User manual TFT1 – triple display

Direct voltage / Direct current signals: 3x 0-20 mA, 4-20 mA or 0-10 V

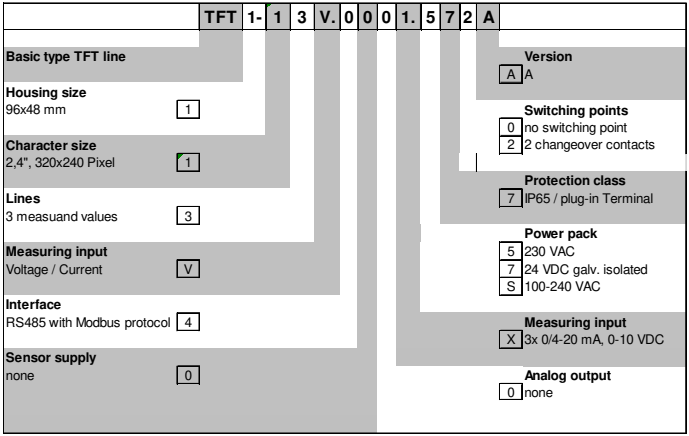
Technical features:

- indication of measuring value of 3x -1999…9999 digits
- digit height approx. 9 mm
- selectable colour of measurand and background: red, green, white, black or orange
- minimal installation depth: 25 mm without plug-in terminal, with transformer 42 mm
- display panel 2,4“, 320x240 Pixel
- adjustable sign for physical dimensions
- min/max value recording
- 9 adjustable supporting points
- display flashing at threshold value exceedance / undercut
- programming interlock via access code
- protection class IP65 at the front side
- pluggable screw terminal
- optional 2 switchingpoints (changer)
- accessories: PC-based configuration-kit PM-TOOL with CD and USB-adapter

Identification

STANDARD-TYPES	ORDER NUMBER
Direct voltage / Direct current Housing size: 96x48 mm	**TFT1-13V.0001.570A** **TFT1-13V.0001.770A** **TFT1-13V.0001.S70A**

Options – Breakdown order code:



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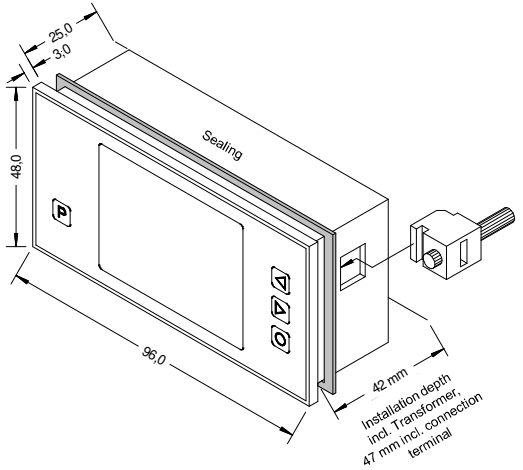
1. Device description

The panel meter **TFT1-13** is a 4-digit digital indicator for the measuring of up to three voltage/current signals (galvanically not isolated) with adjustable physical unit. The device is equipped with two switching points, which support different kind of operating modes. It can be monitored via a threshold value with hystersis or a window contact with alarm range.
The configuration happens via 4 front keys or via the optional PC-software PM-TOOL.
An integrated programming interlock prevents unrequested changes of the parameters; it can be unlocked again by an individual code. The electrical connection happens on the rear side via plug-in terminals. Selectable functions like e.g. the request of the min/max value, a zero point slowdown, a direct change of the threshold value during operating mode and additional measuring suppoerting points for linearisation round up the concept of a modern device.

2. Assembly

Before assembly, please read the *Safety advices* on page 23 and keep this user manual for future reference.



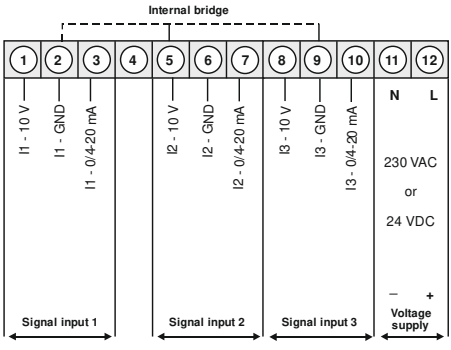
1. After removing the fixing elements, insert the device.
2. Check the seal to make sure it fits securely.
3. Click the fixing elements back into place and tighten the clamping screws by hand. Then use a screwdriver to tighten them another half a turn.

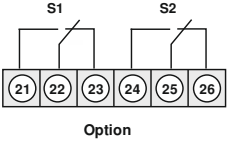
CAUTION! The torque should not exceed 0.1 Nm!

3. Electrical connection

3.1. Terminal assignment

Type TFT1-13V.0001.X72A



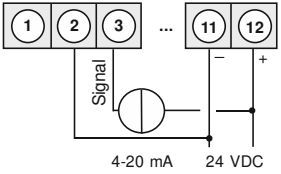


3.2. Connection examples for signal input

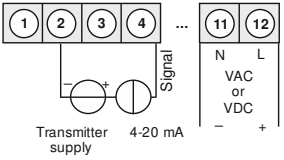
Below please find some connection examples, which demonstrate some practical applications:

3.2.1. Current / Voltage

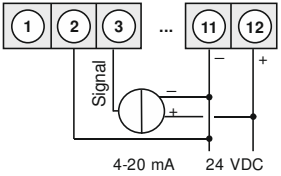
2-wire sensor 4-20 mA



2-wire sensor 4-20 mA
with external voltage source

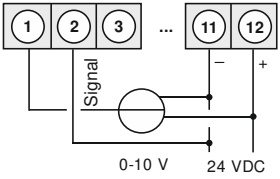


3-wire sensor 0/4-20 mA

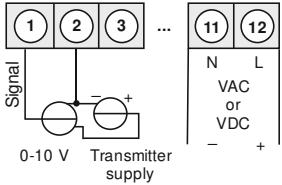


3-wire sensor 0/4-20 mA
with external voltage source

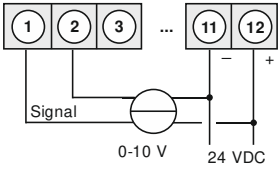
3-wire sensor 0-10 V



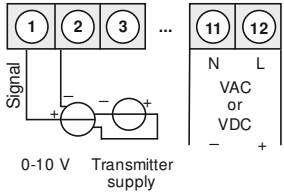
3-wire sensor 0-10 V
with external voltage source



4-wire sensor 0-10 V, 50 mV



4-wire sensor 0-10 V
with external voltage source



4. Description of function and operation

4.1. Operation and display elements

The indicator is equipped with 4 keys, with which the device can be adjusted and deposited functions can be called up during operation. Parameters, that are adjustable or changeable, will be displayed inverse. Adjustments that were made in the parameter level will be confirmed with **[P]** (short/long) and thus saved. In configuration mode, the name of the parameter appears in the upper window and the current adjustment in the middle of the window. The indicator saves all adjustments automatically and changes into operation mode, if no further key operation takes place within 25 seconds. The two navigation keys **[◀] [▶]** can be used to switch between the different parameters. The configuration mode can be interrupted with the **[O]**-key and a taring can be triggered.

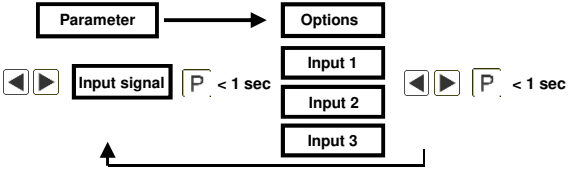
Key symbol	Function in operation mode	Function during parameterisation
Program key [P]	Change into parameterisation with program key **[P]** > 1 sec.	• Change to a lower parameter level or to the desposited value = short < 1 sec **[P]**. • Value transfer for text paramaters = short < 1 sec **[P]**. • Position change with digit parameters / string sequences (e.g. End value) = short < 1 sec **[P].** • Value transfer at digit parameters / string sequences = long **[P]** > 1 sec.
Minus key [◀]	Depending on the set key function, the minimum value can be called up or a lower limit value can be changed with the minus key **[◀]**.	• Change between parameters and changing of parameters in the value level.
Plus key [▶]	Depending on the set key function, the maximum value can be called up or an upper limit value can be changed with the plus key **[▶]**.	• Change between parameters and changing of parameters in the value level.
Zero key [O]	Triggering e.g. Tara (Value Offset)	• Cancellation of the configuration / change menu level (back)

A switched-on relay or an activated switching point is visually reported in the display via a colour change of the background. A display overflow/underflow is displayed via 4 arrows „↑ ↑ ↑ ↑“ respectively „↓ ↓ ↓ ↓“.

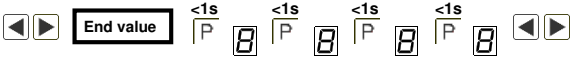
4.2. Adjustment of device parameter, numerical values and text

[P] short = < 1 sec
[P] long = > 1 sec

Device parameter, e.g. selection of the input signal

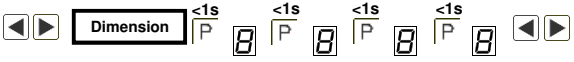


Numerical values, e.g. end value of measuring range



Numerical values are adjusted from the largest to the smallest digit with **[◀] [▶]** and confirmed digit per digit by briefly pressing the **[P]-**key. A minus sign can only be parameterized on the most significant digit. After the last digit, the input changes back on to the most significant position. A transfer takes place by a long press on the **[P]-**key. Here, an area monitoring takes place and if necessary a correction option.

Text, e.g. dimension



Texts are transfered by a long press on the **[P]-**key. Only the text to the left of the current cursor position is taken over, all still visible letters and numbers as from the current cursor position are removed. A text length of maximum 7 characters is available. Special characters and lowercase letters are selected by long pressing of the directional keys.

5. Adjustment of the device

5.1. Power-on

After completing the installation, you can put the device into operation by applying the supply voltage. First check all electrical connections again for their correct connection.

Starting sequence

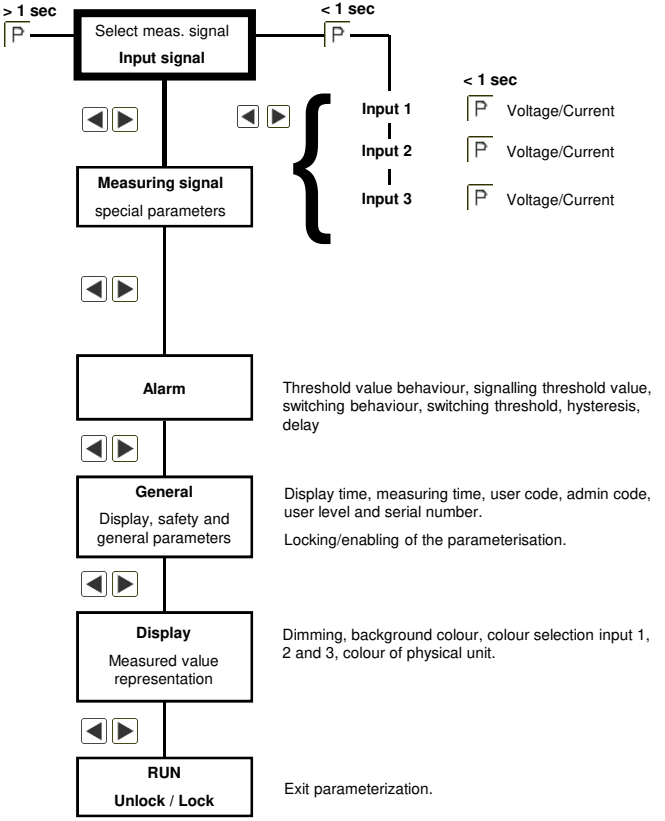
During starting sequence, the device type and software version are displayed for 3 seconds. After the starting sequence follows the change into the operating or display mode.

6. Parameterisation

6.1. Selection of input signal: Input type

During the adjustment of the type, an allocation of the input version takes place.

Choose between 3 input types of voltage and current.



6.1.1.1. Signal input: 1-I1 range: 0-10 V, 0/4-20 mA

With the measuring inputs voltage/current, it is possible to carry out a calibration directly on the measuring section, in addition to the preset input signals. For this, select **Sen.V** or **Sens.mA** as input type.
If the parameter **Sens.Calib** (calibration) is confirmed with **Yes**, the alignment is made over the measuring path and the analog input value is transfered. If **no** (no calibration) is selected, the previously set display value is taken over.

Parameter	Menu item up to/or		Default
12345678901234	**12345678901234**	**12345678901234**	**12345678901234**
I1 range	0-10 V	0-20 mA	0…10 V
	4-20 mA	Sens. V	
	Sens. mA		
I1 End	-1999	+9999	+1000
I1 Start	-1999	+9999	+0000
I1 Dot	0	0.000	0
I1 Dimension	AAAAAAA	ZZZZZZZ	
I1 A-end	-19.99	+99.99	+10.00 (0-10 V) +20.00 (0-20 mA) +20.00 (4-20 mA)
I1 A-start	-19.99	+99.99	+0.00 (0-10 V) +0.00 (0-20 mA) +40.00 (4-20 mA)
I1 Offset	-1999	+9999	0
I1 Average	1	20	1
I1 Zero.sup.	0	99	0
I1 Arithmetic	no	Reciprocal	no
	Square root	Square	
I1 Overrange	Deactive	ADC	ADC
	Full range	5% range	
	10% range		
I1 Min. value	-1999	+9999	-1999
I1 Max. value	-1999	+9999	+9999
I1 Setp. num.	0	9	0
I1 Disp. SP#1	-1999	+9999	0
I1 Analog SP#1	-19.99	+99.99	

Parameter	Menu item up to/or		Default
I1 Disp. SP#2	-1999	+9999	0
I1 Analog SP#2	-19.99	+99.99	
I1 Disp. SP#3	-1999	+9999	0
I1 Analog SP#3	-19.99	+99.99	
I1 Disp. SP#4	-1999	+9999	0
I1 Analog SP#4	-19.99	+99.99	
I1 Disp. SP#5	-1999	+9999	0
I1 Analog SP#5	-19.99	+99.99	
I1 Disp. SP#6	-1999	+9999	0
I1 Analog SP#6	-19.99	+99.99	
I1 Disp. SP#7	-1999	+9999	0
I1 Analog SP#7	-19.99	+99.99	
I1 Disp. SP#8	-1999	+9999	0
I1 Analog SP#8	-19.99	+99.99	
I1 Disp. SP#9	-1999	+9999	0
I1 Analog SP#9	-19.99	+99.99	

Help texts in ticker for parameterization:

Parameter	Menu item up to/or
I1 range	Select the desired measuring range.
I1 End	Set the value for the chosen analog end value.
I1 Start	Set the value for the chosen analog start value.
I1 Dot	Select the position of the shown decimal point in the display.
I1 Dimension	Define the user specified dimension.
I1 A-end	Define the analog end value of the selected measuring range.
I1 A-start	Define the analog start value of the selected measuring range.
I1 Offset	Select the optional offset for the linearization
I1 Average	Define the number of measuring values for the moving averaging.
I1 Zero.sup.	Define a range around the zero point, in which the measured value is set to zero.
I1 Arithmetic	Select an arithmetic conversion function for the process value.
I1 Min. value	Define the lower display limit.
I1 Max. value	Define the higher display limit.

Parameter	Menu item up to/or
I1 Overrange	Select the analog overflow and underflow behaviour of the indicator.
I1 Setp. num.	Select the number of additional setpoints.
I1 Disp. SP#x	Set the display value for the following analog signal value.
I1 Analog SP#x	Set the analog signal value for the previous display value.

I1 Range:
Selection of the measuring input signal: 0-10 VDC, 0-20 mA or 4-20 mA.

I1 End:
Setting the upper range value up to maximum +9999.

I1 Start:
Setting the lower range value up to maximum -1999.

I1 Dot:
Adjust the decimal place.

I1 Dimension:
Setting the physical variable. The physical unit is free selectable as a 5-digit character string. So most of the usual units can be displayed.

I1 A-End:
Rescaling the measurement input signals. With the help of this function, the final value can be set to e.g. 19.5 mA input signal without applying the measurement signal. If sensor calibration is selected, this parameter is not available.

I1 A-Start:
Rescaling the measurement input signals. With the help of this function, the inital value can be set to e.g. 3,5 mA input signal without applying the measurement signal. If sensor calibration is selected, this parameter is not available.

I1 Offset:
Setting the tara value / offset value. The predetermined value is added to the linearized value. This way, the characteristic line can be shifted by the selected amount.

I1 Average:
Additional averaging of the last measured values. This will steady the display. However, the displayed measured value slightly follows the measured value for smaller changes.

I1 Zero.sup.:
With the zero point steadying, it is possible to force the display to indicate a value of "0" for very small input signals. Here, a numerical value is set, up to the amount of which the display indicates a "0". This function can be used e.g. to force a temperature drift of the measuring section around the zeropoint to „0“ in the display, during an analog speed measurement. Also, the display of negative speeds is suppressed.

I1 Arithmetic:
This function does not display the measured value but the calculated value in the display. Selectable are: reciprocal value, root extraction and squaring.

Calculation types
Reciprocal = Final value/Display value
Square root = Root(Display value*Final value)
Square = (Display value)²/Final value

Advice: The denominator of fractions should not be 0 because a division by 0 is not possible. It creates an undefined state and the display goes into the overflow.

I1 Min. value:
With the help of this function, the display underflow can be defined to a specific value. The exception is input type **4-20 mA**, which already indicates an underflow at signal <1 mA, thus indicating a sensor failure.

I1 Max. value:
With the help of this function, the display overflow can be defined to a specific value.

I1 Overrange:
Overflow and underflow behaviour. The overflow/underflow of the measuring input will be indicated with 4 arrows showing up respectively 4 arrows showing down. The exception is input type **4-20** mA, where a measured value smaller than 1 mA is already considered as an underflow. This should indicate a sensor failure.

Parameter	Menu item up to/or
Deactive	Here, an additional check of the range is not taking place. If the display area is left, the display simply remains at the lowest value or the highest value.
ADC	An overflow/underflow will be indicated, at exceedance/undercut of the min/max-value **I1 Min. value** / **I1 Max. value**.
Full range	The measuring signal needs to be within the predetermined measuring range **I1 End** / **I1 Start**, so that no overflow is detected.
5% range	The measuring signal is monitored for ±5 % of the set measuring range.
10% range	The measuring signal is monitored for ±10 % of the set measuring range.

I1 Setp.num.:
Number of additional supporting points. At the start and end value, 9 additional supporting points can be defined to signal nonlinear sensor values. Only the activated supporting point parameters are displayed.

I1 Disp.sp:
I1 Disp. SP1…I1 Disp. SP9 display values for supporting points. Under this parameter, the supporting points are defined by value.

I1 Analog sp:
I1 Analog SP1…I1 Analog SP9 analog values for supporting points. The supporting points are always preset according to the selected input signal Ma/V. Here, the desired analog values can be freely parameterized in ascending order.

The same parameters apply to the other two signal inputs I2 and I3!

6.2. Alarm – Parameter A1 to A8

The alarm system includes 8 alarms, which support different kind of operting principles. If an alarm is deactivated, then parameters that are not needed will be switched-off.

Parameter	Menu item up to/or		Default
12345678901234	**12345678901234**	**12345678901234**	**12345678901234**
A1 function	Off	On	Off
	Exceed limit	Undercut limit	
	In the range	Out of range	
A1 input	Input 1	Input 2	Input 1
	Input 3		
A1 fault	No change	On	No fault
	Off		
A1 relay sel.	No relay	Relay 1	Relay 1
	Relay 2		
A1 limit	-1999	+9999	+0100
A1 upper lim.	-1999	+9999	+0150
A1 lower lim.	-1999	+9999	+0100
A1 hyster.	0000	+9999	+0000
A1 off delay	0 s	100 s	0 s
A1 on delay	0 s	100 s	0 s
A1 flashing	Deactive	Activated	Deactive
A1 signal.type	Background	Font	Font
A1 disp.color	Deactive	Orange	Deactive
	Green	Orange	
A1 dim. behav.	Deactive	Alarm colour	Deactive

Hilf texts:

Parameter	Menu item up to/or
Ax function	Select the limit value behaviour. The other parameter are not displayed by „off“.
Ax input	Select the measurement input channel for this alarm.
Ax fault	Select the limit fault behaviour. On an internal error, the alert goes to the selected state.
Ax relay sel.	Select the relay to be switched.

Parameter	Menu item up to/or
Ax limit	Defines the limit value for the selected function.
Ax uppder lim.	Define the upper limit for the range control.
Ax lower lim.	Define the lower limit for the range control.
Ax hyster.	Defines the hysterisis for the limit value.
Ax off delay	Defines the delay time to off state for the alarm.
Ax on delay	Defines the delay time to on state for the alarm.
Ax flashing	Enables the flashing mode, which will be activated by the alarm.
Ax.signal type	Determines the kind of signalling for an active alarm.
Ax disp. color	Select the display color, which will be activated by alarm.
Ax. Dim. behav.	Select the color behaviour of the dimension.

A1 Function:
Threshold value behaviour. With the function principle, it is possible to switch between different kind of working types of the alarms. If **A1 function = Off** is selected, the associated alarm parameters are not displayed.

Parameter	Menu item up to/or
Off	The alarm is without function and associated parameters will not be displayed.
On	The alarm is switched on in measuring operation.
Exceed limit	Activate at threshold value exceedance.
In the range	Switch in the preset range.
Out of range	Switch outside the preset range.

A1 Fault:
Alarm at threshold value fault. If a device checksum is incorrect or the display range is violated, you can specify the behavior of the alarms.

Parameter	Menu item up to/or
Off	The selected alarm behaviour is activated.
On	The alarm behaves reversely. The malfunction overwrites the actual threshold value function when an error has occurred.
No change	Here an error has no defined effects.

A1 relay sel.:
Via this parameter, the switching relay is selected. Available are **Relay 1**, **Relay 2** or **no Relay**.

A1 limit:
Switching threshold. Here, the switching threshold is specified, from which an alarm responds, or is activated / deactivated. For the window function of a switching point, this parameter is not requested.

A1 upper lim. / A1 lower lim.:
Upper threshold value / lower threshold value. For the range functions **A1 function** = **in the range** or **Out of range**, this value between **-1999 ...+9999** defines the upper or lower limit of the window function. For other operating principles, this parameter is suppressed.

A1 hyster.:
Hysteresis. The hysteresis defines a difference to the threshold value by which an alarm descends delayed. For the window function of a switching point, this parameter is not requested.

A1 on delay:
On-delay. Here, you can specify a delayed switch-on of 0-100 seconds for the threshold values. The internal time counter is not stored permanently and reset by a device start.

A1 off delay:
Delayed release. Here, you can specify a delayed switch-off of 0-100 seconds for the threshold values. The internal time counter is not stored permanently and reset by a device start.

A1 flashing:
Flashing on alarm. Here, you can choose the flashing of the current display or the flashing of the background colour.

A1 signal type:
Signalling on alarm. Indication is selectable via background colour or font colour.

A1 disp.color:
Display colour on alarm. Specifies the display colour on active alarm.

Ax dim. behav.:
If an alarm is pending, the colour of the physical unit can be adjusted to the display value (alarm colour); if the parameter is deactivated, the colour does not change.

The same applies to Alarm 2 to Alarm 8!

6.3. General: General display parameters / safety parameters

Parameter	Menu item up to/or		Default
Display time	0.1s	2.0s	1.0s
Measur. Time	0.1s	2.0s	1.0s
Dir. Keys	No function	Maximum request	No function
	Set limits		
User code	0	9999	0000
Admin code	0	9999	1234
User level	1	7	7
User access	Unlock	Lock	Unlock
Serial number			

Help texts in ticker for parameterization:

Parameter	Menu item up to/or
Display time	Define the display update time.
Measur. Time	Define the measurement time.
Dir. Keys	Select the special function of the direction keys.
User code	Select a code, to lock the user parameter settings.
Admin code	Select a code, to lock the administrator parameter settings.
User level	Select the user level for restricted setting options.
User access	Select the unlocking mode or the locking mode of user access menu.
Serial number	Displays the serial number of the device.

Display time:
Update rate of the digital display in seconds. The currently valid measured value is displayed.

Measur. time:
Over the set measuring time, the display carries out an averaging of the measuring input, whereby at higher measuring times, a higher resolution and measuring accuracy is achieved. Thus the value will be steady. Especially with a very short measuring time of 0.1s, higher or more frequent jumps in the digital display may occur.

Dir.keys:
Deposit of key functions. If you select **Maximum request**, the **minimum/maximum memory** is cleared by simultaneously pressing the direction keys. With **Set limit**, threshold values can be selected using the arrow keys and changed or accepted by pressing the **[P]**-key. With **no function**, no functions are deposited.

User code:
With this code, limited access to the parameters is possible, depending on the preset user level. The user has access to the shared parameters only.

Admin. Code:
This code allows full access to all parameters.

User level:
Defines the parameters, that are accessible to the user:

User level = access to menu	Description	1234567
Alarm X	Thershold value	XXXXXXX
Alarm X	Hysteresis/Threshold value	XXXXXX
Alarm X	All parameters	XXXXX
Measuring input		XXX
General		XXX
Display		XXX

6.4. Display – Display parameters

Parameter	Menu items up to/or		Default
12345678901234	**12345678901234**	**12345678901234**	**12345678901234**
Brightness	0	9	7
Displ.scheme	Dark	Light	Dark
Inp.1 F. color	Deactive	Red	Deactive
	Green	Orange	
	Black	White	
Inp.2 F. color	Deactive	Red	Deactive
	Green	Orange	
	Black	White	
Inp.3 F. color	Deactive	Red	Deactive
	Green	Orange	
	Black	White	
Inp.1 D. color	Deactive	Red	Deactive
	Green	Yellow	
	Black	White	
Inp.2 D. color	Deactive	Red	Deactive
	Green	Yellow	
	Black	White	
Inp.3 D. color	Deactive	Red	Deactive
	Green	Yellow	
	Black	White	
Value B. color	Deactive	Red	Deactive
	Green	Orange	
	Black	White	

Help texts in ticker for parameterization:

Parameter	Menu items up tp /or
Brightness	Select the brightness of the background light.
Displ.scheme	Select the color scheme of the display.
Inp.1 F. color	Select the measured value font color for input 1.
Inp.2 F. color	Select the measured value font color for input 2.
Inp.3 F. color	Select the measured value font color for input 3.
Value f.color	Select the font color of the measured value.
Inp.1 D. color	Select the dimension font color for input 1.
Inp.2 D. color	Select the dimension font color for input 2.
Inp.3 D. color	Select the dimension font color for input 3.
Value B. color	Select the measured value background color.

Attention!
The same colour settings for foreground and background can be used to hide individual lines. The display remains dark, e.g. with only two measuring inputs, only two measured values are shown.

Brightness:
Background brightness, selectable in 9 levels.

Displ.Scheme:
Contrast colour of the display, selectable is dark or light.

Inp.x. F.color:
To display the measured value, the colours red, green, orange, white or black are available. With parameter **Deactive**, the measured value is displayed inversely to the selected background colour.

Inp.x. B.color:
The physical unit can be displayed in the following colours: red, green, orange, white or black. With parameter **Deactive** the dimension is displayed inversely to the selected background colour.

Value D.color:
Here, the background colour can be selected. Available are the colours: red, green, orange, white or black.

6.5. Exit the parameterization, *RUN*

Activation/deactivation of the programming interlock. Here, select with **[◀] [▶]** between deactivated key lock **UNLOC** (factory settings) and activated key lock **LOCK**. By pressing the **[P]-**key, the devices switches automatically into operating mode. If **UNLOC** is selected, the parameterization can be be started by pressing the **[P]-**key in operating mode. If **LOCK** is selected, the user code/release code that was specified under chapter *6.3. General, general display parameters / safety parameters,* must be adjusted.

7. Reset to default values (factory settings)

In order to put the device into a defined basic state, it is possible to perform a reset to the default values. The following procedure should be used for this:

Switch off the voltage supply of the device. Press **[P]-key** and switch voltage supply again while holding down the **[P]-key**. Press the **[P]-key** until the device answers with **Reset config**.

There are two options available:

YES, the default values are loaded and used for further operation. The display is reset to the delivery state.

NO, error messages that have occurred due to short-term faults in the system can be acknowledged. The device works with the user specific data.

ATTENTION! With "YES" all user-specific data is lost!

8. Technical data

Housing			
Dimensions	96x48x42 mm (BxHxD) with transformator, D = 47 mm with plug-in terminals		
Panel cut-out	92.0^{+08} x 45.0^{+06} mm		
Fixing	screw elements for a wall thickness up to 3 mm		
Material	PC Polycarbonate, black, UL94V-0		
Sealing material	EPDM, 65 Shore, black		
Protection class	front side IP65 (Standard), rear side IP00		
Weight	approx. 150 g		
Connection	plug.-in terminal; wire cross section up to 2.5mm² (supply & measuring input) wire cross section up to 1.5mm² (switching points)		
Display			
Display type	full graphics TFT-display with 320x240 Pixel, font type: Segoe UI		
Digit height	9 mm		
Measurand indication	3x -1999 to +9999		
Font colour/ Measurand background colour	red, green, white, orange or black (selectable)		
Threshold values	optical display flashing / change of colour		
Signal	**Measuring range**	**Meas. span**	**Resolution**
Voltage	0…10 V Ri >100 Ohm	0…12 V	14 bit
Current	4…20 mA Ri = ~125 Ohm	1…22 mA	
Current	0…20 mA Ri = ~125 Ohm	0…22 mA	
Input isolation	galvanically not isolated		
Output			
Relay with changeover contact	30 VDC / 2 A at resistive load		
Measuring error			
Standard	0.2% of measuring range ± 1 digit		
Accuracy			
Temperature drift	100 ppm / K		
Measuring time	0.1…2.0 seconds		
Measuring rate	approx. 100/s		
Measuring principle	U/F-conversion		
Resolution	approx. 14 bit at 1s measuring time		

Power pack	
Supply	100-240 VAC 50/60 Hz, DC ±10 %, ≤ 6 VA
	230 VAC 50/60 Hz, ±10 %, ≤ 10 VA
	24 VDC ±10 % galvanic isolated, ≤ 3 VA
Memory	EEPROM
Data preservation	≥ 100 years at 25°C
Ambient condtions	
Working temperature	-20°C…+60°C without dew
Storing temperature	-30°C…+70°C
Weathering resistance	relative humidity 0-85 % on years average without dew
Height	up to 2.000 m
EMV	EN 61326
CE-marking	Conformity according to directive 2014/30/EU
Safety standard	According to low voltage directive 2014/35/EU, EN 61010; EN 60664-1

9. Safety advices

Please read the following safety advices and the assembly chapter 2 before installation and keep it for future reference.

Proper use

The **TFT1-13**-device is designed for the evaluation and display of sensor signals.

Danger! Careless use or improper operation can result in personal injury and/or damage the equipment.

Control of the device

The panel meters are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

Installation

The **TFT1-13**-device must be installed by a suitably qualified specialist (e.g. with a qualification in industrial electronics).

Notes on installation

- There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.
- **The fuse rating of the supply voltage should not exceed a value of 0.4 A N.B. fuse**!
- Do not install **inductive consumers** (relays, solenoid valves etc.) near the device and **suppress** any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.
- Keep input, output and supply lines separate from each other and do not lay them parallel with each other. Position “go” and “return lines” next to one another. Where possible use twisted pair. So, the best measuring results can be received.
- Screen off and twist sensor lines. Do not lay current-carrying lines in the vicinity. Connect the **screening on one side** on a suitable potential equaliser (normally signal ground).
- The device is not suitable for installation in areas where there is a risk of explosion.
- Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.
- The terminal area of the devices is part of the service. Here electrostatic discharge needs to be avoided. **Attention! High voltages can cause dangerous body currents.**
- Galvanically isolated potentials within one complex need to be placed on an appropriate point (normally earth or machines ground). So, a lower disturbance sensibility against impacted energy can be reached and dangerous potentials, that can occur on long lines or due to faulty wiring, can be avoided.

10. Error elimination

	Error description	Measures
1.	The unit permanently indicates overflow.	• The input has a very high measurement, check the measuring circuit. • The display range of 9999 respectively the preset measuring range was exceeded, control the supporting points respectively the selected input type and signal range. • Not all of the activated supporting points are adjusted. Check if the relevant parameters are set correctly.
2.	The unit permanently shows underflow.	• The input has a very low measurement, check the measuring circuit. • The display range of -1999 respectively the preset measuring range was underrun, check the settings. • Not all activated supporting points are parameterized. Check if the relevant parameters are set correctly. • Check that the correct input type is selected. Only **4...20 mA** displays this error message. • Check the wiring for contact or correct connection.
3.	The unit shows **HELP** in the display.	• The device has detected an error in the configuration memory, perform a reset to the default values and reconfigure the device according to your application.
4.	Parameter for the parameterization of the input are not available.	• The programming lock is activated. • Enter correct code.
5.	Configuration errors	• The configuration of the device is secured by a checksum, which is checked at startup or when returning from **Settings**. If an error is detected in the user settings, a **Config error** appears in the upper display window and the alarms go into their optional safety state. In this state, it is still possible to carry out a reset to the factory settings. • In the input area, **Reset settings** or **Restart system** can be selected. At **Restart system** the device tries to do a re-start. In case of **Reset setting** the user settings will be set back to the factory settings. If this is also disturbed, **System error** appears.
6.	The device does not respond as expected.	• If you are not sure, that the device has already been parameterized before, then restore the delivery state as described in chapter 7.