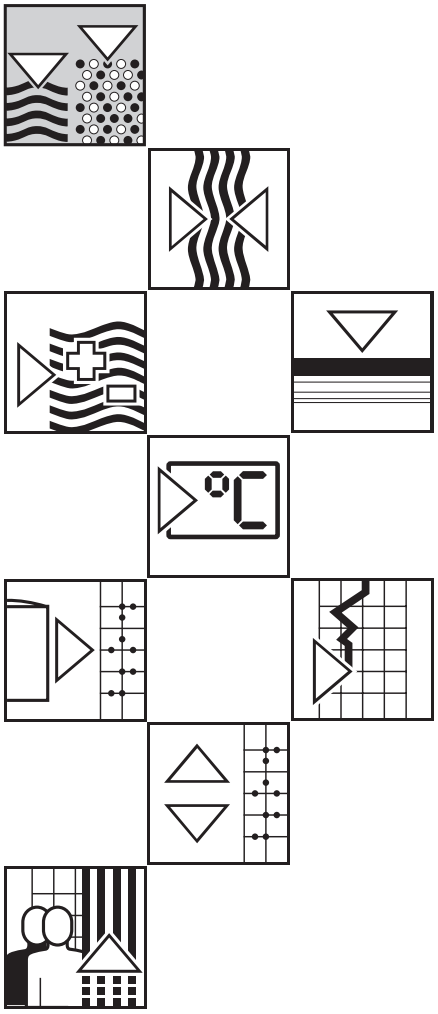
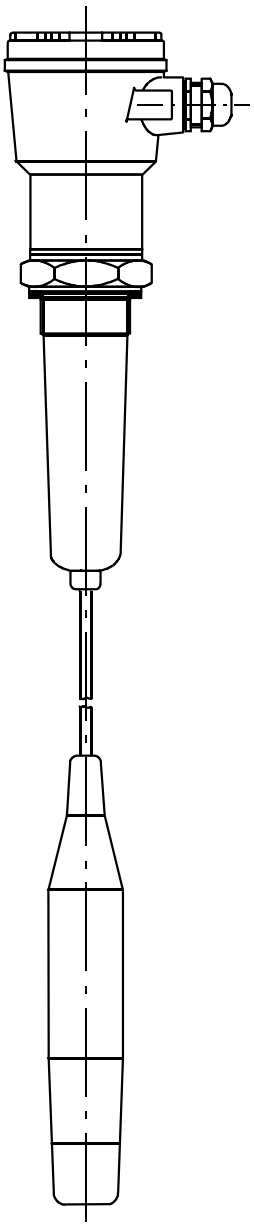
nivocompact
FTC 831
Level Limit Switch

Installation and Operating Manual





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Contents

Application

The Nivocompact FTC 831 is used for limit detection in silos containing bulk solids (for minimum or maximum indication).
Also for use in the food processing industry.
For mounting in silos from above.

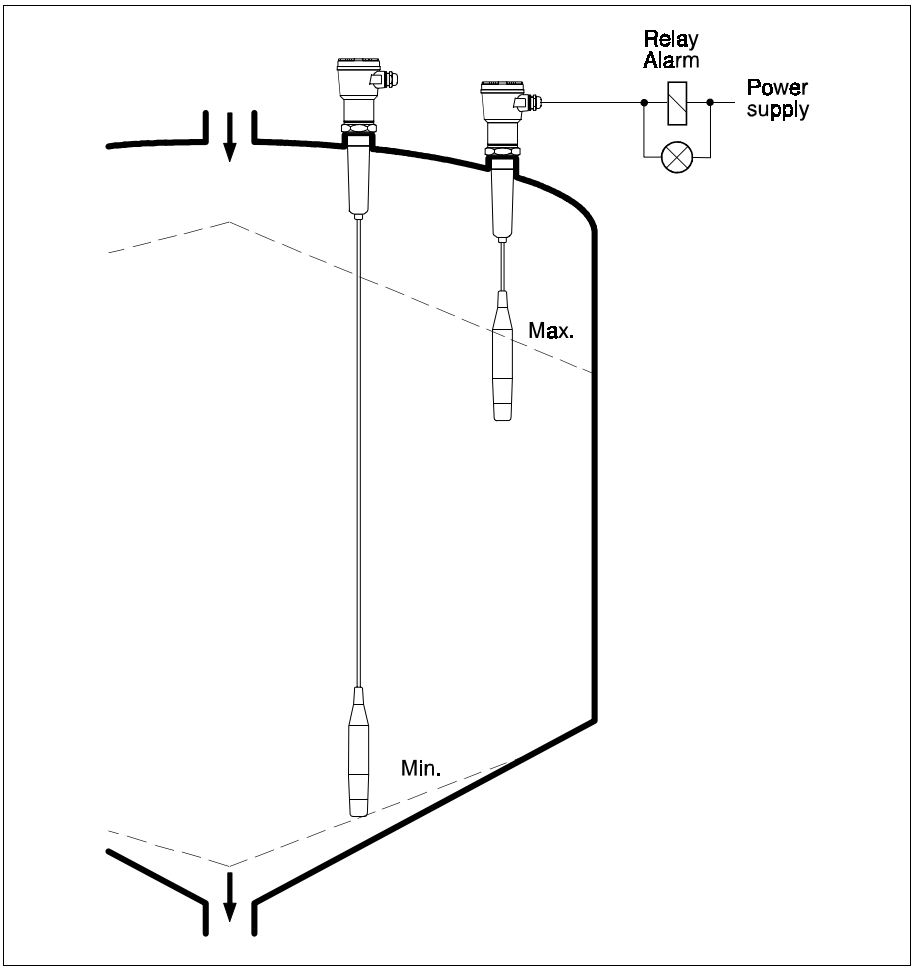


Fig. 1
Limit detection in bulk solid silos with the capacitive level limit switch Nivocompact FTC 831.

Application Examples

Lime	Kaolin	Grain	Spices
Plaster	Plastic	Flour	Semolina
Cement	granulates		Fodder

and similar bulk solids

Note:
Bulk solids should have dielectric constants $\varepsilon_r \geq 1.6$.

Please contact us for advice if the dielectric constant of the bulk solid is not known.

Technical Data

Operating Data

- Operating temperature in silo: –20 °C…+60 °C
- Operating pressure p_e in silo: up to 6 bar
- Max. permissible load on probe: 2500 N vertical
- Grain size of bulk solid: up to approx. 10 mm
- Minimum dielectric constant ε_r of material: 2.0 (factory-set, no adjustment required)
- Minimum adjustment of dielectric constant ε_r for bulk solid: 1.6
- Ambient temperature for housing: –20 °C…+60 °C
- Storage temperature: –40 °C…+85 °C

Probe

- Construction: rope probe with electronics at end of probe
- Process connection: parallel thread G $1^1/_2$ A acc. to DIN ISO 228/I
- Process connection material: glass-fibre reinforced polyester (PBTP)
- Probe material: reinforced steel wire mesh and electronics with PE coating
- Insulation from material: fully insulated

Probe Length Tolerances

Probe length	Tolerance
up to 1 m	+0 mm, –5 mm
up to 3 m	+0 mm, –10 mm
up to 6 m	+0 mm, –20 mm
up to 20 m	+0 mm, –30 mm

Housing Versions

- Aluminium housing, IP 55
- Aluminium housing, IP 66
- Aluminium housing with synthetic coating, IP 66
- Synthetic housing in PBTP, IP 66 (Protection IP… acc. to DIN 40050)

Cable Gland

- Housing IP 55: standard PG in nickel-plated brass with NBR gasket for cable diameter 7…10 mm.
- Housing IP 66: water-tight PG in polyamide with Neoprene-CR gasket for cable diameter 5…12 mm

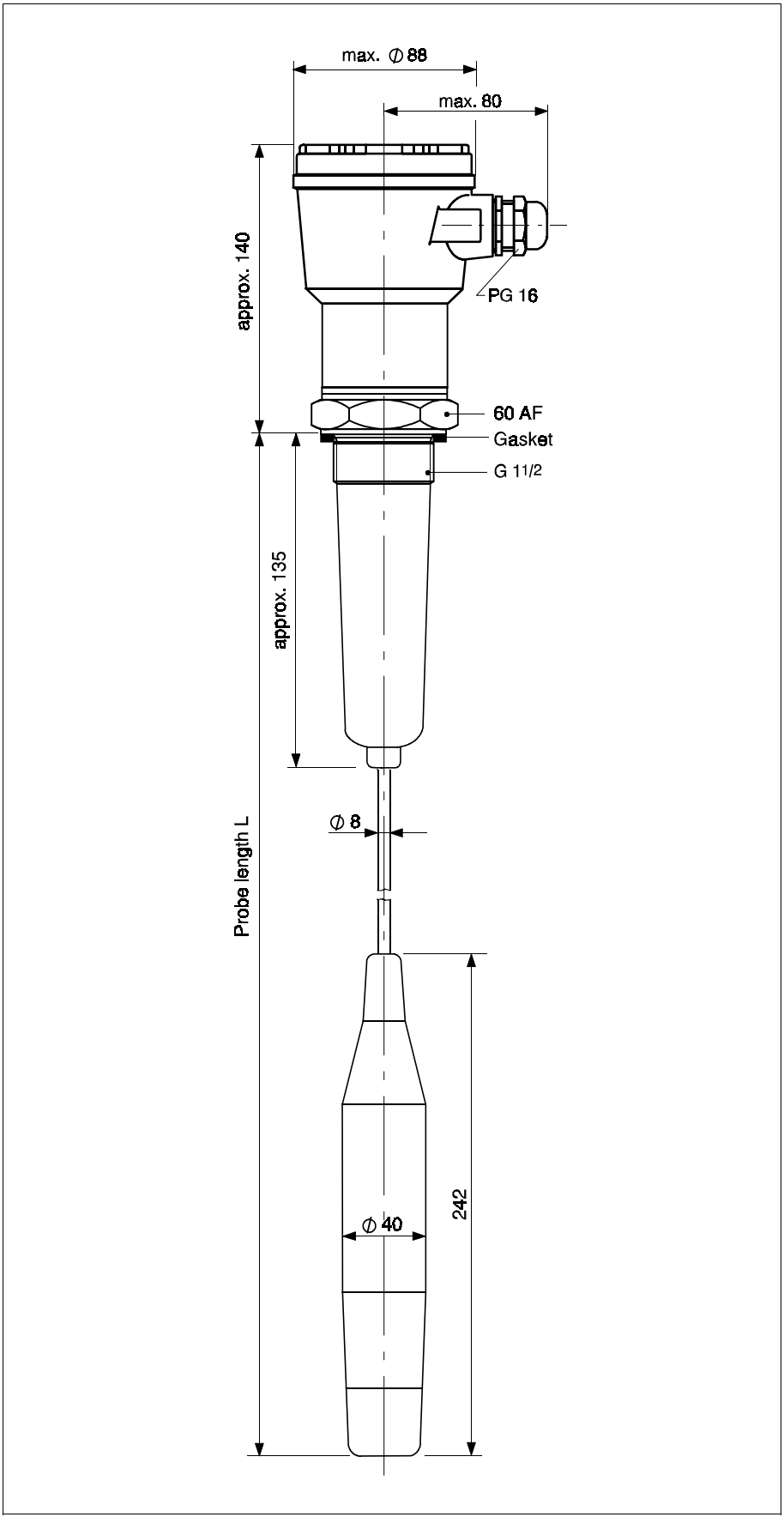


Fig. 2
Dimensions Nivocompact FTC 831

Electronic Inserts

- Terminal connections: for max. 2.5 mm^2
- Measuring frequency: approx. 1.6 MHz
- Switching delay: approx. 0.5 s…approx. 20 s, selectable
- Minimum/maximum fail-safe switching: selectable with rotary switch
- Switching indication: red LED

Electronic Insert EC 40 for AC (Two-Wire Connection)

- Power supply U~: 21 V…250 V, 50/60 Hz
- Connected loads, short-term (max. 40 ms): max. 1.5 A; max. 375 VA at 250 V; max. 36 VA at 24 V
- Maximum voltage drop: 11 V
- Connected loads, continuous: max. 350 mA; max. 87 VA at 250 V; max. 8.4 VA at 24 V
- Minimum load current at 250 V: 10 mA (2.5 VA)
- Minimum load current at 24 V: 20 mA (0.5 VA)
- No-load current (rms): < 5 mA

Electronic Inserts EC 42, EC 43 for DC (Three-wire Connection)

- Power supply U =: 10 V…55 V
- Superimposed AC voltage U_{pp}: max. 5 V
- Current consumption: max. 15 mA
- Load connection: Open Collector; PNP (EC 42) or NPN (EC 43)
- Switching voltage: max. 55 V
- Connected load, short-term (max. 1 s): max. 1 A
- Connected load, continuous: max. 350 mA
- Residual current with transistor blocked: < 100 µA
- Protected against reverse polarity

Electronic Insert EC 44 for DC and AC (Relay Output)

- Power supply U =: 20 V…200 V
  or
  Power supply U~: 21 V…250 V, 50/60 Hz
- Current consumption (rms): max. 5 mA
- Peak inrush current: max. 200 mA, max. 5 ms
- Pulse current: max. 50 mA, max. 5 ms
- Pulse frequency: approx. 1.5 s
- Output: potential-free change-over contact
- Contact load capacity:
  U~ max. 250 V, I~ max. 6 A,
  P~ max. 1500 VA (cos φ = 1) or P~ max. 750 VA, (cos φ ≥ 0.7)
  U = max. 250 V, I = max. 6 A, P = max.200 W
- Operating life: min. 10^5 switchings at max. contact load
- Additional switching delay: max. 1.5 s

Type Key

See Page 11 for order specification key and order code.

EMC

Electromagnetic compatibility:
- Interference Emission to EN 61326, Electrical Equipment Class A
- Interference Immunity to EN 61326
- EMC Test Procedures see TI 241F/00/en

Subject to modification

- Gasket for thread G $1^1/_2$ A;
  elastomer/fibre (asbestos-free) supplied

- Protective sun cover for aluminium housing
  Material: polyamide

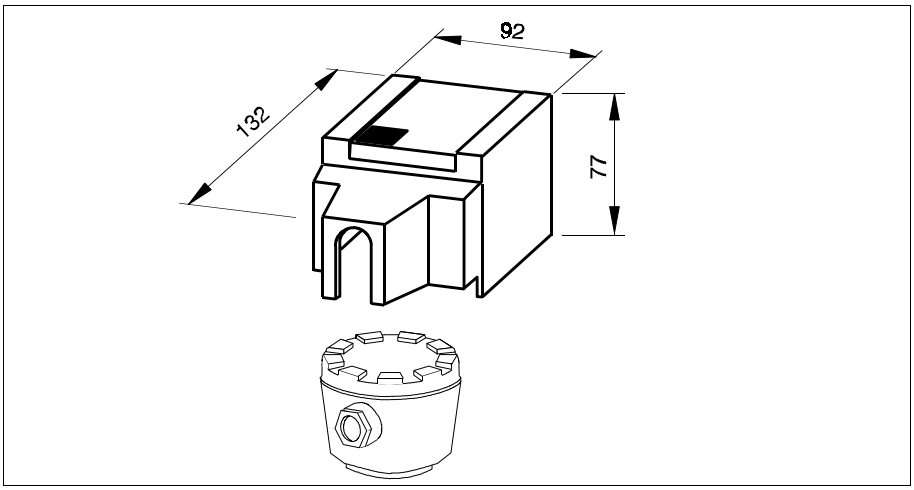


Fig. 3
Dimensions of protective sun cover (accessory).
This cover prevents condensation in the housing.

Accessories

The Measuring System

The Nivocompact is an electronic switch.
The entire measuring system consists of:
- Nivocompact FTC 831
- power supply and
- connected control systems, switches, signal transmitters (e.g. process control systems, PLC, relays, microcontactors, lamps, sirens etc.).

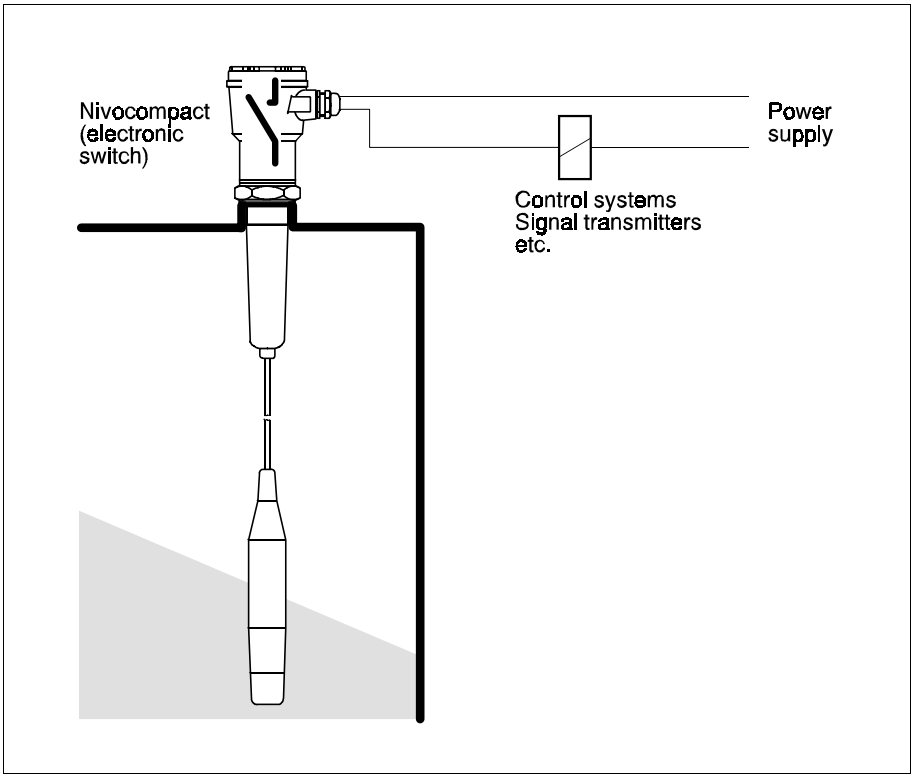


Fig. 4
The measuring system.

Function

A metal plate at the end of the probe, inside the insulation, and the area around it (e.g. silo wall) constitute the two electrodes of a capacitor with a high frequency voltage between them.
The limit value is based on the principle of a discharge circuit.
As long as the end of the probe is in air with a dielectric constant of $\varepsilon_r = 1$, then the discharge time constant is $\tau = R \times C_A$ where R is the resistance of the circuit and C_A the capacitance of the capacitor formed by the probe end and its surroundings.
If a material with a dielectric constant $\varepsilon_r \geq 2.0$ moves into the HF electrical field at the end of the probe, then the capacitance C_A increases and with it the time constant τ.
This change in the time constant is evaluated and the Nivocompact FTC 831 is activated according to its switching mode.

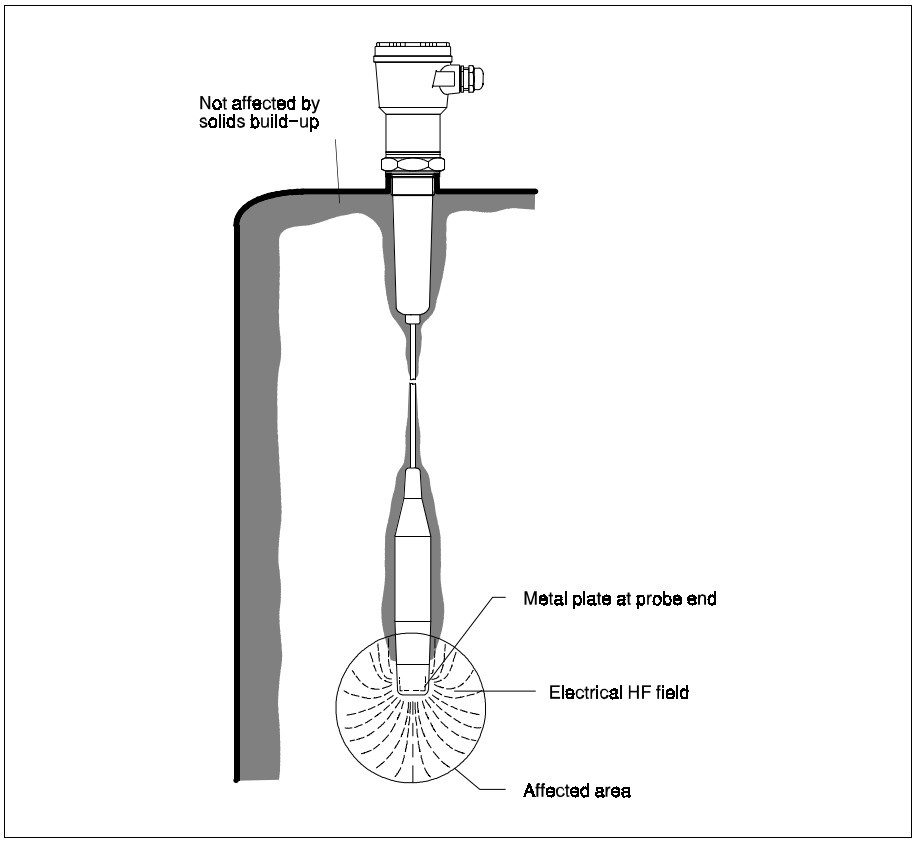


Fig. 5
The operation of the Nivocompact FTC 831 with rope probe is totally unaffected by material build-up on the walls of the silo.

Safety Switching

The built-in feature for minimum/maximum fail-safe switching allows the Nivocompact to be used in all applications requiring high operational safety:

Maximum Fail-Safe:
The circuit is blocked if the probe is covered
or the power supply fails.

Minimum Fail-Safe:
The circuit is blocked if the probe is uncovered
or the power supply fails.

A red LED on the electronic insert indicates the switching status.

See also Fig. 16 in Section »Safety Switching«, Page 20.

Installation

Project Planning

Material of the Silo

The Nivocompact FTC 831 can be installed in silos made of different materials (e.g. metal, plastic, concrete).

Installation Point

Note the angle of material flow or the outlet funnel when determining the measuring point.

The Nivocompact switches (also with bulk solids with very small dielectric constants) when the probe end is covered by a few centimetres of material or when the material drops a few centimetres below the probe end.

The filling curtain should not be directed onto the probe.

Minimum Distance

The minimum distance of 500 mm between the probe ends of two Nivocompact FTC 831 instruments must be maintained to ensure that there is no mutual interference, this also applies to all FTC 831 probes which are mounted next to one another in silos with non-conducting walls.
The distance from the probe end of an FTC 831 to the probe end of an FTC 731 must also be at least 500 mm.

The distance from the probe end of a Nivocompact FTC 831 to the silo wall or to any material build-up must be at least 200 mm. To ensure that no error switching occurs when the probe swings slightly, the distance of the probe to the silo wall should be correspondingly greater, especially with pneumatic conveying systems.

Resistance to Load

With minimum detection, take note of the maximum load of the rope and the strength of the silo roof.
Very high tensile forces may occur at the material outlet especially with heavy powdery bulk materials which tend to form build-up.
These forces are significantly greater in the middle of the silo over the material discharge point than at the silo walls.

Installation in the Open

The protective sun cover available as an accessory protects the Nivocompact with the aluminium housing from excessive temperature and from condensation which may form in the housing due to large temperature variations.

Examples for Mounting

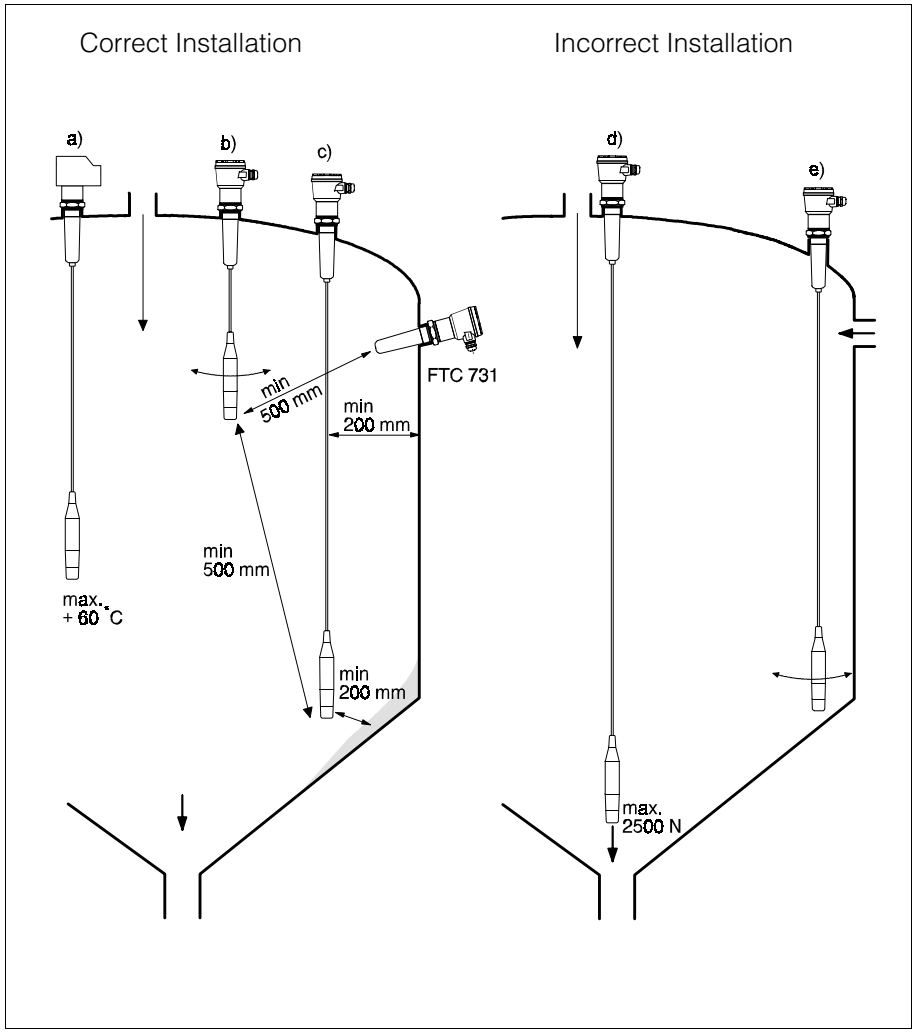


Fig. 6
Noting the information given will prevent errors when installating the instrument.

Correct Installation

a) Protective sun cover for mounting in the open.
b) Sufficient distance from the material inlet and to the next probe.
c) Sufficient distance to the silo wall and to material deposited on the silo wall.

Incorrect Installation

d) When mounted near the centre of the outlet, the high tensile forces present at this point may damage the probe or subject the silo roof to excessive strain.
e) Too near the silo wall.
When swinging gently, the probe can hit the wall or touch any build-up which may have formed. This can result in error switching.
Inflowing material can damage the probe
There is the danger of static electricity building up.

Mounting

Tools Required for Mounting

- Open-end spanner 60 AF
- Screwdriver, blade width 5...6 mm or
  Phillips screwdriver PZD 2

Preparation

Compare the order code on the nameplate of your instrument with the order specification key to ensure that the correct instrument is being installed.

FTC 831 capacitive level limit switch with rod probe

Probe
1 …mm probe length
Probe lengths from 500 to 20000 mm, selectable
2 2500 mm (basic length, can be shortened)
6 6000 mm (basic length, can be shortened)
9 Others - check special version

Housing
A Aluminium housing, IP 55
B Aluminium housing, IP 66
R Aluminium housing, coated, IP 66
K PBTP synthetic housing, IP 66
Y Others - check special version

Electronic Insert (mounted in housing)
1 21 V…250 V, 50/60 Hz (EC 40)
Two-wire AC connection
2 PNP 10 V…55 V= (EC 42)
Three-wire DC connection
3 NPN 10 V…55 V= (EC 43)
Three-wire DC connection
4 Relay, 21 V…250 V AC/200 V= (EC 44)
AC or DC connection
with relay output (change-over contact)
9 Others - check special version

FTC 831 | | | | **Order code on nameplate**

Check that the probe is the correct length for the installation point and application.
The length of the Nivocompact FTC 831 probe at delivery is stated on the nameplate.
The probe may be shortened if it is too long. Refer to Section: »Shortening the Cable« at the end of this manual.

Screwing In

- Place the elastomer/fibre gasket which is supplied against the sealing surface of the Nivocompact. (Do not apply sealing material around the thread!)
- Straighten out the cable at the lower end.
- Feed the cable carefully through the threaded boss making sure that the insulation is not damaged.
- When screwing in the Nivocompact, turn the instrument by the 60 AF nut only!
- If the instrument will not turn easily, then slightly cut into the thread of the boss.
- A torque of 80 Nm…100 Nm is normally sufficient to produce a reliable seal to withstand pressures up to 6 bar.
  A torque of more than 120 Nm will destroy the plastic thread.

Rotating the Housing

The housing can be rotated if the cable gland is facing in the wrong direction after the Nivocompact has been securely screwed in:

Loosening
- Unscrew and remove the housing cover.
  In the housing are 2 four-pole connections which are required if the cable needs to be shortened. These should be kept in a safe place.
- Loosen the central screw in the electronic insert.
- Remove the plug-in electronic insert from the housing using the handle.
- Slightly loosen the 3 screws in the housing, see Fig. 7.

Rotating
- The housing can now be rotated through 360°.

Tightening
- Tighten up the 3 screws in the housing so that the housing is well sealed at the hexagonal nut.
- Insert the electronic insert in the plug.
- Securely tighten the central mounting screw while making sure that the cable gland remains free.

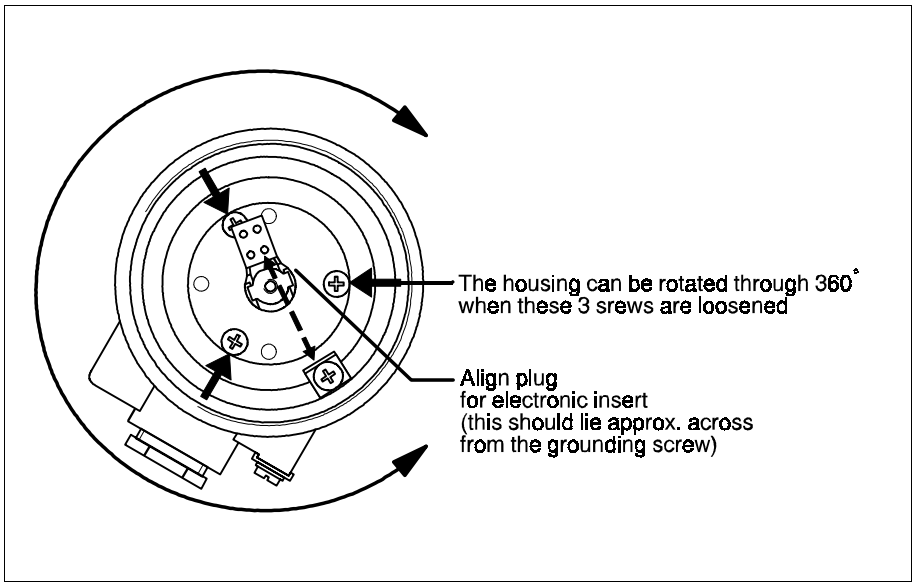


Fig. 7
Loosening and rotating the housing.

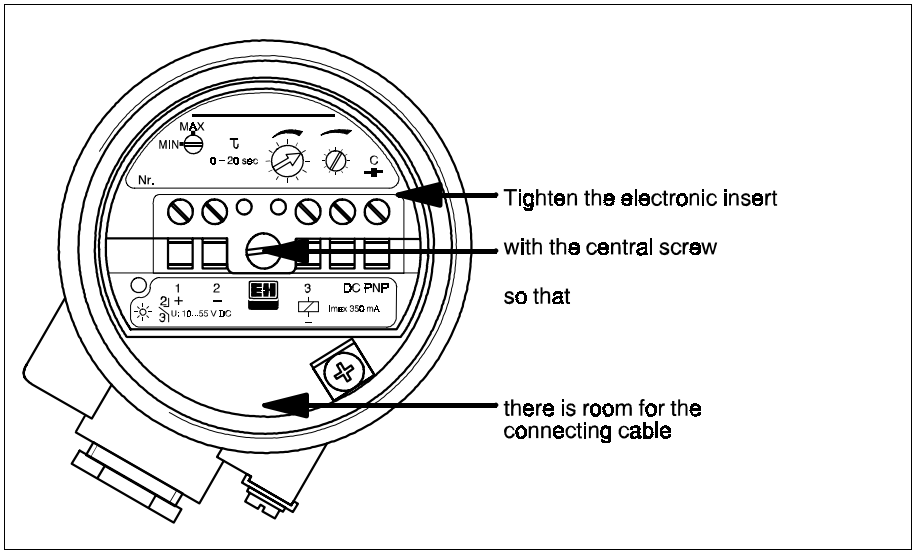


Fig. 8
Securing the electronic insert.

Connection

Wiring Connection

Main Features of the Different Electronic Inserts

The last number of the order code on the nameplate identifies which type of electronic insert is mounted in the Nivocompact FTC 831:

1=Electronic insert EC 40
Two-wire AC; voltage: 21 V…250 V
Electronic switch, max. 350 mA

2=Electronic insert EC 42
Three-wire DC; voltage: 10 V…55 V
Transistor circuit, load connection PNP, max. 350 mA

3=Electronic insert EC 43
Three-wire DC; voltage: 10 V…55 V
Transistor circuit, load connection NPN, max. 350 mA

4=Electronic insert EC 44
with potential-free relay output
AC power supply 21 V…250 V or
DC power supply 20 V…200 V

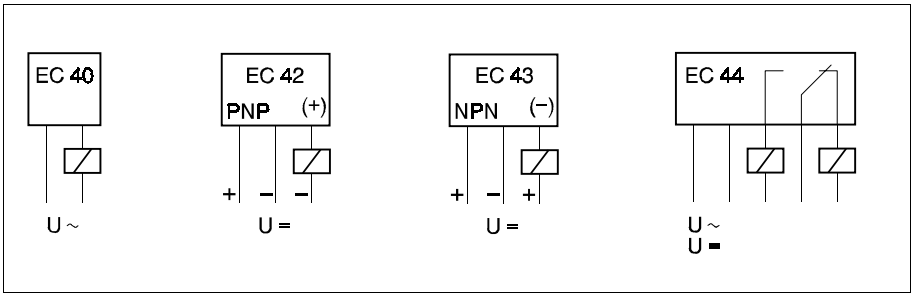


Fig. 9
Electrical connections available with the different electronic inserts

Load Limit Values

Note the limit values of the loads to which you want to connect the Nivocompact. Exceeding the load can destroy the electronic insert (or the relay contact in the EC 44).

Fuse

Ensure that the rating of the fine-wire fuse corresponds to the maximum load to be connected.
The fine-wire fuse does not protect the electronic insert of the Nivocompact FTC.

Diameter of Wiring

Because of the small current used, only small diameter cabling is required. Low-cost cabling with diameters of 0.5 mm^2 to max. 1.5 mm^2 is recommended.

Earth Connection, Grounding

The Nivocompact must be grounded to give reliable operation free from interference. This is done by either connecting it to a grounded silo with metal or reinforced concrete walls or else to the earth conductor PE.
The probe requires a good counter potential which is achieved by connecting the ground connection on the outside of the housing to an electrically conductive part of the silo.
If the silo is made of non-conductive material, then connect conductive and grounded components near to the silo to the ground connection.
The connecting cable should be as short as possible.

Connecting the Nivocompact with Electronic Insert EC 40 for AC (Two-Wire Connection)

Connecting in Series to a Load

The level limit switch Nivocompact with electronic insert EC 40 must be - like all switches - connected in series with the load (e.g. relays, microcontactors, lamps) to the power supply.

Direct connection to the power supply without any intermediate load connected (short-circuit!) will result in immediate and permanent damage to the electronic insert.

The load can be connected to Terminal 1 or 2 of the electronic insert. It is unimportant whether L1 is connected to Terminal 1 or 2.

Power Voltage

The voltage across Terminal 1 and 2 of the electronic insert must be correspondingly higher to compensate for the voltage drop across the connected load.

Load Cut off

Note that loads connected in series are not completely disconnected from the power supply if the electronic switch in the electronic insert of the Nivocompact »disconnects« (blocks) with level alarm.
Because of the current requirements of the electronics, a small »no-load current« still flows through the connected load.
When the load is a relay with a very small retaining current, it is possible that the relay does not de-energise. In this case connect an additional load in parallel to the relay, e.g. a resistor or signal lamp.

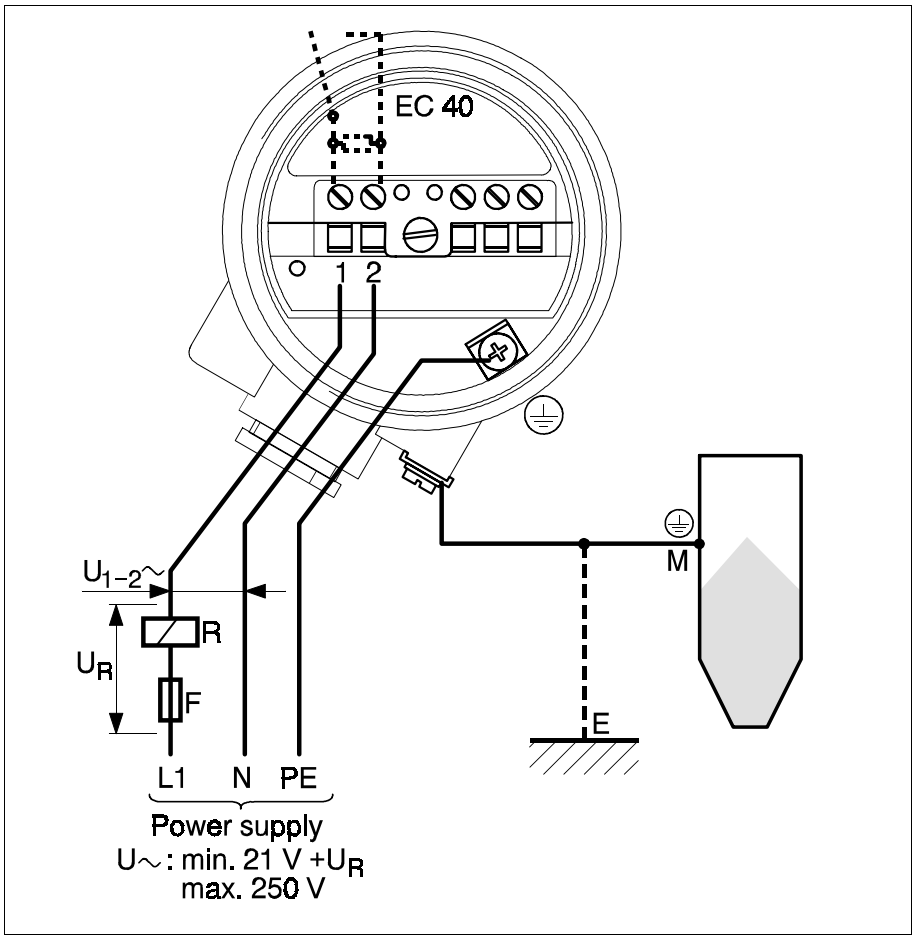


Fig. 10
Connecting the Nivocompact FTC 831 with electronic insert EC 40

$U_{1-2}\sim$: 21 V...250 V across Terminals 1 and 2 of the EC 40
R: Connected (external) load, e.g. relay
F: Fine-wire fuse, load-dependent
U_R: Voltage drop across the load and the fine-wire fuse
M: Ground connection to silo or metal parts near to the silo
E: Grounding

Connecting the Nivocompact with Electronic Insert EC 42 (Three-Wire PNP) for DC

Transistor Circuit for Load

The load connected to Terminal 3 is switched by a transistor, contactless and therefore without bounce.

Terminal 3 has a **positive** signal in normal switching mode.

The transistor is blocked on level alarm or with a power failure.

Protection Against Voltage Peaks

Connecting to an instrument with a high inductance:
a voltage limiter should be connected.

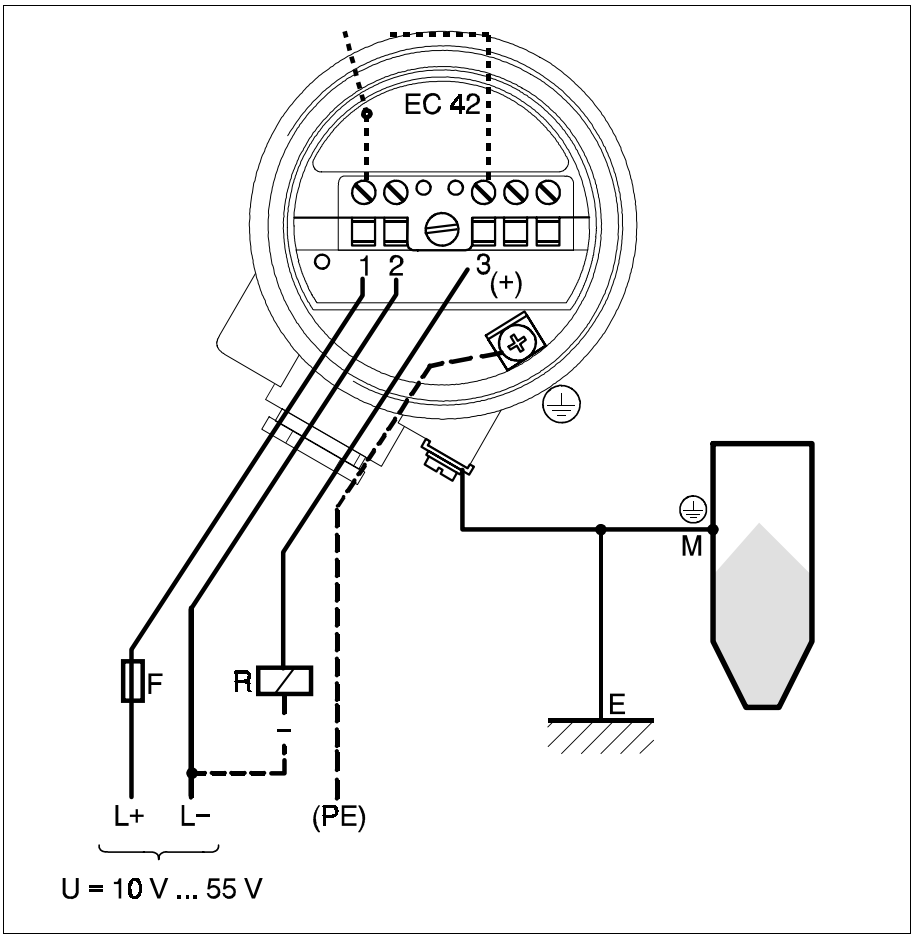


Fig. 11
Connecting the Nivocompact with electronic insert EC 42 (PNP connection)

F: Fine-wire fuse, load-dependent
R: Connected load, e.g. PLC, PCS, relay
M: Ground connection to silo or metal parts near to the silo
E: Grounding

Connecting the Nivocompact with Electronic Insert EC 43 (Three-Wire NPN) for DC

Transistor Circuit for Load

The load connected to Terminal 3 is switched by a transistor, contactless and therefore without bounce.

Terminal 3 has a **negative** signal in normal switching mode.

The transistor is blocked on level alarm or with a power failure.

Protection Against Voltage Peaks

Connecting to an instrument with a high inductance:
a voltage limiter should be connected.

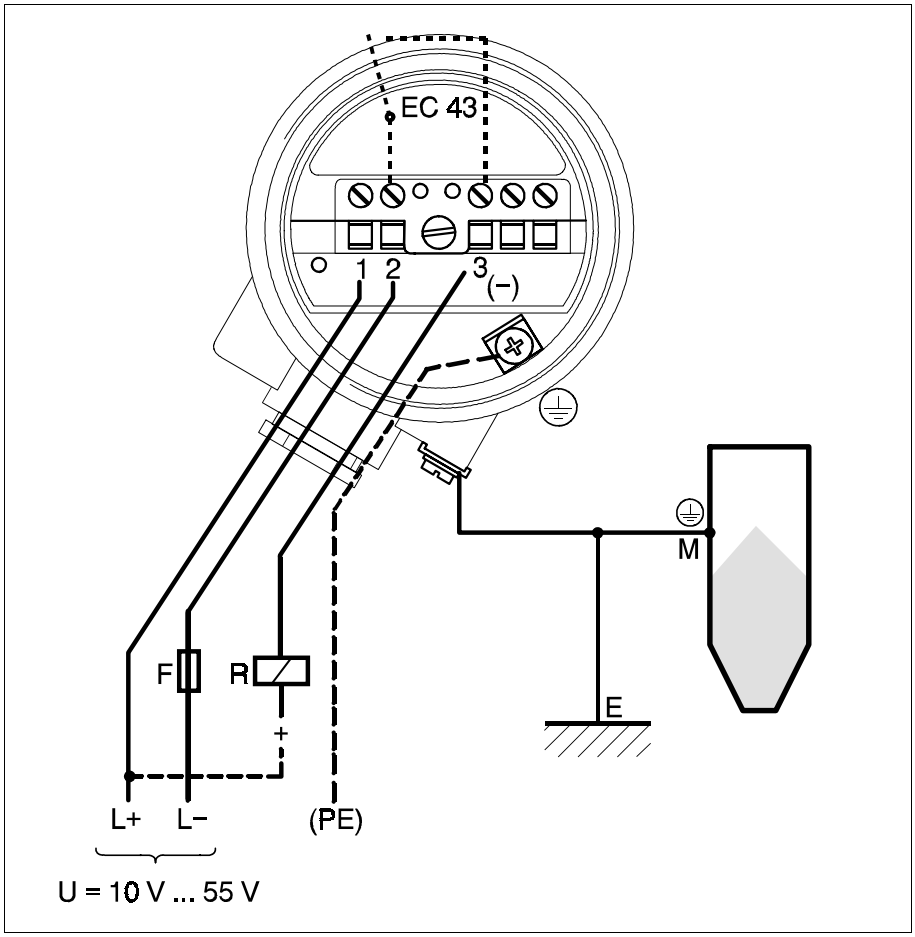


Fig. 12
Connecting the Nivocompact with electronic insert EC 43 (NPN connection)

F: Fine-wire fuse, load-dependent
R: Connected load, e.g. PLC, PCS, relay
M: Ground connection to silo or metal parts near to the silo
E: Grounding

Connecting the Nivocompact with Electronic Insert EC 44 (Relay output) for DC and AC

Power Supply

With AC, it is unimportant whether L1 or N is connected to Terminal 1.
With DC, it is unimportant whether L+ or L– is connected to Terminal 1.

Relay Contact for Load

The load is connected over a potential-free relay contact (change-over contact).
The relay contact breaks the connection between Terminal 3 and Terminal 4 on level alarm or with a power failure.

Protection Against Voltage Peaks and Short-Circuiting

Protect the relay contact by connecting a spark barrier to instruments with high inductance.
A fine-wire fuse (load-dependent) can protect the relay contact if a short-circuit occurs.

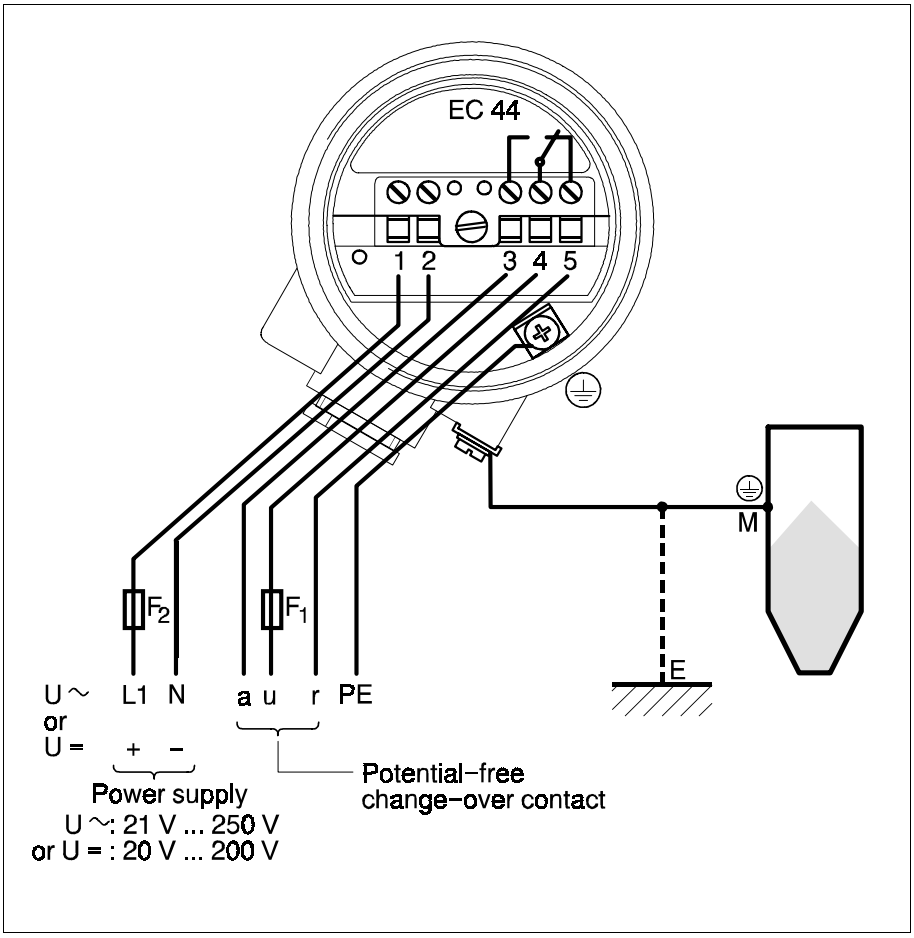


Fig. 13
Connecting the Nivocompact with electronic insert EC 44; (relay output)

F_1: Fine-wire fuse 200 mA, semi-time lag,
F_2: Fine-wire fuse to protect the relay contact, load dependent
M: Ground connection to silo or metal parts near to the silo
E: Grounding

Wiring On-Site

Tools Required for Connection

- Open-end spanner 22 AF
- Screwdrivers, blade width approx. 4 mm and approx. 7 mm or Phillips screwdrivers PZD 1 and PZD 2
- Common electrical tools

Before connecting, make sure that the power supply used is the same as that stated on the nameplate of the electronic insert.

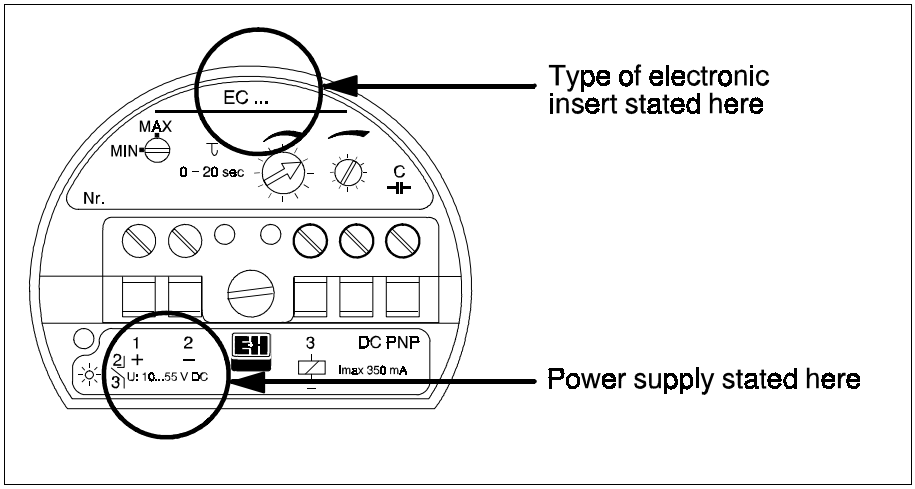


Fig. 14
Note the power voltage stated on the nameplate.

Electrical Connections

Connect the Nivocompact according to the appropriate diagram Fig. 10 to Fig. 13.

Ensure that no water gets into the housing while connecting up.

The gasket in the standard cable gland is designed for cable diameters from 7 mm to 10 mm.
A suitable gasket must also be used for other cable diameters.

You can seal with the "water-tight" cable gland with cable having diameters from 5 mm to 12 mm.

Ensure that there is a good **short ground connection** from the housing of the Nivocompact to the silo or to grounded metal parts near to the silo.

After Connecting

Screw in the thread of the cable gland securely to comply with the standards of Protection IP 55 or IP 66.

For applications in the open or in moist surroundings, sealing the standard cable gland with sealing compound is also recommended.
(This is not required with the »water-tight« cable gland).

Calibration

Tools Required for Calibration

- Screwdriver with blade width approx. 3 mm
- Screwdriver with blade width approx. 4 mm

The rotary switches and adjusting elements for calibration are on the electronic insert in the housing.
Directly beside these calibration elements are the power connections with voltages up to 250 V.
Use a screwdriver which has insulation as far as the blade only or else tape over the terminals with insulating tape before calibration.

Turn on the power supply.

Switching Delay

Set the switching delay to between approx. 0.5 s and 20 s. Refer to Fig. 15. The time interval is the same for the probe whether covered or uncovered. Select the optimum time for your particular application.

Scalar calibration can only be approximate as the function is not quite linear.

Exact calibration is possible by touching the uncovered probe (connection and calibration in the factory).

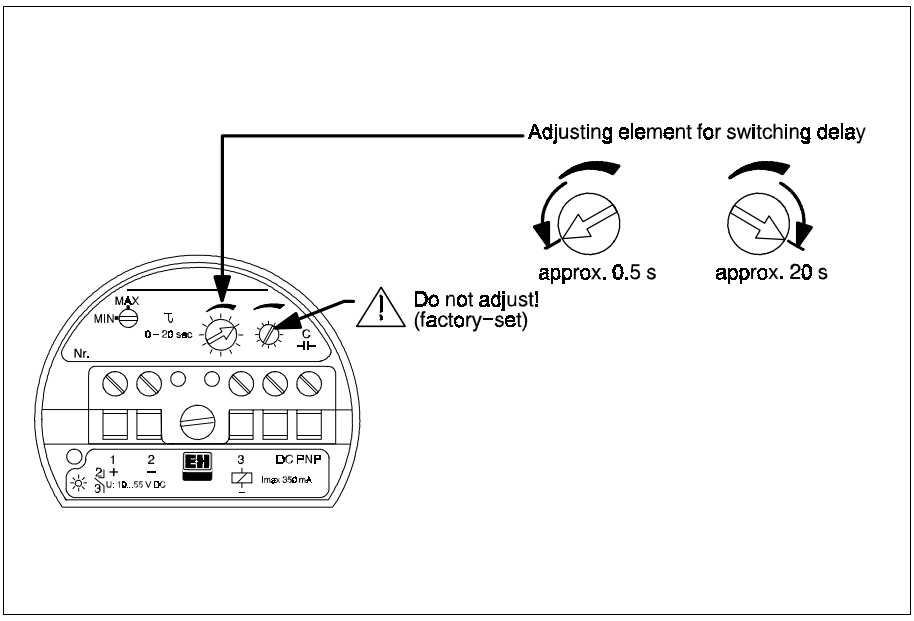


Fig. 15
Selecting the switching delay.

Safety Switching

By using the rotary switch, select the fail-safe mode for your particular application:

- Maximum fail-safe: The circuit is blocked if the probe is covered or the power supply fails.
- Minimum fail-safe: The circuit is blocked if the probe is covered or the power supply fails.

Changing the fail-safe mode also changes the LED status indication.

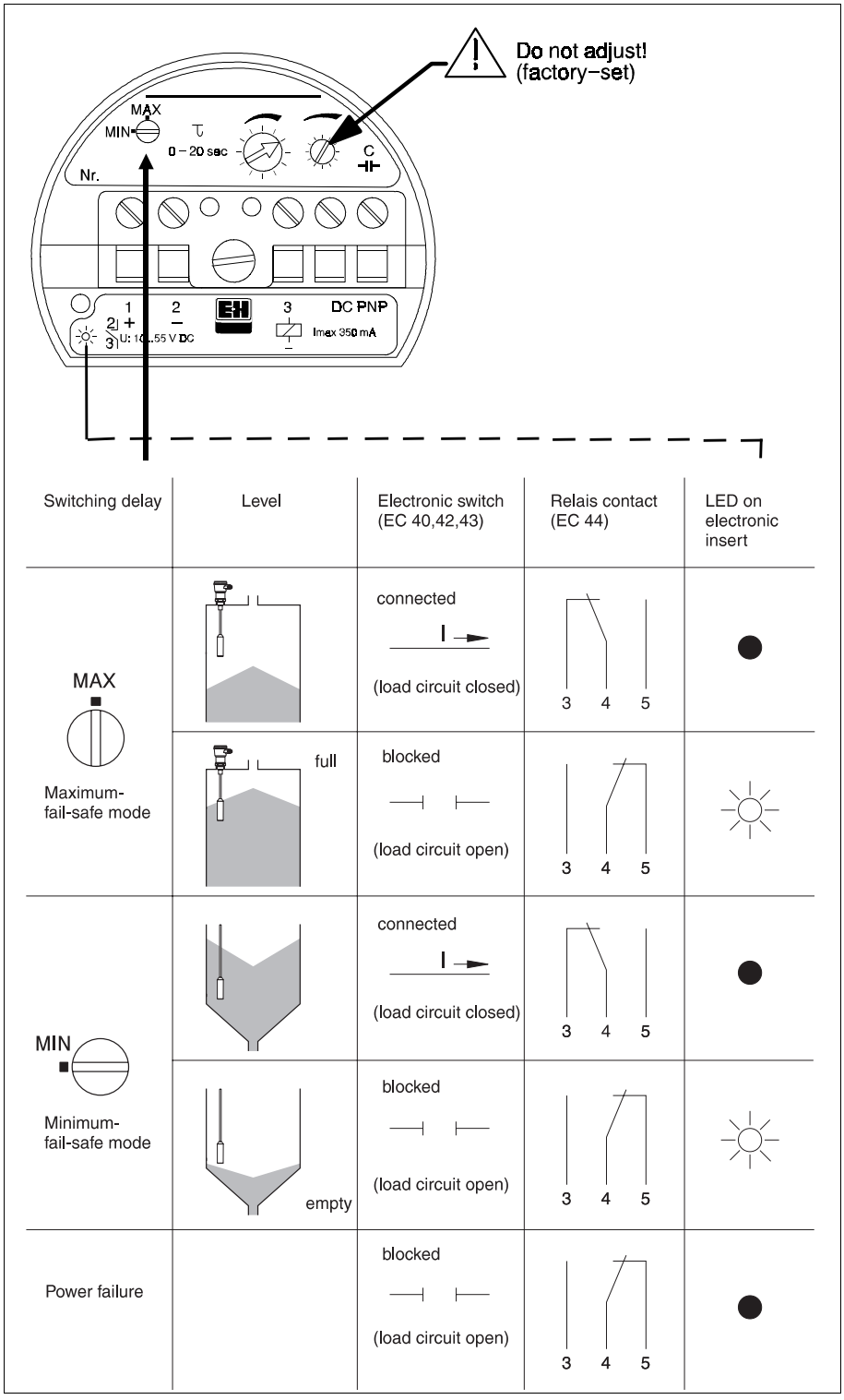


Fig. 16
Selecting the safety switching and function.

Special Applications

Capacitance Calibration (Changing Factory-Set Adjustment)

- When the dielectric constant ε_r of the material is smaller than 2.0, e.g. with plastic granulate, it may be necessary to change the factory-set value.
  Calibration is possible for $\varepsilon_r >$ 1.6.
- A change in the factory-set value may also be required if the minimum distances cannot be maintained.

For this calibration, the silo must be empty or the level must be at least 100 mm below the probe.
The adjuster for calibration is approx. 30 turns from one end of the range to the other.

Carry out the calibration according to the sequence of diagrams Fig. 17 to Fig. 19.

Capacitance Calibration, Initial Settings

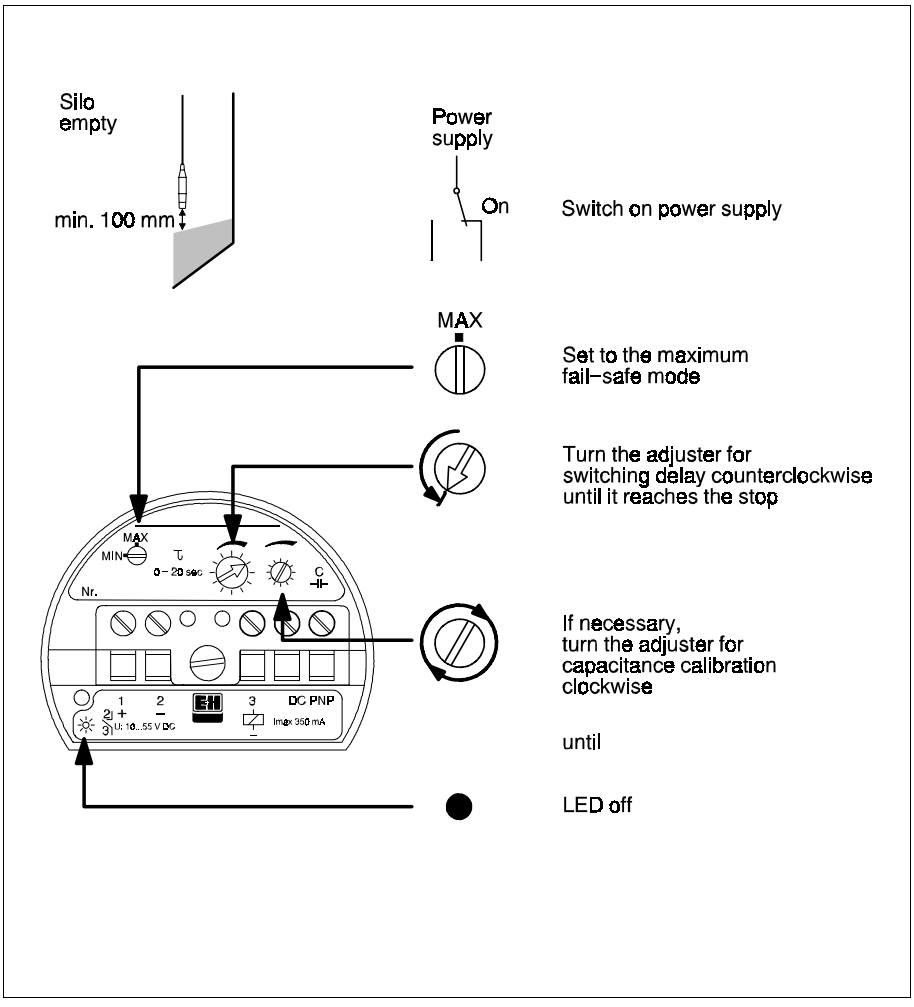


Fig. 17
These initial settings must be done before the capacitance calibration.

Determining the Switching Point

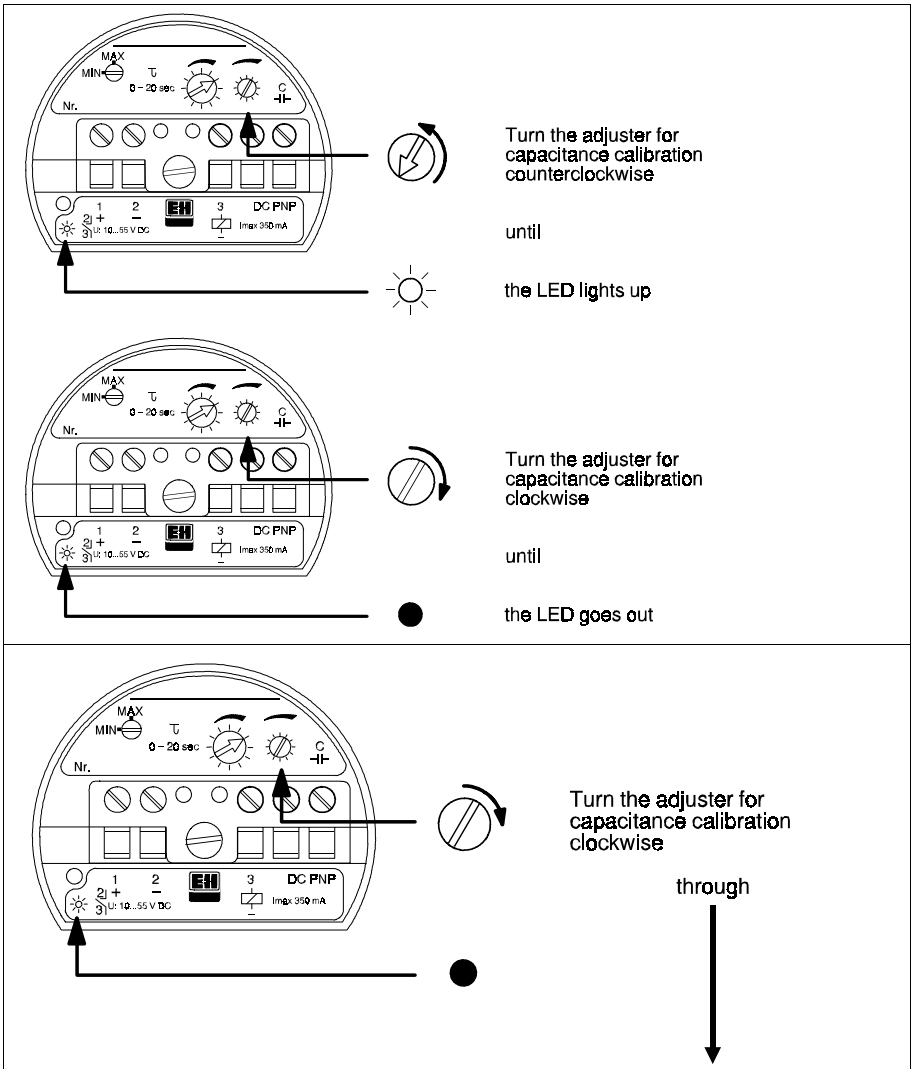


Fig. 18
The capacitance calibration must be carried out both slowly and carefully.

Adjusting for Material Characteristics

Material characteristics (bulk solid)

Very low dielectric constant ε_r approx. 1.6…2.0	No build-up	approx. 180° (4 divisions)
	With low build-up	approx. 270° (6 divisions)
Low dielectric constant ε_r approx. 2.0…2.5	No build-up	approx. 1 complete turn
	With low build-up	approx. $1^1/_2$ turns
Average dielectric constant ε_r approx. 2.5…4.0	No build-up	approx. $1^1/_2$ turns
	With low build-up	approx. 2 turns
High dielectric constant or conductive material	No build-up	approx. 2 turns
	With low build-up	approx. 4 turns

Fig. 19
Accurate adjustment ensures high switching reliability.

When the probe is covered with non-conductive bulk solid having a low dielectric constant, then the Nivocompact only switches when the rod is submerged in the material by several centimetres.
The degree of covering depends on the calibration.
Turning the fine calibrating element clockwise causes the Nivocompact to become less sensitive.

Do not Forget!

- Adjust the switching delay (refer to Page 19).
- Select the safety switching required (refer to Page 20).

Function Control

Check for correct operation of limit detection by increasing and decreasing the level in the silo at roughly the same height as the probe end.

Final Points

Screw the housing cover securely down after connection and calibration so that the standards comply to Protection IP 55 or IP 66.

For applications in the open, a protective sun cover (accessory) is to be used to cover the aluminium housing of the Nivocompact.

Maintenance

The capacitive level limit switch Nivocompact FTC 831 requries no maintenance when correctly installed and used properly under the normal conditions specified by the system.

When cleaning and checking the silo:
- Examine the probe to check for damage, especially to the cable.
- Remove any material build-up on the end of the probe

With initial but permanently low material build-up:
- Carry out another capacitance calibration after the material build-up if the Nivocompact does not switch correctly.

Ensure that the cable gland and housing cover are tight fitting so that no moisture can enter.

Troubleshooting

When an error is indicated, first check to make sure that
- The Nivocompact is properly connected
- Earthing and ground connection are correct
- A power supply exists at the terminals
- All instruments connected are operating correctly
- In the case of the electronic insert EC 40, the minimum required load of the connected instruments is at least present
- The correct fail-safe mode has been chosen
- The switching delay has been correctly set
- The capacitance calibration has been carried out correctly

Carry out a function control (see "Calibration")

Refer to the Error Tables, Fig. 20 and Fig. 21.

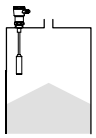
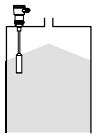
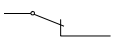
Error with maximum fail-safe mode 	Possible causes
Probe free (level below maximum)  but with  electronic switch blocked  LED on	- High material build-up at end of probe - Water in housing
Probe covered (level above maximum)  but with  electronic switch connected LED off	- Dielectric constant of the material too small - Different material used than calibrated for - Drier material used than calibrated for - Cable damaged

Fig. 20
Troubleshooting with maximum fail-safe mode.

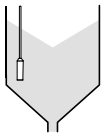
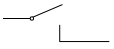
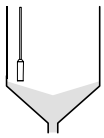
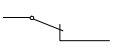
Error with minimum fail-safe mode 	Possible causes
Probe covered (level above minimum)  but with  electronic switch blocked LED on	- Dielectric constant of the material too small - Different material used than calibrated for - Drier material used than calibrated for - Cable damaged
Probe free (level below minimum)  but with  electronic switch connected LED off	- High material build up at end of probe - Probe end touching silo wall or residual material in the silo - water in housing

Fig. 21
Troubleshooting with minimum fail-safe mode.

Guarantee

Our guarantee terms are included with the documents which accompany delivery. Copies may also be obtained from the agent responsible.
Any modification carried out within the instrument during the guarantee period invalidates the terms of the guarantee.

Replacement of Parts

Replacing the Electronic Insert

Switch off all sources of power to the Nivocompact.

Removal

- Remove the electrical connections to the electronic insert.
- Loosen the central screw in the electronic insert.
- Lift out the electronic insert from the housing using the handle.

Insertion

- Push the new electronic insert carefully into the plug in the housing.
- Tighten the central screw.
- Connect up the electrical wires.

Calibration

- Switch on the power supply.
- Carry out a new capacitance calibration with an empty silo.
- Set the switching delay.
- Select the same fail-safe mode as it was for the previous electronic insert.
- Check operation.

Replacing the Probe

- Remove, install and connect in the same way as for shortening the cable, see Page 26.
- Carry out a new capacitance calibration with an empty silo.
- Check operation.

Returning Parts for Repair

If a Nivocompact FTC 831 cannot be repaired and needs to be sent back to Endress+Hauser, then please note the following:

Cleaning the Probe

Remove all material residue attached to the probe.
This is especially important as the material may be of a dangerous nature e.g. corrosive, poisonous, carcinogenic, radioactive etc.
Please return parts only after they have been thoroughly cleaned of dangerous materials. Check in particular scratches and the possibility of diffusion through plastic material.

Stating Material and Defect

When returning the probe, please state exactly the material in which it was used and its characteristics.
A brief description of the error will also help us to diagnose the reason for it and at the same time lower your costs.

Thank you for your cooperation.

Shortening the Cable

Tools Required

- Open-end spanner 17 AF
- Screwdriver, blade width 5...6 mm or Phillips screwdriver PZD 2
- Universal pliers
- Wire cutter
- Wire stripper

Taking Apart

- Unscrew and remove the housing cover.
- Take out the spare plug connectors supplied and store in a safe place.
- Unscrew the central screw in the electronic insert.
- Lift out the electronic insert from the housing using the handle.
- Remove the plug base for the electronic insert from the central threaded rod in the housing (use universal pliers)
- Cut off the plug connector from the probe cable cores. See Fig. 22 above right.
- Remove the plug connector with the rest of the probe cable from the connector at the plug base.
- Unscrew the 3 screws in the housing.
- Remove the housing from the hexagonal nut.
- Remove the sealing screw at the tip of the cone.
- Loosen the terminal clamps in the cone by moving them backwards and forwards.
- Push the cable up from below. The terminal clamps will come out at the top.

Shortening

- Push the cable upwards from below to the correct cable length.
- Cut off the cable about 150 mm above the hexagonal nut (universal pliers/ wire cutter).
- Leave approx. 140 mm of core free and:
  a) remove cable sheath (external insulation) with a knife,
  b) carefully cut round the steel armouring one wire at a time with the wire cutter.
  c) remove approx. 140 mm of the internal cable sheath.

Assembling

- Put the terminal clamps around the cable and place in the cone **tightly**. The cable with its armouring should now protrude approx. 5 mm above the terminal clamps. See Fig. 22 below right.
- Push the sealing washers into the cone from below.
- Screw the sealing screw into the cone tip tightly.
- Put the black gasket on the hexagonal nut.
- Put the screw guide ring in the cone.
- Thread the 4 free cores from below through the rubber bush.
- Tighten the housing onto the hexagonal nut using the 3 screws. Make sure that the screws are screwed up tight so that the housing is watertight against the hexagonal nut.

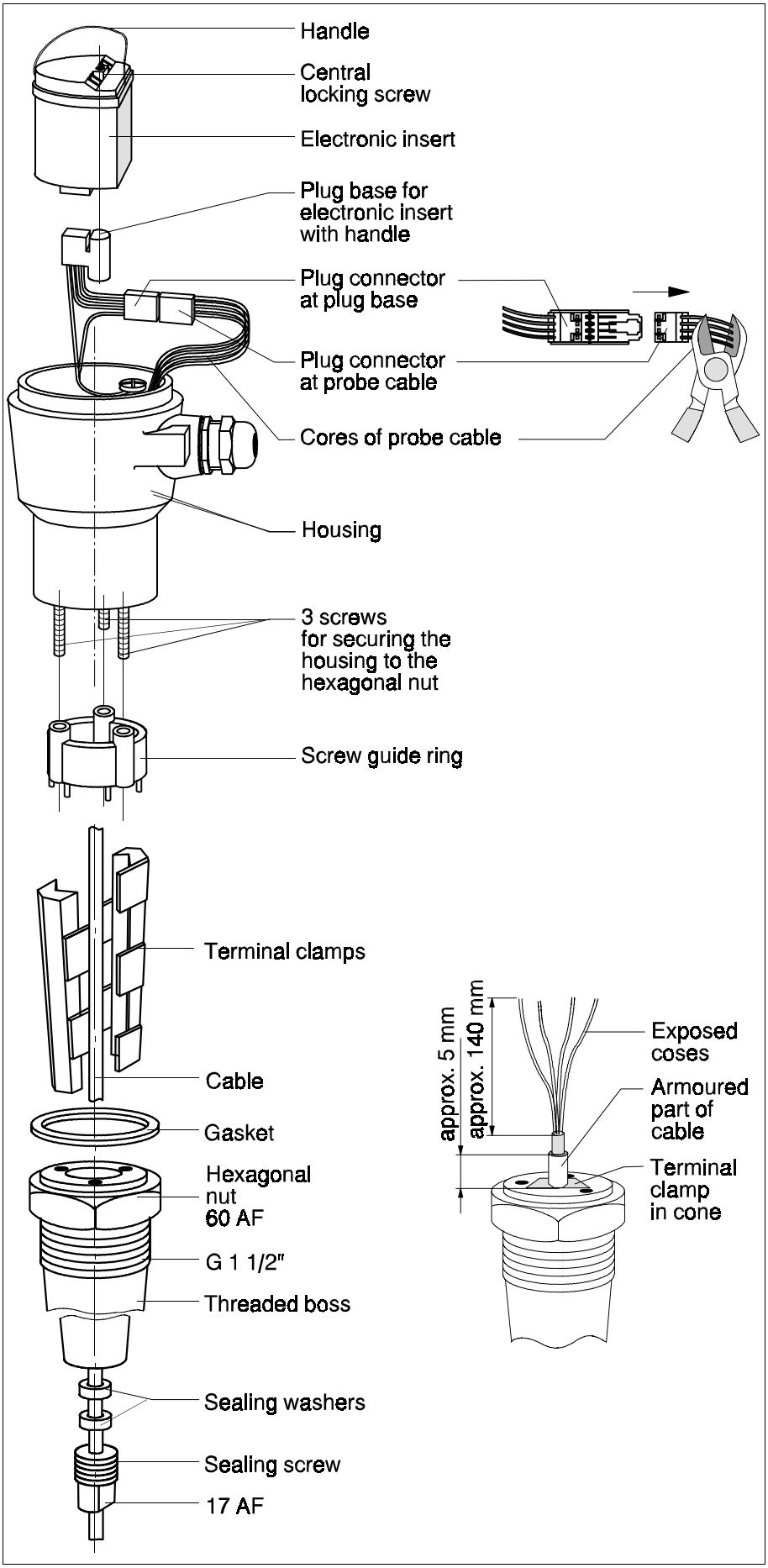


Fig. 22
Left:
Exploded view of the upper part of the Nivocompact FTC 831.

Above right:
The cores shown being cut off and the plug connector pulled apart.

Below right:
Diagram to show how far the shortened cable projects out from the threaded boss.

Connection

- Put the 4 free cores into the connector supplied so that after connecting the colours correspond. The plug connector has cutting terminals so that the cores must not be bared.
- Crimp the plug connector together (e.g with universal pliers or a multiwrench). See Fig. 23.
- Cut off all remaining core ends.
- Plug the connector on the end of the probe cable into the connector on the end of the plug base. See Fig. 24.
- Recheck: Do the core colours correspond with each other?
- Plug the plug base for the electronic insert with mounting on the central threaded rod in the housing.
  The plug base should lie approximately opposite the ground screw.
- Put the plug connector and cores right at the bottom of the housing.
- Plug the electronic insert into the plug base and secure with the central screw while making sure that the cable gland remains free.
- Screw on housing cover.

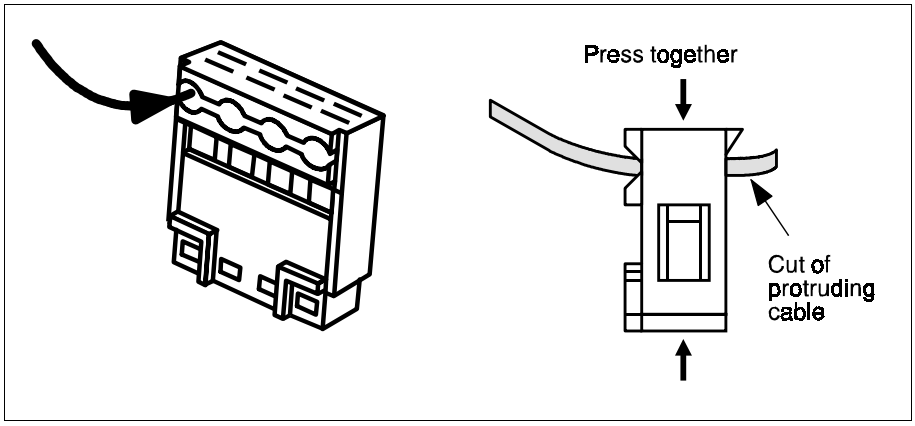


Fig. 23
Left:
The four cores are inserted in the plug connector from the side indicated.

Right:
The plug connectors are pressed together and the core ends cut off.

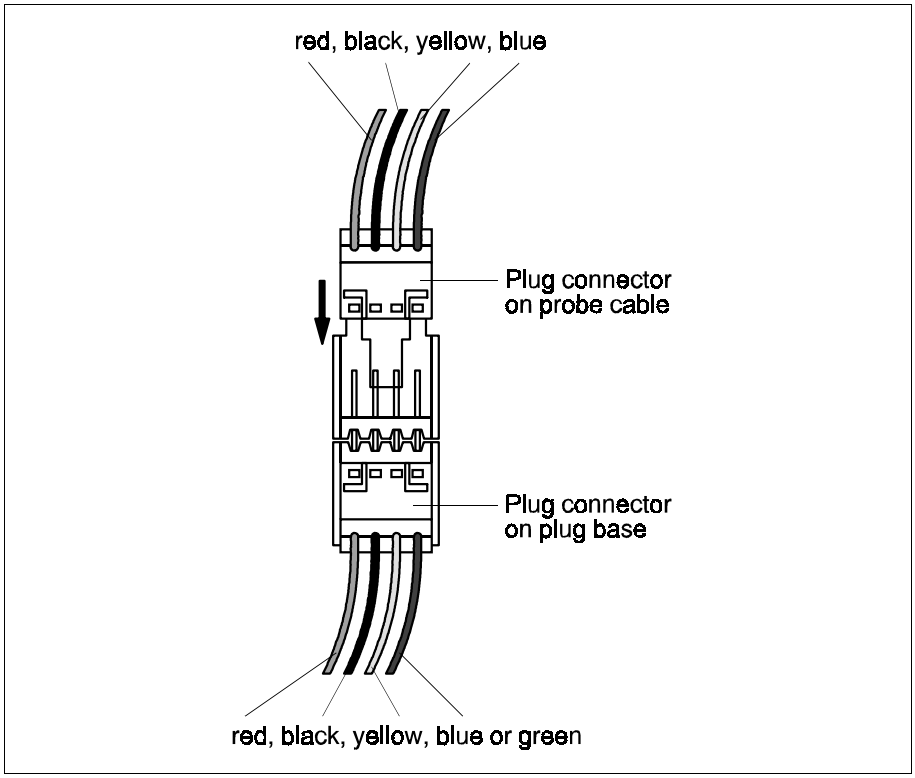


Fig. 24
The two plug connectors are pressed together.
Do the core colours correspond with each other?

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