TopCon TC.LAE
Liquid to air heat exchanger

Manual
DO6410.0003 V00.90

Regatron AG
Kirchstrasse 11
CH-9404 Rorschach
Tel +41 71 846 67 44
Fax +41 71 846 67 77
www.regatron.com
topcon@regatron.ch
General information

© 2016 Regatron AG

This document is protected by copyright.

All rights, including translation, re-printing and duplication of this manual or parts of it, are reserved. No part of this document is allowed to be reproduced or processed using electronic systems, copied or distributed in any form (by photocopying, microfilming or any other process), also not for educational purposes, without the written approval of Regatron AG.

This information in this documentation corresponds to the development situation at the time of going to print and is therefore not of a binding nature. Regatron AG reserves the right to make changes at any time for the purpose of technical progress or product improvement, without stating the reasons.

Identification

Device hardware

Information about the device is to be found on the type plate on the rear side of the TopCon TC.LAE device.

![Type plate image]

Fig. 1 Example - information about the device type, serial number as well as input and output data of the TopCon TC.LAE device.
Manufacturer

Information on the manufacturer

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Tel</th>
<th>Fax</th>
<th>Website</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regatron AG</td>
<td>+41 71 846 67 44</td>
<td>+41 71 846 67 77</td>
<td><a href="http://www.regatron.com">www.regatron.com</a></td>
<td><a href="mailto:topcon@regatron.ch">topcon@regatron.ch</a></td>
</tr>
<tr>
<td>Kirchstrasse 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH-9404 Rorschach</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instructions

Version overview

<table>
<thead>
<tr>
<th>Operating instructions</th>
<th>Manual - TopCon TC.LAE; V00.90; 08.06.2016</th>
</tr>
</thead>
</table>

Tab.1 Subject to technical change without notice.

General information about the manual

Purpose of the manual

This manual provides information on the usage of the TopCon TC.LAE device. Familiarise yourself with the contents of these operating instructions to operate the device efficiently.

The TC.LAE device is used as an Option for the TC.ACS device. The TC.LAE is a liquid cooling device that transfers the internally generated heat energy from the attached device (TC.ACS) out to the surrounding air. To connect the TC.LAE with the TC.ACS device, it is necessary to use the TC.ACS manual too.

Availability of the manual

The manual must be available at all times to the personnel who are operating the device.

Manual changes

The TopCon TC.LAE is a new product that will change as it develops. There may therefore be changes in operation and the scope of operation.

You will find the latest version of the manual on the web site www.regatron.com.
Using the manual

In its description the manual first provides an overview and then discusses the details of a function or situation.

If necessary, instructions on how to perform actions are given step by step after explanatory text, figures and tables.

This aspect is reflected in the layout, which is broken down as follows:

Fig. 2  Example page – layout of a page of the document.
-1- The header

... contains the title of the instructions, the chapter numbers and chapter headings with the related sub-chapters so that you do not lose the overview even in the midst of explanations that cover several pages.

-2- Informative text

... contains important notes, conditions for specific situations and introduces you to specific topics.

-3- Figures

... say more than words to illustrate the majority of the topics. Important details within the figure are referred to using item numbers, boxes and arrows.

-4- Tables

... provide the information in concise form for reference and provide information on the item numbers used in the figure above.

-5- The footer

... contains the publication date, the manual version and the current page number.

A short explanation of specific symbols in the manual:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Bezeichnung&gt;</td>
<td>Text in angle brackets refers to software and hardware buttons, as well as tabs in the software.</td>
</tr>
<tr>
<td>-1-</td>
<td>Item numbers in descriptions, in instructions on how to perform actions or in tables.</td>
</tr>
<tr>
<td>venerable dot</td>
<td>The dot is used to mark lists and instructions for performing actions.</td>
</tr>
<tr>
<td>L→</td>
<td>The result arrow marks the description of a consequence of an action.</td>
</tr>
<tr>
<td>R→</td>
<td>The double arrow marks preventive instructions in information on hazards.</td>
</tr>
<tr>
<td>→</td>
<td>The single arrow is used as a result or reference arrow in tables.</td>
</tr>
<tr>
<td>![1] ![1]</td>
<td>Item numbers with and without reference lines in figures refer to important details.</td>
</tr>
</tbody>
</table>

Tab. 2 Explanation of symbols in the document.
# Table of contents

**GENERAL INFORMATION** ................................................................. 2  
Identification .................................................................................. 2  
General information about the manual............................................. 3  

## TABLE OF CONTENTS ................................................................. 6  

### 1. PRODUCT DESCRIPTION ......................................................... 8  
1.1. Product usage and restrictions .............................................. 8  
1.2. Features ............................................................................... 9  
  1.2.1. Part of standard delivery .................................................. 9  
  1.2.2. Description of the model identifier .................................... 9  
  1.2.3. Model range ................................................................... 9  
1.3. Position of the interfaces ....................................................... 10  
  1.3.1. Overview of the front side of the device ......................... 10  
  1.3.2. Overview of the rear side of the device ......................... 11  
1.4. Technical data ....................................................................... 12  

### 2. GENERAL INFORMATION ON SAFETY AND HAZARDS .......... 13  
2.1. Scope and applicability ......................................................... 13  
2.2. Categorisation of the hazard areas ....................................... 13  
  2.2.1. Personnel area ................................................................ 14  
  2.2.2. Systems and material area ............................................. 14  
  2.2.3. Surrounding area .......................................................... 15  
  2.2.4. Transport area .............................................................. 15  
  2.2.5. Area related to interaction with the system .................... 16  
2.3. Safety pictograms used ......................................................... 16  

### 3. LAYOUT AND FUNCTION ......................................................... 18  
3.1. Function overview .............................................................. 18  
  3.1.1. The scope .................................................................... 18  
  3.1.2. Internal device controlling ............................................ 19  
3.2. Tube connections of inlets and outlets ................................... 19  

### 4. CONTROLS AND DISPLAYS (STANDARD) ......................... 20  

### 5. OPTIONS AND VARIATIONS ............................................... 21  
5.1. Overview ............................................................................ 21  
5.2. Connection variants – Examples ......................................... 22  
5.3. A coolant fill-up set (Option) ............................................. 23
6. INSTALLATION AND COMMISSIONING ........................................... 24

6.1. Device transport and installation ............................................ 24
   6.1.1. Un-/pack sequence – TC.LAE standard packaging ................. 25
   6.1.2. Unpack sequence – Coolant fill-up set (Option) ................. 26
   6.1.3. Disposal with due care for the environment ..................... 27
   6.1.4. Case installation/delivery with case ................................ 27

6.2. Device dis-/connections ..................................................... 28
   6.2.1. Safety information .................................................... 28
   6.2.2. Mains connection .................................................... 29
   6.2.3. Liquid cooling – device connection ................................ 30
   6.2.4. Liquid cooling – device disconnection ........................... 31
   6.2.5. Dis-/connect a quick release coupling system (Option) ....... 32
   6.2.6. Fill-up the system with coolant .................................... 33
   6.2.7. Emptying the coolant from the device ............................ 39

6.3. Switching on and off the TC.LAE device ............................... 44
   6.3.1. Switching on the device ............................................ 44
   6.3.2. Switching off the device .......................................... 44

7. MAINTENANCE ...................................................................... 45

8. SUPPORT ........................................................................... 46

8.1. Contact information ............................................................ 46

8.2. How to contact support ....................................................... 47

8.3. Determination of device information ..................................... 48

8.4. Device return ..................................................................... 48

9. APPENDIX .......................................................................... 49

9.1. Ambient conditions ............................................................ 49

9.2. Cooling ........................................................................... 49
   9.2.1. Cooling power ......................................................... 49
   9.2.2. Coolant ................................................................. 50
   9.2.3. Coolant filling quantity of the devices ........................... 50

9.3. Technical data – mechanical ............................................... 51
   9.3.1. Dimensions ........................................................... 51
   9.3.2. Weight ................................................................. 53
   9.3.3. Liquid cooling – interface .......................................... 53

9.4. Technical data – electrical .................................................. 53
   9.4.1. Cross-section – Cable connections AC line ..................... 53
   9.4.2. Mains connection .................................................... 54
   9.4.3. Interfaces – pin definition ......................................... 55
1. Product description

1.1. Product usage and restrictions

Operation of a TC.LAE device

TC.LAE is a reverse cooling liquid to Air unit.

The outlets and inlets of the TC.LAE and TC.ACS cooling interfaces are connected together to a closed liquid cooling circuit system.

An additional delivered fill-up set supports the coolant filling-up in the system.

Restriction on usage

The TC.LAE is constructed for a single 1 to 1 connection with a TC.ACS device. To connect the cooling tubes in parallel or in serial with more than one TC.ACS device is not allowed.
1.2. Features

1.2.1. Part of standard delivery
A TC.LAE device according the Model range. For further information refer to the type plate in figure Fig. 1, page 2.

1.2.2. Description of the model identifier

![Model Identifier Diagram]

Fig. 3  Structure of the model identifier.

1.2.3. Model range
The Model range has the same mains parameter:

<table>
<thead>
<tr>
<th>Mains voltage (V_{AC})</th>
<th>Connection order</th>
<th>Power input</th>
<th>Cooling power (kW)</th>
<th>Frequency</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>380V_{AC} ... 480 V_{AC}</td>
<td>2 x L, PE</td>
<td>200 VA</td>
<td>0 – 5</td>
<td>48 – 62 Hz</td>
<td>TC.LAE.5.400</td>
</tr>
<tr>
<td>100V_{AC} ... 240 V_{AC}</td>
<td>L+N, PE</td>
<td>200 VA</td>
<td>0 – 5</td>
<td>48 – 62 Hz</td>
<td>TC.LAE.5.230</td>
</tr>
<tr>
<td>24 V_{DC}</td>
<td>DC+, DC-, PE</td>
<td>200 W</td>
<td>0 – 5</td>
<td>---</td>
<td>TC.LAE.5.24</td>
</tr>
</tbody>
</table>

Tab. 1  TC.LAE Standardmodels
For further information about the technical data, refer to chapter 9.4.2, page 54.

The models TC.LAE.5.400 and TC.LAE.5.230 are currently available.
1.3. Position of the interfaces

1.3.1. Overview of the front side of the device

Fig. 4  Overview of the interfaces - front side.

<table>
<thead>
<tr>
<th></th>
<th>Main switch device, rocker switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To switch on/off the device.</td>
</tr>
<tr>
<td></td>
<td>For further information refer to chapter 4, page 20.</td>
</tr>
</tbody>
</table>

Tab. 2  Overview of the interfaces - device front side.
### 1.3.2. Overview of the rear side of the device

![Fig. 5 Overview of interfaces - rear side](image)

<table>
<thead>
<tr>
<th></th>
<th>Overview of interfaces - rear side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>LC inlet</strong>, Interface nipple G1/2”</td>
</tr>
<tr>
<td></td>
<td>Non drip quick release coupling nipple to connect to the outlet of a device, which will be cooled by the TC.LAE device. For further information about the connection procedure, refer to chapter 6.2.3, page 30.</td>
</tr>
<tr>
<td>2</td>
<td><strong>LC outlet</strong>, Interface coupling G1/2”</td>
</tr>
<tr>
<td></td>
<td>Non drop quick release coupling to connect to the inlet of a device, which will be cooled by the TC.LAE device. For further information about the connection procedure, refer to chapter 6.2.3, page 30.</td>
</tr>
<tr>
<td>3</td>
<td><strong>LC filling</strong>, Interface G1/2” for the filling hose</td>
</tr>
<tr>
<td></td>
<td>Connect the filling hose to this 1/2&quot; thread or to the equal threat on the top side of the filling block. For further information, refer to chapter 6.2.6, page 33.</td>
</tr>
<tr>
<td>4</td>
<td><strong>LC venting</strong>, Interface G1/2” for the venting hose</td>
</tr>
<tr>
<td></td>
<td>Connect the venting hose to this 1/2&quot; thread or to the equal threat on the top side of the filling block. For further information, refer to chapter 6.2.6, page 33.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Mains connection</strong>, 3-pin socket</td>
</tr>
<tr>
<td></td>
<td>To connect the mains plug. Pay attention to the label on the socket to get the according device variation connection order. For further information in the technical data, refer to chapter 9.4.3.1, page 55.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Pump operation switch</strong>, rocker switch</td>
</tr>
<tr>
<td></td>
<td>To switch on/off the coolant pump. For further information refer to chapter 4, page 20.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Earth</strong>, connection bolt M6</td>
</tr>
<tr>
<td></td>
<td>Connects the device to the protective earth.</td>
</tr>
</tbody>
</table>

Tab. 3 Overview of interfaces – device rear side.
1.4. Technical data

The TopCon TC.LAE is a new product that will change as it develops. The technical data may therefore change.

You will find the latest version of the TC.LAE data sheet on the web site www.regatron.com.

Technical data in the manual

<table>
<thead>
<tr>
<th>Technical data – overview of references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient conditions</td>
</tr>
<tr>
<td>Coolant</td>
</tr>
<tr>
<td>Mechanical data</td>
</tr>
<tr>
<td>Electrical data</td>
</tr>
<tr>
<td>Interface description</td>
</tr>
</tbody>
</table>

Tab. 4 Technical data – overview of references.
2. General information on safety and hazards

2.1. Scope and applicability

The general information applies to all TopCon low-voltage systems. The user(s) has (have) the obligation to avoid the risks and hazards mentioned by means of the rigorous application of specialist electrical rules.

The system is subject to the Low Voltage Directive, it has to be operated by adequately trained and instructed personnel.

2.2. Categorisation of the hazard areas

The assessment of the effects of hazards from low-voltage systems with a flow of energy for feed and possibly regeneration is divided into the following areas:

![Diagram of hazard areas](image)

Fig. 6 Categorizations of the hazard areas.

The hazard areas stated are explained in the sub-chapters of this chapter that follow.
2.2.1. Personnel area

The utmost attention is to be paid to the hazards for individuals. There are various risks and hazards, of these the most important are mentioned here.

Electric shock

A low-voltage system can produce electrical potentials that can be dangerous or even fatal for individuals. During work on the systems the following guidelines are to be observed:

a) Work in electrically isolated state

   This is the recommended way of working, it should be rigorously applied during all connection and wiring work. Follow the rules:

   1. Electrically isolate
   2. Secure against switching back on.
   3. Short-circuit
   4. Connect to earth
   5. Report and instruct

2.2.2. Systems and material area

Risk of fire

In case of fire, electrically isolate the system immediately, on the one hand to interrupt the supply of energy and on the other hand to shut down the fans.

Fight the fire from bottom to top in accordance with the rules in your organisation using suitable firefighting equipment (CO2 fire extinguisher). If possible use fire extinguishers with asphyxiation action to keep the secondary damage low.

Noise and noise level

The fans on the TC.LAE produce a lower or higher noise level dependent on the temperature of the heat sink. However, in the immediate vicinity of the cabinet this noise is under the tolerance limit that would make acoustic protection equipment necessary.

The usage of acoustic protection equipment or acoustic insulation measures can, however, be necessary in specific circumstances.

Mechanical damage

Incorrect operation of the systems can result in mechanical damage to the downstream equipment and systems.
Chemical risk of injury
While handling with coolant, open doors and windows and ensure the room is well ventilated also on the ground level.
Avoid work which leads to the formation of aerosols.
Use, if necessary the personal safety equipment:
- Use the respiratory protection at short time and existing low concentrations of vapour and aerosols.
  Use breathing apparatus with independent air supply at long time and high concentrations of vapour and aerosols.
- Use protective cloves which are resistant against acids and solvents and safety gloves to avoid direct skin contact.

2.2.3. Surrounding area
TopCon TC.LAE devices are air cooled.
The generated heat is blown out to the rear of the TopCon TC.LAE device with the aid of internal fans.

2.2.4. Transport area
For the transport the TopCon TC.LAE device there are no further transport and positioning aids required, e.g. carrying handles.

![View of the TC.LAE device from the front.](image)

If you place the rear side of the device on the rails in the rack, it can be simply pushed into the rack.
2.2.5. **Area related to interaction with the system**

Compliance with the design data for the specific system is a condition for malfunction-free operation.

Load systems operated using a TC.LAE can have significant effects on the power source. The following points are to be noted.

- The maximum temperature specified is not allowed to be exceeded.
- The system is always to be operated within the permissible temperature range. Temperatures above the specified values will reduce the service life of various modules.

2.3. **Safety pictograms used**

Important information in these operating instructions is marked with the following symbols:

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="DANGER" /></td>
<td>For an immediate hazard that will result in serious injuries or fatality.</td>
</tr>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>For an immediate hazard that can result in serious injuries or fatality.</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>For a possibly hazardous situation that can result in serious injuries or fatality.</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>For a possibly hazardous situation that could result in damage to the product or another item in its surroundings.</td>
</tr>
</tbody>
</table>

Tab. 3 Basic hazard and warning information.
Further warning and hazard information

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="DANGER, WARNING or CAUTION due to electrical power" /></td>
<td>DANGER, WARNING or CAUTION due to electrical power</td>
</tr>
<tr>
<td><img src="image" alt="DANGER, WARNING or CAUTION related to suspended load" /></td>
<td>DANGER, WARNING or CAUTION related to suspended load</td>
</tr>
<tr>
<td><img src="image" alt="DANGER, WARNING or CAUTION due heated areas" /></td>
<td>DANGER, WARNING or CAUTION due heated areas</td>
</tr>
<tr>
<td><img src="image" alt="Health hazard due a substance or mixture of substances (H302)" /></td>
<td>Health hazard due a substance or mixture of substances (H302)</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION, possible health hazard due a substance or mixture of substances (H361, H373)" /></td>
<td>CAUTION, possible health hazard due a substance or mixture of substances (H361, H373)</td>
</tr>
</tbody>
</table>

Tab. 4 Symbols included in the table can be used for more specific depiction of warning information from Tab. 3 "Basic hazard and warning information".

Instructions

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Important information" /></td>
<td>Important information</td>
</tr>
</tbody>
</table>

Tab. 5 Mandatory signs that are important for the operation of the device or the software.

General notes

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Tip, for working efficiently with the device." /></td>
<td>Tip, for working efficiently with the device.</td>
</tr>
</tbody>
</table>

Tab. 6 Additional information, to find any important information quickly.
3. Layout and function

3.1. Function overview

3.1.1. The scope

The TC.LAE is a liquid cooling device that transfers the internally generated heat energy from the attached device (TC.ACS) out to the surrounding air. It receives the heat energy via a tube connected to the liquid inlet and transfers the heat energy via a heat exchanger to the six rear mounted cooling fans. The cooled working liquid is then returned out through the liquid outlet.

TC.LAE is needed for systems with significant cooling demands and without a liquid cooling system/ net.

![Diagram of airflow through TC.LAE device]

Fig. 8  Airflow through the TC.LAE device.
- 1- Rear side: Hot air exhaust.
- 2- Front side: Cold air intake.
- 3- Cooling fans blow the heated air to the rear side of device.
- 4- The liquid to air exchanger transfers the internally heated liquid to the surrounding air.
- 5- Prevent air short circuit.
- 6- Depth to the front wall: ≥ 100 mm.
- 7- Depth to the rear wall: ≥ 100 mm.
3.1.2. Internal device controlling

![Diagram of TC.LAE device](image)

Fig. 9 Airflow through the TC.LAE device.
- 1. The power supply supports all components with 24 VDC.
- 2. The controller controls the fan speed according to the measured temperature by the sensors -5-.
- 3. Cooling fans blow the heated air to the rear side of the device. The fan speed varies according to the controller signals.
- 4. The pump pumps the heated liquid from the connected device through the liquid to air exchanger and back to the connected device.
- 5. The sensors measure the temperature at the inlet of the liquid interface and give that information back to the controller.

3.2. Tube connections of inlets and outlets

![Diagram of tube connections](image)

Fig. 10 Tube connection TC.LAE device and TC.ACS device for a closed cooling circuit.
The outlet of TC.ACS -1- is connected -3- to inlet of TC.LAE -2-.
The inlet of TC.ACS -1- is connected -4- to outlet of TC.LAE -2-.

For further information about the connection, refer to chapter 6.2.3, 30.
4. Controls and displays (standard)

![Standard controls – front side and rear side of the device.](image)

<table>
<thead>
<tr>
<th>No</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Main switch</strong>, Rocker switch</td>
</tr>
<tr>
<td></td>
<td>Switch position &quot;1&quot; (pushed): the device is switched on.</td>
</tr>
<tr>
<td></td>
<td>Switch position &quot;0&quot; (pushed): the device is switched off.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Pump operation switch</strong>, Rocker switch</td>
</tr>
<tr>
<td></td>
<td>The pump switch is enabled, when the main switch -1- is switched on.</td>
</tr>
<tr>
<td></td>
<td>Switch position &quot;1&quot; (pushed): the pump starts pumping the liquid.</td>
</tr>
<tr>
<td></td>
<td>Switch position &quot;0&quot; (pushed): the pump stops pumping the liquid.</td>
</tr>
</tbody>
</table>

Tab. 7 Controls on the TopCon TC.LAE device.

For further information under the key word “device addresses”, see the TopCon device manuals.
5. Options and variations

5.1. Overview

**Definition options**
Regatron considers the term option to cover characteristics that expand the functionality of a TopCon device and that can be purchased.

In principle the options can be divided into 3 main groups:

- **Hardware options**
  Additional hardware that is built into the device, attached to the device, or that can be formed from device combinations (system options).

- **Software options**
  Functions that are enabled using an enable key.

- **Interface options**
  Additional hardware interfaces mostly with additional software, or protocols.

**In this chapter**
Refer to chapter Connection variants, chapter 5.2, page 22.
Refer to chapter coolant fill-up set, chapter 5.3, page 23.
5.2. Connection variants – Examples

It is possible to purchase the following connection variants as an option or to screw the various connections to the TC.LAE device to suit the specific needs.

Fig. 1 Examples for cooling liquid connections.

<table>
<thead>
<tr>
<th>Connection variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 \Hose connection fitting, option \Standard hose connection for hose clip. \Male thread: G1/2&quot; \Hose connection: Inside: 13 mm; Outside: 16 mm</td>
</tr>
<tr>
<td>2 \Hose connection with union nut, standard \For a reusable and secure hose connection. \Male thread: G1/2&quot; \Hose diameter: Inside 13 mm; Outside 16 mm</td>
</tr>
<tr>
<td>3 \Quick release coupling connection system, option \For a non-drip and secure hose connection. \Male thread: G1/2&quot; \Hose diameter: Inside 13 mm; Outside 16 mm</td>
</tr>
<tr>
<td>4 L-piece, option \L-piece with male thread and female thread \Male thread: G1/2&quot; \Female thread: G1/2&quot;</td>
</tr>
</tbody>
</table>

Tab. 5 Examples for cooling liquid connections.

Installing a cooling liquid connection

- Apply thread sealant to the turns on the thread to seal the connection. During this process follow the recommendations from the manufacturer of the sealant. Example: LOCTITE® 542

- Screw the connection into the 1/2" connection on the power supply and tighten and fasten the pipe system.

Check the system for leaks at the 1,5 bar (double operation pressure) for 10 min., as per the standard EN50178.
5.3. A coolant fill-up set (Option)

The coolant fill-up set is used for filling up the coolant in the TC.LAE device or emptying the coolant from the TC.LAE device.

The set contains filling hoses, coolant canister with coolant and funnel. For further information, refer to chapter 6.1.2, page 26

For further information about the coolant filling up procedure, refer to chapter 6.2.6, page 33.

For further information about the coolant emptying procedure, refer to chapter 6.2.7, page 39.
6. Installation and commissioning

6.1. Device transport and installation

The TopCon TC.LAE device does not require any further transport and positioning aids, e.g. carrying handles.

![View of the TC.LAE device from the front.](image)

If you place the device on the rails in the rack, it can be simply pushed into the rack.

**CAUTION** Possible damage!

- Due to soiling and foreign bodies at the installation location.
- Due to a build-up of heat.

Prevention:

⇒ The installation location must be free of aggressive substances as well as moisture.
⇒ No foreign bodies such as drilling swarf or screws are to be allowed to fall into the system.
⇒ It imperative you observe the minimum distances during installation.
6.1.1. **Un-/pack sequence – TC.LAE standard packaging**

![Diagram showing the un-pack sequence of TC.LAE standard packaging]

**Keep the packing material!**
In case of device return, it is possible using it again.

**In case of device return**
The device must be transported vertically to prevent a coolant leaking.
Tag the cardboard box with the according stickers.

**Elements of the original shipping packaging**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Accessories box</strong>&lt;br&gt;The accessories box is placed in front of the device -3-.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Cover</strong>&lt;br&gt;Upper protective cover with space on the rear side for protruding device connections etc. and recesses on the front side for protruding front panel.</td>
</tr>
<tr>
<td>3</td>
<td><strong>TopCon TC.LAE device</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>Bottom</strong>&lt;br&gt;Lower protective material with space on the rear side for protruding device connections etc. and recesses on the front side for protruding front panel.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Cardboard box</strong>&lt;br&gt;Can be used for devices up to 4 U.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Transport pallet</strong>, disposable pallet 1200 x 800 mm&lt;br&gt;The cardboard box is firmly strapped to the disposable pallet.</td>
</tr>
</tbody>
</table>

Tab. 6 Packaging material for standard packaging.
6.1.2. **Unpack sequence – Coolant fill-up set (Option)**

**Fig. 14** Arrangement of shipping packaging for the coolant fill-up set.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | Safety coolant datasheet  
ANTIFREEZE FLUID N, Base ethylene-glycol (EG) |
| 2 | Coolant canister, Base ethylene-glycol (EG)  
Volume: 2.5 l ANTIFREEZE FLUID N, 30 % |
| 3 | Funnel  
Supports the filling-up of the coolant. |
| 4 | Fill-up hoses, transparent 2x  
Commissioned with fill-up nipple and clamp. |
| 5 | Filling material,  
Paper, air cushions etc. |
| 6 | Cardboard box  
Shipping packaging |

Tab. 7 Elements of the original shipping packaging for the coolant fill-up set.
6.1.3. **Disposal with due care for the environment**

**Electrical equipment and packing material**

Electrical equipment and packing material are too valuable for household waste.

**Ethylene glycol**

Do not leave ethylene glycol undiluted and/or in larger quantities into the groundwater, in waters or into drains.

**On the disposal of electrical equipment, chemical substances and packing material, comply with national laws.**

6.1.4. **Case installation/delivery with case**

TopCon TC.LAE devices are installed in standard cases or switch cabinets either separately or in multi-unit systems.

In the standard design TopCon TC.LAE devices are intended to be installed in standard 19" cases and switch cabinets with an external air flow. In this case they are placed on rails or shelves and fastened at the points provided on the front panel.

![Fig. 15 Fastening positions-1- of the TC.LAE.](image)

Number of screws:

- For 4 U devices typically: 4 x screws M6.

On installation in cases or switch cabinets, the following points are to be noted:

- On device installation pay attention to the device dimensions. For further information on the dimensions, see chapter 9.3.1, page 51.

- Use robust rails or shelves
  The cases for TopCon TC.LAE devices must be in contact over the full installation depth.

- Provide fastening holes in the switch cabinet for the fastening positions -1- and fasten the device to the switch cabinet via its front panel.
6.2. Device dis-/connections

The TopCon TC.LAE devices is prepared so that they can be installed, wired and interference suppressed as per the applicable regulations with as little effort as possible. Nevertheless, the responsibility for the compliance of systems and machines with built-in TopCon TC.LAE devices remains with the manufacturer of the system or machine.

On the usage of the electrical power supply in certain application areas, the related applicable standards and health and safety regulations are to be followed.

6.2.1. Safety information

**Possible mortal danger due to electric shock!**

**WARNING**
- Due to tampering with electrical modules

**Prevention:**
- The electrical installation is to be undertaken by personnel with electrical training.
- Never connect or disconnect electrical connections while they are live.
- Do not open the device if it is in operation, as it contains live parts.
- Lay cables carrying high currents using an adequate cable cross-section.

**Possible harm by the coolant!**

**CAUTION**
- Danger of serious damage to health by prolonged exposure through inhalation and if swallowed:
  - Possible damage to organs (H373).
  - Possible damage to the fertility or possible injury to a child in womb (H361).

**Avoidance:**
- Pay attention to the warning signs on the device.
- While handling with coolant, open doors and windows and ensure the room is well ventilated also on the ground level.
- Use the personal protective equipment at existing concentrations of vapour and aerosols. E.g. the respiratory protection and protective cloves which are resistant against solvents.
- Close coolant vessels immediately.
6.2.2. **Mains connection**

![Diagram of mains connection](image)

Fig. 16 3-pin mains connection: socket -1- and plug -2-.

For necessary installation information, refer to the following chapters:

- Position of the interface, chapter 1.3.2, page 11.
- For the technical data, refer to chapter 9.4.2, page 54.
- Pin definition for power supply connector, see chapter 9.4.3.1, page 55.
- For further information about the cross-section of the plug AC line connection, refer to chapter 9.4.1, page 53.
6.2.3. **Liquid cooling – device connection**

![Diagram of coolant hose connection](image)

Fig. 17  Connection of a coolant hose to the coolant standard interface of the device.

**Preparation:**
- Open-end wrench: 24 mm
- Coolant hose:
  - inside Ø: 13 mm
  - outside Ø: 16 mm

**Procedure:**
- Remove the sealed rubber stopper -1- from the connection fitting and keep it for a future use.
- Loosen the union nut -2- from the connection fitting, by turning to the left via open-end wrench.
- The union nut -3- pull over the coolant hose -4-.
- Push -5- the coolant hose with the nut over the nipple -6- of the coolant interface. Try to push the hose to the nipple base.
- Tighten strongly -7- the nut by turning to the right.
- Repeat the procedure for the other coolant interface.
- Fill-up the coolant in the device.
  
  For further information about the fill-up procedure, refer to chapter 6.2.6, page 33.
- Check the connection for leaks at 1.5 bars for 10 min, as per the standard EN50178.
6.2.4. Liquid cooling – device disconnection

![Diagram of liquid cooling device disconnection]

Fig. 18 Disconnection of a coolant hose from the coolant standard interface of the device.

Preparation:
- Open-end wrench: 24 mm

Procedure:
- Loosen the union nut -1-, by turning to the left via open-end wrench.
- Slide the nut backwards -2- on the coolant hose.
- Pull away -2- the coolant hose from the nipple of the coolant interface.
- Take the union nut from the coolant hose -3- and tighten strongly -5- on the coolant interface, by turning to the right via open-end wrench.
- Push -4- the sealed rubber stopper into the connection fitting. Remember, that a coolant rest may be in the device, so the sealed rubber stopper must be strongly pushed in the connection fitting, to avoid leaks.
- Repeat the procedure for the other interface.
- Emptying the coolant from the interface.
  For further information about the procedure, refer to chapter 6.2.7, page 39.
6.2.5. **Dis-/connect a quick release coupling system (Option)***

In case the TC.LAE device is delivered with the quick release coupling connection system (option)

![Image of quick release coupling system](image)

*Fig. 19  Non drip couplings -3- and nipples -2-.*

**Procedure: dis-/connect the quick release coupling system**

- Pulling back the retaining ring of the quick release coupling -1- until the following procedure steps are finished.

**For device removal**

- Pull out the nipple -2- from the female coupling -3-.

**For device installation**

- Push in the nipple -2- in the female coupling -3-.
- Release the retaining ring -1- of the quick release coupling.
  - The retaining ring returns to its original position.
6.2.6. **Fill-up the system with coolant**

**Possible harm by the coolant!**

Danger of serious damage to health by prolonged exposure through inhalation and if swallowed:

- Possible damage to organs (H373).
- Possible damage to the fertility or possible harm to a child in womb (H361).

Avoidance:

⇒ Pay attention to the warning signs on the device.
⇒ While handling with coolant, open doors and windows and ensure the room is well ventilated also on the ground level.
⇒ Use the personal protective equipment at existing concentrations of vapour and aerosols. E.g. the respiratory protection and protective cloves which are resistant against solvents.
⇒ Close coolant vessels immediately.

6.2.6.1. **Checklist for the fill-up with coolant**

- Prepare the coolant mixture to 30 % refer to chapter 9.2.2, page 50.
- Prepare the filling block refer to chapter 6.2.6.2, page 34.
- Mount the filling hoses refer to chapter 6.2.6.3, page 35.
- Fill-up the coolant expansion reservoir, refer to chapter 6.2.6.4, page 36.
- Check the coolant level in the expansion reservoir, refer to chapter 6.2.6.5, page 38.
- Remove the filling hoses, refer to chapter 6.2.6.3, page 35.
- Fasten the Allen screws in the filling block refer to chapter 6.2.6.2, page 34.
- Keep on the material.
6.2.6.2. Preparation of the filling block

Condition:
- The device is in the horizontal position
- The device is switched off.

Preparation:
- A 6 mm Allen wrench is necessary.

Procedure: Removing of the Allen screws
- Remove both Allen screws -2- from the top -1- of the filling block.
- The 1/2˝ thread -3- appears.
- Keep on the Allen screws.

Procedure: Fasten the Allen screws
- Screw the both Allen screws -2- in the drilling holes -3-.
  Maximum torque: 5 Nm.
6.2.6.3. Removing/Mounting of the filling hoses

Fig. 21 Removing/Mounting of the filling hoses.

Preparation:
- Make the coolant fill-up set available with:
  - the coolant Mixture: 30 % coolant to water. For further information about the coolant and the necessary quantity, refer to chapter 9.2.2, page 50.
  - The funnel and the fill-up hoses.
- Make a collection vessel available
  Capacity: 1 l.
- Make an absorbent cloth or paper available.
- Remove the Allen screws, refer to chapter 6.2.6.2, page 34.

Procedure: Mounting the hoses for the filling up
- Mount the blue filling hose -1- in the left side of the block.
  The hose with its mounting nipple is part of delivery.
- Mount the venting hose -2- in the left side of the filling block.
  The hose with its mounting nipple is part of delivery.

Procedure: Removing of the hoses after the filling up
- Remove the filling hose -1- from the left side of the block.
- Empty the content of the venting hose -2- into the available vessel.
- Dispose the redundant coolant into the coolant reserve can.
- Remove the filling hoses -1- and -2-.
  For procedure, refer to chapter 6.2.6.3, page 35.
- Keep on the hoses.
- Wipe off the splashed coolant via the available absorbent cloth or paper.
6.2.6.4. Fill-up the coolant expansions reservoir

![Fig. 22 Fill-up the coolant expansions reservoir.](image)

Notice, rests of cooling liquid are still in the devices. The quantities for fill-up may different, because the device was filled-up and emptied by the manufacturer.

For further information about the required coolant quantities, refer to chapter 9.2.3, page 50.

**Preparation:**

- Mount the filling hoses, refer to chapter 6.2.6.3, page 35.
- Put the funnel into the filling hose. It is part of delivery.
- The main switch is switched on, on the front side. Switch position: “1”
- The pump switch is switched off, on the rear side. Switch position: “0”

**Procedure: Fill-up the expansion reservoir with the cooling liquid**

- Carefully fill in the coolant via funnel -1- and vessel.
  - After a short time, the coolant level in the transparency hose will appear. Finish the filling-5- at the half way of the hose length-3-. 
- Switch on the pump switch -4- on the device rear side until the coolant level -3- disappears in the transparency hose -6-.
  - Switch position: “1”.
- Switch off the pump switch -4- on the device rear side. Switch position: “0”.
- Repeat the filling and pumping procedure until the coolant level -3- does not change although the pump -4- is switched on.
• Check the coolant level in the internal expansion reservoir on the device front side. For the procedure, refer to 6.2.6.5, page 38.

↓ If the coolant do not fill-up the expansion reservoir, repeat the filling and pumping procedure according the steps before.

↓ If the coolant fill-up the expansion reservoir, follow the following steps.

• Switch off the device main switch on the device front side. Switch position: “0”.

• Let the pump switch in position :"1" (switched on)

• Remove the filling hose, refer to chapter 6.2.6.3, page 35.

• Fasten the Allen screws in the filling block. For the procedure, refer to chapter 6.2.6.2, page 34.
6.2.6.5. Check the coolant level in the expansions reservoir

Procedure: Check the coolant level in the internal expansion reservoir.

- Check via a torch -1- the coolant level in the internal expansion reservoir -2-.

- **For a full filled expansion reservoir -2-** with the blue coolant, nothing is to do and the system can be started.

- **For a not full filled expansion reservoir -2-** with blue coolant. refer to the fill-up procedure in chapter 6.2.6.4, page 36.
6.2.7. Emptying the coolant from the device

Possible harm by the coolant!

Danger of serious damage to health by prolonged exposure through inhalation and if swallowed:

- Possible damage to organs (H373).
- Possible damage to the fertility or possible harm to a child in womb (H361).

Avoidance:

⇒ Pay attention to the warning signs on the device.
⇒ While handling with coolant, open doors and windows and ensure the room is well ventilated also on the ground level.
⇒ Use the personal protective equipment at existing concentrations of vapour and aerosols. E.g. the respiratory protection and protective cloves which are resistant against solvents.
⇒ Close coolant vessels immediately.

6.2.7.1. Checklist for emptying the coolant from device

- Prepare the fill-up set refer to chapter 6.1.2, page 26.
- Prepare the filling block refer to chapter 6.2.6.2, page 34.
- Mount the filling hoses refer to chapter 6.2.6.3, page 35.
- Pump out the coolant expansion reservoir, refer to chapter 6.2.6.4, page 36.
- Check the coolant level in the expansion reservoir, refer to chapter 6.2.6.5, page 38.
- Remove the filling hoses, refer to chapter 6.2.6.3, page 35.
- Fasten the Allen screws in the filling block refer to chapter 6.2.6.2, page 34.
- Keep the material.
6.2.7.2. Preparation of the filling block

Condition:
- The device is switched off.

Preparation:
- A 6 mm Allen wrench is necessary.

Procedure: Removing of the Allen screws
- Remove both Allen screws from the rear -1- and the top -2- of the filling block.
- The 1/2" thread appears.
- Keep the Allen screws for the later closing.

Procedure: Fasten the Allen screws
- Screw the both Allen screws -2- in the drilling holes -1- and -2-. Maximum torque: 5 Nm.
6.2.7.3. Removing/ Mounting of the filling hoses

Preparation:

- Make the coolant fill-up set available with:
  - Coolant canister for base ethylene-glycol (EG).
    For further information, refer to chapter 6.1.2, page 26.
  - The fill-up hoses.
- Make a collection vessel available
  Capacity: 1 l.
- Make an absorbent cloth or paper available.
- Remove the Allen screws, refer to chapter 6.2.7.2, page 40.

Procedure: Mounting the hoses for pumping out

- Mount the filling hose -2- in the left side of the block -3-.
  The hose with its mounting nipple.
- Insert the hose side without the nipple in the collection vessel.

Procedure: Removing of the hoses after the pumping out

- Remove the filling hose -2- from the left side of the block.
- Empty the content of the hose -2- into the available vessel.
- Dispose the coolant in the vessel into the coolant reserve can.
- Fasten the screws in the filling block, refer to chapter 6.2.7.2, page 40.
- Keep the hoses of the coolant fill-up set.
- Wipe off the splashed coolant via the available absorbent cloth or paper.
6.2.7.4.  Pump out the coolant of expansions reservoir

Fig. 26  Removing/ Mounting of the filling hoses.

Preparation:
- Mount the filling hoses, refer to chapter 6.2.7.3, page 41.
- The main switch is switched on, on the front side. Switch position: “1”.
- The main switch is switched on, on the front side.
- The pump switch -4- is switched off, on the rear side. Switch position: “0”.

Procedure: Pump out the coolant expansion reservoir
- Switch on the pump switch -4- until no more coolant flows in the vessel -1-.
  Switch position: “1”.
  Switch off the pump switch -4-.
  Switch position: “0”.
- Check the coolant level in the internal expansion reservoir on the device front side. For the procedure, refer to 6.2.6.5, page 38.
  If the coolant expansions reservoir is not empty, repeat the pumping out procedure according the steps before.
  If the coolant expansion reservoir is empty, follow the following steps.
- Switch off the device main switch on the device front side.
  Switch position: “0”.
- Let the pump switch -4- in position :"1" (switched on)
- Remove the filling hose, refer to chapter 6.2.6.3, page 35.
- Fasten the Allen screws in the filling block.
  For the procedure, refer to chapter 6.2.6.2, page 34.
- Wipe off the splashed coolant via the available absorbent cloth or paper.
6.2.7.5.  Check the coolant level in the expansions reservoir

Fig. 27  Check the coolant level in the expansions-reservoir

**Procedure:**  Check the coolant level in the internal expansion reservoir.

- Check via a torch -1- the coolant level in the internal expansion reservoir -2-.
  - For a full filled expansion reservoir -2- with the blue coolant, repeat the emptying procedure via checklist in chapter 6.2.7.1, page 39.

- For an empty expansion reservoir-2-. Nothing is to do. Remember that coolant level of the device is only reduced for the transport.
6.3. Switching on and off the TC.LAE device

**CAUTION** Possible damage of device

- An operation without coolant leads to damage of the pump.

  **Avoidance:**
  
  ⇒ Check the coolant level in the expansion reservoir.
  If the level is too low, fill-up the coolant.

The connected TC.LAE device of a system must be switched on first. Then the TC.ACS master device must be switched on.

6.3.1. **Switching on the device.**

- Switch on the main switch on the front side of the TC.LAE device. Main switch set to position "1".
- Check for switched on position:"1" of the pump switch on the rear side vice.
- Switch on the TC.ACS device.
  Switch positon:"1"

6.3.2. **Switching off the device**

- Switch off the TC.ACS device.
- Switch off the main switch on the front side of the TC.LAE device. Main switch set to position "0".
- Let the pump switch in switched off position.
  Pump switch position: “0”.
7. Maintenance

In principle the electronics in the TopCon TC.LAE device is maintenance-free.

<table>
<thead>
<tr>
<th>Life-expectancy – TC.LAE device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life-expectancy in stand by</td>
</tr>
<tr>
<td>Life-expectancy with nominal power $P_{NOM}$</td>
</tr>
</tbody>
</table>

Tab. 8  Life expectancy of the TC.LAE device.

<table>
<thead>
<tr>
<th>Corrosion protection-expectancy – Coolant ethylene glycol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosion protection duration time</td>
</tr>
</tbody>
</table>

Tab. 9  Corrosion protection-expectancy

However, the following components require maintenance interval:

<table>
<thead>
<tr>
<th>Maintenance interval of cooling fans</th>
</tr>
</thead>
<tbody>
<tr>
<td>General (at operation time)</td>
</tr>
<tr>
<td>Maintenance work</td>
</tr>
</tbody>
</table>

Tab. 10  Maintenance interval – Cooling fans.

In dirty surroundings the maintenance interval may be reduced. Check for running the visible fans on the rear side of device. ➔ In case of a defect fan, the maintenance work has to be done immediately, contact the customer support.
8. Support

You will receive assistance from Regatron support:

- In case of questions on hardware and software, interfaces and maintenance.
- On the procedure in the event of a repair.

Prepare for contacting support!

If you contact Regatron support, you can make the process more efficient with the following information:

- Contact data:
  About your company, your sales partner

- System information:
  Device type, serial number, description of error, software versions

8.1. Contact information

If you compile the following information in an e-mail and send this e-mail to support in advance, support will then have this information available already when you ring.

<table>
<thead>
<tr>
<th>Contact data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Name of company</td>
<td>The name of your company</td>
</tr>
<tr>
<td><strong>2</strong> Contact person</td>
<td>Your name or the name of the person responsible for the problem in your company with whom further contact will be made.</td>
</tr>
<tr>
<td><strong>3</strong> Contact details</td>
<td>E-mail address, telephone number (extension)</td>
</tr>
<tr>
<td><strong>4</strong> Sales partner or supplier</td>
<td>Name of the sales partners or supplier’s company and name of the employee in this company.</td>
</tr>
<tr>
<td><strong>5</strong> Any support number, S 12345678</td>
<td>If you have already received a support number or enquiry number for your problem from support.</td>
</tr>
</tbody>
</table>

Tab. 8 Important contact information for support.
### System information

<table>
<thead>
<tr>
<th></th>
<th>Hardware and software information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software version and firmware version, device serial number or device input and output data for single devices or multi-unit systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Description of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Information that documents the situation and the state of the system using measured results, logs, scope, screenshots and photographs</td>
</tr>
</tbody>
</table>

Tab. 9 Important system information for support.

### 8.2. How to contact support

**Regatron AG**  
TopCon Support  
Kirchstrasse 11  
CH-9404 Rorschach  
Switzerland  
E-mail: tc.support@regatron.ch  
Tel +41 71 846 67 44  
Fax +41 71 846 67 77  
Web: www.regatron.com
8.3. Determination of device information

Information on the device is to be found on the type plate on the rear side of the TC.LAE device.

Fig. 28 Example - information on the device type, serial number as well as mains data and cooling power on the TC.LAE device.

8.4. Device return

Use the original packaging to return the device.

If you no longer have the device packaging at hand, you can order new packaging via Regatron support.

For further information of packaging of the device, refer to chapter 6.1.1, page 25.
9. Appendix

9.1. Ambient conditions

<table>
<thead>
<tr>
<th>Ambient conditions for standard devices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum ambient temperature</strong></td>
</tr>
<tr>
<td>Storage temperature(^1)</td>
</tr>
<tr>
<td>Cooling air temperature in operation</td>
</tr>
<tr>
<td><strong>Atmospheric humidity</strong></td>
</tr>
</tbody>
</table>

Tab. 10 Ambient conditions for the TopCon TC.LAE device.  
\(^1\) With full filed ethylene glycol based coolant in a mixture of 30%.

9.2. Cooling

9.2.1. Cooling power

<table>
<thead>
<tr>
<th>Cooling power – TC.LAE device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Power (^1)</td>
</tr>
<tr>
<td>Flow rate (max.)</td>
</tr>
<tr>
<td>Pressure difference  (\Delta p = p_{out} - p_{in})</td>
</tr>
</tbody>
</table>

Tab. 11 Cooling power – TC.LAE device  
\(^1\) Cooling power at ambient temperature.
9.2.2. **Coolant**

**Coolant characteristics**

<table>
<thead>
<tr>
<th>Recommended coolant – Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant</td>
</tr>
<tr>
<td>Mixture (Volume)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (20 °C)</td>
<td>1,129 g/ml</td>
</tr>
<tr>
<td>Refraction (20 °C)</td>
<td>1,432</td>
</tr>
<tr>
<td>pH value (20 °C)</td>
<td>6.4 (mixture relation 30%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashpoint</td>
<td>&gt; 100 °C</td>
</tr>
<tr>
<td>Puffer effect</td>
<td>12.2 ml 0.1n HCl</td>
</tr>
<tr>
<td>Toxicity-class</td>
<td>4</td>
</tr>
</tbody>
</table>

Tab. 12 Recommended coolant – Characteristics

**Safety datasheet**

The coolant safety datasheet is part of delivery in the shipping packaging of the coolant fill-up set.

For further Information about the coolant safety datasheet, contact Support according the address in chapter 8.2, page 47.

9.2.3. **Coolant filling quantity of the devices**

<table>
<thead>
<tr>
<th>Coolant filling quantity for an empty device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required coolant volume</td>
</tr>
<tr>
<td>TC.LAE</td>
</tr>
<tr>
<td>TC.ACS</td>
</tr>
<tr>
<td>Coolant hoses between TC.ACS and TC.LAE</td>
</tr>
<tr>
<td>devices</td>
</tr>
<tr>
<td>Delivered coolant volume</td>
</tr>
<tr>
<td>Quantity of the coolant in the fill-up set canister</td>
</tr>
</tbody>
</table>

Tab. 13 Coolant filling quantity for the device.

Keep the rest coolant. It is possible using it again.

Notice, that the quantities for fill-up may differennt, because the devices was filled-up and emptied by the manufacturer. Rests of cooling liquid are still in the devices.
9.3. Technical data – mechanical

9.3.1. Dimensions

Front view

Fig. 29 Front view of TopCon TC.LAE. Dimensions in mm

Rear view

Fig. 30 Rear view of TopCon TC.LAE. Dimensions in mm
Side view

![Side view of TopCon TC.LAE. Dimensions in mm](image)

Top view

![Top view of TopCon TC.LAE. Dimensions in mm](image)

### Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width front panel / housing</td>
<td>483 mm / (19&quot;) 443 mm</td>
</tr>
<tr>
<td>Height front panel / housing</td>
<td>176.1 mm / (4 HU) 173.2 mm</td>
</tr>
<tr>
<td>Depth with terminals / housing</td>
<td>649 mm / 601 mm</td>
</tr>
</tbody>
</table>

**Tab. 14** Information on the device dimensions
9.3.2. **Weight**

<table>
<thead>
<tr>
<th>Device variants</th>
<th>Device total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard device (^1)</td>
<td>(~25) kg</td>
</tr>
</tbody>
</table>

Tab. 15 Information on the device weight.

\(^1\) Full filled with coolant glycol ethylene 30%

9.3.3. **Liquid cooling – interface**

For further information about the Liquid cooling interfaces, refer to chapter 5.2, page 22.

9.4. **Technical data – electrical**

For further information on the technical data, see device data sheet.

9.4.1. **Cross-section – Cable connections AC line**

**Terminal connection via cable ferrules**

Regatron recommends attaching cable ferrules at the connection cables for the plugs at the interface AC line.

![Diagram of cable connections](image)

Fig. 33 Cable connections – AC line.

Cable types: -1- Flexible, -2- Rigid, -3- Ferrule

Pay attention to the cross-section of the line \( A = \pi \cdot d^2 / 4 \).

The mechanical specifications about cross-section and the required stripping length for the according connector types can be found in the following tables.

<table>
<thead>
<tr>
<th>AC line X10</th>
<th>Cross-section A [mm(^2)]</th>
<th>Stripping length a [mm]</th>
<th>Tightening tourge(^1) [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flexible</td>
<td>0.20 … 4</td>
<td>24 … 10</td>
<td>7</td>
</tr>
<tr>
<td>2 Rigid</td>
<td>0.20 … 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Ferrule</td>
<td>0.25 … 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tabelle 16 Cable connections AC line – Mechanical specifications.

\(^1\) Recommend torque at the cable connection via mounting screws.

\(^2\) 1 kcmil \( \approx 0.5067 \) mm\(^2\)
9.4.2. **Mains connection**

<table>
<thead>
<tr>
<th>Mains connection</th>
<th>TC.LAE.5.400</th>
<th>TC.LAE.5.230</th>
<th>TC.LAE.5.24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line voltage</td>
<td>380 – 480 V&lt;sub&gt;AC&lt;/sub&gt;</td>
<td>100 – 240 V&lt;sub&gt;AC&lt;/sub&gt;</td>
<td>24 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Voltage tolerance</td>
<td>± 10 %</td>
<td>± 10 %</td>
<td>-10 %/ +0 %</td>
</tr>
<tr>
<td>Line frequency</td>
<td>48 – 62 Hz</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Input power</td>
<td>200 VA</td>
<td>200 VA</td>
<td>200 W</td>
</tr>
<tr>
<td>Mains connection type</td>
<td>2*L + PE</td>
<td>L + N + PE</td>
<td>DC +, DC-, PE</td>
</tr>
<tr>
<td>Power factor</td>
<td>≥ 0.98</td>
<td>≥ 0.98</td>
<td>1</td>
</tr>
<tr>
<td>Current</td>
<td>0.5 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage current</td>
<td></td>
<td>&lt; 10 mA</td>
<td></td>
</tr>
<tr>
<td>L to PE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tab. 17  Mains connection – TC.LAE devices
9.4.3. Interfaces – pin definition

9.4.3.1. AC line (mains input)

![3-pin mains connection: socket -1- and plug -2-]

400 V\textsubscript{AC} Variation

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L\textsubscript{1}</td>
<td>I</td>
<td>Phase L1</td>
</tr>
<tr>
<td>2</td>
<td>L\textsubscript{2}</td>
<td>I</td>
<td>Phase L2</td>
</tr>
<tr>
<td>3</td>
<td>PE</td>
<td>I</td>
<td>Earth</td>
</tr>
</tbody>
</table>

Tab. 18 Pin definition - mains input model TC.LAE.5.400

230 V\textsubscript{AC} Variation

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>I</td>
<td>Phase L1 or L2 or L3</td>
</tr>
<tr>
<td>2</td>
<td>N</td>
<td>I</td>
<td>N line</td>
</tr>
<tr>
<td>3</td>
<td>PE</td>
<td>I</td>
<td>Earth</td>
</tr>
</tbody>
</table>

Tab. 19 Pin definition - mains input model TC.LAE.5.230

For further information about the cross-section of the connection mains, refer to chapter 9.4.1, page 53.
24 V\textsubscript{AC} Variation

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>I/O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+</td>
<td>I</td>
<td>DC positive (max. 24 V\textsubscript{DC})</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>I</td>
<td>DC negative (GND)</td>
</tr>
<tr>
<td>3</td>
<td>PE</td>
<td>I</td>
<td>Protected earth</td>
</tr>
</tbody>
</table>

Tab. 20 Pin definition - mains input model TC.LAE.5.24.

For further information about the cross-section of the connection mains, refer to chapter 9.4.1, page 53.