TURCK

Industrial
Automation

PROFIBUS-PA

USER MANUAL DIGITAL FIELDBUS DISPLAY FD-48-T317/EX

PROFI® PROCESS FIELD BUS

F1089/01

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Industrial Automation

Contents

Definition of the used symbols

WARNING

This sign is placed next to a warning indicating a potential hazard.
This can relate to personal injury as well as to system (hardware and software) and equipment damage.
The user should interpret this symbol as follows: exercise extreme caution.

NOTE

This sign is located next to general notes providing important information on individual or stepwise work procedures.
The relevant instructions can facilitate work and possibly help to avoid additional work resulting from faulty procedures.

1 Notes for explosion-proof equipment

Scope and regulations

The notes and warnings stated in these operating instructions must be observed in order to ensure safe and proper operation. This equipment must only be used for its intended use. It complies with EN 60079 regulations, in particular EN 60079-14 “Electrical Equipment for Explosion Hazardous Areas” and EN 50281-1-2 “Electrical Apparatus for Use in the Presence of Combustible Dust”. It is suitable for use in hazardous locations that are endangered by gases and vapours which are assigned to the explosion group stated on the type label. The erection and operation of explosion-proof controllers and systems must be carried out according to the relevant national regulations and directives.

General notes

Correct and safe operation of this equipment relies on appropriate transport and storage, correct installation as well as careful operation and maintenance. Any work on the equipment must only be carried out by trained and qualified personnel. The electrical characteristic values stated on the type label and the EC type examination certificate TÜV 07 ATEX 553588, and any special requirements related to this must be observed.

If the installation is outdoors, it is recommended that the explosion-proof device is protected against direct influence of the weather, e.g. by means of a protective cover. The maximum permissible ambient temperature is stated in the technical data in the Appendix.

Intrinsically safe circuits

The installation instructions stated in the EC type examination certificates of the intrinsically safe electrical equipment must be observed. The safety-related electrical values stated on the type label must not be exceeded in the intrinsically safe circuit. When intrinsically safe circuits are interconnected, the occurrence of a voltage and/or current addition must be tested. The intrinsic safety of the interconnected circuits must be ensured (EN 60079-14, section 12)

The certification of intrinsic safety is not required if the display device is connected to a FISCO-compliant fieldbus.

WARNING

Working on live electrical installations and equipment is expressly forbidden in hazardous locations. This does not apply to work on intrinsically safe circuits. In special cases, work can also be carried on non-intrinsically safe circuits, in which case it must be ensured that an explosive atmosphere is not present during the work.

Isolation must only be tested with permissible explosion-proof measuring devices.

Earthing and short-circuiting must only be carried out if there is no explosion hazard at the point of earthing and short-circuiting

- **Danger of static charging. Only clean with damp cloth!**
- **Do not open in an explosive dust-loaded atmosphere!**

2 FD-48-T317/Ex Digital Display

Brief description

The FD-48-T317/Ex digital display device is used for displaying process information of fieldbus nodes connected to the PROFIBUS-PA network. The display device operates as a “listener”, i.e. it does not appear on the bus as a node with its own address and also does not increase the traffic on the bus.
The display device listens to the data (only publisher/subscriber data traffic) published by a field device.

The process value of the actuator or sensor is displayed as a five-digit number, and the process value status can be scanned via status key. As well as the display for measured values, the device also features a 41 segment bargraph for trend monitoring that can be scaled separately from the displayed value.

The device is also provided with a rugged powder-coated die-cast aluminium housing.

The FD-48-T317/Ex digital display device can be used in Zone 1 and 2 (hazardous area exposed to gas) as well as in Zone 21 and 22 (area exposed to dust hazards).

Overview of features

FD-48-T317/Ex Ex i display device in the fieldbus network

Uses the auxiliary supply from the fieldbus – use in an Ex environment is simple since no power supply cables are required
Provided with an easy to install bus node connection.

Explosion protection for gas and dust-laden environments:

II 2(1) G, EEx ia IIC T6 and T5
II 2 D, IP65 T 70°C

Display:

Five-digit 7-segment display (display range from -9999 to (+)99999)
LCD display with 30 mm digit height
Fast response bargraph for trend monitoring (41 segments, image generated several times per second)

Ergonomics:

Microprocessor technology for extensive paramaterisation options
Status control key
All parameters retained after power failure
Parameters can be modified during operation
Exchangeable unit of measure symbols

Housing:

Rugged die-cast aluminium housing
Dimensions (H x W x D) 140 x 140 x 72 mm

3 Mounting and connection

Mounting

Choose a solid surface for fastening the display device.

The device has an integrated paper strip for writing the unit of measure symbols.

- To write the required unit of measure symbols on the paper strip, unscrew the four screws of the housing cover and remove the cover.
- The unit of measure symbol slot is located under the display panel.

Inserting the unit of measure symbols:

- Insert the prepared paper strip with the symbols facing the front into the unit of measure symbol slot on the inside of the housing cover.
- Screw on the cover to the housing bottom.

Connection

WARNING

The device should only be connected to the PROFIBUS-PA network.

The maximum values for terminal voltage and short-circuit current specified in the EC type examination certificate TÜV 07 ATEX 553588 must be observed.

The device must be earthed if there is a risk of static charge.

There must be a low-resistance connection between shield of the connection cable and the screw connection.

When used in hazardous locations the housing must be connected to the equipotential bonding via the external earthing connection (EN 60079-14, para. 12.2.2.3).
Any multiple earthing must only be implemented using a capacitive connection (EN 60079-14, para. 12.2.2.3c).

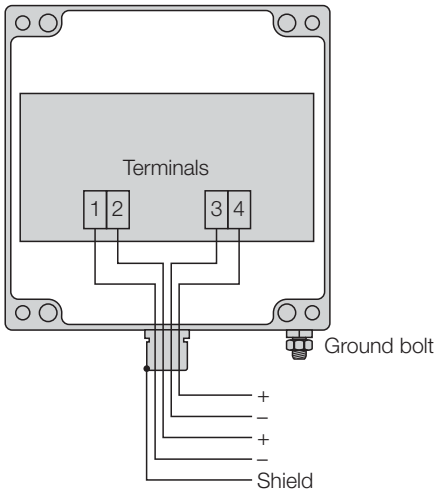
The connection terminals of the display device are located in the housing.

To connect, undo the housing screws and remove the cover.

The figure below shows the terminal arrangement:

- Terminal 1: –
- Terminal 2: +
- Terminal 3: – For other bus nodes
- Terminal 4: + For other bus nodes
- The shield must be connected to the housing of the cable gland

After connection screw on the cover.



Commissioning

1. A display segment test is carried out for one second after the device is connected.
2. The version number of the device is displayed for another second.

The device is factory set with the following parameters when commissioned for the first time after initial connection:

Description	Display	Parameter
Number of displayed channels	Chan	1
Automatic channel switching	Auto	No
Fieldbus address(es)	Addr.1 Addr.2 Addr.3	0
Index (Offset) of the first byte of the value to be displayed from the received user data	OFFS1 OFFS2 OFFS3	1
Dispaly of input i.e. output data	OUT.I1 OUT.I2 OUT.I3	In (input data)
Interchange of the most significant and the least significant bytes of the floating point values	SFL1 SFL2 SFL3	No
Set decimal place	dP.PO1 dP.PO2 dP.PO3	1
Display bargraph	bAr	Yes
Min value for bargraph	bar.L1 bar.L2 bar.L3	0
Max value for the bargraph	bar.H1 bar.H2 bar.H3	100
Status bargraph	STATU	Yes
Measured value scaling factor	SFAC1 SFAC2 SFAC3	1,000
Measured value scaling offset	SOFS1 SOFS2 SOFS3	0,0
Menu code word	CodE	0001
Menu end	END	/

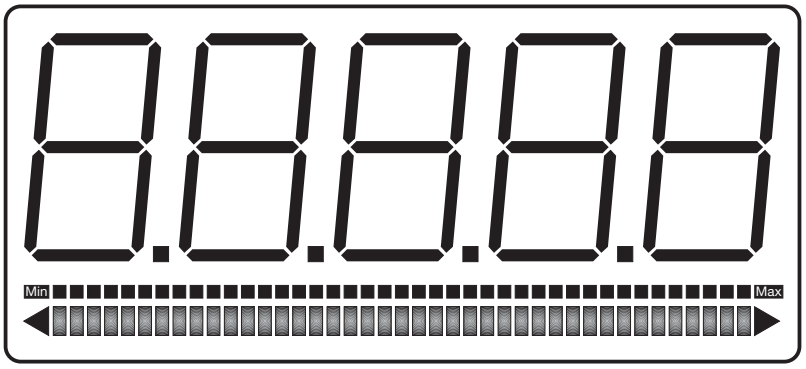
Restoring the factory set parameters (RESET)

NOTE

Pressing the Enter key  and the Right key  simultaneously during the startup will restore the factory set parameters.

4 Operation

LCD front view



Display with decimal points

Bargraph for measured value

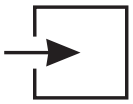
Bargraph for status information

Status information

The status of the measured value is displayed by the bargraph for status information. Values to be displayed are: Low-Low, Low, Good, High und High-High
If all the segments of this bargraph are indicated, the measured value is (= „**uncertain**“).

Keypad

Three membrane keys with different function symbols are located on the front of the display device.
These keys enable the user to select all functions of the device and carry out the individual settings. The keys have the following names:



Enter key
The *Enter* key is used to activate the Entry menu.
Pressing the Enter key activates the displayed menu item or confirms entries.

Up key
The *Up* has the following functions:
– Status byte scan (Status key)
– Modification of the selected digit
– Move through menu items

Right key
The *Right* has the following functions:
– Move through channels
– Change the selected digit
– Move to menu end

LEDs

The display device has three LEDs. Each LED shows its respective channel and the associated physical unit of measure by means of unit of measure symbols on a paper strip. Inserting the writable paper strip (see page 6)

The LED states have the following meaning:

Green:	The channel is active, the data is received correctly and displayed.
Green flashing:	The display device cannot detect data traffic on the bus at the set address. See also section 5, Error messages: “Error C”.
Off:	The corresponding channel is not displayed.

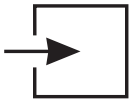
Menu structure, parameter entry

Display of operating state

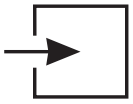
After the display device is connected up it starts up with the initialisation of parameter and scaling data. This is read from the internal EEPROM memory and comes from the previous operation. On delivery this memory is assigned default values (see page 8)

Holding down the *Up* key (Status key) will cause the display of the status byte belonging to the float value.
Releasing the key will return the device to the output status (operating state).

1. Switching to Code word protection



Starting from the operating state, pressing the *Enter* key switches to Code word protection.

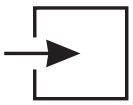


Entering and modifying device settings is to be reserved for authorised persons. The activation of the Entry menu is therefore protected by the code word.
The Code word menu is factory set to [0001]. The code word request for accessing the Entry menu cannot be deactivated.

Confirm with the *Enter* key in order to modify the code word.

A flashing bar will appear underneath the 1st digit on the left (the sign can be entered here in the Entry menu).
Pressing the *Right* key will select the digit to be modified and pressing the *Up* key will increment the value by one.

2. Switching to the Entry menu



The Entry menu for setting parameters is started after the correct code word is entered and confirmed via the *Enter* key.

List and explanation of parameters in the Entry menu –
see next page.

Parameters in the Entry menu (see also parameter example page 14)

The parameters are shown as simple digits on the 7-segment display.
The following list shows the name and values of the parameters in the order of their appearance and provides an explanation.
The setting of each parameter must be confirmed by pressing the *Enter* key.
This will cause the next parameter to appear.
The *Right* key can be used to jump directly to the end of the menu after the parameter has been displayed.

Chan	The parameter can specify the number (1…3) of measured values (= channels) to be displayed.
Auto	If more than one channel is to be displayed, setting Auto = yes will cause the automatic switching through channels (delay approx.4 sec.) during operation. Otherwise one channel will remain on the display until the operator presses the *Right* key.
Addr1	This is used to set the bus address that is to be “listened to”. If several channels were activated “Addr2” and “Addr3” will then appear.
OFFS1	The parameter "Offset“ indicates the index (Offset) of the first byte of the displayed value received from the user data. If more channels were activated „OFFS2“ and „OFFS3“ will then appear.
OUT.I1	The parameter „Out I1“ (Data Out 1) is used to define whether the input data or the output data of the PROFIBUS slaves should be displayed. „Out I1 = Yes“ shows the output data, „Out I1 = No“ shows the input data If several channels were activated „OUT.2“ and „OUT.3“ will then appear.
S FL1	With parameter „S FL1“ (Swap Float) the significance of the two bytes in the data word can be swaped. This is necessary depending on the usage of the PROFIBUS slave. If several channels were activated „S FL2“ and „S FL.3“ will then appear.
dP.PO1	This menu item defines the position of the decimal point. If several channels were activated, “dP.PO2” and “dP.PO3” will then appear.
bAr.	This menu item defines whether a values bargraph is to be displayed or not. “bAr = “Yes”: displays the bargraph. “bAr = “No”: does not display the bargraph.
bar.L1	If the bargraph was activated in menu item bAr., the minimum value of the bargraph (= Bargraph Low 1) must be defined for all channels in order to scale the bargraph to customer requirements. If several channels were activated, “bar.L2” and “bar.L3”. will then appear.
bar.H1	If the bargraph was activated in menu item bAr., the maximum value of the bargraph (= Bargraph High1) must be defined for all channels in order to scale the bargraph to customer requirements. If several channels were activated, “bar.H2” and “bar.H3” will then appear.

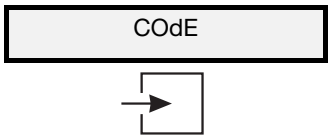
STATU	This menu item is used to define if the status bargraph should bedisplayed or not
SFAC1	The menu item “SFAC1” (measured value scaling: factor) defines the factor by which the currently displayed value is multiplied. SFAC1 = 10.0 will display a ten times larger display value than the value read in the data word. The factor can be entered up to 3 places behind the point, and the display will scroll automatically to the left during entry. If several channels were activated, “SFAC2” and “SFAC3” will then appear.
SOFS1	Menu item “SOFS1” (measured value scaling: Offset) defines the offset constant. The display then outputs the *sum* of the read data value and the offset. SOFS1 = -10.0, means that 10 will be deducted from the read data word before it is displayed. If several channels were activated, “SOFS2” and “SOFS3” will then appear.
CodE	This menu can be used to reset the factory set code word “0001” in order to prevent access to the Entry menu by unauthorised persons.
End	Exit the menu by pressing the *Entry* key. The display device returns to the operating state. The entries become active immediately and are also stored after the display device is disconnected from the bus. Carry out a RESET in order to use the factory set settings (see page 8).

Parameter example

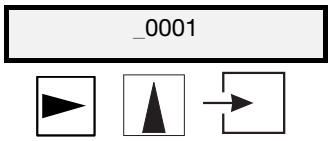
The following example of a temperature display with a limit value warning is used to explain the parameter setting procedure.

Required settings:	Fieldbus address	41
	Offset (Index des Anzeigewertes)	0
	Indication of the output data of bus master	Out
	Swap of High- and Low bytes	No
	Decimal places	2
	Max value for the bargraph	5000
	Measured value scaling: Factor	1
	Measured value scaling: Offset	0
	Code word menu	0001

Press the *Enter* key.
This exits the operating display and activates the code word protection.

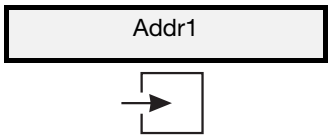


The code word is requested.
The factory set menu code word is [0001].
Then confirm the entry by pressing the *Enter* key.

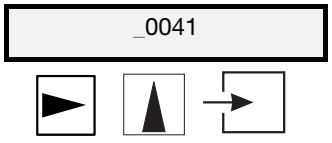


1. 2. 3.

A flashing bar will appear under the sign digit.
Pressing the *Right* key will select the digit to be modified and pressing the *Up* key will increment the value by one.
Use this procedure to enter the code word 0001.
Then press the *Entry* key to access the Entry menu.

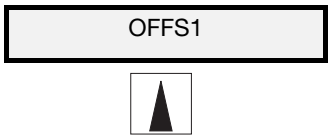


The bus address parameter will appear.
Then confirm the entry by pressing the *Enter* key.



1. ⇔ 2. 3.

Proceed as for Code word entry.
Pressing the *Right* key will select the digit to be modified and pressing the *Up* key will increment the value by one.
Use this procedure to enter the address 41.
Then confirm the entry by pressing the *Enter* key.



The next parameter „Offset“ is skipped with the *Up* key.

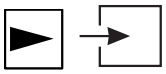
OUT.I1

The next parameter „display of output data“ is skipped with the *Up* key.

S FL1

The next parameter „Swap Float“ is skipped with the *Up* key.

dP.PO1



1. 2.

The decimal point is set so that two decimal places are shown.
Pressing the *Right* key will select the digit at which the decimal point is to be set.
Then confirm the entry by pressing the *Enter* key.

bAr.H1

1. 2. 3.

The upper scaling mark of the bargraph is entered.
Proceed as for Code word entry.
Pressing the *Right* key will select the digit to be modified and pressing the *Up* key will increment the value by one.
Use this procedure to enter the value 5000.
Then confirm the entry by pressing the *Enter* key.

STATU

The next parameter „Status-Bargraph“ is skipped with the *Up* key.

SFAC1

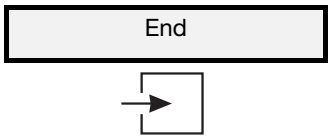
The next parameter “Scaling factor” is skipped by pressing the *Up* key.

SOFF1

The next parameter “Scaling offset” is skipped by pressing the *Up* key.

COdE

The last parameter “Code word protection” is skipped by pressing the *Up* key.



Exit the menu by pressing the *Entry* key.
The display device returns to the operating state. The entries become active immediately and are also stored after the display device is disconnected from the bus.

NOTE

If a value outside of its valid range is entered, moving to the next parameter is not possible until a valid value has been entered.

5 Appendix

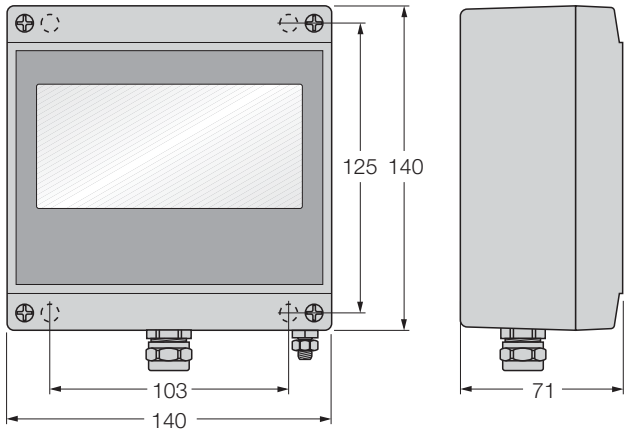
Technical data

Type Ident-no.		FD-48-T317/Ex 6901315
General	Explosion protection	II 2(1) G, EEx ia IIC T6 and T5 II 2 D, IP65 T 70°C
	Explosion limit values FISCO-compliant	U_i = 30 V I_i = 660 mA P_i = 1.6 W C_i = 0 F, Li = 0 H
	EC type examination certificate	TÜV 07 ATEX 553588
	Ambient temperature T_{amb}	-10°C ...+45°C for T 6 and -10°C ...+60°C for T 5 -10°C ...+65°C for II 2 D (devices with range starting temperature of -20 °C on request)
Housing	Type	Field housings
	Protection degree	IP66 according to IEC/EN 60529
	Dimensions W x H x D [mm]	140 x 140 x 71
	Material	Aluminium
	Weight	900 g
Display	LCD	5-digit LCD 7-segment display
	Digit height	30 mm
	Display range	-9999 ... +99999
	Dimension symbols	Can be inscribed with insert symbol strip
	Decimal points	Freely adjustable for scaling
	Bargraph	41 segments
Electrical Specifications	Auxiliary supply	None – fed from bus (9...30 V)
	Current consumption (Bus)	< 10 mA
	Status control key	Display of the current status code

Error messages

Error indication	Cause	Remedy
Err_E.	“EEPROM ERROR” The data in the EEPROM is inconsistent and is not accepted.	Switch the device off and on. If the error persists the device must be exchanged.
Err_C.	The display device cannot detect data traffic on the bus at the set address.	Check the set device address

Dimension drawing FD-48-T317/Ex



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