Technical Information
Nivotester FTR525

Process transmitter with control unit for Soliwave FQR57/FDR57 microwave barrier



Digital process transmitter for operation and configuration of microwave barrier

Application

- The Nivotester FTR525 process transmitter with control unit is used, in conjunction with the Soliwave FQR57/FDR57 microwave barrier, for continuous, non-contact level limit detection of powdered to granular media and liquids, for the purpose of monitoring and counting piece goods and, optionally, to detect bulk flow interruptions.
- The FTR525 enables the convenient operation and configuration of the microwave barrier at an easily accessible location near the measuring point or in the system's control room.
- Up to five different channels can be configured, so that several microwave barriers can be operated in the immediate vicinity.

Your benefits

- A maximum of two relay outputs and one current output (4 - 20 mA) are freely assignable (level limit detection, optional additional bulk flow detection)
- High functional safety thanks to monitoring of lines to the connected devices FQR57/FDR57
- Functions for application analysis
- Different setup options (automatic or manual) with clear graphic display of the configured detection range and the current signal strength
- Many configuration options, such as sensitivity or attenuation, switch-on and switch-off points as well as switch-on and switch-off delay

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People for Process Automation

Table of contents

Document information 3
Display conventions 3

Function and system design 4
Measuring principle 4
Measuring system 4
Safety 4

Input 5
Measured variable 5
Measuring range 5
Input signal 5
Terminals 5
Cable specification 6
Terminal assignment 6

Output 7
Output signal 7
Terminals 7
Cable specification 7
Terminal assignment 7
Signal on alarm 8
Load 9
Galvanic isolation 9

Power supply 10
Terminal assignment 10
Supply voltage 10
Power consumption 10
Power failure 10
Terminals 10
Cable specification 10

Performance characteristics 11
Reference operating conditions 11
Reaction time 11

Installation 12
Mounting location 12
Orientation 12
Installation instructions 12
Special mounting instructions 12

Environment 13
Operating temperature range 13
Storage temperature 13
Degree of protection 13
Electromagnetic Compatibility (EMC) 13

Mechanical construction 14
Dimensions 14
Weight 14
Materials 14
Terminals 14

Operability 15
Operating concept 15
Local operation 15
Languages 17

Certificates and approvals 18
CE mark 18
Ex approval 18
External standards and guidelines 18

Ordering information 19
Product structure 19
Customized settings 19
Scope of delivery 19

Accessories 20
Protective housing 20

Supplementary documentation 21
Standard documentation 21
Device-dependent supplementary documentation 21

Document information

Display conventions

Safety symbols

Symbol	Meaning
NOTICE	**NOTICE**! This symbol contains information on procedures and other facts which do not result in personal injury.

Symbols for different types of information

Symbol	Meaning
	**Tip** Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to figure

Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1., 2., 3. ...	Series of steps

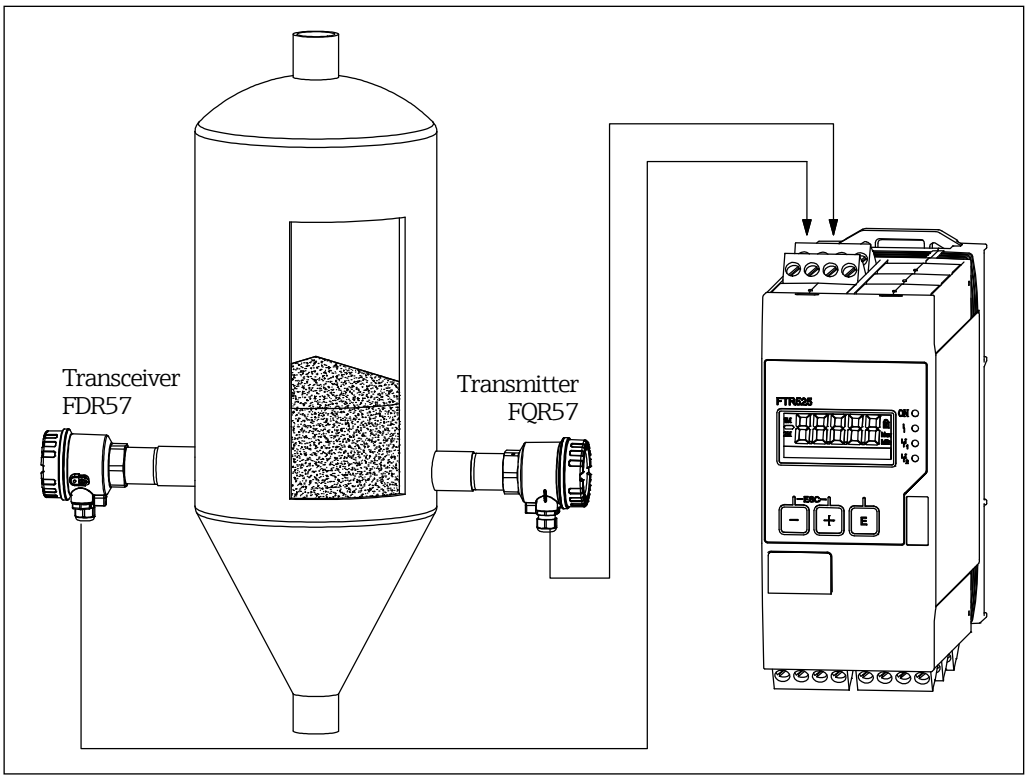
Device-specific symbols

Symbol	Meaning
	**Bidirectional communication** Indicates a bidirectional communication between the FTR525 and the devices FQR57 and FDR57 of the Soliwave microwave barrier.

Function and system design

Measuring principle

The FTR525 process transmitter supplies the Soliwave microwave barrier with a power supply. At the same time, it records the measured values of the level limit detection and, optionally, the bulk flow detection. Devices FQR57 and FDR57 of the microwave barrier can be operated and configured at the FTR525.



1 Example of level limit detection

Depending on the settings, such as amplification or delay times, the microwave barrier's measured values are released at the outputs (4 - 20 mA current output, max. two relay or SSR switch outputs → 7).

The FTR525 also offers extensive functions for the following tasks:
- Adaptation to the measuring point
- Fault display and troubleshooting
- Simulation
- User administration

Measuring system

The complete measuring system of a microwave barrier with level limit detection and optional bulk flow detection consists of a FTR525 process transmitter as well as a FQR57 transmitter and FDR57 transceiver for the Soliwave microwave barrier.

Safety

We shall only grant a guarantee if the device is installed and operated in accordance with the operating instructions (BA) and, if relevant, the safety instructions (XA). The device is equipped with safety mechanisms to protect it from having its settings accidentally changed.

Input

Measured variable

Measured process variables

- Microwave barrier
  The FQR57 transmitter emits a microwave signal which is detected by the opposite FDR57 transceiver. The FDR57 measures the attenuation of the received signal and transmits the value digitally to the FTR525.
- Microwave barrier with integrated bulk flow monitoring
  The FDR57 transceiver is also a bulk flow detector, which also emits microwaves that are reflected by the bulk solids. In doing this, the FDR57 measures the strength of the reflected frequency-shifted energy (Doppler effect) and transmits the value digitally to the FTR525.

Calculated process variables

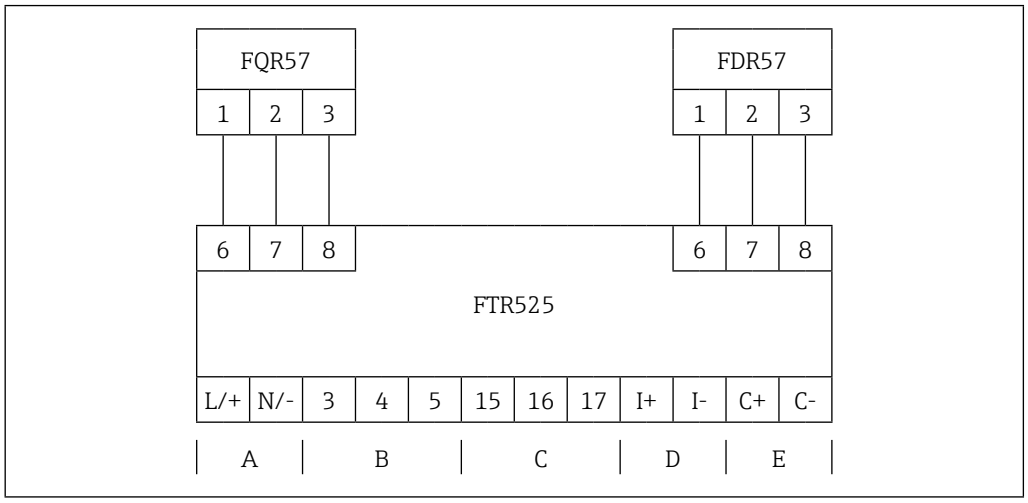
Taking into account the specified configuration, such as automatic or manual adjustment, a measuring value for level limit detection and optional bulk flow detection is mapped in the range from 0 to 100 %.

Measuring range

- The maximum detection range for level limit detection is 100 m.
- The maximum detection range for optional bulk flow detection is 10 m, depending on the bulk solids.

Input signal

- FTR525 input: Galvanically isolated from supply and output
- Type of protection (certified version): Intrinsic safety [Ex ia Ga] IIC / [Ex ia Da] IIIC
- Devices that can be connected to the Soliwave microwave barrier: FQR57, FDR57
- Power supply to FQR57/FDR57 devices: Comes from the FTR525 Nivotester
- Signal transmission: Bidirectional communication



2 Terminal assignment microwave barrier with process transmitter

A Power supply
B Switch output 1 (Relay or SSR)
C Switch output 2 (Relay or SSR, optional)
D Current output
E Switch output (open collector)

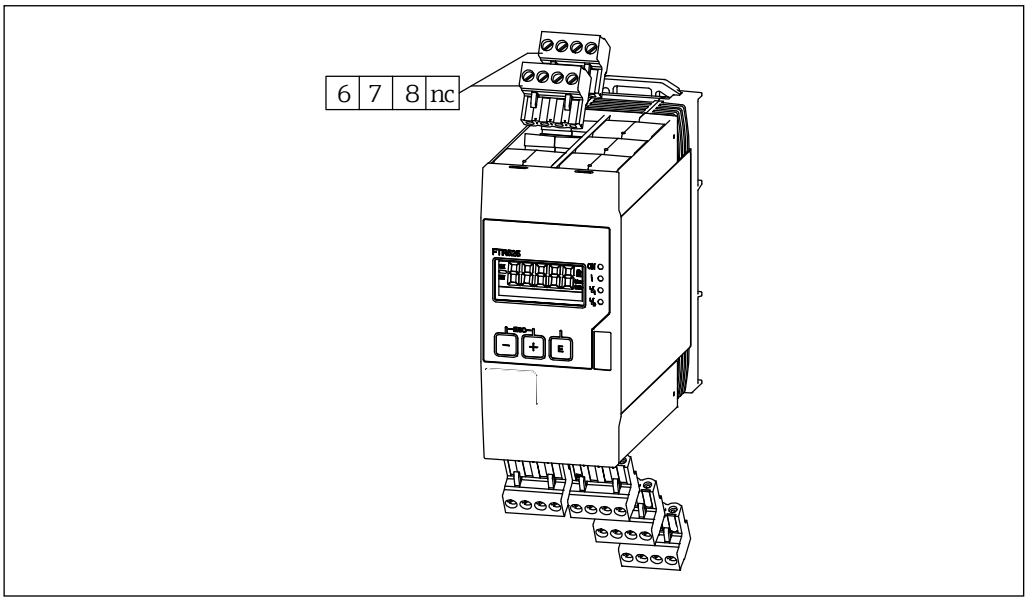
Terminals

Max. 2.5 mm²

Cable specification

- Minimum requirement: cable temperature range ≥ ambient temperature
- Connecting line to the microwave barrier: Triple wire, shield not required (except in operating conditions outside the conditions of the corresponding EMC standard → 13)
- Line resistance: max. 25 Ω per connecting line of FQR57 or FDR57

Terminal assignment



3 *Terminal assignment inputs of the FTR525*

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
None	6	(+)	→ 2
	7	(–)	
	8	⋊	

NOTICE

The two plug-in terminals (connection with the FQR57 transmitter and FDR57 transceiver of the Soliwave microwave barrier) can be in any position.

Output

Output signal

Current output

- 4 to 20 mA (passive)
- max. 22 mA
- Supply voltage max. 28 V DC

Relay output (SPDT, standard)

- Quantity: 1 (optional 2)
- Contact load: 250 V AC/40 V DC, max. 2 A
- Operating life: Min. 60 x 10^3 (mechanical)/min. 10 x 10^6 (electric)

Solid-state relay (SSR, optional)

- Quantity: 1 (optional 2)
- Contact load: 30 V AC/40 V DC, max. 400 mA

Switch output (open collector, alarm only)

- Quantity: 1
- Loading capacity: 28 V DC, max. 200 mA

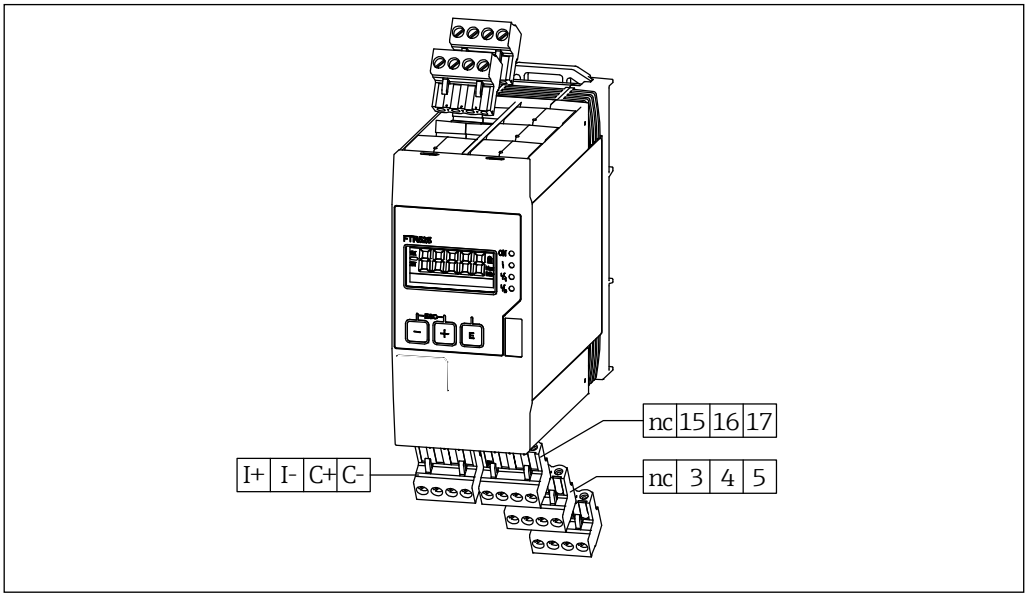
Terminals

Max. 2.5 mm^2

Cable specification

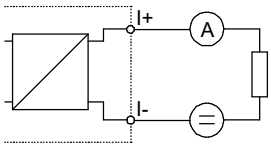
- Minimum requirement: cable temperature range ≥ ambient temperature
- Normal installation cable is sufficient for the signal outputs.

Terminal assignment

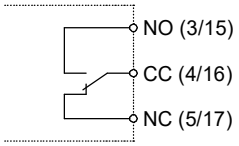


4 Terminal assignment outputs of the FTR525

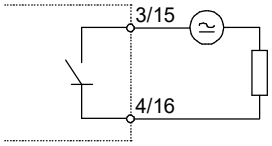
Current output

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
None	I+	I(+)	
	I–	I(–)	

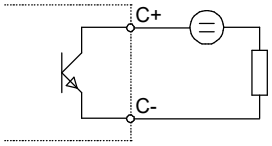
Relay output

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
Output Relay 1 (Options **1, 2**)	3	NO	
	4	CC	
	5	NC	
	nc		
Output Relay 2 (Option **2**)	15	NO	
	16	CC	
	17	NC	
	nc		

Solid-state relay (SSR)

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
Output SSR 1 (Options **3, 4**)	3	NO	
	4	CC	
	nc		
	nc		
Output SSR 2 (Option **4**)	15	NO	
	16	CC	
	nc		
	nc		

Switch output (open collector)

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
None	C+	C+	
	C–	C–	

Signal on alarm

Breakdown information is illustrated as follows, depending on the interface.

Local display

- Error code with plain text display
- Error LED (red)
- Display's background illumination changes color (red)

Current output

- Minimum: Current value ≈ 3.6 mA
- Maximum: ≈22 mA
- Programmed: Current value 3.6 to 22 mA

Relay output / Solid-state relay (optional)

Alarm function

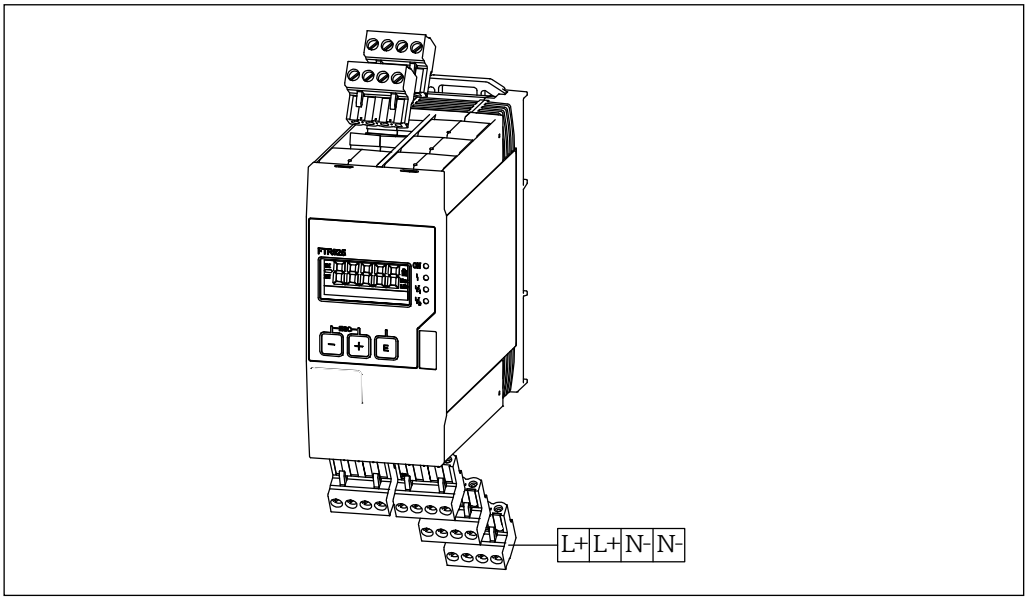
Switch output (open collector)

Alarm function

Load	Passive current output load: max. 600 Ω
Galvanic isolation	The relay outputs are galvanically isolated from each other and from all other circuits.

Power supply

Terminal assignment



5 *Terminal assignment power supply of the FTR525*

Power supply

Order code	Terminal assignment		
	Terminal labeling	Terminal assignment	Connection diagram
None	L+	L/+	–
	N–	N/–	

Supply voltage

Wide range power supply
- 24 to 230 V DC (-15 %/+10 %)
- 42 to 230 V AC (-15 %/+10 %), 50/60 Hz

NOTICE
- When connecting to the public power supply, a power switch for the device must be installed within easy reach of the device. The power switch must be labeled as a circuit breaker for the device (EN/IEC 61010).
- An overcurrent protection device (rated current of ≤ 10 A) is required for the power cable.

Power consumption

Max. 15 VA/7 W

Power failure
- Configuration retained in device memory.
- An error that occurs before the breakdown is displayed in the "last error" function, provided the error is no longer present after the restart.

Terminals

Max. 2.5 mm^2

Cable specification
- Minimum requirement: cable temperature range ≥ ambient temperature
- Normal installation cable is sufficient for the supply voltage.

Performance characteristics

Reference operating conditions

- Power supply: 230 V AC, 50/60 Hz
- Ambient temperature: +25 °C (+77 °F) ±5 °C (9 °F)
- Humidity: 20 to 60 %

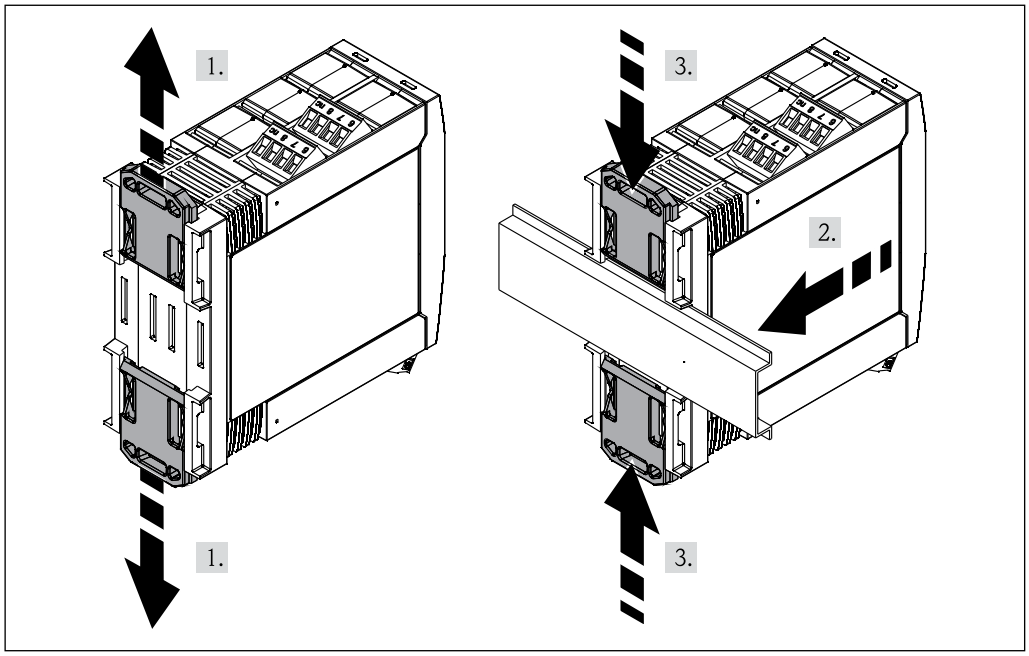
Reaction time

The reaction time is determined by the FQR57/FDR57 Soliwave microwave barrier.
→ 🖹 TI01330F

Installation

Mounting location

Mounting on top-hat rail in accordance with IEC 60715 (TH35)



6 Mounting the FTR525 on the top-hat rail

Installation procedure:

1. Slide the upper top-hat rail clip upwards and the lower clip downwards until they reach the points at which they click into place.
2. Position the device on the top-hat rail from the front.
3. Slide the two top-hat rail clips together again until they click into place.

Orientation

Vertical or horizontal

NOTICE

Heat build-up with horizontal mounting of several devices on a vertically installed top-hat rail
▸ Maintain an adequate distance between the devices.

Installation instructions

Please observe the reduced maximum ambient temperature for installation in closed housings or for end-to-end mounting (→ 13).

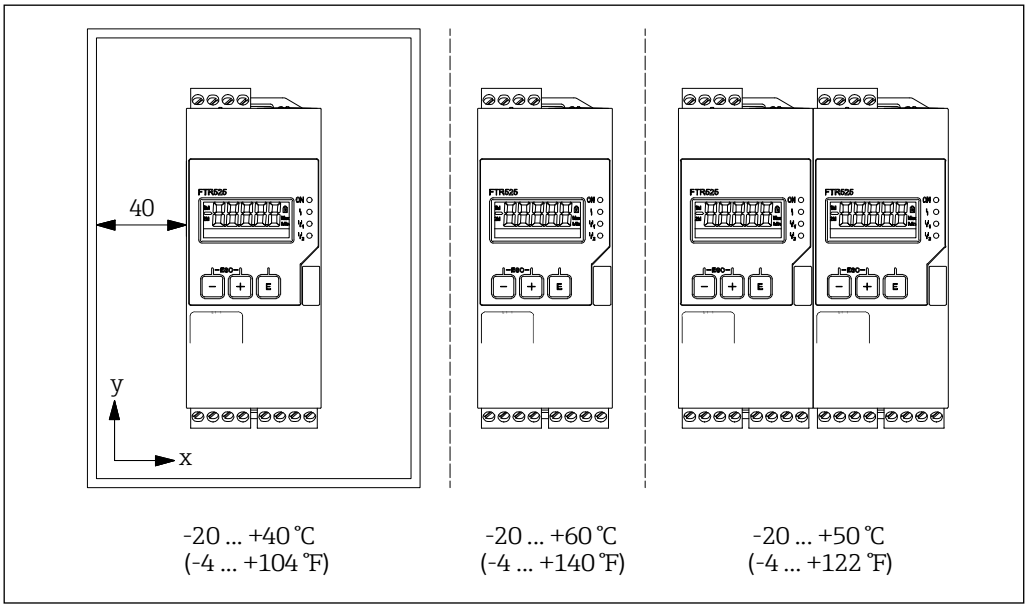
Special mounting instructions

Protective housing

A protective housing (IP66, → 20) is available for outdoor mounting. The housing offers space for several top hat rail housings up to a maximum installation width of 145 mm.

Environment

Operating temperature range



7 *Permissible ambient temperatures at the FTR525*

NOTICE

The display's operating life is reduced when operated in the upper temperature limit range
▸ To avoid heat build-up, always ensure adequate cooling of the device.

Storage temperature

-40 to +85 °C (-40 to +185 °F)

Degree of protection

Top hat rail housing IP20

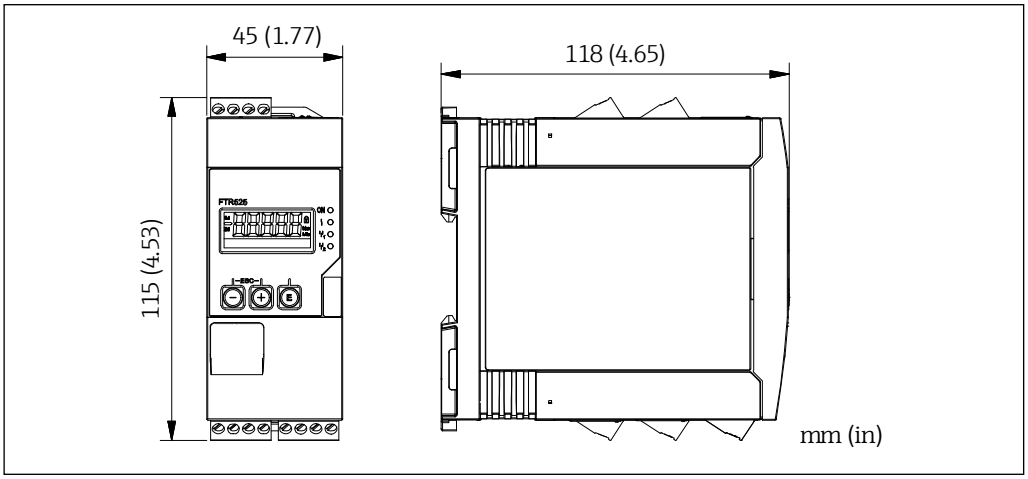
For on-site use, a corresponding protective housing with degree of protection IP66 → 20 is available.

Electromagnetic Compatibility (EMC)

- Interference emission in accordance with EN 61326, equipment in class B
- Interference immunity in accordance with EN 61326, appendix A (industrial)

Mechanical construction

Dimensions



8 Dimensions of the FTR525

Weight

Max. 350 g (12.4 oz)

Materials

- Housing: Plastic PC-GF10

Terminals

- Plug-in screw terminal
- 0.14 to 2.5 mm² (26 to 14 AWG)
- Torque 0.5 to 0.6 Nm (0.36 to 0.43 ft-lbs)

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks
- Operation
- Diagnosis
- Expert level

Fast and reliable commissioning
- Menu guidance with brief descriptions of the individual parameter functions

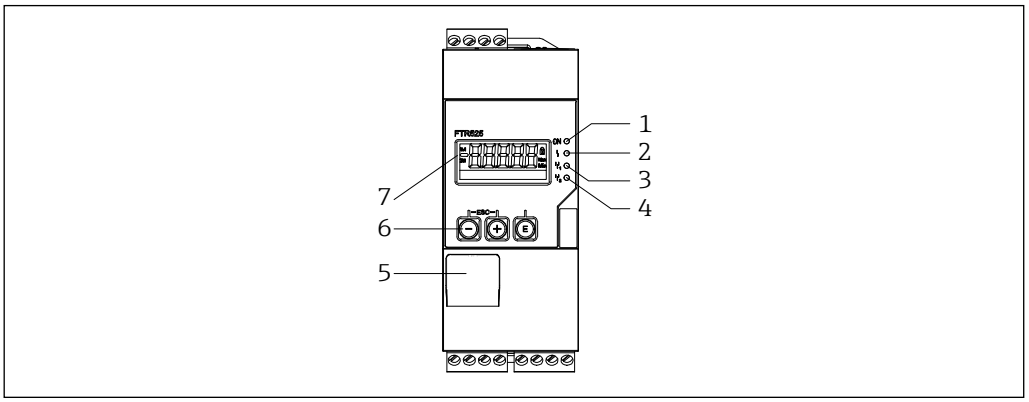
Safe operation
- Operation in the following languages: German, English (other languages on request)
- Information text in the selected language

Efficient diagnostics increase measurement availability
- Display of current and last fault
- Information text on each error that occurs
- Diverse simulation options

Local operation

Operating elements

On-site operation with three pushbuttons: ⊟, ⊞, Ⓔ

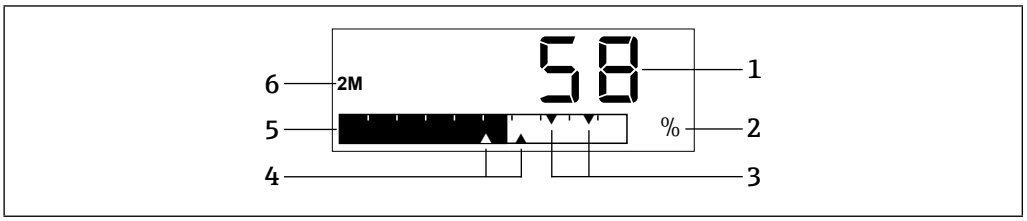


9 Display and operating options

1 Supply voltage LED (green)
2 Fault/alarm LED (red)
3 Relay/SSR output 1 LED (yellow)
4 Relay/SSR output 2 LED (yellow), optional
5 In-plant interface
6 Operating keys
7 Display

Display elements

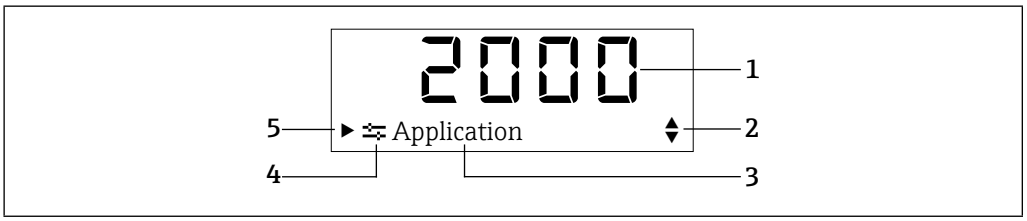
Depending on the display configuration, various illustrations of the measured values and other information, such as the switch points of the relay outputs, are possible.



10 *Example measured value display on device version with two relay outputs*

1 *Numerical measured value display*
2 *Measured value unit display*
3 *Relay/SSR 1 switch point display*
4 *Relay/SSR 2 switch point display*
5 *Measured value bar graph display*
6 *Display of measuring channel:*
- 1 M (level limit detection)
- 2 M, optional (bulk flow detection)

Function/function group display



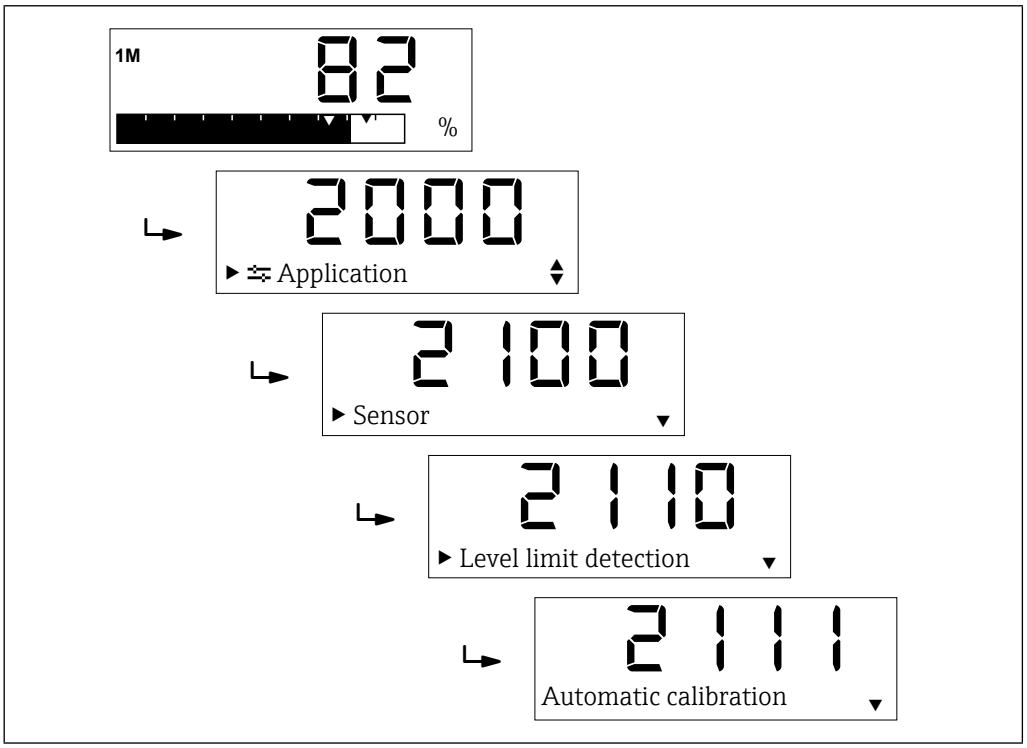
11 *Function/function group display*

1 *Function/function group number*
2 *Reference to other functions/function groups or selection options:*
▲ *Additional function/function group or selection option, previous*
▼ *Additional function/function group or selection option, next*
3 *Function/function group designation*
4 *Main function group symbol*
5 *Reference to lower-order functions/function groups*

Configuration displays

To configure the FTR525, such as to adapt to a specific application, various functions are available, which are divided into function groups

Function overview → BA01683F/97/EN



12 *Configuration displays*

Languages

- German
- English

In combination with English, other languages are available on request.

Certificates and approvals

CE mark

The device satisfies the statutory requirements of the applicable EU guidelines. These are listed in the corresponding EU Declaration of Conformity, together with the applied standards.
By applying the CE mark, Endress+Hauser confirms that the device has passed the necessary tests.

Ex approval

As associated apparatus, the process transmitter is not approved for use in hazardous areas, as it controls the FQR57/FDR57 Soliwave microwave barrier devices located there. The safety instructions in the separate document "Safety Instructions" (XA) must be observed, as referenced on the nameplate.

The separate Ex documentation (XA) with all relevant data regarding explosion protection can be obtained from your Endress+Hauser sales center or as a download from www.endress.com.

External standards and guidelines

- EN 60529
  Degrees of protection through housing (IP code)
- EN 61010-1
  Protection measures for electrical equipment for measurement, control, regulation and laboratory procedures
- EN 61326
  Interference emission (equipment in class B) and interference immunity (appendix A – industrial)
- EN 60079-0
  Hazardous areas – part 0: Equipment – general requirements
- EN 60079-11
  Hazardous areas – part 11: Device protection through intrinsic safety "i"
- EN 60079-26
  Hazardous areas – part 26: Equipment with device protection level (EPL) Ga

Ordering information

Product structure

Detailed ordering information is available from the following sources:

- In the product configurator on the Endress+Hauser website: www.endress.com → Select your country → Products → Select measurement technologies, software or components → Select product (selection lists: Measuring methods, product family, etc.) → Device support (right column): Configure the selected product → The product configurator opens for the selected product.
- From your Endress+Hauser sales center: www.addresses.endress.com

Customized settings

We also offer a service whereby the device can be pre-configured according to customer-specific wishes during manufacturing. To request this, please enclose the following form with your order.

User-specific settings

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The order option for Nivotester FTR525 with user-specific settings requires that all necessary parameters and options are mentioned. Whereever informations are missing, default values will be used. This completed form must be supplied with every order.

Order code: **FTR525 -** ☐☐☐

2112 Manual adjustment LL (Point level detektion) _____ % (0 ... 100 %; **30 %**)	2113 Manual adjustment UL (Point level detektion) _____ % (0 ... 100 %; **80 %**)	2114 Damping (Point level detektion) ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**
2122 Manual adjustment LL (Bulk flow detection) _____ % (0 ... 100 %; **30 %**)	2123 Manual adjustment UL (Bulk flow detection) _____ % (0 ... 100 %; **80 %**)	2124 Damping (Bulk flow detection) ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**
2130 Parallel mode ❑ **Channel 1** ❑ Channel 2 ❑ Channel 3 ❑ Channel 4 ❑ Channel 5	2210 Assignment switching contact 1 ❑ **Limit (1M)** ❑ Failure ❑ Motion (2M) *1	2220 Assignment switching contact 2 *1 ❑ **Limit (1M) *2** ❑ **Motion (2M) *3** ❑ Failure
2230 Assignment current output ❑ **Limit (1M)** ❑ Motion (2M) *1	2310 Current output mode ❑ **Standard** ❑ Magnify	2320 4mA value (if 2310 = Magnify) _____ % (0 ... 100 %; **10 %**)
2330 20mA value (if 2310 = Magnify) _____ % (0 ... 100 %; **90 %**)	2340 Failure mode ❑ **MIN (<4mA)** ❑ MAX (>20mA) ❑ Fixed value	2350 Fixed value (if 2340 = Fixed value) _____ mA (3.6 ... 22.0 mA; **12.0 mA**)
2411 Switching function output 1 ❑ **Min.safety** ❑ **Max.safety**	2412 Switch-on point output 1 _____ % (0 ... 100 %; **50 %**)	2413 Switch-off point output 1 _____ % (0 ... 100 %; **40 %**)
2414 Switch-on delay output 1 ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**	2415 Switch-off delay output 1 ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**	2421 Switching function output 2 *1 ❑ **Min.safety** ❑ **Max.safety**
2422 Switch-on point output 2 *1 _____ % (0 ... 100 %; **50 %**)	2423 Switch-off point output 2 *1 _____ % (0 ... 100 %; **40 %**)	2424 Switch-on delay output 2 *1 ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**
2425 Switch-off delay output 2 *1 ❑ 100 ms ❑ 200 ms ❑ 300 ms ❑ 500 ms ❑ 1 s ❑ 2 s ❑ 3 s ❑ 5 s ❑ 10 s ❑ 20 s ❑ **Off**	3111 TAG _____ (max. 16 digits)	3123 Define unlock parameter _____ (4 to 16 digit, **0000**) Notice: 0000 = no unlock parameter
3510 Language ❑ **English** ❑ Deutsch	3520 Display mode ❑ % limit (1M) ❑ **Bargraph limit (1M) *2** ❑ TAG limit (1M) ❑ % motion (2M) *1 ❑ Bargraph motion (2M) *1 ❑ TAG motion (2M) *1 ❑ % alternating (1M/2M) *1 ❑ **Bargraph alternating (1M/2M) *1 *3** ❑ TAG alternating (1M/2M) *1	3530 Back to home _____ s (3 ... 9999; **120**) 3550 Contrast ❑ 1 ❑ 2 ❑ 3 ❑ **4** ❑ 5 ❑ 6 ❑ 7 3560 Brightness ❑ 1 ❑ 2 ❑ 3 ❑ **4** ❑ 5 ❑ 6 ❑ 7

Notice:
The bold marked options are the default values.
*1 Available with appropriate type of device
*2 Default on FTR525-**1
*3 Default on FTR525-**2

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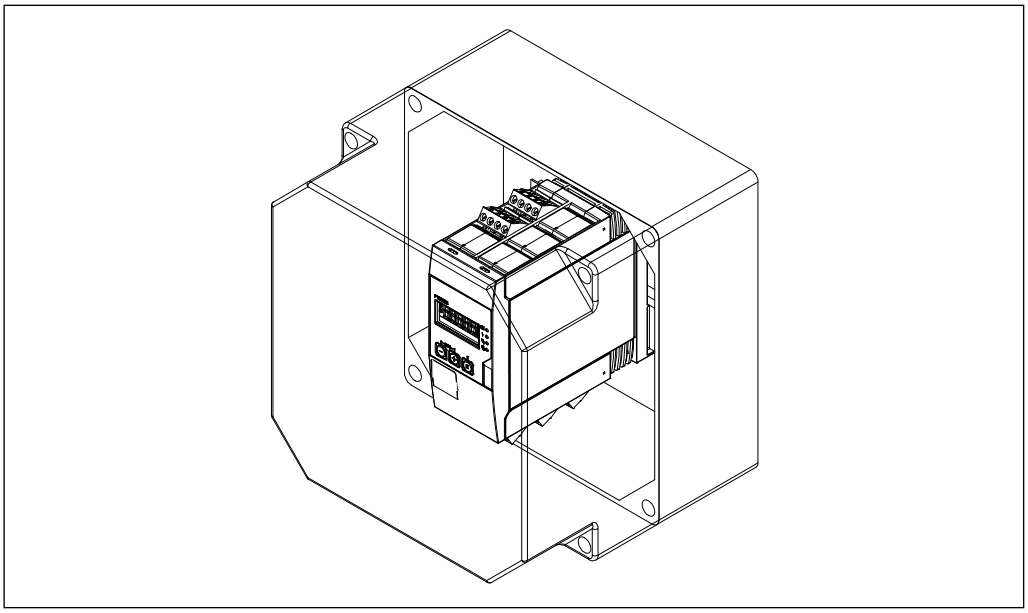
Scope of delivery

The scope of delivery includes the FTR525 process transmitter with control unit and the KA01344F/97/A2 brief operating instructions in a box.

Accessories

Protective housing

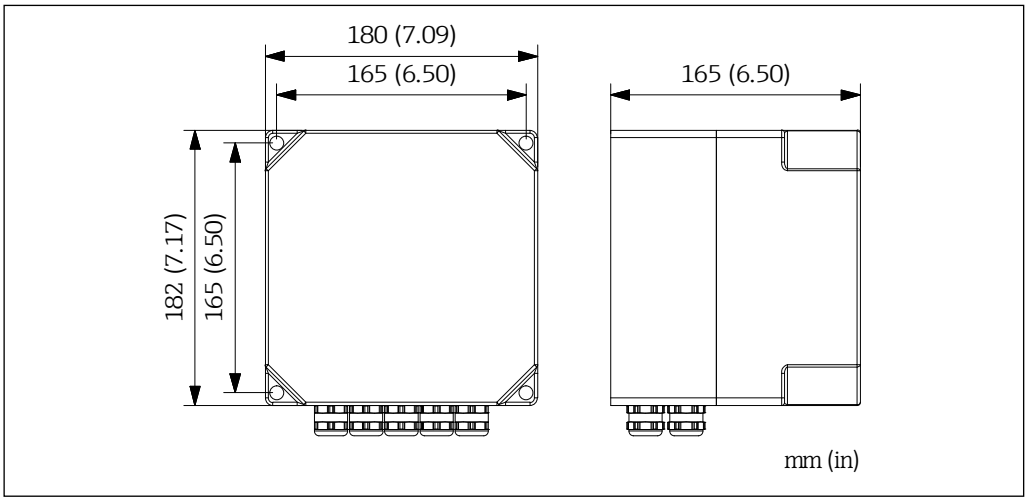
For on-site use of top-hat rail devices like the FTR525 Nivotester, a corresponding protective housing can be supplied. The housing offers space for several top hat rail devices up to a maximum installation width of 145 mm.



13 Protective housing for top-hat rail devices

Technical data:

- Order No.: 52010132
- Degree of protection (in accordance with EN 60529): IP66
- Material:
  - Lower housing section: Fiber-glass reinforced polycarbonate, color gray
  - Housing cover: Polycarbonate, transparent
  - Seal: PU
- Top-hat rail (EN 60715): Galvanized
- Cable entries: M20 x 1.5 (max. 5 pieces)



14 Dimensions of protective housing

Supplementary documentation

For an overview of the scope of the associated technical documentation, see the W@M Device Viewer: enter serial number from nameplate (www.endress.com/deviceviewer)

Standard documentation

Operating instructions for FTR525 Nivotester
Documentation code: BA01683F

Operating instructions for Soliwave FQR57/FDR57
Documentation code: BA01684F

Device-dependent supplementary documentation

Safety instructions ATEX
Documentation code: XA01603F

Safety instructions IECEx
Documentation code: XA01604F

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