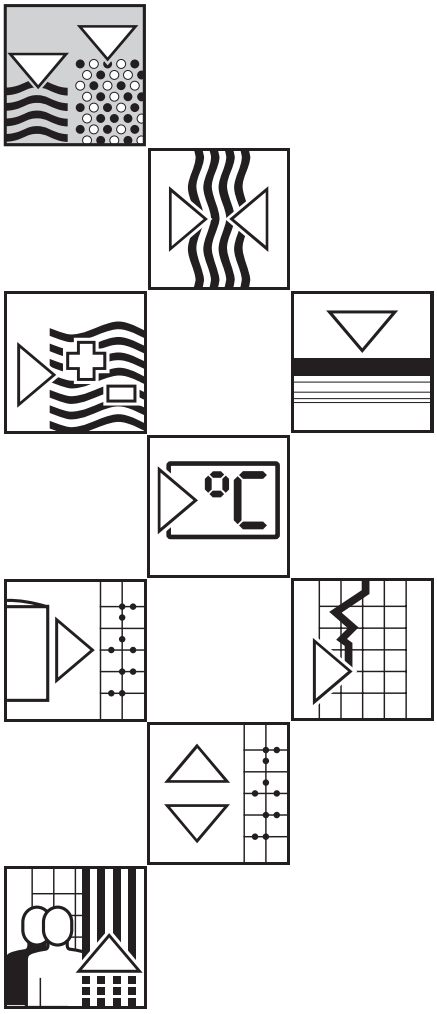
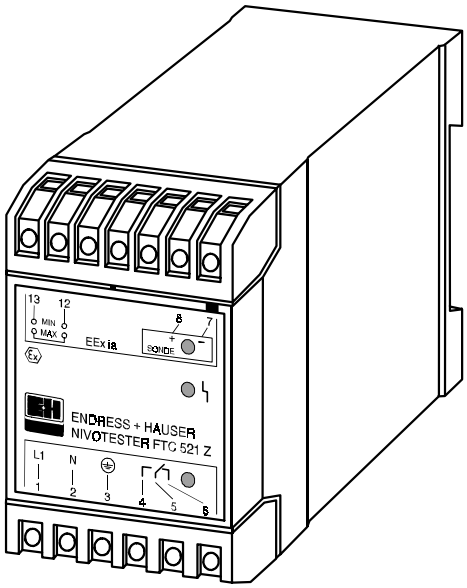
BA 055F/00/en/04.03
015581-1000

nivotester
FTC 520 Z/FTC 521 Z
Level limit switch

Installation and operating manual





Endress + Hauser

The Power of Know How

Contents

Reference Guide

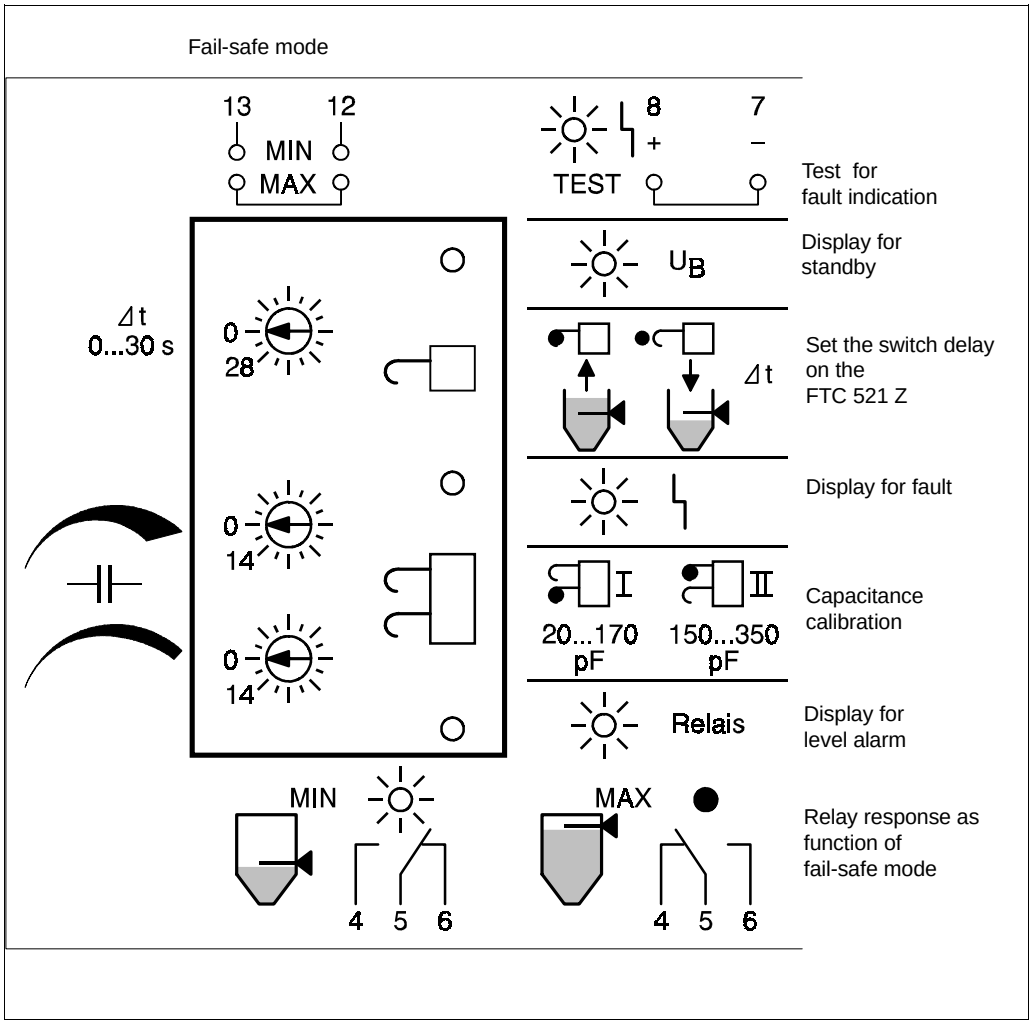


Fig. 1
Switches and adjusting elements for calibration

Application

The Nivotester FTC 520 Z, FTC 521 Z is a level limit switch for the detection of limits in vessels containing liquids or solids.
The intrinsically-safe signal circuit [EEx ia] II C also enables the probes to be used in explosion-hazardous areas.

- **Nivotester FTC 520 Z**
  for prompt indication.

- **Nivotester FTC 521 Z**
  also with adjustable switch delay on reaching the preset limit.

The Measuring System

The measuring system consists of:
- the Nivotester FTC 520 Z or FTC 521 Z
- a suitable capacitive probe
- an electronic insert (transmitter) EC 17 Z or EC 16 Z. This is usually mounted in the housing of the probe
- control or signalling systems

The Nivotester FTC 521 Z with adjustable switching delay is best suited for level limit detection of liquids with turbulent surfaces.

The probes approved for use in hazardous area Zone 0 are listed in the declarations of conformity for electronic inserts.

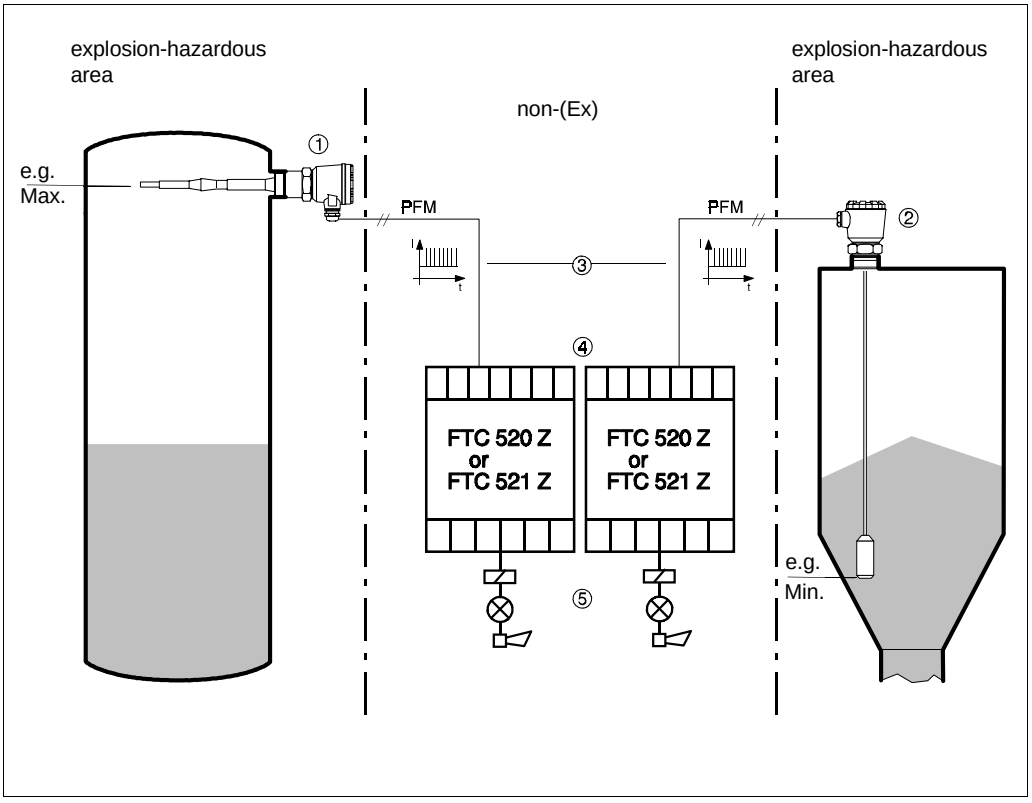


Fig. 2
The measuring system used for limit detection in vessels containing liquids or solids
① e.g. rod probe with active build-up compensation and electronic insert EC 16 Z
② e.g. rope probe with electronic insert EC 17 Z
③ e.g. interference-immune PFM signal transmission along intrinsically-safe two-wire cabling
④ Nivotester FTC 520 Z or FTC 521 Z
⑤ signal and control instruments

Function

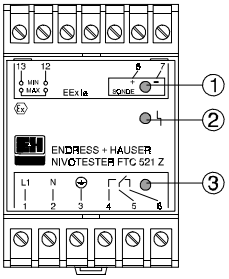
Measurement and signal transmission

The Nivotester FTC…Z supplies the electronic insert and probe with the necessary power (intrinsically safe).
The probe and vessel together constitute a capacitor whose capacitance changes with the level of the product. The electronic insert converts capacitance into current pulses that are superimposed on the supply current on the two-core cabling.
This interference-free pulse-frequency-modulation signal is evaluated by the Nivotester FTC 520 Z or FTC 521 Z, and the output relay is actuated.

Fail-safe switching mode

The fail-safe mode (quiescent current) can be selected using a jumper at the connection terminals:
- **Minimum** fail-safe: The relay de-energises when the switchpoint is **under**stepped, when a fault is indicated or when the power supply fails.
- **Maximum** fail-safe: The relay de-energises when the switchpoint is **over**stepped, when a fault is indicated or when the power supply fails.

Function displays



① The green LED for »standby« shows that a power supply is connected and that the fine-wire fuse is not defective.
② The red LED for »fault« lights up if the connection to the electronic insert in the probe is broken, is short circuited or if the electronic insert is defective.
The fault indication has a delay of approx. 4 s and is independent of the switching delay setting of the FTC 521 Z.
③ The red LED for »level alarm« lights up if the upper limit is overstepped at maximum fail-safe or the lower limit is understepped at minimum fail-safe.
The output relay is de-energised after the switching delay time interval.
It also lights up on fault.

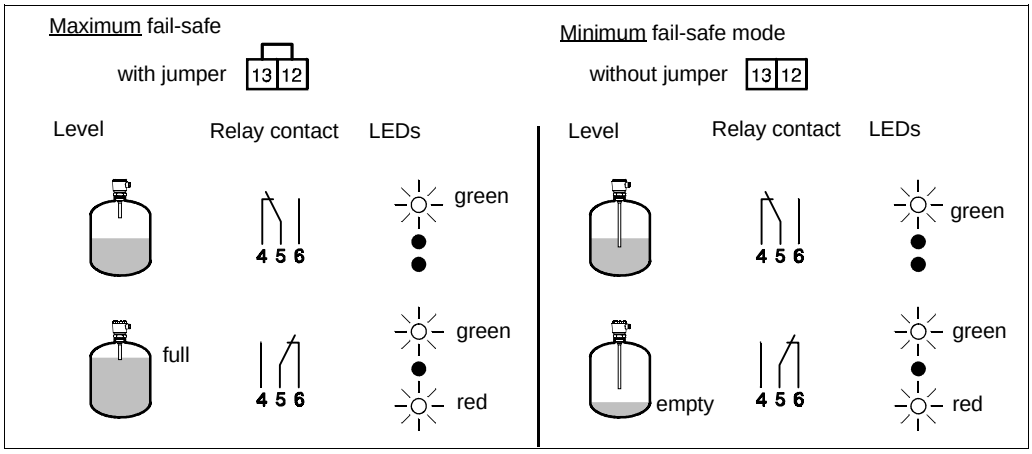


Fig. 3
Function of relay and LEDs for level and fail-safe switching mode

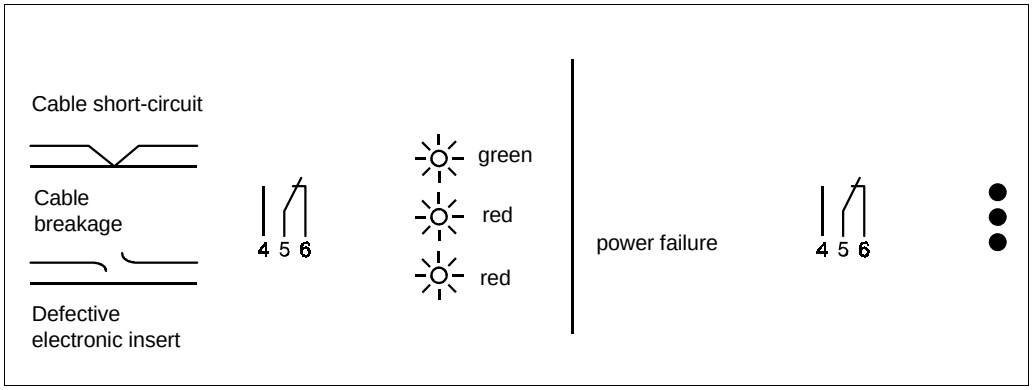


Fig. 4
Function on fault

Technical Data

Design
- Housing: row housing (MINIPAC format) in plastic
- Mounting: on standard rail conf. to EN 50022-35 x 7.5 or EN 50022-35 x 15
- Protection conf. to DIN 40050: Housing IP 40, Terminals IP 20

Permissible ambient temperatures
- Single mounting: –20 °C...+60 °C Row mounting without side spacing: –20 °C...+50 °C
- In protective housing (2 units): –20 °C...+40 °C
- Storage temperature: –25 °C...+85 °C

Electrical connection
- Terminals: removable terminal blocks, non-interchangeable, 6-pole, 7-pole
- Max. wire diameter: 1x0.5 mm^2 to 1x2.5 mm^2 or 2x0.5 mm^2 to 2x1.5 mm^2
- Power supply AC: 127 V, 115 V, 110 V, 48 V, 42 V, 24 V, each +15% -10%, 50/60 Hz 230 V, +10%, –15% 100 V, ±10%, 50/60 Hz
- Power consumption: max. 3.5 W (4.4 VA)
- Transmitters: Probes with electronic insert EC 17 Z, EC 16 Z
- Connection cable to probe: 2-core, max. 25 Ω/core

Powering the electronic insert (EC 17 Z, EC 16 Z)
- Protection: [EEx ia] II C
- Voltage: 10.5...12.2 V
- Operating current: max. 12 mA
- Short circuit current: max. 60 mA
- Duration of short circuit: unlimited

Input signals
- Signal transmission: PFM
- Pulse width: approx. 200 µs
- Transmission frequency: 185 Hz...116 Hz, (corresponding to 20 pF... 350 pF probe capacitance)
- Pulse current: approx. 12 mA, superimposed on the basic current

Ordering key

FTC 520 Z Nivotester
FTC 521 Z Nivotester with switching delay

Certificate
A ATEX II (1) GD [EEx ia] IIC
Y Special version

Version
0 MINIPAC with terminal block
1 MINIPAC for flat plug
2 Weather proof MINIPAC, with terminal block
3 Weather proof MINIPAC, for flat plug
9 Special version

Power supply
A Power supply: 230 V AC
B Power supply: 110 V AC
C Power supply: 48 V AC
D Power supply: 24 V AC
F Power supply: 115 V AC
G Power supply: 127 V AC
K Power supply: 42 V AC
L Power supply: 100 V AC
Y Special version

Output
0 1 relay, volt free SPDT
9 Special version

Order code

Electromagnetic Compatibility (EMC)
Interference Emission to EN 61326; Electrical Equipment Class B.
Interference Immunity to EN 61326
For hints on installation, see TI 241F/00/en.

Output:
- Relay output: one potential-free change-over contact
- Switching consumption: max. 4 A, max. 250 V AC, max. 500 VA at cos φ ≥ 0.7
- Quiescent current: for minimum or maximum, selectable
- Switching delay with FTC 521 Z: selectable approx. 0.5 s...30 s
- Function displays: 3 LEDs on the front panel for operating, fault, level alarm

Subject to modification

Certificates

- Nivotester FTC 520 Z, FTC 521 Z
  EC-Type-examination certificate
  TÜV 01 ATEX 1682
- Electronic insert EC 16 Z, EC 17 Z
  EC-Type-examination certificate
  PTB 98 ATEX 2215 X

When using certified probes, please pay special attention to the following instructions and the special remarks in the certificates.

Mounting

Nivotester FTC 520 Z, FTC 521 Z

- Please compare the order code on the nameplate of your instrument with the order key on Page 5 in order to ensure that you are installing the correct instrument.
- Mount the Nivotester FTC…Z outside the explosion-hazardous area in a control panel or in a protective housing (as accessory).
- Please also note the permissible ambient temperatures (see Technical Data) and the minimum distance between rows of instruments. (Fig. 5)

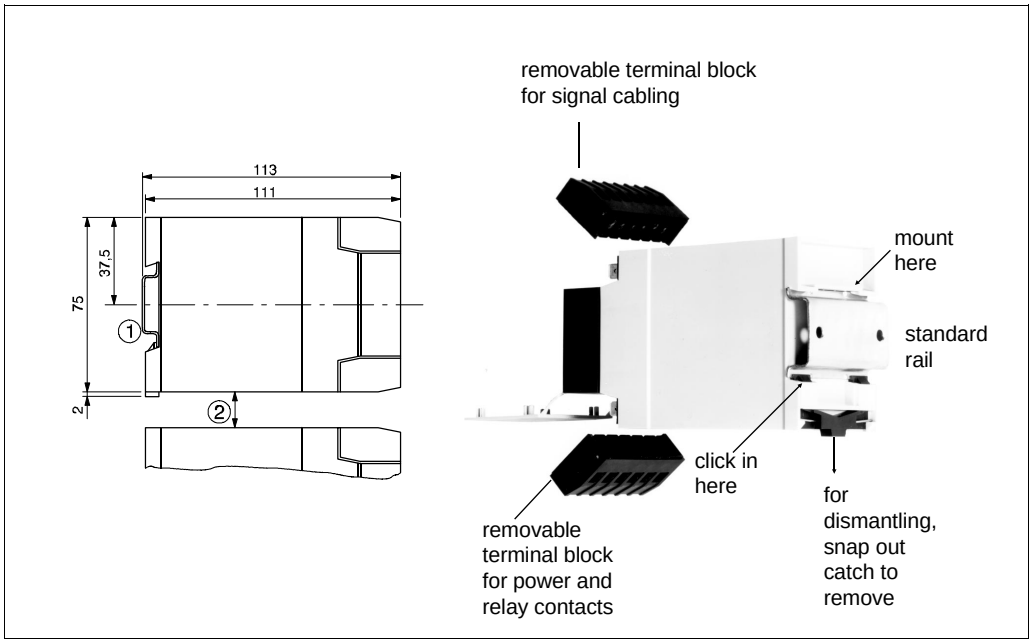


Fig. 5
left
Dimensions of the Nivotester FTC 520 Z,FTC 521 Z in Minipac format
Width of housing: 50 mm
①Mounted on standard rail 35 x 7 or 35 x 15
②Minimum interval between the bottom edge and top edge of the next row of instruments: For probes used in explosion-hazardous area, min. 50 mm For probe used in non-explosion-hazardous area, min. 25 mm.

Fig. 5
right
Nivotester FTC...Z, mounting, dismantling

Probes

Please refer to the mounting recommendations in the Technical Information brochures for the probes and the remarks given in their certificates.

Connection

The Nivotester must only be connected up by trained personnel who also have the necessary experience in installing instruments in the explosion-hazardous area.

Connecting the probe to the electronic insert.

Screened cable should be used for the connecting cable to the probe.
2 cores are required. Cable resistance max. 25 Ω/core.

Connect the screening to the ground at one point only and, if required, also connect the potential compensating cable at this point. This should be on the probe housing if possible (vessel potential).

When using the probe in the explosion-hazardous area:
Please note regulations governing explosion protection regarding the type and laying out of intrinsically-safe signal cabling!

Please refer to the certificate of conformity for the Nivotester FTC for the maximum permissible values for capacitance and inductance.
Note: The intrinsically-safe signal current circuit is completely electrically isolated from other circuits.

After connection, ensure that the cover and cable gland are tight.

Selecting the fail-safe mode

- Minimum fail-safe: Without jumper 12/13:
- Maximum fail-safe: With jumper 12-13,
  For function see Fig.3 on Page 4.

The fail-safe mode is part of the intrinsically-safe circuit.
Only a short insulated jumper is to be used.
Ensure that the screws are tight so that the jumper cannot become loose!

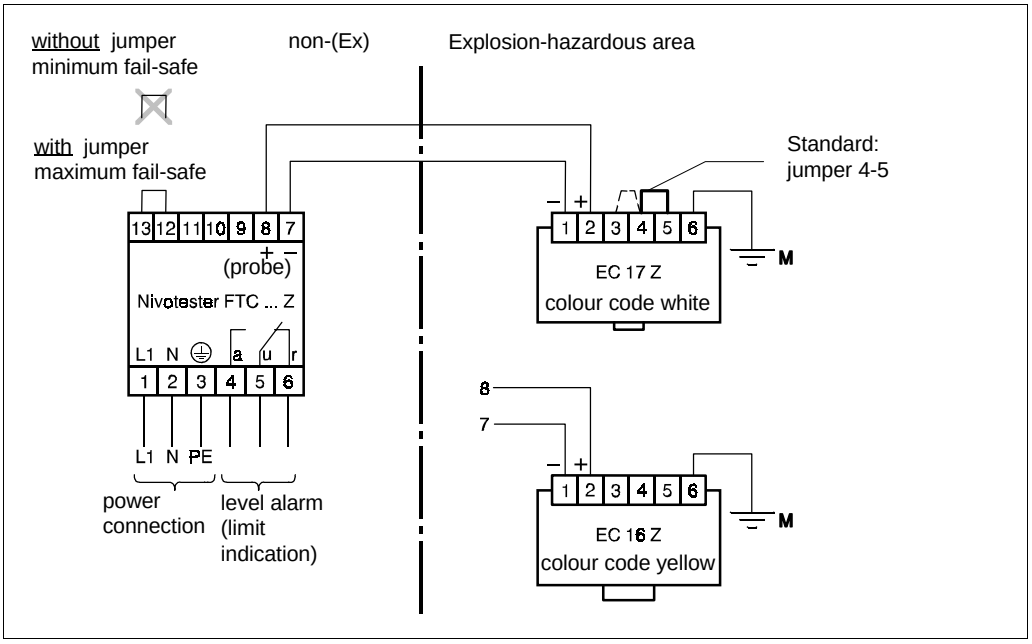


Fig. 6
top right
Connecting the Nivotester FTC 520 Z, FTC 521 Z to the electronic insert EC 17 Z.
With electrically conducting build-up on the probe: connect jumper to 4-3 instead of 4-5 on the electronic insert.
M = ground connection in probe head housing.

Fig. 6
below right
Connecting the Nivotester FTC 520 Z, FTC 521 Z to the electronic insert EC 16 Z.

Connecting control and signalling systems

Please note the maximum current carrying capacity of the potential-free relay contact and the function of the level limit switch Nivotester FTC…Z regarding the fail-safe mode and the level. See Fig. 3 on Page 4.

Note:
The power supply and the potential-free change-over contact are isolated from one another so that one circuit can be operated at maximum permissible voltage while the other is operating with a safe functional low voltage.

Connecting the power supply

Before connection, ensure that the power supply used agrees with the specifications given on the nameplate of the Nivotester FTC…Z.
A fine-wire fuse is integrated into the unit so that no fine-wire fuse is required for the power cable.

Switching over the power supply

If you have a Nivotester FTC…Z for power supply 220 V or 230 V, or one for 110 V, 115 V or 127 V, then the instrument can be simply adapted to the power voltage:

① Remove the terminal blocks (Points a and b)
② Open the front panel (Points c and d)
③ Remove the unit from the housing: Grasp the instrument by the black plastic at the top and the bottom of the instrument and pull it firmly towards you.
④ Reposition the jumper to suit the power supply used.
The fine-wire fuse does not have to be changed.
• Reassemble the instrument
• Change the power supply specifications on the nameplate

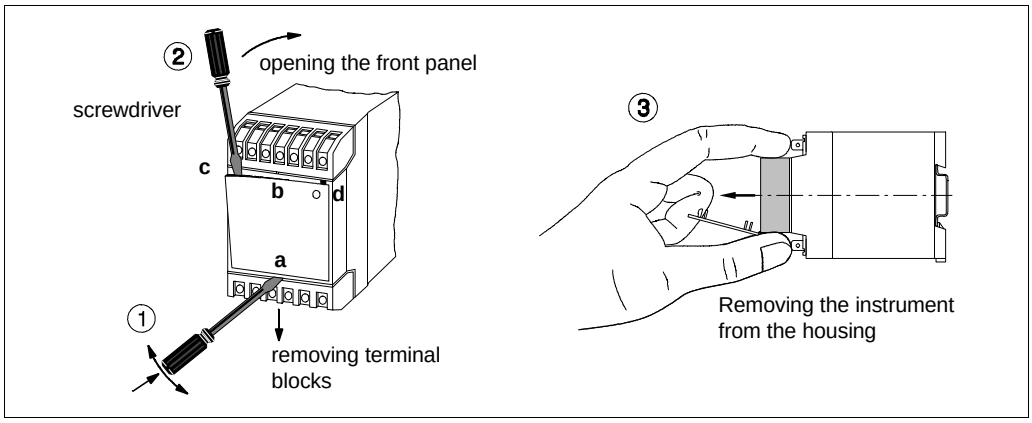
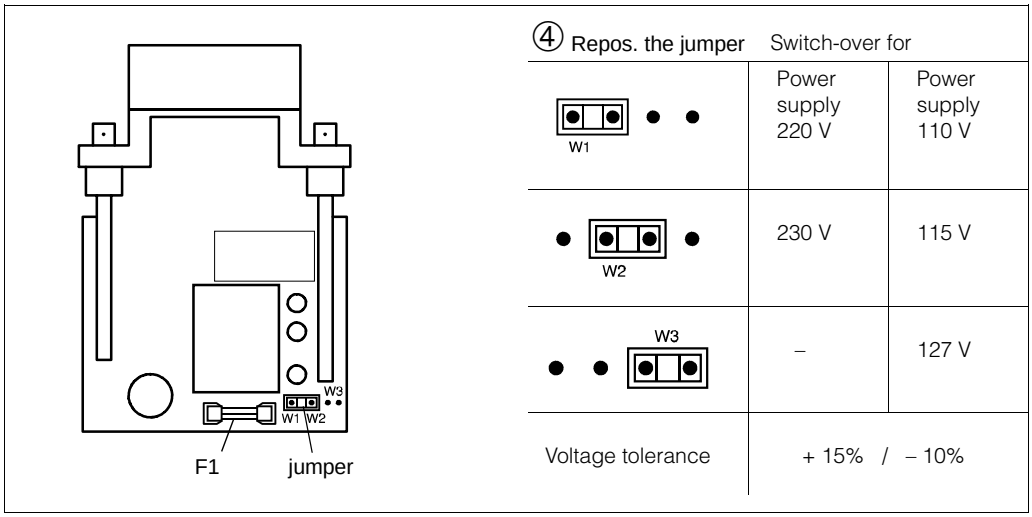


Fig. 7
Opening the instrument



④ Repos. the jumper	Switch-over for Power supply 220 V	Power supply 110 V
W1		
W2	230 V	115 V
W3	–	127 V
Voltage tolerance	+ 15% / – 10%	

Fig. 8
Adjusting the instrument to the power supply

Fine-wire fuse F1
50 mA time-lag fuse for 220/230 V
80 mA time-lag fuse for 110/115/125 V
80 mA time-lag fuse for 100 V
200 mA time-lag fuse for 48 V
250 mA time-lag fuse for 42 V
315 mA time-lag fuse for 24 V

Calibration

Calibration, preliminary work

- Switch on the power supply to the Nivotester. In order to prevent any unwanted control sequences, turn off any control instruments connected until the Nivotester is calibrated.
- The adjusting elements are found behind the hinged front panel. To open the front panel, refer to Fig. 9.
- Reset all switches and calibrating units to their initial positions. See Fig. 10.

- Set all adjusters to **0**
- Close the change-over switch **downwards** for range selection
- Open or close the switch for the type of delay required

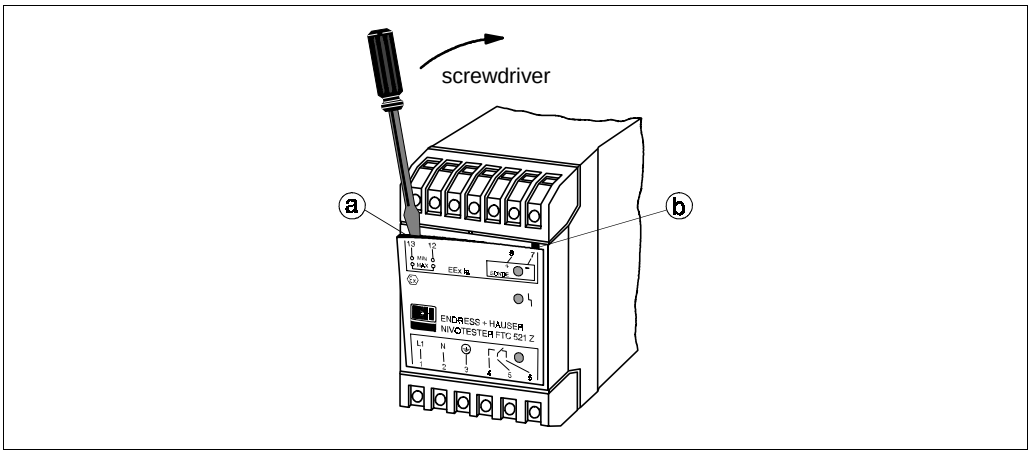


Fig. 9
opening the front panel

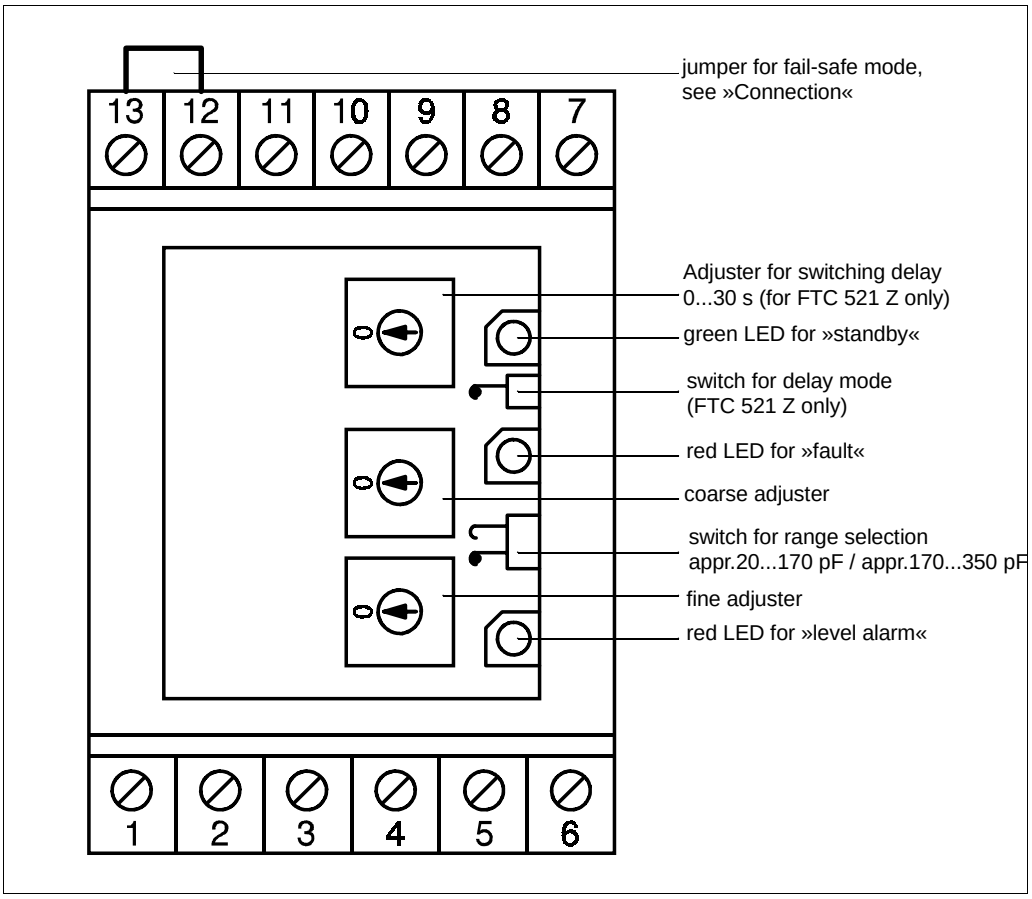


Fig. 10
Initial positions for adjuster and switches for the following calibration

Selecting the adjustment range

① Rotate the coarse adjuster slowly* through one turn.
Does the LED for »level alarm« then change its On/Off indication?

☐ *Yes: You may now carry out the capacitance calibration.*

■ No:
② Switch the change-over range switch to the range 170...350 pF.
Turn the coarse adjuster slowly through one complete turn.
Does the LED for »level alarm« this time change its On/Off indication?

☐ *Yes: You may now carry out the capacitance calibration.*

■ No:
The initial capacitance of the probe is too large.
③ Is the probe covered with material?

☐ Yes: Lower the level until the probe is free and then select the calibration range, beginning with ① again.

■ No: Fault in project planning or short-circuit in probe

*slowly= approx. 1 division per second

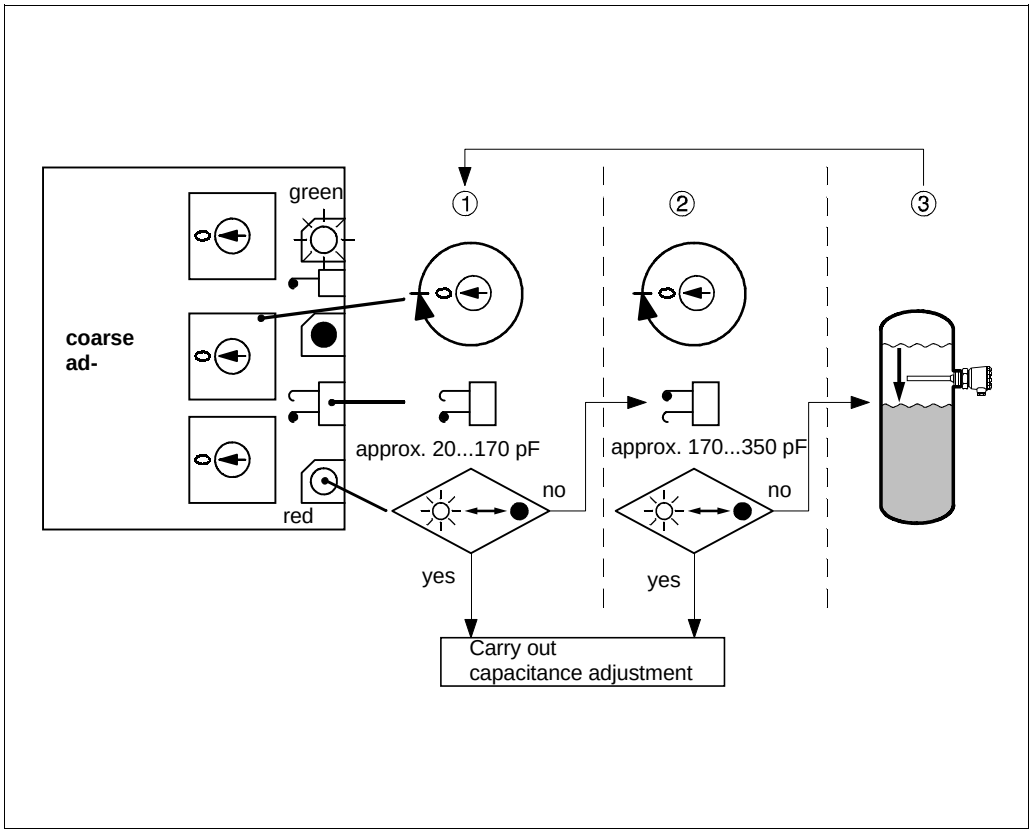


Fig. 11
Selecting calibration range

Carrying out a capacitance calibration

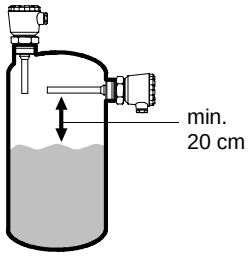
The calibration for maximum fail-safe switching is given.
(The values in brackets are for the minimum fail-safe mode).

The following calibrations are described:
- Calibration with a free probe
- Calibration with a covered probe

One of the two calibrations is sufficient.

Calibration with a free probe

The filling material must be at least 20 cm away from the probe



① Turn the **coarse** adjuster slowly* in a clockwise direction until the red LED for »level alarm« goes out (lights up).
② Turn back the **coarse** adjuster by one division.
The LED for »level alarm« lights up (goes out) again.
③ Turn the **fine** adjuster slowly* in a clockwise direction until the red LED for »level alarm« goes out (lights up).
④ To ensure correct switching, turn the **fine** adjuster a few divisions further.
See Table Fig. 13.
If the arrow of the fine adjuster oversteps 0, then turn the coarse adjuster clockwise by one further division.

*slowly= approx. 1 division per second

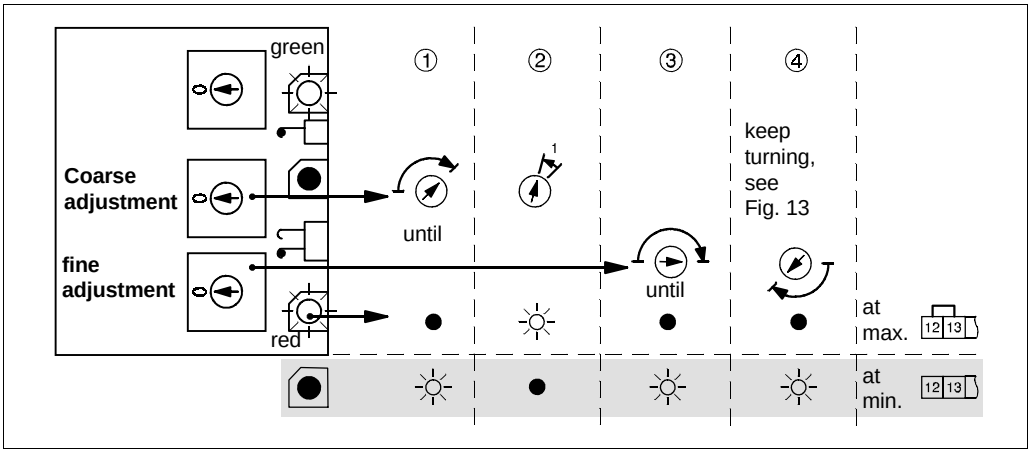
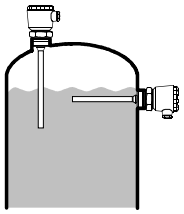


Fig. 12
Capacitance calibration with free probe

Application criteria								Keep turning the fine adjuster by ... divisions
Material				Type of probe mounting				
Example	Relative dielectric constant ε_r	Conductivity	Tendency to build-up	Insulation		Ground tube		
				Full	Part.	with	without	
Solvents / fuels	< 3	low	low	X	X	X		3... 4
Dry bulk solids	< 3	low	low		X		X	2... 3
Moist bulk solids	> 3	average	average	X	X		X	6... 8
Aqueous liquids and alcohols	> 3	strong	weak	X	X		X	6...10
			strong		X		X	14...16
Sludge	> 3	strong	very strong		X		X	16...18

Abb. 13
Table for recommended switching point delays

Variation: Calibration with a covered probe



The calibration for maximum fail-safe switching is given.
(The values in brackets are for the minimum fail-safe mode).

① Turn the **coarse** adjuster slowly* in a clockwise direction until the red LED for »level alarm« goes out (lights up).
② Turn back the **coarse** adjuster by one division. The LED for »level alarm« lights up (goes out) again.
③ Turn the **fine** adjuster slowly* in a clockwise direction until the LED for »level alarm« goes out (lights up).
④ Turn back the **fine** adjuster by one or two divisions until the LED for »level alarm« lights up (goes out) again.
If one (vertically mounted) probe is covered right to the switchpoint, then the calibration sequence is over.
Otherwise:
⑤ To ensure correct switching, turn the **fine** adjuster a few divisions in an anticlockwise direction. See Table Fig. 15.
If the arrow on the fine adjuster oversteps 0,
then turn the coarse adjuster back one division in an anticlockwise direction.

*slowly: approx. 1 division per second

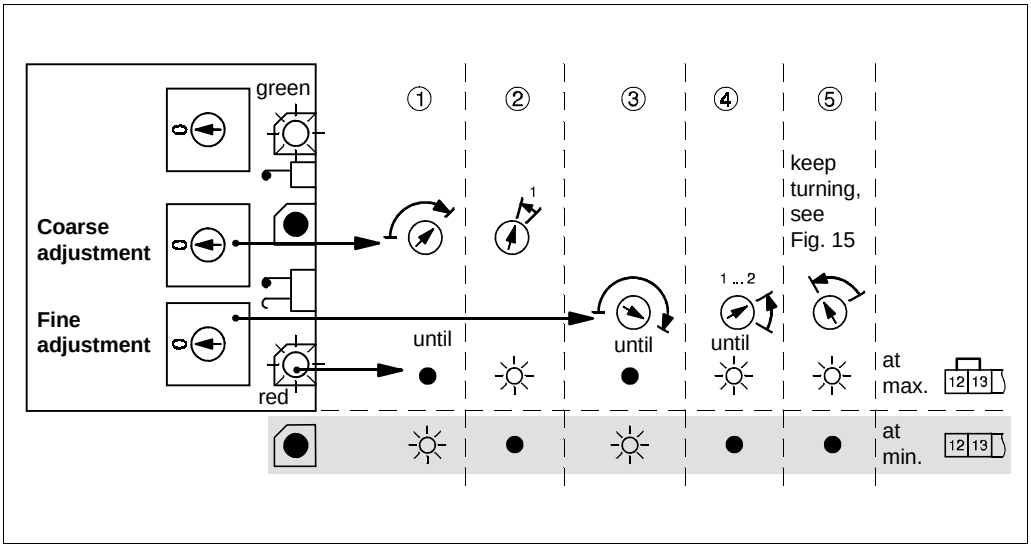


Fig. 14
Capacitance calibration with covered probe

Application criteria								Keep turning the fine adjuster by ... divisions
Material				Type of probe mounting				
Example	Relative dielectric constant ε_r	Conductivity	Tendency to build-up	Insulation		Ground tube		
				Full	Part.	with	without	
Solvents / fuels	< 3	weak	weak	X	X	X		3... 4
Dry bulk solids	< 3	weak	weak		X		X	2... 3
Moist bulk solids	> 3	medium	medium	X	X		X	6... 8
Aqueous liquids and alcohols	> 3	strong	weak	X	X		X	6...10
			strong		X		X	14...16
Sludge	> 3	strong	very strong		X		X	16...18

Abb. 15
Table for recommended switching point delays

FTC 521 Z only: Calibrating the switching delay for the output relay

Delay mode

The switching delay can be selected for two conditions:

- Delay when covering the probe (switch closed)
- Delay when freeing the probe (switch open)

If the material moves in the opposite direction, then the output relay switches immediately.

Delay time

The Nivotester has a basic delay of approx. 0.5 s (Switch position 0).
You can increase the switching delay up to approx. 30 s by turning the switch in a clockwise direction. One division is approx. 2 s.

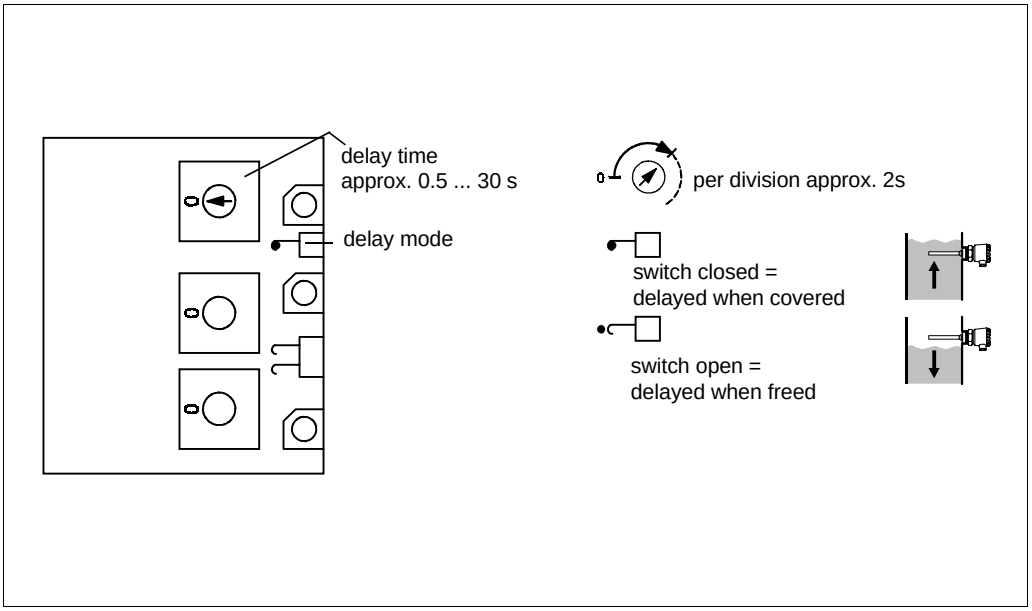


Fig. 16
Setting the switching delay on the FTC 521

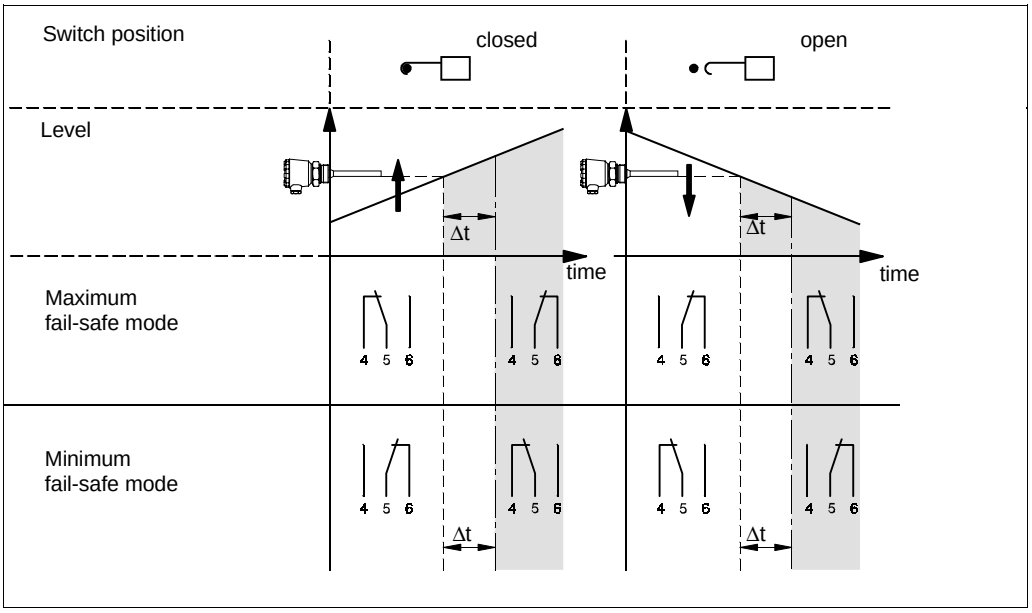


Abb. 17
Function diagram of switching delay

Function test

Level alarm

Please check correct switching of the Nivotester FTC…Z by raising and lowering the level over the switchpoint selected.

Fault indication

Short circuit Terminals 7-8 on the Nivotester, e.g. with pincers.
All three LEDs should light up after approx. 4 s.

After the calibration and function test:
Switch on all instruments connected to the Nivotester.

Replacing an instrument

The Nivotester FTC…Z can be replaced without disconnecting the electrical cabling:
- Switch off the power supply and the voltage to the relay contact
- Remove terminal blocks, see Fig. 7 on Page 8.
- Undo the catch on the bottom of the instrument housing by pulling it down with a screwdriver and then remove the Nivotester from the rail.
  See Fig. 5 on Page 6.
- Mount the new instrument on the rail
- Push and click in terminal blocks
- Carry out adjustments as with the old instrument
- Due to the tolerances of individual components, a capacitance calibration must be carried out when replacing a Nivotester FTC…Z or electronic insert.

Supplementary Documentation

- Technical Information on the specific probe
- Technical Information on the specific electronic insert
- Technical Information for Minipac accessories (standard rail, protective housing).
- Certificate of conformity for the Nivotester FTC 520 Z, FTC 521 Z
- Certificate of conformity for the electronic insert EC 16 Z, EC 17 Z

Key Word Index

Europe

Austria
❑ Endress+Hauser Ges.m.b.H.
Wien
Tel. (01) 88056-0, Fax (01) 88056-35

Belarus
Belorgsintez
Minsk
Tel. (0172) 508473, Fax (0172) 508583

Belgium / Luxemburg
❑ Endress+Hauser N.V.
Brussels
Tel. (02) 2480600, Fax (02) 2480553

Bulgaria
INTERTECH-AUTOMATION
Sofia
Tel. (02) 664869, Fax (02) 963139

Croatia
❑ Endress+Hauser GmbH+Co.
Zagreb
Tel. (01) 6637785, Fax (01) 6637823

Cyprus
I+G Electrical Services Co. Ltd.
Nicosia
Tel. (02) 484788, Fax (02) 484690

Czech Republic
❑ Endress+Hauser GmbH+Co.
Praha
Tel. (026) 6784200, Fax (026) 6784179

Denmark
❑ Endress+Hauser A/S
Søborg
Tel. (70) 131132, Fax (70) 132133

Estonia
ELVI-Aqua
Tartu
Tel. (7) 441638, Fax (7) 441582

Finland
❑ Endress+Hauser Oy
Helsinki
Tel. (0204) 83160, Fax (0204) 83161

France
❑ Endress+Hauser S.A.
Huningue
Tel. (389) 696768, Fax (389) 694802

Germany
❑ Endress+Hauser Messtechnik GmbH+Co.
Weil am Rhein
Tel. (07621) 975-01, Fax (07621) 975-555

Great Britain
❑ Endress+Hauser Ltd.
Manchester
Tel. (0161) 2865000, Fax (0161) 9981841

Greece
I & G Building Services Automation S.A.
Athens
Tel. (01) 9241500, Fax (01) 9221714

Hungary
Mile Ipari-Elektro
Budapest
Tel. (01) 4319800, Fax (01) 4319817

Iceland
BIL ehf
Reykjavik
Tel. (05) 619616, Fax (05) 619617

Ireland
Flomeaco Company Ltd.
Kildare
Tel. (045) 868615, Fax (045) 868182

Italy
❑ Endress+Hauser S.p.A.
Cernusco s/N Milano
Tel. (02) 92192-1, Fax (02) 92192-362

Latvia
Rino TK
Riga
Tel. (07) 315087, Fax (07) 315084

Lithuania
UAB "Agava"
Kaunas
Tel. (07) 202410, Fax (07) 207414

Netherlands
❑ Endress+Hauser B.V.
Naarden
Tel. (035) 6958611, Fax (035) 6958825

Norway
❑ Endress+Hauser A/S
Tranby
Tel. (032) 859850, Fax (032) 859851

Poland
Endress+Hauser Polska Sp. z o.o.
Warszawy
Tel. (022) 7201090, Fax (022) 7201085

Portugal
Tecnisis - Tecnica de Sistemas Industriais
Linda-a-Velha
Tel. (21) 4267290, Fax (21) 4267299

Romania
Romconseng S.R.L.
Bucharest
Tel. (01) 4101634, Fax (01) 4112501

Russia
Endress+Hauser Moscow Office
Moscow
Tel. (095) 1587564, Fax (095) 1589871

Slovakia
Transcom Technik s.r.o.
Bratislava
Tel. (7) 44886884, Fax (7) 44887112

Slovenia
Endress+Hauser D.O.O.
Ljubljana
Tel. (01) 5192217, Fax (01) 5192298

Spain
❑ Endress+Hauser S.A.
Sant Just Desvern
Tel. (93) 4803366, Fax (93) 4733839

Sweden
❑ Endress+Hauser AB
Sollentuna
Tel. (08) 55511600, Fax (08) 55511655

Switzerland
❑ Endress+Hauser Metso AG
Reinach/BL 1
Tel. (061) 7157575, Fax (061) 7111650

Turkey
Intek Endüstriyel Ölcü ve Kontrol Sistemleri
Istanbul
Tel. (0212) 2751355, Fax (0212) 2662775

Ukraine
Photonika GmbH
Kiev
Tel. (44) 26881, Fax (44) 26908

Yugoslavia Rep.
Meris d.o.o.
Beograd
Tel. (11) 4441966, Fax (11) 4441966

Africa

Egypt
Anasia
Heliopolis/Cairo
Tel. (02) 4179007, Fax (02) 4179008

Morocco
Oussama S.A.
Casablanca
Tel. (02) 241338, Fax (02) 402657

South Africa
❑ Endress+Hauser Pty. Ltd.
Sandton
Tel. (011) 2628000 Fax (011) 262806 2

Tunisia
Controle, Maintenance et Regulation
Tunis
Tel. (01) 793077, Fax (01) 788595

America

Argentina
❑ Endress+Hauser Argentina S.A.
Buenos Aires
Tel. (01) 14522 7970, Fax (01) 14522 7909

Bolivia
Tritec S.R.L.
Cochabamba
Tel. (042) 56993, Fax (042) 50981

Brazil
❑ Samson Endress+Hauser Ltda.
Sao Paulo
Tel. (011) 50313455, Fax (011) 50313067

Canada
❑ Endress+Hauser Ltd.
Burlington, Ontario
Tel. (905) 6819292, Fax (905) 6819444

Chile
❑ Endress+Hauser Chile Ltd.
Santiago
Tel. (02) 321-3009, Fax (02) 321-3025

Colombia
Colsein Ltda.
Bogota D.C.
Tel. (01) 2367659, Fax (01) 6104186

Costa Rica
EURO-TEC S.A.
San Jose
Tel. (02) 961542, Fax (02) 961542

Ecuador
Insetec Cia. Ltda.
Quito
Tel. (02) 269148, Fax (02) 461833

Guatemala
ACISA Automatizacion Y Control Industrial S.A.
Ciudad de Guatemala, C.A.
Tel. (03) 345985, Fax (03) 327431

Mexico
❑ Endress+Hauser S.A. de C.V.
Mexico City
Tel. (5) 5682405, Fax (5) 5687459

Paraguay
Incoel S.R.L.
Asuncion
Tel. (021) 213989, Fax (021) 226583

Uruguay
Circular S.A.
Montevideo
Tel. (02) 925785, Fax (02) 929151

USA
❑ Endress+Hauser Inc.
Greenwood, Indiana
Tel. (317) 535-7138, Fax (317) 535-8498

Venezuela
Controval C.A.
Caracas
Tel. (02) 9440966, Fax (02) 944 4554

Asia

China
❑ Endress+Hauser Shanghai
Instrumentation Co. Ltd.
Shanghai
Tel. (021) 54902300, Fax (021) 54902303

❑ Endress+Hauser Beijing Office
Beijing
Tel. (010) 68344058, Fax (010) 68344068

Hong Kong
❑ Endress+Hauser HK Ltd.
Hong Kong
Tel. 25283120, Fax 28654171

India
❑ Endress+Hauser (India) Pvt. Ltd.
Mumbai
Tel. (022) 8521458, Fax (022) 8521927

Indonesia
PT Grama Bazita
Jakarta
Tel. (21) 7975083, Fax (21) 7975089

Japan
❑ Sakura Endress Co. Ltd.
Tokyo
Tel. (0422) 540613, Fax (0422) 550275

Malaysia
❑ Endress+Hauser (M) Sdn. Bhd.
Petaling Jaya, Selangor Darul Ehsan
Tel. (03) 7334848, Fax (03) 7338800

Pakistan
Speedy Automation
Karachi
Tel. (021) 7722953, Fax (021) 7736884

Philippines
❑ Endress+Hauser Philippines Inc.
= Metro Manila
Tel. (2) 3723601-05, Fax (2) 4121944

Singapore
❑ Endress+Hauser (S.E.A.) Pte., Ltd.
Singapore
Tel. 5668222, Fax 5666848

South Korea
❑ Endress+Hauser (Korea) Co., Ltd.
Seoul
Tel. (02) 6587200, Fax (02) 6592838

Taiwan
Kingjarl Corporation
Taipei R.O.C.
Tel. (02) 27183938, Fax (02) 27134190

Thailand
❑ Endress+Hauser Ltd.
Bangkok
Tel. (2) 9967811-20, Fax (2) 9967810

Vietnam
Tan Viet Bao Co. Ltd.
Ho Chi Minh City
Tel. (08) 8335225, Fax (08) 8335227

Iran
PATSA Co.
Tehran
Tel. (021) 8754748, Fax(021) 8747761

Israel
Instrumetrics Industrial Control Ltd.
Netanya
Tel. (09) 835 7090, Fax (09) 835 0619

Jordan
A.P. Parpas Engineering S.A.
Amman
Tel. (06) 4643246, Fax (06) 4645707

Kingdom of Saudi Arabia
Anasia Ind. Agencies
Jeddah
Tel. (02) 6710014, Fax (02) 6725929

Lebanon
Network Engineering
Jbeil
Tel. (3) 944080, Fax (9) 548038

Sultanate of Oman
Mustafa Sultan Science & Industry Co. L.L.C.
Ruwi
Tel. 602009, Fax 607066

United Arab Emirates
Descon Trading EST.
Dubai
Tel. (04) 2653651, Fax (04) 2653264

Yemen
Yemen Company for Ghee and Soap Industry
Taiz
Tel. (04) 230664, Fax (04) 212338

Australia + New Zealand

Australia
ALSTOM Australia Limited
Milperra
Tel. (02) 97747444, Fax (02) 97744667

New Zealand
EMC Industrial Group Limited
Auckland
Tel. (09) 4155110, Fax (09) 4155115

All other countries

❑ Endress+Hauser GmbH+Co.
Instruments International
Weil am Rhein
Germany
Tel. (07621) 975-02, Fax (07621) 975-345

http://www.endress.com

Endress+Hauser
The Power of Know How

❑ Members of the Endress+Hauser group 02.02/PT

BA 055F/00/en/04.03
015581-1000
CCS/CV4.2

015581-1000