

Operating Manual

for

Bi**O**.**L**i.**X**!

Storage

Range

STT3k0

Important Notice

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Before operating the instrument, the user must read and understand this manual.

Installation and Servicing

Installation, servicing and reinstallation of the instrument shall only be performed by System Integrators and / or service personnel authorized by LiCONiC AG.

LiCONiC regularly offers Operator Training Courses. We highly recommend the attendance of such a course prior to working with a LiCONiC Instrument.

History Page

Document Change History

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1. About the Product and its Manual

1.1 Intended Use

The LiCONiC Kiwi Store is intended for storage, identification and transfer of Microplates and Tubes. It is to be applied exclusively in the research field. The LiCONiC Kiwi Store is intended to work as a stand alone unit or an element in an automated system.

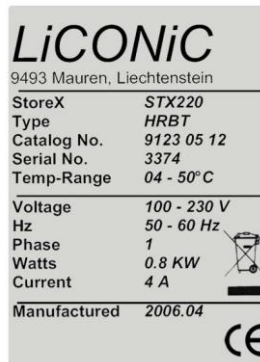
1.2 Unintended Use

Due to its open architecture, the LiCONiC Kiwi Store is NOT intended for regulated clinical and diagnostic applications (IvD Directive).

Read the safety instructions in this Manual carefully.

1.3 Product Identification

The Type Plate is located at the rear of the LiCONiC STC



LiCONiC	
9493 Mauren, Liechtenstein	
StoreX	STX220
Type	HRBT
Catalog No.	9123 05 12
Serial No.	3374
Temp-Range	04 - 50° C
Voltage	100 - 230 V
Hz	50 - 60 Hz
Phase	1
Watts	0.8 KW
Current	4 A
Manufactured	2006.04

For future reference, please read the instrument Serial No. on the rear of your instrument and write it in the provided space.

1.4 Scope of Delivery

- Basic Unit, consisting of a Plate Handling, a Gate and the storage chamber
- Cooling unit for storage chamber
- Tube Handling
- Product Documents
- Cables
- User Software and Drivers
- Cassettes (as specified)
- Transfer Station (as specified)
- Redundant Cooling (optional)
- IO-Port (optional) including Cassettes
- 2D Rack Reader (optional)

Exact delivery scope may differ according to project scope

1.5 General

The LiCONiC Kiwi Store is a complete product for end users. Setup of equipment is conducted by LiCONiC Engineers or by LiCONiC trained and certified personnel.

1.6 Definitions

Operator:	Any person who uses the equipment for its intended purpose.
System Integrator:	Authorized person or company responsible for integration, installation, initial start up and overall safety of the system.
Authorized Engineer	Authorized person responsible for installation, initial start up. Person who carries out service and maintenance tasks and is therefore contacted in the case of any problems with the system.
Plate	Any lab ware according to SBS standard, such as MTP (micro titer plate), NTP (nano titer plate), DWP (deep well plate), tube racks and other carriers.

1.7 Target User Group

The Kiwi Store has been conceived for applications in the research field.

Instrument operation requires a trained user.

1.8 Importance of the Safety Instructions

This chapter contains general information assuring safe operation of the instrument. More specific instructions in regard to safety are given throughout this manual, at the respective points where observation is most important.

Make sure that all Safety Instructions in this publication are strictly followed.

1.9 Labels

Throughout this publication, Warning Notices are to be interpreted as follows:



WARNING!

Indicates the possibility of severe personal injury, loss of life or equipment damage if instructions are not followed.



CAUTION!

Indicates the possibility of severe equipment damage if instructions are not followed.



NOTE!

Gives helpful information about the equipment.



DANGER!

May be harmful to your eyes.

1.10 Safety - Basics

1.10.1 General Operating Hazards

Carefully observe the following precautions:

1.10.2 Mechanical Hazards

Keep the housing and safety panels closed and never reach into the instrument work space when the unit is in operating mode. Ensure safety of user prior to any tasks sent to the equipment.

1.10.3 Electrical Hazards

Keep the housing and safety panels closed. Before opening any of the panels disconnect the power supply to avoid electrical shock.

1.10.4 Chemical, Biological and Radioactive Hazards

All samples and test-kit components must be considered as potentially hazardous agents. Therefore, a potential risk may arise from the liquids being handled, such as infectious biological samples, toxic or corrosive chemicals, or radioactive substances. Strictly apply appropriate safety precautions according to local, state and federal regulations.

Prior to any first time application, test runs should be made with a neutral liquid to allow optimization of all liquid handling parameters.

Handling and disposing of waste has to be in accordance with all local, state and federal environmental, health and safety laws and regulations.

Prior to executing any maintenance task on the instrument or sending it, or parts of it for repair, the instrument or the parts have to be thoroughly decontaminated.

1.10.5 Extreme Temperature Hazards

All surfaces inside the storage chambers, interface and some parts of the refrigeration may be considered as potentially dangerous if touched without sufficient protective clothing. All components externally to the chamber are protected and are not able to be touched. Only if protective covers are removed components with extreme cold or heat may be touchable.

Inside the chamber temperatures below zero degree Celsius are present. Contact to any surfaces with bear skin should be avoided. Protective clothing has to be worn when manual operations are performed inside the chamber.

1.10.6 Suffocation Hazard

When entering the service area of the Storage chamber a potential risk of suffocation is present. A maximum of 15 minutes is given to stay in the service area without a respirator. When entering the service area a O2 monitor has to be worn under any circumstances. The monitor has to provide at least an adjustable O2 low limit and an acoustic alert when O2 level is to low.



WARNING !	
➤	Inert gases are asphyxiates and will displace oxygen to produce localized oxygen deficient atmospheres
➤	Inert gases are odorless, colorless and tasteless
➤	Inert gases give no warning and may cause death in few seconds
➤	The Exhaust of the CO2 or LN2 backup cooling option needs to be lead out of the building otherwise danger of suffocation is immanent
➤	In their liquid state inert gases are extremely cold fluids which can cause serious burns when in contact with the skin
➤	A cryogenic spill often gives a low lying cloud of vapor that creeps along the ground
➤	Due to very specific local rules and regulations in different countries it is the customers / owners responsibility to install suitable oxygen (O2) and carbon dioxide (CO2) monitor systems which trigger alarms to protect operators in and around the SAB store.

It is not allowed to work inside the system alone. A second person has to be outside surveying the work inside and to be in permanent contact with a radio with the person inside.

1.11 General Safety Regulations

1.11.1 Legal Requirements

Please consult the Manufacturer's Declaration, delivered with each unit by LiCONiC AG, listing all applied directives and standards.

In Europe, the System Integrator must provide a Conformity Declaration upon final installation of the entire system.

1.11.2 General Inspection and Maintenance Duties

Only an authorized Engineer shall carry out inspection, maintenance and repair tasks.

1.11.3 Spare Parts to be used

Only original LiCONiC Spare Parts may be used. If other parts are used during the normal warranty period, the manufacturer's guarantee may be invalidated.

1.11.4 Modifications

Modifications shall only be carried out by an authorized Engineer. LiCONiC AG will not accept responsibility for any claim resulting from unauthorized modification or alteration.

2. Biolix STT Kiwi Stores

2.1 STT3k0 Kiwi Store

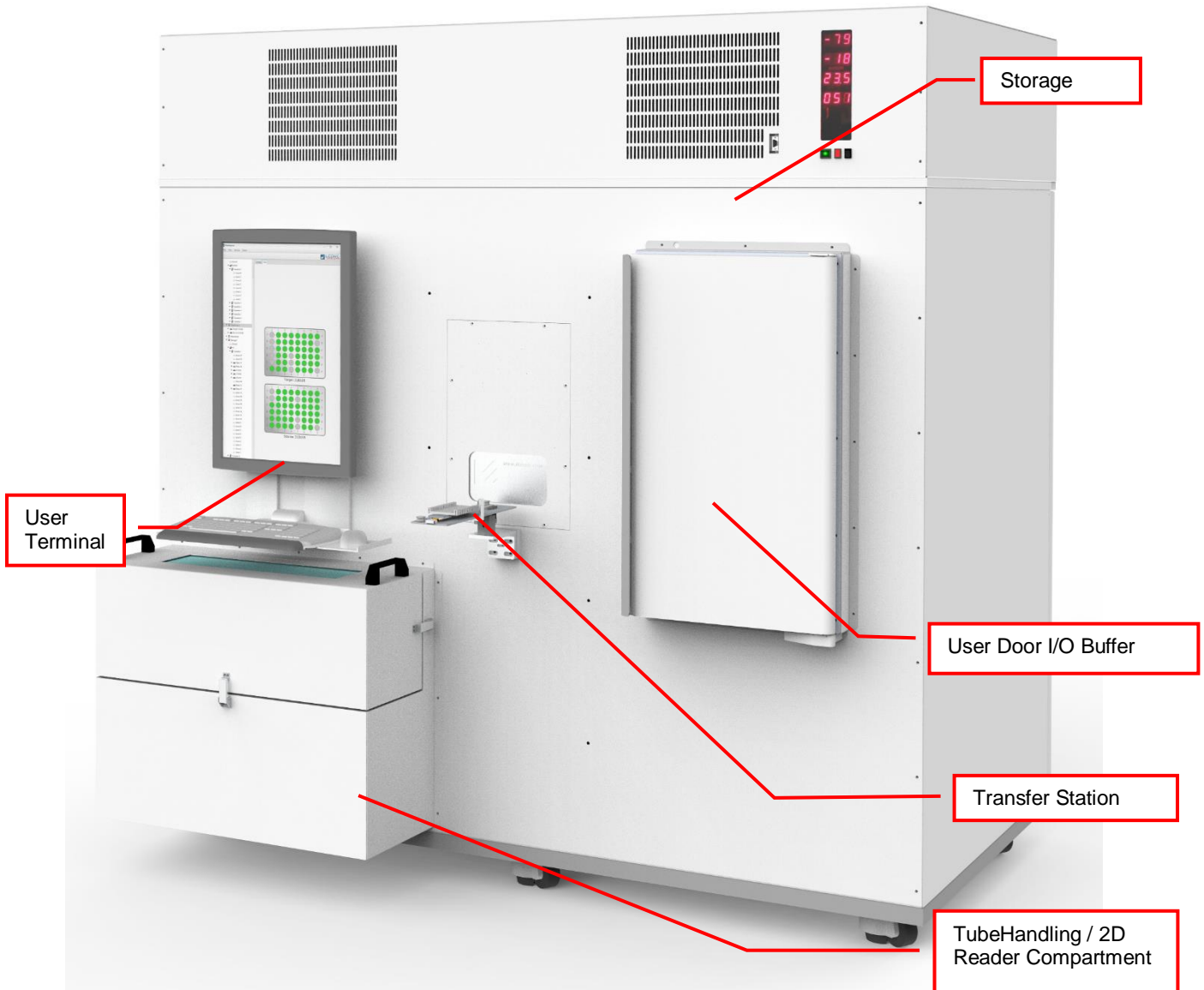
2.1.1 Store

The Biolix STT3k0 Kiwi Store is the most compact Storage with Integrated Handling that covers tube and plate storage needs at -20°C . The Biolix Kiwi Store Series offers dry climate storage.

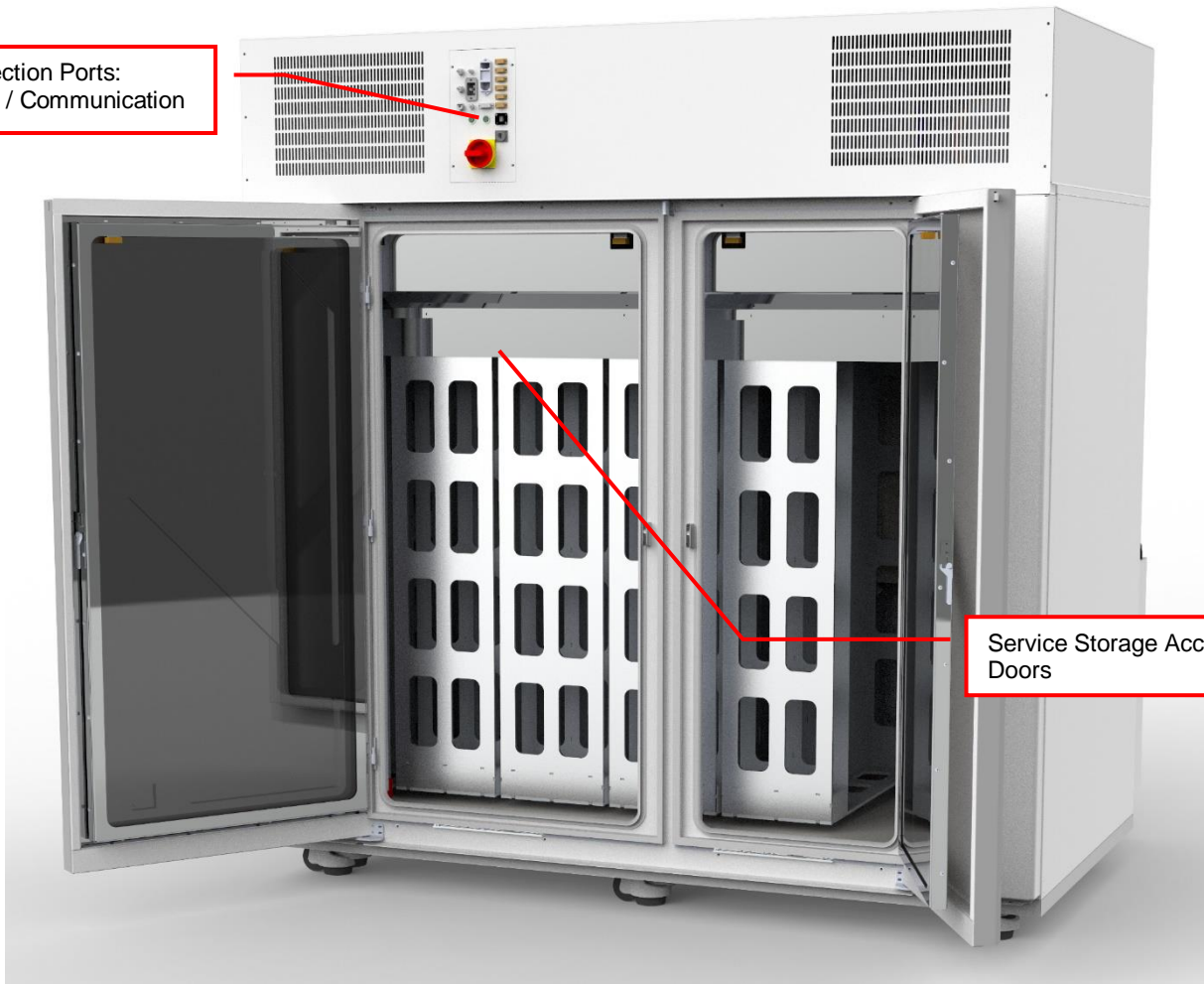
The modular mechanical design in combination with extremely simple commands eases the integration of these systems into any environment. A growing number of accessories are available for this series Series.

2.1.2 Features

The units have compact dimensions. The unit has a user front door which allows comfortable and easy access for manual operation. The internal glass door allows visual inspection of the content and operation of the system without disturbing the internal climate. Removable cassettes make the use of the system even simpler and more efficient. Cassettes are available for all common plate types.



Connection Ports:
Power / Communication



Service Storage Access
Doors

2.1.3 Configuration and Capacity Overview

The Systems are structured by their capacity in Microtiter plates (MTP) and their climate.

They are Stand Alone units with the possibility to be integrated into a robotic Platform. The height of transfer position of the units is ~1000mm above ground.

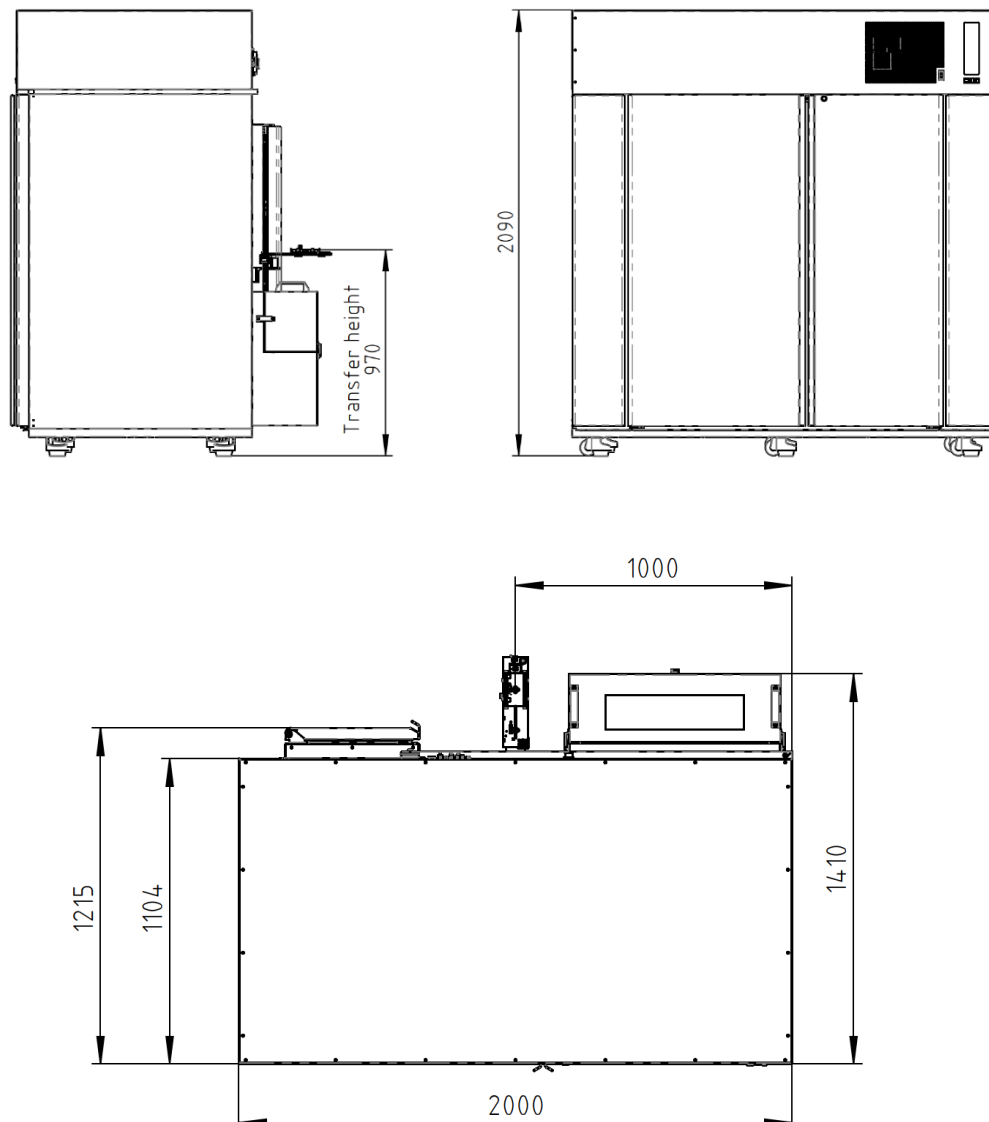
Capacity:

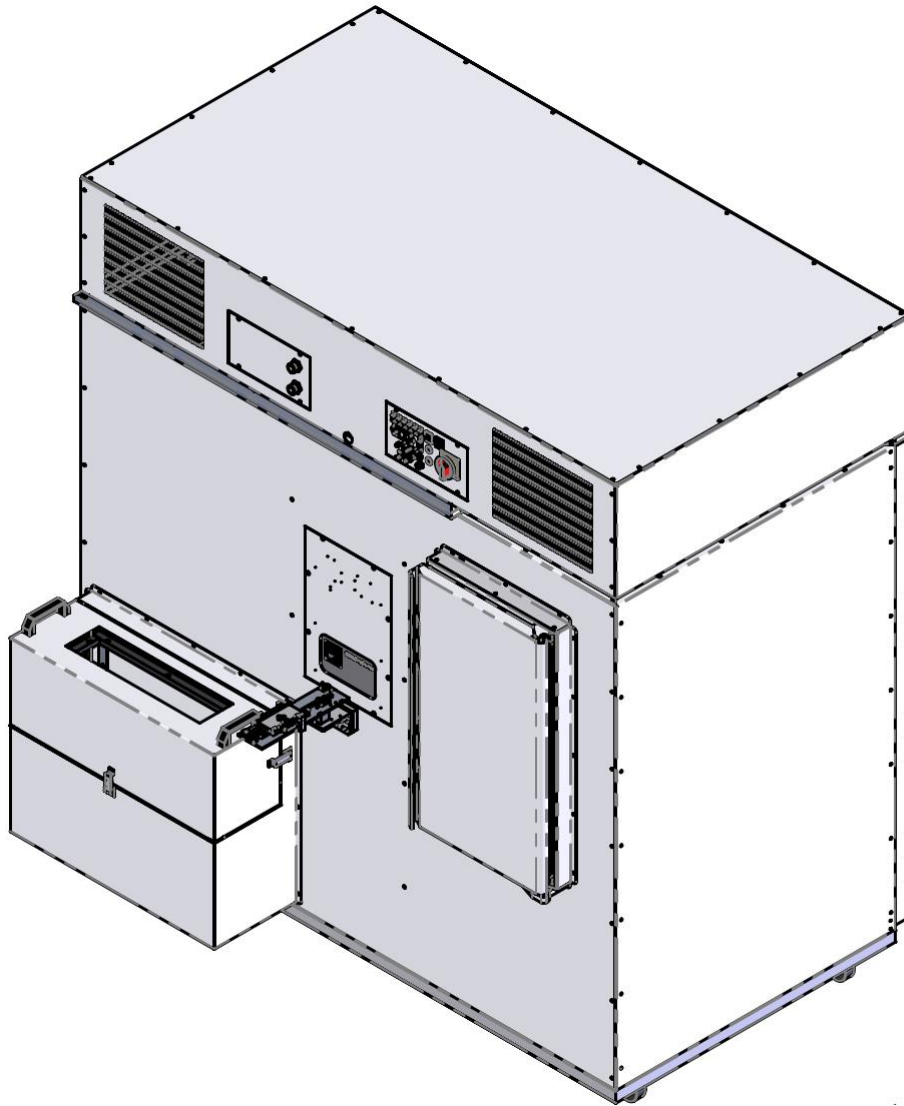
System Type:	STT3k0 Kiwi Store
Number of Trolleys:	4 Mobile + 2 Fixed
Trolley With:	6 Cassettes
Total Number of Cassettes.	60
Cassette Series:	1100mm (usable height)

Capacity in MTP equivalent: 2'880 Plates

Dimensions:

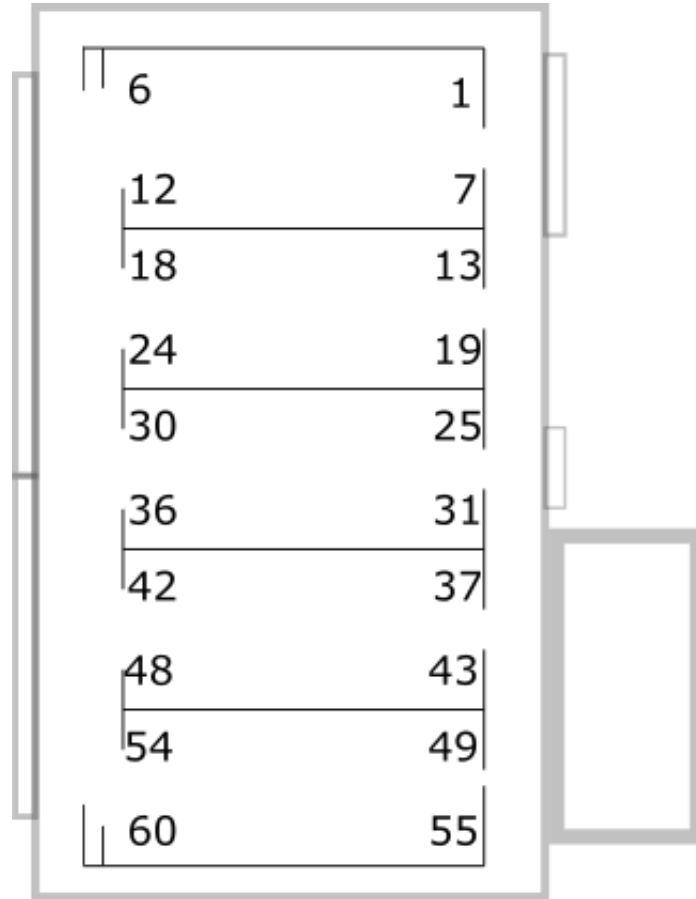
STT3k0 DF Kiwi Store





For detailed systems dimensions please contact LiCONiC AG. These Dimensions are standard at the time of the creation of the manual and may be subject to change.

Configuration:



3. Options

3.1 Climate

3.1.1 Overview

Name	Temperature	Humidity
DC2 Dry Storage	+04...+25°C	04..50%RH
DF Deep Freezer	-20..00°C	02..45%RH

The DF and DC2 Stores are designated for the use as compound storage or for storing DNA.

3.1.2 Cooling

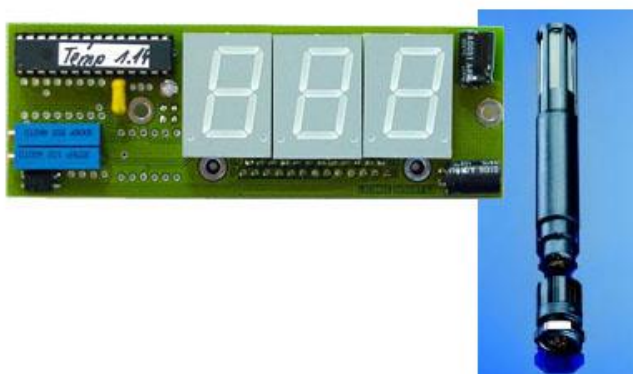
Within all units the air is actively dried by forcing the air through an evaporator. This allows cooling and actively drying the air. Since the evaporator gets covered with ice after a certain time a defrost cycle has to be run. During the defrost the air circulation is stopped and resumed as soon the defrost has ended. The collected water will be exhausted through a drain.

3.1.3 Temperature

All units are equipped with a Temperature-Sensor. This allows to displaying and to regulate the temperature inside the storage chamber. A very high-quality sensor is used for this purpose. Quality and accuracy of the sensor is maintained by the Swiss Federal Office of Metrology and the Swiss Accreditation Service (see specification in next chapter).

3.1.4 Humidity

All units are equipped with an RH-Sensor. This allows displaying the humidity inside the storage chamber. A very high-quality sensor is used for this purpose. Quality and accuracy of the sensor is maintained by the Swiss Federal Office of Metrology and the Swiss Accreditation Service.



The Humidity sensors used in the systems are suitable for extremely high humidity as well as for extreme dryness. They incorporate a humidity and a temperature sensor allowing a relative humidity (RH) readout.

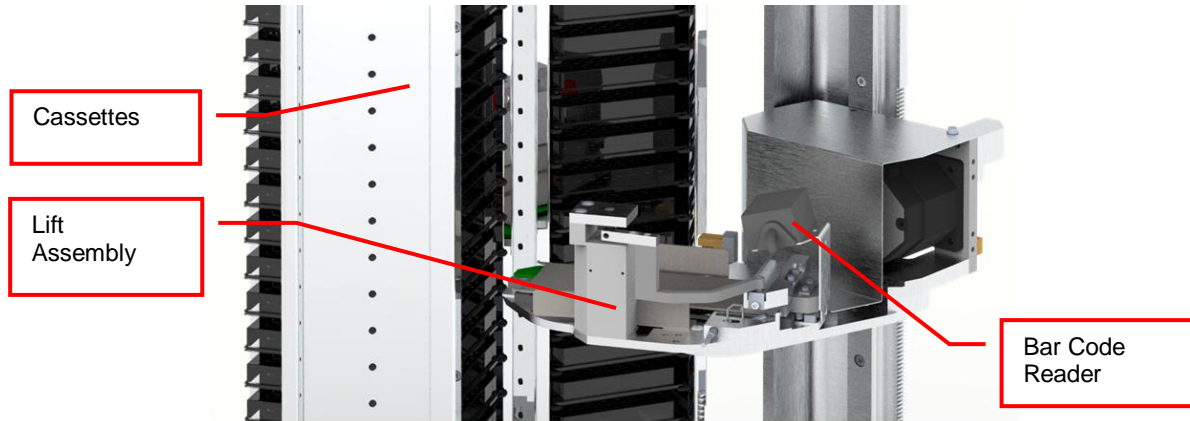
Specifications

Measuring Range	0..100	% RH
Accuracy@23°C	±1.5 ±0.1	% RH °C Temp.
Resolution	12 12	Bit / 0.02% Bit / 0.1°C
Sensor	RS485 HMP110	Temperature Humidity
Adjustment	-	E2-PROM

3.2 Identification

3.2.1 Barcode reader

A Bar Code Reader is installed on the Lift Assembly. It allows the reading of Bar Codes on plates stored in the cassettes. Bar Codes have to be printed on the shorter side of the plates and have to face outwards to the Lift Assembly.



Supported Barcode Types

The barcode reader recognizes the following barcode types.

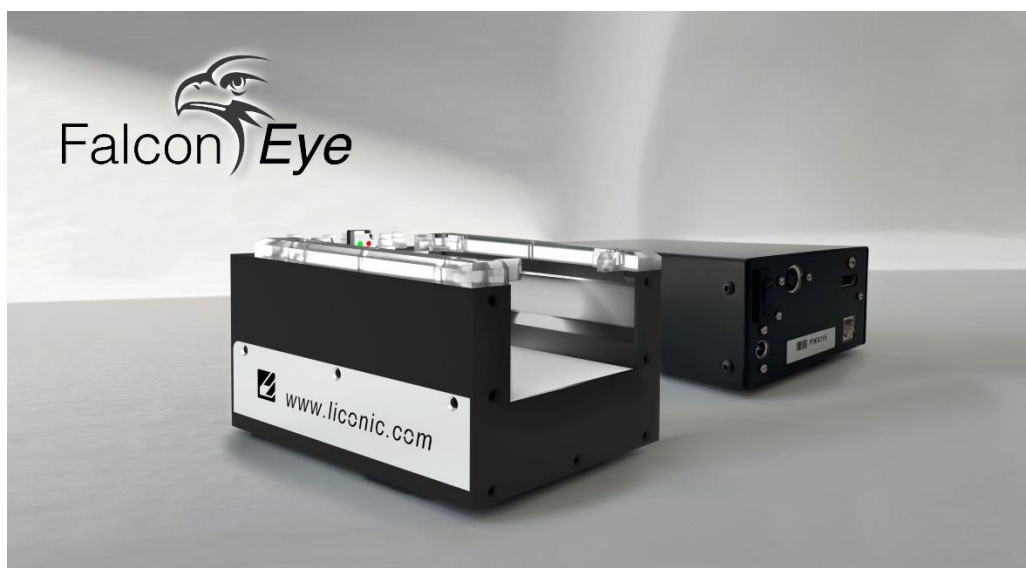
- Code 128 number of characters : 1..32
- Code 39 number of characters : 3..32
- Coda bar number of characters : 3..32
- EAN(UPC (A/E) EAN 13, EAN 8, UPC-E
- ITF
- Industrial 2 of 5
- COOP 2of5
- Code 93
- EAN-128

Barcode Specifications

- Light Source: Semiconductor Laser
- Wavelength: 650nm
- Output: 1.0mW
- Class: FDA: Class II
IEC 825-1 11.1993: Class 2
DIN EN 608251 07.1994: Klasse 2
- Reading Bar Width: Reading Bar Width: 0.125 – 1.0 mm
0.15 – 1.0 mm for Code 93 and Code 128
- Ambient Light: Sunlight 10'000 lx
- Incandescent Lamp: 6'000 lx
- UL Applicable standards
- UL File No.
- UL category

3.2.2 Falcon Eye FE2D-138 scanner

A 2D code whole rack scanner can be integrated into the systems. It allows the reading of 2D Codes of a whole rack at once under controlled climate condition. To read the 2D codes, the rack needs moved as a whole to the reader.



Supported 2D code Types

The optional 2D code reader recognizes the following 2D code types.

- DataMatrix

2D code scanner Specifications

- Scanning Device: Customized camera-based scanner
- Compatible rack vendors
 - Thermo Matrix
 - Thermo Abgene
 - Thermo Nunc
 - Remp
 - Micronic
 - FluidX
 - HD Racks
 - Further types possible
- Compatible rack sizes: 24, 48, 96, 138, 240, 384
- Export data to Excel, text, XML, JSON, rack images
- Database connectivity: SQL Server, Oracle, MySQL, Postgres, HSQL and others [v1.23+]\$
- Operating system: Windows 7, 8 and 10
- Fast Scanning — 2-3 seconds per rack
- Displays damaged/missing tubes
- One-click scan for any size or brand of tube
- Simple installer — no dongles required
- Multiple scanners/multiple configurations
- 100-240VAC automatically selected
- Fully integratable into robotics platforms

3.3 Tube Handling

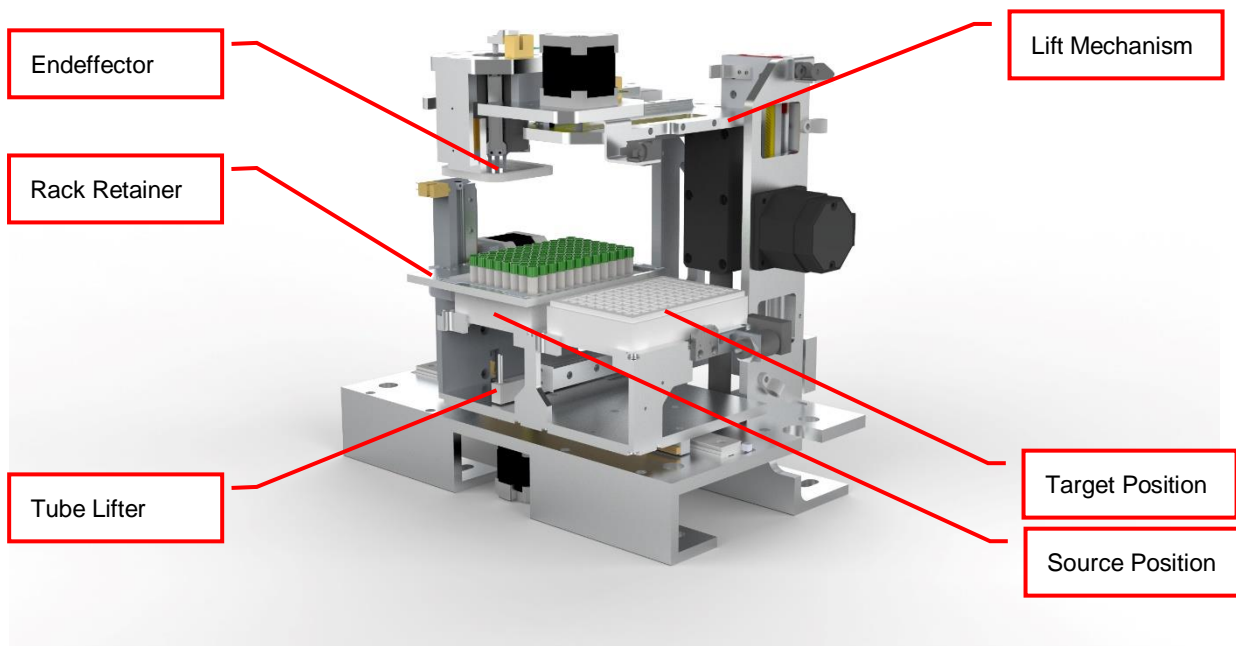
3.3.1 General

The Kiwi units are distinguished through the capability to hold a tube handling unit under climatized conditions. The tube Handling is able to handle most tube types. The tube handling is integrated into the Liconic System and allows it to work under control climate conditions.

To work with the tube handling, rack need to be moved by the storage handling to the picker location and be placed into the source and target nest. The picker will pick up a Tube from the source and then places the tubes into the target.

There are tube handlings available which are compatible with following rack size: 24, 48, 60, 96, 138, 384. By default, the tube handling is configured to work with one tube format, such as 96 (138). The limitation is the endeffector which is moving the tube. This endeffector is only capable to handle a certain diameter range, hence different endeffectors for 24, 48, 96 and 384 are required. The handling can be equipped with an option which allows to handle up to two formats.

The handling is by default equipped with a rack retainer and a tube lifter. The lifter pushes up the tube for the endeffector to be taken. Hence for the source position the retainer is required to ensure the rack is not moved in any case.



Solutions for push through labware are available upon request.

3.3.2 Options

HD-Rack capability

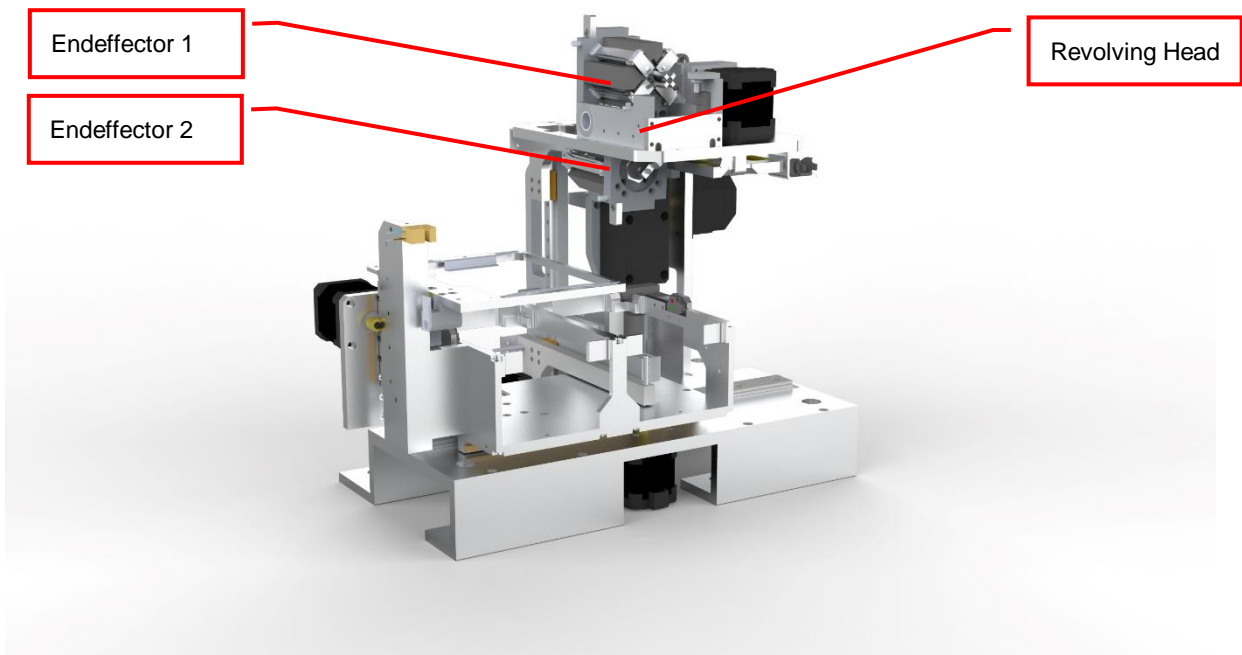
The latest generation of tube handlings are capable to work with HD Rack formats. It is possible to reformat from standard to HD format and back. Following two formats are commonly used:

Standard Format	HD Format
SBS 96	SBS 138
SBS 48	SBS 60

The use of HD formats on existing devices is possible but should be confirmed with a Liconic representative. Software configuration changes and teaching is required in any case.

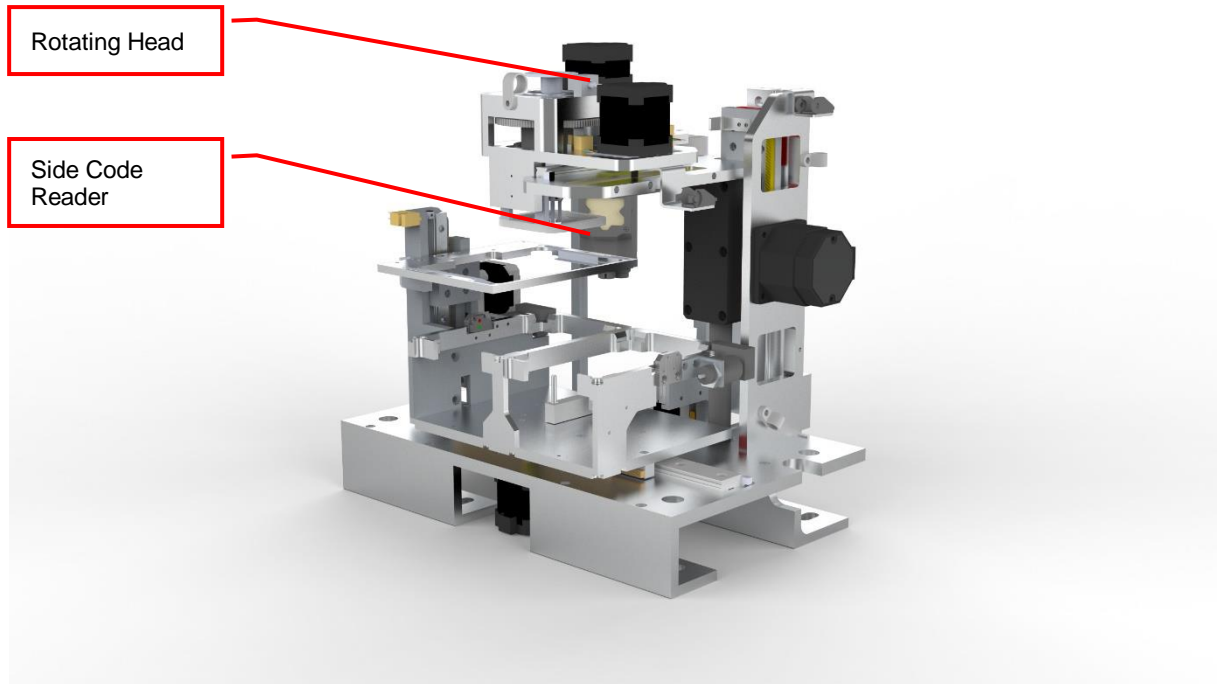
Revolving Head Option

This option allows the tube handling to hold two endeffectors for different tube formats. Most commonly 48 and 96 are combined. Not all combinations are possible. For further information about possible combinations contact Liconic.



Side Code Reader with Rotating Endeffector

For tubes with side labels a solution is offered to read such labels. The reader is located at the side of the actual picking area. Each tube needs to be lifted up individually to be read. The reader is capable to identify 1D Barcodes and 2D Codes. As the position of the code may be initially not visible for the reader a rotating head is part of this option. The endeffector can be rotated nearly 360 degree in order to read the code at any location on the circumference of the tube body.



Multi Nest Tube Handling

Tube handlings can be offered with multiple source or target nest configurations, most suitable for the application. These solutions mainly are used when time constraints are a concern.

Custom Tube Handlings

For specific application custom solutions may be offered. These custom solutions will build on the mentioned features or a combination of them. Please contact Liconic for further information.

4. Accessories

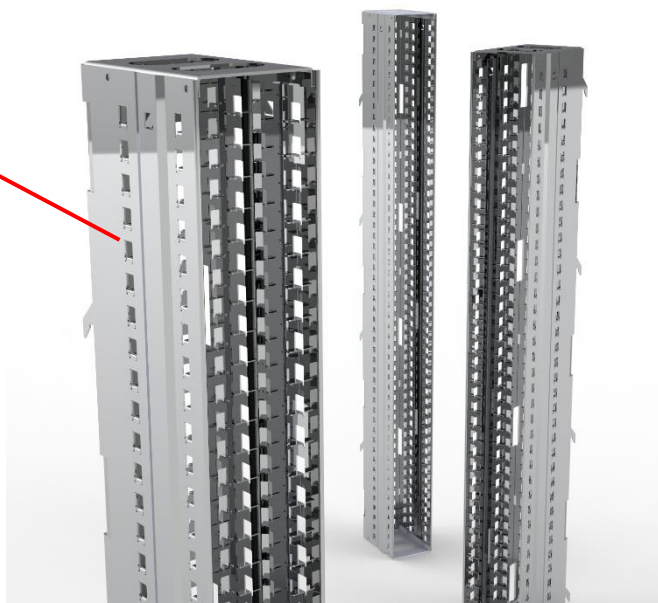
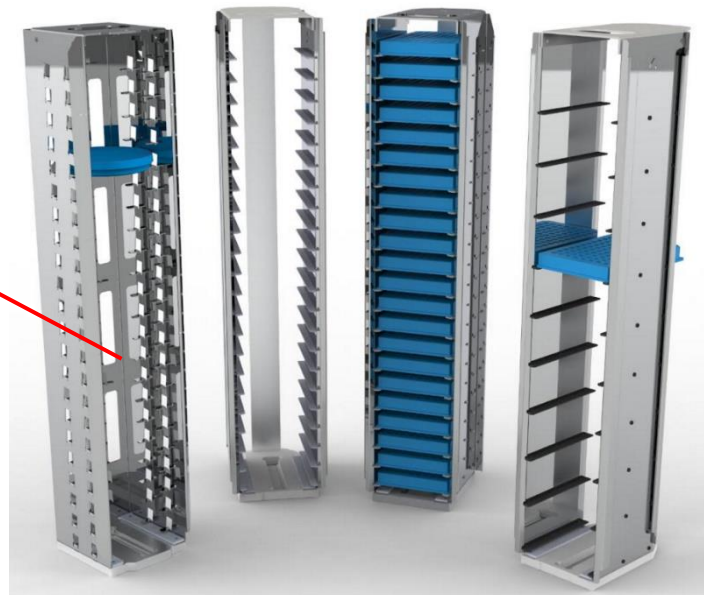
4.1 Kiwi Store Cassettes for STT3k0 Stores

The manual door access includes one or two buffer cassettes which are 505 mm in height. The number of the cassettes depends on the given specification.

The store cassette capacity is depending on its usable cassette height given by the cassettes Series. Series 1100mm is a standard height, it is also possibility to use 1050 mm height. The maximum number of the cassettes in the store is 60.

The System Capacity depends on the specific configuration.

The Kiwi Store can handle almost every plate or tube racks in SBS format currently available on the market. For optimum performance LiCONiC offers a variety of cassettes.



4.2 Transfer Stations

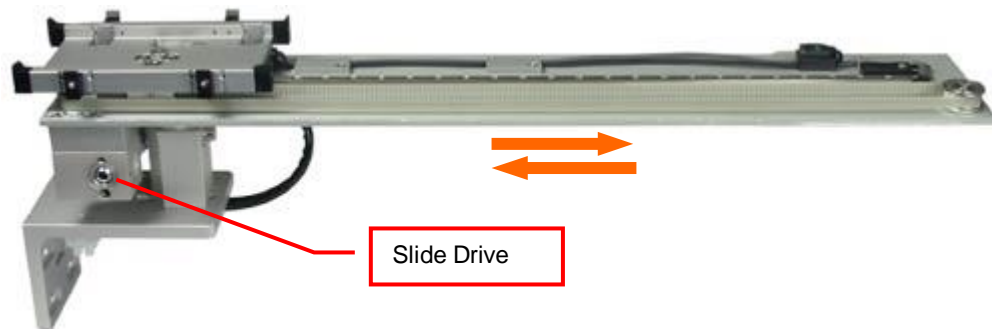
LiCONiC offer a wide range of transfer stations for different applications. Please contact LiCONiC for detailed information on compatibility and special hand off requirements. Almost the whole range of transfer stations known from the Liconic Incubator product range can be used with the STT1k0.

4.2.1 Standard Transfer Station

For the STT1k0 this transfer station with a simple set down position and a plate presence sensor is the default configuration. This transfer station can be manually accessed by the user to place plates as well as within robotic integrations. The storage accesses the transfer station with its handler to transfer plates.

4.2.2 Slide Station

Mostly in integrations when the distance of the transfer location in correspondence to the robotic integration not sufficient, it may be extended by the Slide Station. The Slide Station has a linearly displaceable Transfer Plate. The travel path of the Transfer Plate can be ordered as necessary.



The movements of the station are controlled by the KIWI STORE system. Each time a plate is accessed by the KIWI STORE handling, the Transfer Plate is moved towards the unit. After access by the KIWI STORE the transfer station travels back to its outer home position.

4.2.3 Shuttle Slide Station

The shuttle station operates similar to the slide station. The only difference is the orientation of the travel. The slide station does move away from the unit whereas the shuttle station moves parallel to the back of the unit. Much like the slide station this station is used for robotic integrations to bridge the distance between the unit and a possible access point for the robotics. Depending on the available options to place the unit the transfer station is selected.

4.2.4 Step Stations

All active transfer station are available as step stations. Equipped with a stepper motor drive the transfer station can access intermediate positions. The positions are adjusted via the standard handling communication.

On a slide station per example various stop position can be defined. One for delidding, the next for buffer filling and the last for aliquoting.

4.2.5 Customized Transfer Stations

Further transfer station solutions are available. They are ranging from orientation rotation to combinations of linear displacement and rotation to full direct integration of grippers and specific equipment. The solutions LiCONiC can offer in this regards are sheer endless. For specific requirements contact LiCONiC.

5. System Installation

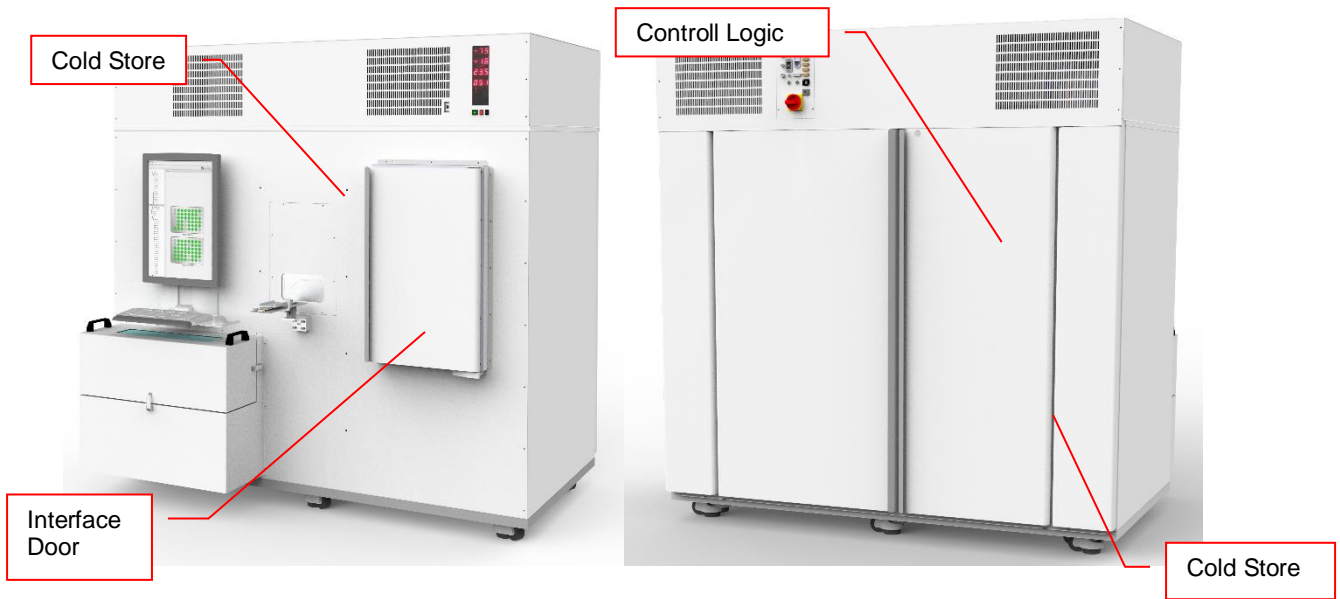
5.1 BiOLiX Store STT3k0 installation

The installation of the STT3k0 is only performed by Liconic personnel and in rare cases thoroughly trained representatives. These systems need some on-site installation and adjustments. In this manual, only preparations necessary to be done by the customer are described.

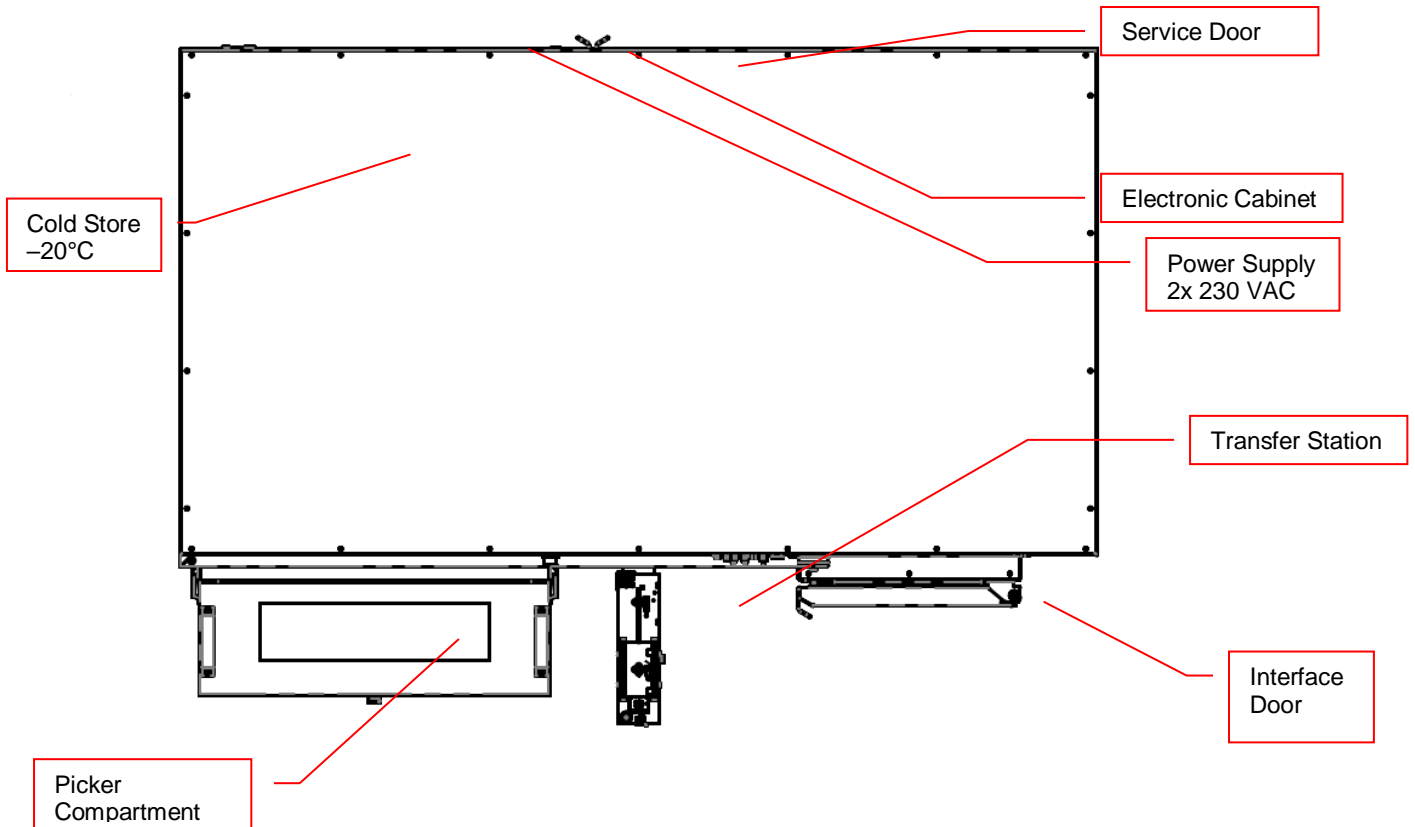
5.2 Customer installation guide

5.2.1 Complete System Overview

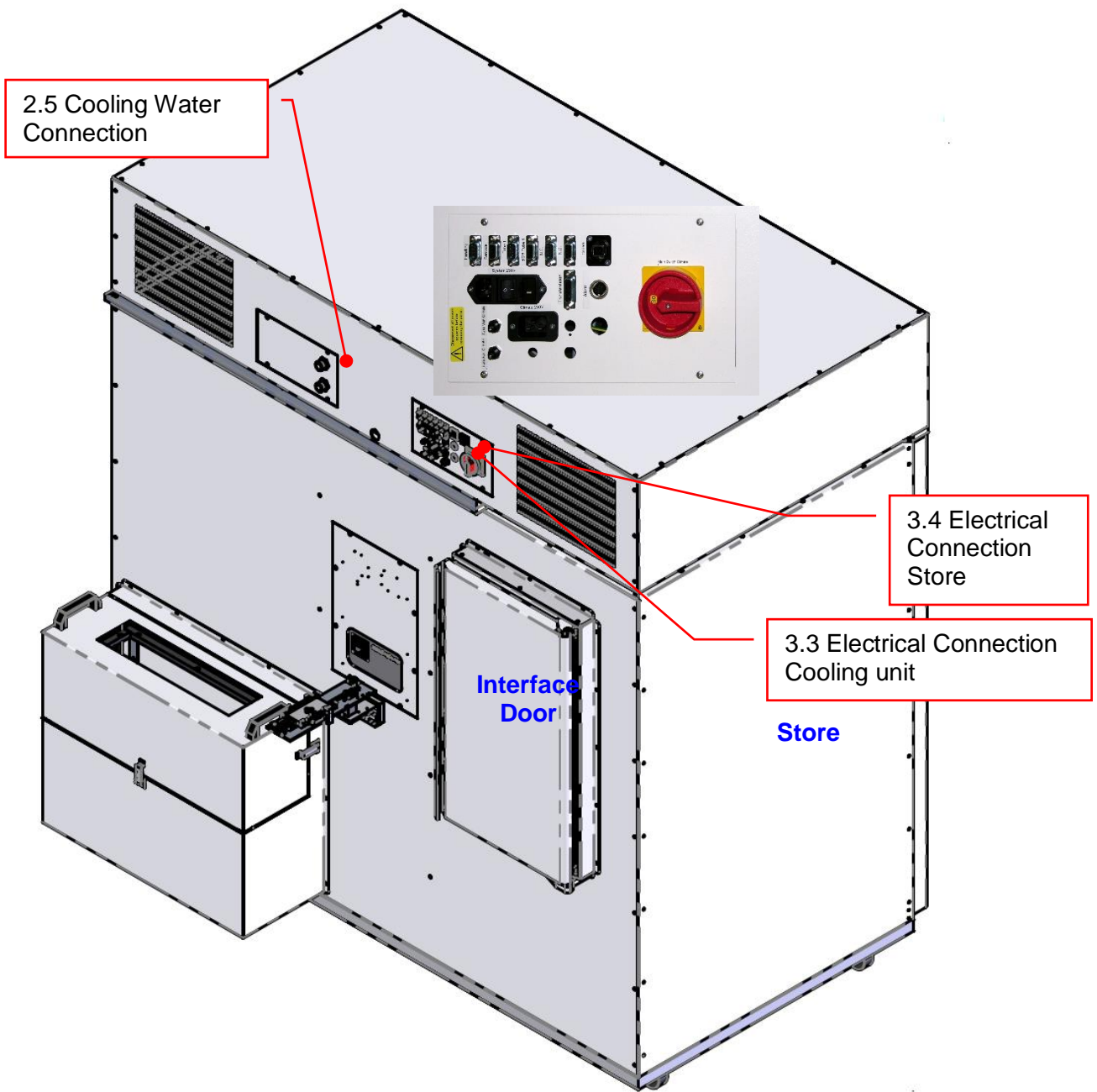
3D-View



Top view



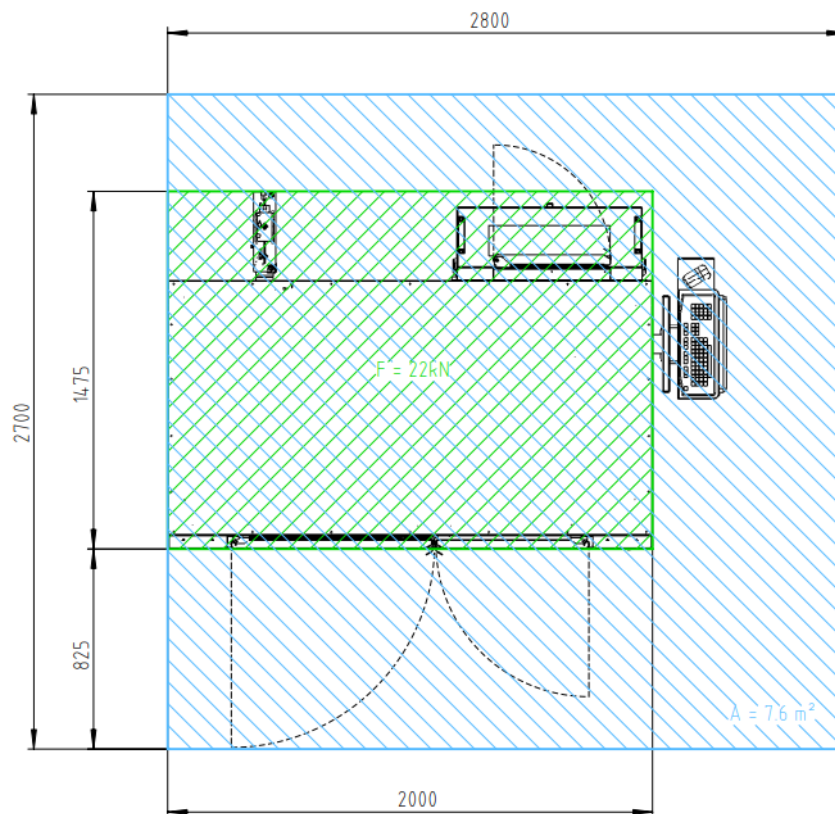
Panel Locations



General Requirements

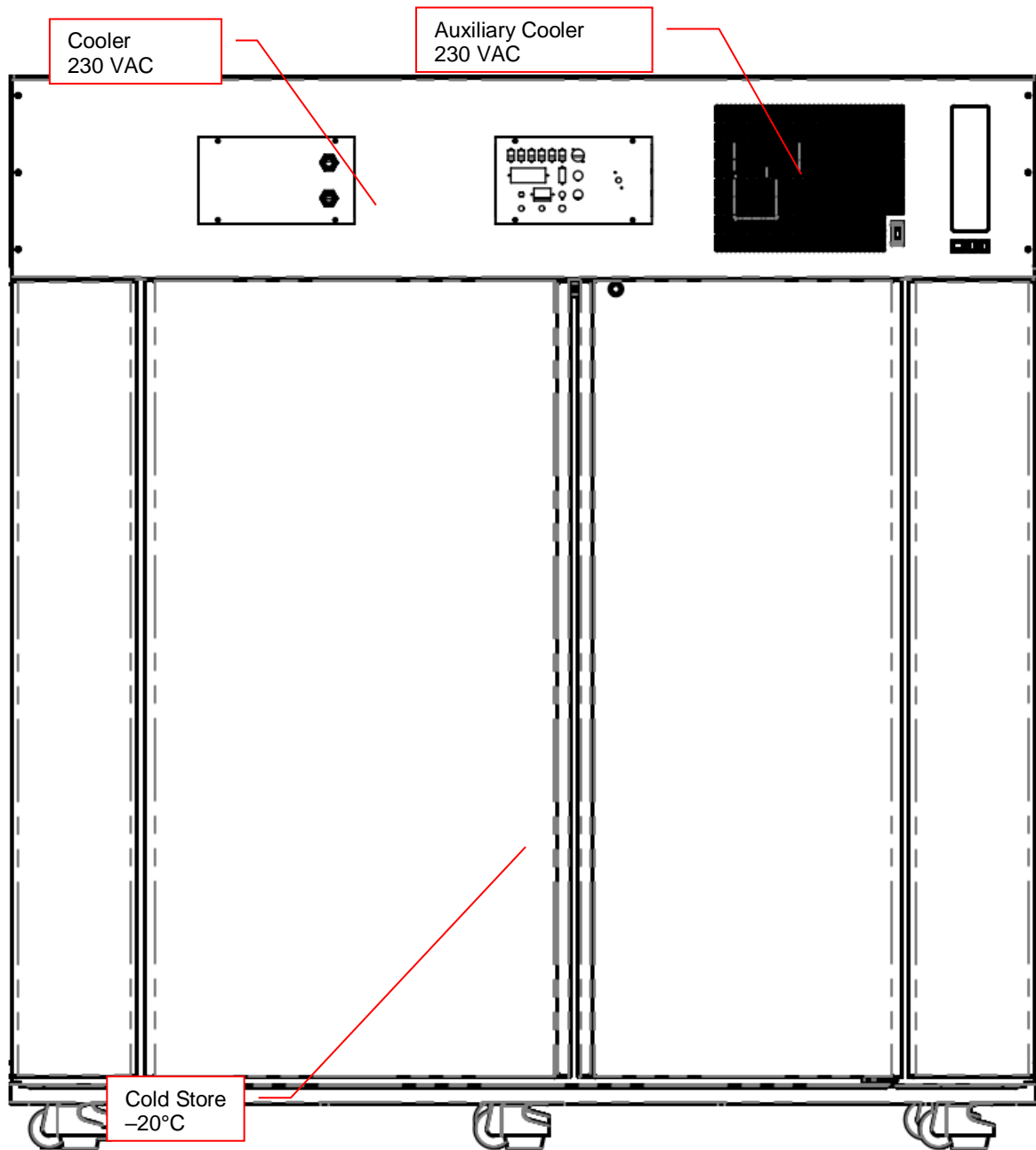
Requirement	Details
Ambient	Temperature: max. 22 °C Humidity: < 40%
Room height	2.1 m
Floor load	Recommended 500 kg/m ² (for smaller load specifications please consult clearance recommendations with Liconic Applications team, case-by-case approval required)
Point load	250 kg
Heat dissipation	< 2kW
Flatness	+/- 1mm per 1m
Accessibility	Room has to be accessible from 7am - 7pm for installation
Storage	A room has to be supplied to lock in all tools and material
Communication	RJ45 Connector Access to Network

Clearance Requirements

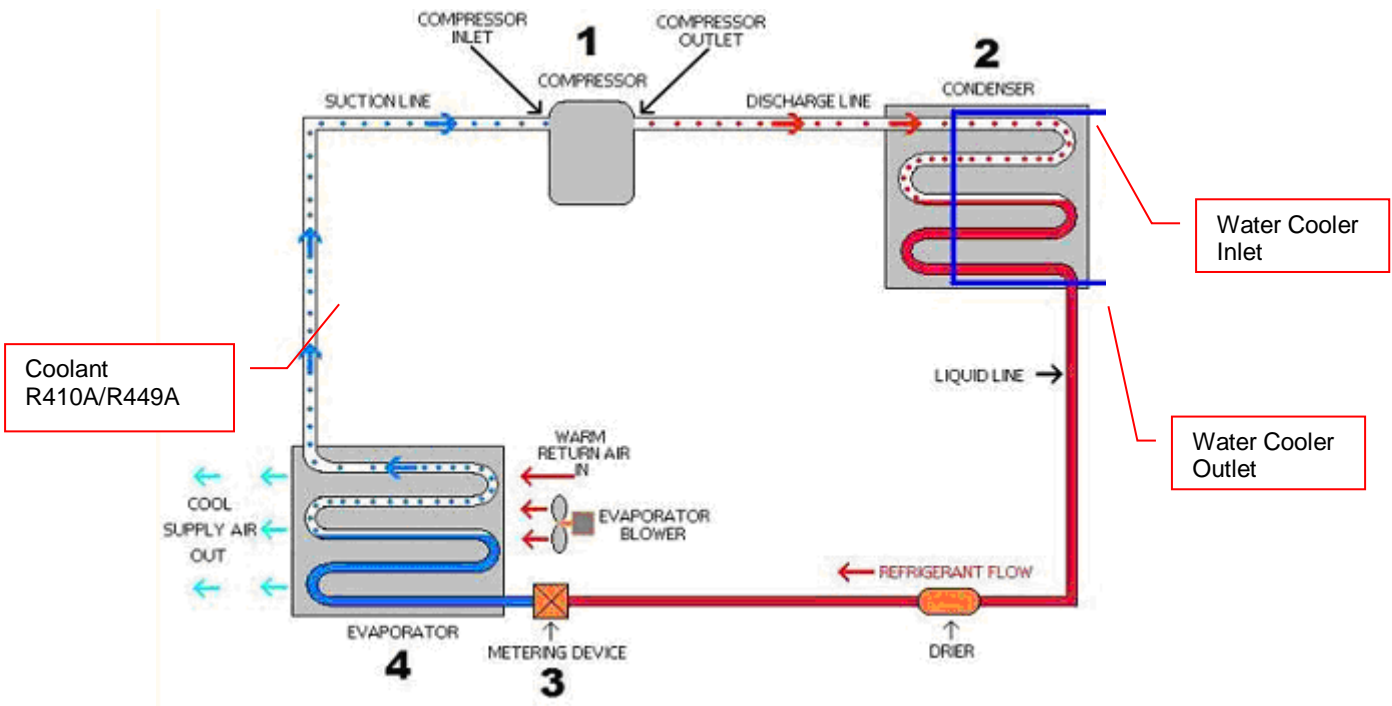


5.2.2 Refrigeration

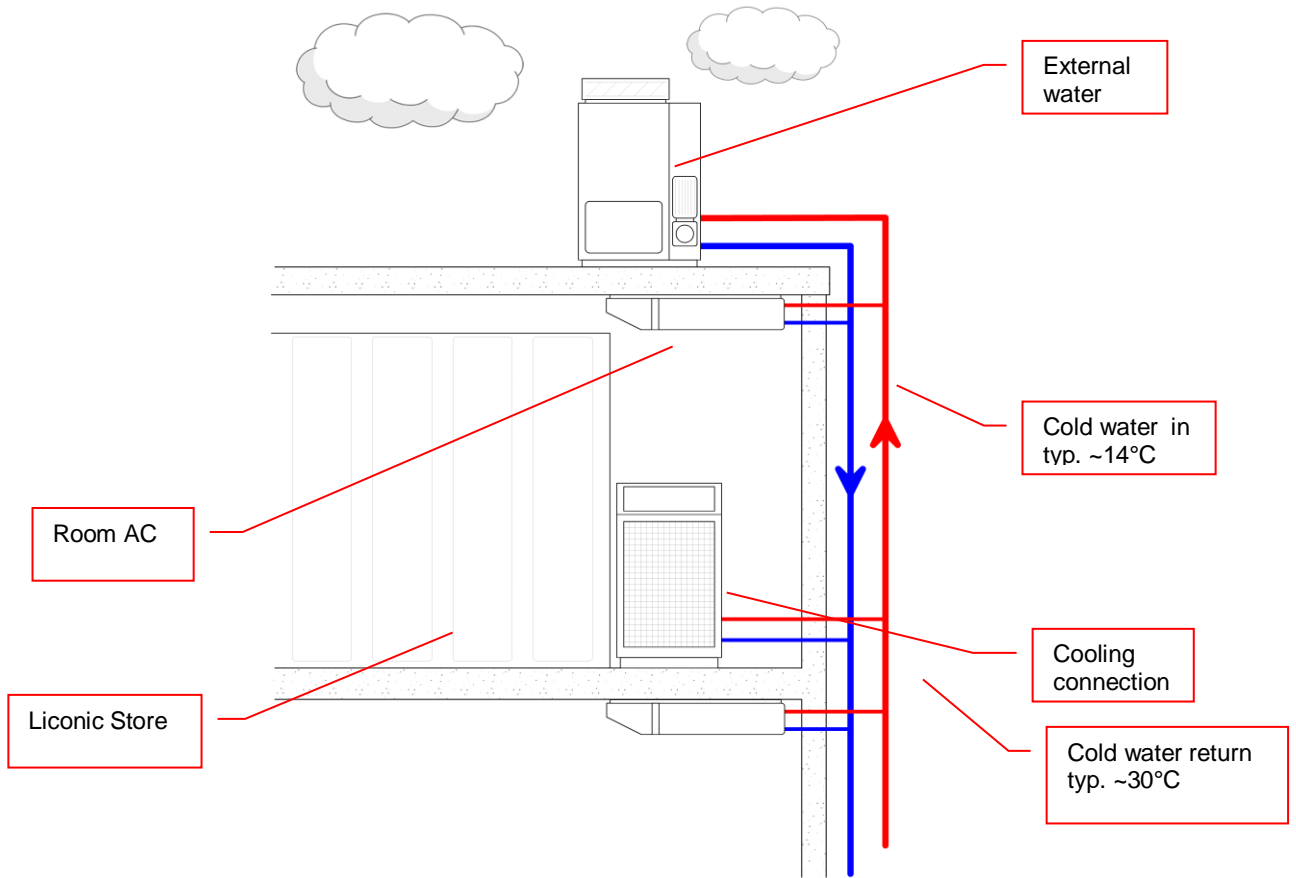
Refrigeration Elements Overview



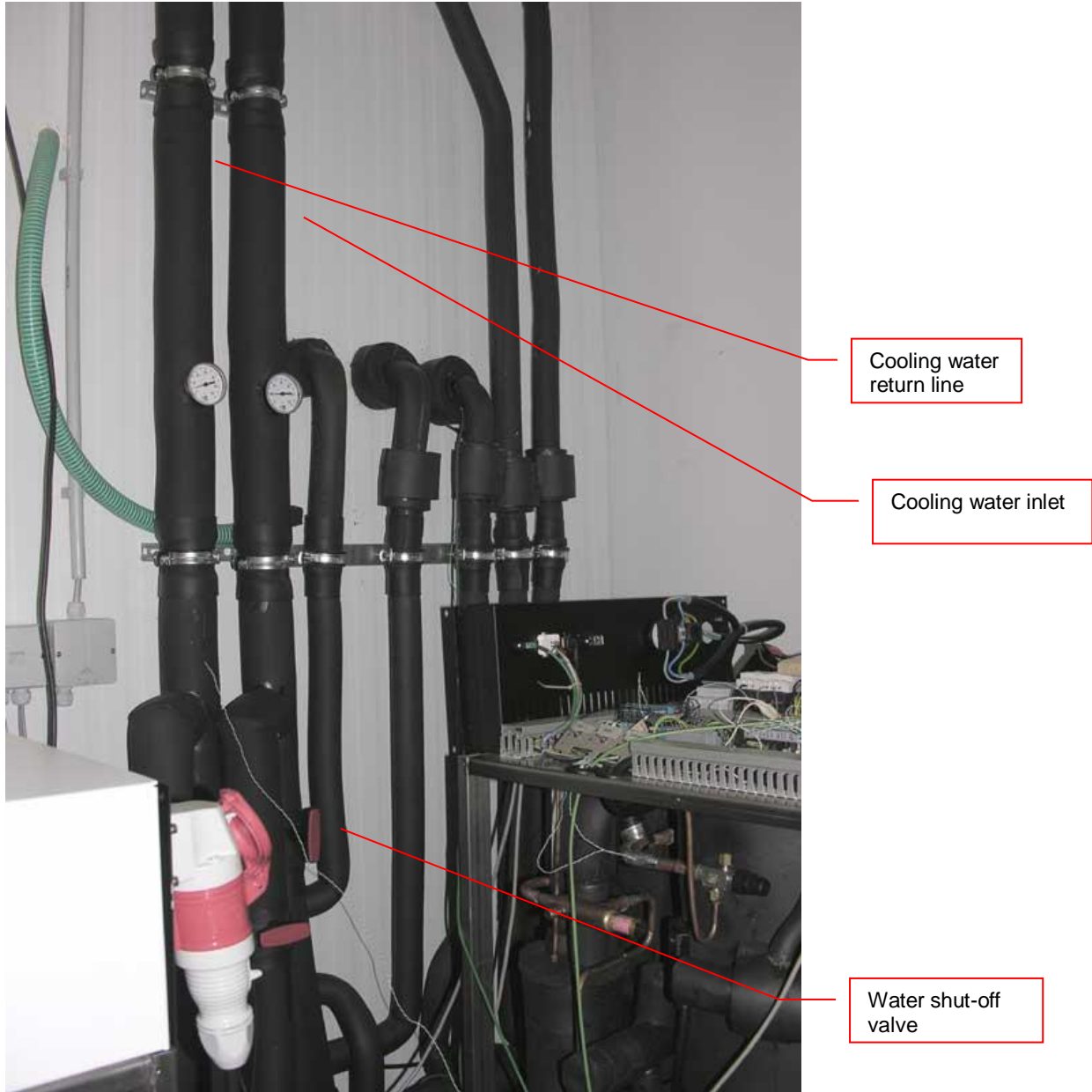
Electrical Refrigeration Principles

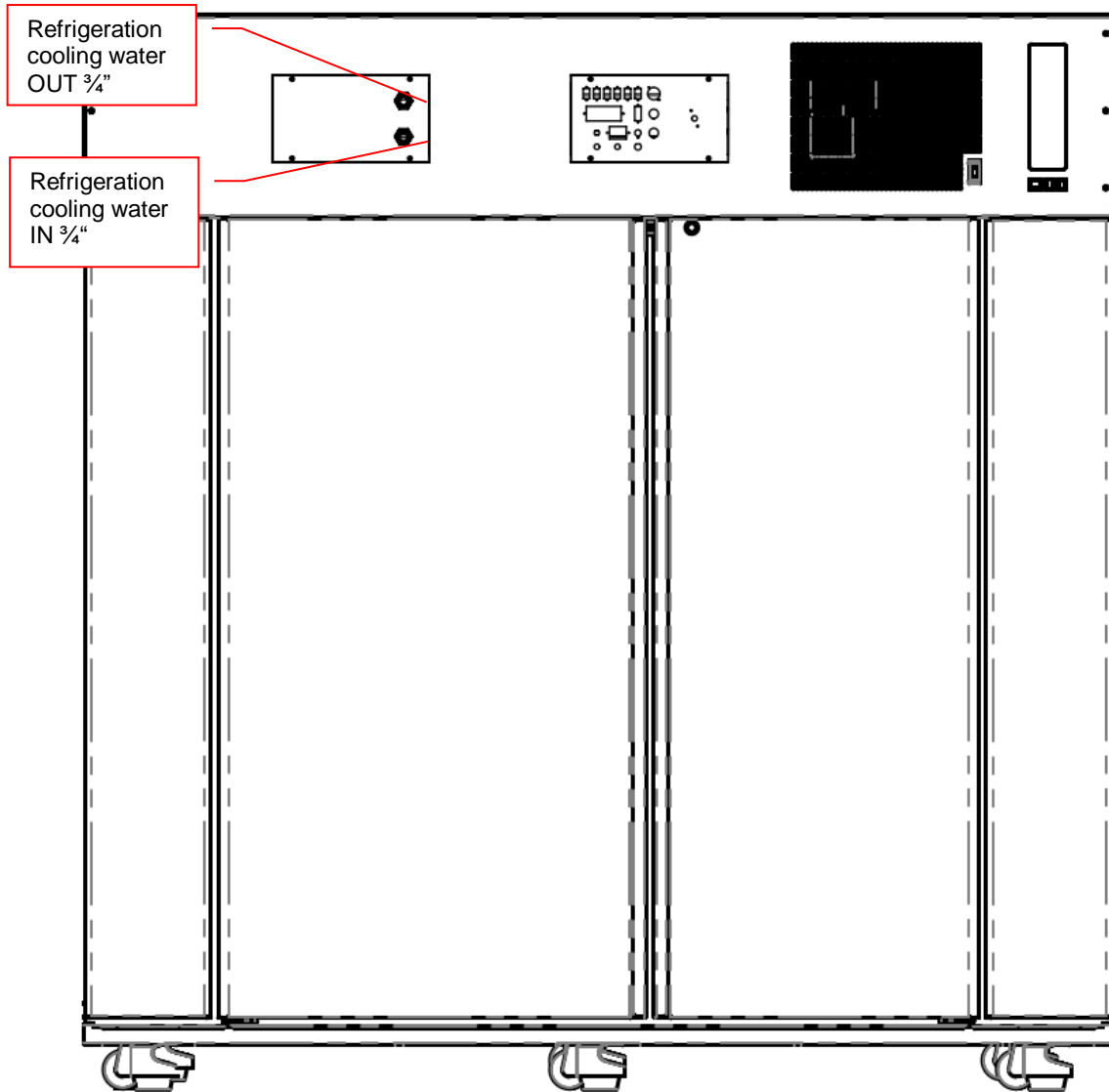


Cold Water Cooler



Typical Water Cooler Integration



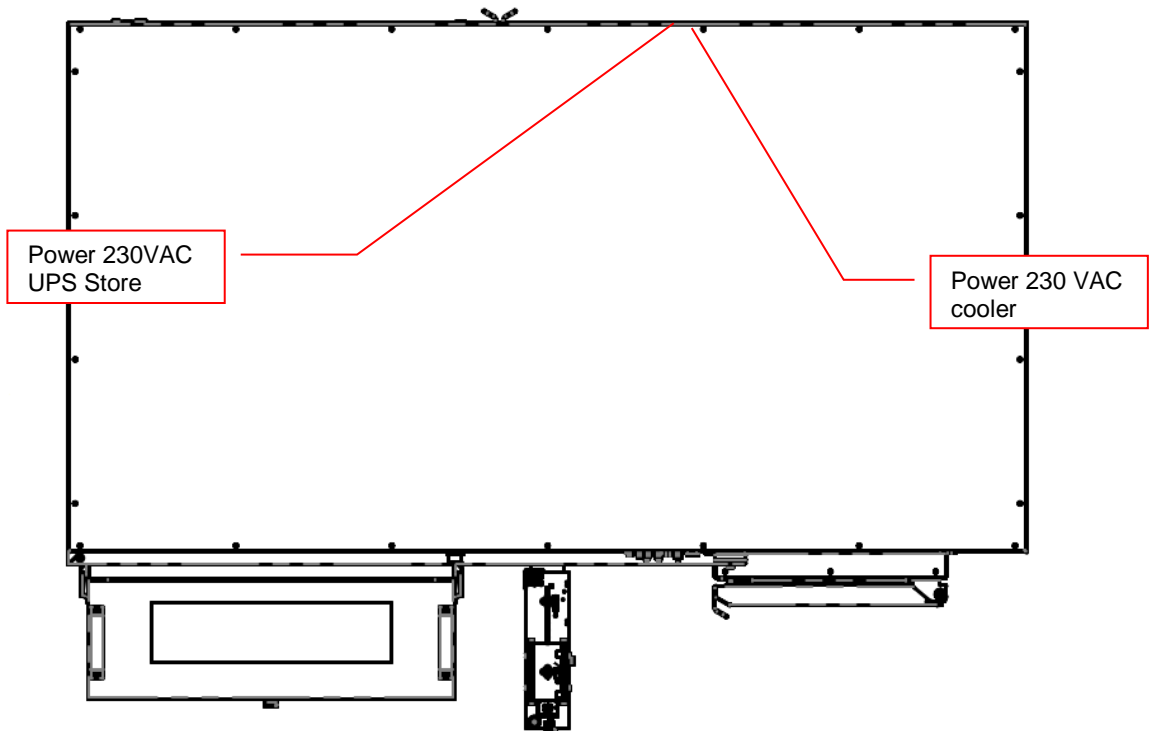


Requirements Cooling Water

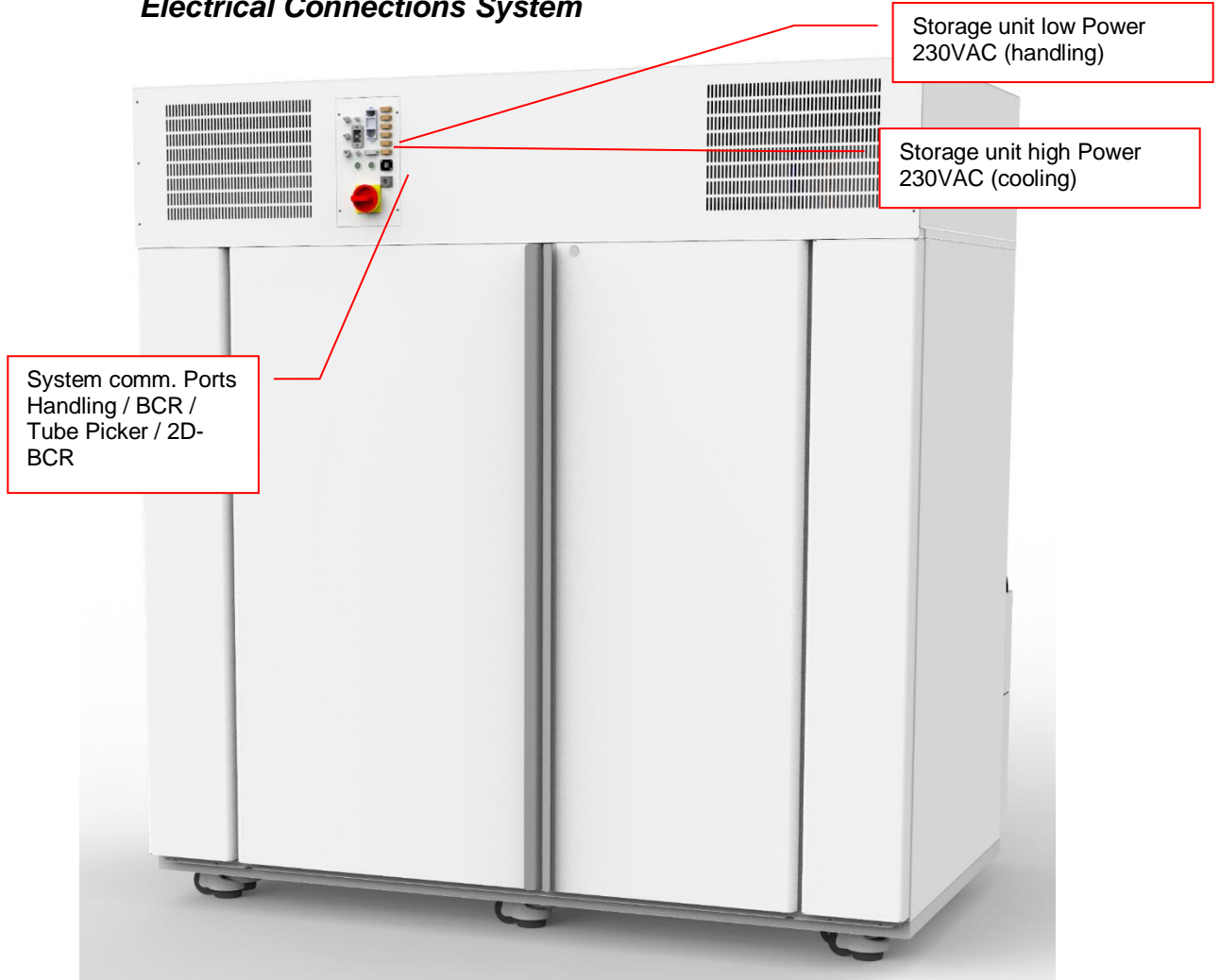
Requirement	Details
Cooling	<p>Media: Water</p> <p>Water quality: Tap water quality, clear</p> <p>Suspended solids: None</p> <p>Conductivity: 50-600 uS/cm</p> <p>Hardness: < 8° dH</p> <p>PH: 7.8</p> <p>CO2 aggressive: None</p> <p>Iron: < 0.3 mg/L</p> <p>Manganese: < 0.05 mg/L</p> <p>Sulfate: < 250 mg/L</p> <p>Chloride: < 250 mg/L</p> <p>COD: < 40 mg/L</p> <p>Bacteria: < 1000 CFU/ml</p> <p>Pressure Difference: 2.5 bar (e.g.: IN 5 bar; OUT 2.5 bar)</p> <p>Max. Inlet Pressure: 10 bar</p> <p>Temperature: IN 5 .. 14 °C</p> <p>Flow: typ. 3-5 l/min @ 12°C</p> <p>Temperature Return: 35°C</p> <p>Connection fittings: 3/4" male</p> <p>Individual connections for main and redundant cooling</p> <p>Mixture of Water with Glycol are possible.</p>
Typical pump used for cooling loop	Grundfos CR Series (e.g.: CR 1-8 AN-FGJ-G-E-HQQE or regulated for constant pressure difference)
Water loop cooling DF power requirements (per active cooling unit)	<p>Normal Operation:</p> <p>2-3l/min @ 12°C</p> <p>2-4kW</p> <p>Start-Up Condition:</p> <p>5-7l/min @ 12°C</p> <p>5-8kW</p>
Water Connections	<p>2x 3/4" male</p> <p>Cooling: 1x Inlet; 1x Return</p> <p>Optional Aux Cooling: 1x Inlet; 1x Return/Drain</p>
Drain	<p>Unit may perform regular defrost cycles and therefore is equipped with a drain tube leading the gathered water out of the system.</p> <p>Solution to remove the water may be foreseen. In the simplest case an evaporation pan could be used. (Water would evaporate into the room over time)</p> <p>More sophisticated solution would be to provide a drain to guide the water out of the room.</p>

5.2.3 Electrics

Overview



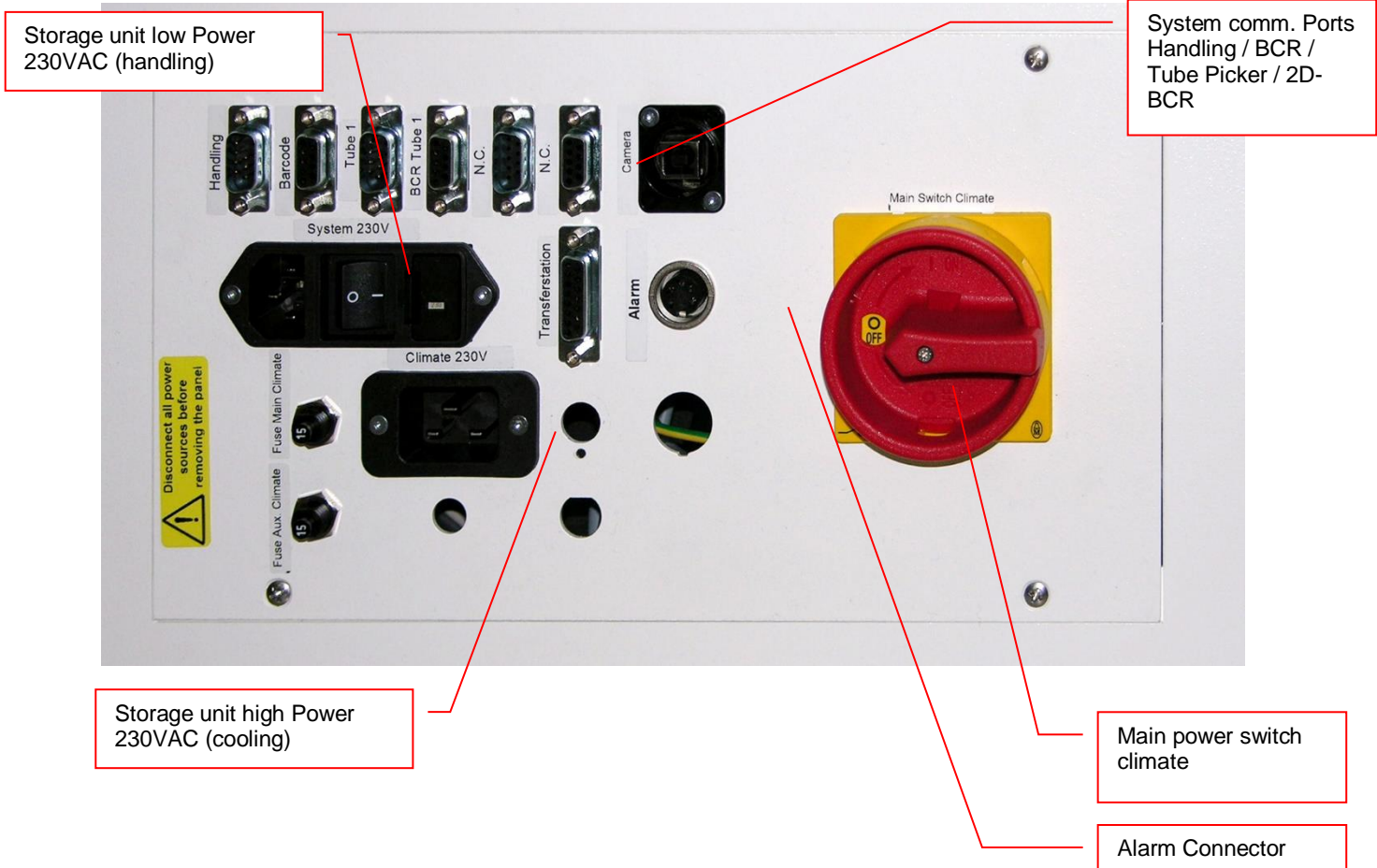
Electrical Connections System





Requirements

Requirement	Details
Supply Refrigeration Store	230V / 50Hz 1 Phases Fuse: 16A (Type: D) Connector: Type C16, 16A 3-Pol: L, N, G
Power consumption Refrigeration	Typically: Current: 8 - 10 A Voltage: 230V / 50Hz Power: 1.2 - 2 kW
Supply Logic Control Unit Store	230V / 50Hz UPS protection Fuse: 10A Connector: Type C14, 10A 3-Pol: L, N, G
Power consumption Logic Control Unit Store	Typically: Voltage: 230V / 50Hz Power: < 1 kW



5.3 Gassing Installation

5.3.1 Kiwi Store Gassing and Backup Options

The Kiwi Store series supports a wide selection of gassing and backup options. Typical properties of some commonly used options are described next. There are other gassing options available. Note that each gassing and backup option is linked to specific risks and hazards. It is important to be fully informed about any specific application before installing the instrument or even running any application.

5.3.2 Safety Information

General

Commonly used in research medicine are inert gases like: Nitrogen, Argon, Helium and Carbon Dioxide. Inert gases are used mainly to create and maintain inert atmospheres for an application or process. The above gases, which generally don't react with other materials, displace oxygen in order to maintain an inert, contaminant free atmosphere.

In their liquid form these gases are very cold, (the boiling point of liquid nitrogen is -196°C). Such cold liquids are known as cryogenic liquids, (from the Greek, kryos meaning frost and gene meaning producing). The liquid gases therefore can be used as backup cooling option in case of power failure.

Major hazards

There are some major hazards associated with these gases



WARNING !

- Inert gases are asphyxiating and will displace oxygen to produce localized oxygen deficient atmospheres
- Inert gases are odorless, colorless and tasteless
- Inert gases give no warning and may cause death in few seconds

Oxygen is the only gas, which supports life. The normal concentration in the air that we breathe is approximately 21%. If the oxygen concentration in air diminishes or, (what amounts to the same) if the concentration of inert gases increases, a situation is rapidly reached where the hazards of asphyxia become very great.

The danger occurs as soon as the oxygen levels are lower than 16%. Inert gases are odorless, colorless and tasteless and are therefore a great deal more dangerous than other gases such as chlorine, ammonia, or hydrogen sulfide, which can be detected by their odor, at very low concentrations. The asphyxiating effect of inert gases occurs without any preceding physiological signals which could alert the victim. It takes place very rapidly: just a few dozen seconds with very low oxygen content. Stated clearly "you do not notice that you are passing out!"

The danger from the inert gases such as nitrogen, argon, helium, etc. cannot be stressed enough!! . Especially in this case of Asphyxia as there are no warning signs. People also vary considerably in their reactions to oxygen deficiency.

**WARNING !**

- In their liquid state inert gases are extremely cold fluids which can cause serious burns when in contact with the skin
- A cryogenic spill often gives a low-lying cloud of vapor that creeps along the ground

When a cryogenic liquid is released into the atmosphere, it evaporates and forms a dense cloud. As it is very cold it is heavy and hangs close to the ground. So, it will flow into any low-lying areas, such as drains or pits. Therefore, the first warning of a cryogenic spill is often given by the presence of a low-lying cloud of vapor that creeps along the ground. These clouds can be dangerous, as their temperature or composition will be unknown. Visibility within the cloud is very low with the possibility of falling, perhaps into contact with the cryogenic liquid. If the cloud is nitrogen or argon then it is very likely that the cloud does not contain sufficient oxygen to support life. In this case unconsciousness could be immediate and death could follow.

**CAUTION !**

- When you see a cryogenic spill or a large vapor cloud notify qualified personnel immediately
- Shut off the source of liquid, by a REMOTELY controlled valve
- Do not enter a vapor cloud caused by vaporizing cryogenic liquid
- DO NOT SMOKE!

When you see a cryogenic spill or a large vapor cloud notify qualified personnel immediately. Call the Fire Department in the case of a large liquid oxygen spill. Have them stand by until the spillage is dispersed.

If possible shut off the source of liquid, by a **remotely** controlled valve if one is fitted. Do not expose yourself to the hazard, such as high oxygen, combustible or asphyxiating atmospheres or cryogenic liquid. Do not allow liquid oxygen to enter drains or sewers. If so advised, shut down any air conditioning or ventilating systems that may draw vapor or gas from the spill into other locations.

If it is essential to enter a cloud caused by nitrogen or argon (note: never enter one that could be rich in oxygen), then wear a self-contained breathing apparatus provided you are trained and qualified to do so. A stand-by person, also wearing breathing apparatus must keep you under surveillance. If the release is oxygen, then your clothes could be saturated making them extremely flammable. If you suspect that you have been contaminated with oxygen do not go near any source of ignition for no less than 15 minutes. Ventilate your clothing; change if possible. A fire may occur at any time in the oxygen cloud, should it come into contact with highly combustible material.

General Safety Instructions

When working with inert gases prevent contact of liquid gas, cold vapors, or "snow" with exposed skin. Prevent entrapment of liquid in closed systems. Use only in well ventilated areas. Compressed gas cylinders contain gaseous and liquid gas at extremely high pressure and should be handled with care. Use a pressure-reducing regulator when connecting to lower pressure piping systems. Secure cylinders when in use. Never use direct flame to heat a compressed gas cylinder. Use a check valve to prevent backflow into a storage container. Avoid dragging, rolling, or sliding the cylinders, even for a short distance. Use a suitable hand truck. For additional handling recommendations on compressed gas cylinders, consult the Compressed Gas Association Pamphlet P-1.



CAUTION !

- Wear loose fitting gloves of impermeable material such as leather when working with cold liquid, solid, or vapor
- Safety glasses are recommended when handling high-pressure cylinders and in areas where vapors are discharged

Set-up gas cylinder in a well-ventilated area. Keep cylinder away from sources of heat. Storage should not be in heavy traffic areas to prevent accidental knocking over or damage from passing or falling objects. Valve caps should remain on cylinders not connected for use. Segregate full and empty cylinders. Storage areas should be free of combustible material. Avoid exposure to areas where salt or other corrosive chemicals are present. Install carbon dioxide cylinders with the valve end up. See Compressed Gas Association Pamphlet P-1 for additional recommendations.

5.3.3 Installation Safety Recommendations

Preventive Measures

The very first preventive measure is to inform all persons who handle or who use inert gases:

- Of the hazard represented by the refraction of oxygen in atmosphere
- Of the preventive means to be employed in handling the gases
- Of procedures to be observed should an accident occur

This information and training should be systematically and periodically reviewed in order to maintain an awareness with regard to these hazards. In particular, training in rescue work is fundamental since quickly improvised rescue, without the respect of a strict procedure, often proves to be ineffective, if not catastrophic (the rescue worker lacking foresight becomes a second victim). An annual program of training and rescue drills is recommended.

Ventilation

Depending on the existing ventilation, amount of gas used and size of room where the unit is installed and operated, ventilation may be required. A local exhaust may be useful at the point of sources of possible gas vapors. Where low lying areas are not naturally ventilated vents should be situated to avoid higher than normal concentration. Hazards to be considered in confined spaces are:

- Limited access and exits
- Increased likelihood of gas accumulation through leaks
- Increased asphyxiation risk
- Fire and explosion hazard

To be considered as confined spaces are the inside rooms of a building, laboratory rooms, machine pits, culverts, basement trenches for piping. When working in confined spaces, it is advisable that operators and other personnel are fully aware of the hazards of oxygen deficiency and adopt the following practices:

- A fully documented permit to work system
- Personal and fixed oxygen analyzers
- Self-contained breathing apparatus available for use and all personnel fully trained in its use
- Personnel harnesses and ropes
- Operation of the "buddy system"
- A system of fresh air ventilation and fume extraction

In the case of permanent presence of personnel in a room where there are risks of oxygen depletion mixture, ventilation must be maintained with at least 30m³ per hour per person. The volume of air introduced per hour must not be less than twice the enclosed space in question. Ventilation should never be carried out with pure oxygen, but solely with air.

Testing of Oxygen or Gas Content

At present, various types of oxygen analyzers are available, which are often simple and reliable to operate. Such a monitor should at least have

- A readout of the actual gas concentration
- A settable alarm threshold value
- An alarm output with an acoustic and optical alarm connected
- An error output that shows malfunction of the monitor

Ideally the monitor should be placed so that it can be read inside, as well as from outside, the room which has gas present. The selection of the type of apparatus depends on the nature of the work in the place to be monitored (temperature, multiple detectors, portable equipment, etc). The picture below shows such a monitor for CO₂.



Testing the oxygen content is desirable, although attention must be drawn to the fact that an analyzer alone is not absolute protection. Such equipment can always malfunction, unexpectedly be out of adjustment or detectors can be improperly positioned. Testing of oxygen content should therefore only be considered as an aid to the detection of a lack of oxygen.

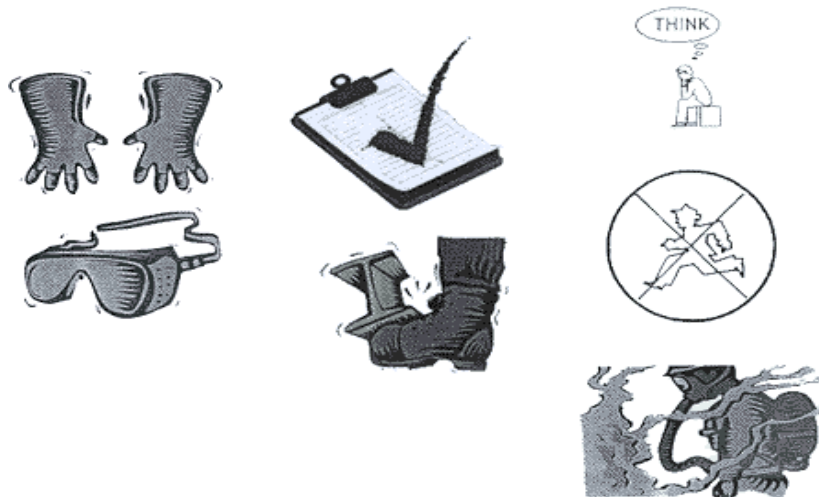
Work Permit

For certain types of work, safety instructions and a special work procedure must be set up in the form of a work permit

Personnel Protection

Depending on the type of work to be performed, and the layout of the premises, the decision to provide additional protection for personnel may be taken on the initiative of the person in charge. Such additional protection may involve:

- The use of notices warning against the presence of a hazard
- The placing of a person on watch outside the work area
- The use of personal atmosphere monitors
- The organization of an alarm system for rapid intervention in case of an emergency
- The wearing of a harness so that the worker can be easily and rapidly taken out of an enclosed space in the case of an emergency. Preferably this harness is connected to a hoist to facilitate removing the victim. It is very difficult for one man to lift up another in the absence of a hoist.
- The wearing of an autonomous breathing mask, to the exclusion of all cartridge masks, which are ineffective in a case of lack of oxygen.
- The wearing of protective goggles and gloves when handling liquid nitrogen to avoid burns
- The wearing of all other means of protection, such as safety shoes, helmet, etc., depending on the circumstances



Considering the hazards mentioned above, it is essential to provide all those who handle or use inert gases with all the information and training necessary regarding safety instructions, means of prevention and procedures to be followed to avoid accidents, as well as rescue procedures to be implemented in the event of an accident.

5.3.4 Backup Refrigeration installation

On installations preferably choose pressurized liquid gas storage cylinders rather than wall outlets. The use of cylinders will limit the amount of gas being spilled in case of fatal failure. Whenever a wall outlet installation is chosen, make sure that there is a remote shut off valve installed outside the room where the liquid is used.

Place the cylinder in an easily accessible and visible place next to the system. Remember that the cylinder will have to be replaced or refilled routinely. As the operator will have to check the cylinder routinely it should be clearly visible to all personnel during routine work.

The room should provide a glass door or a window that will allow a good view of the instrument and gas connection from outside the room. Often major defects can easily be detected by visible vapor clouds or icy tubes without the risk of entering a contaminated room. If this is not possible a oxygen level meter with a remote alarm needs to be installed creating a acoustic and optical alarm in case of low oxygen level.

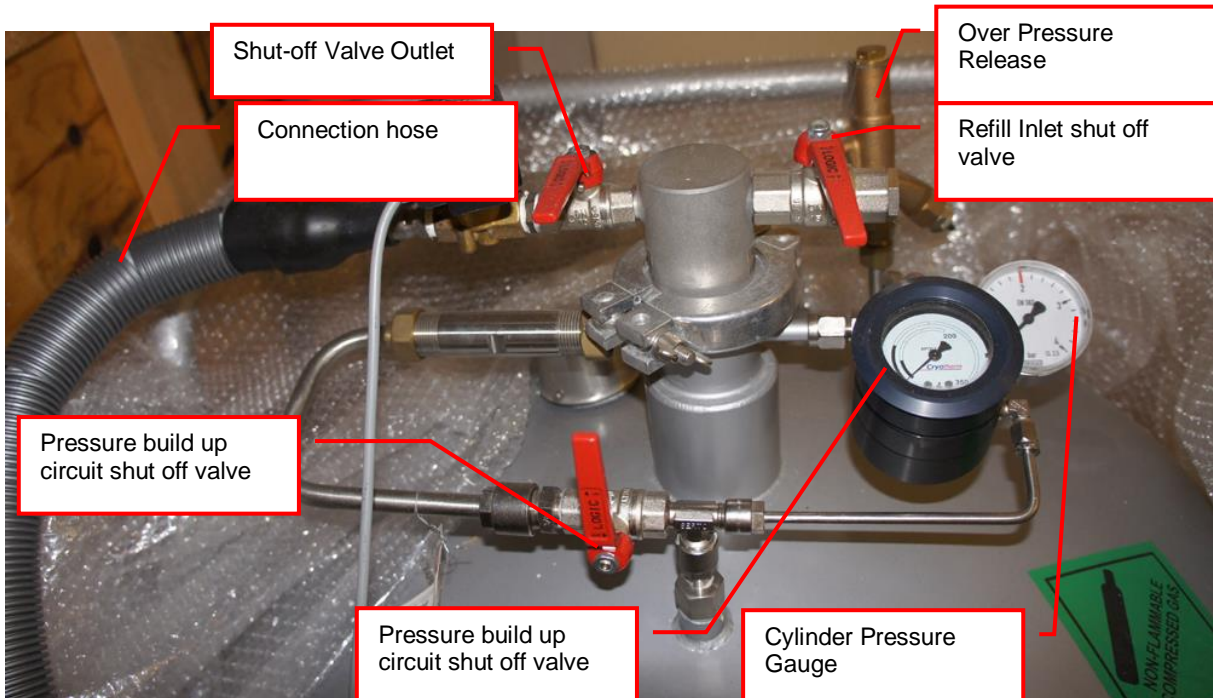
Before installation make sure that the maximum specified inlet pressure is never exceeded. Always install a main shut-off valve that will cut gas flow as close to the source as possible. Secure cylinder when in use.



WARNING!

- Never operate a damaged liquid gas cylinder
- Special pressure-reducing regulator may be required to operate a liquid gas backup.
- Never exceed maximum specified cylinder pressure
- Always ensure tight fit of all connections.

Supplied connection for liquid gas backup is a 1/2" SAE male (outside thread). For liquid gas cylinder such as Cryogenic cylinders, standard connection hose are available.



5.3.5 Specific Advice for LN2 Liquid Nitrogen

Properties of Nitrogen

Nitrogen is colorless, odorless and tasteless, as gas or liquid. It is nontoxic and non-flammable at atmospheric temperatures and pressures. A specific gravity of 0.9669 makes nitrogen slightly lighter than air. Nitrogen is mainly found in the atmosphere, where it accounts for 78.1% by volume of the air we breathe. It is stored in containers under its own vapor pressure.

Boiling Point @ 1 atm	-195.8°C (-320.4°F)
Freezing Point @ 1 atm	-209.9°C (-345.8°F)
Vapor Pressure @ 20°C	150 atm
Solubility in Water @ 0°C, 1 atm	2.3% vol.
Specific Gravity (air =1) @ 20°C, 1 atm	0.97

Health Hazard Data of Nitrogen

Nitrogen is inert and does not sustain life. Nitrogen is nontoxic, but may cause suffocation by displacing the oxygen in air.

Oxygen Concentration	Symptoms
21 - 14% (<19.5%) Oxygen	Increasing pulse rate, tiredness, dizziness, drowsiness, excess salivation, diminished mental alertness
14 - 11% Oxygen	Muscular coordination slightly disturbed, intellectual performance becomes difficult, breathing and pulse rate increased
11 – 8% Oxygen	Possibility of headaches, nausea and vomiting, collapse or loss of consciousness.
< 6% Oxygen:	Unconsciousness occurs without warning and so quickly that the individuals cannot help or protect themselves. Convulsive movements, possible respiratory collapse and death or brain damage

Spills of liquid Nitrogen have extremely cold temperatures of -196°C (-320°F) at atmospheric pressure. This can cause **severe frost bite**.



WARNING !

- Nitrogen may cause suffocation by displacing the oxygen in air. Ensure levels of *at least 19.5% Oxygen*
- Liquid Nitrogen has *extremely cold* temperatures of -196°C (-320°F)

Contact with liquid Nitrogen may cause skin frost burns and severe eye damages.

On vaporization Nitrogen expands by a factor of 700; one liter of liquid nitrogen becomes 0.7 cubic meter (24.6 cubic feet) of nitrogen gas. This can cause the **explosion** of a sealed container, or it can displace oxygen in the room and cause **suffocation without warning**. Nitrogen can also become oxygen enriched and cause ordinarily noncombustible materials to burn rapidly.

In case of an accident evacuate all personnel from the affected area. Persons suffering from lack of oxygen should be removed to fresh air. If victim is not breathing, use trained personnel to administer a supplemental oxygen supply and

artificial respiration to support vital functions. If breathing is difficult, administer oxygen. Victim and rescuers must seek immediate medical attention.

Ventilate area and attempt to shut off the release of gas by tightening the main valve. If it is not possible to stop the release of gas, allow the gas to be released there. If leaking from cylinder or its valve, contact your supplier. Monitor area for a minimum of 19.5% oxygen content before allowing re-entry by personnel.

In case of frostbite, restore tissue to normal body temperature, 37°C (98.6°F), followed by protection of the injured tissue from further damage and infection. Immediately place the frostbitten part in warm water (not to exceed 40°C) or wrap affected parts gently in blankets. Under no circumstances should the water be over 44°C (112°F), nor should the frozen part be rubbed either before or after re-warming. Remove or loosen clothing that may constrict blood circulation to the frozen area. In case of massive exposure, remove clothing while showering the area with warm water. Encourage victim to gently exercise the affected part while being warmed. Call a physician. The patient should neither smoke, nor drink alcohol.

5.3.6 Refill LN2 Liquid Nitrogen cylinder

Whenever working with liquid Nitrogen use of personal safety equipment is required. Thermal gloves and protective glasses have to be worn at least.

Refill interval of LN2 cylinder is depending on the required minimum backup time and the available LN2 cylinder volume. All cryogenic cylinder do have a certain leakage rate which will define the time after which the minimum filling level of the tank is reached. The filling level is shown by a gauge mounted next to the connection points on the cylinder. The actual design may vary depending on cylinder manufacturer.

Before disconnecting the connection, hose close the pressure builder valve, the shut off valve on the cylinder and the shut off valve on the connection point on the actual storage chamber. Use two suitable spanners to loosen the connection on the chamber (or on the cylinder depending on refill procedure). Usually the cylinder is then moved to a refill station and refilled with LN2. Depending on cylinder manufacturer the process may vary. Please refer to the manufacturers cylinder manual for further details.

To reconnect the cylinder with the system, proceed in the reverse way to the disconnecting procedure. Connect back the hose. Open the main shut off valve on the cylinder, open the shut off valve on the storage chamber and open the valve on the pressure builder. The pressure builder valve has to stay opened in order to ensure proper operation of the LN2 backup option.



WARNING!

- Wear personnel protection when disconnecting, refilling and reconnecting LN2 cylinder.
- Ensure the shut off valves are closed when disconnecting the cylinder.
- Refer to cylinder manufacture manual for exact refill procedure



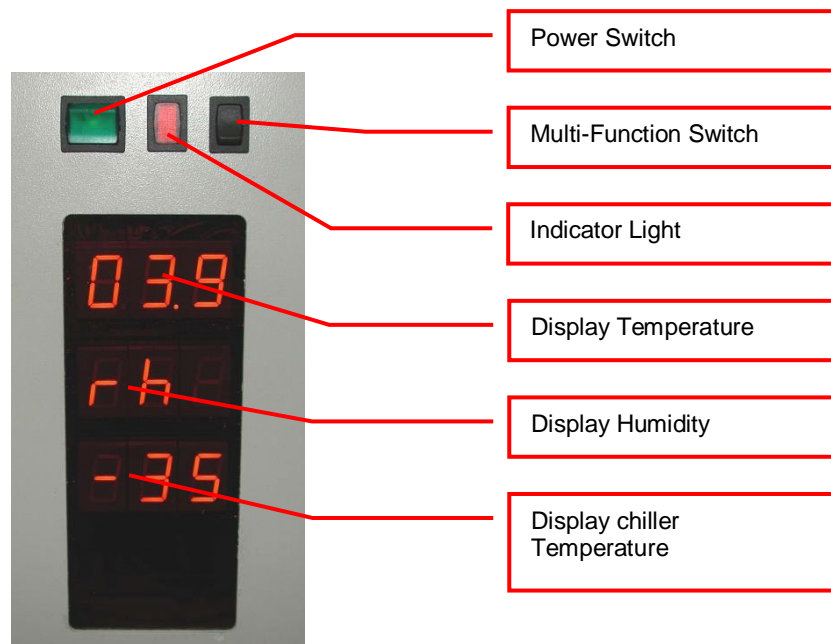
CAUTION !

- Shut off valve of pressure builder has to stay open as long as the cylinder is connected to the storage.

6. Manual Operation

6.1 Power-On STT

The instruments power is activated by the main switch. The instrument is turned on by pressing the power switch located at the front of the instrument. After power-on the climate portion of the instrument is activated automatically. An alarm will sound. If the green light of the power switch does not turn on, check the main switch at the back of the instrument or the fuse in the mains supply.



The alarm indicates that the handling is not activated. In order to activate the handling, the black multi-function switch has to be pressed. The multi-function switch will cause the handling to initialize. Take note the gate - if opened- is closed after pressing the multi-function switch. Pressing the multi-function switch is equal to sending an external activate command through the software.

It is normal for some condensation to occur during start-up. This condensation will disappear once the internal climate is stabilized. The settling time may take several hours.

The temperature inside the climate chamber is displayed on the temperature display. The temperature display may not be used to set temperature. The operating temperature can only be set through the communication port.

Toggle Switch	Multi-Function	Function	Description
Toggle (< 1sec) (after power on)		Initialize	Unit initializes
Toggle (< 1sec) (Unit initialized)		Carousel turns one position further	Carousel turns to the next cassette position. (STT1k0 only)
Hold	(Unit initialized)	Carousel turns	Carousel turns till switch is released (STT1k0 only)
Hold in case of Alert (10sec)		Acknowledge Alert	Check system for cause of Alert

6.2 Climate Settings

6.2.1 Temperature Settings

System Temperature is pre-set. Temperature should only be changed by a qualified system administrator or LiCONiC engineer.

6.2.2 Humidity Settings

Humidity is kept as low as possible and is not adjustable.

6.3 The Robot Gate

The robot gate is located on the side of the Interface unit or on the user side of the unit. Through the robot gate the storage samples are transported by the handler. The robot gate has the same sealing system as the front door. Because of the frequent accessing through the gate, special care must be taken with the sealing performance of the gate.

The gate may make spontaneous movements. External commands, manual interaction and internal protection time-out functions may cause the gate to close. Special care must be taken that the gate cannot be accessed during operation.



WARNING!

- Remote Accesses have priority over manual accesses
- No remote access should be initiated during a manual access

The Gate movement is speed and force controlled. However, the high demands on the sealing capability of the gate require certain minimum forces, therefore there is a risk of injury. Never put hands into the gate opening when the instrument is active.



WARNING!

- The gate cannot be opened manually. Do not apply force to the gate.



6.4 Routine Safety Checks

Carefully read all safety instructions before operating the instrument. Be sure that you fully understand their content. Although the KIWI STORE is intended to be operated as a remote-controlled system, there still are some manual interactions required for operation. Apart from these operations there are also some very important safety checks the operator should be familiar with.

The operator should regularly read the display readings and check whether they match the desired values. Readings like “0.00” or “9.99”, readings that are far out, instable or that differ over long periods of time could indicate a malfunction of the instrument or could be caused by faulty settings of the system.

The electrical cables should be routinely inspected for wear, defects or contusion. There should be no mechanical tension on any cable. Broken connectors should be replaced immediately. All electrical installations should be kept clean and well protected from water and humidity.

The same applies to cables and gas tubing. They should be free of mechanical tension and should show no signs of wear or contusion. Sharp bends should be avoided under all circumstances. All fittings should be secured. Missing security nuts must be reinstalled immediately. Any broken pneumatics parts must also be replaced immediately.

The mechanical appearance of the instrument should be clean and “straight”. All movements should be smooth and precise. Watch out for unusual noises as these may indicate misalignments or mechanical wear.

Seals should close the chamber firmly. Check seals by placing a piece of paper between the seal and door. When trying to pull on the paper, there should be an even resistance. Check the seal on the glass door, gate and front door.

Condensation, mainly on the front glass door, presents a possible severe danger as it may lead to water flowing into the electrical parts of the instrument. When cooling, excessive condensation on the glass door will occur when the front door is open over a long period of time. Furthermore, it may also indicate a faulty heater or high environmental humidity.

Icing on a gassing tube or on a pressurized gas cylinder indicates excessive gas flow and therefore severe danger. Once icing has been observed leave the room immediately and call for help. Do not try to locate the source of the problem or try to fix it. The room may already be contaminated.



WARNING!

- Icing on the gas cylinder or other parts of the gassing system indicate excessive gas flow.
- In the case of such icing leave the room immediately and call for help
- Do not try to locate the source of the problem or try to fix it

6.5 Cassettes

Cassettes allow simple and comfortable loading and unloading of storage samples and can be prepared outside the climate chamber. Once prepared, the samples can be quickly transferred into the climate chamber of the Kiwi unit.

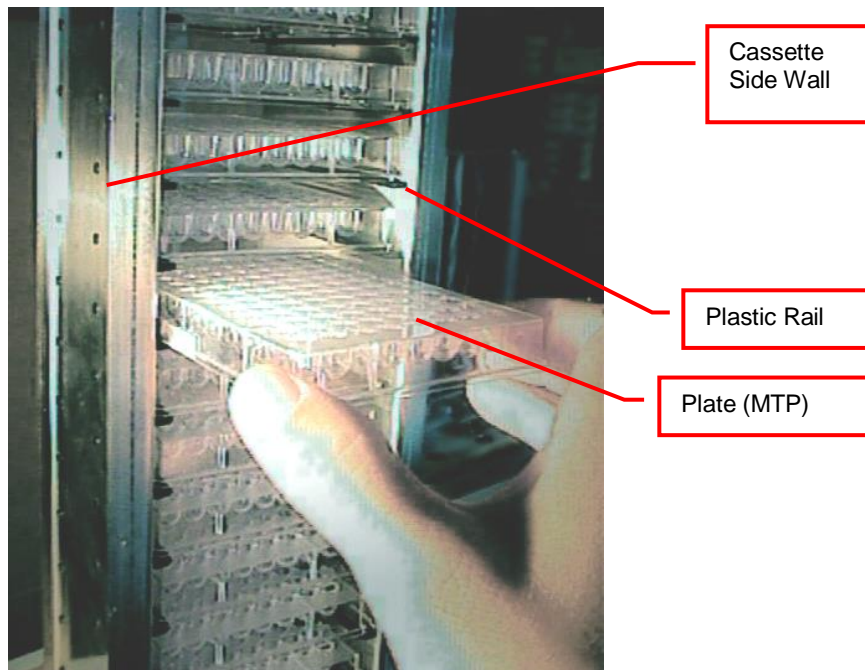
There is a wide variety of cassette types available. Make sure that you work with the proper cassette size that matches the type of plates you are using.



CAUTION!

- Do not add, bend or remove support rails.
- If cassettes with different pitch height are used within the same system, make sure a prior removed cassette is put back in exactly the same position. Failures being generated like that, will in destinations not found or crashes.
- Only a trained System Integrator may alter the instrument configuration and reset the lift accordingly.

The cassettes are open at their front for loading.

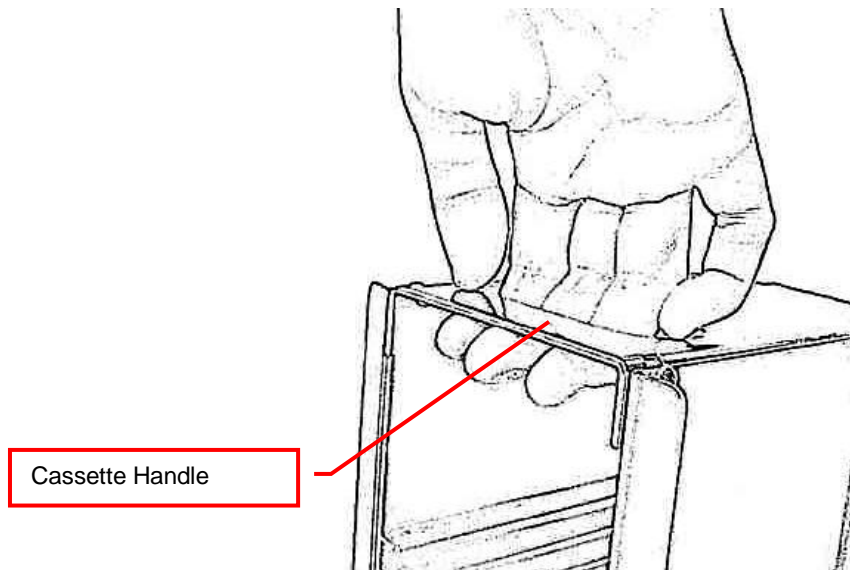


To put a plate into the cassette, choose the level and slide the plate along the rails towards the back of the cassette. Slightly lift the front of the plate to avoid excessive wear of the retaining nozzles at the front end of the rails. When the plates are loaded make sure that they are all pushed towards the back of the cassette. Plates that jut out may cause collision with the handler and may result in damage to the handler.

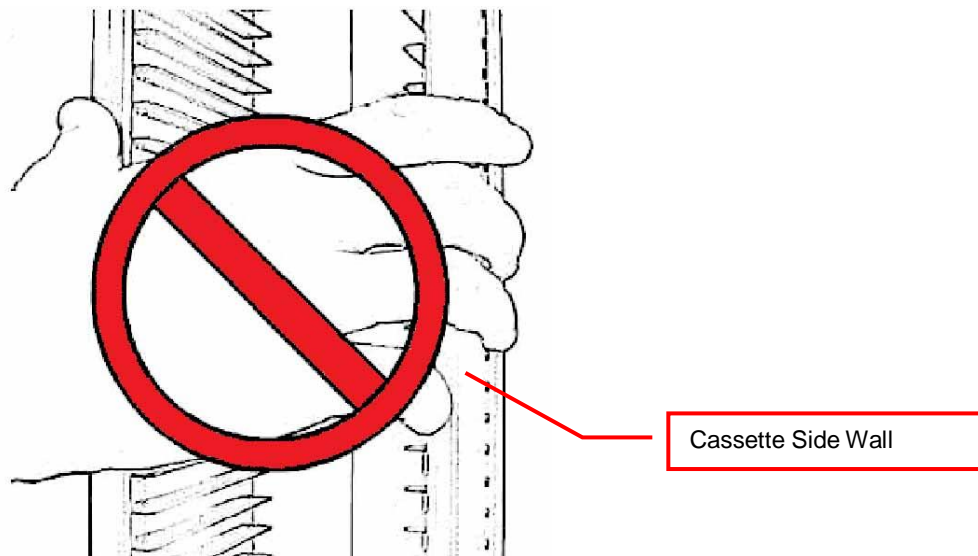
Cassettes must be treated with great care. They are aligned within 1mm when leaving the factory. Misaligned cassettes must be returned for re-alignment. Misaligned, tilted or bent cassettes may cause handling failures. Special care must be taken when cassettes are fully loaded with plates.

The carousel must be kept clean as particles may cause the cassette to tilt. Do not place cassettes on the floor as they may pick-up dust etc. Always store cassettes inside the climate chamber or on clean surfaces.

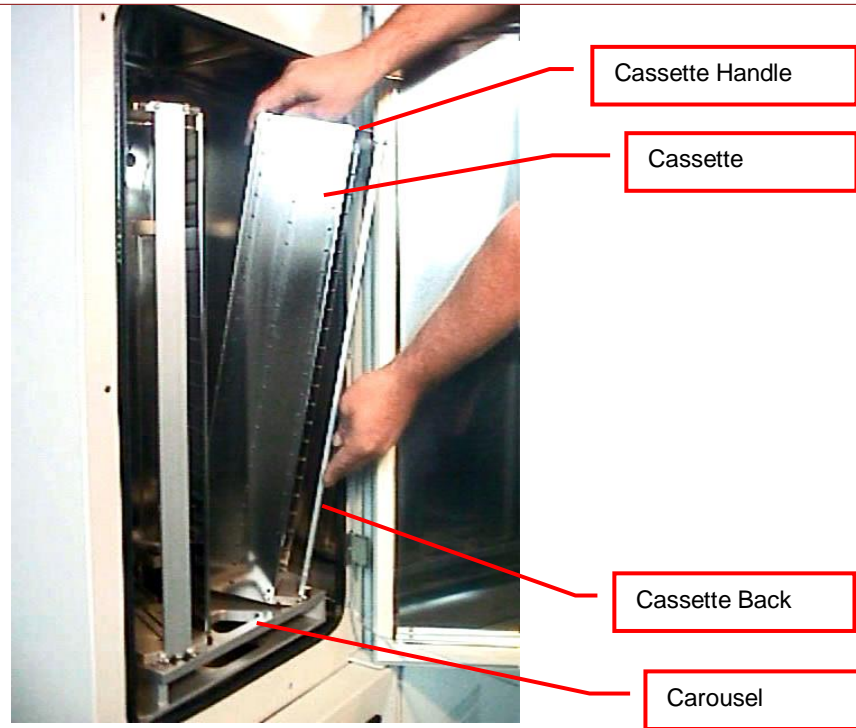
Use the cassette handle for transport of the cassettes. When lifting the cassette by its handle it will tilt backward slightly in order to prevent plates from shifting to the front.



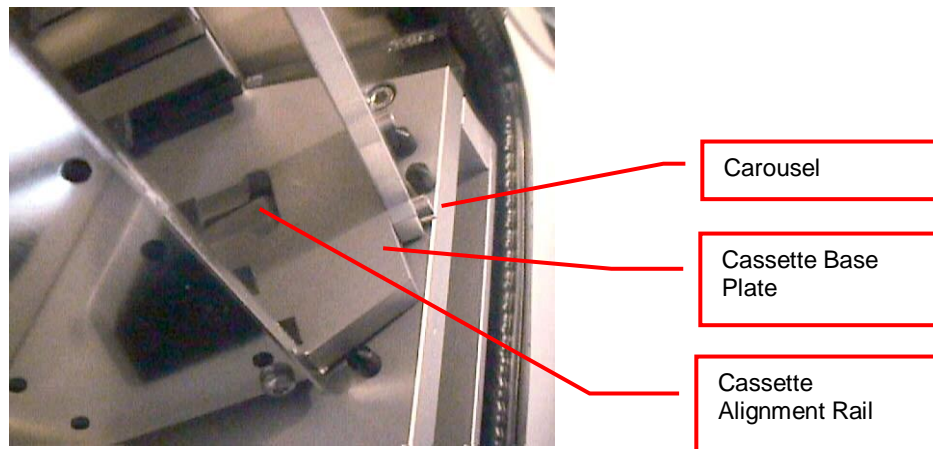
Never apply force to the cassettes. Do not drop a cassette as mechanical shock will misalign it. Never lift a cassette by its side walls. This may bend the side walls of the cassette. Bent side walls cause the plates to block when being loaded or unloaded.



In the rare event of a blockage with the extended shovel in the cassette, the shovel must be carefully pushed backwards until it can move freely. Then the cassette can be removed.



The cassettes are secured by alignment rails to the carousel. The cassettes may be tilted slightly backwards (towards the front opening) for removal. In order to load a cassette align the back of the stacker base plate to the cassette alignment rail. Push the cassette forward until it stands vertically. The cassette should now stand firmly on the cassette plate. There should be no movement.



To remove a cassette pull the stacker handle slightly backwards, tilting it, then lift the cassette until it loosens from the cassette alignment rail. Use both hands for this operation. Never use force.



CAUTION !

- Make sure that ALL plates are pushed to the back of the cassette. Plates jutting out the front side of the cassette may cause collision with the handler shovel.
- Lift cassettes by their cassette handles only
- Do not drop cassettes. Misaligned cassettes can cause handling errors
- Do not autoclave cassettes with plastic rails. Use disinfecting solution for sterilization. All stainless steel cassettes may be autoclaved.
- Keep cassette plate clean. Particles may tilt cassettes

6.6 Barcode Reader

6.6.1 1D Reader for racks and plates

The Barcode reader for plate/rack identification is mounted onto the handling mechanism.

The Barcodes must be placed on the shorter side of the plates and must face towards the open side of the cassette. The barcodes should be parallel to the plate's lower edge. The barcode label should be centered both vertically and horizontally. On higher plates (e.g. deep well plates) place the barcode further down. Preferably barcode labels should be at the same height independent of the plate height. Barcode reading reliability is improved when the barcode is not covered by the plate's lid.



WARNING!

- Laser Class 2. Laser light - do not look into the beam.



DANGER!

- May be harmful to your eyes.

Use barcode testing device to verify barcode quality. Quality Class A, B or C are required. Identification of Class D is not guaranteed. For sufficient print quality use barcodes printed by thermal transfer or photographic methods. The barcode label surface should be mat and clean. Do not use yellowed, dirty or damaged barcodes

6.6.2 2D Rack Scanner / Reader

The 2D Scanner / Reader for tube identification is located in the interface unit.

The 2D codes must be placed on the bottom of the tube. The 2D reader operates either on a scanner or camera-based principle. If a camera is used it requires lighting by short flashes to take pictures. These flashes may be a potential trigger for people with photosensitive epilepsy.



WARNING!

- A few people may experience epileptic seizures when viewing flashing lights or patterns. Avoid watching the 2D code reading for longer time.

Use barcode testing device to verify barcode quality. The code label surface should to be mat and clean. Do not use dirty or damaged barcodes.

7. Sample Management Software

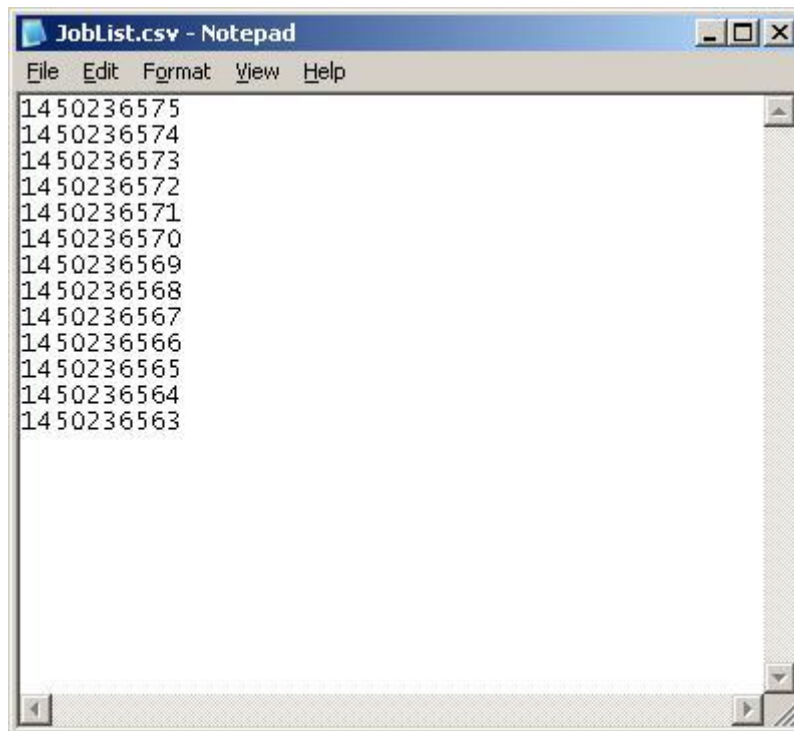
7.1 Order File

The order file is used to retrieve specific samples from the storage system. Two types of order files can be used to execute order jobs. The first type is the simple order file containing only 1D or 2D codes or ID's of tubes/racks to be retrieved. The second type is more complex, allowing more functionality. Refer to the following chapter for a detailed description of the files.

In an integrated environment such as a connection to a LIMS system the pick orders are sent through a direct connection to the Liconic System. These files are only used in a stand alone configuration.

7.1.1 Simple order file

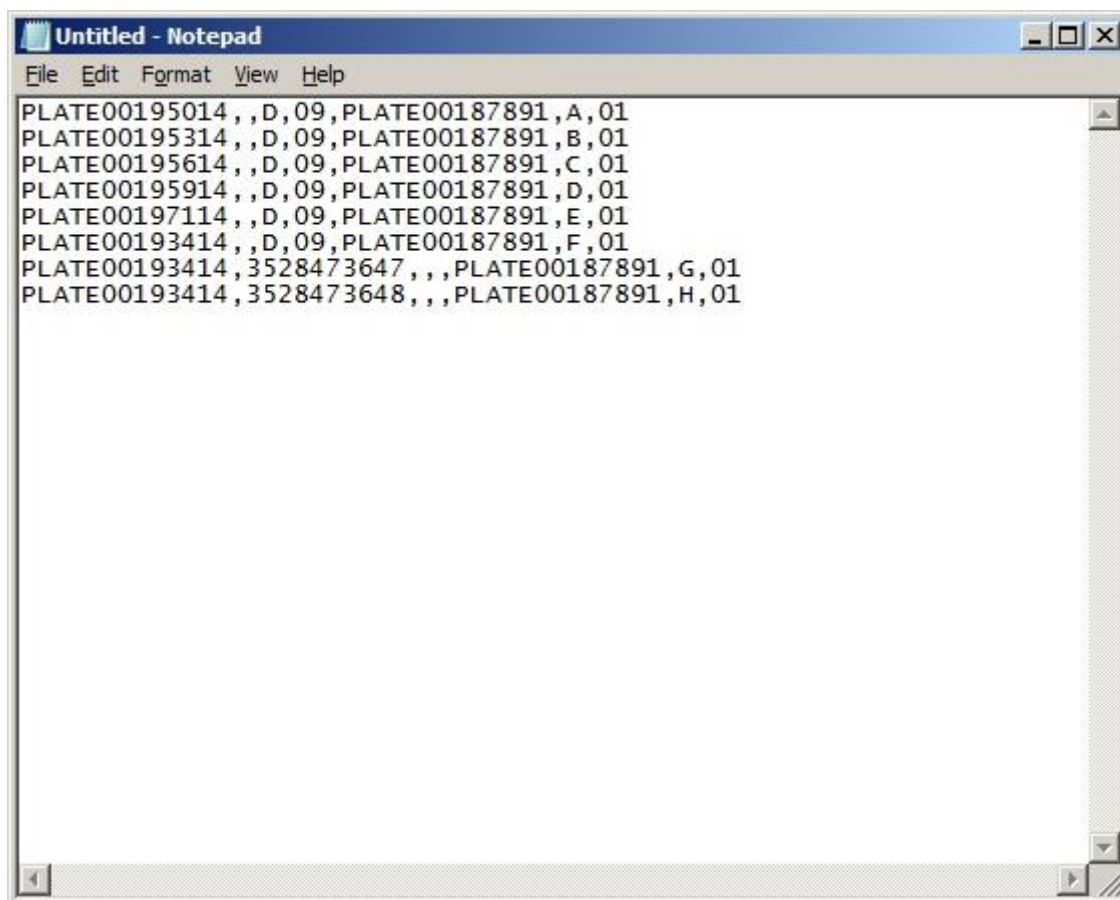
In case of the simple order file, the file is a simple list of 1D barcodes for plate orders only. For tube orders 2D barcodes/Sample ID's, or a mixture of both can be used. These files can be passed onto the system as CSV (Comma Separated Values) file. They can be populated manually by a user or exported from MS Excel© or a database. Picture 1 below shows an example of a simple order file for tube picking.



Picture 1: Sample order file

7.1.2 Complex order file

In case of the complex order file, the file consists of a parameter list. This file can be passed onto the system as a CSV (Comma Separated Values) file. The file can be populated manually by a user or exported from Excel© or a database too. Picture 2 below shows an example of a complex order file.



Picture 2: Complex order file

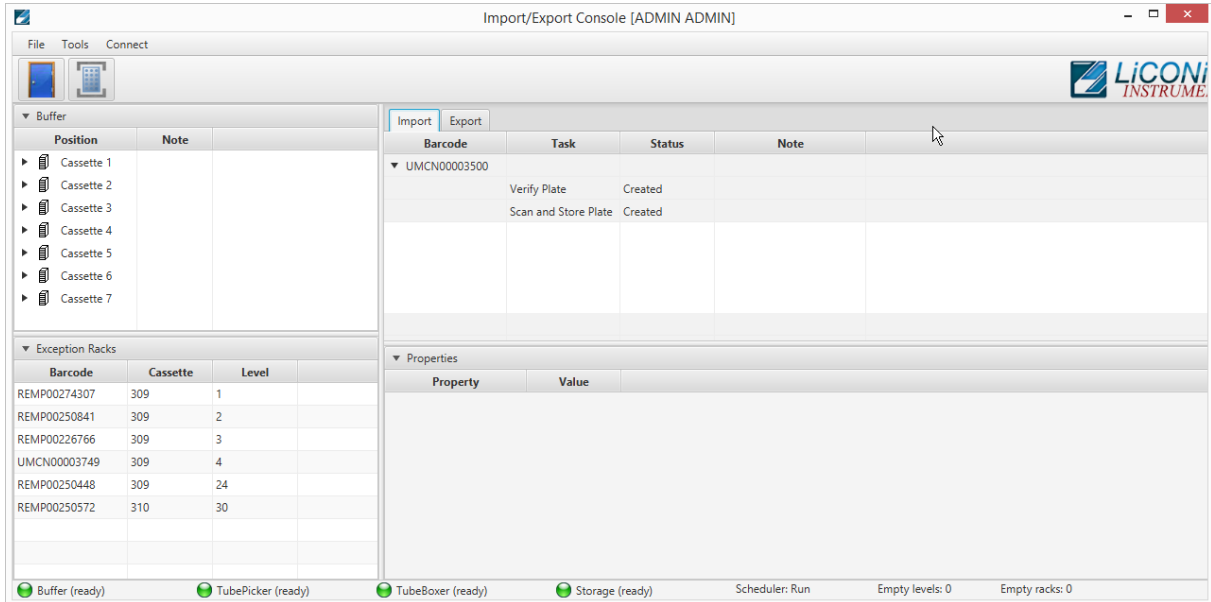
A parameter line consists of the following items:

- Barcode(1D) or explicit name of the source rack,
- 2D Code(2D) or explicit name of the tube to be picked,
- Row of the picked tube on the source rack, (e.g.: A-H)
- Column of the picked tube on the source rack, (e.g.: 1-12)
- Barcode(1D), explicit name or generic name ([Rack_1],[...]) of the target rack,
- Row of the picked tube on the target rack, (e.g.: A-H)
- Column of the picked tube on the target rack (e.g.: 1-12)

7.2 Import – Export Interface

The Liconic Import and Export interface is used to create and execute operations with the result to load samples to the system or unload them from the system. In stand-alone configuration this can be used to introduce samples to the system, start pick orders and unload samples from the system.

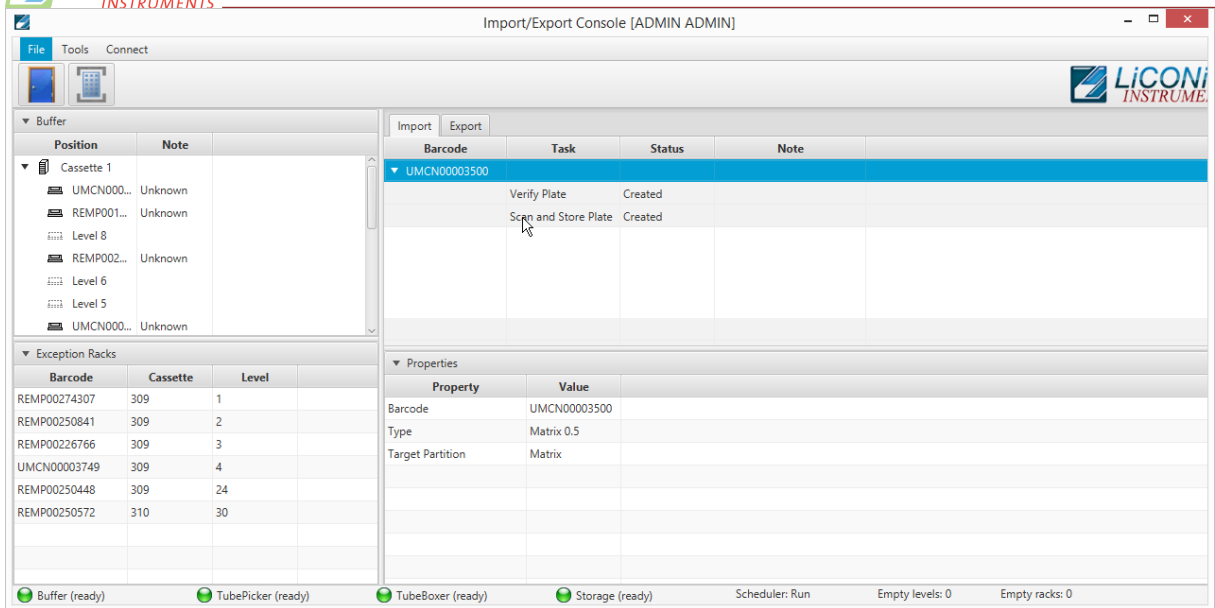
In combination with a LIMS system this interface will be used to trigger loading or unloading operations. The actual creation of the jobs is done by the LIMS and handed over to the Liconic System.



Picture 3: Overview Import - Export Interface

7.2.1 Import

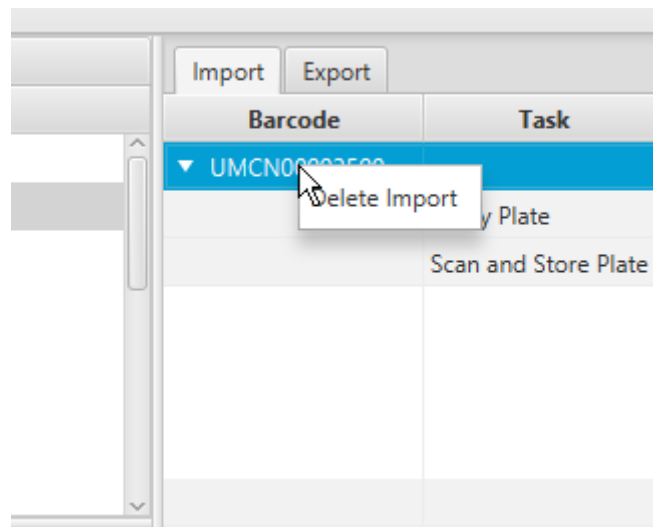
The import view provides an overview of all registered jobs for loading plates into the system. One import job can consist of several tasks. The application allows to create import jobs with tasks. A listing of the possible tasks is provided at the chapter Create Import.



Picture 4: Import View with Rack details

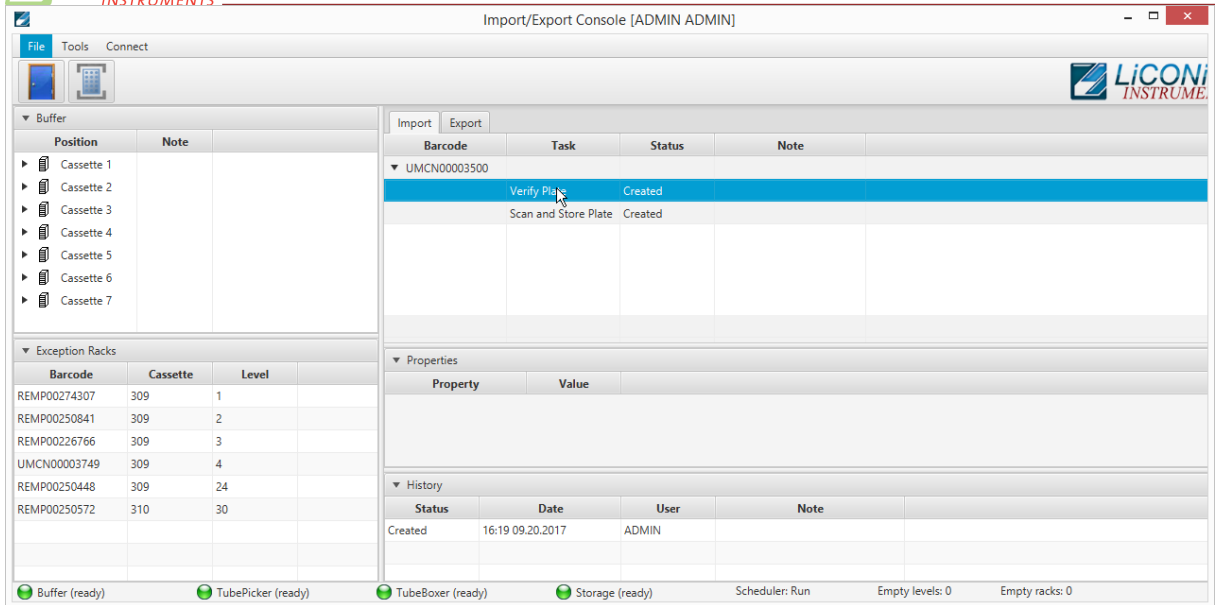
Selecting the import job, provides a detailed view of additional information in the “Properties” view (See Picture 4: Import View with Rack details). Information such as barcode, lab ware type and target storage partition are displayed.

By right clicking on the import job it is possible to delete a created job. The job will then be removed from the queue and all associated information will be cleared off the system.



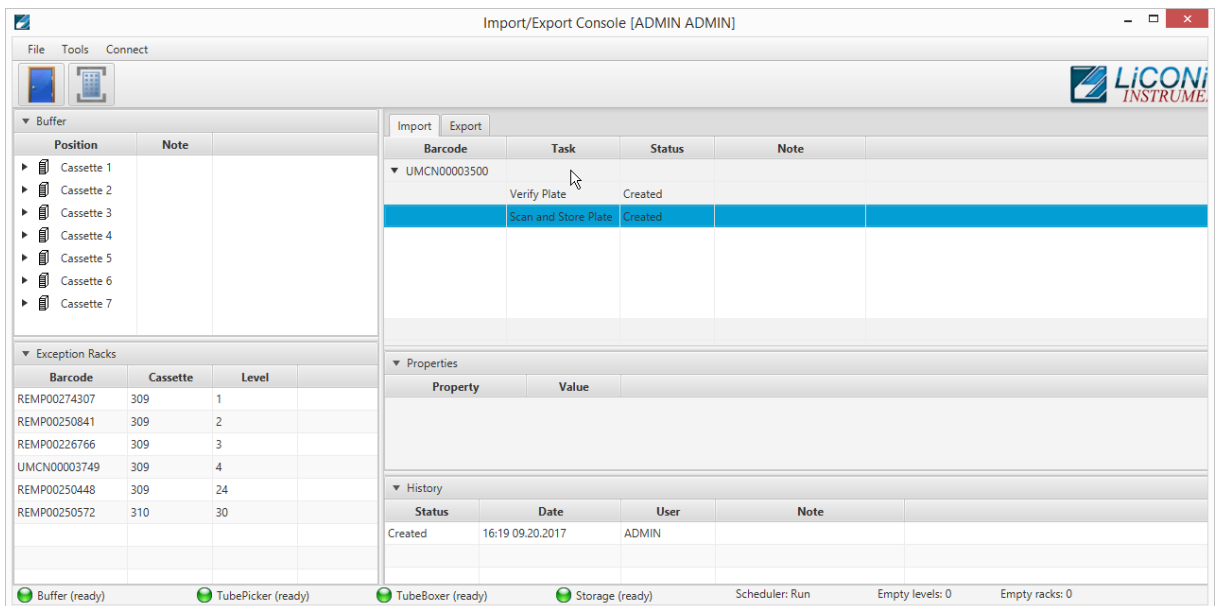
Picture 5: Deleting a created Import Job

A already started job cannot be deleted directly as operations had already been started and put in to pending state. Import jobs can be deleted in “Created” and “Stopped” state.



Picture 6: Detail Information on Task 1

By selecting an individual task of an import job additional information and properties are shown. The shown information depends on the current state each task is in.

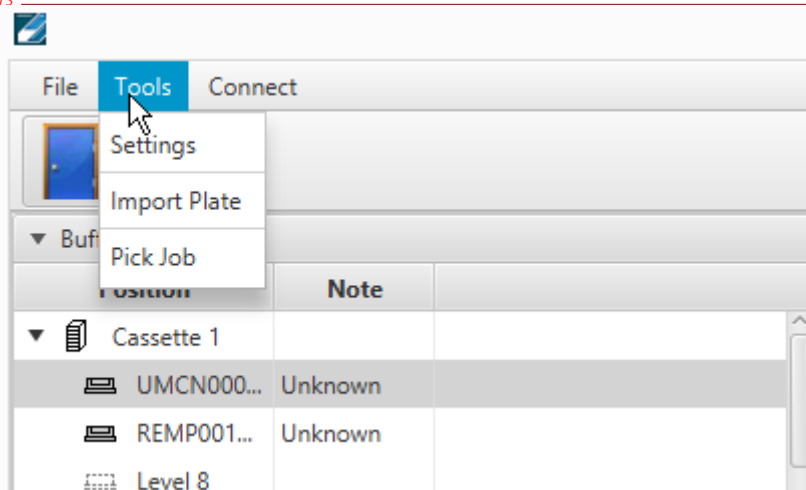


Picture 7: Detail Information on Task 1

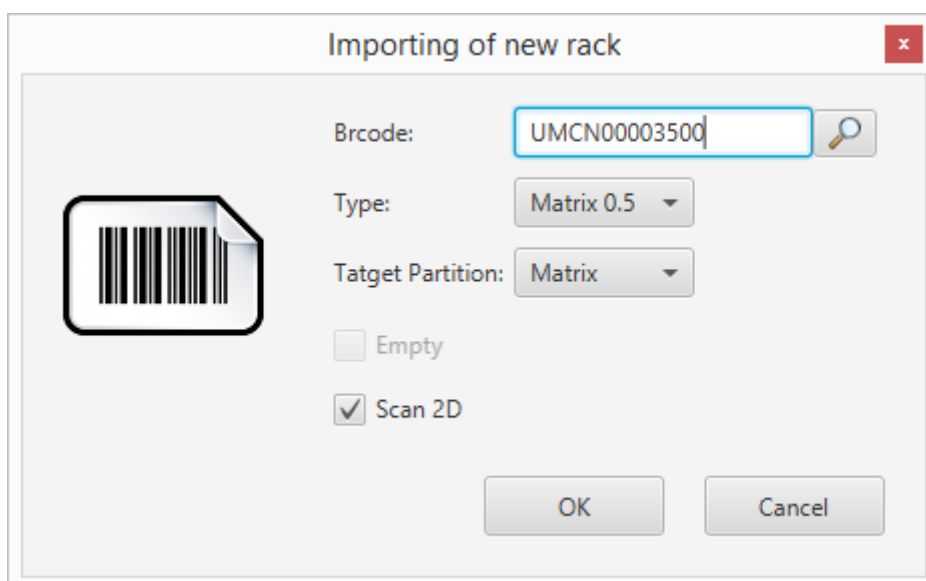
In the “History” section of each task the history of selected task is shown. Information such as which user did trigger which state of the task and the associated date to the status change.

Create Import

The Import – Export Interface does allow to create import jobs. To do so the menu entry “Tools” is selected and in there the entry “Import Plate” is selected. This will call a dialogue to enter details and select the properties for the import.



Picture 8: Tools Menu Import



Picture 9: Import Plate Dialogue

The import dialogue will require to enter a barcode of the plate going to be loaded to the system. This is required for the system to recognize the plate and associate the given information to it.

By clicking onto the “Magnifier Glass” icon the windows file open dialogue is opened. This will allow to search for a content file on the computer or drives connected to this computer.

The “Type” menu allows the selection of the lab ware type. The menu will only provide the lab ware types the system is configured for. The lab ware type can not be changed once the plate has been introduced into the system. If the lab ware type has be set wrongly the import has to be deleted and created newly. If the palate has already been entered into the system, the plate has to be removed and newly imported.

Selecting “Target Partition” does allow to define the final storage location of a plate. The partitions correspond to the configuration of the system.

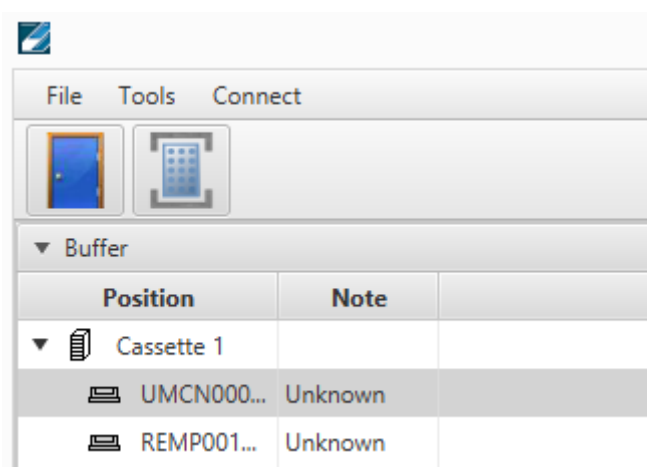
Chose the check box “Empty” if a plate containing no tubes is going to be loaded to the system. Empty plates may be used as target in case of a pick order.

Chose the check box “Scan 2D” to include a 2D scanning step in the import. Should there be content provided for the plate, the scan step will compare the provided content with the physical present content. In case of a discrepancy the plate will be stored in a suitable safe area. Further details in the chapter Exception Racks.

Pressing “OK” will create the import job. The job is now listed in the import queue list. Pressing “Cancel” will close the dialogue and no further action is triggered.

Trigger Import

To trigger an import either the door icon or the transfer station icon has to be pressed. The door icon will show a dialogue and guide through the steps of loading samples through the user door into the buffer cassettes.



Picture 10: Icons to trigger Import

The dialogue will tell when you need to open the user door. After closing the door the system will perform an inventory of the buffer. All known plates with an import job will be treated according to the selected options.

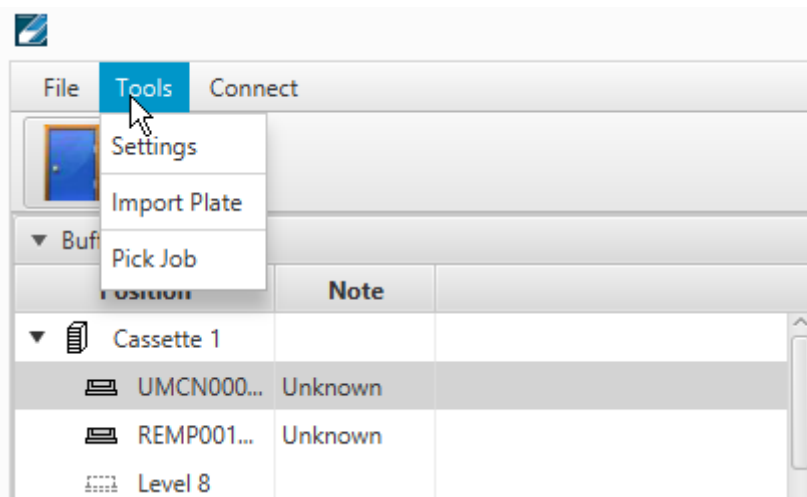
Prior to selecting the transfer station icon a plate needs to be set to the transfer station. As soon as the icon is clicked the system moves the transfer station into the unit. The barcode is checked and the plate moved into the unit if the barcode is known. The plate will be processed as selected. Should there be a unknown barcode or the barcode not be readable the system will refuse the plate and send it back out. The software will show an error message in this case.

7.2.2 Export

The export view provides an overview of all registered jobs for collecting individual samples and plates to be unloaded. One export job can consist of several tasks. The application allows to create export jobs.

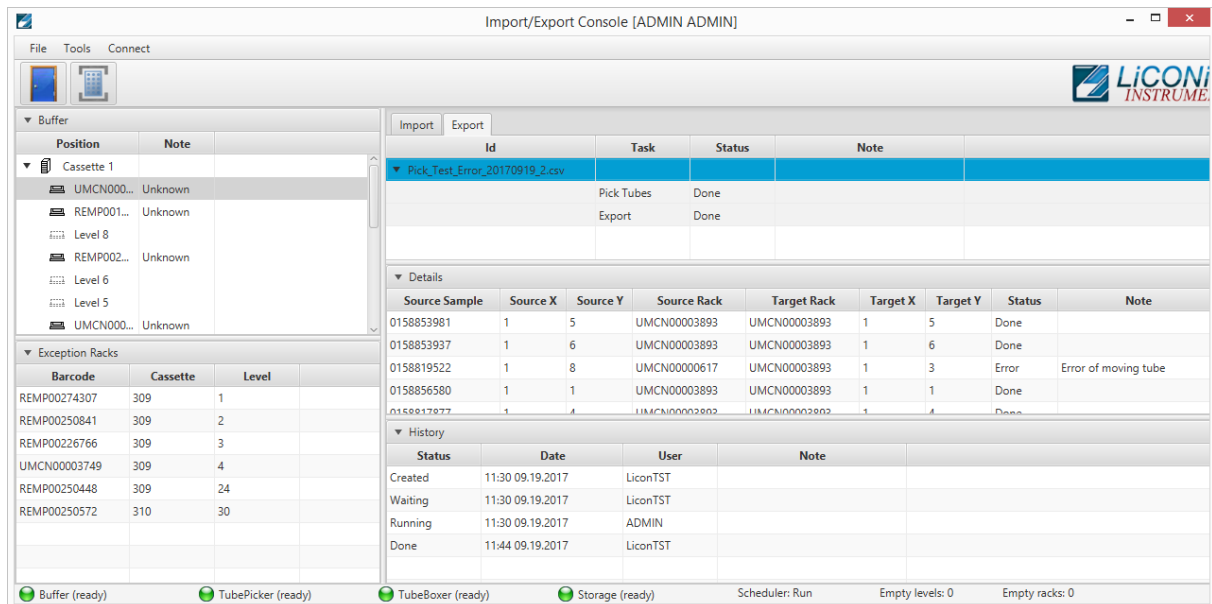
Create Export

Selecting in the Tools menu the entry “Pick Job” will open up the Windows file dialogue. A pick file can be selected. After opening the file the export task is listed in the Export queue



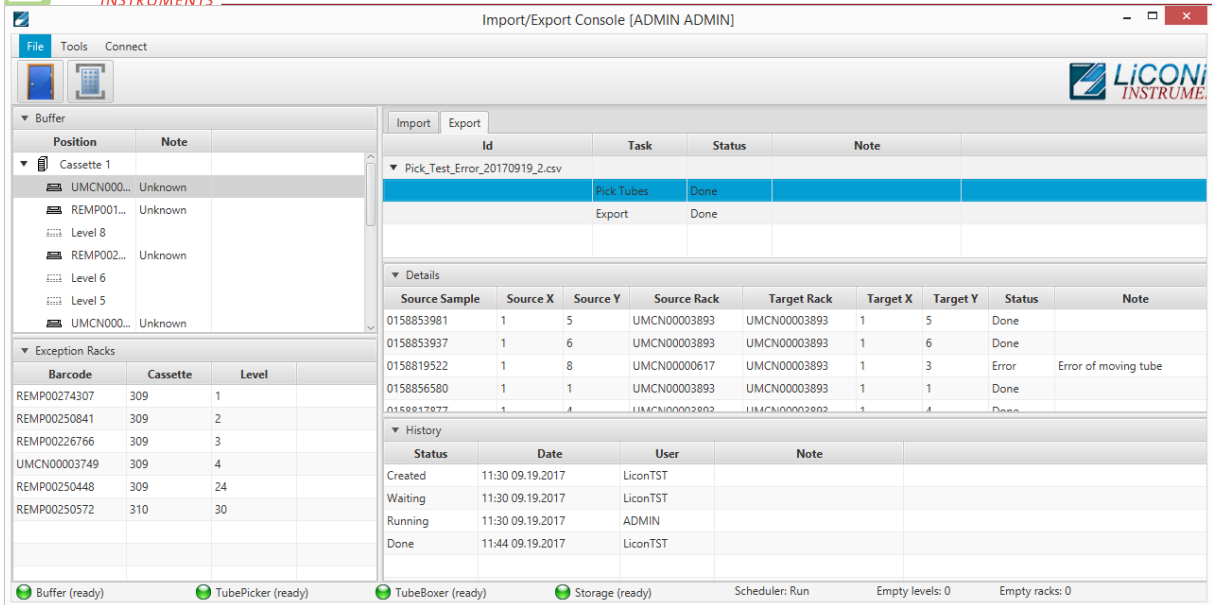
Picture 11: Tools menu Pick Job

Export Interface



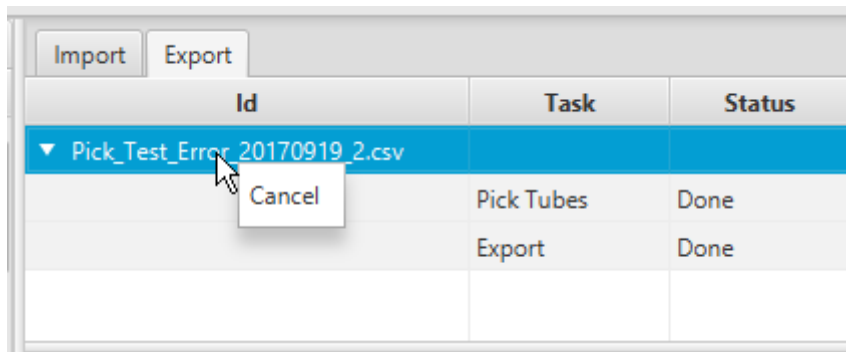
Picture 12: Import - Export Interface Export-View

Selecting one export job will provide additional detail information in the “Details” view. In case of a sample pick order the list of samples is provided. In the “History” view the status of the job and the status changes, who triggered the changes and when they were changed are listed.



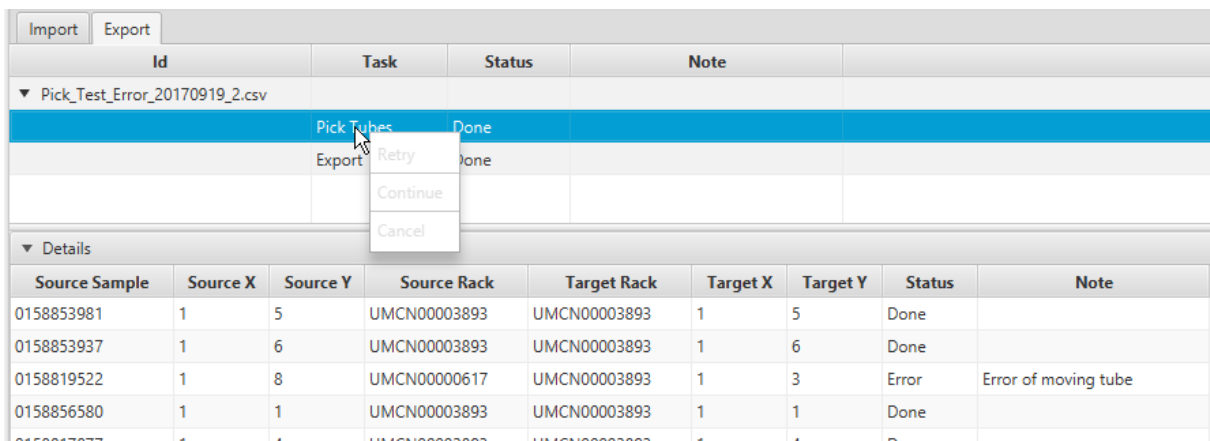
Picture 13: Export Task Detail 1

If the actual pick task is selected the detail view varies according the state the pick task is in. In the created state only the list of tubes is shown. During the running state tubes vanish according them to be moved within the progress of the pick task. In the done state all tubes are listed with their target position and the status.



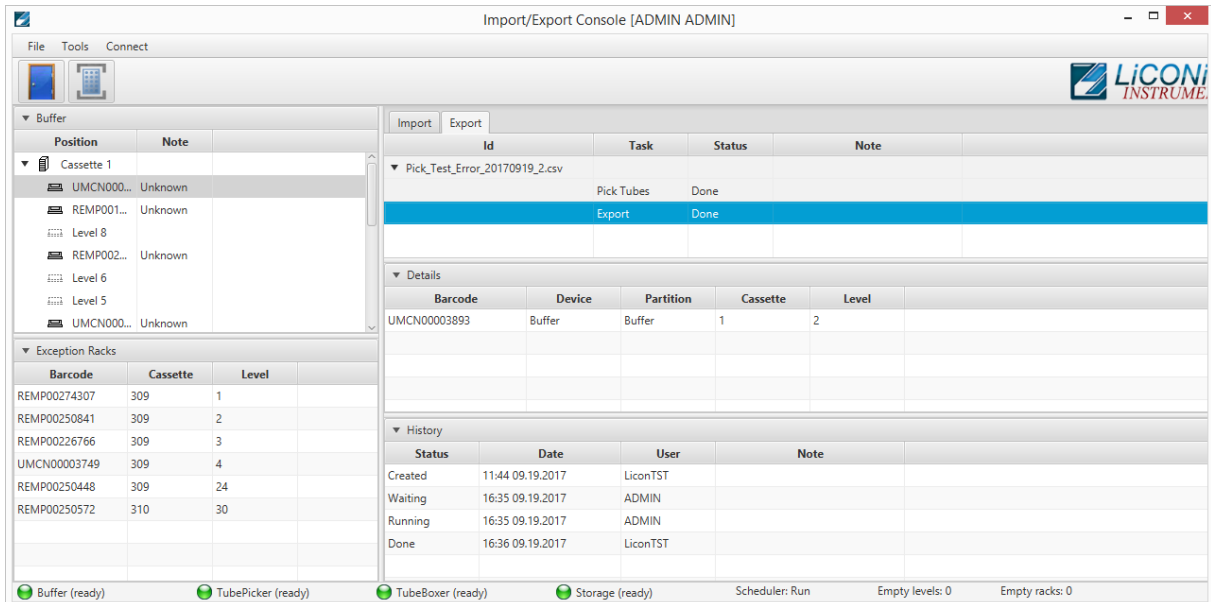
Picture 14: Cancel a export job

A complete job can be canceled in the states created and done. In the case of canceling the job in the created state the job will be removed from the queue and no samples will be moved. Is the job canceled in the done state the already collected samples will stay in the target plate they had been moved to.



Picture 15: Pick Task Management

By right clicking onto the pick task the context menu is provided. This menu is active in the states created, running and error. The “Retry” and the “Continue” functions are solely used in the error status. Is the error state caused by a hardware error this needs to be resolved in order to continue operating the system. “Retry” would allow to perform a second attempt of moving the sample causing the error. “Continue” does skip the error sample and jumps to the next sample in line. “Cancel” allows to cancel the pick order.



Picture 16: Export Task Detail 2

Selecting the “Export” task of the export job, provides at the details view the list of plates associated with the export job.

Trigger Unload

There are two ways to trigger an unload of a plate from the system through the Import – Export Interface. The first is the most direct and will provide the plate immediately onto the transfer station.

Selecting the export task and right click on one of the racks shown in the details view will provide a context menu. Select the item “Export Rack to Xfer” the plate will be unloaded from the system directly to the transfer station.

Import		Export	
Id	Task	Status	Note
▼ Pick_Test_Error_20170919_2.csv	Pick Tubes	Done	
	Export	Done	

▼ Details				
Barcode	Device	Partition	Cassette	Level
UMCN00003893	Buffer	Buffer	1	2

Picture 17: Unload plate from system

The second possibility requires to select in the context menu the item “Export Rack to Buffer” the plate will be moved into the buffer area inside the interface unit. To remove the rack the door icon in the interface has to be clicked. Follow the dialogues. When the door is closed again the unit will perform an inventory. The plate will be removed from the system if she is not found anymore inside the buffer during the inventory.

7.2.3 Exception Plates

If the system has detected a deviation in the 2D codes read during the scanning step and the content provided at the time of import creation, the plates will be sent to the safe area. In this case the plates will also show up in the Exception Racks section of the Import – Export interface. These racks can be unloaded with a right click for further investigation and correction if needed.

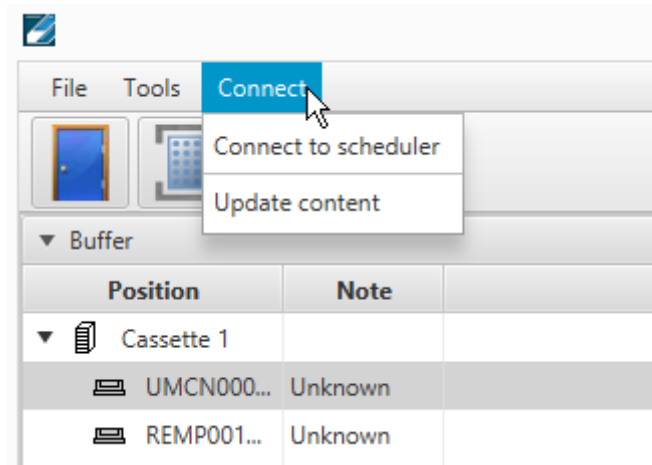
▼ Exception Racks			
Barcode	Cassette	Level	
REMP00274307	309	1	
REMP002508	309	2	
REMP00226766	309	3	
UMCN00003749	309	4	
REMP00250448	309	24	
REMP00250572	310	30	

Picture 18: Exception Racks

The plate is transferred directly to the transfer station if “Export” is selected.

7.2.4 Connections

In the connection menu the connection to the scheduler can be reestablished. Also the “Update content” can manually be triggered. This function is used if an expected entry in the Import or Export view is not present. Update content will recheck in the database if there are new entries not yet visualized.

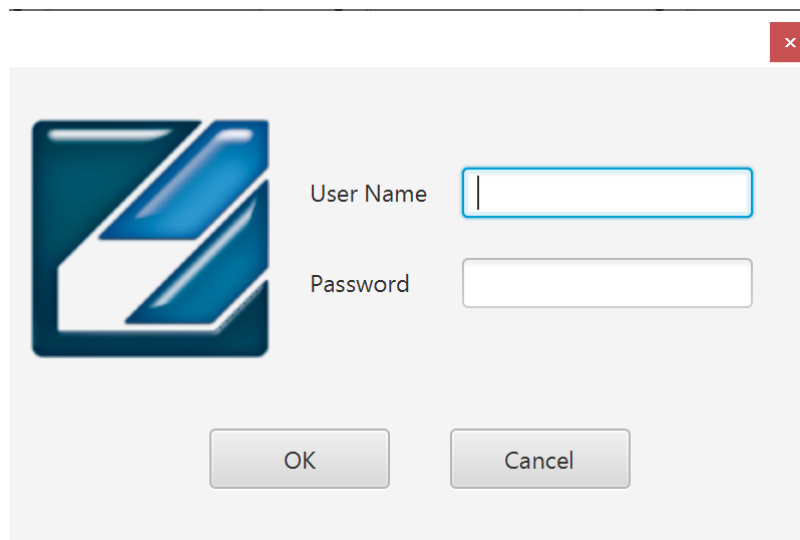


Picture 19: Connection Menu

7.3 PlateExplorer

The PlateExplorer is the more sophisticated administrative access possibility to the Storage system. It allows to manage the system and use some functions manually. The functions accessible may vary according to user permissions. Administrator users have the least restrictions.

The PlateExplorer is a network-based application and can run therefore on a remote computer over the network. Before using the application every user has to log on. (Picture 20)



Picture 20: The PlateExplorer's login window

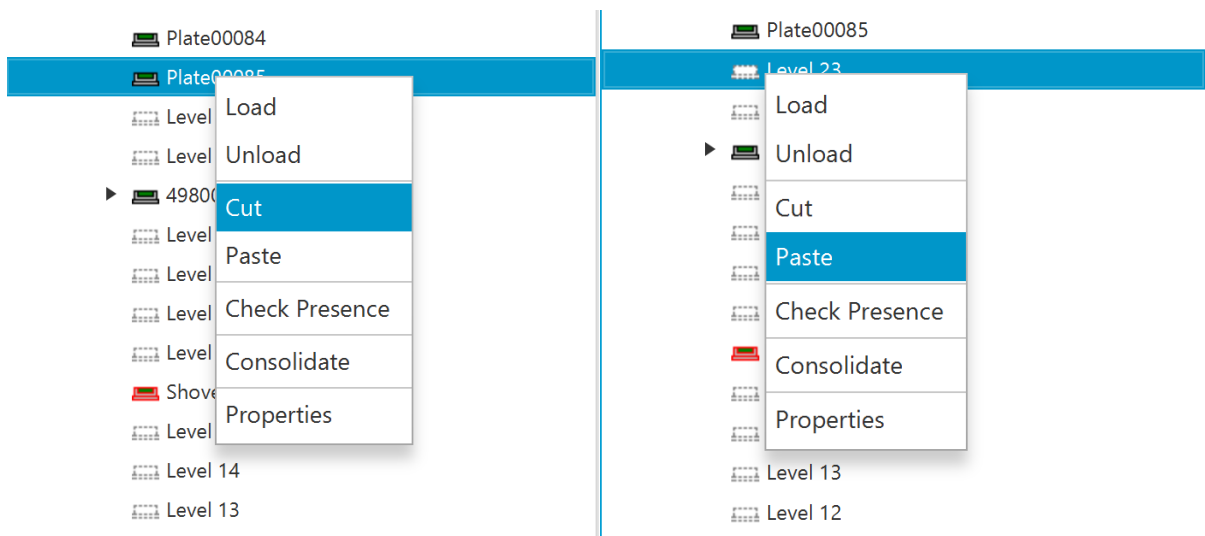
7.3.1 General Functionalities

In this chapter the functionality accessible to the administrator and the normal user are described. There is only one difference between user and administrator. Whilst the user has only access to the assigned area, the administrator has access to the full store. Therefore the difference will not be mentioned in this part of the manual anymore.

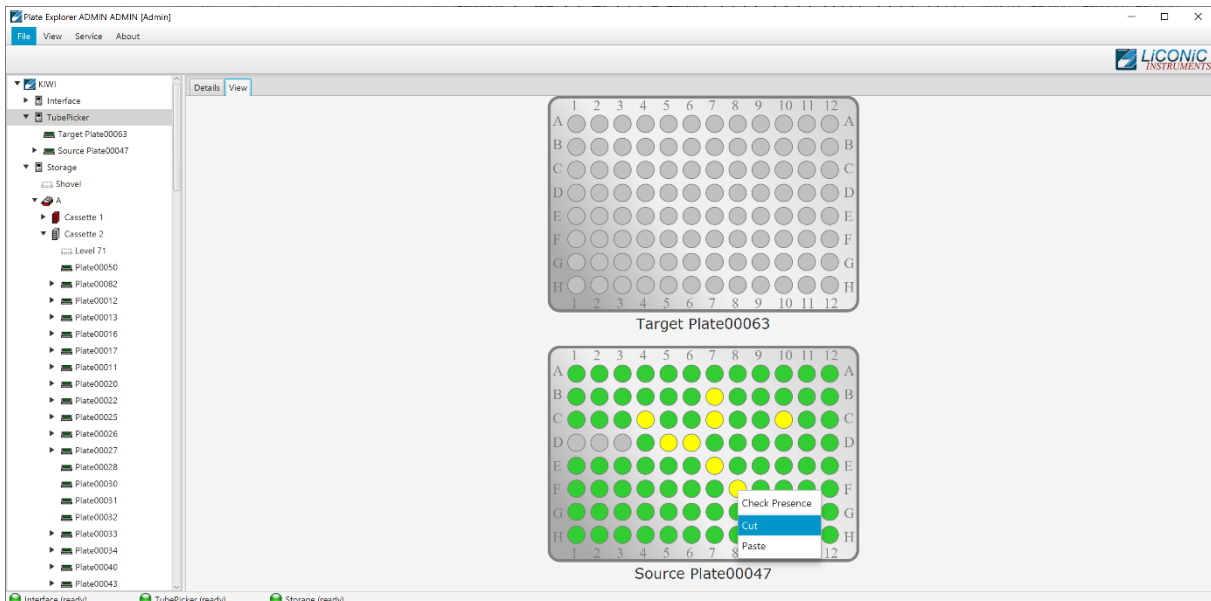
Cut&Paste

Cut and paste is used to move manually plates between all the available positions. Some positions do not offer the possibility to paste a plate to as this functionality is limited. Also, tubes may be used with the cut and past functionality but this is only available when plates are present on the tube picker.

To move multiple plates or tubes hold the CTRL button pressed and select the plates to be moved. On the picker the same is possible with tubes, also on the picker a rubber band selection may be used to select multiple tubes.



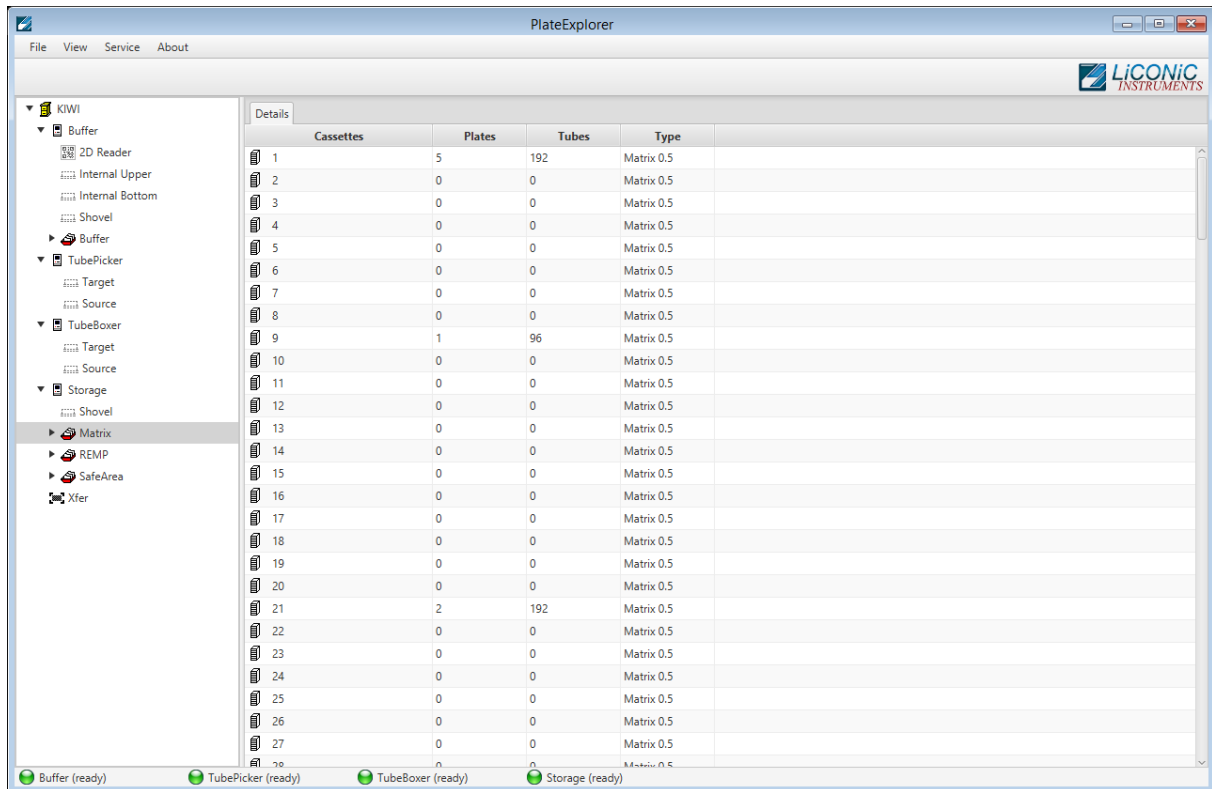
Picture 21: Cut&Paste a plate



Picture 22: Cut&Paste tubes

7.3.2 Layout of the PlateExplorer

The main window of the PlateExplorer is subdivided into the Menu bar, the contents tree on the left and the detailed information view on the right (see Picture 23).

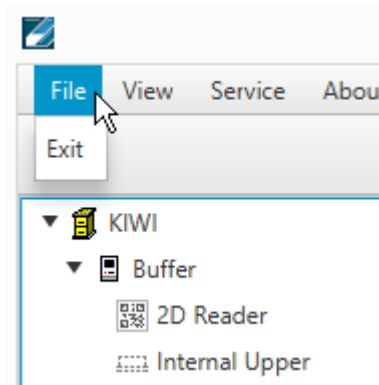


Picture 23: Main screen of the PlateExplorer

The Menu Bar

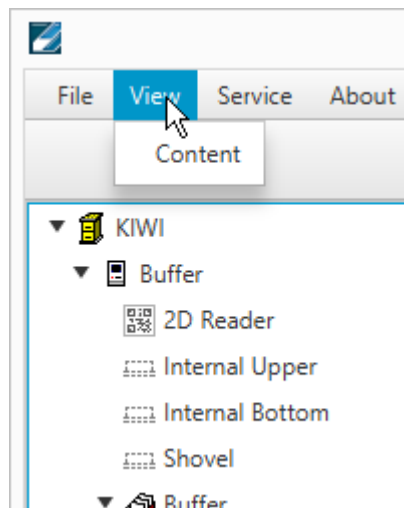
The menu bar of the PlateExplorer covers four main entries.

The “File”-menu item offers the user to “Exit” the program.



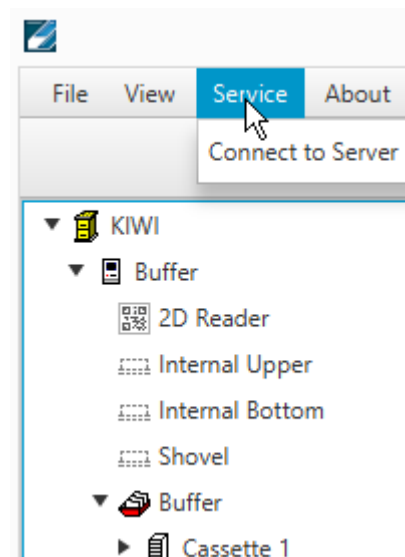
Picture 24: File Menu Entry

The “View” options enable the user to define the way to look at the items being displayed in the PlateExplorer’s Detail View on the right.



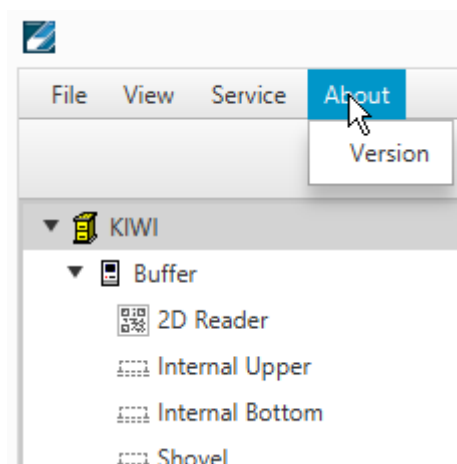
Picture 25: View Menu Entry (to be checked)

The “Service” allows access to the Service functions. Currently it contains only the entry to reestablish the connection to the server.



Picture 26: Service Menu Entry (to be checked)





The “About” window will show information on the running PlateExplorer software.



Picture 27: About Menu Entry

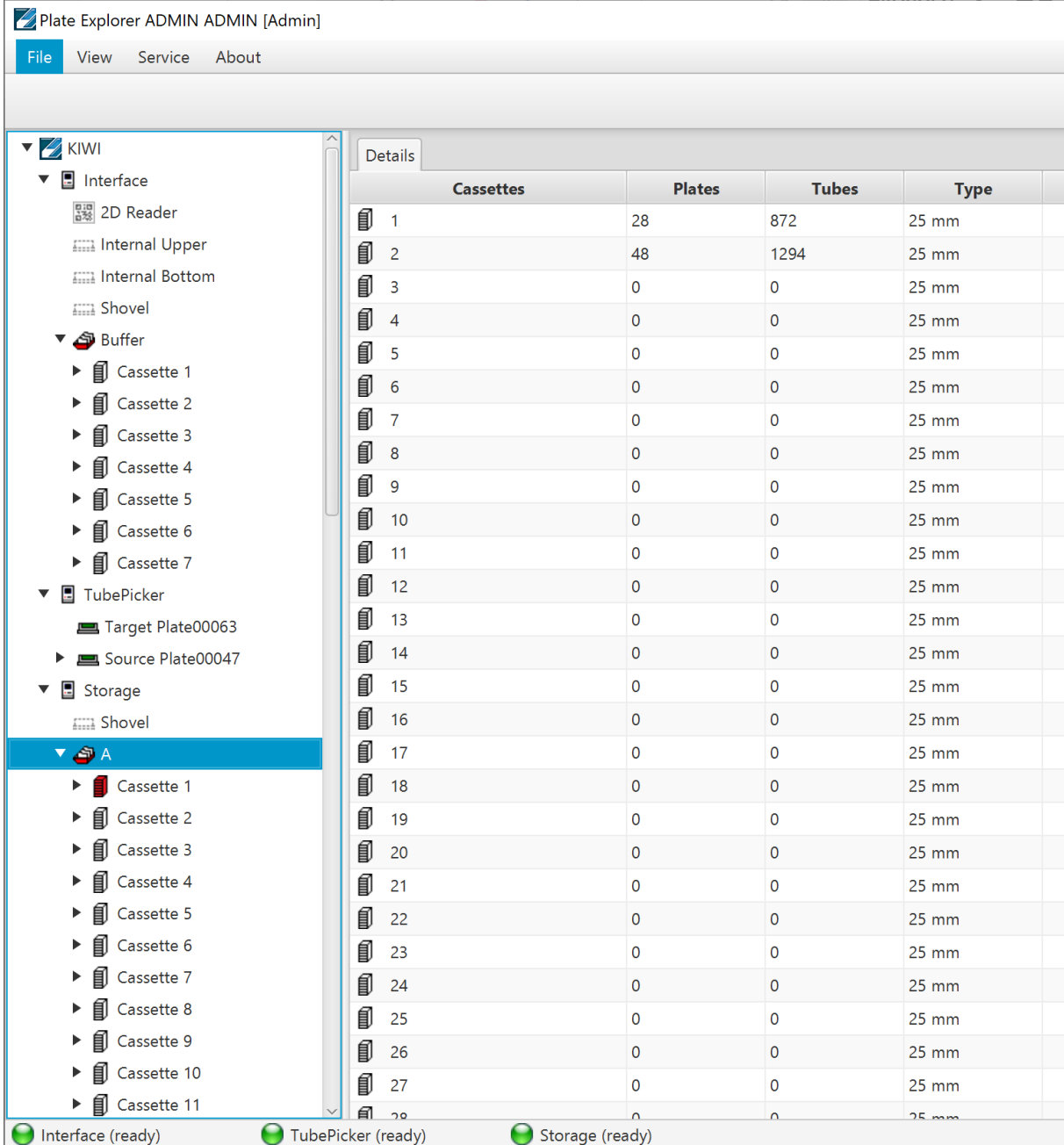
Tree View

The tree view is located on the left side of the PlateExplorer window. All accessible positions plates are held are represented in the tree view. Transfer positions such as internal upper and bottom position, 2D Reader, Tube handling source/target and cassette positions can be accessed. Some positions only allow cut from it and not paste to them.

Icon	Meaning
▶  4980000002054	Known Plate type with read barcode (arrow indicates content in plate)
▶  Plate00062	Known Plate type not yet read barcode or not readable barcode
 099/000012	Unknown plate type with read barcode
 Plate 304	Unknown plate type with not yet read barcode or unreadable barcode

Picture 28: Rack symbols in the Tree View

The tree view represents the physical devices and positions present in the system. This may slightly vary depending on the system configuration.



Picture 29: Tree View Overview

The Detail Information Screen

The detail information screen on the right of the PlateExplorer shows the user all properties of the item selected within the tree view on the left. Its functionality can mostly be accessed with the help of the right-click action menus. The Partition management will be described in the corresponding chapter of this manual.

PlateExplorer

File View Service About

LiCONiC INSTRUMENTS

▼ KIWI

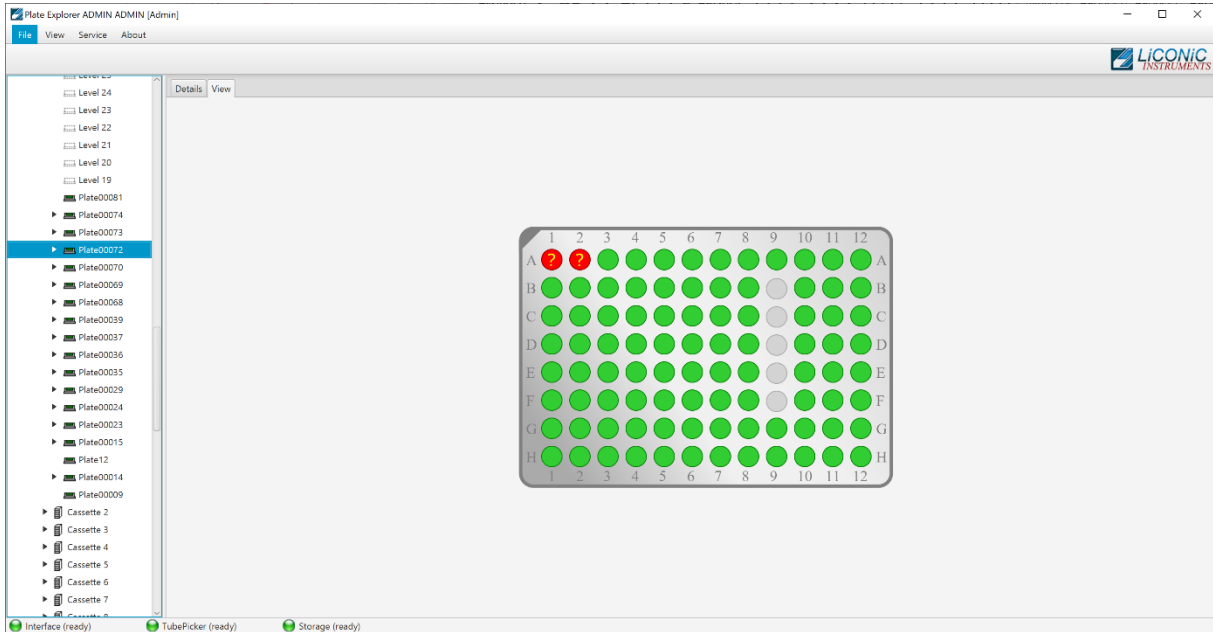
- ▼ Buffer
 - ▼ 2D Reader
 - REMP00191689
 - Internal Upper
 - Internal Bottom
 - Shovel
 - Buffer
 - Cassette 1
 - UMCN00000605
 - Level 9
 - Level 8
 - Level 7
 - Level 6
 - Level 5
 - UMCN0000068
 - Level 3
 - UMCN00003893
 - REMP00227035
 - Cassette 2
 - Cassette 3
 - Cassette 4
 - Cassette 5
 - Cassette 6
 - Cassette 7
 - ▼ TubePicker
 - Target
 - Source
 - ▼ TubeBoxer
 - Target
 - Source

| Tubes | X | Y |
|------------|---|---|
| 0158834098 | 1 | B |
| 0158834424 | 1 | C |
| 0158859457 | 1 | D |
| 0158819750 | 1 | E |
| 0158835063 | 1 | F |
| 0158856123 | 1 | G |
| 0158819985 | 1 | H |
| 0158833500 | 2 | A |
| 0158833867 | 2 | B |
| 0158819992 | 2 | C |
| 0158859782 | 2 | D |
| 0158821149 | 2 | E |
| 0158834352 | 2 | F |
| 0158820175 | 2 | G |
| 0158834145 | 2 | H |
| 0158835333 | 3 | A |
| 0158819095 | 3 | B |
| 0158831662 | 3 | C |
| 0158856597 | 3 | D |
| 0158820007 | 3 | E |
| 0158870375 | 3 | F |
| 0158818061 | 3 | G |
| 0158821244 | 3 | H |
| 0158819475 | 4 | A |
| 0158818589 | 4 | B |
| 0158834058 | 4 | C |
| 0158833468 | 4 | D |
| 0158834133 | 4 | E |
| 0158834133 | 4 | F |
| 0158834133 | 4 | G |
| 0158834133 | 4 | H |

Buffer (ready) TubePicker (ready) TubeBoxer (ready) Storage (ready)

Picture 30: Plate Explorer Detail View

Alternative to the detail view a location view can be selected. It is only available on plate level. A visualization of the plate with its physical positions is presented. The positions are represented as grey if they are empty or as green if a tube is present. A red position with a question mark indicates a tube present with an unreadable 2D code.



Picture 31: Plate Explorer Location View

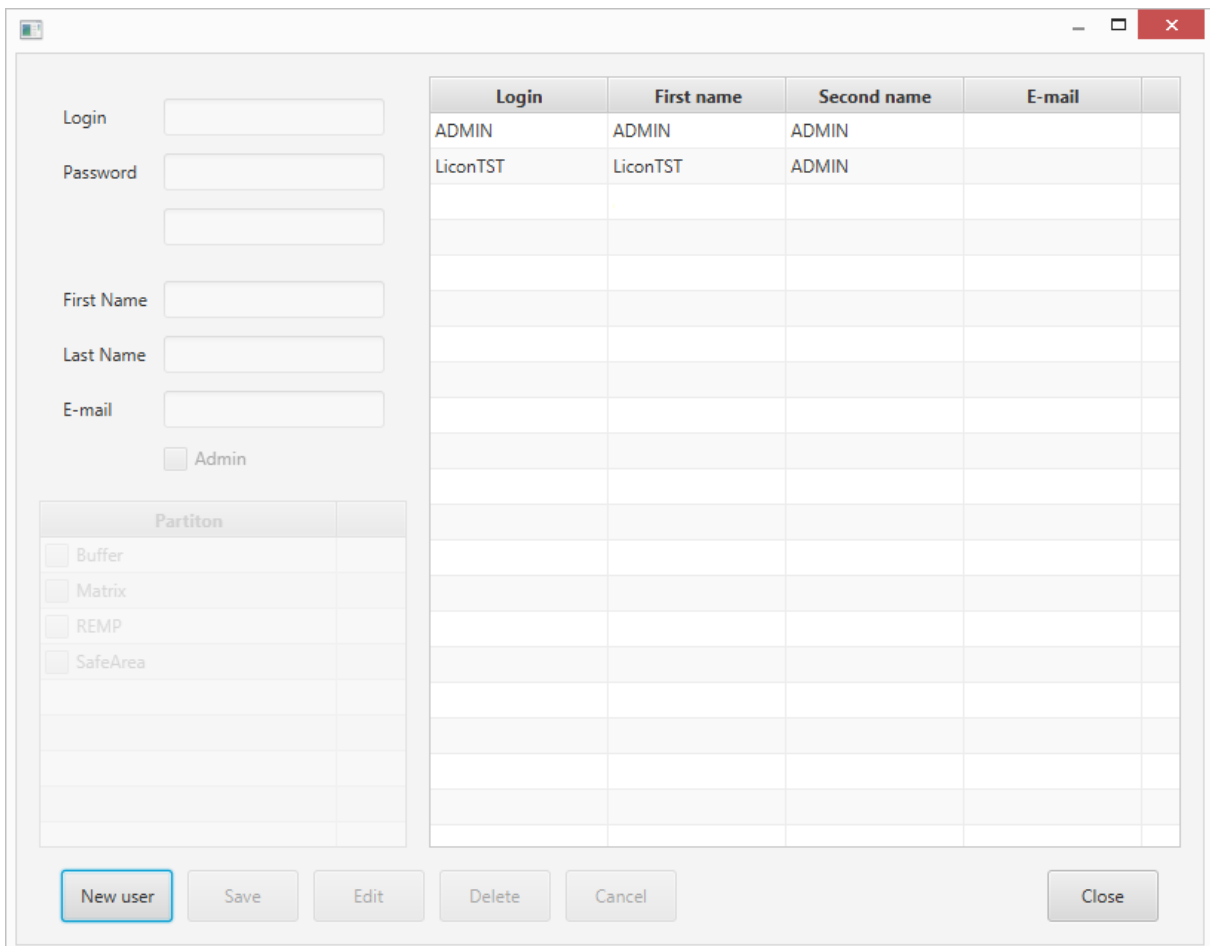
7.3.3 User Management and Alarm Notification

The Administrator mode allows the creation, modification and deletion of users and their rights. In the picture below (Picture 32) the “User Manager” is shown. All users accessing to the system have to be created with this tool, even users accessing only through the Web-Access.

The initial user data for accessing the User manager (Firebird database) are the user “SYSDBA” with the password “masterkey”. In case of different database these credentials may not be needed.

To access the tool, got to the “Service” menu item in the item bar and select user. Log in as mentioned above. To create a new user press the button new user at the bottom of the window. A new line will be shown on the right-hand side and the dialogue boxes on the left will get editable. Now a login name, password, the users name and mail details have to be assigned. Additionally, the Administrator here needs to assign the partitions the user is allowed to work with. The partitions are storage areas within the unit. A user can have access to only one or multiple areas. Details how to create partitions will be given further on.

After all information is entered, the “Save” button has to be pressed to finally store the user and their details.



The screenshot shows a window titled "User Management" with a form on the left and a table on the right. The form contains fields for Login, Password, First Name, Last Name, and E-mail, along with a checkbox for "Admin" and a "Partiton" table with checkboxes for Buffer, Matrix, REMP, and SafeArea. The table on the right has columns for Login, First name, Second name, and E-mail, and contains two rows of user data.

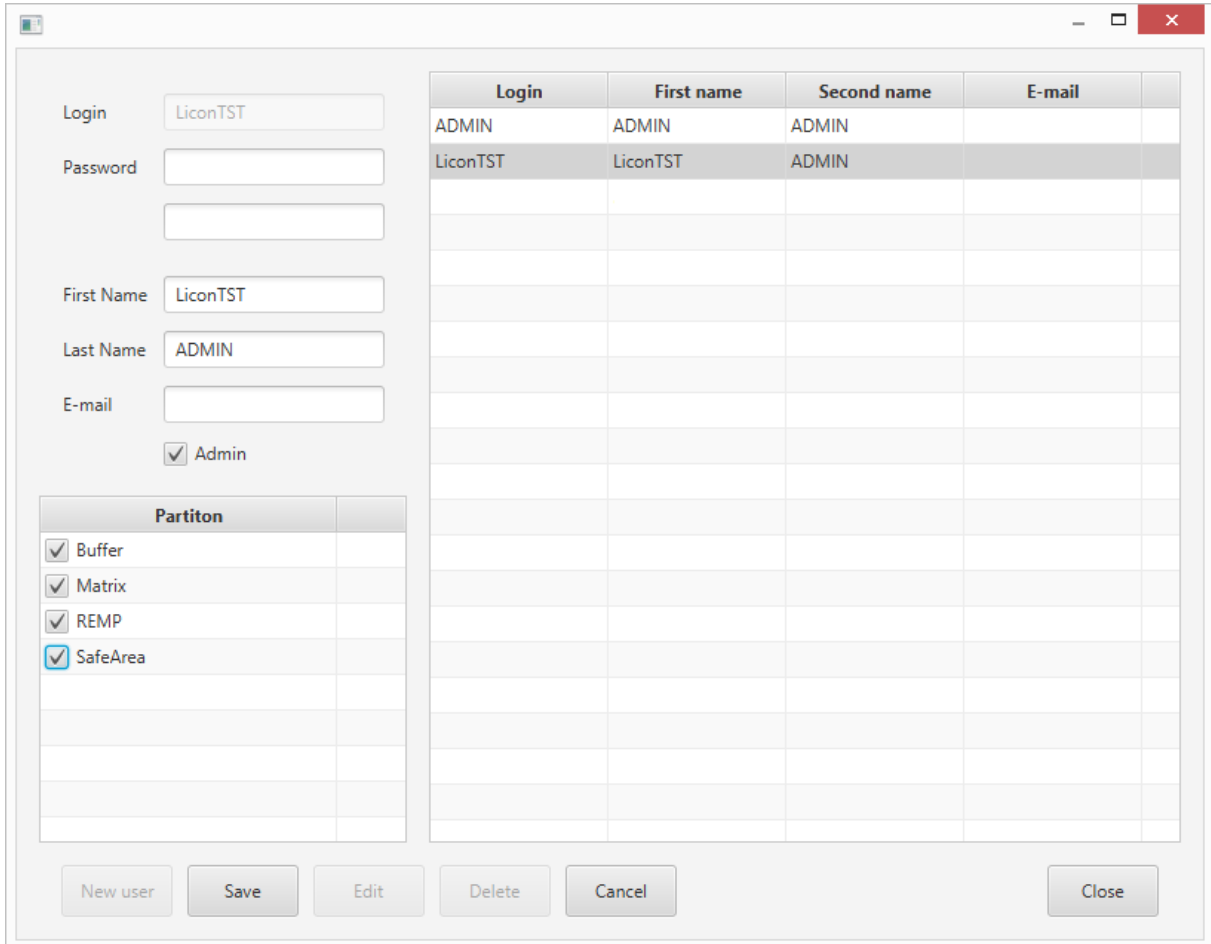
| Login | First name | Second name | E-mail |
|----------|------------|-------------|--------|
| ADMIN | ADMIN | ADMIN | |
| LiconTST | LiconTST | ADMIN | |
| | | | |
| | | | |
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Buttons at the bottom: New user, Save, Edit, Delete, Cancel, Close.

Picture 32: User Management

To edit a user the desired user is selected from the list on the right and the “Edit” button pressed. The fields on the left side will get editable. Change the information and press the “Save” button to store the changes made. When finished, press “Close” to close the user manager.

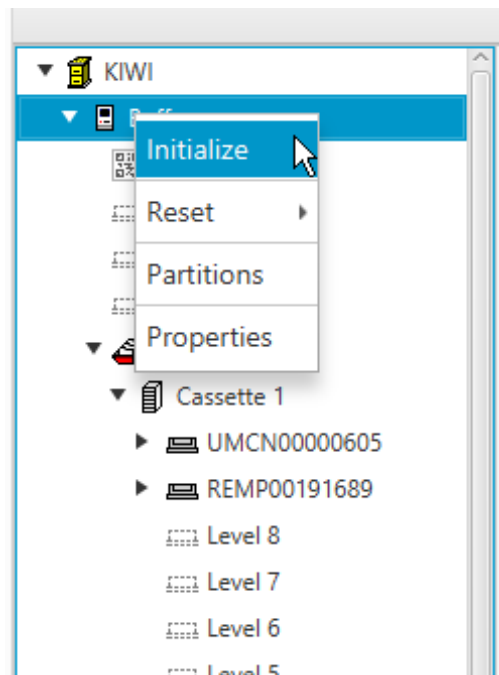
In order to set up a desired alarm notification, one needs to know that everyone who is marked as Administrator in this manager will get all error notifications under his or her given email address. Additionally, the submitting users will get the alarms concerning their jobs.



Picture 33: User Management Edit

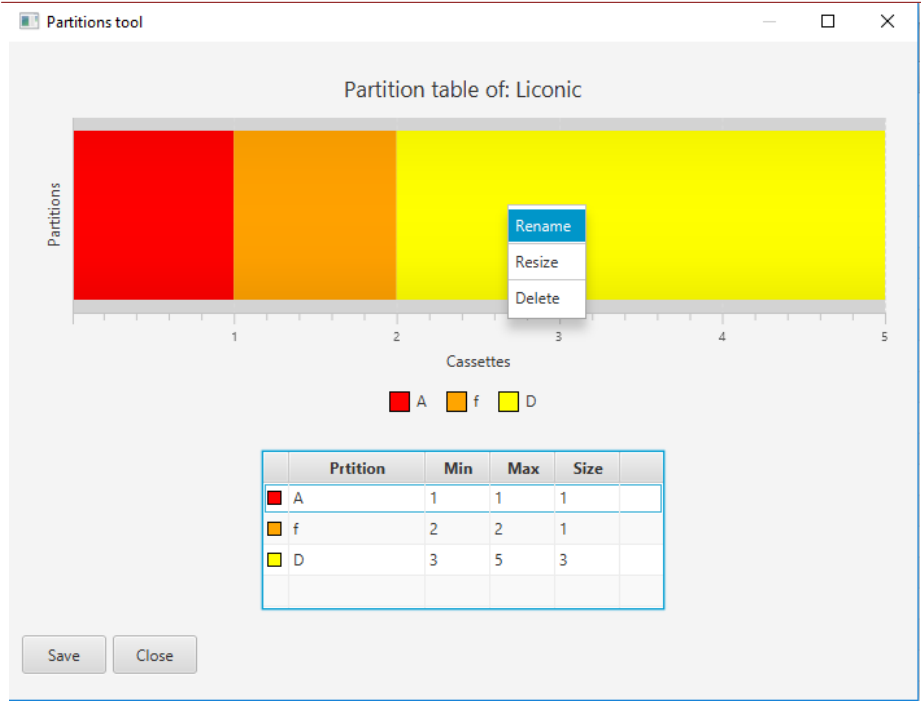
7.3.4 Partitions Tool

Depending on the use of the system different partitions can be created. Partitions are virtual subdivisions and can be used to split the storage capacity for different uses, user groups or experiments. To launch the partition tool mark the system unit with a left click, then right click and select “Partition” in the menu. (Picture 34)

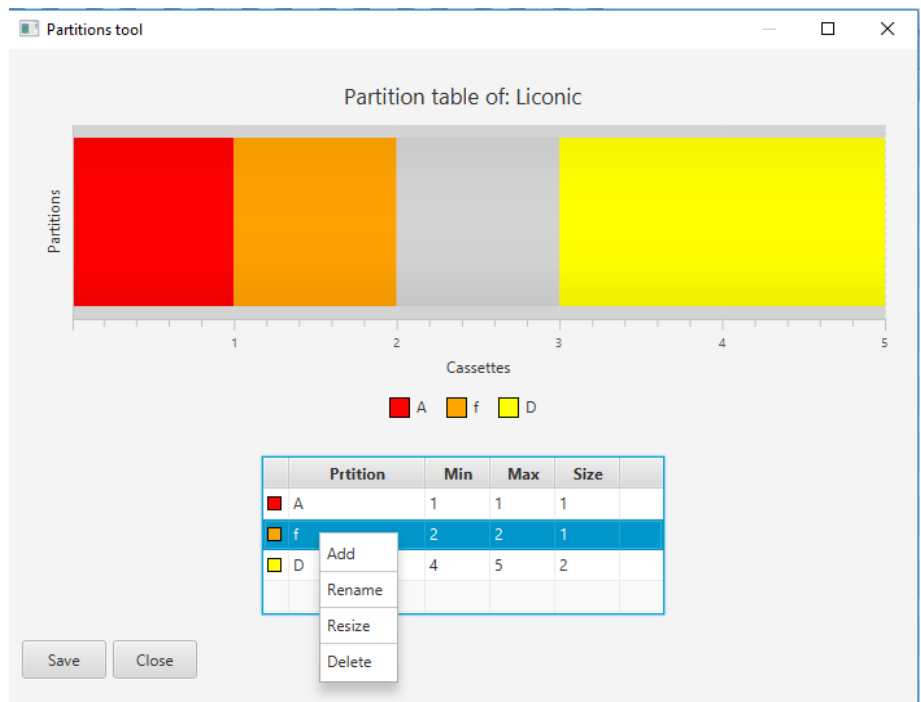


Picture 34: PlateExplorer Right Click Menu

The “Partitions tool” will be started. The tool does allow to “Add”, “Delete”, “Rename” and “Resize” partitions. Not all option may be available all the time as restrictions may disable some of the functions. For example, it is not possible to add further partitions if no unassigned cassettes are present. The function may be accessed through right click either on the graphic bar (Picture 35) or the table (Picture 36).

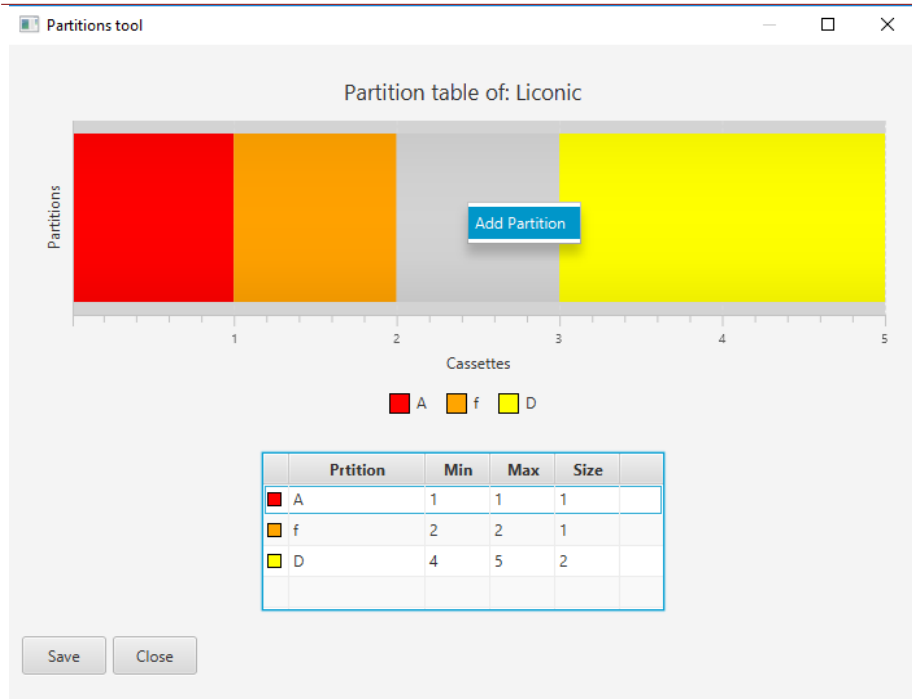


Picture 35: Right Click Menu Graphic

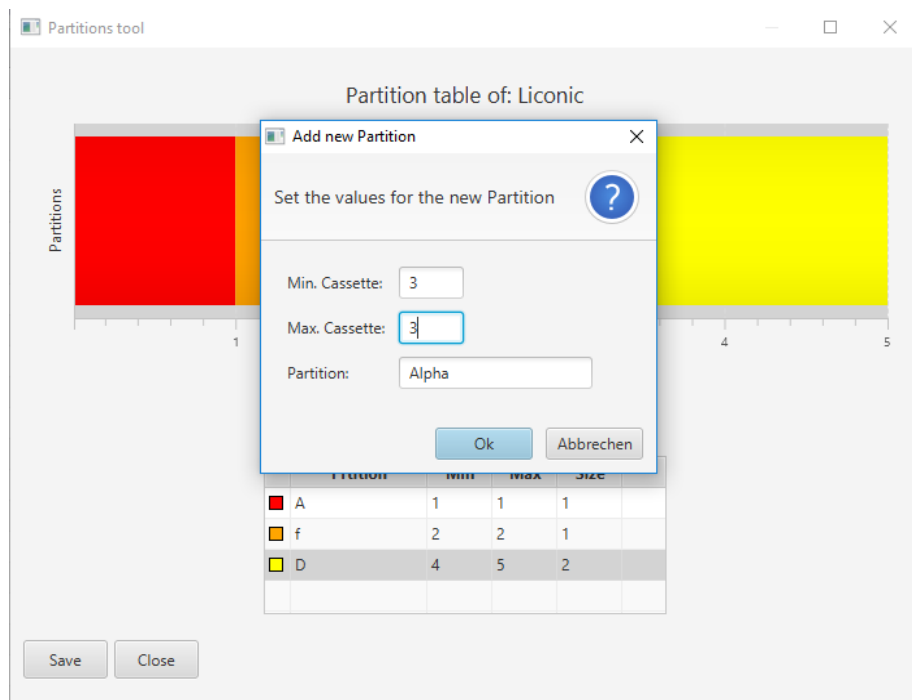


Picture 36: Right Click Menu Table

Existing partitions can easily be manipulated. Just right click into the graphic or the table and select the option. The “Add Partition” in the graphic is only available if unassigned cassettes (represented in grey) are available. (Picture 37)

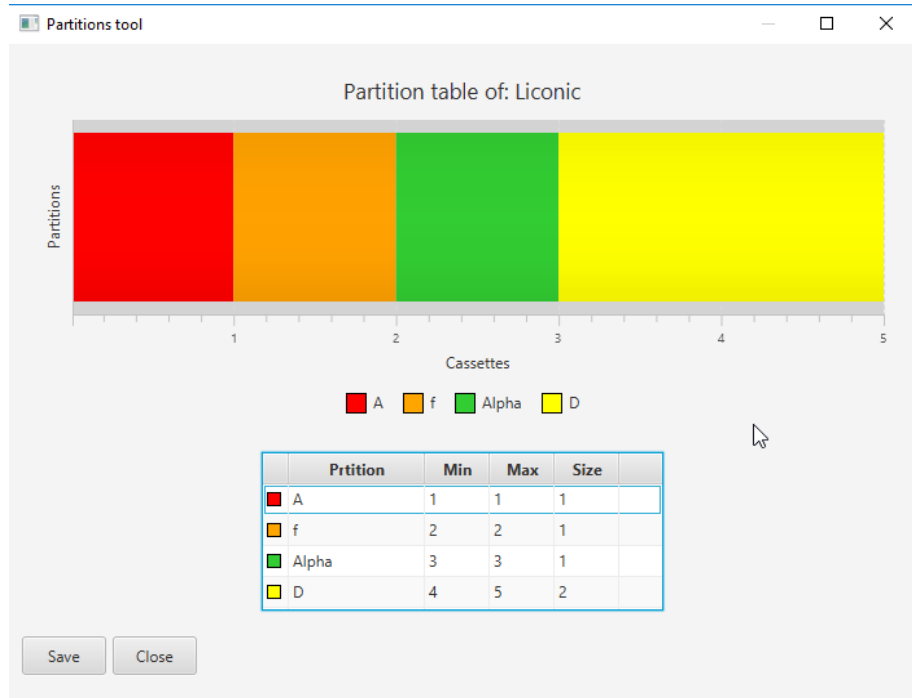


Picture 37: Add Partition Unassigned Cassette



Picture 38: Add Partition Dialogue

Unassigned cassettes can be used to create a new partition (Picture 39) or assign them to an existing partition (Picture 40). Adding cassettes to existing partition will be represented by the same coloring. In the table the cassettes will be displayed in order only the partition name will show their association.

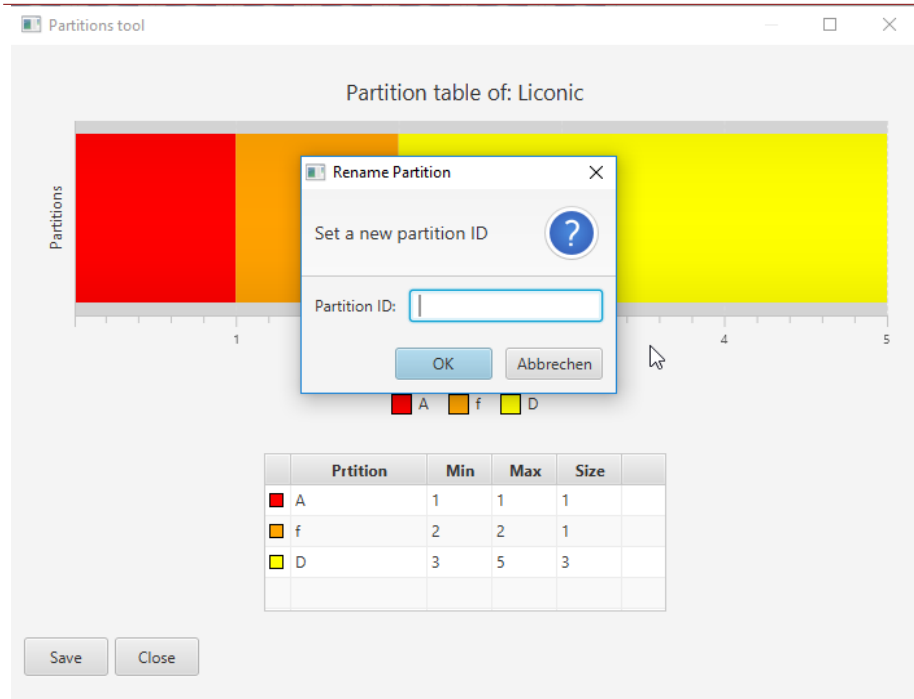


Picture 39: Added New Partition



Picture 40: Added Existing Partition

Already existing partitions can be assigned to another partition by renaming. The obsolete partition will be renamed to the same name as the chosen one and the cassettes will be assigned to this partition.



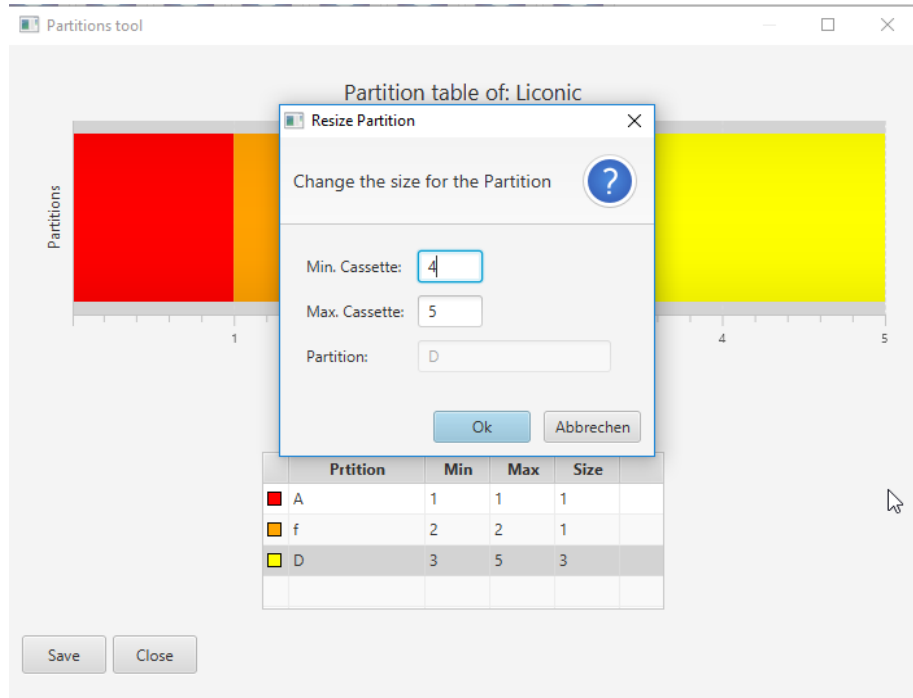
Picture 41: Dialogue Rename

If cassettes are “scattered” meaning a partition consists of cassettes not being next to each other the partition segments have to be deleted individually (Picture 42).



Picture 42: Deleted Partition A

Also partitions may be resized (Picture 43). The partitions may be made larger if unassigned cassettes are available or made smaller if they consist of more than one cassette. Resizing is not available if the minimal partition size of one cassette is present and no unassigned cassettes next to the partition available (Picture 44).



Picture 43: Resize Dialogue



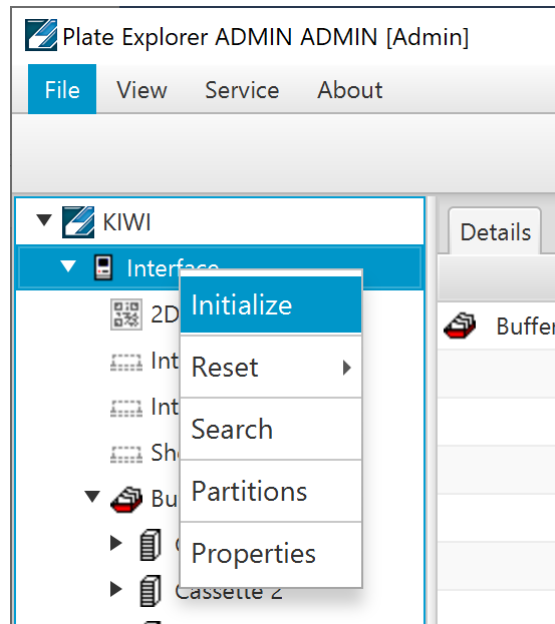
Picture 44: Resize Not Possible

7.3.5 Right-Click Action Menus in the Tree View

The right-click action menus are the most powerful tool within the PlateExplorer. They cover most of the commands and their content is depending on where they get activated.

Right-Click a “Unit”

When right-clicking a unit, a sub menu appears as shown in Picture 45 below.



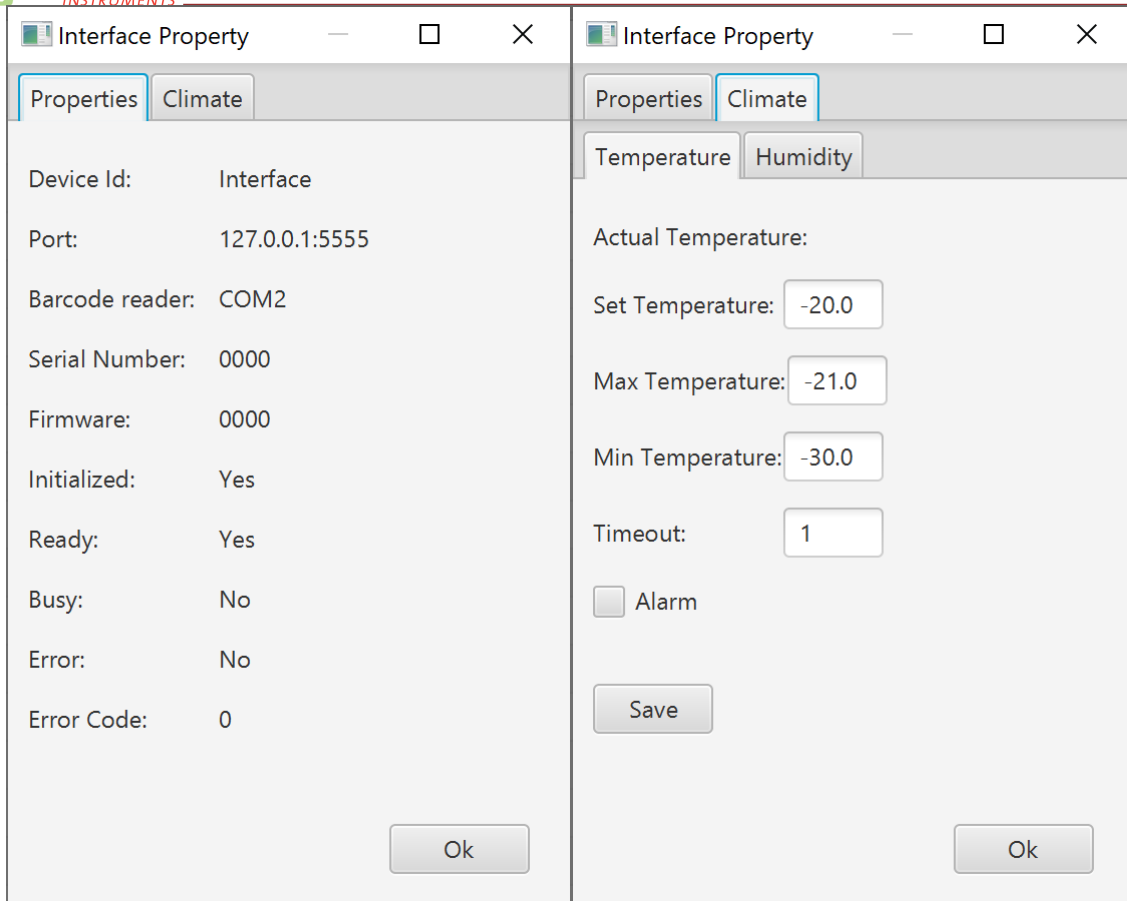
Picture 45: Right Click Menu Unit

“Initialize” the unit will be initialized and all necessary parameters transferred to the unit.

“Reset” the unit will be reset. The Reset entry offers two further options. “Reset” triggers a complete reset of the system requiring to perform an initialization as consequence to use the system again. “Soft Reset” allowing to continue on the exact same position without the need to initialize. The system will by itself cause a complete reset if a soft reset is attempted, when an error of the hardware requires a mandatory reset and initialization procedure.

“Partition” this entry is required to modify the partitions of a unit. The details are described in the chapter 7.3.4.

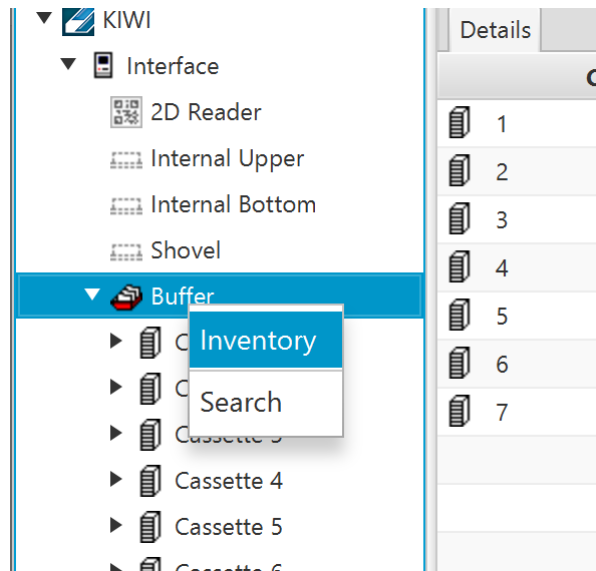
“Properties” is divided into two tabs. The tab “Properties” shows the hardware settings for the COM-port of the unit, its firmware and its current status. The “Climate” tab by itself is subdivided in to two additional tabs “Temperature” and “Humidity”. In these tabs it is possible to set alarm values for the software to trigger mail alarms in case of exceeding the allowed boundaries. The humidity tab may not be available for all system types.



Picture 46: Unit properties

Right-Click a “Partition”

When right-clicking a partition, a sub menu with several options appears.



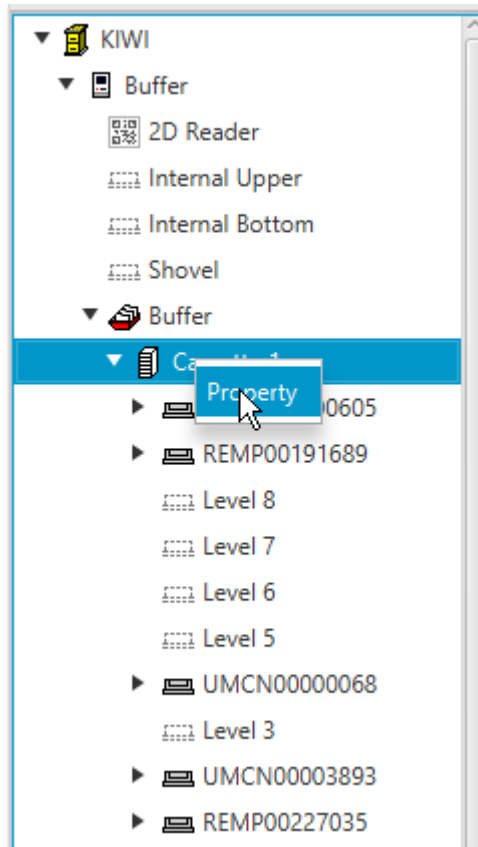
Picture 47: Right Click Menu Partition

“Inventory” starts a 1D barcode inventory on the selected partition.

“Search” lets the user search within the partition for key words such a plate barcode, tube code or fragments of them. Additional search parameters are available.

Right-Click a “Cassette”

When right-clicking a cassette, there are two options to choose from:

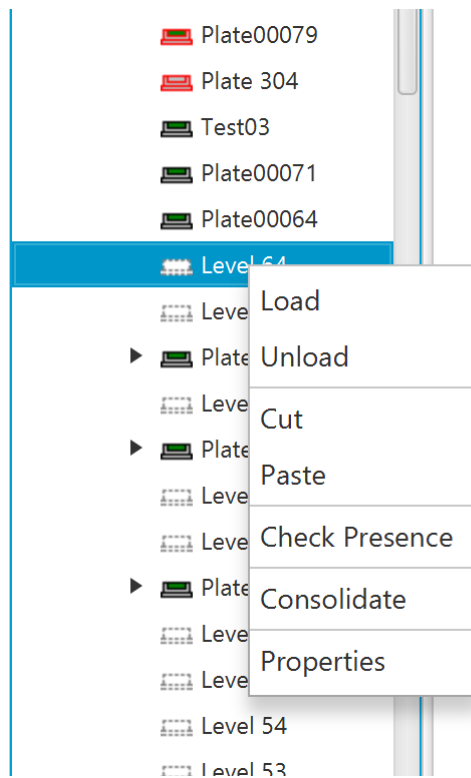


Picture 48: Right Click Menu Cassette

“Properties” will show the usage graph of the clicked cassette and a check box to block the complete cassette for administrative reasons.

Right-Click a “Level”

When right-clicking a level, several options will appear:



Picture 49: Right Click Menu Level (to be checked)

“Cut” and “Paste” will enable the user to move plates within the system as described in 1.3.1. under “Using Cut&Paste”.

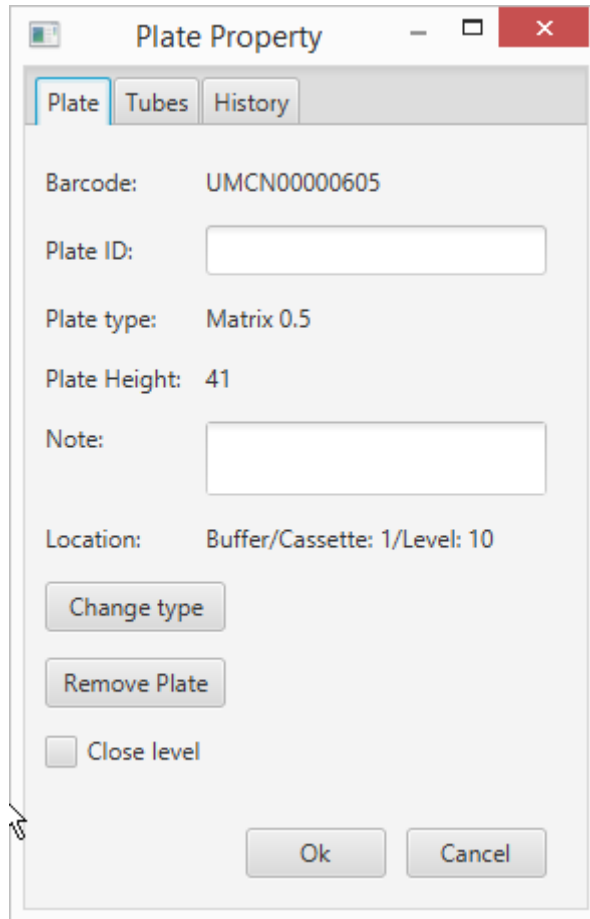
“Load” and “Unload” are direct access commands and will, when activated, immediately load a plate from the transfer station onto this level or unload the existing plate onto the transfer station.

“Check Presence” will check the presence of a rack/plate on that level and if a plate is present read its barcode.

“Consolidate” will trigger a consolidation for all selected plates. Multiple plates can be selected by holding CTRL pressed clicking on them.

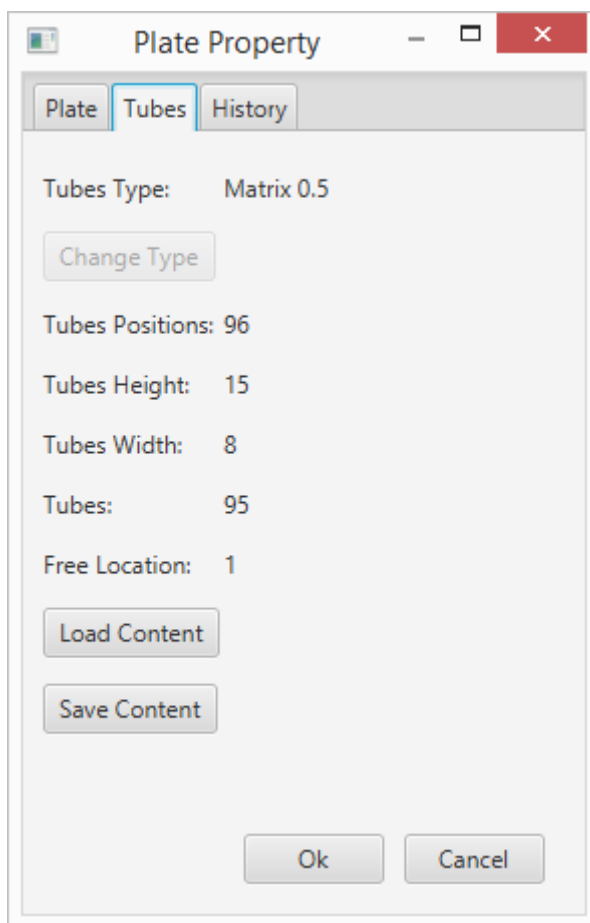
The “Properties” of a rack in a level allows under the tab “Plate” to set the PlateID, add some note, see location information of the chosen Level. Furthermore, the plate type can be removed or the plate type changed. Changes of the plate type are only possible with certain limitations. These limitations are depending on the cassette the plate is located in. Changing the plate type to a different one from a previously selected one is not possible.

If a level is clicked without a plate or rack being stored in it, the Properties only show the levels plate history and enable the user to close the level for administrative reasons. A closed level will not be accessed.



Picture 50: Plate Properties Plate Tab

Under the tab “Tubes” it is possible to set the tube type if not yet set and load content from an XML file. Furthermore, the content of the plate can be saved as a file. Some general information about the tube configuration and the content of the plate is shown such as the tube parameters, number of tubes and free locations.



Picture 51: Plate Properties Tubes Tab

The tab “History” and its sub tabs “Level” and “Plate” are explained in the following chapter HISTORY.

7.3.6 History

The “History” tab in the level and plate properties allows to access the history data for the respective. The history contains the information which user did conduct, the respective Event at which date and what Barcode and User ID was involved.

| User | Date | Event | Barcode | uid |
|----------|-------------------------|----------|--------------|-----|
| LiconTST | 2017-07-14 12:11:38.657 | Load | UMCN00000605 | |
| LiconTST | 2017-07-14 12:09:43.967 | Unload | UMCN00000605 | |
| LiconTST | 2017-07-13 15:36:07.513 | Load | UMCN00000605 | |
| LiconTST | 2017-07-13 11:48:50.19 | Unload | UMCN00000068 | |
| LiconTST | 2017-07-10 14:39:52.27 | Load | UMCN00000068 | |
| LiconTST | 2017-07-10 12:10:03.65 | Presence | | |
| LiconTST | 2017-07-03 15:12:11.943 | Presence | | |
| LiconTST | 2017-07-03 14:55:44.537 | Unload | REMP00270469 | |
| LiconTST | 2017-07-03 14:54:56.71 | Load | REMP00270469 | |
| LiconTST | 2017-07-03 14:54:17.863 | Unload | REMP00270469 | |
| LiconTST | 2017-06-27 07:15:41.767 | Load | REMP00270469 | |
| LiconTST | 2017-06-26 14:13:15.27 | Presence | | |
| LiconTST | 2017-06-26 08:12:32.47 | Presence | UMCN00001329 | |
| LiconTST | 2017-06-23 11:08:00.293 | Presence | UMCN00001329 | |
| LiconTST | 2017-06-23 10:11:36.83 | Presence | UMCN00001329 | |
| LiconTST | 2017-06-22 15:37:33.13 | Presence | UMCN00001329 | |

Picture 52: Properties History Level

If no plate is present when selecting a level only the history of the respective level is available.

Is a plate present on the selected level, the history of this plate is available. Similar to the level history the User manipulating the plate, the date, the performed Event and the location of the plate are displayed.

The screenshot shows a 'Plate Property' dialog box with a 'History' tab selected. The table below contains the history data:

| User | Date | Event | Device | Cassette | Level |
|----------|-------------------------|----------|------------|----------|-------|
| LiconTST | 2017-07-14 12:11:38.657 | Load | Buffer | 1 | 10 |
| LiconTST | 2017-07-14 12:09:43.967 | Unload | Buffer | 1 | 10 |
| LiconTST | 2017-07-13 15:36:07.513 | Load | Buffer | 1 | 10 |
| LiconTST | 2017-07-13 15:35:05.763 | Unload | Storage | 1 | 15 |
| LiconTST | 2017-07-13 15:33:25.607 | Load | Storage | 1 | 15 |
| LiconTST | 2017-07-13 15:32:36.887 | Unload | TubePicker | 1 | 1 |
| LiconTST | 2017-07-13 15:31:35.87 | Load | TubePicker | 1 | 1 |
| LiconTST | 2017-07-13 15:30:42.2 | Unload | Storage | 1 | 15 |
| LiconTST | 2017-07-13 12:08:32.717 | Load | Storage | 1 | 15 |
| LiconTST | 2017-07-13 12:07:39.793 | Unload | Buffer | 1 | 1 |
| LiconTST | 2017-07-13 12:06:48.607 | Presence | Buffer | 1 | 1 |
| LiconTST | 2017-07-13 12:06:32.293 | Load | Buffer | 1 | 1 |
| LiconTST | 2017-07-13 11:52:57.817 | Unload | Buffer | 1 | 1 |
| LiconTST | 2017-07-10 14:37:13.487 | Presence | Buffer | 1 | 1 |
| LiconTST | 2017-07-10 14:36:10.597 | Load | Buffer | 1 | 1 |
| LiconTST | 2017-07-10 14:29:18.377 | Unload | Buffer | 1 | 2 |

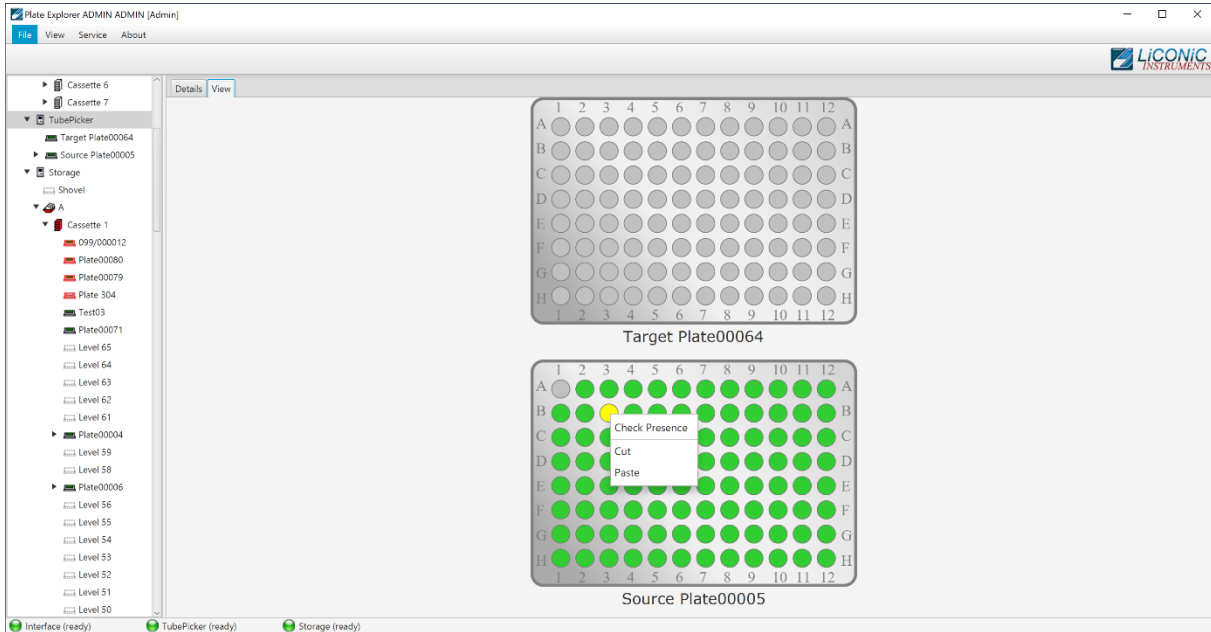
Picture 53: Properties History Plate

7.3.7 Right-Click Menu on Tubes at Tube Handling

The right-click menu on the tube handling unit covers the following items:

“Cut” and “Paste” enable the user to manually move tubes from plate to plate on the device.

“Check Presence” will work only depending on the model of the tube handling. If integrated, the function checks if a tube exists on the clicked location within the rack. Depending on the system configuration the check presence will automatically trigger a code reading if such a reader is present. This is mostly used to scan an additional side code on tubes.

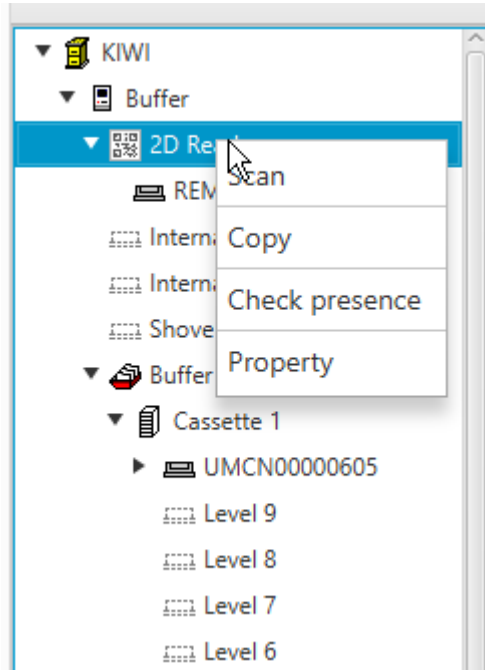


Picture 54: Right-click Menu on Tubes on the Tube Handling

7.3.8 Right-Click Action Menu on 2D Rack Reader

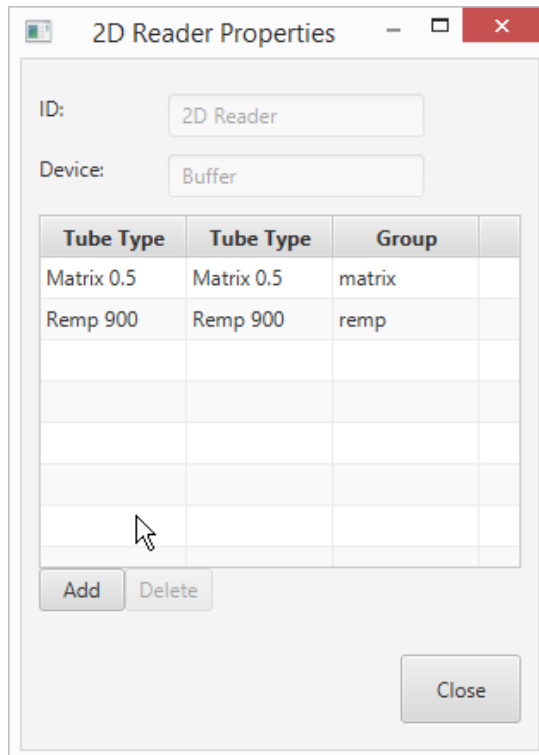
The right-click menu on the 2D Rack Reader allows to select the following items:

“Cut” and “Paste” enable the user to manually move plates and racks from and to the reader. “Check Presence” will check if a plate or rack is present on the reader. “Property” will allow access to the settings of the reader



Picture 55: Right Click Menu 2D Rack Reader (to be checked)

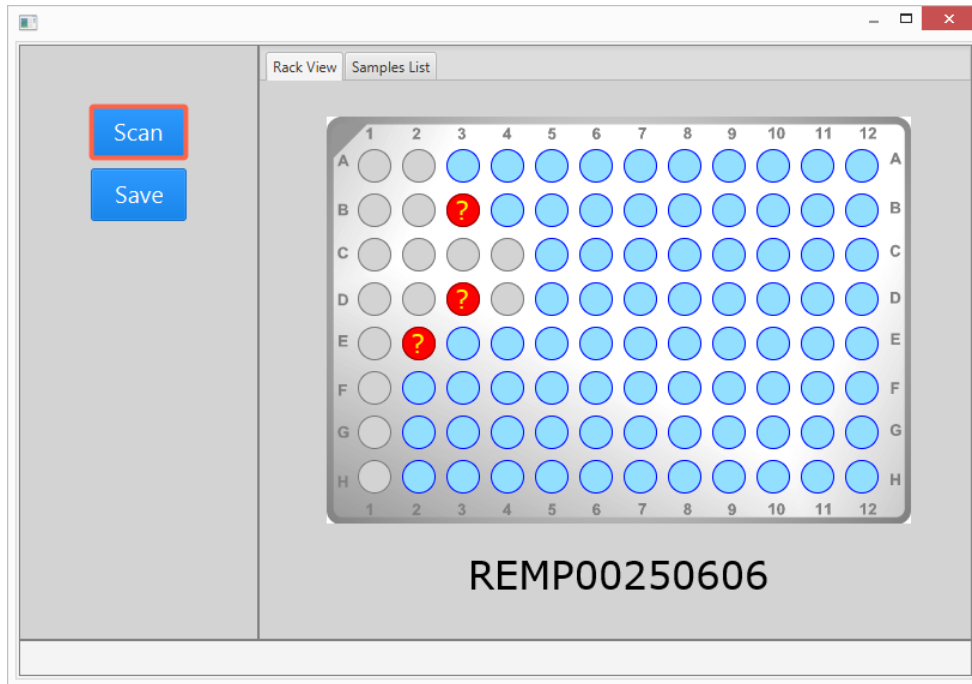
Under Properties the configuration of the 2D reader can be done. The scan group for each tube type is set. This has to be done in order to use the correct settings to read the 2D codes for each tube type.



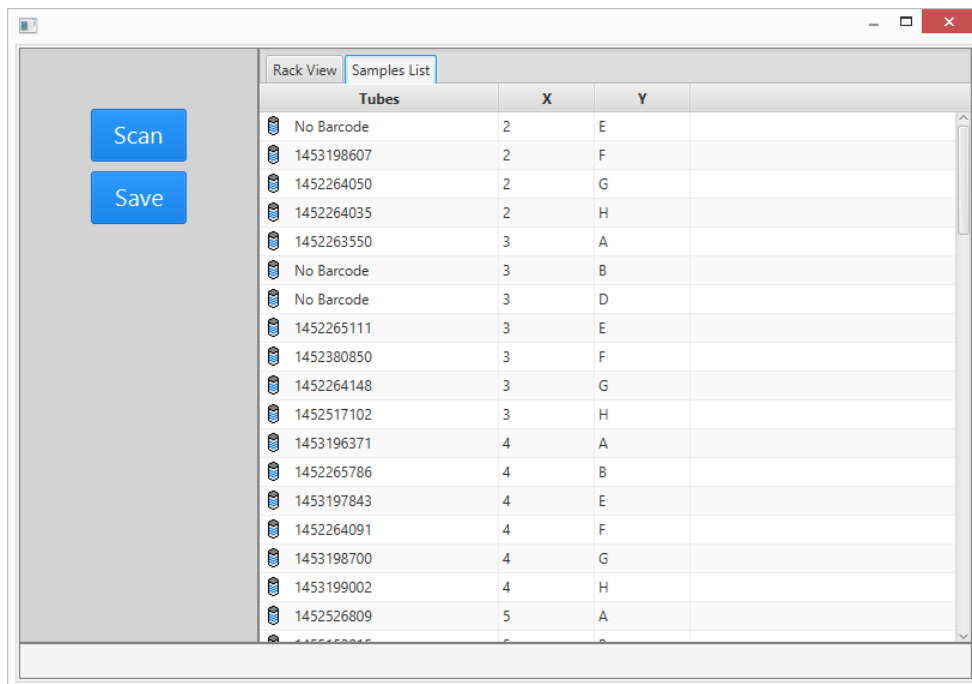
Picture 56: 2D Reader Properties

Selecting the “Scan” option will trigger a scanning process when a plate is present on the scanner. An additional Window is opened showing the result of the scan. This window allows to re-scan or save the scan results into the database. It has two display options one shows the locations of the tubes in a visual representation and the other one as a list.

The readable tubes are represented with blue marking, not tube is represented by a grey location. Tubes which have been detected as present but the 2D code has not been readable are represented by red with a question mark.



Picture 57: Scan Result Location View



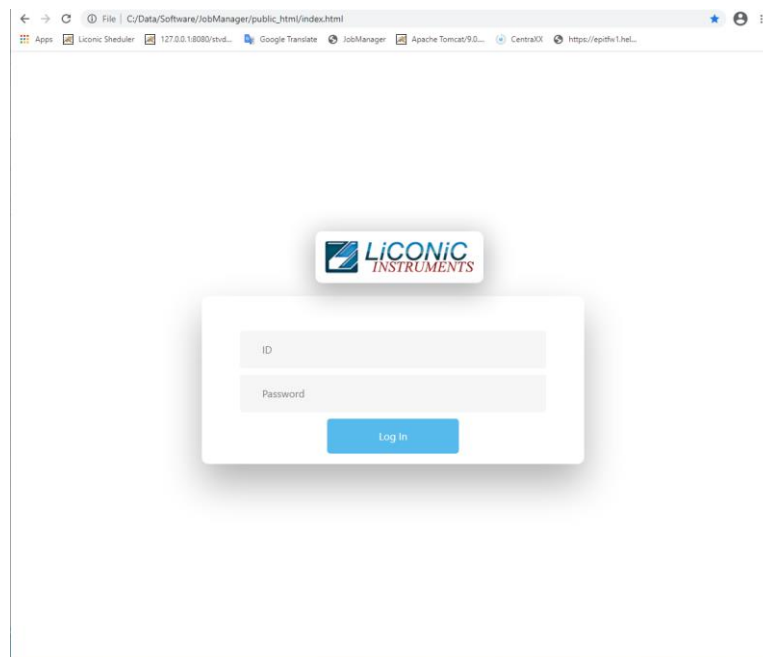
Picture 58: Scan Result List View

7.4 Job Manager

The JobManager Web based interface allows to manipulate jobs. The different coloring of the jobs are indicating their status and manipulation can be performed upon them such as Cancel, Continue, Retry, Delete.

The available functions are provided by each job/task. If a job/task is in error it will offer the options Continue, Retry and Cancel if they are possible. Every job/task can be canceled. Deletion of a job/task is only possible if the status is canceled. This means in order to delete a job/task it has to be canceled first.

To access the JobManager user interface, it is required to log in. The access to this may be restricted, depending on the user access rights



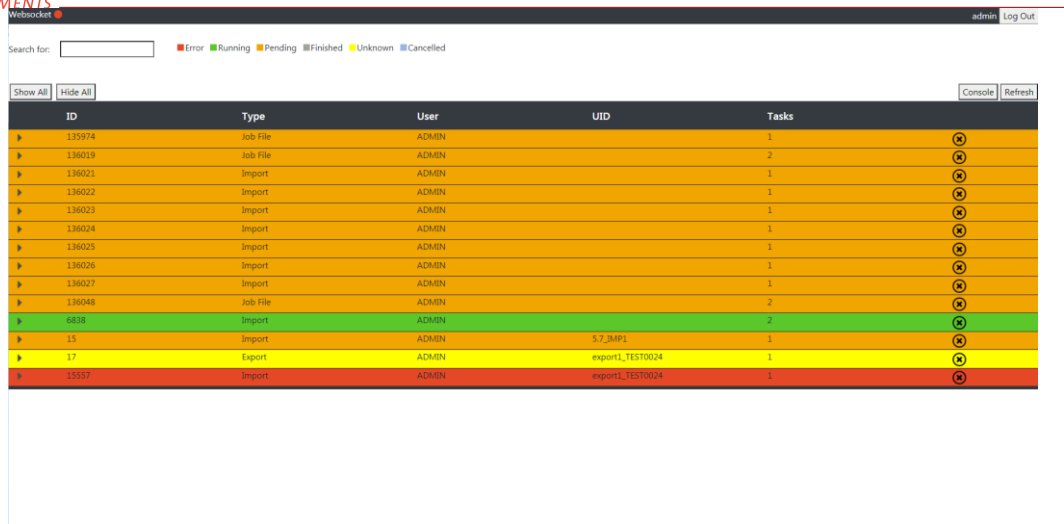
Picture 59: JobManager Log In Page

7.4.1 Use of JobManager

The JobManager offers the possibility to manage jobs within the job queue of the system. The jobs may show different states and allow different manipulation depending on their state. The following states can be present:

- Running: Currently running job
- Pending: Job in queue ready for running
- Finishes: Job in the process to reach done state
- Unknown: Jobs with an unknown state
- Cancelled: Jobs which have been cancelled
- Error: Job in Error status due to logical or hardware error

For a better visualization the different states are represented with different colors.



| ID | Type | User | UID | Tasks |
|--------|----------|-------|------------------|-------|
| 135974 | Job File | ADMIN | | 1 |
| 136019 | Job File | ADMIN | | 2 |
| 136021 | Import | ADMIN | | 1 |
| 136022 | Import | ADMIN | | 1 |
| 136023 | Import | ADMIN | | 1 |
| 136024 | Import | ADMIN | | 1 |
| 136025 | Import | ADMIN | | 1 |
| 136026 | Import | ADMIN | | 1 |
| 136027 | Import | ADMIN | | 1 |
| 136048 | Job File | ADMIN | | 2 |
| 6838 | Import | ADMIN | | 2 |
| 15 | Import | ADMIN | S_7_BMP1 | 1 |
| 17 | Export | ADMIN | exportL_TEST0024 | 1 |
| 15557 | Import | ADMIN | exportL_TEST0024 | 1 |

Picture 60: JobManager Main Page

Jobs in the different states allow for different manipulations. To delete a job from the queue it has to be first cancelled. The cancelation of a job can be easily performed by pressing the “X” within the circle at the right of each job. Only after the cancelation the delete icon in the shape of a trash bin becomes available.

Jobs and task in error present the possible manipulation option when right clicking on to the job or task. There are three different options available to be selected:

- Retry: The system attempts the same step again
- Continue: The system jumps to the next step in the process
- Cancel: The job is canceled

Retry:

The retry option allows to attempt the same operation again at the time of error. The system has to be left in the same state as the error appeared, only clearing the error condition. The system will then try to do the exact same step again in the process and continues the operation afterwards. This option would be selected per example if a tube was not possible to be taken out of a source rack, the tube is still present at the origin position and the condition why the tube was not possible to be moved has been rectified.

Continue:

The continue option allows to jump over the error step and continue the job with the next step in the process. For this the error step needs to be cleared and the system put back in operational state. This option may be selected if for example a tube has been missing and can not be transferred. In this case the step can not be retried and the system needs to continue with the next step.

Cancel:

The cancel option can be selected if a job or task can not be retried not continued or if the retry/continue is not within the interest of the user. This may be the case if a general issue is detected or it has been decided to abandon the job and continue with another task.

Websocket admin Log Out

Search for: ■ Error ■ Running ■ Pending ■ Finished ■ Unknown ■ Cancelled

Show All Hide All Console Refresh

| ID | Type | User | UID | Tasks | |
|----------|--------------|-------|------------------|-------|---|
| ▶ 136021 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136022 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136023 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136024 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136025 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136026 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136027 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136048 | Job File | ADMIN | | 2 | ⊗ |
| ⊖ 6838 | Import | ADMIN | | 2 | ⊗ |
| ⊕ 11543 | Import Plate | | Done | 0 | ⓘ |
| ⊖ 11544 | Scan 2D | | Running | 1 | ⓘ |
| ▶ 15 | Import | ADMIN | S7_BMP1 | 1 | ⊗ |
| ▶ 17 | Export | ADMIN | export1_TEST0024 | 1 | ⊗ |
| ⊖ 13557 | Import | ADMIN | export1_TEST0024 | 1 | ⊗ |
| ⓘ 6775 | Scan 2D | | Running | 1 | ⓘ |

⊕ Retry
⊖ Continue
⊗ Cancel

Picture 61: JobManager Task Options

Websocket admin Log Out

Search for: ■ Error ■ Running ■ Pending ■ Finished ■ Unknown ■ Cancelled

Show All Hide All Console Refresh

| ID | Type | User | UID | Tasks | |
|----------|--------------|-------|------------------|-------|---|
| ▶ 136019 | Job File | ADMIN | | 2 | ⊗ |
| ▶ 136021 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136022 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136023 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136024 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136025 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136026 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136027 | Import | ADMIN | | 1 | ⊗ |
| ▶ 136048 | Job File | ADMIN | | 2 | ⊗ |
| ⊖ 6838 | Import | ADMIN | | 2 | ⊗ |
| ⊕ 11543 | Import Plate | | Done | 0 | ⓘ |
| ⊖ 11544 | Scan 2D | | Running | 1 | ⓘ |
| ▶ 15 | Import | ADMIN | S7_BMP1 | 1 | ⊗ |
| ▶ 17 | Export | ADMIN | export1_TEST0024 | 1 | ⊗ |
| ⊖ 13557 | Import | ADMIN | export1_TEST0024 | 1 | ⊗ |

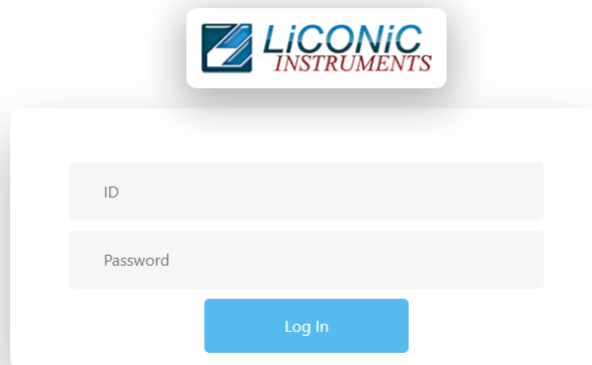
| ID | Type | Status | Run | Stats | Clear |
|---|---------|---------|-----|-------|-------|
| ⊖ 11544 | Scan 2D | Running | 1 | 0 | ☒ |
| Scanning plate: TESTPL041 at 2D Reader: 2D Reader2, path: 2 | | | | | |

Picture 62: JobManager Task Details

7.5 Climate Reporting

The climate reporting interface is used to extract climate data from the database. The historic and current climate values can be accessed, displayed and saved for further use.

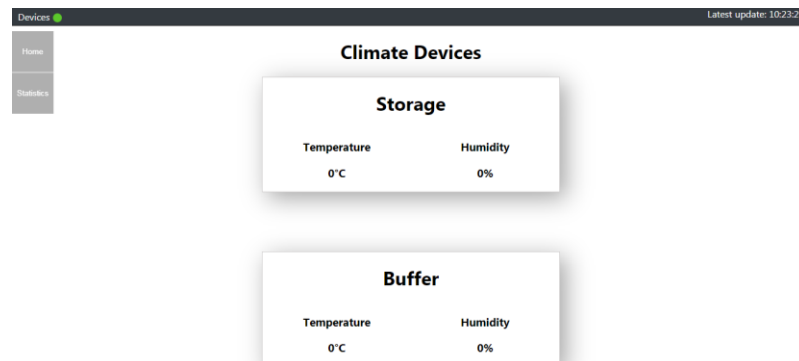
To access the Climate Reporting user interface, it is required to log in. The access to this may be restricted, depending on the user access rights



The image shows a login form for the Climate Reporting interface. At the top is the LiCONiC INSTRUMENTS logo. Below it are two input fields: one labeled 'ID' and one labeled 'Password'. A blue 'Log In' button is positioned below the password field.

Picture 63: Climate Reporting Log In

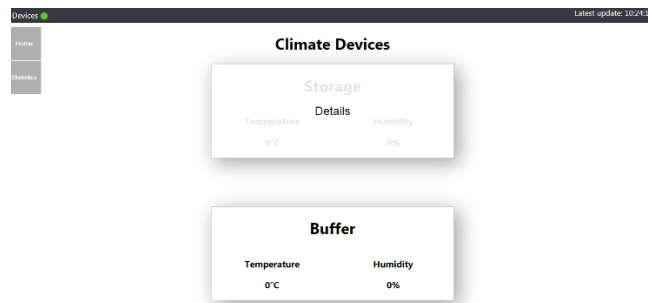
The main page after the log in will show an overview of all device which have temperature recording. The current climate data are shown



The image shows the main page of the Climate Reporting interface. At the top, there is a header with 'Devices' and a green status indicator, and 'Latest update: 10:23:25'. On the left, there is a sidebar with 'Home' and 'Statistics' buttons. The main content area is titled 'Climate Devices' and contains two data cards. The first card is titled 'Storage' and shows 'Temperature' as 0°C and 'Humidity' as 0%. The second card is titled 'Buffer' and also shows 'Temperature' as 0°C and 'Humidity' as 0%.

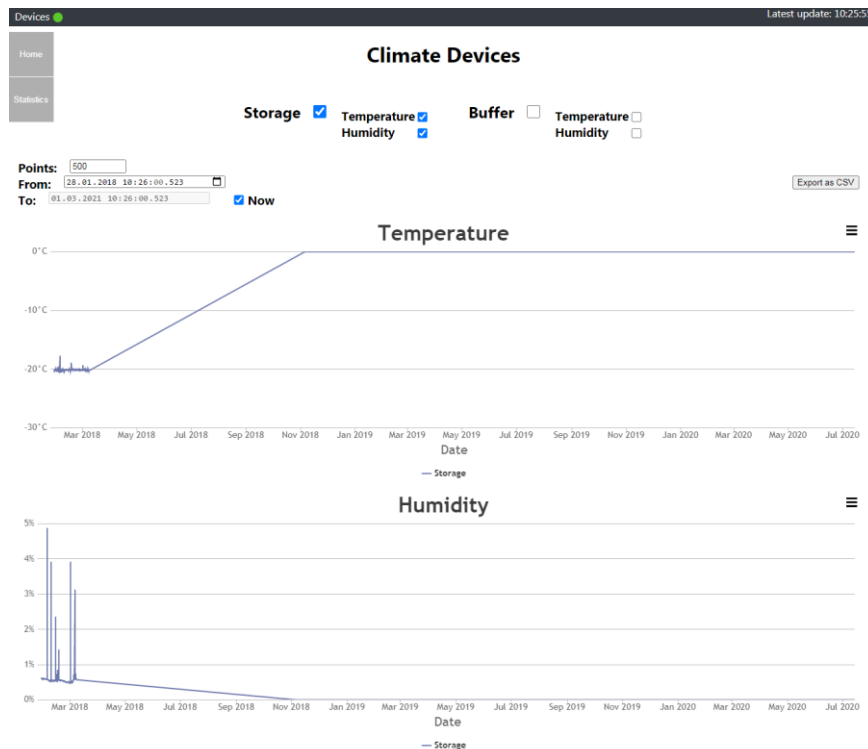
Picture 64: Climate Reporting Main Page

To access the detail view for a device, the device is selected and clicked. Afterward a graph view is presented.



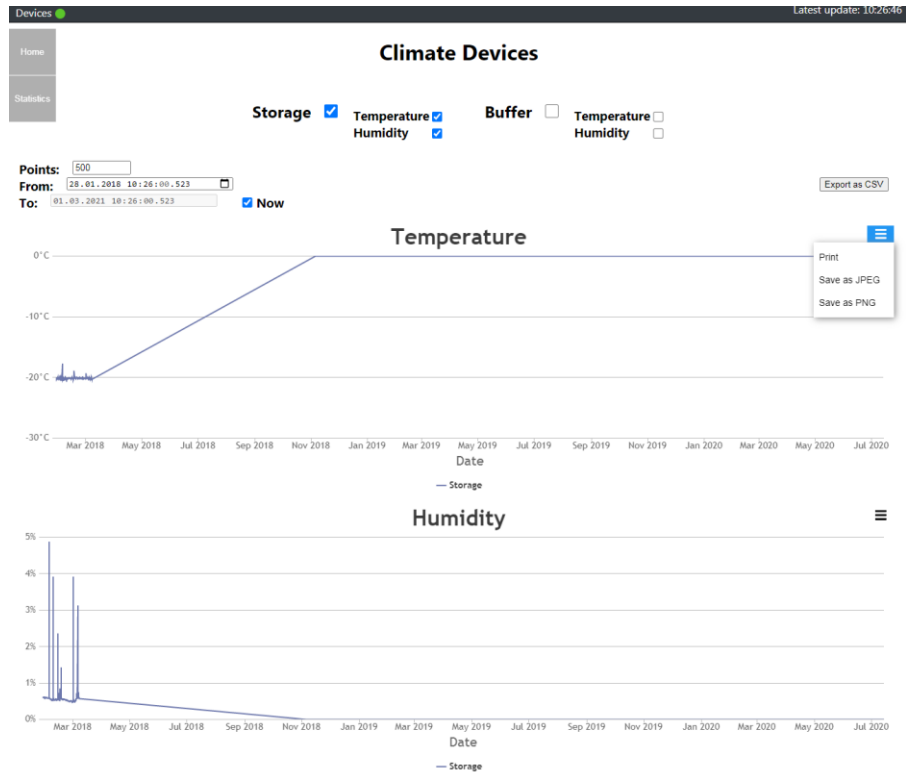
Picture 65: Climate Reporting Device Selection

The graph view allows to view current and historic data. The displayed data can be selected by device. It is offered either to display data from a historic point until now or to a specific date.



Picture 66: Climate Reporting Graph View

From the graph view it is possible to extract the climate data. The graphs can be saved as picture or directly printed. The climate data can also be exported as a CSV file for further use.



Picture 67: Climate Reporting Save

7.6 Utility Tools

7.6.1 Web Terminal

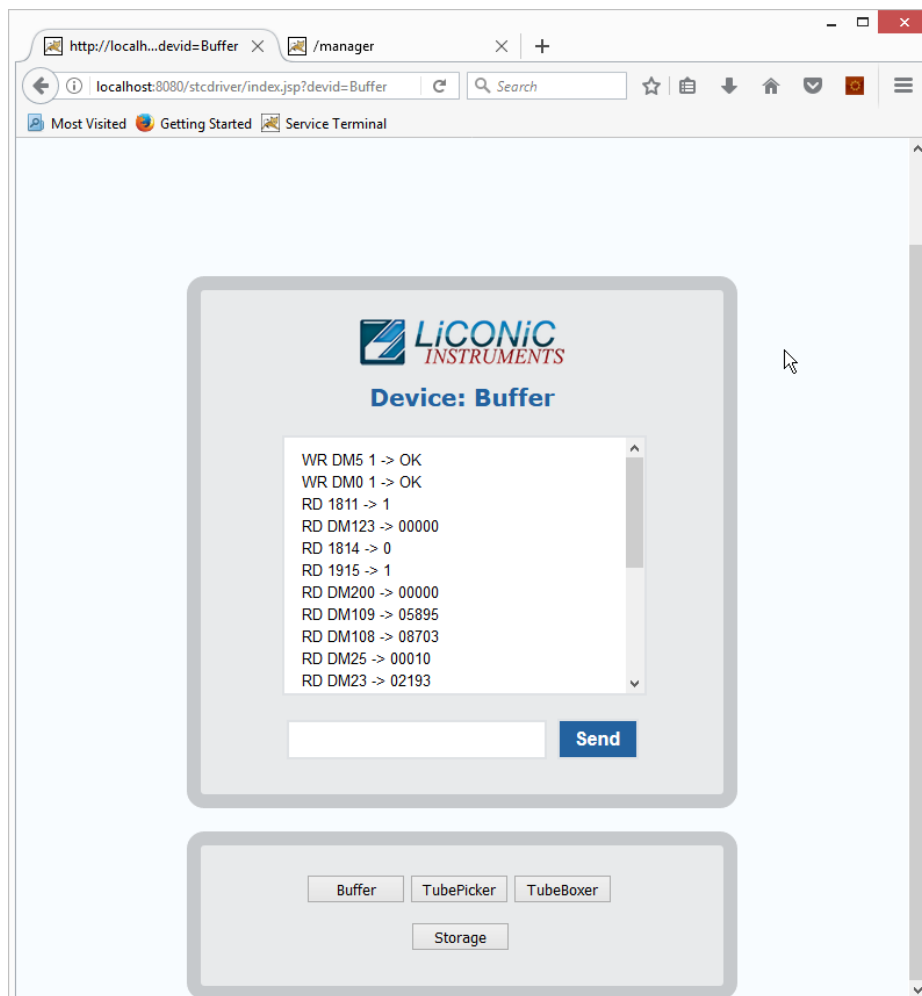
The web terminal can be accessed via any standard web browser. It allows for communication directly to the individual devices. The use of this terminal is for trained only for trained personnel.



CAUTION!

Terminal should only be used by personnel trained in the use of direct commands or under supervision of a Liconic engineer.

The terminal can be used to read out state variables of the system and send direct commands to the hardware. It may be used to change temporarily settings or recover the system from a state which requires intervention on this level. This terminal should only be used by trained personnel or under the supervision of a Liconic engineer. If there are any uncertainty in the use of the terminal please contact your local engineer or the Liconic service organization.



Picture 68: Web Based Commands Terminal

8. Troubleshooting

The following chapter does give assistance to the customer to fix some errors which eventually could appear.

8.1 Basic Errors

The following table shows some basic errors which can be fixed by the customer. If the steps below aren't successful, please contact an authorized service person.



CAUTION !

- Never touch electrical connections as long the System is connected to the main power supply or one or more covers are removed.

| Error | Cause | Action |
|---|---|---|
| Instrument does not power-up | Main Switch off
circuit breaker or fuse in the power cabinet has tripped
main inlet power source is not present | Turn Main Switch on
Set back circuit breaker or replace fuses
Check main inlet power source |
| System does not react on external commands | A fault in the electrical connectors/cables
Wrong communication settings
No communication to System
Internal error | Check RS232 connections
Check communication settings
Check if software is running
Call service personnel |
| System does not cool down | Cooling unit does not turn on | Check main power switch on cooling unit
Call Service personnel |
| Cooling unit switches off shortly after it starts | Cooling unit break down
Insufficient cooling media supply
Insufficient coolant within system | Check cooling media supply
Check coolant level
Call service personnel |
| Handling stops with error | Error did appear | Check general handling error procedure for further steps |

8.2 Error Listing

In this chapter all the possible errors codes which could arise in the system are listed, separated by device. The error codes are provided in PlateExplore as the hexadecimal number (column \$Hex), for manual Read out the decimal number (column #Dec) may be helpful.

Liconic provides an error converter tool. The errors may also be manually translated if the tool is unavailable. Therefore, the following procedure may be used:

RD DM200 Read our error code with a suitable terminal program

The return value is a 5-digit decimal number. In order to get the error code this number needs to be converted into a hexadecimal number. The last two digits of the hexadecimal number is the error code. This code is referenced in the error lists of the following chapters.

8.2.1 STT3k0

| #Dec | \$Hex | Description |
|------|-------|---|
| 01 | 01 | General time out; Operation took longer than 15 Minutes |
| 02 | 02 | General time out; Time out after previous time out; Operation longer than 5 Minutes |
| 03 | 03 | Init time out; Initialization has taken to long |
| 04 | 04 | |
| 05 | 05 | |
| 06 | 06 | |
| 07 | 07 | Gate OPEN time out |
| 08 | 08 | Gate CLOSE time out |
| 09 | 09 | Lift travel exceeds maximum value |
| 10 | 0A | Wrong Cassette; DM0 > DM29; Cassette number exceeds maximum cassette |
| 11 | 0B | Lift overflow; travel path exceeds maximum allowed path |
| 12 | 0C | Wrong Level; DM5 > DM25; Level does exceed the maximum available levels |
| 13 | 0D | Plate trace Error; Plate was not loaded/unloaded as expected from/to shovel |
| 14 | 0E | Init time out; System was not able to initialize |
| 15 | 0F | |
| 16 | 10 | Turn in Turn Init Sensor or not in safe position; Possible step loss |
| 17 | 11 | |
| 18 | 12 | Shovel IN time out; Shovel could not be retracted |
| 19 | 13 | Shovel OUT time out; shovel could not be extended |
| 20 | 14 | |

8.2.2 Tube Handling

| #Dec | \$Hex | Description |
|------|-------|---|
| 01 | 01 | General time out; Operation took longer than 15 Minutes |
| 02 | 02 | General time out; Time out after previous time out; Operation longer than 5 Minutes |
| 03 | 03 | Init time out; Initialization has taken to long |
| 04 | 04 | |
| 05 | 05 | |
| 06 | 06 | |
| 07 | 07 | |
| 08 | 08 | |
| 09 | 09 | Tube Trace Error; Tube has not been taken into or moved out of gripper as expected |
| 10 | 0A | Wrong Tube Y; DM5 > DM25; Cassette number exceeds maximum cassette |
| 11 | 0B | |
| 12 | 0C | Wrong Tube X; DM0 > DM29; Level does exceed the maximum available levels |
| 13 | 0D | Plate trace Error; Plate was not loaded/unloaded to the Source/Target position |
| 14 | 0E | Init time out; System was not able to initialize |
| 15 | 0F | |
| 16 | 10 | Turn in Turn Init Sensor or not in safe position; Possible step loss |
| 17 | 11 | |
| 18 | 12 | Nest Init time out |
| 19 | 13 | |
| 20 | 14 | Shovel IN time out; Shovel could not be retracted |
| 21 | 15 | Emergency Stop; Swap head not ready |
| 22 | 16 | Swap head not in safe position |
| 23 | 17 | Plate Trace Error; plate on source position, no plate on Target position |
| 24 | 18 | Plate Trace Error; plate on target position, no plate on Source position |
| 25 | 19 | Plate Trace Error; no Plates on picker |
| 26 | 1A | Denied Command (Movement attempt in wrong direction) |
| 27 | 1B | Head collision; head safe activated |
| 28 | 1C | |
| 29 | 1D | |
| 30 | 1E | |
| 31 | 1F | Diver safe not in expected state |
| 88 | 58 | Revolver not in expected position |

8.3 Handling Errors

Some issues encountered while handling plates can be resolved by performing the procedures described in the following chapters. When performing these procedures, always carefully observe the moving of the robotics.

Should any mechanical resistance be observed while the robotics are moving, reset the system immediately and ask a trained engineer for assistance.

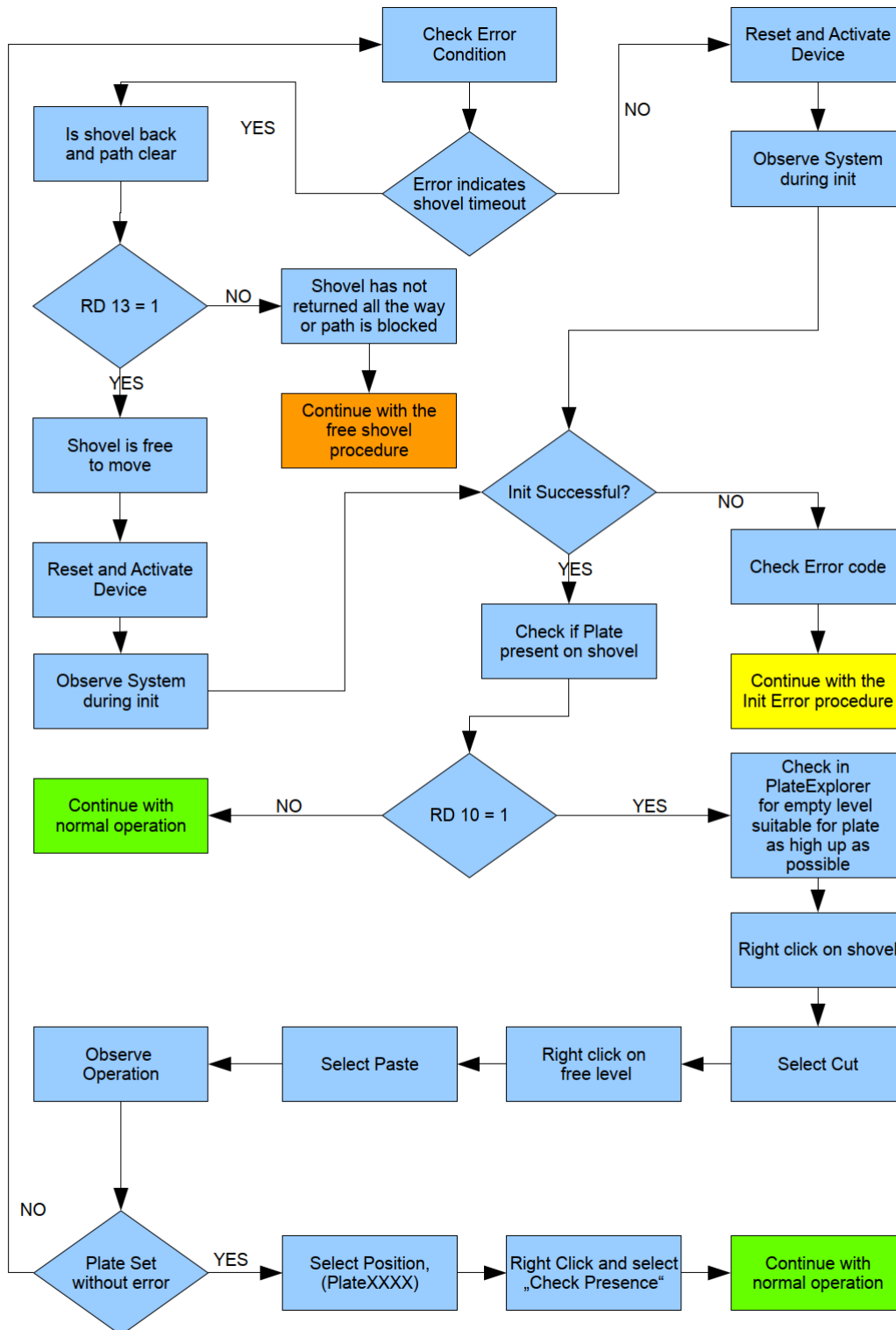
Should none of the procedures be of help contact a Liconic trained engineer for further support.



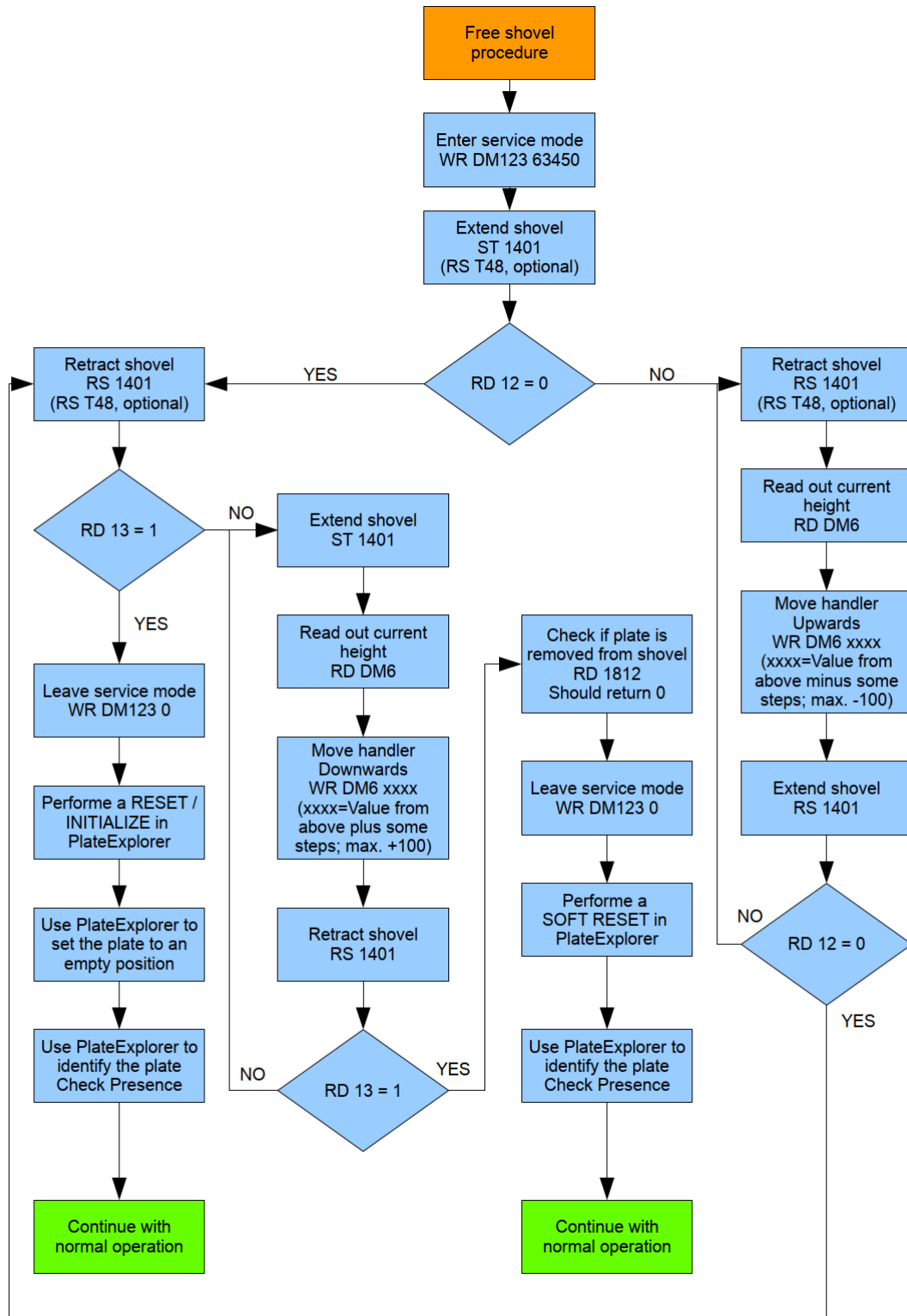
CAUTION!

- When initializing system after an error stop, check if handler does move freely. Reset the system if this is not the case and ask for assistance.
- If you do not feel secure about performing the following tasks, ask your local engineer for assistance.
- When changing DM6 with extended shovel, always be sure about the entered value as the handler will immediately move after sending the new value.

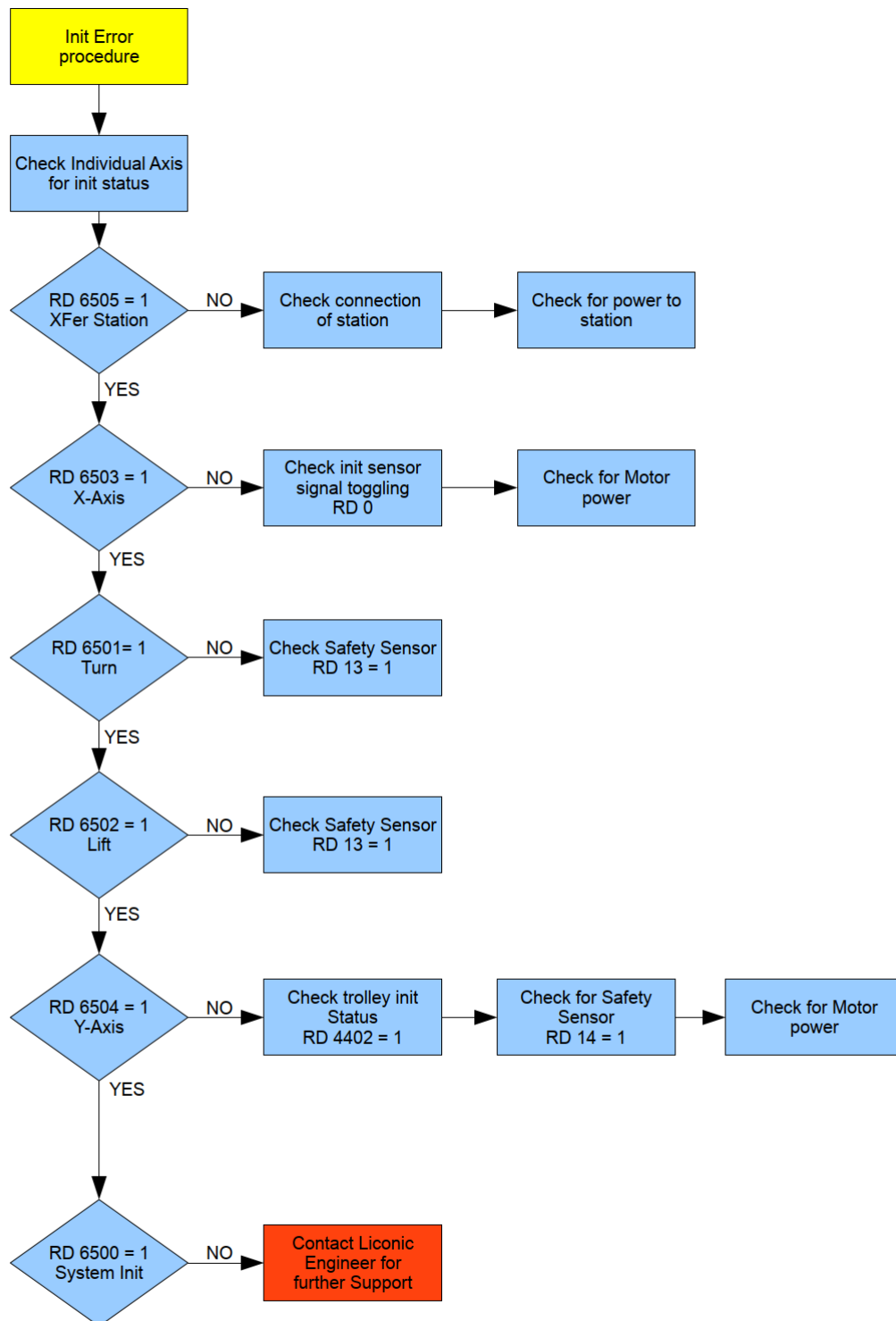
8.3.1 General



8.3.2 Free Shovel Procedure



8.3.3 Init Error Analysis



9. Technical Data

9.1 Mechanics

- Cassettes 60 storage cassettes
- Levels Depending on used lab ware
- Position drives Stepper Motor, bipolar, micro-stepping mode
- Shovel drive DC-Motor
- Gate Linear movement, heated
- Noise <82dBA / 1m
- RAL Color 9010

9.2 Electronics

9.2.1 Robotics

- Mains 110 / 230VAC, 50/60Hz
- Power consumption Handling Maximum: 1 kW,
Typical: 400 – 600 W

9.2.2 Cooling

- Mains 208 / 230VAC, 50/60Hz
- Power consumption cooling Maximum: 1 kW,
Typical: 600 W

9.2.3 Communication

- Handling communication Communication via RS-232
2=Controller RX, 3=Controller TX, 5=GND
7,8 and 4,6 shortened
- Barcode Communication Communication via RS-232
Straight connected serial extension
- Software Interface RESTful with XML command structure

9.3 Pneumatics

- Optional Gas Pressure <4 bar

9.4 Water (optional)

- Water consumption 3-5 l/min
- Pressure Difference 2.5 bar (max 10 bar Inlet)
- Water Temperature Inlet maximum: 18°C
Outlet regulated: 35°C

9.5 Cooling

Depending on the ordered configuration the cooling may work air or water cooled or a combination of both. Water cooling is recommended for the main cooling. The heat transfer out of the room/building is more efficient than through utilization of air. Air is a good addition for an optional backup cooling.

9.5.1 Air cooled

- Principle Single stage compressor, air cooled
- Working conditions Typical: 22°C; ~45% rH
max. Temperature: 26°C
- Type of refrigerant R449a
- Refrigerant charge 1.5 kg

9.5.2 Water cooled

- Principle Single stage compressor, water cooled
- Working conditions Typical: 22°C; ~45% rH
max. Temperature: 26°C
- Type of refrigerant R410a
- Refrigerant charge 1.5 kg

For detailed installation requirements refer to the section installation.

9.6 Overall Dimensions

System dimensions do depend on the configuration. Dimension for specific systems may be retrieved from LiCONiC according to the needs and room constraints.

9.7 Weights

System weights do depend on the configuration. Weights for specific systems may be retrieved from LiCONiC according to the needs and room constraints.

9.8 Ambient Ratings


| | | |
|------------|--------------------|--------------------------------|
| Operating: | Temperature: | 22 °C |
| | Relative humidity: | 45% or below (non- condensing) |
| Storage: | Temperature: | 10 – 40°C |
| | Relative humidity: | 50% or below (non- condensing) |

10. Appendix


10.1 Certificate of Decontamination


To guarantee safety and health for LiCONiC employees, contractors and agents we ask our customers to complete this document and sign it by a qualified person (a) before transporting by any means an article to LiCONiC for repair or service, or (b) prior to any on-site service to be performed by LiCONiC.
A completed copy of this certificate is required to be **attached to the instrument or spare part itself and to the outside of the packing container** when transporting it to a LiCONiC facility.

| |
|---|
| Instrument model, type or part name: |
| Serial number: |
| Reason for return / service: |
| Customer Reference number : |
| Name of LiCONiC Field Service Engineer (if applicable): |

| | |
|---|---|
|  | <input type="checkbox"/> The above LiCONiC device has not been exposed to chemical contaminants*.
<input type="checkbox"/> The above LiCONiC device has been exposed to the following chemical contaminants:
.....
.....
<input type="checkbox"/> The above LiCONiC device has successfully been decontaminated from all chemical contaminants; Method applied:
.....
<input type="checkbox"/> The above LiCONiC device is not completely decontaminated and still poses chemical risk. |
|---|---|

* Chemical contaminants: Chemical sensitizers, toxins, carcinogens, mutagens, teratogens and corrosive substances

| | |
|---|--|
|  | <input type="checkbox"/> The above LiCONiC device has not been exposed to infectious substances.
<input type="checkbox"/> The above LiCONiC device has been exposed to the following infectious substances:
.....
.....
<input type="checkbox"/> The above LiCONiC device has successfully been decontaminated from all infectious substances; Method applied:
.....
<input type="checkbox"/> The above LiCONiC device is not completely decontaminated and still poses biological risk. |
|---|--|

| | |
|---|--|
|  | <input type="checkbox"/> The above LiCONiC device has not been exposed to radioactive substances.
<input type="checkbox"/> The above LiCONiC device has been exposed to the following radioactive substances:
.....
..... |
| | <input type="checkbox"/> The above LiCONiC device has successfully been decontaminated from all radioactivity; Method applied:
..... |
| | <input type="checkbox"/> The above LiCONiC device is not completely decontaminated and still poses radioactive risk. |

I / we hereby confirm that the information supplied on this form is complete and accurate. The shipping of the item affected will be in accordance with the appropriate regulations covering packaging, transportation and labelling of dangerous substances. However, if damage or person injuries should occur due to wrong or incomplete data or incorrect shipping the originator of this declaration or their employer will be liable.

| | | | |
|---------------------------|--|------------|--|
| Customer
/
Company: | | Date: | |
| Responsible Person: | | Signature: | |

(in block letters)

10.2 Preventative Maintenance

10.2.1 Preventative Maintenance STT-Series

| | |
|------------------------------------|--|
| Maintenance protocol number | |
|------------------------------------|--|

| | | |
|---------------------------------------|------------------------------|----------|
| unit | STT 3K0 | |
| serial | | |
| specifications: | Camera | |
| <small>if appropriate mark it</small> | 1D-BCR | |
| | 2D-BCR | |
| | Numbers of trolleys | 6 |
| maintenance contract | PM | |
| <small>if appropriate mark it</small> | CS | |
| Date | | |
| Service Engineer | | |
| | <small>plain writing</small> | |

| current climate values | |
|------------------------|--|
| ULT Display | |
| Temp. Display | |
| RH Display | |
| KTY Display | |
| Temp. room | |
| RH room | |

(readings)

| | |
|-----------------|--|
| comments | |
| | |

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|-------------------------|-------------------------------|------------|----------|----------------------------|------------|------|
| X-axis assembly | Components | | | | | |
| | Rails | X | X | X | | |
| | Bearings | X | X | | | |
| | Rack rail | X | X | X | | |
| | Test wire harness connection | X | | | | |
| | Test camera wire connection | X | | | | |
| | Sensors and switches | X | X | | | |
| Y- axis assembly | Components | | | | | |
| | Rails | X | X | X | | |
| | Bearings | X | X | | | |
| | Rack rails | X | X | X | | |
| | Test wire harness connections | X | X | | | |
| | Test camera wire connection | X | X | | | |
| | Sensors and switches | X | X | | | |

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|--------------------------|-------------------------------|------------|----------|----------------------------|------------|------|
| Z-axis assembly | Components | | | | | |
| | Rails | X | X | X | | |
| | Bearings | X | X | | | |
| | Rack rail | X | X | X | | |
| | Test wire harness connections | X | X | | | |
| | Test camera wire connection | X | X | | | |
| | Sensors and switches | X | X | | | |
| handling assembly | Components | | | | | |
| | Shovel rail | X | X | | | |
| | Turn - gear | X | X | | | |
| | Z- break (solenoid) | X | X | | | |
| | BCR | X | X | | | |
| | Test camera wire connection | X | X | | | |
| | Test wire harness connections | X | X | | | |
| | Sensors and switches | X | X | | | |
| Trolley assembly | Components | | | | | |
| | Trolley rails left | X | X | X | | |
| | Trolley rails right | X | X | X | | |
| | Rack rail left | X | X | X | | |
| | Rack rail right | X | X | X | | |
| | Test wire harness connections | X | X | | | |
| | Sensor and switches | X | X | | | |
| Dryer | Components | | | | | |
| | De-Icing Dryer | X | X | | | |
| | Dampers | X | X | | | |
| | Dryer Fan | X | X | | | |
| | Test wire harness connections | X | X | | | |
| | Sensors and switches | X | X | | | |

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|---|---|------------|----------|----------------------------|------------|------|
| Main Cabinet & Moduls & Displays | Components | | | | | |
| | Test wire harness connection | X | | | | |
| | Test camera wire connection | X | | | | |
| | Sensors | X | | | | |
| | 24 volt power supply | X | | | | |
| | PLC module | X | | | | |
| | Hygro-Sensor | X | | | | |
| | ULT-Display | X | | | | |
| | Temp-/RH-Display | X | | | | |
| | KTY-Display Main-Agg | X | | | | |
| | KTY-Display Aux.-Agg | X | | | | |
| Overall unit | Components | | | | | |
| | Leveling | X | X | | | |
| | Outer doors | X | X | | | |
| | Inner door | X | | | | |
| | Door latch | X | | | | |
| | Ventilation | X | X | | | |
| Testing Unit | Components | | | | | |
| | Mechanical alignments (e.g. DM20, DM13X, DM23X, DM33X, DM43X) | X | | | | |
| | Firmware Update (If settings have been changed) | X | | | | |
| | Full test , load & unload plates | X | | | | |
| | New prev. maintenance label | X | | | | |

Parts were checked and replaced if necessary.

 Service Engineer
 (Signature)

10.2.2 Preventative Maintenance TubePicker

| | |
|------------------------------------|--|
| Maintenance protocol number | |
|------------------------------------|--|

| | | |
|---------------------------------------|-----------------------|--|
| unit | Tube Picker | |
| serial | | |
| specifications: | 1D-BCR | |
| <small>if appropriate mark it</small> | 2D-BCR | |
| | 24-Well Format Tubes | |
| | 48-Well Format Tubes | |
| | 96-Well Format Tubes | |
| | 384-Well Format Tubes | |
| maintenance contract | PM | |
| <small>if appropriate mark it</small> | CS | |
| Date | | |
| Service Engineer | | |

plain writing

| | |
|-----------------|--|
| comments | |
|-----------------|--|

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|-------------------------|----------------------|------------|----------|----------------------------|------------|------|
| X-axis assembly | Components | | | | | |
| | Rail | X | X | | | |
| | Rack rail | X | X | | | |
| | Bearings | X | X | | | |
| | Tension test | X | | | | |
| | Sensors and switches | X | X | | | |
| Y- axis assembly | Components | | | | | |
| | Rail | X | X | | | |
| | Rack rail | X | X | | | |
| | Bearings | X | X | | | |
| | Tension test | X | | | | |
| | Sensors and switches | X | X | | | |

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|-------------------------------|-------------------------------|------------|----------|----------------------------|------------|------|
| Z-axis assembly | Components | | | | | |
| | Rail | X | X | | | |
| | Rack rail | X | X | | | |
| | Bearings | X | X | | | |
| | Tension test | X | | | | |
| | Sensors and switches | X | X | | | |
| Lifter-axis assembly | Components | | | | | |
| | Rail | X | X | | | |
| | Rack rail | X | X | | | |
| | Bearings | X | X | | | |
| | Tension test | X | | | | |
| | Sensors and switches | X | X | | | |
| Retainer-axis assembly | Components | | | | | |
| | Rail | X | X | | | |
| | Rack rail | X | X | | | |
| | Bearings | X | X | | | |
| | Tension test | X | | | | |
| | Sensors and switches | X | X | | | |
| Gripper assembly | Components | | | | | |
| | flexures Gripper | X | | | | |
| | flexure safe | X | | | | |
| | Test wire harness connections | X | | | | |
| | Sensors | X | X | | | |
| General | Components | | | | | |
| | Tension test | X | | | | |
| | Test wire harness connections | X | X | | | |
| | Sensors and switches | X | X | | | |
| Electronics | Components | | | | | |
| | 24 volt power supply | X | X | | | |
| | PLC module | X | X | | | |
| | Wire harness connections | X | | | | |

| | | Inspection | Cleaning | Lubrication and parts swap | Adjustment | done |
|--------------|---|------------|----------|----------------------------|------------|------|
| Testing Unit | Components | | | | | |
| | Mechanical alignments (e.g. DM20) | X | | | | |
| | Firmware Update (If settings have been changed) | X | | | | |
| | Pitch, clearances | X | | | | |
| | Full test report , tubes picking / punching | X | | | | |
| | New prev. maintenance label | X | | | | |

Parts were checked and replaced if necessary.

 Service Engineer
 (Signature)