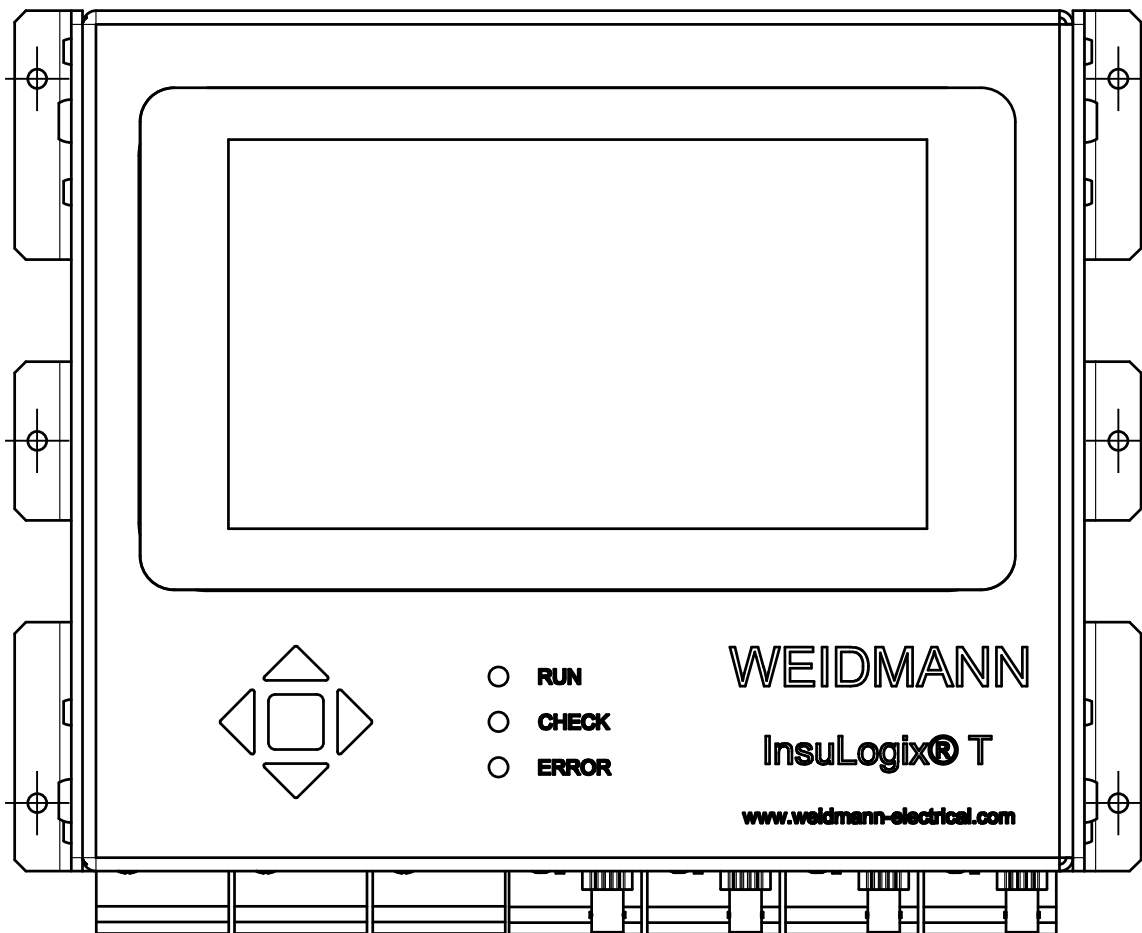**InsuLogix® T**

CONTROLLER MANUAL

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WARRANTY
Products supplied by Weidmann are warranted against defects in material and workmanship for a period of five years for InsuLogix® T controller following shipment. Our liability is specifically limited to replacing or repairing, at our option, the defective controller. Equipment returned to the factory for repair must be shipped prepaid and insured. This warranty does not include batteries, lamps, or other expendable items, where the original manufacturer's warranty shall apply. We make no other warranty. The warranty is void in the event of abuse (failure to follow recommended operation procedures) or failure by the customer to perform as specified in the instruction manual.

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SECTION 1 - INTRODUCTION

InsuLogix® T provides reliable detection and monitoring of the winding and other desired temperatures within the tank of a transformer.

1.1   InsuLogix® T Controller Dimensions

Dimensions in drawings below are in millimeters.
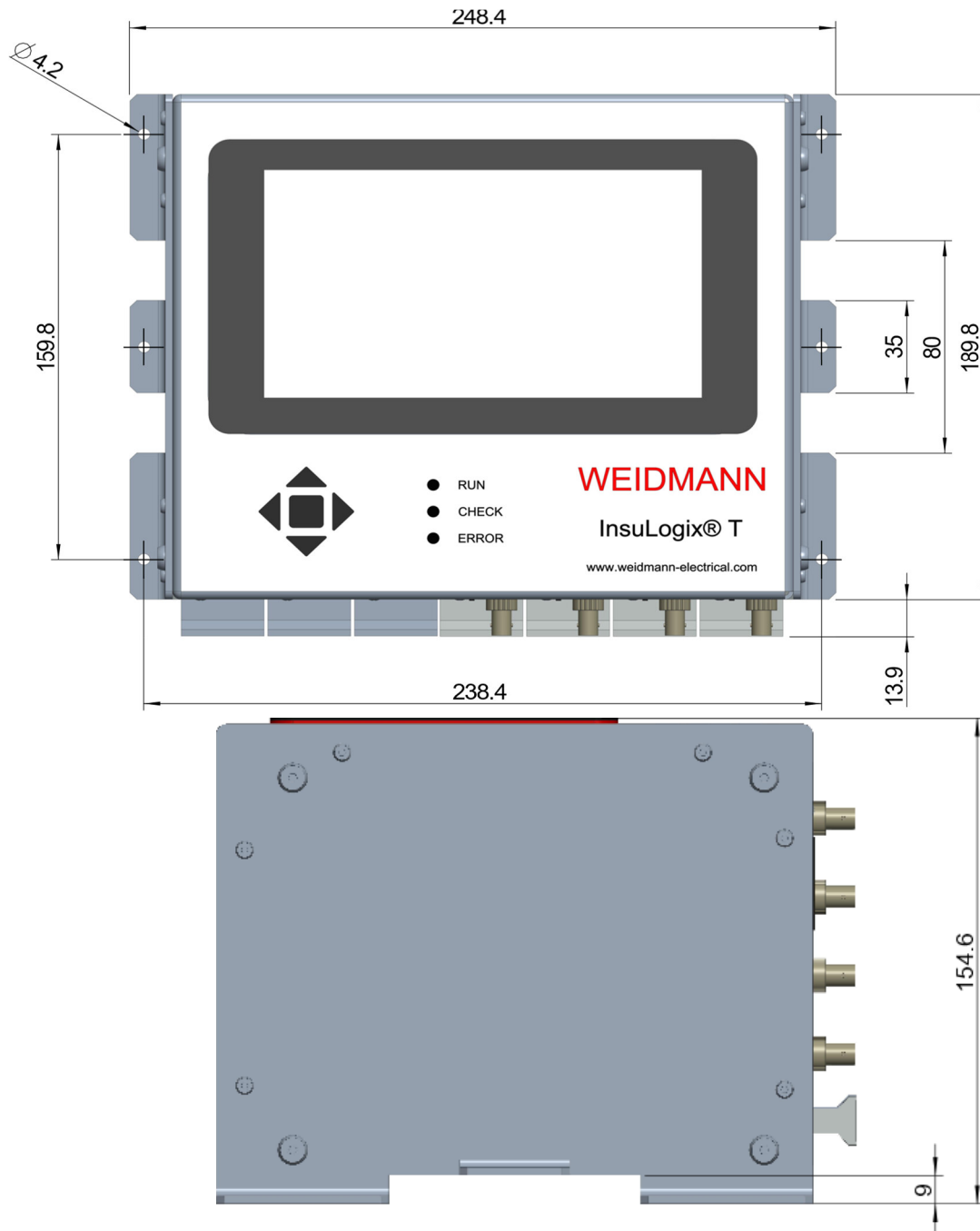
Figure 1 - InsuLogix® T dimensions

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1.2   InsuLogix® T Controller Components and Ports

Back panel mounting points (two on each side)

7" TFT touch screen display

Optional DIN Rail mounting points (one on each side), with adapter

Keypad

Controller status LEDs

○ RUN
○ CHECK
○ ERROR

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InsuLogix® T

www.weidmann-electrical.com
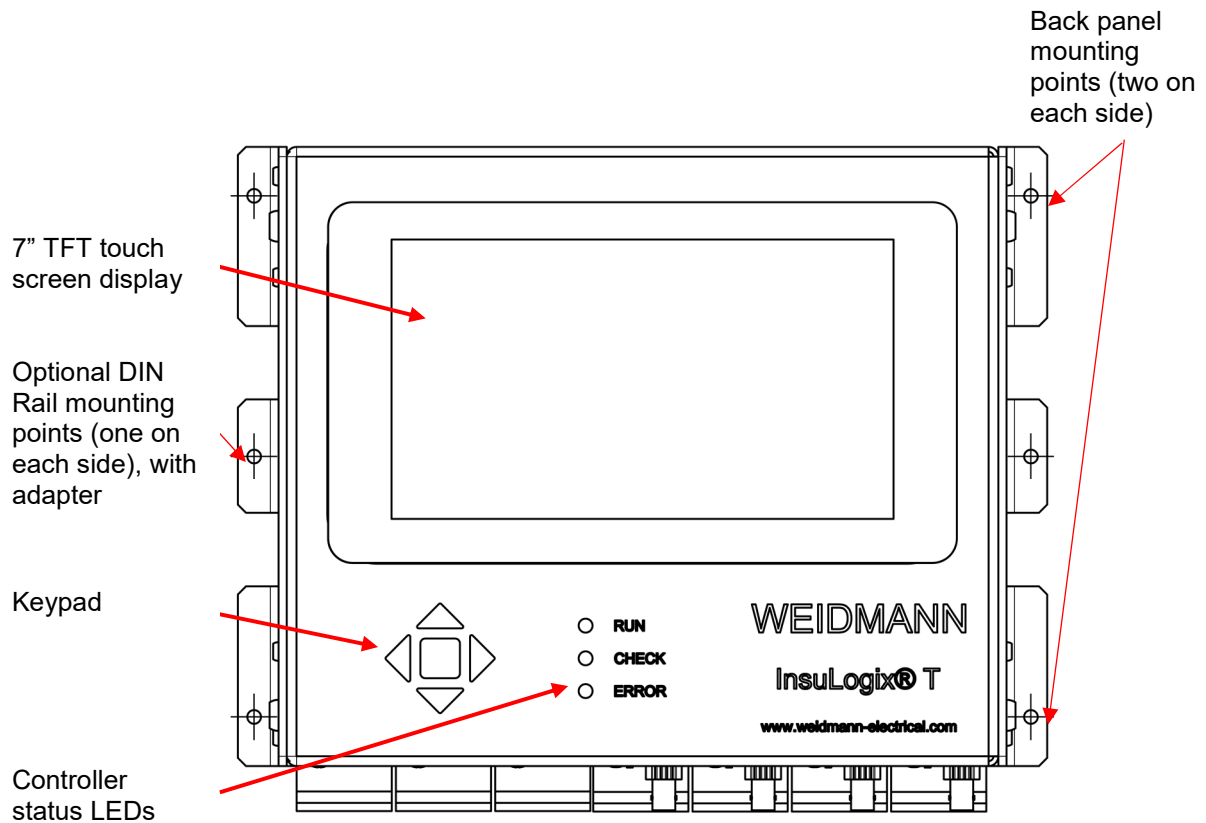
Figure 2 - InsuLogix® T components

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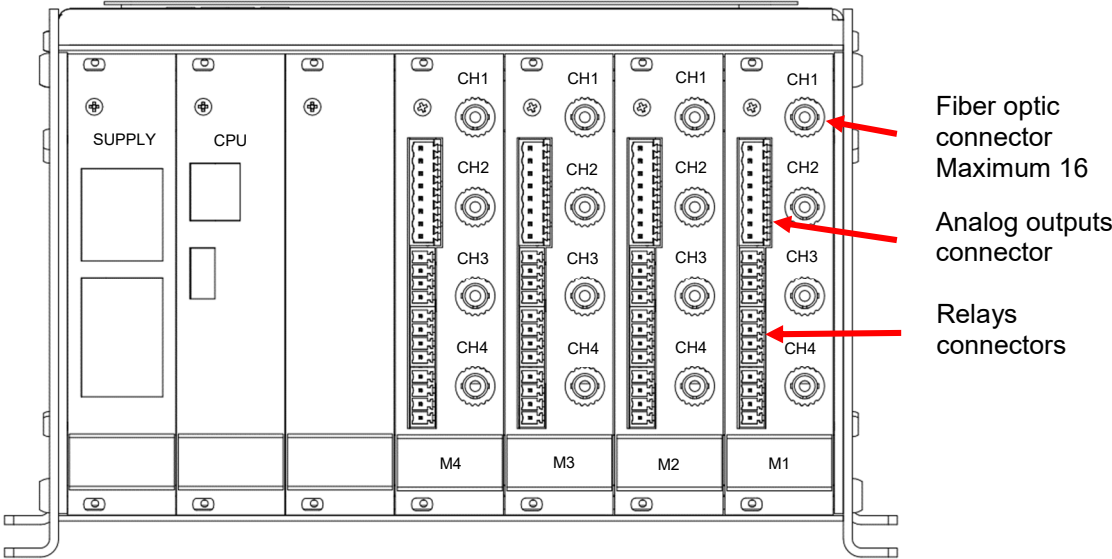
Figure 3 - InsuLogix® T bottom panel

Fiber optic connector Maximum 16

Analog outputs connector

Relays connectors

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SECTION 2 – CONTROLLER INTEGRATION AND COMMUNICATION SETUP

2.1 Hardware Interfaces
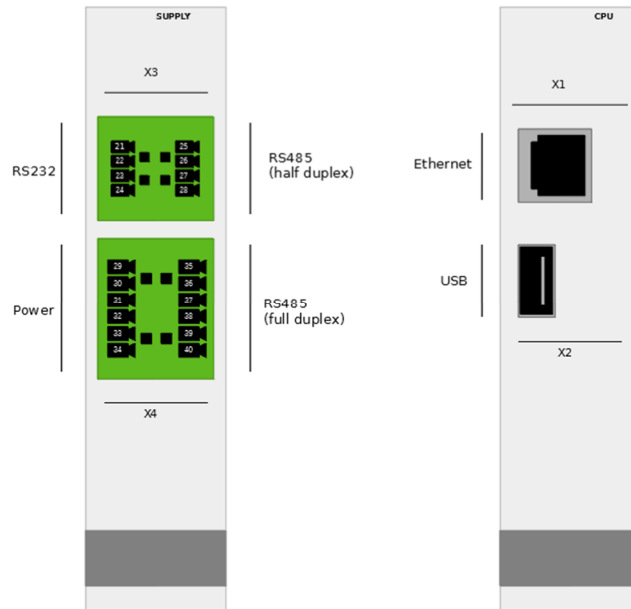
Figure 4 - InsuLogix® T Supply and CPU Modules

Supply Module Pinout

X3

21	RS232_RX	RS485_EXT1_A	25
22	RS232_TX	RS485_EXT1_B	26
23	NC	NC	27
24	RS232_GND	RS485_EXT1_GND	28

X4

29	+24V	RS485_EXT2_A	35
30	+24V	RS485_EXT2_B	36
31	GND	RS485_EXT2_Z	37
32	GND	RS485_EXT2_Y	38
33	PE	RS485_EXT2_5V	39
34	PE	RS485_EXT2_GND	40

Figure 5 - InsuLogix® T Supply Module Connections

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Measurement Module
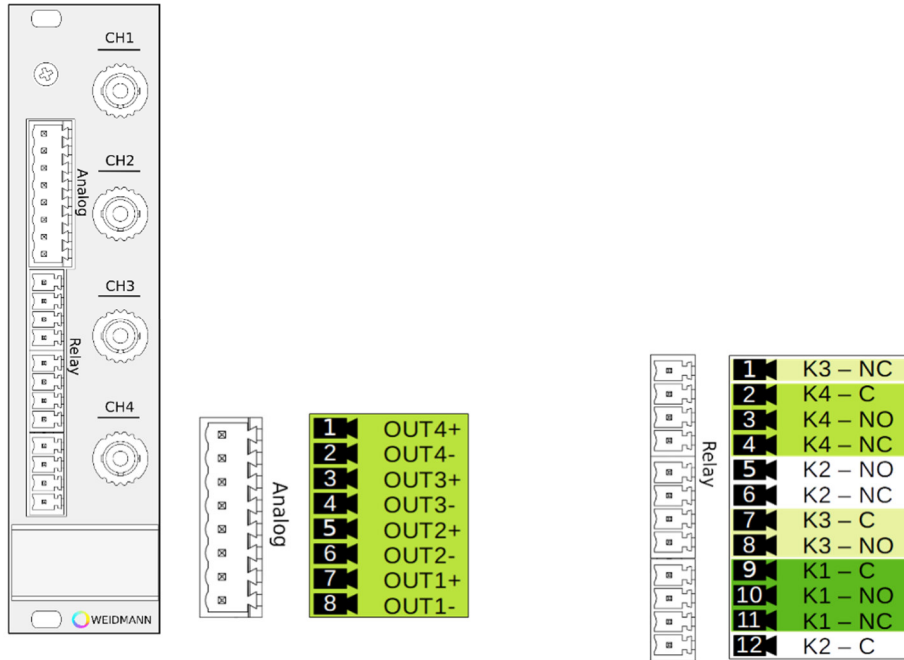
Figure 6 - InsuLogix® T Measurement Module Layout and Connections

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SECTION 3 - INSULOGIX® T CONTROLLER SETUP AND OPERATION

There is no software to be installed on a computer in order to set up and operate the controller. All software resides in the controller and can be configured using the Touch Screen Display and the keypad located on the controller's front panel.
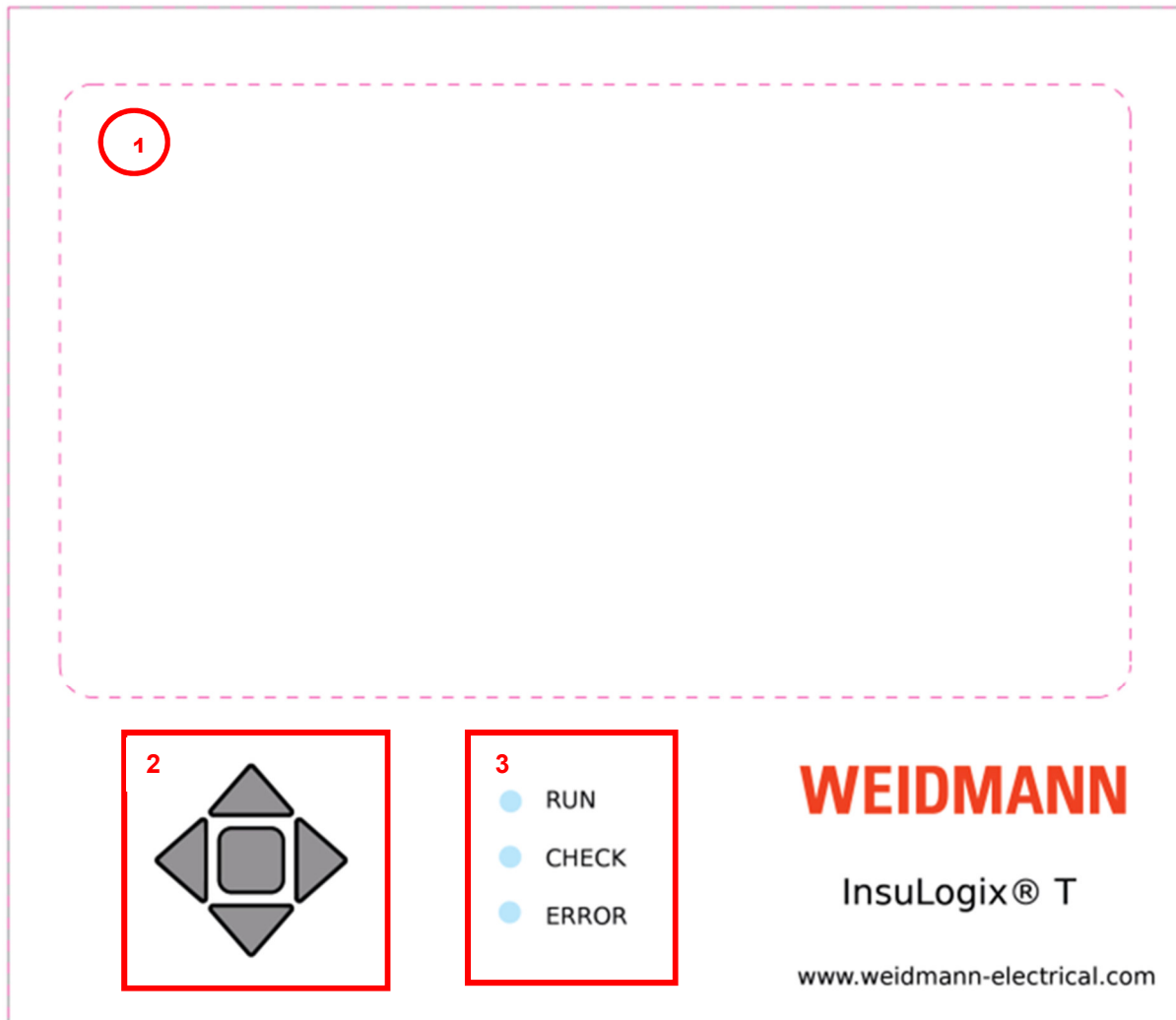
Figure 7 - InsuLogix® T front panel

(1) Touch screen

(2) Keypad

(3) Controller Status LEDs

The controller is configured and operated via the touch screen (1) and/or the keypad (2).

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3.1 Controller keypad

The keypad (2) consists of four cursor keys and one enter key.

The **left cursor key** and the **right cursor key** are always usable.
Use **the left cursor key** or the **right cursor key** to select a menu item or an input field.

Confirm selection with the **enter key**.

The **up-cursor key** and the **down cursor key** are not always applicable.
Use the **up-cursor key** and the **down cursor key** to enter letters and numbers. Confirm the input with the **enter key**.

3.2 Controller Front Panel Status LEDs

Front panel LEDs signification

| Controller Status	LED Color		Description & Recommended Investigation
Run	**Green**	Measuring controller functions correctly	
Check	**Yellow**	Channel error while reading the temperature	Check log Replace sensor
		Storage capacity on the SD card is less than 10%	Clear log memory or download logs (see 3.3.5 and 3.3.6)
		Interface error – interface process not operating (IEC61850 or Modbus)	IEC61850 Check settings (see Annex 1 – IEC61850) Contact manufacturer if necessary
Error	**Red**	The watchdog flag has been set for one of the modules or the main application during crash and/or reboot	Reset the watchdog flag for the modules and the main application within the settings (3.3.7) Check log, contact manufacturer if necessary

The display timeout is deactivated within the roll mode (see 3.3.2 Module Mode).
Red notifications within the input mask always indicated an error.

> If the controller status lights up yellow, a red dot is displayed in the interface to illustrate the malfunction.

Changing settings

The changes made within any value or settings dialog must be confirmed with the **Accept** button. The usage of the back arrow discards the previously made changes.

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3.3 User Interface Software

The InsuLogix® T software resides in the controller. The User Interface can be accessed using the Touch Screen Display and/or the keypad located on the front panel of the controller. The following sections describe the various screens along with the settings and operation options available to user.

3.3.1 Login Screen

To login as **Admin** press the **Login** button (see Figure 8).
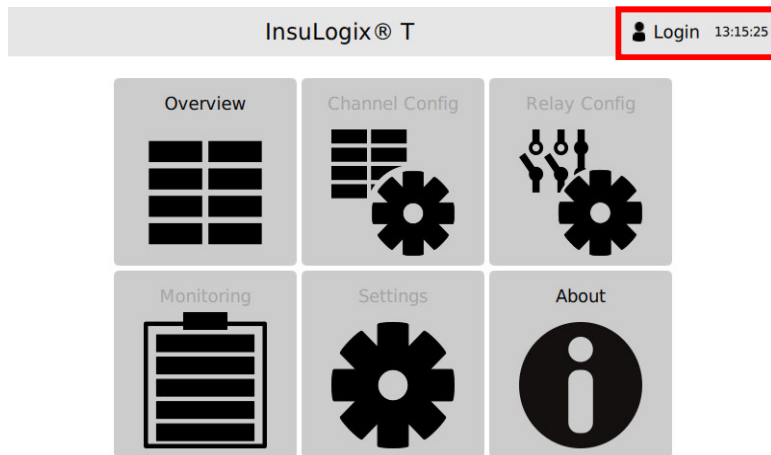

Figure 8 - Menu overview (standard user)

Login: Access to the menu items overview and about
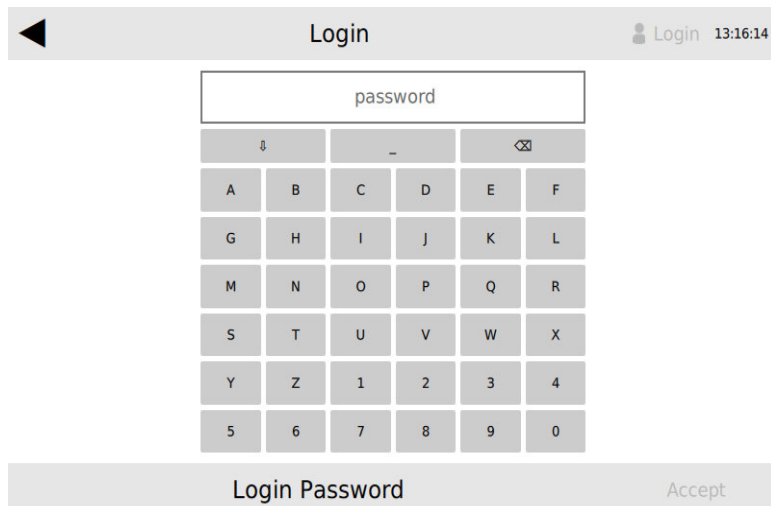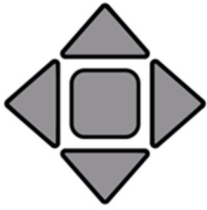
Admin: Access to all menu items

Figure 9 - Password input

The default password is the last four numbers of the monitor's serial number.

Enter the password via the touch screen display and/or the 5-keypad

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When using the keypad to enter the password, you must press either the left or right curser key first to get to the number/letter selections.

Use the four cursor keys to select letter or numbers for the password.

Confirm the selection with the **enter key.**

Confirm the entered password with the **Accept** button.

An invalid entered password will redirect the user to the previously displayed screen and "Login" will still appear in the top right corner of the screen.

If the password input was successful, all six menu items are available. "Admin" will be displayed in the top right corner of the screen.

To log out as admin or to change your password, click the **Admin** button (see Figure 10).
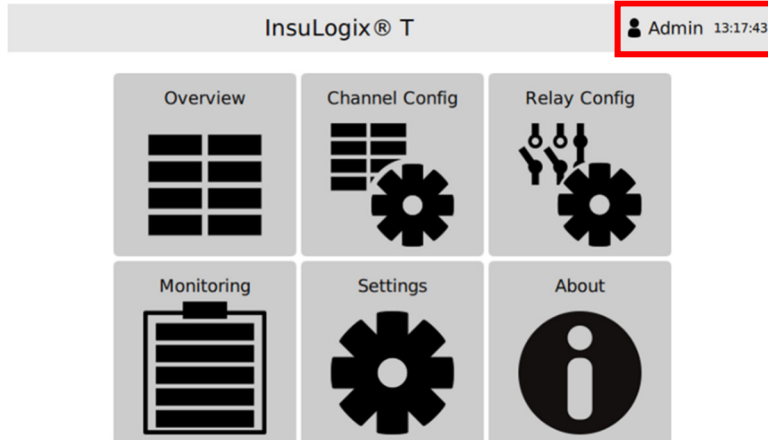
Figure 10 - Menu overview (admin user)

After an idle time of five minutes (initial logout time – can be changed in the **Settings** menu) an automatic logout takes place. A new login is required.

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Password change

Status of the device	**Action**
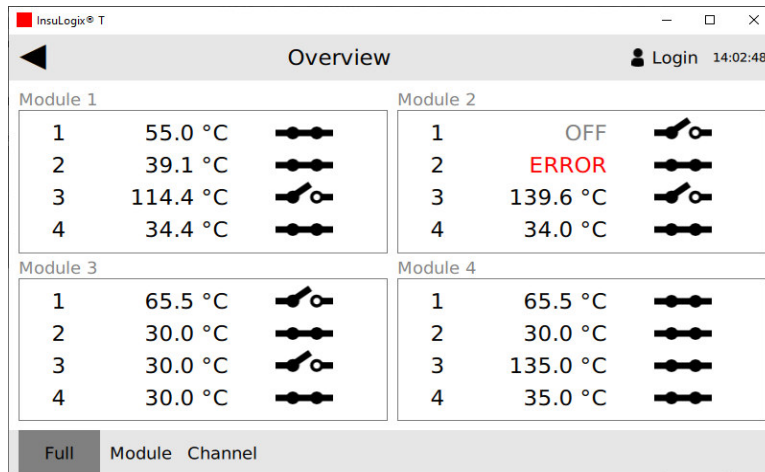
Figure 11 – Overview (Full)

Click on **"Login"** button

Device shows "Login" dialog
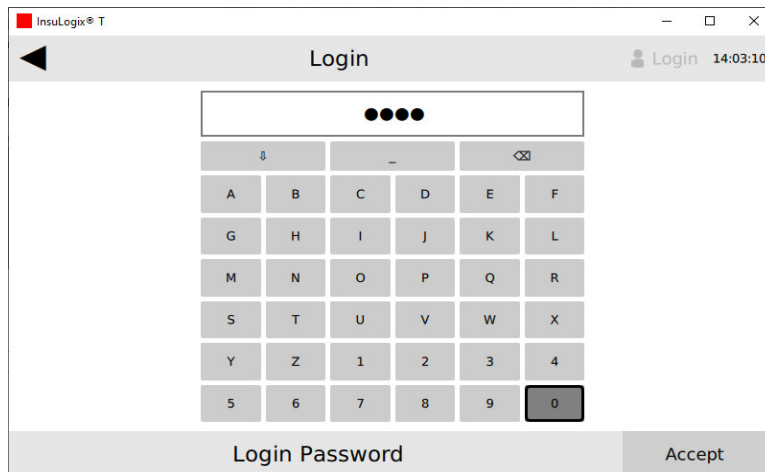
Figure 12 – Login

Enter **the last four digits of the montor's serial number** as the manufacturing password, click on **"Accept"**

Device entered "Admin" mode

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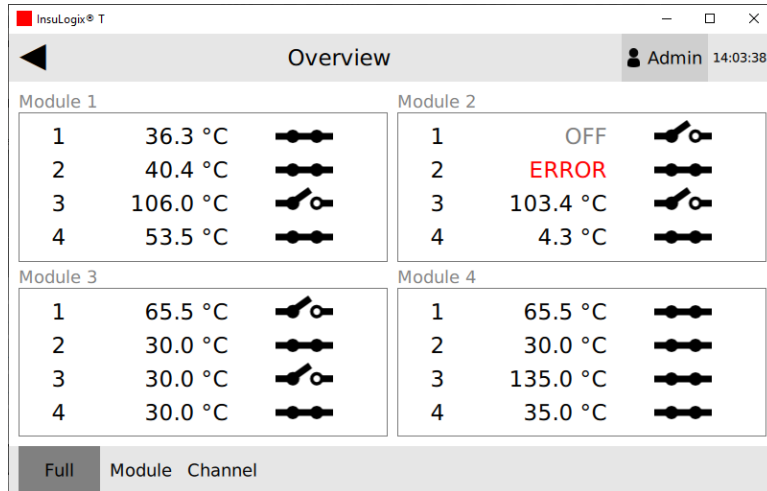
Figure 13 – Overview (Full) Logged in

Click on **"Admin"** button

Device asks to logout or change password
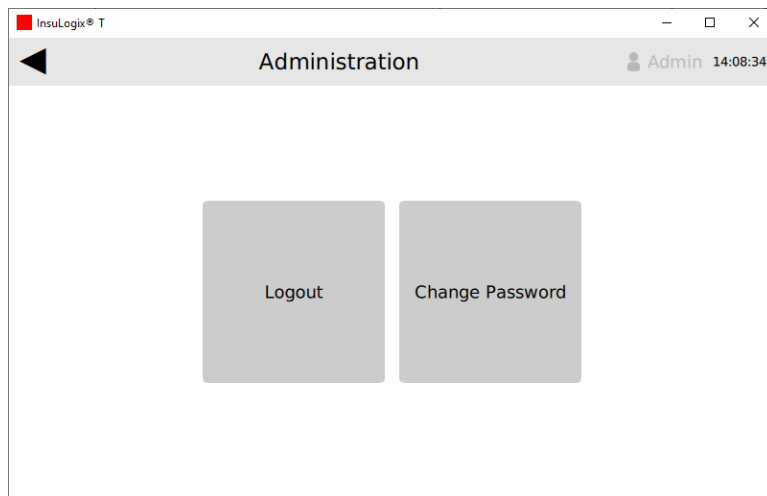
Figure 14 – Administration Screen

Click on **"Change Password"**

Device needs the old password and then accepts a new one
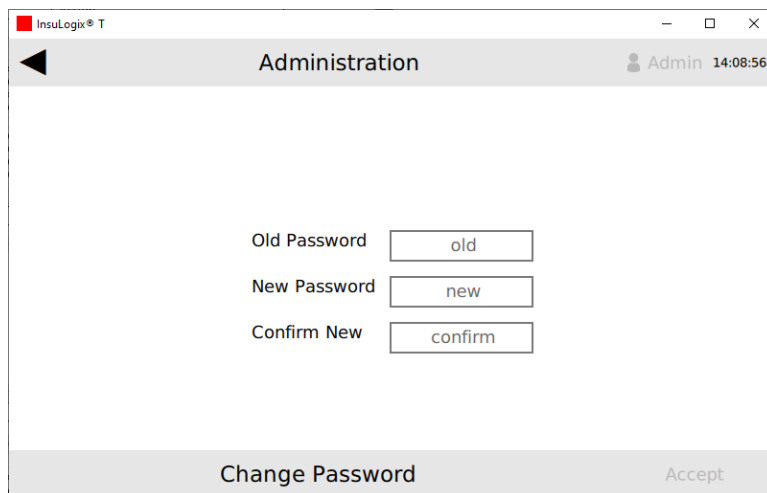
Figure 15 – Administration Password Change

Enter the old password and the desired new password (twice). Click **"Accept".**

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New password is set.
Device asks to logout or change password again
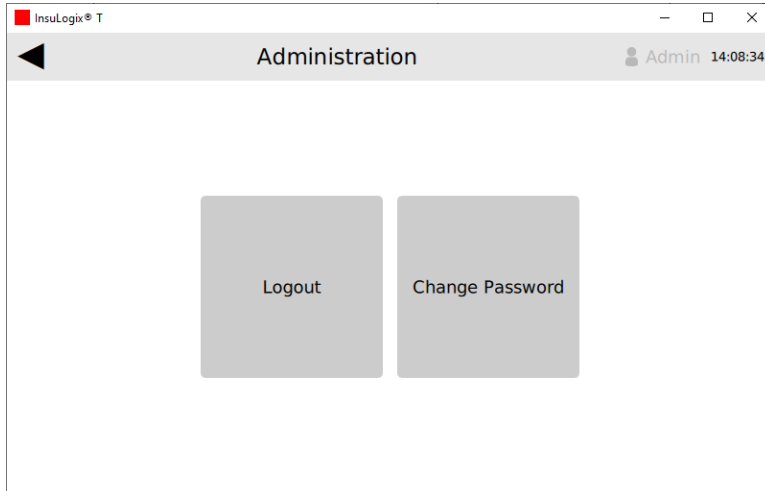
Click on **"Logout"**

Figure 16 – Administration Screen Logout

3.3.2 Overview Screen

The **Overview** menu displays temperature measurements and relay positions for all of the installed modules. There can be up to four measurement modules installed within the InsuLogix® T.

The following display modes are selectable:

Full mode

The measuring controller has four slots for measuring cards (so called modules). Up to four separate channels are connected to one module.

The **Full** mode provides a complete overview of the occupancy of all four modules and their channels.

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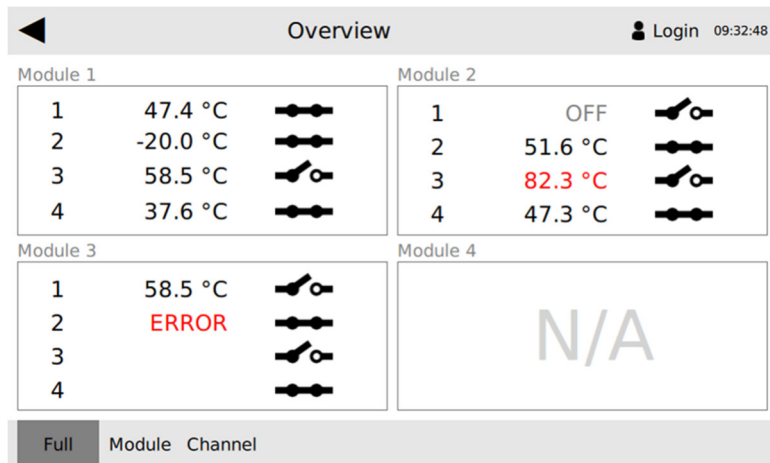
Figure 17 - Overview - Full view

In this mode, each module is allocated in an individual area or the display. In these areas the modules can display the following states:

All four channels are active: each channel displays a measured temperature value and the corresponding relay position.

(1) Temperature measurement

(2) Relay position

 Relay closed

 Relay open

 Each module has either four relays (see modules 1 and 2 or no relays (see module 3).

Channels can be deactivated within a module. The display shows OFF (3).

A temperature alert is highlighted in red (4).

The module has only two channels

In case of errors (e.g. sensor damaged, optic fiber cable broken and so on) the display shows the message ERROR (5).

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Module 4

The module slot is not in use.

N/A appears in the area of the affected module location (6).

Module Mode

Module mode displays each module full screen.
The view starts in deactivated roll mode.
Use the arrow keys to switch between module views (2).
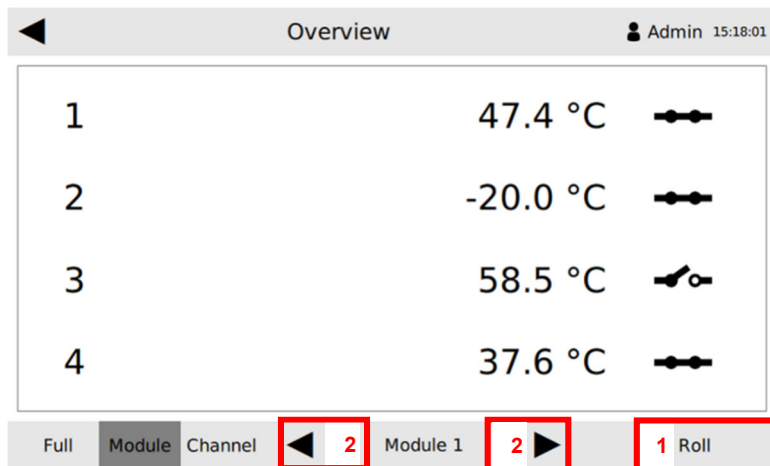
Figure 18 - Overview - Module View

ⓘ   Unused modules are ignored within this mode

To enable roll mode, press the **Roll** button. In roll mode the displayed module changes after four seconds. The current module is indicated in the lower bar (1).

Channel mode

Channel mode displays each single channel for all modules. This mode starts with disabled roll mode.

Use the arrow keys to switch between channel views (1).
The screen displays the channel name (2) and temperature measurement (3). If a module is equipped with relays, the position of these relays is displayed at the end of each module.

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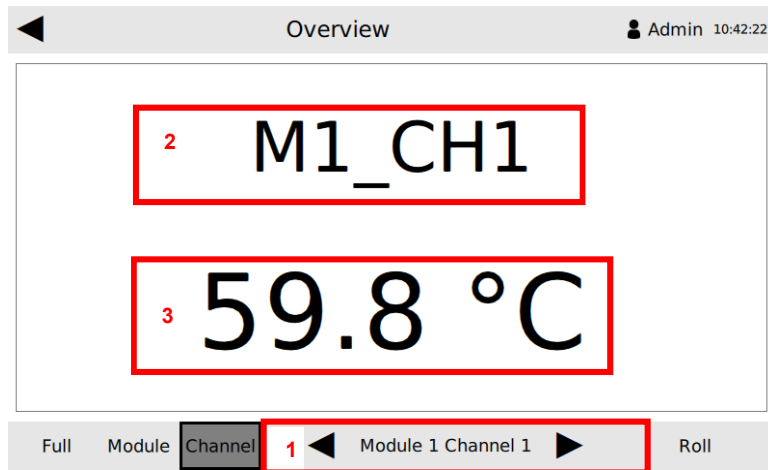
Figure 19 - Channel view with enabled roll-mode
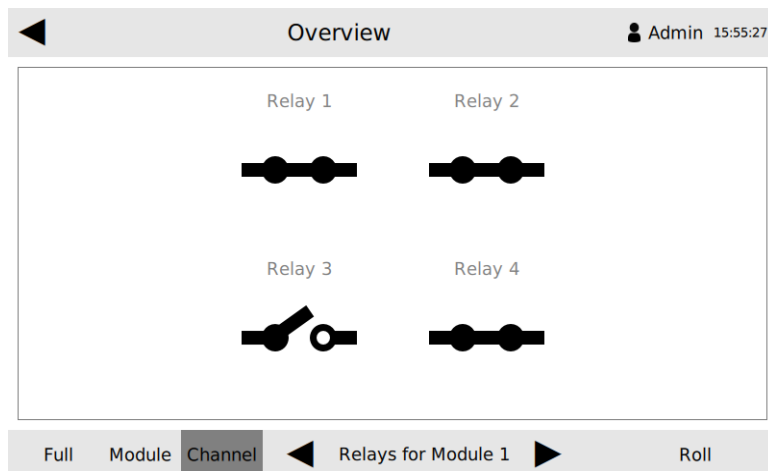
Figure 20 - Channel view with displayed relay for modules

To enable roll mode, press the **Roll** button.

In roll mode the displayed module changes after four seconds. The current module and channel is indicated in the lower bar (1).

The following must be considered in the **Channel** mode:

Temperature alert (see Section 3.3.2 Module 2	➡	are displayed
Error (see Section 3.3.2 Module 3	➡	are displayed
Unused modules (see chapter 3.3.2 Module 4	➡	are displayed
Disabled channels (see Section 3.3.2 Module 3	➡	are not displayed (only valid for enabled roll mode)

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Channel Configuration Screen
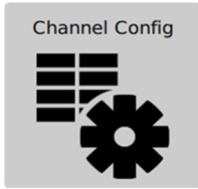
The **Channel Configuration** menu provides the possibility to organize and configure the assembled channels.

The display shows the channels for the used modules.
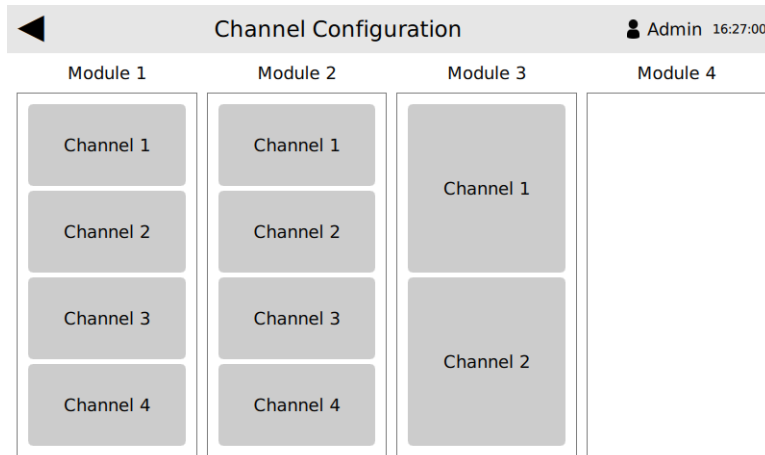
Figure 21 - Channel configuration

Select a channel to switch to its Channel Configuration screen.
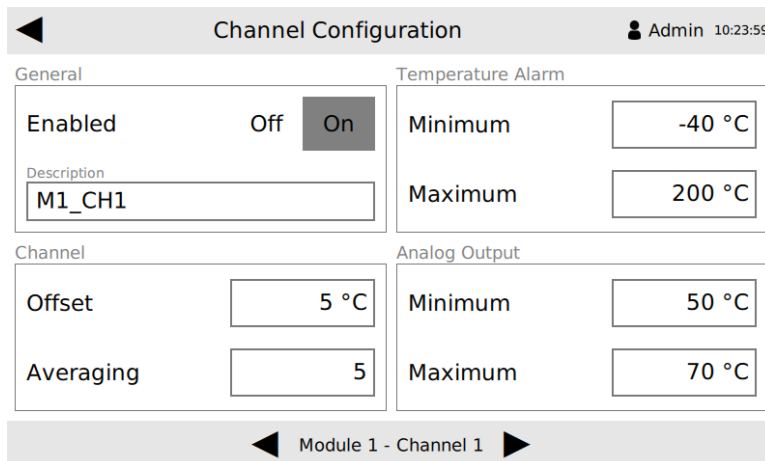
Figure 22 - Channel Configuration - Module

Configure the selected channel. All displayed input fields and switches can be defined.

Use the arrow keys at the bottom of the screen to switch to the next channel or module once the entries have been completed.

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Input options:
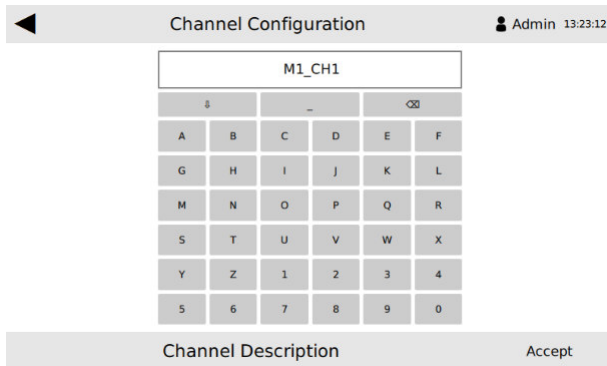
Define the description of the channel via the onscreen keypad
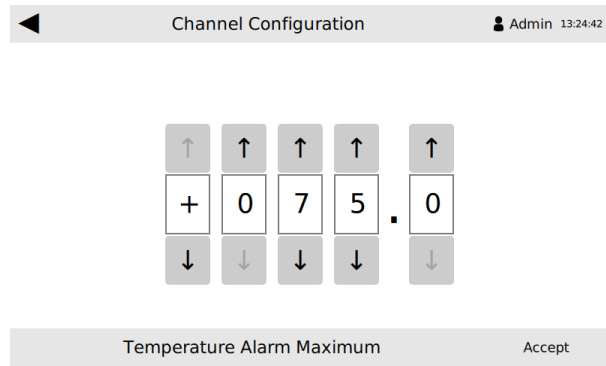
Define values using the numeric entry keypad

Once an entry has been made, press "Accept" to store the value to the unit. This will return you to the screen shown in Figure 22. Failure to do so and instead pressing the left arrow at the top left of the screen will cancel the entry and the unit will keep the previously stored value.

General configuration
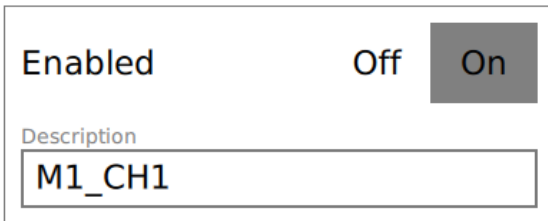
Enable or disable the display of the channel with the switch. An enabled channel will be displayed and a disabled channel will be hidden in the overview menu.

Enter the name of the channel. A maximum of 12 characters is recommended.

Temperature Alert Configuration
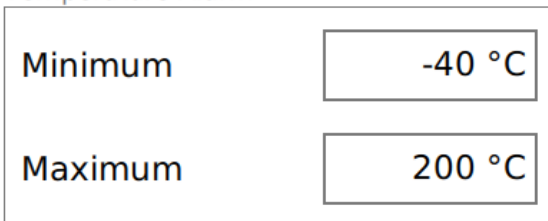
Define a temperature range in which the measured value can lie by entering the temperature values Minimum and Maximum. If the measured value lies outside this range a temperature alert is set in the **Overview** menu. The accepted range is between -40 °C and 200 °C.

Channel configuration
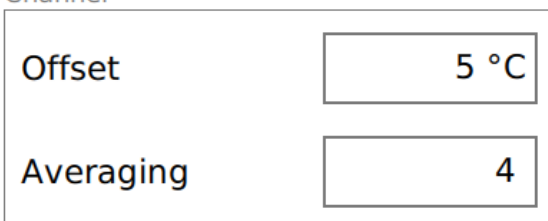
If the measured temperature value must be corrected, enter an **Offset** value.
The corrected temperature value is then displayed in the Overview menu.

Define the number of measured values for **Averaging**.

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Analog Output configuration

Analog Output	
Minimum	50 °C
Maximum	70 °C

Define the **Minimum** and **Maximum** temperature scaling parameters for the analog outputs.
Depending on the controller type, the current output is between 4…20 mA and the voltage output between 0…10 V DC.

3.3.3 Relay Configuration Screen

You can configure the relays settings in the **Relay config** menu.

Overview

The relays of the occupied modules are depicted in the display.
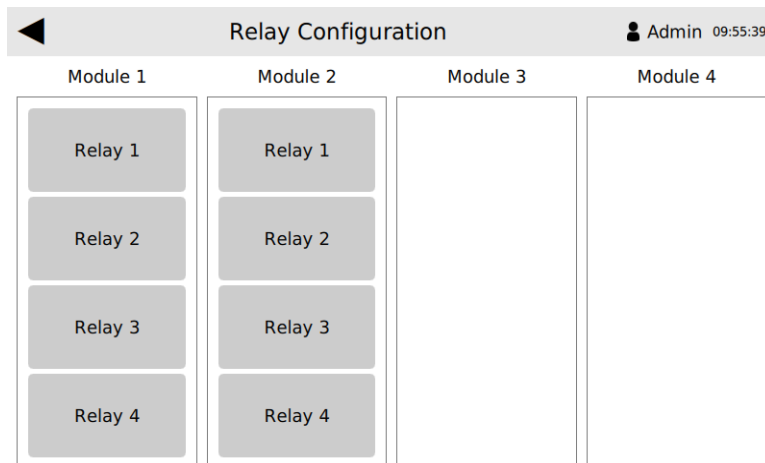
Figure 23 - Relay Configuration

The defined relay logic is applied once a minute.

Relay Logic Group

This menu provides an overview of the defined logic groups. You can add a new logic group by pressing the "OR" button, then pressing the **+** button that appears on the screen.

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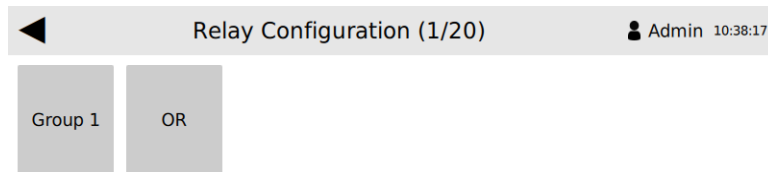
Figure 24 - Relay module configuration overview

All defined logic groups are linked with a logical OR. Within a logic group, all logic conditions are linked with a logical AND. The resulting logical expression defines the overall switching state of the relay.

To adjust a relay logic, press the corresponding logic group button.

Within the relay configuration headline, a counter is displayed in brackets of the used logic impressions.

The possible combinations of logic groups and logic conditions are limited to a total number of 20 possibilities.

OR Button then + Button - Add a new logic group to the relay logic. You can define up to 20 logic groups.

If the maximum number of logic groups and logic conditions is reached, the + button will be grayed out.

Invert - An activated Invert button leads to a reversal of the defined switching state of the relay (1).

Test - Disables the relay logic temporarily so that the relay can be switched manually (2).

Info - The relay logic will be display as plain text with logical expressions (3).

Accept - Confirms all inputs and applies the defined logic expression to the relay (4).

Change Type - Displays an overview of all Watchdog and channel conditions for all modules to switch between those two options.

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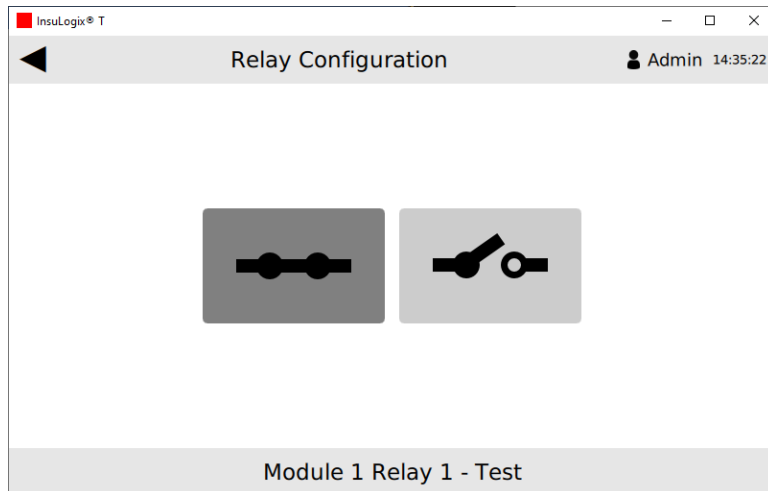
Figure 25 - Relay test screen

Logic conditions configuration

Within the condition menu you can delete a logic group or add a new logic condition expression.
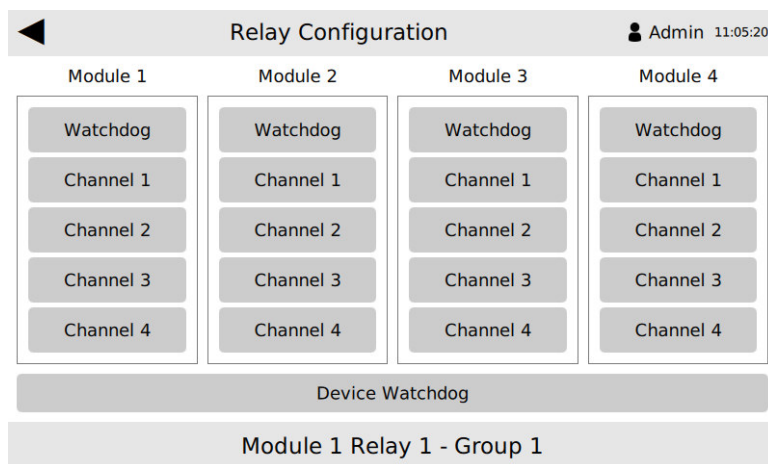
Figure 26 - Logic condition selection

When you add a new logic condition a selection monolog appears. There you can select between **Watchdog** or **Channel** conditions.

> A **Watchdog** condition can be set for all four modules.
> **Channel** conditions can only be set for the assembled and/or enabled modules.

Channel condition

Sets a temperature limit at which the relay switches. If **On Error** is set to On additional switching can take place if an error occurs. If both values are set the relay switches to **true** if one of the two states occur.

To adjust a relay logic condition, press the corresponding condition button.
A logic condition can only be deleted in the condition setting monolog and not in the condition overview.
To add a new logic condition, press the AND, then the **+** button.

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Figure 27 – Channel condition selection

3.3.4 Monitoring Screen
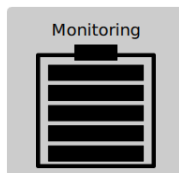
You can log temperature and events in the **Monitoring** menu.

The data is recorded in a log file in CSV (Character-separated values) file format. To separate the data fields in the CSV file **semicolons** are used. The CSV file is stored internally in the controller and can be downloaded via a USB interface.

If used in a region that uses commas in a CSV file, use these steps to be able to use this file as you would expect.
1. Open file in a text editor
2. Find/Replace all ";" with ","
3. Save file (as .csv)
4. Open file a spreadsheet editor

Figure 28. - Monitoring overview

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Interval - Specify the time interval (1) with Days/Hours/Minutes/Seconds at which the temperature measurements of all active channels shall be recorded.

Status - The status provides information about the used memory (2) and the available memory capacity (3).

Activate or deactivate the monitoring with the State button.

Show - The Show menu lists the logged temperatures and events.

Press the **Show** button to switch to the **Monitoring Temperatures** log.

Monitoring Temperatures

The display shows the temperatures according to the set time interval. The log starts with the current day. You can also display the temperatures of the previous days, therefore use the cursor keys (1).
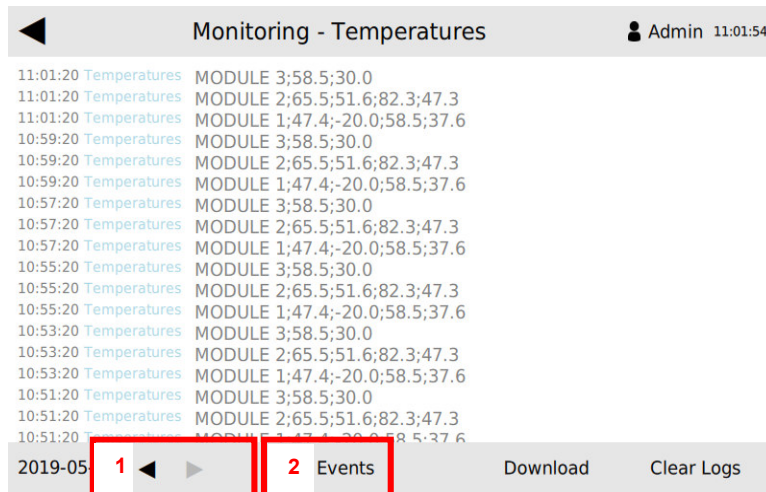
Figure 29 - Monitoring - Temperature log overview

If you have already downloaded data (see Section 3.3.5) from previous days you can no longer display them.

Press the **Events** (2) button to switch to the **Monitoring Events** dialog.

Monitoring Events

The default time interval for recording **Events** is one minute.

The following events will be logged:

- every setting and change made by the **Admin**
- alerts
- relay conditions
- timeout

The log starts with the current day. To display the events of the previous days, use the cursor keys (1).

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Figure 30 - Monitoring - event log overview

The events are recorded, but not described.
If you have already downloaded data from previous days you cannot display those past events.

Press the **Temperatures** (2) button to switch to the **Monitoring Temperatures** dialog.

3.3.5 Data download

You can download the data stored internally on the measuring controller to USB. A folder named "logs" will be created on your USB automatically by the InsuLogix® T if it does not already exist.

Recent log files

Here you see the internally stored files that have not yet been downloaded.

Downloaded (Archived) files

Here you see the internally stored files that have already been downloaded but not yet deleted.

Figure 31 - Download - start input mask

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To download the files, insert an USB-stick.
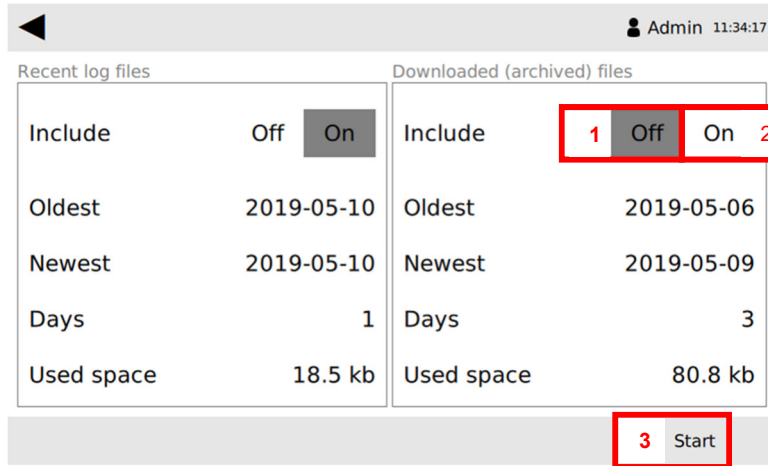
Figure 32 - Download - after connecting an USB-stick

Include Off (1)	Only files in the internal memory that have not been downloaded yet will be downloaded.
Include On (2)	All files in the internal memory will be downloaded. This allows you to save files that have already been downloaded.
Press Start (3)	This will start the download process.
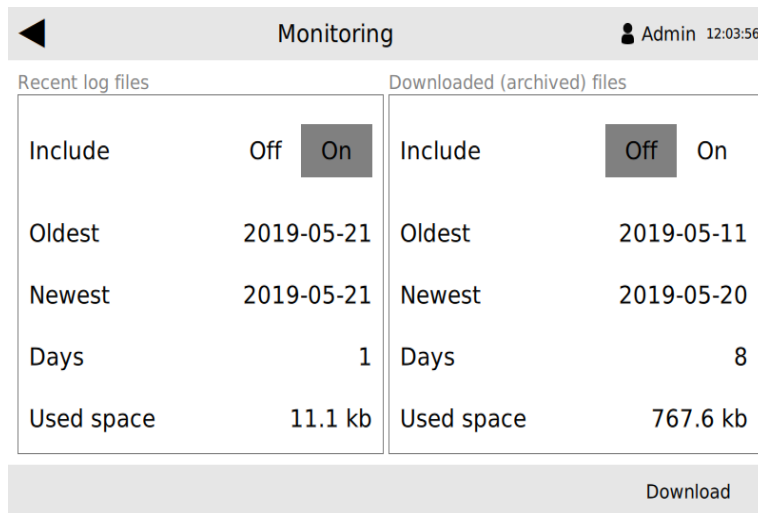
Figure 33 - Monitoring – Downloading the recent Log files

The Figure 33 above shows the downloading of recent Log files, not including the archived files.

The file for the current day does not exist yet. Therefore, the saved file on the USB stick will be marked with "incomplete".

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3.3.6 Clearing the logs

You can delete log files, whether they have been downloaded or not, however the data in the log file for the current day is not erasable. Start this process by pressing the "Clear Logs" button in the bottom right of the screen as shown in Figure 34.
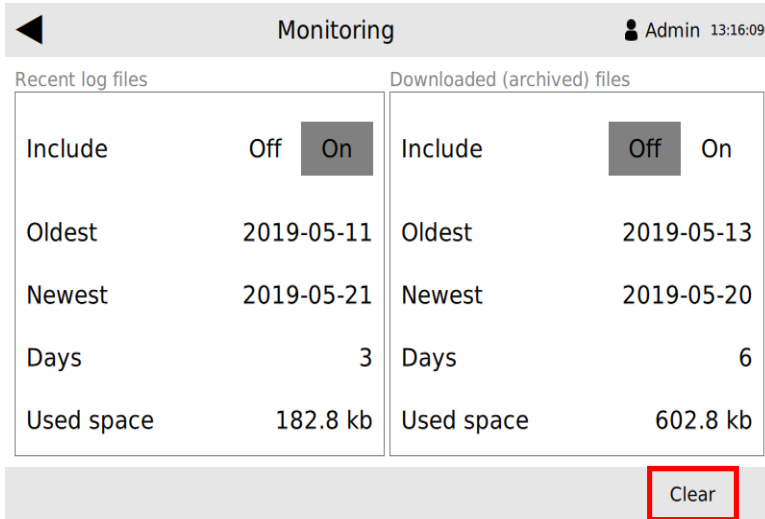
Figure 34 - Monitoring - Recent log files
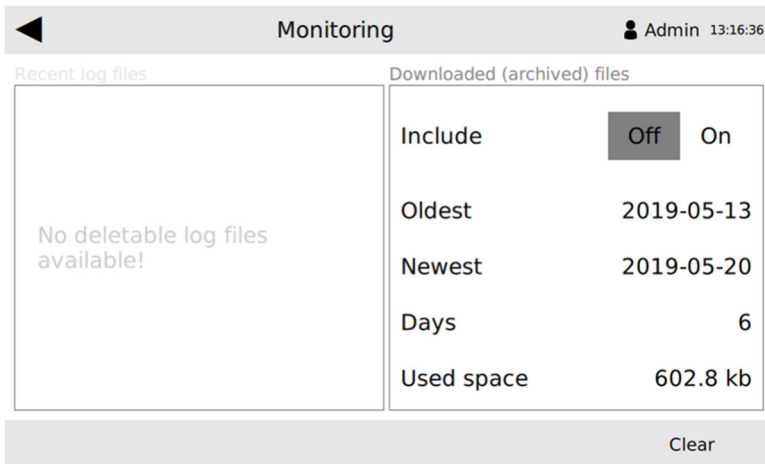
Figure 35 - Monitoring - Recent log files deleted

Downloaded (Archived) files

Here you can see the internally stored files that have already been downloaded.

You can delete this data by pressing "Clear".

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Figure 36 - Monitoring - Downloaded (archived) files

Figure 37 - Monitoring - Downloaded (archived) files deleted

3.3.7 Settings Screen
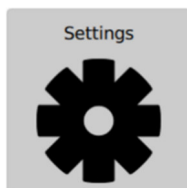
Using the Settings menu you can configure the InsuLogix® T monitor system settings.

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General Screen

Figure 38 - Settings - General

General

The operating **language** of the software is English, it cannot be adjusted.

Select between degrees Celsius, degrees Fahrenheit or Kelvin as the **Unit** for the temperature values.

> The use of degrees Fahrenheit can lead to rounding errors because the measured values are stored internally in degrees Celsius.

Network Configuration

Select between the DHCP or Manual configuration for the **Type**. Only Internet Protocol Version 4 (IPv4) is supported.

Only a selection of Manual will allow the IP address to be set

Display

Define **Timeout** and **Brightness**.

> The time set in the **Timeout** menu directly controls the **Admin** logout time. If the **Timeout** is switched **off**, the **Admin** will still be logged out after 30 minutes.
>
> When roll mode is enabled, the **Timeout** is disabled.

Description

Enter the **Description** of the measurement controller. This Description is shown on every downloaded file.

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System Screen
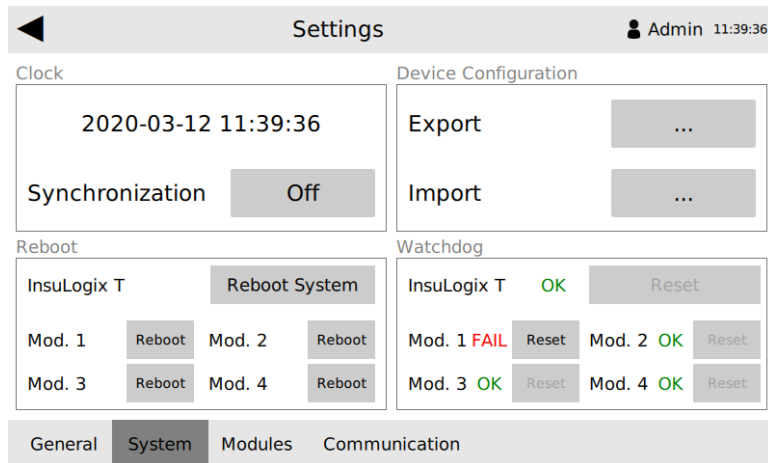
Figure 39 - Settings - System

Clock

Shown in Figure 39 is the current date and time of the controller in ISO 8601 format (year-month-day, hour:minute:second).

Note: No Daylight saving functionality is implemented. No time zone support is implemented.

Synchronize date and time using Network Time Protocol (NTP).

Select the Synchronization **OFF** button to set the date and time manually.

Device Configuration

The configuration of the measurement controller can be transferred to another controller. Therefore, the settings can be saved on an external storage device, such as a USB drive.

Export a controller configuration to an external storage device
The current settings of a controller are written to an "init.xml" file on the external storage device and can be imported to another controller.

To export a controller configuration:
1. Press on "…" next to Export. If no USB drive is connected to the controller, the controller will prompt the user to insert one.
2. If a valid configuration file is found to already be on the USB, the controller will display a message that reads "Hint: File init.xml exists on external storage and will be overwritten."
3. Press "Export" in the lower right corner of the screen to export the system configuration.
4. Once the export has finished, the controller will display the message "Export Successful"

Import a controller configuration from an external storage device
To import a controller configuration:
1. Press on "…" next to Import. If no USB drive is connected to the controller, the controller will prompt the user to insert one.
2. If a valid config file is found on the USB, the controller will display a message that reads "Hint: Found file init.xml. Can import data".
3. Press "Import" in the lower right corner of the screen to import the system configuration.
4. Once the import has completed, the controller will display the message "Import Successful"

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All settings of a controller are read from the configuration file on the external storage device and transferred to another controller. These settings replace the existing controller configurations or reconfigure the controller.

The following settings will be modified:
- Channel Configuration
- Relay Configuration
- Monitoring (Interval)
- Setting

> ℹ️ The import of a controller configuration only runs correctly if the controllers are identical in construction, i.e. the same number of modules in the controller, the same number of channels on one module and so on.

Reboot

To reboot the measurement controller or a single module press and hold the **Reboot System** or **Reboot** button.
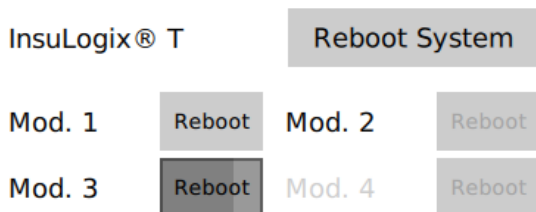
A progress bar will be displayed when a Re-boot button is pressed (see Mod. 2) and the label changes to Reset..
Non-assembled modules will be displayed hidden (see Mod. 4).

> ℹ️ To initiate the reboot the Reboot System or Reboot button has to be held for around 3 seconds, until the progress bar has completed. This mechanism is to prevent an inadvertent reboot.

Watchdog

To reset the watchdog for the measurement controller or a single module press the **Reset** button.
A watchdog timeout is set when the text FAIL is displayed and no watchdog timeout if OK is displayed.
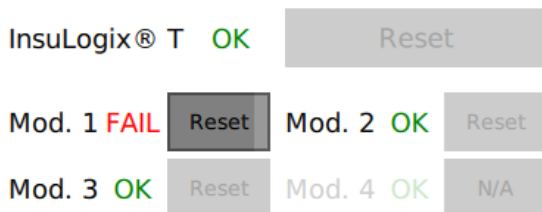
A progress bar will be displayed when a button is pressed (see Mod. 1).
If a module or the whole controller functions are nominal, the reset button is greyed out.
Non-assembled modules will be displayed as N/A (see Mod. 4).

Modules Screen

The values **Spectrum Averaging**, **Spectrum Smoothing** and **Lamp Delay** are set for each measuring module.

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Do not change these parameters without permission from Weidmann as these parameters affect the factory calibration and accuracy of readings. Doing so may void the warranty.

Figure 40 - Settings - Modules

Communication Screen

The Communication Screen is used to define the parameters for the various protocols that are activated on the InsuLogix® T. Protocol parameters can only be modified for the protocols that are activated/licensed on a given system.

Communication options should be defined at time of order so these can be licensed prior to shipping from the factory.

Figure 41 - Settings - Modules

IEC61850 CID

Use this setting to export an internal CID file or import an external one.

> The export of a CID file is only possible if an internal CID file is installed on the measurement controller.

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3.3.8 About Screen

The **About** menu provides information about the serial number and the version of the measurement controller and each assembled module.
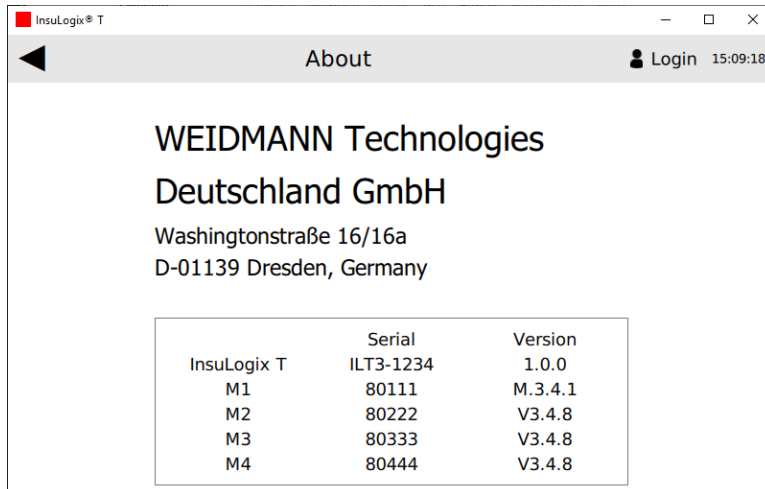
Figure 42 - About - Overview of serial number and software version

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ANNEX 1 – COMMUNICATION PROTOCOLS

Modbus

Note: The Modbus specification version is 1.1b.

This is the full Modbus map for an InsuLogix® T. Therefore all module-, channel- and relay-specific registers are designed for their maximum If your device does not have a certain amount of modules, channels or relays, access to the respective addresses will fail.

Settings

Parameter	Value
ID (default)	Specify on GUI (1)
Baudrate	115200
Stopbits	1
Parity	None
Port (Ethernet)	502
Interface	RS485 HX or Ethernet

Addresses

Discrete Output Coils

Function	Address	R/W	Description
Enable Channel [K1–16]	0x000 – 0x00F	X / X	0: Channel off 1: Channel on
Auto Integration [M1–4]	0x010 – 0x013	X / X	0: Constant Exposure Time 1: Auto tuning
Log Mode	0x014 – 0x014	X / X	0: Logging deactivated 1: Logging activated
Erase Archive Log Data	0x015 – 0x015	– / X	1: Erase archive log data
Erase Log Data	0x016 – 0x016	– / X	1: Erase log data
Module Watchdog Reset [M1–4]	0x017 – 0x01A	– / X	1: Reset Watchdog in Modules
Module Reboot [M1-4]	0x01B – 0x01E	– / X	1: Reboot Modules
Device Reboot	0x01F – 0x01F	– / X	1: Reboot Device

Discrete Input Coils

Function	Address	R/W	Description
Alarm State [K1–16]	0x000 – 0x00F	X / –	0: Condition not met 1: Condition met
Relay State [K1–16]	0x010 – 0x01F	X / –	0: Relay open 1: Relay closed
Module Watchdog [M1–4]	0x020 – 0x023	X / –	0: Module OK 1: Module Watchdog raised
Device Watchdog	0x024 – 0x024	X / –	0: Device OK 1: Device Watchdog raised

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Analog Input Registers

Function	Address	R/W	Description
Edge [K1–16]	0x000 – 0x00F	X / –	
Temperature [K1–16]	0x010 – 0x01F	X / –	Channel temperature (tenths °C)
Error [K1–16]	0x020 – 0x02F	X / –	0: Channel OK, 1: No Sensor, 2: No Signal, 3: Signal too low, 4: Signal too high, 5: Channel off
Module Count	0x030 – 0x030	X / –	
Module Location	0x031 – 0x031	X / –	Bit-masked
Channel Count	0x032 – 0x032	X / –	
Channel Location	0x033 – 0x033	X / –	Bit-masked
Relay Count	0x034 – 0x034	X / –	
Relay Location	0x035 – 0x035	X / –	Bit-masked
Device Temperature	0x036 – 0x036	X / –	CPU temperature (tenths °C)
Internal Space Usage	0x037 – 0x038	X / –	32-bit value for amount of used bytes
Internal Space Size	0x039 – 0x03A	X / –	32-bit value for amount of used bytes

Analog Output Holding Registers

Function	Address	R/W	Description
Temperature Offset [K1–16]	0x000 – 0x00F	X / X	The written value is a delta to the existing offset
Temperature Averaging [K1–16]	0x010 – 0x01F	X / X	Amount of values for the Average Temperature
Analog Low Temp. [K1–16]	0x020 – 0x02F	X / X	
Analog High Temp. [K1–16]	0x030 – 0x03F	X / X	
Alarm Low Temp. [K1–16]	0x040 – 0x04F	X / X	
Alarm High Temp. [K1–16]	0x050 – 0x05F	X / X	
Integration Time [K1–16]	0x060 – 0x06F	X / X	When Auto Integration is active, without effect
Spectrum Average Count [M1–4]	0x070 – 0x073	X / X	Amount of accumulated Spectra
Spectrum Smoothing Factor [M1–4]	0x074 – 0x077	X / X	Matrix size of the smoothing algorithm
Next Lamp Delay [M1–4]	0x078 – 0x07B	X / X	Preheating time before a measurement starts
Real Time Clock	0x07C – 0x07F	X / X	64-bit Unix timestamp (2038 Problem)
Log Interval	0x080 – 0x081	X / X	32-bit value for amount of used seconds
Relay Invert [R1-R16]	0x082 – 0x082	X / X	16bit – Bit-masked

Relay 1 Configuration	0x083 – 0x0AA	X / X	32-bit per single relay condition:
			  1 Bit: Activation Bit
			  2-3 Bit: Module Index [1-4]
			  4 Bit: New Group Bit
			  5-6 Bit: Condition Bit
			    0: Channel Condition
			    1: Module Watchdog Condition
			    2: Controller Watchdog Condition
			    3: Not defined
			  7-8 Bit: Channel Index [1-4]

…			

Function	Address	R/W	Description
			9 Bit: On Error
			10-16 Bit: unused/free
			- 17-32 Bit: is a 16bit-Integer for the temperature limit
Relay 16 Configuration	0x2DB – 0x302	X / X	**20** possible relay conditions per relay. All conditions per relay will be arranged without gaps in the address area when data is read.

Function code FC43 – read controller identification

Object Id	Object Name	Category
0x00	Vendor Name	Basic
0x01	Product Code	Basic
0x02	Major Minor Revision	Basic
0x03	Vendor URL	Regular
0x04	Product Name	Regular
0x05	Model Name	Regular
0x80 - 0x81	M1: Serial number / Firmware version	Extended
0x82 - 0x83	M2: Serial number / Firmware version	Extended
0x83 - 0x84	M3: Serial number / Firmware version	Extended
0x85 - 0x86	M4: Serial number / Firmware version	Extended

DNP3

Settings

Parameter	Value
Master Address (default)	Specify on GUI (1024)
Outstation Address (default)	Specify on GUI (0)
Baudrate	115200
Stopbits	1
Parity	None
Port (Ethernet)	20000
Interface	RS485 FX or Ethernet

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Addresses

Binary Outputs

Object Group 10: Binary Output Static

Function	Address	Variation	Description
Enable Channel [K1–16]	0x000 – 0x00F	1	0: Channel off 1: Channel on
Auto Integration [M1–4]	0x010 – 0x013	1	0: Constant Exposure Time 1: Auto tuning
Log Mode	0x014 – 0x014	1	0: Logging deactivated 1: Logging activated

Object Group 12: Binary Output Command

Function	Address	Variation	Description
Enable Channel [K1–16]	0x000 – 0x00F	1	0: Channel off 1: Channel on
Auto Integration [M1–4]	0x010 – 0x013	1	0: Constant Exposure Time 1: Auto tuning
Log Mode	0x014 – 0x014	1	0: Logging deactivated 1: Logging activated
Erase Archive Log Data	0x015 – 0x015	1	1: Erase archive log data
Erase Log Data	0x016 – 0x016	1	1: Erase log data
Module Watchdog Reset [M1–4]	0x017 – 0x01A	1	1: Reset Watchdog in Modules
Module Reboot [M1-4]	0x01B – 0x01E	1	1: Reboot Modules
Device Reboot	0x01F – 0x01F	1	1: Reboot Device

Binary Input

Object Group1: Binary Input Static

Function	Address	Variation	Description
Alarm State [K1–16]	0x020 – 0x02F	1	0: Condition not met 1: Condition met
Relay State [K1–16]	0x030 – 0x03F	1	0: Relay open 1: Relay closed
Module Watchdog [M1–4]	0x040 – 0x043	1	0: Module OK 1: Module Watchdog raised
Device Watchdog	0x044 – 0x044	1	0: Device OK 1: Device Watchdog raised

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Analog Input

Object Group 30: Analog Input Static

Function	Address	Variation	Description
Edge [K1–16]	0x045 – 0x054	4	
Temperature [K1–16]	0x055 – 0x064	4	
Error [K1–16]	0x065 – 0x074	4	0: Channel OK, 1: No Sensor, 2: No Signal, 3: Signal too low, 4: Signal too high, 5: Channel off
Module Count	0x075 – 0x075	4	
Module Location	0x076 – 0x076	4	Bit-masked
Channel Count	0x077 – 0x077	4	
Channel Location	0x078 – 0x078	4	Bit-masked
Relay Count	0x079 – 0x079	4	
Relay Location	0x07A – 0x07A	4	Bit-masked
Device Temperature	0x07B – 0x07B	4	Temperature from the processing unit (°C * 10)
Internal Space Usage	0x07C – 0x07D	4	32-bit value for amount of used bytes
Internal Space Size	0x07E – 0x07F	4	32-bit value for amount of used bytes

Analog Output

Object Group 40: Analog Output Status

Function	Address	Variation	Description
Temperature Offset [K1–16]	0x080 – 0x08F	2	The written value is a delta to the existing offset
Temperature Averaging [K1–16]	0x090 – 0x09F	2	Amount of values for the Average Temperature
Analog Low Temp. [K1–16]	0x0A0 – 0x0AF	2	
Analog High Temp. [K1–16]	0x0B0 – 0x0BF	2	
Alarm Low Temp. [K1–16]	0x0C0 – 0x0CF	2	
Alarm High Temp. [K1–16]	0x0D0 – 0x0DF	2	
Integration Time [K1–16]	0x0E0 – 0x0EF	2	When Auto Integration is active, without effect
Spectrum Average Count [M1–4]	0x0F0 – 0x0F3	2	Amount of accumulate Spectra
Spectrum Smoothing Factor [M1–4]	0x0F4 – 0x0F7	2	Matrix size of the smoothing algorithm
Next Lamp Delay [M1–4]	0x0F8 – 0x0FB	2	Preheating time before a measure starts
Real Time Clock	0x0FC – 0x0FF	2	64-bit Unix timestamp (2038 Problem)
Log Interval	0x100 – 0x101	2	32-bit value for amount of used seconds
Relay Invert [R1-R16]	0x102 – 0x102	2	16bit – Bit-masked

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Function	Address	Variation	Description
Relay 1 Configuration	0x103 – 0x116	2	**32-bit per single relay condition**: (see Modbus Data Map)
	...		**20** possible relay conditions per relay. All conditions per relay will be arranged without gaps in the address area when data is read.
Relay 16 Configuration	0x36F – 0x382	2	

Object Group 41: Analog Output Command

Function	Address	Variation	Description
Temperature Offset [K1–16]	0x080 – 0x08F	2	The written value is a delta to the existing offset
Temperature Averaging [K1–16]	0x090 – 0x09F	2	Amount of values for the Average Temperature
Analog Low Temp. [K1–16]	0x0A0 – 0x0AF	2	
Analog High Temp. [K1–16]	0x0B0 – 0x0BF	2	
Alarm Low Temp. [K1–16]	0x0C0 – 0x0CF	2	
Alarm High Temp. [K1–16]	0x0D0 – 0x0DF	2	
Integration Time [K1–16]	0x0E0 – 0x0EF	2	When Auto Integration is active, without effect
Spectrum Average Count [M1–4]	0x0F0 – 0x0F3	2	Amount of accumulate Spectra
Spectrum Smoothing Factor [M1–4]	0x0F4 – 0x0F7	2	Matrix size of the smoothing algorithm
Next Lamp Delay [M1–4]	0x0F8 – 0x0FB	2	Preheating time before a measurement starts
Real Time Clock	0x0FC – 0x0FF	2	64-bit Unix timestamp (2038 Problem)
Log Interval	0x100 – 0x101	2	32-bit value for amount of used seconds
Relay Invert [R1-R16]	0x102 – 0x102	2	16bit – Bit-masked
Relay 1 Configuration	0x103 – 0x116	2	**32-bit per single relay condition:** (see Modbus Data Map)
	...		**20** possible relay conditions per relay. All conditions per relay will be arranged without gaps in the address area when data is read.
Relay 16 Configuration	0x36F – 0x382	2	

Ascii (Debug)

Settings

Parameter	Value
Baud rate	57600
Stop bits	1
Parity	None
Newline	CR
Interface	RS232

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Commands

Function	Command	Parameter	Return
Average Temperature	?01	X / X	
All Average Temperatures	?02	X / X	
Temperature	?03	X / X	
All Temperatures	?04	X / X	
Temperature + Timestamp	?05	X / X	
Error	?07	X / X	
Channel Count	?0F		Reserved for debug functionality
Channel Enabled	?10	X / X	
Channel Disturbed	?11	– / X	1: Reset Watchdog Relay
Actual Channel	?12	– / X	1: Reset RTC system registers
Integration Time	?23	– / X	1: Reset all RTC registers
Auto Integration	?26	– / X	1: Erase SD data
Next Lamp Delay	?27	– / X	1: Reboot
Model Name	?40		
Serial Number	?41		
Firmware Version	?42		
Library Version	?43		
Hardware Configuration	?46		
Spectrum Smoothing Factor	?50		
Spectrum Average Count	?52		
Temperature Averaging	?53		
Last Edge	?73		
Temperature Offset	?75		
Analog Limits	?81		
Relay State	?87		
Watchdog	?88		

Write Commands

Function	Command	Parameter	Description
Channel Enabled	:10	2byte (hex)	(De)Activate
Integration Time	:23		1: Reset all RTC registers
Auto Integration	:26	Flag (boolean)	0: Constant Exposure Time 1: Auto Tuning
Next Lamp Delay	:27	Timespan (dec)	Pre-glowing time before a measure starts on this Channel
Spectrum Smoothing Factor	:50	Number (dec)	Matrix size of the smoothing algorithm
Spectrum Average Count	:52	Number (dec)	Amount of accumulate spectra

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Function	Command	Parameter	Description
Temperature Averaging	:53	<Channel (dec)> Number (dec)	Amount of values for the Average Temperature
Temperature Offset	:75	Channel (dec), Offset (hex)	Delta to the existing offset
Analog Limits	:81		
Watchdog	:88	Flag (boolean)	1: Reset Watchdog Relay
Reboot	:C2	Flag (boolean)	1: Reboot

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Settings

Parameter	Value
IED Name	
IP Address	Specify in the CID file
Subnet	
Gateway	
Interface	Ethernet

Addresses

MMS Tags

Function	Address	Type	R/W	Description
Temperature [K1–16]	STMP<K>.MXTmpmagf	Float	X / -	
Error [K1–16]	STMP<K>.MXTmp$q	Bit Array	X / -	
Last Measurement [K1–16]	STMP<K>.MXTmp$t	UTC Time	X / -	
Error [K1–16]	STMP<K>.STBeh$stVal	Integer	X / -	
Last Measurement [K1–16]	STMP<K>.STBeh$t	UTC Time	X / -	
Alarm State [K1–16]	STMP<K>.STAlm$stVal	Boolean	X / -	
Last Measurement [K1–16]	STMP<K>.STAlm$t	UTC Time	X / -	
Channel Enabled [K1-16]	STMP<K>.STMod$stVal	Integer	X / -	
Enable Channel [K1-16]	STMP<K>.COMod$Oper$ctlVal	Integer	- / X	
Temperature Offset [K1–16]	STMP<K>.SPTmpOffset$setMag$f	Float	X / X	
Relay Exist [R1-R16]	GGIO<R>STBeh$stVal	Integer	X / -	
Relay State [R1-R16]	GGIO<R>STInd1$stVal	Boolean	X / -	
Relay Changed Time [R1-R16]	GGIO<R>STInd1$t	UTC Time	X / -	

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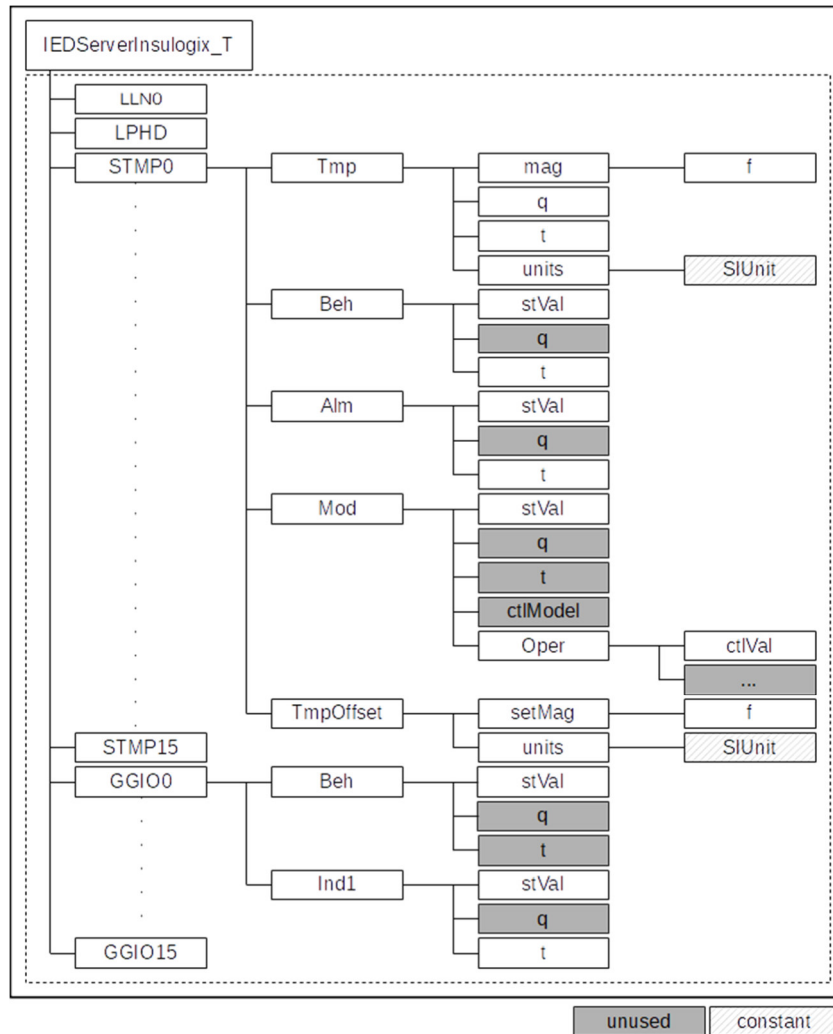
Figure 43 – IED Structure

IEC60870-5

Settings

Parameter	Value
Common Address (default)	Specify over GUI (1)
Baud rate	115200
Stop bits	1
Parity	None
Port (Ethernet)	2404
Interface	RS485 FX or Ethernet

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Addresses