



STULZ the natural choice

## Operating instructions

Index 35A  
Edition 06.18

# Tel-Air-2

Air conditioner

230/1/50 - 400/3+N/50



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### Important

Read these operating instructions carefully and observe them before installing and using this A/C unit.

Keep this manual throughout the lifetime of the product.

This manual reflects the state of the art existing at the time the product is marketed and shall not be deemed to be inadequate for the sole reason that it has not been updated following new developments in design and construction methods.

STULZ reserves the right to update the product and relevant manual without being required to update previous products and manuals other than in exceptional circumstances. To require or receive any updates of the instructions manual or amendments thereto, which shall be deemed to be an integral part of the manual, please contact your local STULZ partner.



Observe the instructions contained in the section entitled  
Safety instructions.

**For three-phase scroll compressors: take care of correct phase sequence after the connection of the main power supply.**

The sequence is important for the correct sense of rotation of the 3-phase Scroll compressor. A loud noise coming from the compressor means it is turning in the wrong direction. If this continues for a few hours, it will overheat and irreparably damage the compressor. Correct compressor operation can be easily checked by measuring the temperature at the condenser outlet. If this temperature is noticeably higher than the external temperature, the compressors is working correctly. Otherwise, the compressor is turning in the wrong direction and the phase sequence must be changed.

# 1. Safety directions

This manual contains the basic instructions which must be respected during installation, use and maintenance of the unit. Therefore, installer and specialized personnel / user must read and respect these indications before mounting and commissioning the unit.



**Read carefully the whole information on this manual, with particular attention to the norms marked with the symbol on the left. Failure of conformity to these norms might cause damages to things, people, ambient and the unit itself.**

The manufacturer is not responsible for any misuse of air conditioner, as well as for non-authorized modifications and for the inobservance of instructions on this manual.



**This manual must be kept by the customer and made available to the installation, commissioning, use and maintenance personnel.**

SYMBOLS ON THIS MANUAL			LABELS ON THE UNIT	
	DANGER	RISK OF INJURY FOR OPERATOR AND POSSIBILITY OF DAMAGING THE UNIT		DANGER: MOVING COMPONENTS
	ATTENTION	INFORMATION OR WARNING OF CAUTION IN CARRYING OUT A PROCEDURE		DANGER: HOT COMPONENTS
	INFORMATION	IMPORTANT INFORMATION		DANGER: HIGH VOLTAGE

## 1.1 Attachments

The following documents are attached to this manual, as its integral part:

- Use and maintenance manual part 2, which contains the electrical drawing and the conformity declaration CE of the unit.
- User manual of the electronic controller.

## 1.2 General information

This air conditioning unit has been designed and built for a professional use according to applicable regulations. Please check the complete list of applicable regulations to the attached CE conformity declaration. It has been manufactured with high quality components, tested to certify its reliability and safety (see attached test report), and provided with warranty.

These operating instructions include the basic directions that must be complied with during system installation, operation and maintenance. Consequently both the installer and assigned specialized personnel/operators must read and comply with these directions before proceeding with installation and start-up. The instruction manual must always be available at the site where the system is used.



- **Works have to be carried out by competent staff only.**
- **Observance of regulations for accident prevention.**
- **Stay out of danger when lifting and setting off the unit.**
- **Secure the unit to avoid the risk of overturning.**
- **Do not climb on or enter the air conditioner.**
- **Do not remove protection panels. Safety devices may not be bypassed.**
- **Respect the corresponding EN and IEC standards for the electric connection of the unit and observe the conditions of power supply companies.**
- **Switch off the voltage from the unit when working on it.**



- **Observe the national regulations of the country where the unit will be installed.**
- **The refrigerant circuit contains refrigerant and refrigerating plant oil: observe professional disposal for maintenance and when setting the unit out of service.**
- **For transport, installation, either ordinary or extraordinary maintenance, operators and maintenance people must wear individual protection devices (i.e. gloves, glasses, helmet, shoes), according to the indications of safety manager and applicable regulations.**
- **The unit may only be used to cool according to the Stulz specification.**
- **Before any maintenance operation, read and follow instructions in the corresponding chapter.**



- **The manufacturer is not liable for damages caused by either a misuse or unauthorized modifications of the air conditioner.**
- **Any special opening tools have to be placed in a visible location nearby the unit.**

### **1.3 Handling refrigerants**

According to EN 378, refrigerants are divided in groups, concerning health and safety. Refrigerants used in Telecom Line units belongs to group L1 (non-flammable, non-toxic).

- Adherence to the regulations by law and guide-lines.
- Execution only by competent staff.
- Responsibility for correct disposal of refrigerant and system parts is incumbent on the operator (see chapter 'Uninstalling and disposal of the unit').
- Refrigerants have a narcotic effect when inhaled in high concentrations.
- The room is to be evacuated immediately if high concentrations of refrigerant suddenly occur. The room may only be entered again after adequate ventilation.
- If unavoidable work is required in presence of a high concentration of refrigerant, breathing apparatus must be worn. This does not mean simple filter masks. Comply with breathing protection data sheet.
- Safety glasses and safety gloves are to be worn.
- Do not eat, drink or smoke at work.
- Liquid refrigerant must not get onto the skin.
- Only use in well ventilated areas.
- Do not inhale refrigerant vapours.
- Warn against intentional misuse.
- Remove refrigerant from the system before performing any welding or brazing works.
- Weld and braze air conditioning systems without refrigerants only in suitably ventilated rooms.
- If the system emits a pungent smell this means that the refrigerant has decomposed due to overheating. Immediately leave the room and return only after it has been suitably ventilated or when wearing a gas mask for acid gases.
- It is absolutely essential to comply with the first aid measures if accidents occur.
- Refrigerants containing FCs contribute to the global warming and with this to climate changes. The FCs must therefore be disposed of in accordance with the regulations, i.e. only by companies specially qualified and licensed as recognised disposal companies for refrigerants (see chapter 'Uninstalling and disposal of the unit').

### **1.4 Safety and environmental requirements**

The following requirements relate to the operation of refrigerating plants within the European Community.

- The used components must correspond to the pressure equipment guide-line 2014/68/EU and EN 378 part 1-4.
- Independent of the design, the equipment and inspection before the delivery, also the operator of such plants has duties according to EN 378 and national regulations.

This concerns the installation, the operation and the repeated inspection:

Installation: according to EN 378

Operation: Determination of emergency measures (accidents, malfunctions)  
Creation of an abbreviated instruction and notification (template page)  
a. A unit protocol must be kept  
b. To be stored in the proximity of the unit  
c. Access for competent staff in case of repairs and repeated inspection must be ensured.

Repeated inspection: according to EN 378. The operator is responsible for the execution.

The operator must ensure that all maintenance, inspection and assembly work is carried out by authorised and qualified specialist staff who have made an in-depth study of the operating instructions.

It is absolutely essential to comply with the procedure for shutting down the system described in the operating instructions. Before maintenance work, the unit must be switched off at the main switch and a warning sign displayed to prevent unintentional switching-on.

Efficiency of safety devices must be kept during the whole life cycle of the unit. In order to perform this task, please follow the prescription given in Chapter 9.

### **First aid measures**

- If health problems occur during or after handling fluorinated hydrocarbons, a doctor is to be consulted immediately. The doctor is to be informed that the work involved the use of fluorinated hydrocarbons.
- In the case of acute effects, the casualty is to be brought into the fresh air as quickly as possible.
- The casualty must never be left unsupervised.
- If the casualty is not breathing, initiate mouth-to-mouth resuscitation immediately.
- If the casualty is unconscious or very dazed he or she must not be given any liquid.
- Splashes of fluorinated hydrocarbons in the eyes can be removed by an assistant by blowing air or using a fan. Then rinse with water.
- Independent conversion and manufacture of replacement parts.
- The system may only be converted or modified after consultation with STULZ. Original replacement parts and replacement parts/accessories authorized by STULZ are an aid to safety.

### **Independent conversion and manufacture of replacement parts**

The system may only be converted or modified after consultation with STULZ. Original replacement parts and replacement parts/accessories authorized by STULZ are an aid to safety.

### **Unacceptable operating methods**

The operating safety of the system is only guaranteed when it is used as intended. The limit values stipulated in the technical data must not be exceeded under any circumstances.

## 2. Unit identification

### Technical name-plate

This unit can be correctly identified by the technical name-plate containing all the information for its correct use.

The name-plate is attached both to the external casing of the unit (generally on one of the sides) and to the door of the electrical panel.

In addition to the manufacturer's identification data and the product trademarks, the name-plate contains the following information:

		Manufactured by STULZ S.p.A. Via E. Torricelli 3, 37087 Valeggio sul Mincio (VR)			
					
<b>CONDIZIONATORE D'ARIA - AIR CONDITIONER</b> <b>KUHLAGGREGAT - CONDITIONNEUR</b>					
<b>MODELLO - MODEL - TYP - MODELE</b>		<b>TLF40FT142C2A0 7035</b>			
<b>SERIE - SERIES - SERIE - SERIE</b>		<b>N°</b>			
<b>ORDINE - ORDER - BESTELLUNG - COMMANDE</b>		<b>OP-</b>			
<b>DATA - DATE - DATUM - DATE</b>		<b>21/12/2016</b>			
<b>Tensione nominale - Rated voltage - Nennspannung - Tension nominale</b>					
<b>400V 3N 50Hz -</b>					
<b>Avviamento/marcia - Starting/run current - Anlaufstrom/Nennstrom - Demarrage/marche</b>					
<b>22/6,06 A</b>					
<b>Resa nom. - Cooling cap. - Kaelteleistung - Puissance nominale</b>					
<b>4,6 kW (L30L36RH30%)</b>					
<b>Potenza Assorbita - Input power - Leistungsaufnahme - Puissance absorbee</b>					
<b>2,13 kW (L30L36RH30%)</b>					
<b>Potenza assorbita in riscaldamento - Heating power consumption - Aufnahmeleistung der E-Heizung - puissance absorbee en chauffage</b>					
<b>1,6 Kw</b>					
<b>Carica gas - Filling capacity - Fuelmenge - Charge de gaz</b>					
<b>2 kg</b>					
<b>Refrigerante tipo - Refrigerant type - Kaeltemittel - Refrigerant tyj</b>					
<b>R407C</b>					
<b>Grado di Protezione IP - Degree of protection IP - Schutzart IP - Degré de protection IP</b>					
 <b>IP X4</b>					
<b>Peso - Weight - Gewicht - Poids</b>					
<b>170 kg</b>					
<b>TSS (Max temp. di stoccaggio - Max Storage temp. - Max Lagertemperatur - Temp. Max d'emmagasinage)</b>					
<b>60 °C</b>					
<b>TS MAX (Refrigerante - Refrigerant - Kaeltemittel - Refrigerant)</b>					
<b>86 °C</b>					
<b>TS MIN (Refrigerante - Refrigerant - Kaeltemittel - Refrigerant)</b>					
<b>-10 °C</b>					
<b>PS HP (Max pressione ammissibile HP - Max allowable pressure HP - Max zulassiger Druck HP - Pression max admise HP)</b>					
<b>28,6 bar</b>					
<b>PS LP (Max pressione ammissibile LP - Max allowable pressure LP - Max zulassiger Druck LP - Pression max admise LP)</b>					
<b>20 bar</b>					
<b>CAT PED</b>					
<b>3.3</b>					
Contiene gas fluorati ad effetto serra disciplinati dal protocollo di Kyoto - Device containing HFC fluids causing greenhouse effect regulated by kyoto protocol - Das Gerät enthält wie vom Kyoto-Protokoll geregelte Fluorkohlenwasserstoffe Treibhausgasen - Dispositif contenant fluides HFC à effet de serre disciplinés par le protocole de Kyoto					
<b>MADE IN ITALY</b>					

Example of name-plate. Data are purely an example.

The technical name-plate is embossed on a plastic support which ensures high endurance of the text even in particularly difficult environments.

 **For any assistance or information concerning the unit described in this manual, knowledge of its serial number is essential.**

**\*Nominal conditions:**

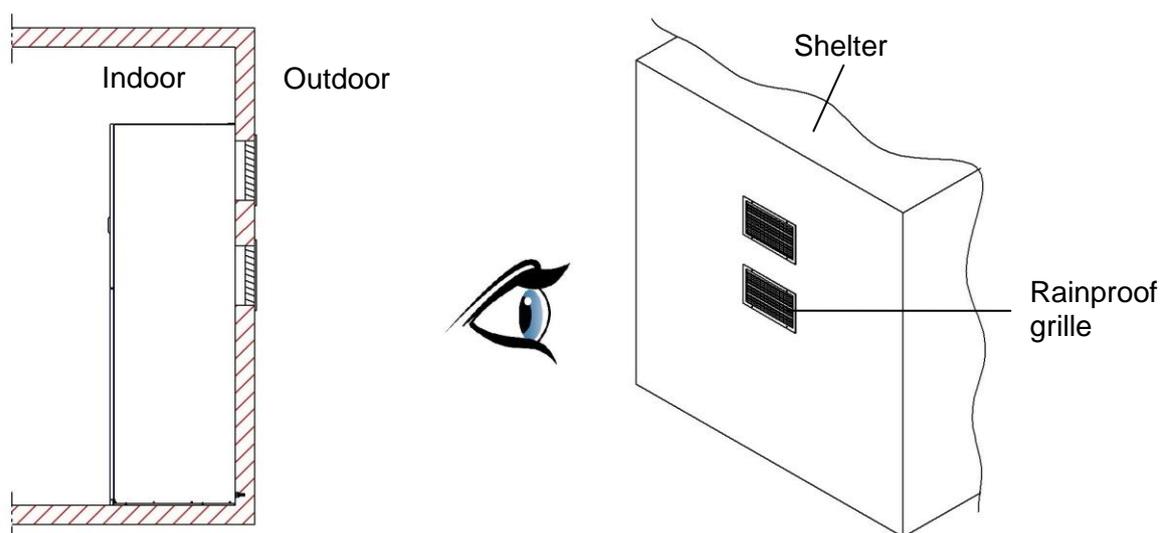
30°C (RH 30%) inside shelter temperature and 35°C ambient temperature

## IP protection degree

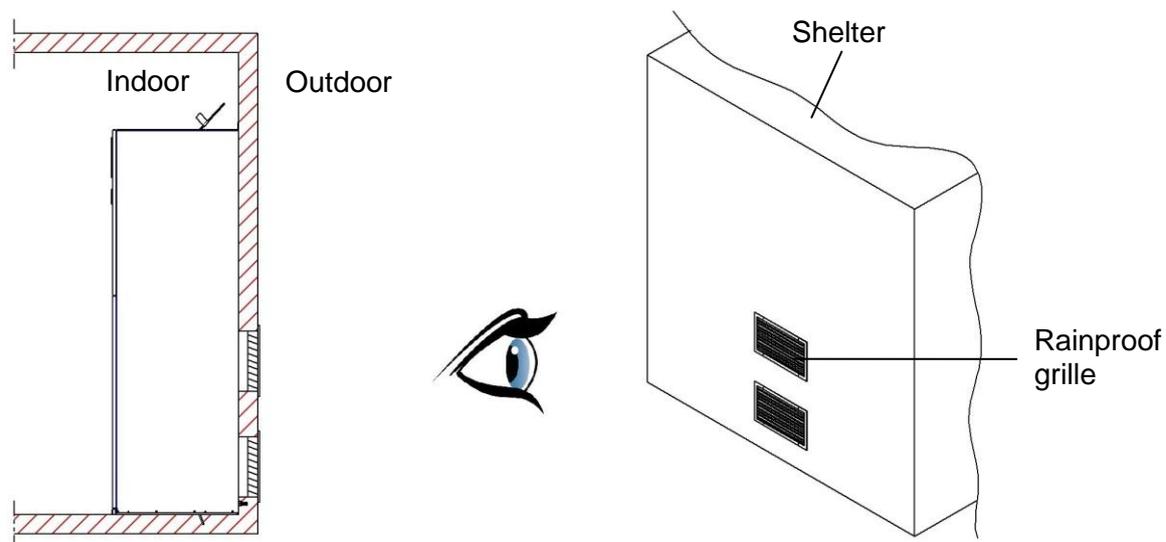
**i** IP protection degree is the protection, from the outdoor environment, of the unit when installed in its normal use.

The IP protection degree of STULZ Tel-Air-2 unit, installed combined with a suitable external rainproof grille (available as Stulz accessory ACTGRxxTL), is IPX4, therefore the unit is protected from harmful effects of splashing of water against the enclosure from any direction (according to EN 60529, considering the prescriptions of EN 60335).

### TLF/TLD units:

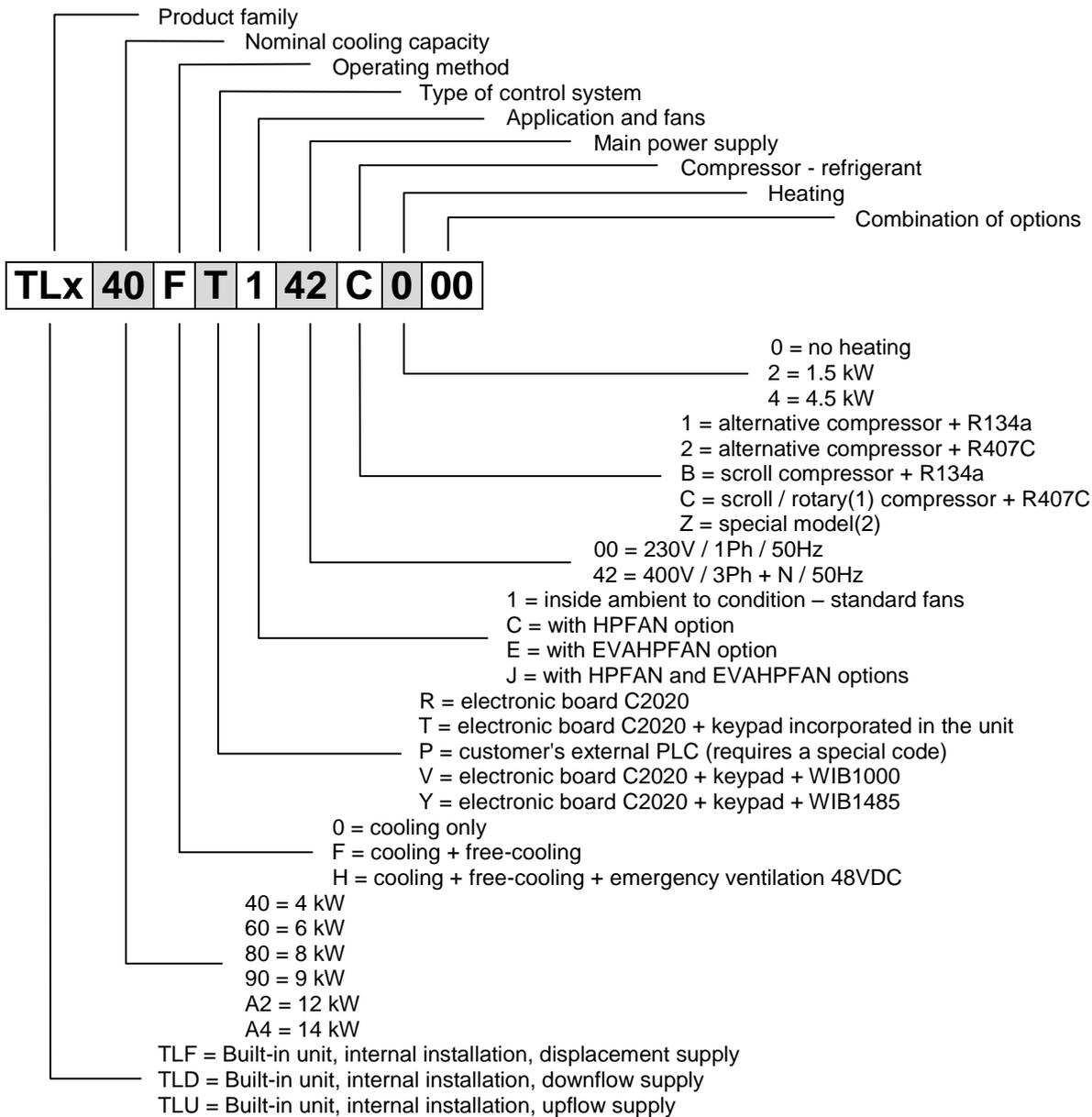


### TLU units:



**Code**

The table summarises the available options for the Tel-Air-2 family. Some of the options or combinations are not available on all the products in the family.



**(1) rotary compressor is used on single-phase model of TLx40 with R407C.**



**(2) special models are identified with a Z in the fourth to last digit of the code. The 3 digits following the Z lose their original meaning and act as the progressive number for special versions.**

## 2.1 Intended and non-intended use

### Intended use

STULZ Tel-Air-2 conditioners are designed to cool rooms containing technological systems, suitably protected from weather. Their use eliminates the problems caused by high temperatures, dirt and humidity present in the area where they are installed.

STULZ Tel-Air-2 units are designed to be installed inside a shelter / room whose internal side is not accessible to the general public (see EN 60335-2-40, paragraph 3.119).

Additionally, STULZ Tel-Air-2 conditioners are designed to operate in an upright position. For all models the compressor is and must always be in an upright position.



**The conditioners may not be used or transported in a position other than that for which they have been designed. STULZ declines all liability deriving from failure to observe the above.**

### Non-intended use

Air conditioner cannot be installed on movable, vibrating, oscillating, tilted (non-levelled) parts. Generally, air conditioner cannot be installed in the following areas:

- with strong heat radiation
- with strong magnetic fields
- with free flames
- with fire risk
- with inflammable products
- with explosive atmosphere
- with saline atmosphere
- with aggressive atmosphere

For any doubt, please consult the manufacturer.

## **3. Components and operating principle**

### **3.1 Layout of components**

#### **TLF – DISPLACEMENT SUPPLY**

The internal air return is located in the roof of the unit. Taken in by the radial fan located at the bottom of the unit behind the supply opening, the air crosses the treatment filter in the centre of the unit, is blown onto the evaporator coil and leaves from the opening in the lower front panel.

On TLF size 1, the compressor is beside the electrical panel, over the evaporator fan. On TLF size 2, the compressor is fixed to the base of the unit, under the evaporator coil and beside the evaporator fan.

The conditioner is controlled by the electronic board in the electrical panel, located behind the lower front panel and closed by a protective cover. The display indicating operating states and parameters and used to modify board parameters is located on the upper front panel.

The through holes for the power cables and the electronic board input / output signal connectors are located on the roof of the unit.

The condensate drainage system is located at the rear.

#### **TLD – DOWNFLOW SUPPLY**

Lay-out is the same as TLF units, but cooled air is supplied through an opening on the base of the unit, not from lower frontal panel.

#### **TLU – UPFLOW SUPPLY**

The internal air return is located in the lower frontal panel of the unit. Taken in by the radial fan located at the top of the unit behind the supply opening, the air crosses the treatment filter in the centre of the unit, is blown onto the evaporator coil and leaves from the opening in the upper front panel.

The compressor is fixed to a support in the centre of the unit, in front of the evaporator coil.

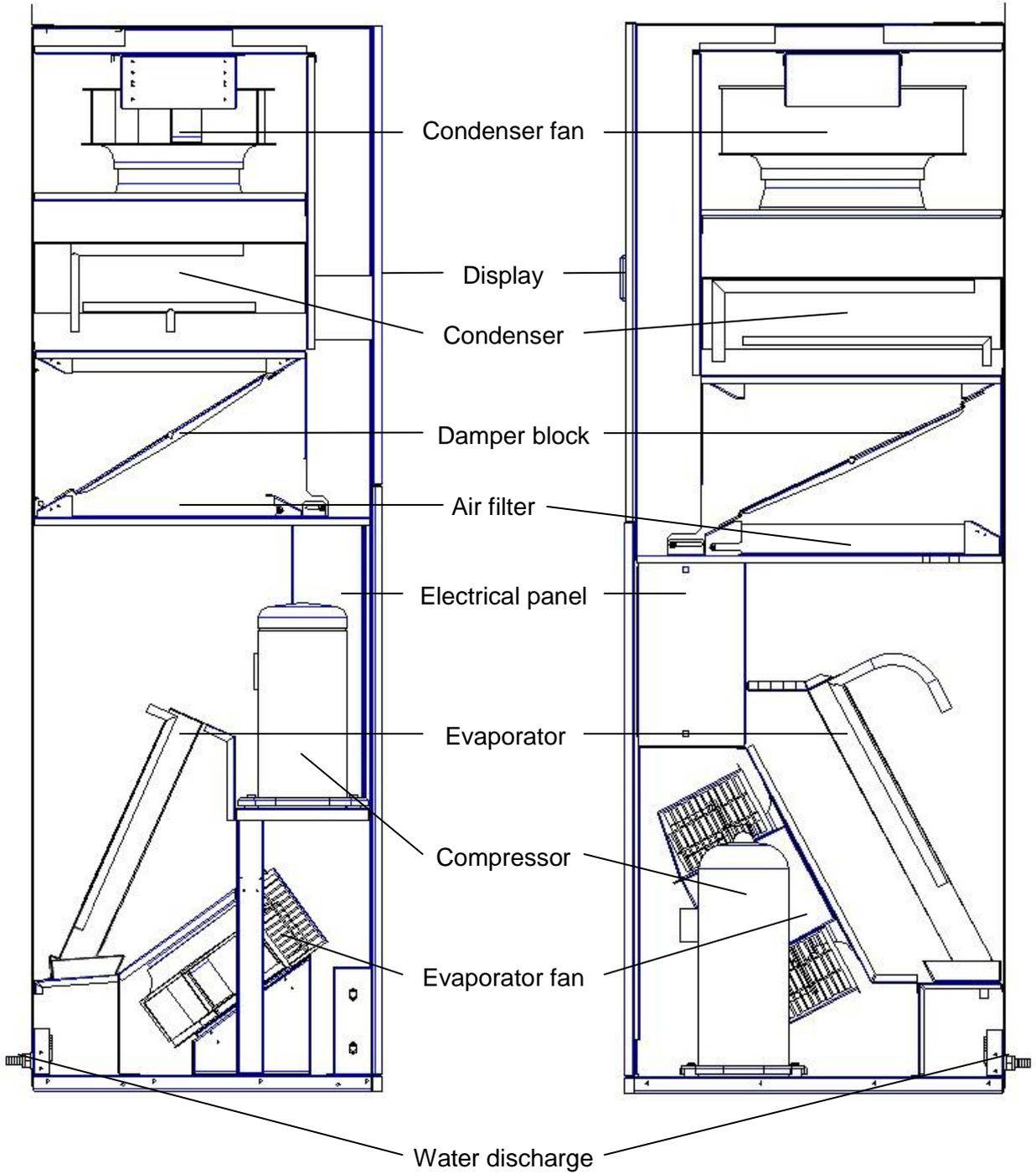
The conditioner is controlled by the electronic board in the electrical panel, located behind the upper front panel and closed by a protective cover. The display indicating operating states and parameters and used to modify board parameters is located on the upper front panel.

The through holes for the power cables and the electronic board input / output signal connectors are located on the roof of the unit.

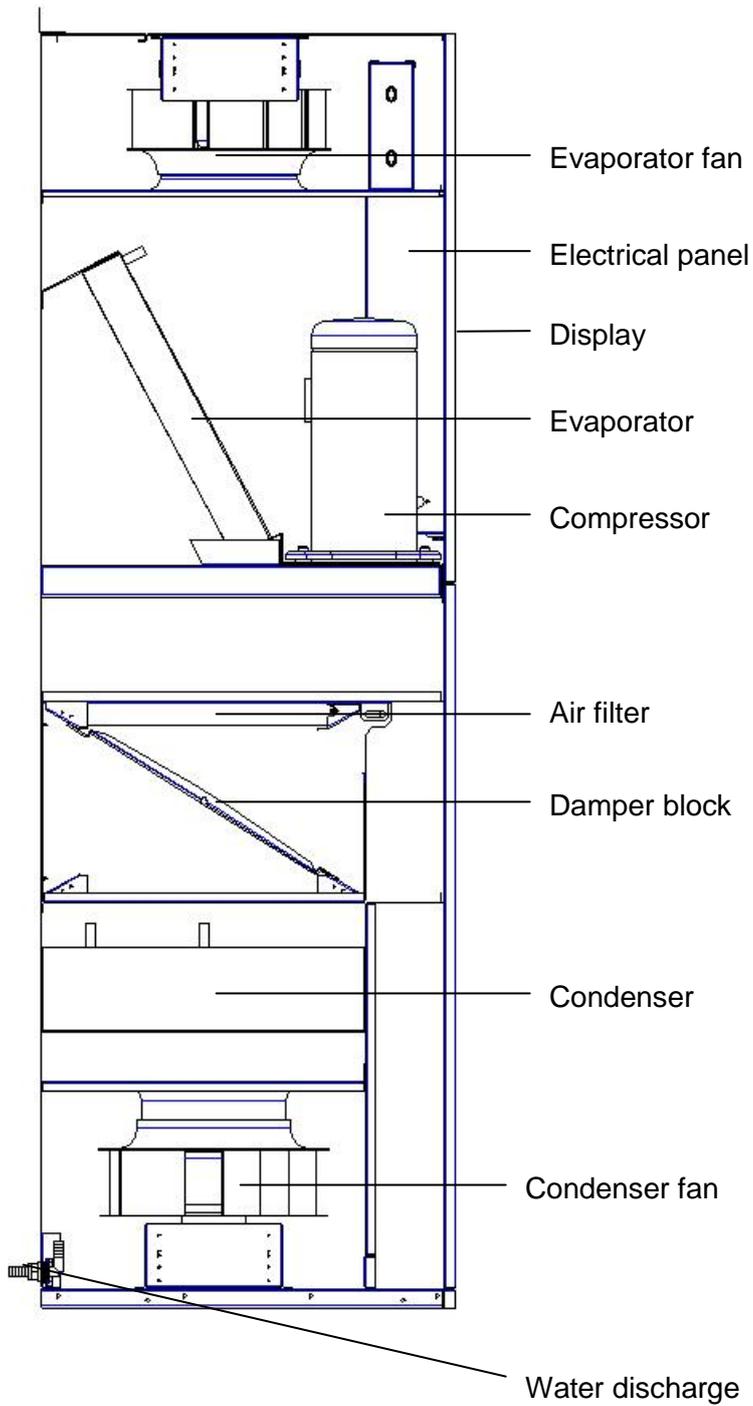
The condensate drainage system is located at the rear.

TLF/TLD 40-60

TLF/TLD 80-A4

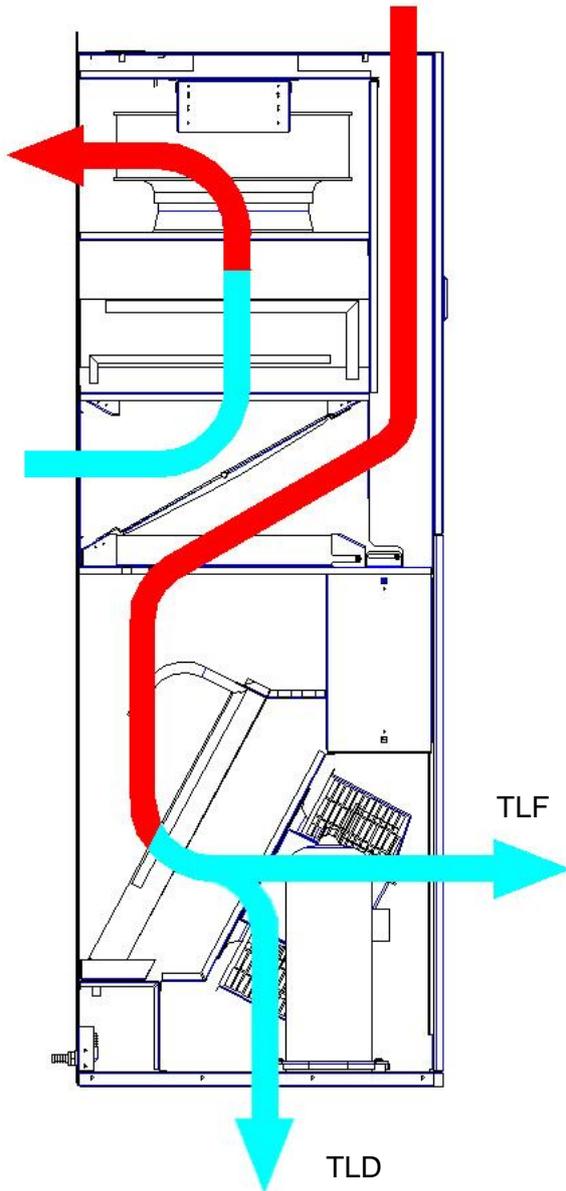


Layout of the internal TLF/TLD components

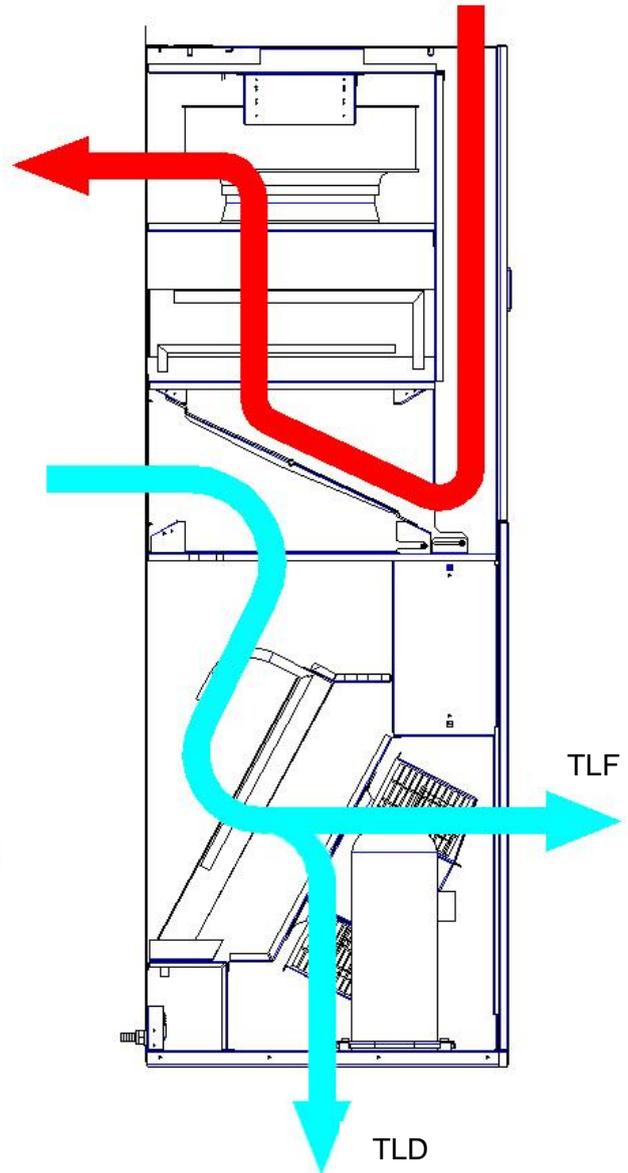


Layout of the internal TLU components

COOLING



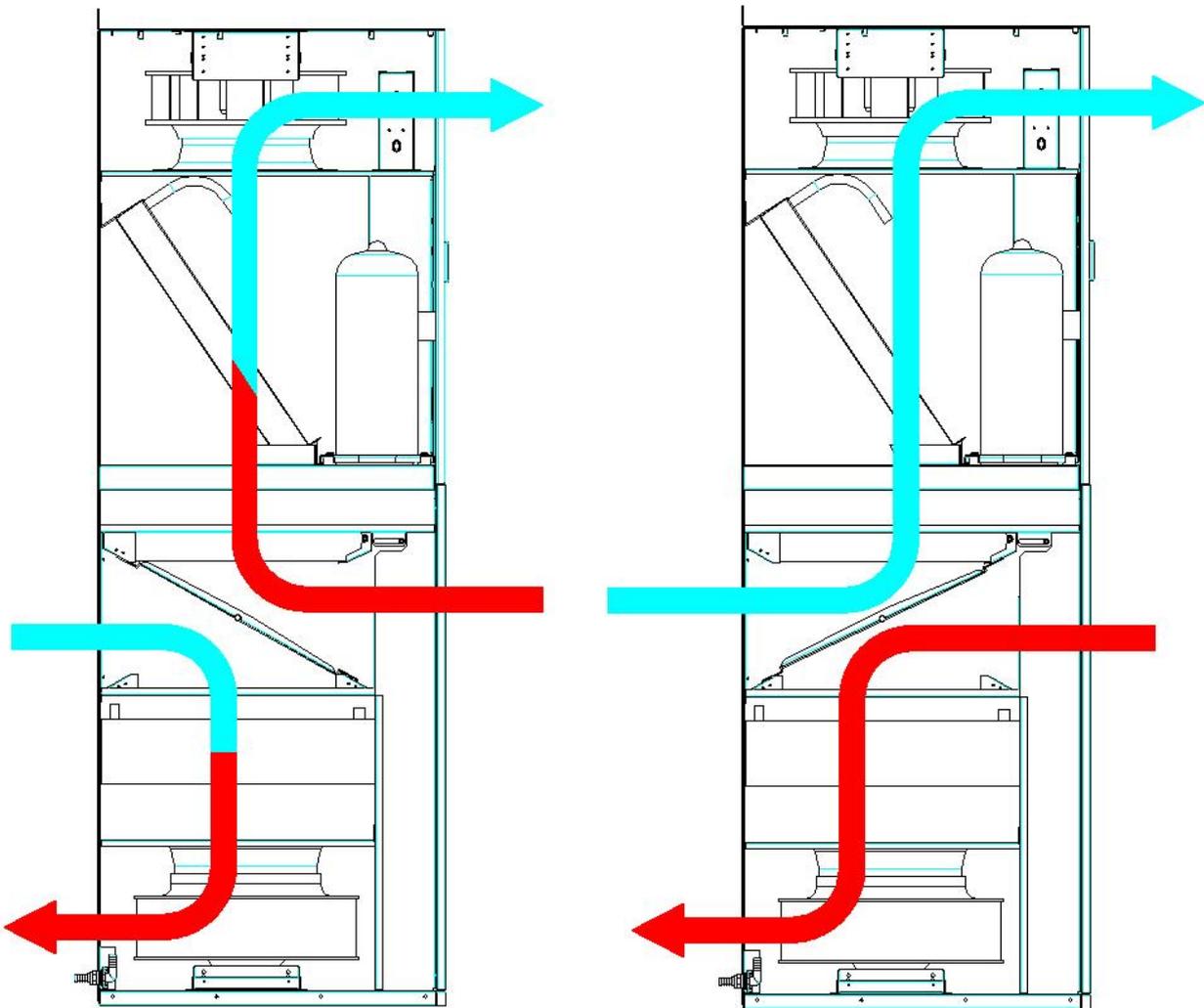
FREE-COOLING



Air flow diagram TLF/TLD units (a unit size 2 is shown in these drawings)

COOLING

FREE-COOLING



Air flow diagram TLU units (a unit size 2 is shown in these drawings)

## 3.2 Operating method

### Cooling

The shelter air is taken in by the radial fan, filtered and then cooled as it crosses the evaporator coil. The treated air is then returned to the shelter through the supply air opening. The compressor operates in order to cool the air.

### Free-cooling

There is a damper equipped with servomotor which directs internal and external air flows. The damper is located in the central part of the conditioner. External air is taken in through an opening near the damper while the internal air is discharged by overpressure through an opening located above (TLF/TLD) or below (TLU) the other one.

This damper is proportionally controlled by a modulating signal from the C2020 controller. Its position can be adjusted from 0 to 100% of fresh air, to regulate free-cooling capacity.

### Assisted free-cooling

When the temperature of the external air is low enough to enable the free-cooling mode, but the effect of this operating mode is not sufficient to keep the internal temperature within the required range, the compressor is switched on while the free-cooling damper remains open. In this way, the evaporator cools the external air rather than the internal re-circulating air, combining the benefits of the free-cooling and the cooling modes.

### Emergency ventilation (optional)

When there is a power failure, part of the unit (evaporator fans, control components and the free-cooling damper motor) is powered by an emergency 48 VDC power supply. In this way, continuous circulation of air inside the shelter is always assured. This circulation of air is combined with free-cooling when the conditions required to enable this mode are satisfied.



**Units with direct current emergency ventilation always require an external direct current power line even when mains power is present.**

### Heating (optional)

With the heating elements option, the units include an electric heating element. When the temperature is low, the heating coil turns on (compressor off) and the free-cooling damper is in complete re-circulation position, in order to heat internal air. This mode is controlled by the C2020 microprocessor.

### **3.3 Mechanical parts**

#### **Structure**

These machines are built using self-supporting panels made of painted galvanised sheet metal to guarantee good corrosion resistance (not suitable for corrosive and saline environments). They make the machine easy to inspect and, at the same time, offer adequate protection to its internal components. The external panels are internally lined with a 3 mm layer of sound-absorbing material.

The internal components of the unit can be accessed by simply removing the cladding panels. This is done by undoing their fastening screws.

#### **Air filter**

Belonging to class G4, it is designed to prevent large dirt particles present in the environment from obstructing airflow through the evaporator.

#### **Drip-tray**

Made of sheet aluminium, it is located under the evaporator coil to collect the moisture from the internal air which condenses on the surface of the coil during cooling. It is fitted with a union for external drainage.

#### **Damper**

This damper, fitted in units featuring the free-cooling option, consists of a metal baffle powered by a servomotor for directing inside and outside air flows. The damper body is made of galvanised sheet metal.

### **3.4 Cooling components**

The unit comprises a hermetic cooling circuit consisting of a compressor, condenser, refrigerant filter, thermostatic valve and evaporator. The air inside the shelter is cooled without coming into contact with the external air in cooling mode.

The system works as follows:

The compressor compresses the refrigerant gas bringing it to a high pressure and temperature. The hot gas, by going through the condenser, is cooled and liquefied thus releasing heat to the air in the environment. Pushed through the thermal expansion valve, the liquid refrigerant loses pressure, which makes it prone to evaporation. This takes place in the evaporator, where the refrigerant absorbs the heat of the warm air from the shelter, which is therefore cooled.

The circuit components are connected together by copper piping, appropriately welded to ensure a greater seal. Schrader service valves are fitted internally on the compressor intake and return lines.

#### **Refrigerant**

The refrigerant that is used is R407C (HFC). Optional: R134a.

**Compressor**

A reciprocating compressor is used for the TLx40 model with 400V/3Ph+N/50Hz power supply. TLx40 with 230V/1Ph/50Hz power supply is provided with a rotary compressor. Scroll compressors are used for all the other models.

Compressors are basically composed of an electric motor and a mechanical section which is powered by this motor for pumping the refrigerant gas.

In reciprocating compressors the pumping unit consists of a piston which slides inside a cylinder and which generates, depending on its phase, compression and aspiration.

In rotary compressors, the pumping unit consists of a rotor with sliding blades, inside a stator. As the rotor turns, compression is obtained with space reduction between rotor, blades and stator.

In scroll compressors the pumping unit consists of two spirals positioned one inside the other. One spiral is fixed while the other performs orbital motion which aspirates and compresses the gas.

**Condenser**

This part allows the release of the heat of the coolant gas in the environment. It consists of an exchange pack with copper piping and aluminium fins (suitable only for non-corrosive and non-salty environments).

**Filter dryer**

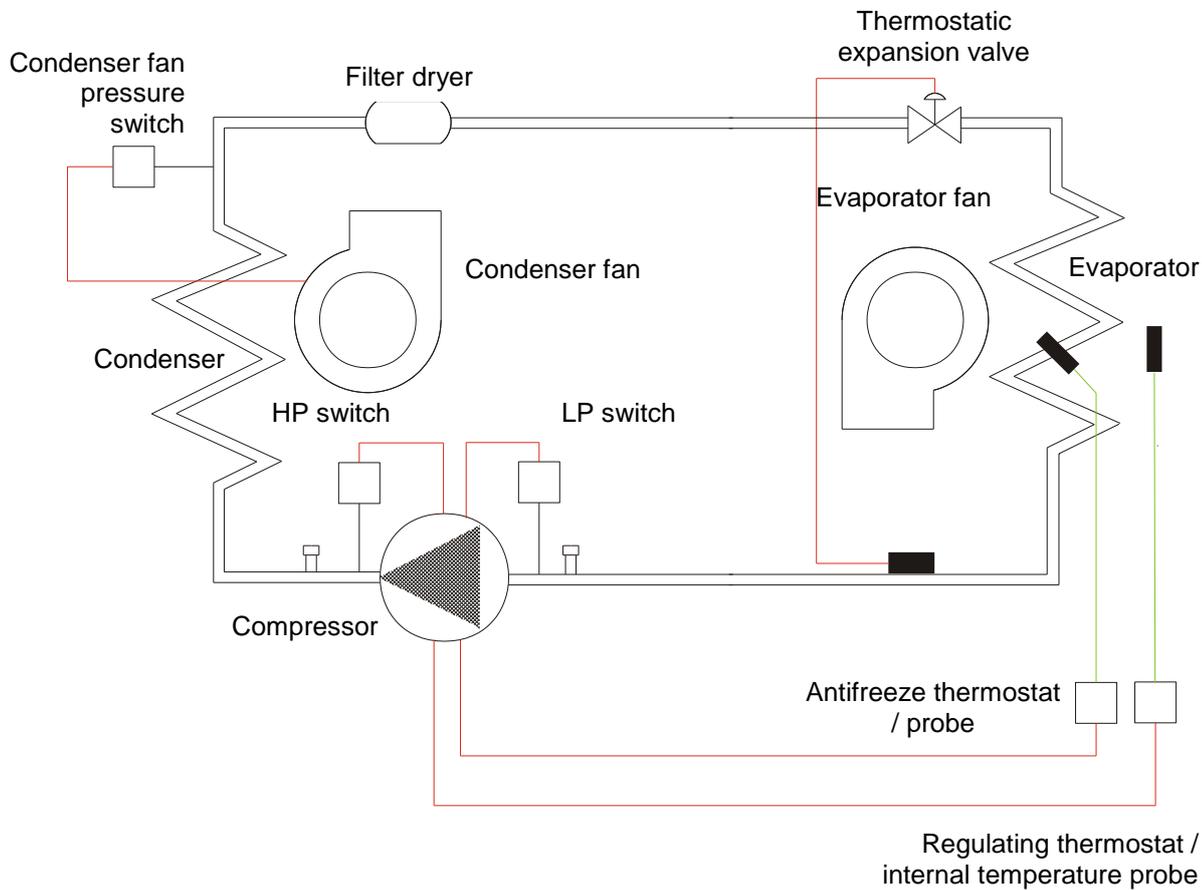
This is a mixed mechanical/chemical filter and serves the purpose of filtering the coolant which goes through it, at the same time eliminating humidity particles.

**Thermostatic valve**

This adapts coolant evaporation pressure, inside the evaporator exchanger, to the real thermal load. This component is factory set during testing and must not be tampered with.

**Evaporator**

This is the part where the transfer of the heat, contained in the air in the shelter, to the coolant gas takes place. It consists of copper pipes and aluminium fins (suitable only for non-corrosive and non-salty environments).



### 3.5 Motors

#### Compressor

Electric motor positioned inside the compressor. It is mounted on vibration dampers to reduce vibrations.

#### Fans

The fans are radial, with plastic or metal rotor, mounted on bearings. These fans are manufactured in accordance with Standard EN 60335-1 or Standard EN 60034-1 (depending on the model). They are treated with anticorrosion plastic materials, with class B or F insulation (depending on the model) and class I protection (according to Standard EN 50178 and EN60335-1). The motor protection varies from IP42 (only evaporator fans) to IP44 and IP54 depending on the model of conditioner, in accordance with Standard DIN EN 60034-5.

Noise levels are consistent with Standard DIN EN 45635 part 1 or ISO 3745.

#### Damper servomotor

Electric servomotor with built-in travel stop switch and overload protection.

Protection degree: IP54 Protection class: III

### 3.6 Control, Monitoring and Safety Components

All equipment is set and inspected at the factory and generally does not require further adjustments or interventions.

If, for specific reasons, it becomes necessary to perform modifications on the settings of automatic device this task must only be performed, subsequent to notification to the STULZ engineering service, by specialized product expert.

STULZ air conditioner are equipped with a set of devices designed to ensure proper operation. Intervention by any one of these automatic safety device is a sign of a malfunction and it is absolutely necessary to eliminate the cause of the malfunction.



**It is prohibited to make electrical by-passes on safety equipment. This intervention, in addition to being dangerous, also immediately invalidates guarantee coverage for the product.**



**Interrupt electrical power to the unit before performing any repair or maintenance.**

**Work on the unit must only be done by expert, qualified and authorized personnel.**

#### High pressure safety switch

Stops compressor operation when the pressure inside the refrigeration circuit exceeds the following value. OFF 29,5 bar ON 24,5 bar

#### Low pressure safety switch

Stops compressor operation when the pressure inside the refrigeration circuit drops below the following value. OFF 0,4 bar ON 1,5 bar

#### Contactors

Control the motors by operating with auxiliary voltage. They refer to IEC947-4-1 standards.

#### Automatic circuit breakers

Protect against short circuits and excessive motor current. They have adjustable thermal and magnetic triggering devices.

#### Mechanical safety thermostat of heating elements (if present)

Protects the heating elements by cutting off the power supply in case of excessive surface temperature of the heating elements. The thermostat is adjusted to 90°C.

#### Autotransformer

This device is necessary, when the power supply voltage differs from the standard voltage. The autotransformer adapts the supplied voltage to the standard voltage.

It is manufactured in compliance with EN60742 and CEI14-6 standards. When the space is sufficient, it is installed in the unit.

**STANDARD COMPONENTS with ELECTRONIC CONTROL**

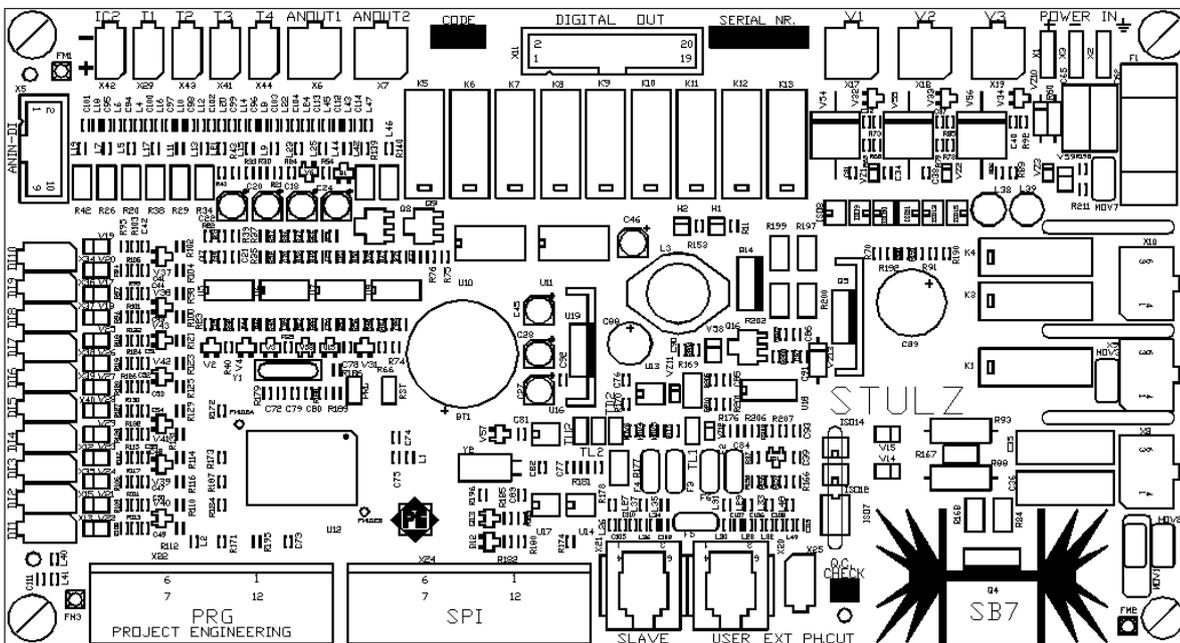
**C2020 I/O CONTROLLER**

This microprocessor-based electronic board is equipped with a set of terminals which are necessary to connect the board to the controlled devices (e.g. valves, compressors, fans). Software with working logic and parameter settings are written in the EEPROM so that they remain permanently stored even in case of power failure.

C2020 controller is housed inside the electrical panel and can control only one air conditioner. C2020 controllers on different units (up to 5) can be connected in a LAN for the facility of data transfer (e.g. for sequencing).

A keypad can be connected to C2020 to display information about working conditions, status of the air conditioner and eventual alarms. If option code KPDC1010BI is ordered, the keypad of Tel-Air-2 units is installed on-board and accessible from the front side of the unit without removing any panels. Ordering accessory ACTKPDC1010, it is possible to choose also the wall-mounted version (not inside the unit), provided in a separate plastic box. When two or more units are linked in a sequencing LAN, with only one keypad connected to the master controller it is possible to display data of all units, selecting it via the keypad itself.

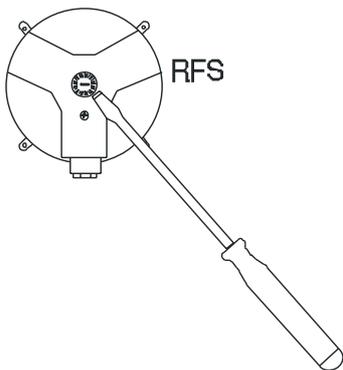
C2020 controller can be optionally linked to a supervisory/telemonitoring system via serial line, providing it with the necessary options.



**For controller input / output assignation, please refer to the electrical diagram on part 2 manual, specific for each unit.**

**Dirty filter alarm device RFS – air flow alarm FL**

It provides a signal, via the display; which indicates the need to service the air filter

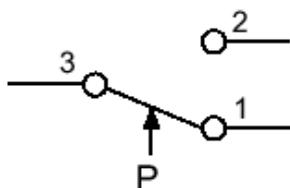


Range : 0.4 - 2.0 mbar  
 Differential press. : 0.2 mbar + 15%  
 P1 : Connection of the high pressure  
 P2 : Connection of the low pressure  
 Adjustment:  
 Using a screwdriver, you can adjust the desired differential pressure, over which the filter control triggers, at the central screw.

**Technical features:**

Power supply:	1.5 (0.4) A; 250 Vac - 0.1 A; 24 Vac
Humidity:	0...50% rel. h., non condensing
Operating temperature:	-20/+85°C
Max. pressure:	50 mbar
Contacts:	Micro switch with contacts of AgCdO (on/off)
Housing:	Plastic
Protection:	IP54
Protection class:	I
Diaphragm:	Silicone
Pressure connection:	Ø 6 tube

**Wiring :**



Contact 3-1 opens, when the differential pressure increases to the adjusted value. Simultaneously contact 3-2 closes, the signal is transmitted by this contact.

## 4. Technical data and drawings

### 4.1 Application limits

Operation limits		
Outside operating limit temperature (with R407C)	Min	-20°
	Max	+50°
Inside operating limit temperature	Min	+20°
	Max	+40°
Return air humidity	Min	5,5 °C dew point
	Max	60% r.h. and 15 °C dew point
Nominal power supply		400 V / 3 ph +N / 50 Hz
Voltage tolerance		± 10%
Frequency tolerance		± 2%
Storage limits		
Temperature	Min	-20°
	Max	+50°
Humidity		90%

### 4.2 Technical data

#### NOTES ON TECHNICAL DATA:

- \* Inclusive of power absorbed by evaporator fans. External temperature 35°C / internal temperature 30°C / internal relative humidity 30%.
- \*\* Sound pressure level at 2 m obtained from the measured sound power according to the EN ISO 9614-2 on normal condition of use and nominal operating condition.

Technical data TLD/F 40-TLD/F 80							
MODEL		TLD/F 40		TLD/F 60		TLD/F 80	
Total cooling capacity*	kW	4,8	4,3	5,7		8,2	
Sensible cooling capacity*	kW	4,8	4,3	5,7		8,2	
Refrigerant		R407C		R407C		R407C	
Refrigerant charge	kg	2		1,9		3,2	
EER index (with evap. fan in direct current)*	W/W	2,36	3,12	3,02		3,49	
EER index (with evap. fan in alternating current)*	W/W	2,36	3,12	2,97		3,45	
Outside operating limit temperatures min/max	°C	-20 / +50		-20 / +50		-20 / +45	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	53		55		61	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	64		64		64	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	64		64		64	
Duty cycle	%	100		100		100	
Weight	kg	170		190		250	
Height	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	600		600		900	
Depth	mm	650		650		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	1600		2000		3000	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	1000		1500		2000	
Air flow in free-cooling mode	m <sup>3</sup> /h	800		1200		1600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	1,8	1,2	1,6		1,8	
Operating current (OA)*	A	4,0	5,9	3,0	7,9	3,5	8,7
Maximum operating current (FLA)	A	5,4	6,7	4,2	11,4	5,1	14,8
Locked rotor current (LRA)	A	22	33	24	47	32	61
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,13		0,19		0,40	
Operating current (OA)*		0,60		0,87		1,9	
Maximum operating current (FLA)	A	1,0		1,0		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36÷57		36÷57		36÷57	
Power consumption*	kW	0,1		0,1		0,15	
Operating current at 48V (OA)*	A	2,4		2,4		3,2	
Maximum operating current at 48V (FLA)	A	2,6		7,3		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,1		0,13		0,18	
Operating current (OA)*	A	0,45		0,59		0,91	
Maximum operating current (FLA)	A	0,6		1,2		2,4	

Technical data TLD/F 90-TLD/F A4							
MODEL		TLD/F 90		TLD/F A2		TLD/F A4	
Total cooling capacity*	kW	9		10,8		12,4	
Sensible cooling capacity*	kW	9		10,8		12,4	
Refrigerant		R407C		R407C		R407C	
Refrigerant charge	kg	3,3		3,7		3,2	
EER index (with evap. fan in direct current)*	W/W	3,13		3,01		2,92	
EER index (with evap. fan in alternating current)*	W/W	3,10		2,99		2,90	
Outside operating limit temperatures min/max	°C	-20 / +45		-20 / +45		-20 / +45	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	62		63		63	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	67		67		67	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	67		67		67	
Duty cycle	%	100		100		100	
Weight	kg	260		270		280	
Height	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	900		900		900	
Depth	mm	700		700		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	3200		3500		3500	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	2200		3000		3200	
Air flow in free-cooling mode	m <sup>3</sup> /h	1800		2400		2600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	2,2		2,6		3,2	
Operating current (OA)*	A	4,3	10,7	4,8	12,1	6,2	16,3
Maximum operating current (FLA)	A	5,6	17,3	7	23,1	10	23,5
Locked rotor current (LRA)	A	40	76	46	100	50	114
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,48		0,60		0,60	
Operating current (OA)*	A	2,3		2,9		2,9	
Maximum operating current (FLA)	A	3,1		3,1		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36÷57		36÷57		36÷57	
Power consumption*	kW	0,2		0,39		0,44	
Operating current at 48V (OA)*	A	4,2		8,3		9,2	
Maximum operating current at 48V (FLA)	A	12,5		12,5		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,22		0,41		0,47	
Operating current (OA)*	A	1,11		2,07		2,3	
Maximum operating current (FLA)	A	2,4		2,3		2,3	

Technical data TLU40-TLU80							
MODEL		TLU40		TLU60		TLU80	
Total cooling capacity*	kW	4,6	4,1	5,4		7,8	
Sensible cooling capacity*	kW	4,6	4,1	5,4		7,8	
Refrigerant		R407C		R407C		R407C	
Refrigerant charge	kg	1,75		1,9		5,2	
EER index (with evap. fan in direct current)*	W/W	2,27	2,87	3,02		3,06	
EER index (with evap. fan in alternating current)*	W/W	2,27	2,87	2,97		3,02	
Outside operating limit temperatures min/max	°C	-20 / +50		-20 / +50		-20 / +45	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	53		55		61	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	64		64		64	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	64		64		64	
Duty cycle	%	100		100		100	
Weight	kg	170		190		250	
Height (with bracket)	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	600		600		900	
Depth	mm	650		650		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	1600		2000		3000	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	1000		1500		2000	
Air flow in free-cooling mode	m <sup>3</sup> /h	800		1200		1600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	1,8	1,2	1,5		2,0	
Operating current (OA)*	A	4,0	5,7	2,8	7,4	3,6	9,1
Maximum operating current (FLA)	A	5,4	6,7	4,2	11,4	5,1	14,8
Locked rotor current (LRA)	A	22	33	24	47	32	61
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,13		0,19		0,40	
Operating current (OA)*	A	0,60		0,87		1,9	
Maximum operating current (FLA)	A	1,0		1,0		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36÷57		36÷57		36÷57	
Power consumption*	kW	0,1		0,1		0,15	
Operating current at 48V (OA)*	A	2,4		2,4		3,2	
Maximum operating current at 48V (FLA)	A	2,6		7,3		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,1		0,13		0,18	
Operating current (OA)*	A	0,45		0,59		0,91	
Maximum operating current (FLA)	A	0,6		1,2		2,4	

Technical data TLU90-TLUA4							
MODEL		TLU90		TLUA2		TLUA4	
Total cooling capacity*	kW	8,6		10,5		11,5	
Sensible cooling capacity*	kW	8,6		10,5		11,5	
Refrigerant		R407C		R407C		R407C	
Refrigerant charge	kg	4,1		2,9		2,9	
EER index (with evap. fan in direct current)*	W/W	2,99		2,92		2,59	
EER index (with evap. fan in alternating current)*	W/W	2,97		2,91		2,57	
Outside operating limit temperatures min/max	°C	-20 / +45		-20 / +45		-20 / +45	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	62		63		63	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	67		67		67	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	67		67		67	
Duty cycle	%	100		100		100	
Weight	kg	260		270		280	
Height	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	900		900		900	
Depth	mm	700		700		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	3200		3500		3500	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	2200		3000		3200	
Air flow in free-cooling mode	m <sup>3</sup> /h	1800		2400		2600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	2,2		2,6		3,4	
Operating current (OA)*	A	4,2	10,6	4,8	12,4	6,1	16,4
Maximum operating current (FLA)	A	6,3	17,3	7	23,1	10	23,5
Locked rotor current (LRA)	A	40	76	46	100	50	114
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,48		0,60		0,60	
Operating current (OA)*	A	2,3		2,9		2,9	
Maximum operating current (FLA)	A	3,1		3,1		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36+57		36+57		36+57	
Power consumption*	kW	0,2		0,39		0,44	
Operating current at 48V (OA)*	A	4,2		8,3		9,2	
Maximum operating current at 48V (FLA)	A	12,5		12,5		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,22		0,41		0,47	
Operating current (OA)*	A	1,11		2,07		2,3	
Maximum operating current (FLA)	A	2,4		2,3		2,3	

### HP fans TLx40-TLx80

MODEL		TLx40	TLx60	TLx80
<b>Condenser fan - HPFAN option</b>				
Q.ty / Type		1 / radial (A)	1 / radial (A)	1 / radial
Air flow	m <sup>3</sup> /h	1600	2000	3000
Available static pressure	Pa	110	80	220
External sound pressure level**	dB(A)	55	57	64
Nominal voltage	V AC	230	230	230
Phases	ph	1	1	1
Power consumption*	kW	0,20	0,25	0,67
Operating current (OA)*	A	0,92	1,16	2,95
Maximum operating current (FLA)	A	1,0	1,2	3
<b>Evaporator fan in direct current - EVAHPFAN option</b>				
Q.ty / Type		1 / radial	1 / radial (A)	1 / radial (A)
Air flow in cooling mode	m <sup>3</sup> /h	1000	1500	2000
Air flow in free-cooling mode	m <sup>3</sup> /h	800	1200	1600
Available static pressure	Pa	330	140	330
Internal sound pressure level**	dB(A)	58	59	67
Nominal voltage	V DC	48	48	48
Tolerance on DC voltage	V DC	36÷57	36÷57	36÷57
Power consumption*	kW	0,26	0,27	0,45
Operating current at 48V (OA)*	A	5,4	5,6	9,5
Maximum operating current at 48V (FLA)	A	7,3	7,3	12,5
<b>Evaporator fan in alternating current - EVAHPFAN option</b>				
Q.ty / Type		1 / radial (A)	1 / radial (A)	1 / radial (A)
Air flow in cooling mode	m <sup>3</sup> /h	1000	1500	2000
Air flow in free-cooling mode	m <sup>3</sup> /h	800	1200	1600
Available static pressure	Pa	170	60	250
Internal sound pressure level**	dB(A)	65	65	67
Nominal voltage	V AC	230	230	230
Phases	ph	1	1	1
Power consumption*	kW	0,26	0,26	0,44
Operating current (OA)*	A	1,2	1,2	2,22
Maximum operating current (FLA)	A	1,2	1,2	2,4

**HP fans TLx90-TLxA4**

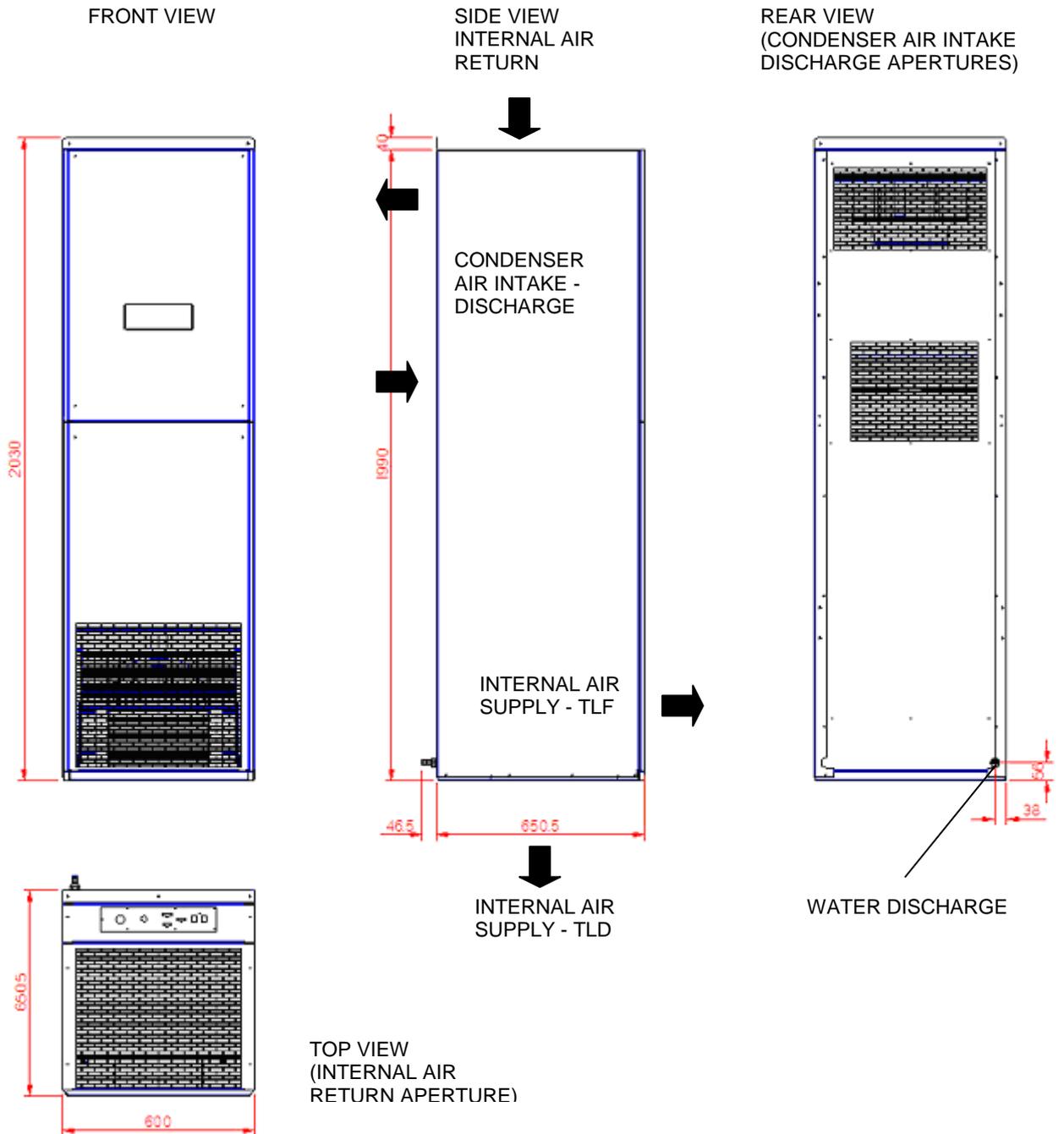
MODEL		TLx90	TLF/DA2	TLUA2	TLF/DA4	TLUA4
<b>Condenser fan - HPFAN option</b>						
Q.ty / Type		1 / radial	1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	3200	3500		3500	
Available static pressure	Pa	180	120		120	
External sound pressure level**	dB(A)	63	64		64	
Nominal voltage	V AC	230	230		230	
Phases	ph	1	1		1	
Power consumption*	kW	0,68	0,68		0,68	
Operating current (OA)*	A	3,00	3,00		3,00	
Maximum operating current (FLA)	A	3,0	3,0		3,0	
<b>Evaporator fan in direct current - EVAHPFAN option (standard on TLD units)</b>						
Q.ty / Type		1 / radial	N.A.		N.A.	
Air flow in cooling mode	m <sup>3</sup> /h	2200	N.A.		N.A.	
Air flow in free-cooling mode	m <sup>3</sup> /h	1800	N.A.		N.A.	
Available static pressure	Pa	270	N.A.		N.A.	
Internal sound pressure level**	dB(A)	70	N.A.		N.A.	
Nominal voltage	V DC	48	N.A.		N.A.	
Tolerance on DC voltage	V DC	36÷57	N.A.		N.A.	
Power consumption*	kW	0,46	N.A.		N.A.	
Operating current at 48V (OA)*	A	9,7	N.A.		N.A.	
Maximum operating current at 48V (FLA)	A	12,5	N.A.		N.A.	
<b>Evaporator fan in alternating current - EVAHPFAN option (standard on TLD units)</b>						
Q.ty / Type		1 / radial	1 / radial (A)		1 / radial (A)	
Air flow in cooling mode	m <sup>3</sup> /h	2200	3000		3200	
Air flow in free-cooling mode	m <sup>3</sup> /h	1800	2400		2600	
Available static pressure	Pa	200	90		50	
Internal sound pressure level**	dB(A)	70	71		71	
Nominal voltage	V AC	230	230		230	
Phases	ph	1	1		1	
Power consumption*	kW	0,45	0,52		0,52	
Operating current (OA)*	A	2,27	2,4		2,4	
Maximum operating current (FLA)	A	2,4	2,4		2,4	

**Notes on HP fans:**

- (A). These fans are not selectable as HPFAN or EVAHPFAN options, but it's possible to reach a static pressure with the regulation of the standard fan. If the user needs a static pressure, he has to regulate fan speed and increase it to 100%.

### Overall dimensions and air flows

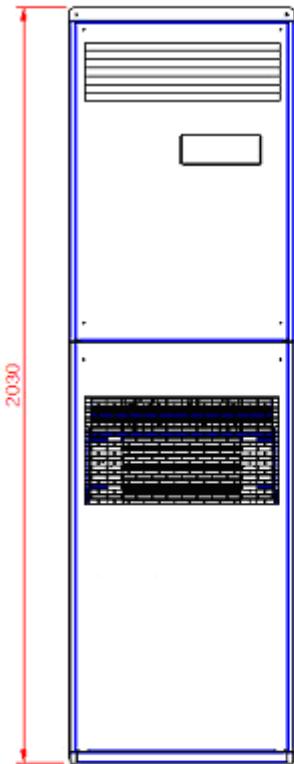
TLF / TLD 40 - 60



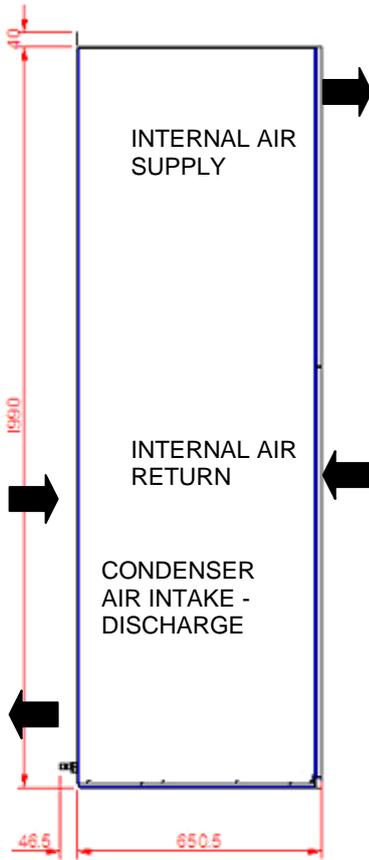
**Overall dimensions and air flows**

TLU 40 - 60

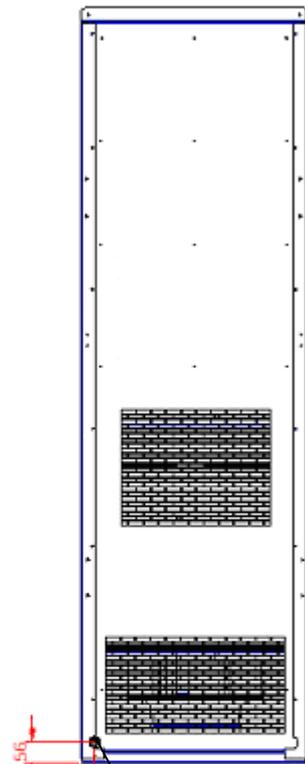
FRONT VIEW



SIDE VIEW

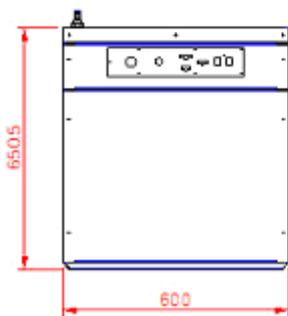


REAR VIEW  
(CONDENSER AIR INTAKE  
DISCHARGE APERTURES)



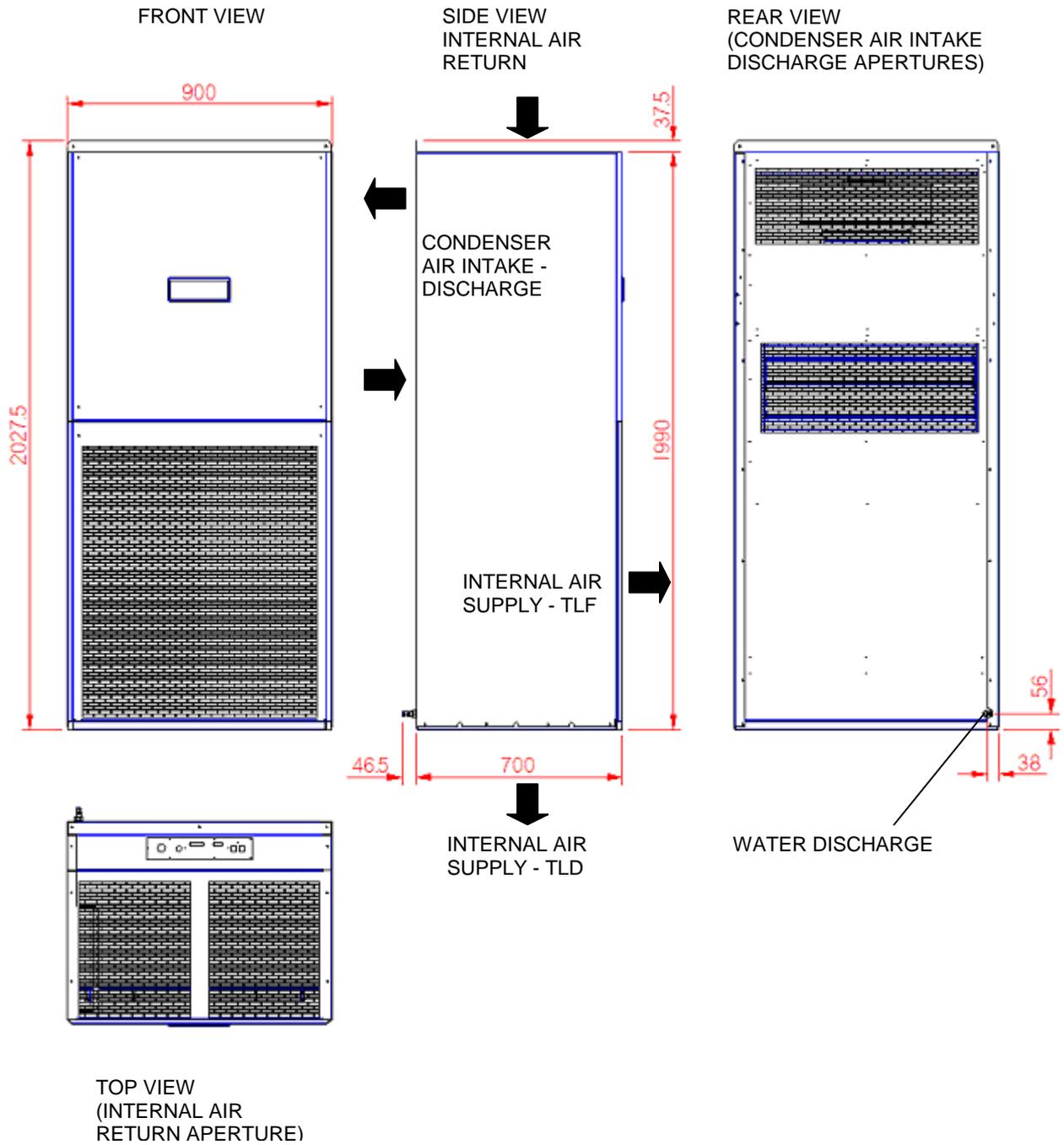
WATER DISCHARGE

TOP VIEW



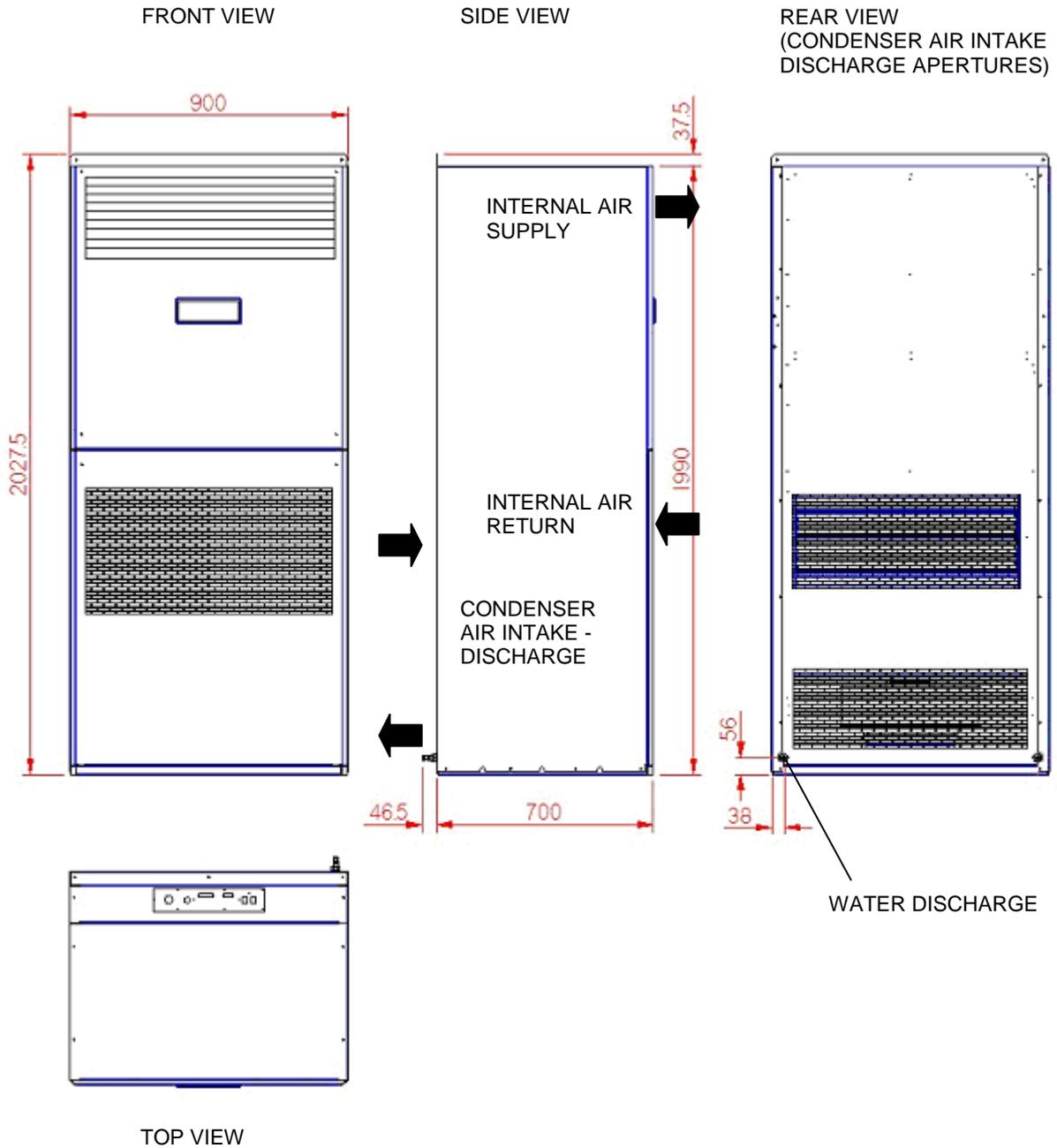
### Overall dimensions and air flows

TLF / TLD 80 – A4



**Overall dimensions and air flows**

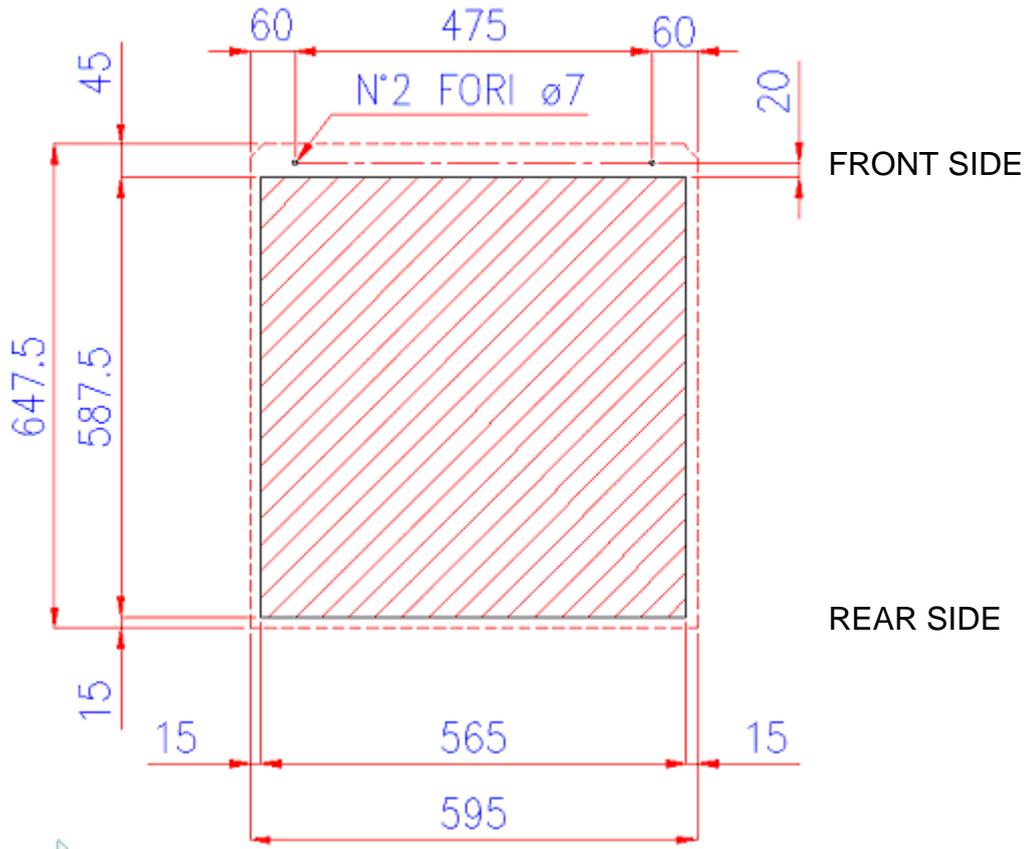
TLU 80 – A4





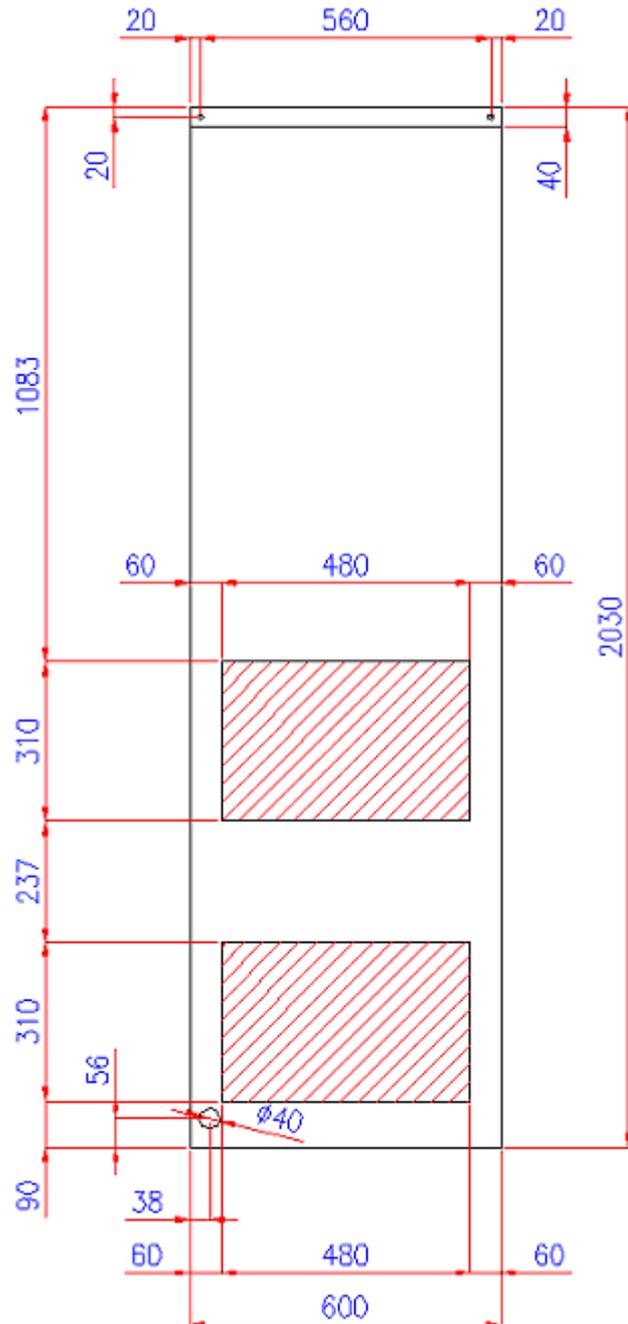
Cut-out

FLOOR TLD 40 - 60



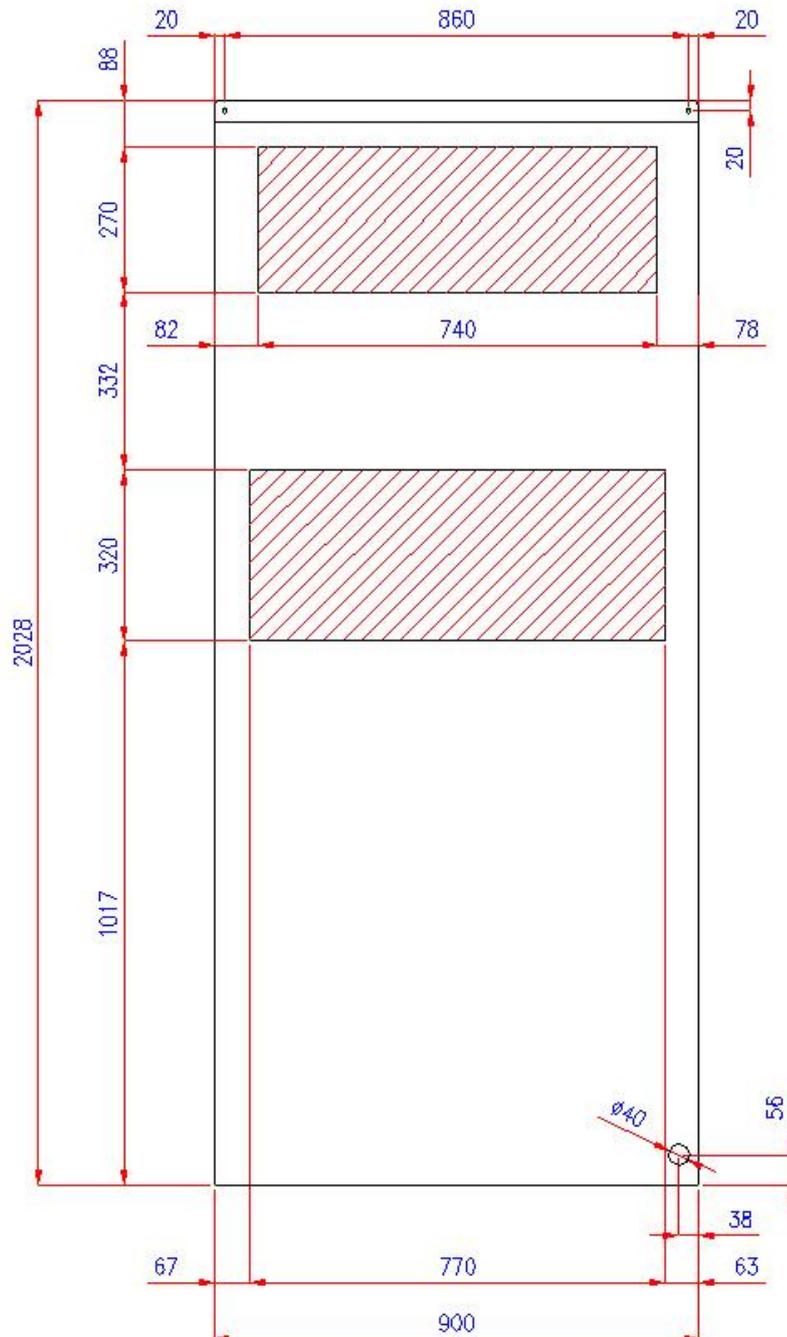
Cut-out

TLU 40 - 60 (EXTERNAL OUTSIDE)



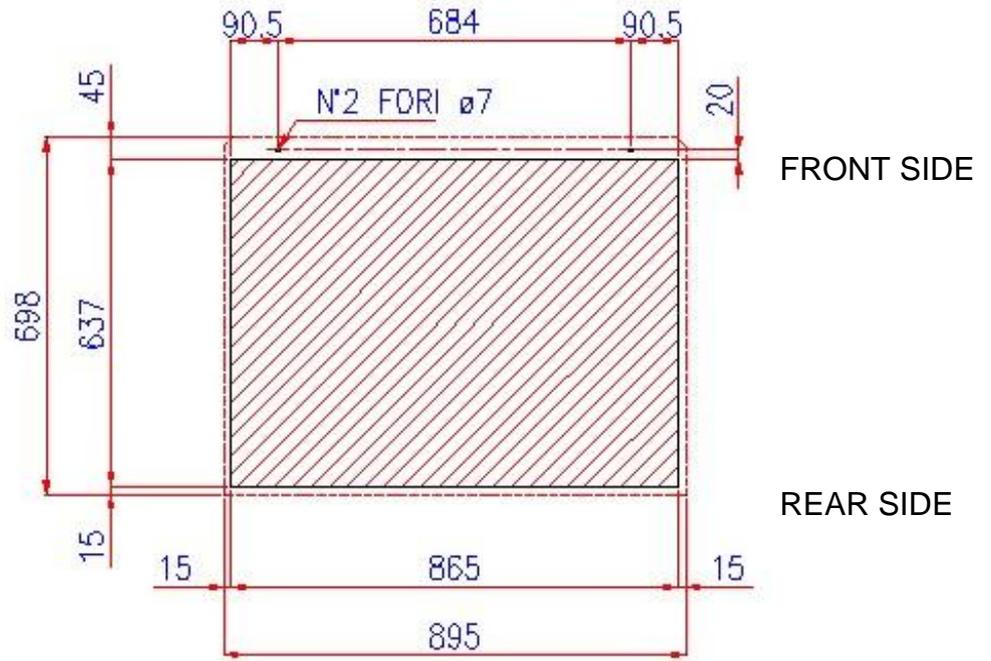
Cut-out

TLF/TLD 80 - A4 (EXTERNAL OUTSIDE)



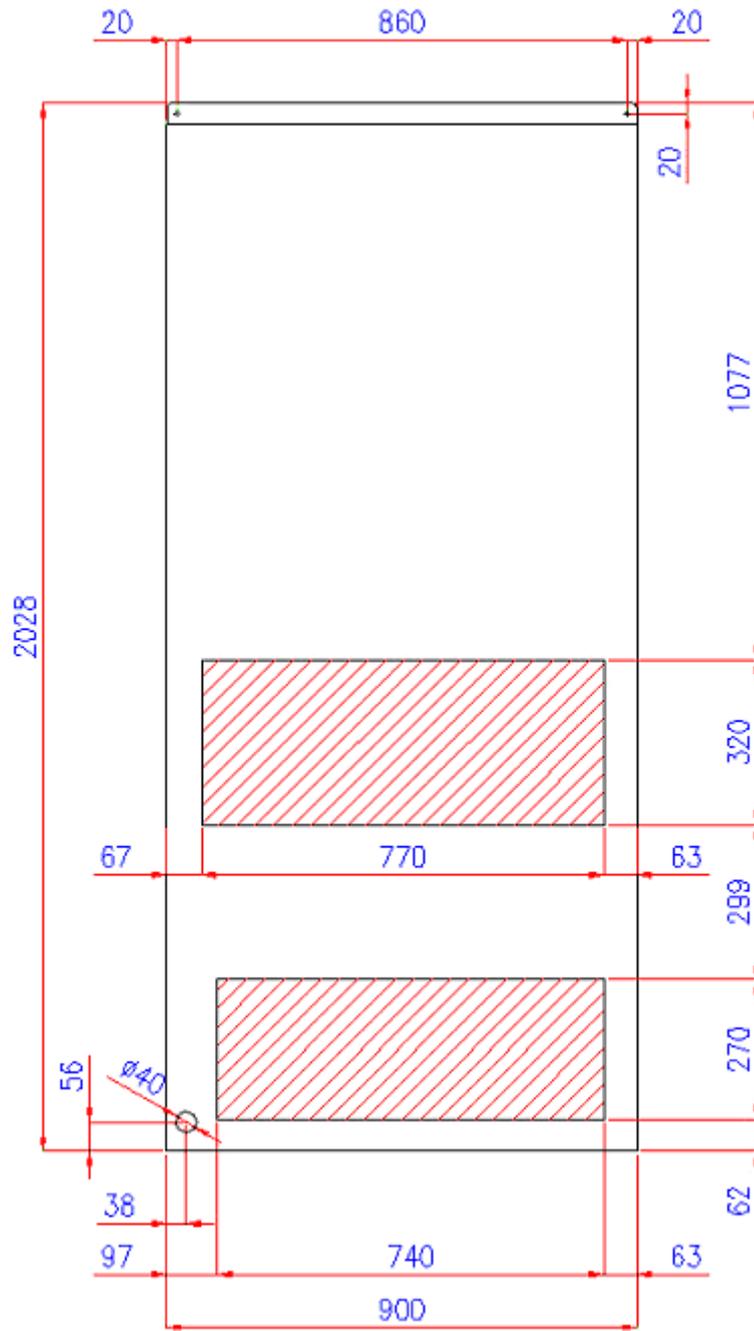
Cut-out

FLOOR TLD 80 - A4

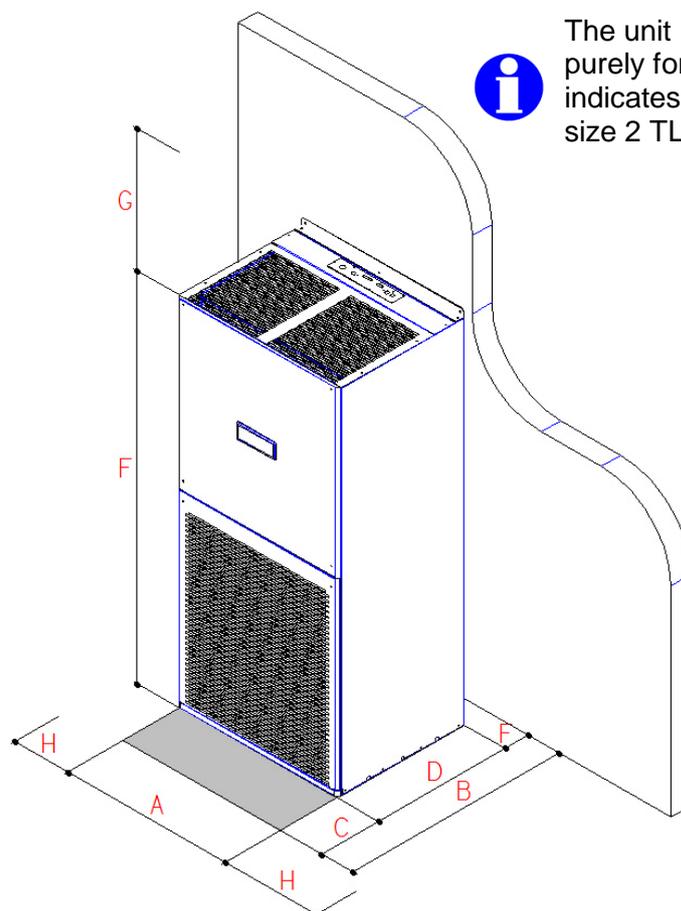


Cut-out

TLU 80 – A4 (EXTERNAL OUTSIDE)



**Space for installation and maintenance**



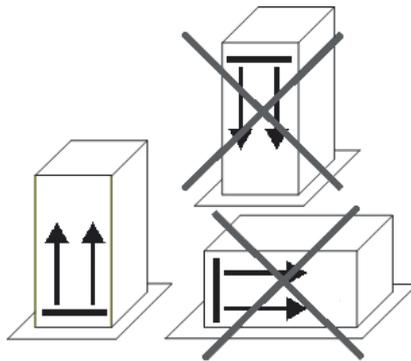
The unit in the drawing, shown purely for the sake of example, indicates the air apertures of a size 2 TLF unit

MODEL	TLF / TLD 40 – 60	TLF / TLD 80 – A4	TLU 40 – 60	TLU 80 – A4
A (mm)	600	900	600	900
B (mm)	1650	1700	1650	1700
C (mm)	1000	1000	1000	1000
D (mm)	650	700	650	700
E (mm)	0	0	0	0
F (mm)	1990 (2030 with fixing bracket)			
G (mm)	500	500	200	200
H (mm)	0	0	0	0
Only for TLD: free space under the base (mm)	400	400	-	-

## 5. Unpacking and Inspection

STULZ products are shipped ex-works. All units have been individually inspected in all their parts and carefully packaged. Immediately inspect the unit upon receipt, making sure it has been shipped in its proper position. Note improper shipment on the shipping document.

We recommend you accepting merchandise subject to inspection.



Check for damage and, if any, note this immediately on the shipping document. Remove packing and check that the exterior casing is not scratched, marked or have signs of blows and that no components are missing and that there are no traces of oil. Before throwing the packaging away check that it does not contain documents or parts of the machine.

Any damage that is encountered must be notified to the carrier by registered letter within 8 days of receipt. The carrier is responsible for any damage caused during shipment. STULZ is not responsible for damage caused to the merchandise by the shipper but will do all in its power to assist customers in these situations.



**This product may not be returned without prior written approval by STULZ. For any assistance please contact your local STULZ partner.**



**If installation of the product is not required immediately or the product needs to be onforwarded to its final destination, replace it in its packing, after inspecting it, and store it in a safe place.**



**As an environmental concern, we recommend to recycle the packing cartons and to separate them from any plastic, read and follow instructions in chapter 11.**

## 6. Precautions and safety considerations

The units in the Tel-Air-2 family are designed to operate as a wall-type unit and in an upright position. For all models the compressor is and must always be in an upright position. The cooling units may not be used or transported in a position other than that for which they have been designed.

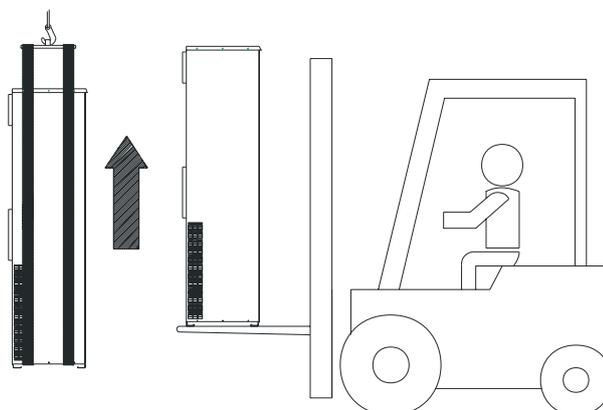


**Never run the machine if you have discovered leakage of the coolant fluid.**

If traces of oil are present on the unit, which point to a loss of coolant, on the inside or the outside, then the equipment must be thoroughly checked before starting the unit and, if necessary, STULZ technical department should be contacted.

### 6.1 Precautions when handling the unit

Handle these units, when they are packaged, using a fork lift. When they are not packaged use a hoisting machine equipped with cables or chains suited for supporting their weight.



### 6.2 Precautions when installing and servicing the unit

The installation and handling of cooling units may be hazardous as they form a pressurised system with electric components. Only skilled personnel may repair, inspect or maintain the cooling units. Unskilled staff may only replace the filter, if present. All other operations must be performed by personnel who are experienced and qualified in the maintenance of cooling systems. Before servicing this unit, refer to the instructions contained in this manual, check the data on the data plate and follow any other precaution to ensure optimum safety.



**Never work on the unit without disconnecting all power supplies before.**

## 7. Installation

Unpack the unit taking care not to damage its exposed parts. Before discarding the packaging, make sure no parts or documents have been left inside. Check that the supply voltage is as designated.

## 7.1 Positioning the unit

1. Tel-Air-2 conditioners must be installed inside the shelter.
2. Check that:
  - there is enough room for easy application, installation and servicing, both inside and outside the shelter. Always observe the minimum spaces indicated in the drawing at the end of this manual;
  - the floor can support the weight of the unit;
  - the inside of the shelter is clean;
  - the conditioner is not in the proximity of heat sources or warm air flows;
  - the structure is watertight;
  - the inside of the shelter allows a proper air circulation, preventing any recirculation;
  - the units do not lie directly on raised floors without auxiliary supports to prevent the transmission of vibrations to other equipment;
  - the units are installed on perfectly level floors to ensure they operate correctly and drain the condensate correctly.



**It is important to prevent hot air expelled by the condenser fan from being even partially sucked back in. This would cause continuous stoppages, commanded by the pressure switches, reducing efficiency and increasing electricity consumption. Improper operation of this type can also cause irreparable harm to the compressor.**



**Do not obstruct circulation of air being sucked into or expelled from the air conditioner.**

3. Make openings for the condenser / free-cooling air circuit according to the cut-out indicated at chapter 4.
4. In case of TLD units, besides the openings on the wall, an additional hole for internal air supply has to be made on the floor of the room. This opening has to be realised according to the drawings at chapter 4.



**Before starting work, disconnect the power supply. Prior to drilling holes or making cuts, make sure that holes, screws, cables, etc. do not interfere with the equipment which has already been installed.**

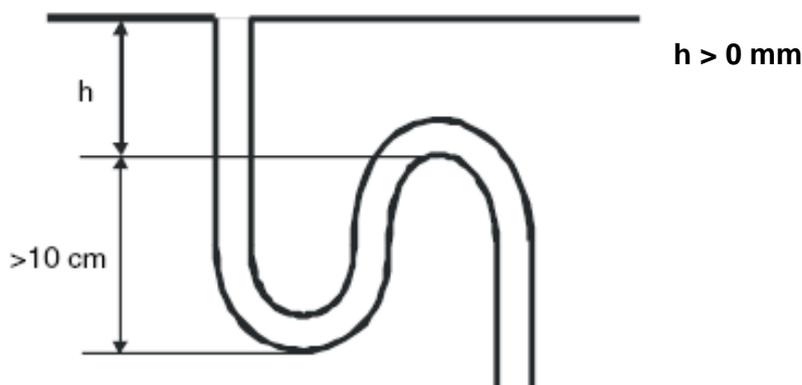
5. After making cuts on the shelter panels, suitably insulate them against water infiltration (rain).
6. Glue the adhesive gasket around the edges of the cut-out openings in the shelter. The adhesive gasket consists of ethylene propylene, open-cell type, 3 mm thick and 10 mm wide.
7. Fix the condensate drain pipe, supplied with the unit, to the plastic connector at the rear of the unit. To allow the drain pipe to leave the shelter, make an extra hole in the wall, as shown in the cut-outs. Make sure the condensate drains properly (no curves or places where it can stagnate).
8. Lean the unit against the wall so that the condenser openings on the unit correspond to the openings cut on the wall. Then, fix the unit through its top bracket via suitable screws (position of the holes is indicated on chapter 4, diameter holes Ø8). Additionally, if necessary for a better stability, fix the unit to the floor through the holes on its base (their position is indicated on floor cut-outs of TLD units, at the end of this manual).
9. When also the electrical installation is completed, put the return and supply grilles / diffuser (accessories) in place.

## 7.2 Hydraulic connections



**Make sure the condensate drain pipes do not interfere with the air flow.**

**Connections are carried out by the installer.**



- Use PVC pipes with an internal diameter of 14 mm
- Connect the pipes to the plastic union at the rear of the conditioner
- Make sure there is a slope of at least 2% towards the drain outlet

## 7.3 Electrical Connections



**It is absolutely necessary, before making any connections, to use a suitable tester to check the supply voltage. This must be the same as the voltage indicated on the technical data plate.**



**The user must furnish and install, upstream from the unit, an isolating switch with pre-fuse and capacity as specified on the technical plate in order to be able to perform maintenance on the unit in the absence of electricity.**



**The ON/OFF-key on the C2020 keypad (if present) is only used for the unit stand-by. It must therefore not be considered as a safety element to perform maintenance on the unit. Maintenance must be done after disconnecting the power supply of the unit (see note above).**



**Electrical connections may only be performed by authorised technicians.**

**The system must be connected to an efficient earth circuit.**

The conditioning system must be electrically connected in compliance with the regulations at paragraph 1.2 and national regulations for technical systems.

- Check the supply voltage and frequency.
- Check that supply voltage and frequency are compatible with those for the unit (shown in its name-plate).
- Interrupt both main power and auxiliary power before working on the system.

- Section of power supply cables must be selected in accordance to their length, kind of power supply and the current absorbed by the unit, as prescribed by current regulations. These cables must comply with currently applicable standards. In any case we recommend using shielded cables unless the installer carries out, at his expense, tests that demonstrate that shielding is not necessary.
- Check that power cables are installed with a sufficient distance from alarm cables, from the network connection cable and from the master-slave connection cable.
- On the main power supply line, install a disconnect switch (in overvoltage category III), please refer to the electric diagram on part 2 manual. Size of main switch must be determined according to the maximum current consumption of the components (standard + options). Current absorption data are in the technical data sheets.
- Do the same on emergency 48VDC power supply line, if present.
- Verify carefully the polarities of DC power supply, according to the wiring diagram.
- For 3-phase scroll compressors: take care of correct phase sequence after the connection of the main power supply. The sequence is important for the correct sense of rotation of the 3-phase Scroll compressor. A loud noise coming from the compressor means it is turning in the wrong direction. If this continues for a few hours, it will overheat and irreparably damage the compressor. Correct compressor operation can be easily checked by measuring the temperature at the condenser outlet. If this temperature is noticeably higher than the external temperature, the compressors is working correctly. Otherwise, the compressor is turning in the wrong direction and the phase sequence must be changed.

**The inobservance of these points can provoke damages or malfunction of components and warranty shall become forthwith void.**



**For use of leakage-current (FI) circuit breakers, EN 50178 5.2.11.2 must be taken into account. Only type B pulse-current FI circuit breakers are permitted. FI circuit breakers do not provide protection against bodily harm during operation of the unit or frequency converters.**

- The power lines must be connected to the power terminal board inside the electric panel. To reach this position, insert the cables in the holes in the connector plate on the roof of the unit, behind the internal air return opening. Then, follow the route indicated in the drawing on the next page.
- This plate also contains the connectors for the digital output (alarms), analogue input (humidity probes) and digital input (customer's external devices) signals connected to the electronic control board, as shown in the drawing on the following page. All digital output signals are voltage-free type, with the following rating for contacts: maximum allowed voltage = 24V AC / 48V DC, maximum allowed current = 1A. All digital inputs require a voltage-free signal from external devices eventually connected to them.  
I/O signal connectors C1 and C2 are SUB-D type. ACTADAPT accessory is available as interface from SUB-D to screw terminals.



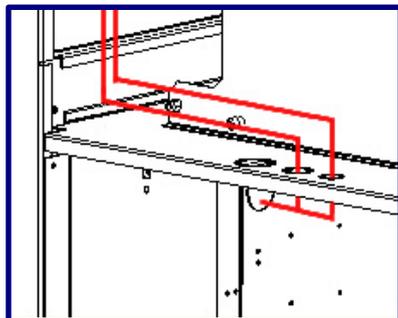
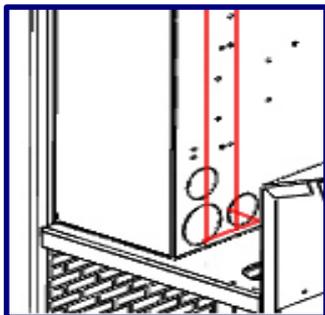
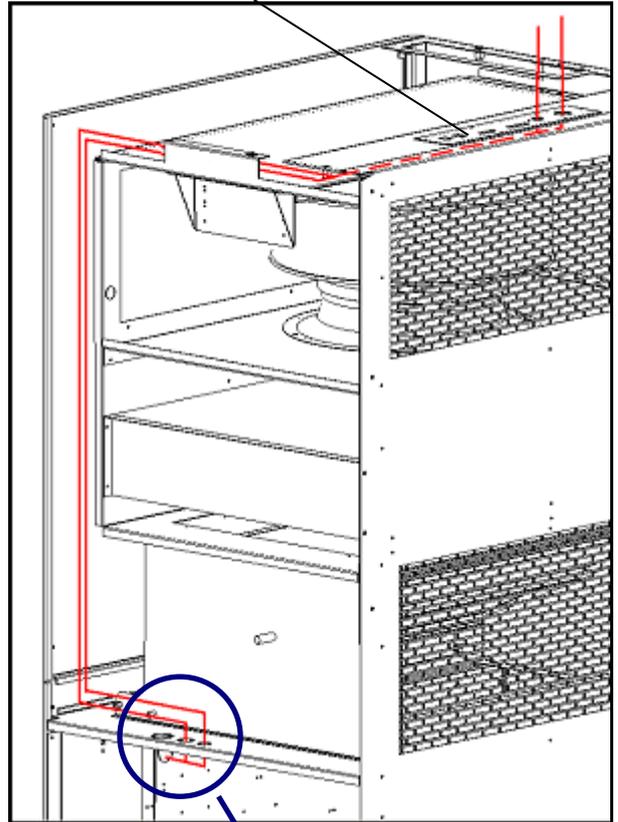
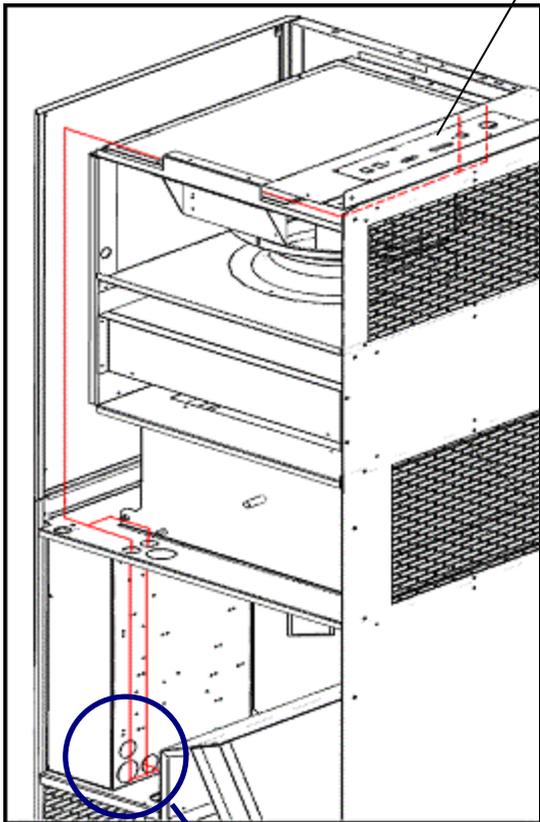
**All the devices connected to the digital outputs and analogic inputs of the controller, must be connected to a SELV type power source (voltage limit 42Vdc/ac). The digital inputs of the controller must be connected to voltage-free contacts.**

**Please refer to use and maintenance manual part 2 for more information.**

TLF / TLD 40-60

TLF / TLD 80-A4

Plate with power supply cable access and signal connectors

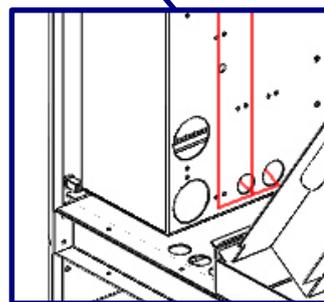
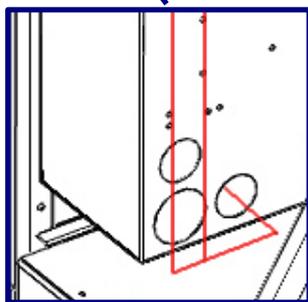
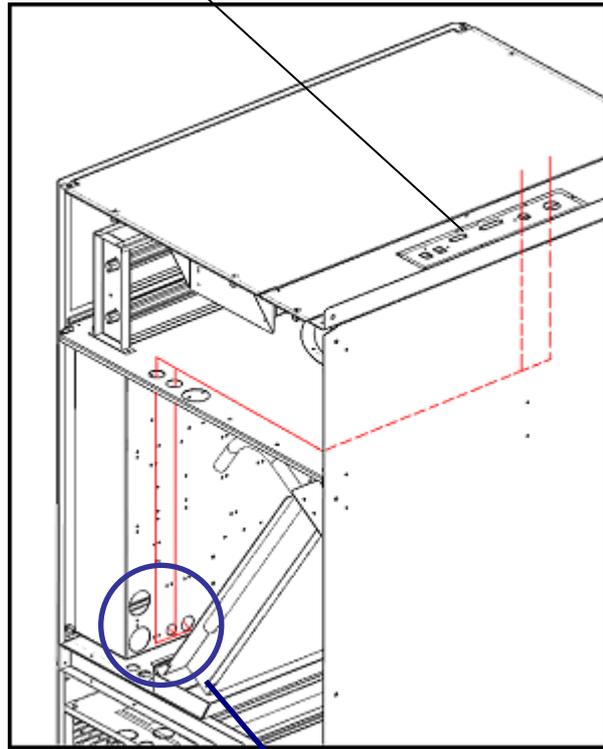
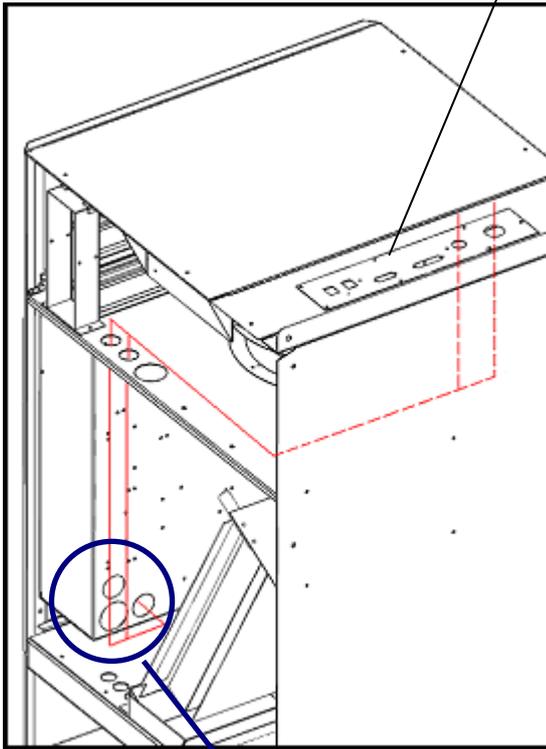


Route of cables inside TLF / TLD unit

TLU 40-60

TLU 80-A4

Plate with power supply cable access and signal connectors



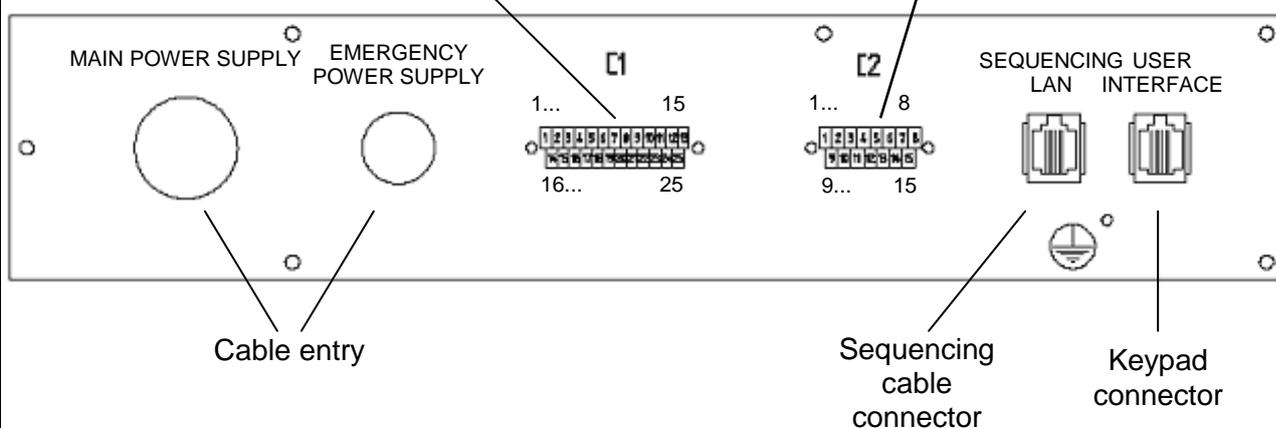
Route of cables inside TLU unit

**SUB-D CONNECTOR C1**

- 1/14 Common warning
- 2/15 Low pressure
- 3/16 High pressure
- 4/17 Air flow
- 5/18 Dirty filter
- 6/19 High temperature
- 7/20 Low temperature
- 8/21 High humidity
- 9/22 Common alarm
- Other pins not used

**SUB-D CONNECTOR C2**

- 1/9 Internal relative humidity probe
- 2/10 External relative humidity probe (3)
- 3/11 Smoke / fire sensor
- 4/12 Door open / intrusion (3)
- 5/13 External on-off
- Other pins not used



Configuration of plate connecting the cables to the unit with electronic control



**(1) All digital output signals are voltage-free type, with the following rating for contacts: maximum allowed voltage = 24V AC / 48V DC, maximum allowed current = 1A. All digital inputs require a voltage-free signal from external devices eventually connected to them. Analogue inputs for humidity probes accept a 4÷20mA signal / 27V DC.**



**(2) I/O signal connectors C1 and C2 are SUB-D type. ACTADAPT accessory is available as interface from SUB-D to screw terminals.**

**(3) ACTRAS accessory needs pins 2/10/12 of C2 to be connected to C2020. Therefore with this accessory, two inputs for external humidity probe and door open / intrusion signals are not available.**

## 8. Start-up

**Before performing initial start-up, install and connect the system as described in the “Installation” chapter.**

- Make sure the general switch is turned off and that the system is not live.
- Check that all the power switches and control fuses in the electrical system are off.
- Check that the power cable and terminals, including the PE terminals, are correctly connected.
- Check the contactors move freely.
- Switch on the conditioner with the general switch.
- Enable the control fuses one by one and the fan and compressor power switches.
- Check the input voltage on all the phases and on the direct current circuit (if present).
- When starting up for the first time or after a long period, if the conditioner has remained inactive in environments with temperatures below 0°C, preheat the compressor sump for 3-4 hours.
- At this point the electronic board is powered and individual components can be enabled to check they work properly. The main operations that can be performed during installation are described in the next paragraph. Additional indications can be found in the C2020 electronic board manual.
- Set the required return air temperature on the conditioner display.
- Press the ON-OFF button on the display to start the conditioner.
- After about 20 minutes, check the sight glass for air bubbles. If there are, some refrigerant may have leaked. Check the circuit for leaks, repair them and fill the circuit with R407C according to the quantities indicated on the technical name-plate.
- Check the current absorption of the compressors and fans and compare them with the values indicated in the technical data.
- Check the electrical absorption of all the components.
- Check the direction of rotation of the compressor, as indicated in the previous chapter (electrical installation section). If it is incorrect, invert the wires.
- After having completed the start-up, please fill in the start-up form which is supplied with each unit and send a copy to the address on the form.
- Once the system is working at full power: 1) check that no alarms have occurred; 2) check that the air discharged from the condenser flows correctly without being drawn into the cooling unit; 3) check that the fans work properly; 4) check, with the unit running, that the supply voltage remains within the values indicated on the technical name-plate; 5) check that the unit works according to the set logic (described in the following sections).

### Switching off

To switch off the unit, turn off all the power supplies.



**The ON-OFF button on the C2020 display (if present) is only used to put the unit on stand-by. It must therefore not be considered as a safety device for switching off the unit prior to maintenance operations.**

## 9. Maintenance

Very little ordinary maintenance is required to keep the unit reliable and protect the moving parts. This maintenance, however, must be performed according to prescribed maintenance intervals. Failure to perform maintenance, in addition to affecting the unit durability and operation, invalidates the warranty.



**Switch off the power supply of the unit before performing any maintenance measures.**



**The ON-OFF button on the C2020 display (if present) is only used to put the unit on stand-by. It must therefore not be considered as a safety device for switching off the unit prior to maintenance operations.**



**Maintenance operations may only be performed by authorised and qualified technicians.**

### 9.1 Preventive maintenance schedule

#### Once monthly

- CONDENSATE DRAIN: check that the condensate drainage system is perfectly clean and operational.
- FANS: check that the fans do not show signs of overheating or abnormal vibrations and that they turn freely.
- COOLING CIRCUIT: Pressure switches and liquid indicators.
- AIR FILTERS: check the air filter, clean it or replace if necessary (dirty filter alarm). If you decide to change the filter, the medium and thickness of the spare must be the same as the original. A set of spare filters can be ordered to the STULZ service dept.

#### Once quarterly

- EXCHANGERS: check that the exchangers are efficient and not soiled.



**If the air conditioner works in exceptionally dirty environments or if experience shows that it requires more frequent maintenance then this maintenance must be performed as required.**

#### Once yearly

- COMPRESSOR: check the oil level from the compressor indicator.
- ELECTRIC CIRCUIT: check that the electrical connections are tight and that the remote switches and the general switch are operational and in good condition. Also check that the control board works and perform an alarm signal test.
- MECHANICAL PARTS: clean the internal parts of the system.

### Replacing the air filters

Proceed as follows:

- For TLF/TLD: remove the upper front panel. For TLU: remove the lower front panel.

- Loosen the screws securing the filter holder.
- Pull the filter holder towards you.
- Rotate free-cooling damper in cooling position (complete recirculation), pushing the unblocking button on free-cooling damper motor.
- Remove the filter.

Unblocking button of free cooling damper motor



### Cleaning the exchangers

Proceed as follows:

blow compressed air through the exchanger in the opposite direction to that of the air flow during normal operation.

### General cleaning

The metal casing of the unit can be cleaned using a detergent liquid as long as this liquid is compatible with: PVC, polyethylene, silicone and polyester coating. Be careful not to wet the electrical connections inside the unit.

**Use of an unsuitable detergent might cause damage to the unit.**



**Do not use either acid or caustic substances or solvents like trichloroethylene to clean any part of the unit.**

Remove dust with a vacuum cleaner.

Clean the internal parts with a liquid detergent and compressed air not greater than 4 bar, with the unit suitably earthed.

## 10. Residual Hazards and Emergency Information

This unit was designed to reduce danger sources or situations to a minimum.

These dangers arise from improper use of the product or from failure to comply with installation and operating instructions.

All personnel who work on or near the unit must be familiar with these instructions.

### 10.1 General safety provisions

All personnel charged with testing and maintaining the unit must be familiar with the following safety regulations:

- Danger signs must be easily visible in areas of potential danger.
- A visual supervision service must be set up in danger areas.
- Supervisors must keep constant contact with controllers.
- Transit zones, doors and ladders placed near the area where the unit is located must never be blocked.
- Emergency exits must never be blocked.
- Slippery areas that could be a potential risk for persons must be covered with anti-slip materials.
- Proper tools and suitable procedures must be used for every specific activity.
- Test tools and equipment must be kept in good order.
- Personnel must have in-depth knowledge of methods and procedures to apply in case of fire (set up a fire extinguisher service in a handy position).
- The following actions must be taken if a fire starts:
- Switch off the electrical power supply to the component that is burning.
- Switch off all fans so as to cut the oxygen supply.
- Advise the appropriate department.

### 10.2 Hazards arising from the product coming into contact with things or persons

- Danger point 1a) comes from movement by the fan. The grating mesh has a useful gap, between wires, smaller than 10 mm. Particles with smaller dimensions could be ejected by the fan blade.
- Danger point 1b) comes from accidental contact with the heat exchanger since its aluminium fins can have sharp edges.

### 10.3 Hazards arising from electrical faults

#### SAFETY STANDARDS FOR ELECTRICAL EQUIPMENT

##### Introduction

The causes of electrical risks are well known and it is not difficult to prevent these risks by applying constant care and attention.

Assigned personnel must be informed regarding potential dangers and trained regarding safety procedures in order to reduce the number of potential electrical accidents.

## **TASKS ASSIGNED TO PLANT MANAGERS**

Plant managers must be informed regarding potential risks in the system and must superintend personnel that works with electrical equipment.

Superintending tasks consist of localizing possible risk situations and investigating problems encountered by personnel when performing maintenance.

Each defective component must be immediately repaired or replaced.

The manager must insist on application of safety measures. He must not tolerate or accept deviations from these because this could cause harm to persons or to the machinery.

## **HIGH VOLTAGE**

Contact with high voltage circuits can cause burns, shock, unconsciousness or even death for the persons involved.

This problem can be caused by poor understanding of the dangers inherent to use of electrical devices. Damage to the human body, in this case, depends on the intensity of current, the duration of current and the path the current takes as it goes through the body.

## **SAFETY STANDARDS TO COMPLY WITH WHEN THE EQUIPMENT IS SWITCHED OFF**

Interrupt the power supply to the unit before opening it.

Make sure no electricity is present in the unit's circuits.

Clean and dry the work area.

Remove dowels, rings, brackets or metal parts which can hamper the job to be done or become potential conductors for electricity.

Ground or short-circuit the terminals of the fan capacitors in the de-energized circuit.

Remove fuses only after the circuit has been deactivated.

## **SAFETY STANDARDS TO COMPLY WITH WHEN PERFORMING MAINTENANCE ON LIVE**

The following standards must be complied with, in addition to those stated at point above:

- personnel must never work alone;
- work should be done, if possible, using only one hand;
- use only authorized procedures to perform by-passes at interlocks;
- make sure assigned personnel are perfectly familiar with the machine's components and maintenance procedures before starting to work;
- use protective gloves;
- open all contacts that bring power to the equipment before measuring resistance values;
- check that there is no high voltage in the low voltage circuits;
- do not use magnetic tools near strong magnetic fields.

## **SAFETY STANDARDS TO COMPLY WITH DURING MAINTENANCE**

If continuous operation is not required, the system must be turned off.

Before beginning work, the following is required:

- check the maintenance person and make sure he is not carrying objects which could become conductors;
- inspect the work site and make sure the floor is clean and dry;
- inspect work tools. These must be suited for the job to be done and be in good condition in order to permit safe maintenance;

- measuring instruments must be periodically calibrated;
- check work procedures before starting the job. Check the wiring diagram and get an overall picture of how the system is structured.

It is necessary, while maintenance is being done:

- for the maintenance person to be aware of which circuits are under high voltage;
- no resistance measurements must be made on live circuits;
- use only one hand when testing live circuits;
- ground the terminals of the instrument before measuring live circuits;
- always strictly comply with the suggestions mentioned above.

Maintenance can be held to be terminated when all components have been reinstalled and the unit has its original appearance.

#### **10.4 Safety standards to comply with when working on refrigeration circuits**

The refrigerant used for this machine can be dangerous if it is not properly used. Several precautions must be taken when handling this substance:

- never release, store or use the refrigerant near open flames. The refrigerant is non-toxic. Contact with flames causes combustion which generates toxic gases that can corrode metal surfaces;
- never expose the eyes to contact with the refrigerant since it can reach temperatures of  $-40^{\circ}\text{C}$ ;
- never expose the skin to contact with the refrigerant. If this happens then the damaged part must be treated using the same procedures used in combination with frostbite and freezing;
- avoid high concentrations of refrigerant since these can cause suffocation. In this case the person must be evacuated from the room and undergo artificial respiration;
- avoid brazing or welding in the presence of refrigerant vapours;
- do not place gas heating equipment or electrical radiators in places where refrigerant vapours may be present;
- do not smoke;
- do not overheat gas cylinders; do not exceed the refrigerant gas limit indicated on the technical data plate;
- the cooling system must be handled with care as it may contain acids as a result of motor burn-out. Therefore, protective gloves, goggles and clothing must be worn;
- eliminate pressure from the entire cooling system before brazing or welding. Welding when the circuit is under pressure is extremely dangerous due to the risk of the piping rupturing and molten material being projected by the refrigerant gas pressure.

### 10.5 Hazards arising in case of fire

There are no direct dangers.

The refrigerant gas, in the presence of flames, generates toxic and corrosive substances.

The way to prevent this risk, in view of the relatively small quantities of refrigerant contained in the machine, is to position the unit in adequately ventilated rooms.

### 10.6 Toxic substances

When the machine is not installed in a well-ventilated or suitably large room and there is a substantial leak of refrigerant then the room should be ventilated and personnel should be sent out from the room.

### 10.7 Hazardous fluids

The unit does not contain any fluids which are hazardous to people.

During operation, the A/C unit produces condensate which is drained into the environment if it is not dissipated by the dissipator. It is recommended to drain this fluid adequately by condensate lines so as to prevent possible hazards to people in the area.

## 11. Uninstalling and disposal of the unit



**This unit contains refrigerant gas and a small quantity of lubricants (esters) in the compressor. These components are pollutants for the environment and must not be dispersed.**



**Disassembling operations on this unit must only be done by experts.**

**Before starting to dismantle the unit check that it has been disconnected from electric power supply.**

This unit must be disassembled by authorised organisations.

The following are the instructions for proper disposal of the unit during the various phases of its life. For further clarification or additional information, please contact [info@stulz.it](mailto:info@stulz.it).



**To ensure proper and safe disposal activities, operator must equip themselves with the necessary PPE including: anti-cut gloves, oil resistant gloves, heat resistant gloves, safety footwear, safety eye-wear against liquid and gas splashes.**

**The context in which the unit is located may require the use of additional PPE, thus it is mandatory to inquire with the relevant staff of the area before starting operation.**

Once the materials have been separated as shown below, they should be assigned EWC codes and then sent for disposal in accordance with the national legislation. Disposal related to the unit purchased occurs in three stages:

### 1. Disposal of packaging

The packaging of the unit must be disposed of ensuring separation of the following materials:

- Paper and Cardboard
- Wood Packing–Packing materials are not chemically treated unless they are declared to be “fumigate”
- Plastic pallets- high- density polyethylene HDPE
- Plastic Film– polyethylene PE
- Polystyrene –expanded polystyrene EPS 6

### 2. Disposal of substances during maintenance operations

- During the life cycle of the unit, if it becomes necessary to drain the cooling system, the refrigerant must be recovered. This operation must be performed by qualified personnel in accordance with UE Regulation 517/2014. The types of gases used are shown in the following table.
- If the compressor oil needs to be replaced, it must be disposed of according to the instructions below.
- The air filters should be disposed of depending on the substances they contain from the environment in which the units operate
- The gas filters must be disposed of as contaminated materials from the oils of the type shown below

### 3. Disposal at the end of life of the unit

The unit must be disposed of ensuring separation of the following materials:

- Refrigerant - The refrigerant must therefore be recovered before dismantling the unit. The types of refrigerants used are the following:

Code	CASnumber
R-407C	75-10-5 / 354-33-6 / 811-97-2
R-134a	811-97-2

- Metals
- Copper pipes– may contain traces of oil
- Insulation and sound-absorbing materials
- Electric and electronic components
- Cables and wiring
- Oil content within the compressors–is polyester based (POE). Refer to the label on the compressor.
- Plastic Parts - Plastic parts that are important in terms of weight are the following:

Identified Substance	CAS Number
Acrylonitrile butadiene styrene terpolymer	9003-56-9
Polystyrene homopolymer	9003-53-6
–Polycarbonatefrom bisphenol A	103598-77-2

## 12. Options



On TLx40 – 60 options VCC, PSCR, SWT, SWM in combination with options SOFTM or SOFTT, CRA, RSC do not fit all together. Please contact technical support for further information.

### 12.1 Protective treatment on coils – TREATT

It's a protective treatment on condenser and evaporator surface in order to protect them against corrosion by salt spray. This option consists of epoxy treatment on the evaporator surface and cataphoresis treatment on condenser surface. This treatment reduces efficiency of the heat exchanger.

### 12.2 Electrical reheat – RSC

This option is useful when heating of the internal air is required. The electrical reheat is made of aluminium and includes a safety device. It is controlled directly by C2020 microprocessor. Heaters are divided in single-phase modules, each with 1,5 kW of heating capacity and 6,52 A current absorption at nominal voltage.

### 12.3 Monitoring of phase sequence and phase loss (for 3-phase scroll compressors) – PSCR

Protection relay for phase sequence and phase loss installed in the electrical box. In case of incorrect phase sequence or phase loss, the relay automatically switch off the compressor to protect them from damage . Automatic reset when failure is no longer present. LED indication for power on and fault.

### 12.4 Refrigerant R134a

With standard R407C the upper limit of external temperature is +45°C. With R134a, units can work up at higher temperatures, although also the operating temperature limit of the condenser fans has to be verified as a special model may be required, depending on maximum outdoor working temperature. Since with R134a, compressors have a lower efficiency than with R407C, with this option a bigger compressor is installed to achieve roughly the same total cooling capacity as with standard R407C refrigerant.



With R134a refrigerant, single phase power supply is only available up to TLx90.

In the following pages the technical data sheets of units with R134a.

#### NOTES ON TECHNICAL DATA:

\* Inclusive of power absorbed by evaporator fans. External temperature 35°C / internal temperature 30°C / internal relative humidity 30%.

\*\* Sound pressure level at 2 m obtained from the measured sound power according to the EN ISO 9614-2 on normal condition of use and nominal operating condition.

<b>Technical data TLF40-TLF80</b>							
<b>MODEL</b>		<b>TLF40</b>		<b>TLF60</b>		<b>TLF 80</b>	
Total cooling capacity*	kW	4,5		6,1		7,7	
Sensible cooling capacity*	kW	4,5		6,1		7,7	
Refrigerant		R134a		R134a		R134a	
Refrigerant charge	kg	2,05		1,95		3,3	
EER index (with evap. fan in direct current)*	W/W	2,71		3,23		3,02	
EER index (with evap. fan in alternating current)*	W/W	2,71		3,18		2,98	
Outside operating limit temperatures min/max	°C	-20 / +55		-20 / +55		-20 / +55	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	53		55		61	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	64		64		64	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	64		64		64	
Duty cycle	%	100		100		100	
Weight	kg	170		190		250	
Height	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	600		600		900	
Depth	mm	650		650		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	1600		2000		3000	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	1000		1500		2000	
Air flow in free-cooling mode	m <sup>3</sup> /h	800		1200		1600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	1,4		1,6		2,0	
Operating current (OA)*	A	3,0	6,9	3,5	8,1	3,7	10,7
Maximum operating current (FLA)	A	5,1	14,8	6,3	17,3	7	23,1
Locked rotor current (LRA)	A	32	61	40	76	46	100
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Power consumption*	kW	0,13		0,19		0,40	
Operating current (OA)*	A	0,60		0,87		1,9	
Maximum operating current (FLA)	A	1,0		1,0		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36÷57		36÷57		36÷57	
Power consumption*	kW	0,1		0,1		0,15	
Operating current at 48V (OA)*	A	2,4		2,4		3,2	
Maximum operating current at 48V (FLA)	A	2,6		7,3		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,1		0,13		0,18	
Operating current (OA)*	A	0,45		0,59		0,91	
Maximum operating current (FLA)	A	0,6		1,2		2,4	

Technical data TLF90-TLFA4					
MODEL		TLF90		TLFA2	TLFA4
Total cooling capacity*	kW	8,7		11,1	12,2
Sensible cooling capacity*	kW	8,7		11,1	12,2
Refrigerant		R134a		R134a	R134a
Refrigerant charge	kg	4		3,35	3,2
EER index (with evap. fan in direct current)*	W/W	2,74		2,85	2,63
EER index (with evap. fan in alternating current)*	W/W	2,72		2,84	2,61
Outside operating limit temperatures min/max	°C	-20 / +55		-20 / +55	-20 / +55
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40	+20 / +40
External sound pressure level**	dB(A)	62		63	63
Internal sound pressure level (with evap. fan in DC)**	dB(A)	67		67	67
Internal sound pressure level (with evap. fan in AC)**	dB(A)	67		67	67
Duty cycle	%	100		100	100
Weight	kg	260		270	280
Height	mm	1990 (2030)		1990 (2030)	1990 (2030)
Width	mm	900		900	900
Depth	mm	700		700	700
<b>Condenser fan</b>					
Q.ty / Type		1 / radial		1 / radial	1 / radial
Air flow	m <sup>3</sup> /h	3200		3500	3500
<b>Evaporator fan</b>					
Q.ty / Type		1 / radial		1 / radial	1 / radial
Air flow in cooling mode	m <sup>3</sup> /h	2200		3000	3200
Air flow in free-cooling mode	m <sup>3</sup> /h	1800		2400	2600
<b>Electrical data</b>					
Nominal voltage	V AC	400	230	400	400
Tolerance on voltage		±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	3+N
Frequency	Hz	50		50	50
Tolerance on frequency		±2%		±2%	±2%
Auxiliary voltage	V AC	24		24	24
<b>Compressor</b>					
Power consumption*	kW	2,5		2,9	3,6
Operating current (OA)*	A	4,5	14,5	5,9	6,5
Maximum operating current (FLA)	A	10	23,5	11	13
Locked rotor current (LRA)	A	50	114	65,5	74
<b>Condenser fan</b>					
Nominal voltage	V AC	230		230	230
Phases	ph	1		1	1
Power consumption*	kW	0,48		0,60	0,60
Operating current (OA)*	A	2,3		2,9	2,9
Maximum operating current (FLA)	A	3,1		3,1	3,1
<b>Evaporator fan in direct current</b>					
Nominal voltage	V DC	48		48	48
Tolerance on DC voltage	V DC	36÷57		36÷57	36÷57
Power consumption*	kW	0,2		0,39	0,44
Operating current at 48V (OA)*	A	4,2		8,3	9,2
Maximum operating current at 48V (FLA)	A	12,5		12,5	12,5
<b>Evaporator fan in alternating current</b>					
Nominal voltage	V AC	230		230	230
Phases	ph	1		1	1
Power consumption*	kW	0,22		0,41	0,47
Operating current (OA)*	A	1,11		2,07	2,37
Maximum operating current (FLA)	A	2,4		2,3	2,3

Technical data TLU40-TLU80							
MODEL		TLU40		TLU60		TLU80	
Total cooling capacity*	kW	4,2		5,9		7,6	
Sensible cooling capacity*	kW	4,2		5,9		7,6	
Refrigerant		R134a		R134a		R134a	
Refrigerant charge	kg			1,9		5,2	
EER index (with evap. fan in direct current)*	W/W	2,43		3,09		2,87	
EER index (with evap. fan in alternating current)*	W/W	2,43		3,04		2,84	
Outside operating limit temperatures min/max	°C	-20 / +55		-20 / +55		-20 / +55	
Inside operating limit temperatures min/max	°C	+20 / +40		+20 / +40		+20 / +40	
External sound pressure level**	dB(A)	53		55		61	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	64		64		64	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	64		64		64	
Duty cycle	%	100		100		100	
Weight	kg	170		190		250	
Height (with bracket)	mm	1990 (2030)		1990 (2030)		1990 (2030)	
Width	mm	600		600		900	
Depth	mm	650		650		700	
<b>Condenser fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow	m <sup>3</sup> /h	1600		2000		3000	
<b>Evaporator fan</b>							
Q.ty / Type		1 / radial		1 / radial		1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	1000		1500		2000	
Air flow in free-cooling mode	m <sup>3</sup> /h	800		1200		1600	
<b>Electrical data</b>							
Nominal voltage	V AC	400	230	400	230	400	230
Tolerance on voltage		±10%	±10%	±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	1	3+N	1
Frequency	Hz	50		50		50	
Tolerance on frequency		±2%		±2%		±2%	
Auxiliary voltage	V AC	24		24		24	
<b>Compressor</b>							
Power consumption*	kW	1,5		1,6		2,1	
Operating current (OA)*	A	3,0	6,9	3,5	8,1	3,6	10,4
Maximum operating current (FLA)	A	5,1	14,8	6,3	17,3	7	23,1
Locked rotor current (LRA)	A	32	61	40	76	46	100
<b>Condenser fan</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,13		0,19		0,40	
Operating current (OA)*	A	0,60		0,87		1,9	
Maximum operating current (FLA)	A	1,0		1,0		3,1	
<b>Evaporator fan in direct current</b>							
Nominal voltage	V DC	48		48		48	
Tolerance on DC voltage	V DC	36÷57		36÷57		36÷57	
Power consumption*	kW	0,1		0,1		0,15	
Operating current at 48V (OA)*	A	2,4		2,4		3,2	
Maximum operating current at 48V (FLA)	A	2,6		7,3		12,5	
<b>Evaporator fan in alternating current</b>							
Nominal voltage	V AC	230		230		230	
Phases	ph	1		1		1	
Power consumption*	kW	0,1		0,13		0,18	
Operating current (OA)*	A	0,45		0,59		0,91	
Maximum operating current (FLA)	A	0,6		1,2		2,4	

Technical data TLU90-TLUA4					
MODEL		TLU90	TLUA2	TLUA4	
Total cooling capacity*	kW	8,4	10,7	11,7	
Sensible cooling capacity*	kW	8,4	10,7	11,7	
Refrigerant		R134a	R134a	R134a	
Refrigerant charge	kg	3,35		3,15	
EER index (with evap. fan in direct current)*	W/W	2,64	2,75	2,58	
EER index (with evap. fan in alternating current)*	W/W	2,63	2,74	2,56	
Outside operating limit temperatures min/max	°C	-20 / +55	-20 / +55	-20 / +55	
Inside operating limit temperatures min/max	°C	+20 / +40	+20 / +40	+20 / +40	
External sound pressure level**	dB(A)	62	63	63	
Internal sound pressure level (with evap. fan in DC)**	dB(A)	67	67	67	
Internal sound pressure level (with evap. fan in AC)**	dB(A)	67	67	67	
Duty cycle	%	100	100	100	
Weight	kg	260	270	280	
Height	mm	1990 (2030)	1990 (2030)	1990 (2030)	
Width	mm	900	900	900	
Depth	mm	700	700	700	
<b>Condenser fan</b>					
Q.ty / Type		1 / radial	1 / radial	1 / radial	
Air flow	m <sup>3</sup> /h	3200	3500	3500	
<b>Evaporator fan</b>					
Q.ty / Type		1 / radial	1 / radial	1 / radial	
Air flow in cooling mode	m <sup>3</sup> /h	2200	3000	3200	
Air flow in free-cooling mode	m <sup>3</sup> /h	1800	2400	2600	
<b>Electrical data</b>					
Nominal voltage	V AC	400	230	400	400
Tolerance on voltage		±10%	±10%	±10%	±10%
Phases	ph	3+N	1	3+N	3+N
Frequency	Hz	50		50	50
Tolerance on frequency		±2%		±2%	±2%
Auxiliary voltage	V AC	24		24	24
<b>Compressor</b>					
Power consumption*	kW	2,5		2,9	3,5
Operating current (OA)*	A	4,5	14,5	6,0	6,5
Maximum operating current (FLA)	A	10	23,5	11	13
Locked rotor current (LRA)	A	50	114	65,5	74
<b>Condenser fan</b>					
Nominal voltage	V AC	230		230	230
Phases	ph	1		1	1
Power consumption*	kW	0,48		0,60	0,60
Operating current (OA)*	A	2,3		2,9	2,9
Maximum operating current (FLA)	A	3,1		3,1	3,1
<b>Evaporator fan in direct current</b>					
Nominal voltage	V DC	48		48	48
Tolerance on DC voltage	V DC	36÷57		36÷57	36÷57
Power consumption*	kW	0,2		0,39	0,44
Operating current at 48V (OA)*	A	4,2		8,3	9,2
Maximum operating current at 48V (FLA)	A	12,5		12,5	12,5
<b>Evaporator fan in alternating current</b>					
Nominal voltage	V AC	230		230	230
Phases	ph	1		1	1
Power consumption*	kW	0,22		0,41	0,47
Operating current (OA)*	A	1,11		2,07	2,37
Maximum operating current (FLA)	A	2,4		2,3	2,3

## 12.5 Kit for low external temperatures – WINTER KIT

When minimum outdoor temperature is below  $-25^{\circ}\text{C}$  and cooling function is still required, units must be provided with this option. With this kit, minimum outdoor working temperature is  $-40^{\circ}\text{C}$ . The kit is installed in factory and is composed of:

- condenser fan with special bearings for low temperature
- heating resistance on electrical box
- heating resistance on condensate drain pan
- heating resistance on free cooling damper (when present)
- pressure transducer on condenser
- condenser shut system
- crankcase heater (so there is no need to order it separately).



**It's possible to install Winter kit option only in the units with refrigerant R407C.**

## 12.6 Main switch - SWT/SWM

This is located on the electrical panel and is used to disconnect main power supply to the unit. When switched off, it interrupts power supply to the unit circuits from it downstream. This switch can be provided by the installer as well, or it can be requested ordering this option. SWT is the version for 3-phase main power supply, SWM the version for single-phase main power supply.



**Setting of this component is made in factory and must not be altered. ATTENTION: In case of main switch, the power supply cables between the connection terminals of the customer and the main switch are always under voltage also if the main switch is open.**

The supply cables are identified with the symbol below (high voltage).



## 12.7 Socket connection field – SCF

This option consists of connectors to allow a fast power supply connection. These connectors replace the holes for passing electrical cables on the plate placed on the top of the unit, rear right corner (for standard configuration of this plate, see Chapter Installation). Matching plugs to wire power supply cables are provided with option ACTSKIT.

## 12.8 Crankcase heater for compressor – CRA

This heating resistance, installed around compressor carter, operates when compressor is OFF, to keep lubricating oil warm. This function assures constant lubricating performance of oil at the compressor start. It is necessary only when outdoor temperature might go below  $-20^{\circ}\text{C}$ .

## 12.9 Soft start for three-phase compressor – SOFTT



**Hazardous voltage: will cause death or serious injury. Disconnect power before working on equipment.**



**Setting of this component is made in factory and must not be altered.**

The soft start is installed inside the e-box on the supply line to the compressor. Its purpose is the reduction of compressor starting current. This can be obtained in two ways:

- Soft start is the most common method of starting. The initial torque setting is DIP switch selectable as a percentage of the locked rotor torque (LRT), ranging from 15...65% of full value. The starting time is customer set, ranging from 2...15 seconds.
- Current limit start is used when a limitation of the maximum starting current is necessary. This is DIP switch selectable and can be adjusted from 150...450% of full load amps. The current limit starting time is customer set, ranging from 2...15 seconds.
- Other operation modes of this device are kick start and soft stop, but these must be disabled for the control of the air conditioner.

Additional features:

- Motor overload: The overload is DIP switch selectable. The overload trip class is selectable for OFF or a 10, 15, or 20 protection. A current transformer (CT) monitors each phase. The motor's full load current rating is set by a potentiometer. The overload reset option can be operated either manually or automatically.
- Fault indication: this device monitors both the pre-start and running modes. A single LED is used to display both RUN/ON and FAULT indication. If the controller senses a fault, it shuts down the motor and the LED displays the appropriate fault condition. The controller monitors the following conditions:
  - Overload
  - Over-temperature
  - Phase reversal
  - Phase loss / Open load
  - Phase imbalance
  - Shorted SCR

Any fault condition will cause the auxiliary contacts to change state and the hold-in circuit to release. All faults can be cleared by either pressing the reset button or by removing control power. Overload and over-temperature are time-based conditions that may require waiting for some additional cooling time, before reset is possible.

### Control terminal description

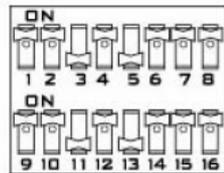
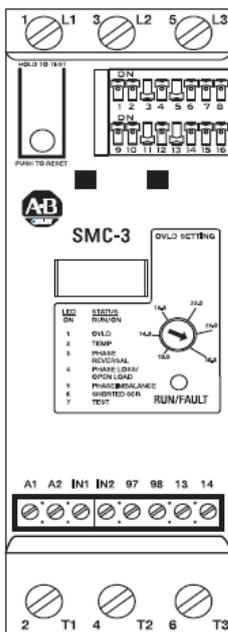
The device contains eight control terminals on the front of the controller. These control terminals are described below.

Terminal number	Description	Terminal number	Description
A1	Control power input	97	N.O. relay - aux. contact for fault indication
A2	Control power common	98	N.O. relay - aux. contact for fault indication
IN1	Start input	13	N.O. auxiliary relay #1 (normal/up-to-speed)
IN2	Stop input	14	N.O. auxiliary relay #1 (normal/up-to-speed)

### Auxiliary contacts

Two hard contacts are provided as standard. These contacts are finger safe. The first contact is for fault indication. The auxiliary relay #1 is programmable via dipswitch #14, for normal/up-to-speed indication. A side-mounted additional auxiliary relay #2 can be added as an accessory and programmed via dipswitch #15 for normal/up-to-speed indication.

### DIP switch configuration



Position number	Description
1	Start time
2	Start time
3	Start mode (current limit or soft start)
4	Current limit start setting (when selected) or Soft start initial torque setting (when selected)
5	Current limit start setting (when selected) or Soft start initial torque setting (when selected)
6	Soft stop
7	Soft stop
8	Not used
9	Kick start
10	Kick start
11	Overload class selection
12	Overload class selection
13	Overload reset
14	Auxiliary relay #1 (normal or up-to-speed)
15	Optional auxiliary relay #2 (normal or up-to-speed)
16	Phase rotation check

Start time			Current limit start setting ( when selected)		
DIP switch number			DIP switch number		
1	2	Time [S]	4	5	Current limit % FLA
OFF	OFF	2	OFF	OFF	150 %
ON	OFF	5	ON	OFF	250 %
OFF	ON	10	OFF	ON	350 %
ON	ON	15	ON	ON	450 %

Start time (current limit or soft start)		Soft start initial torque setting (when selected)			
DIP switch number			DIP switch number		
3			4	5	Initial torque % LRT
OFF	Current limit		OFF	OFF	15 %
ON	Soft start		ON	OFF	25 %
			OFF	ON	35 %
			ON	ON	65 %

Overload class selection		
DIP switch number		
11	12	Trip class
OFF	OFF	OFF
ON	OFF	10
OFF	ON	15
ON	ON	20

Overload reset		Auxiliary relay #1	
DIP switch number		DIP switch number	
13		14	Setting
OFF	Current limit	OFF	Normal
ON	Soft start	ON	Up-to-speed

Optional auxiliary relay #2		Phase rotation check	
DIP switch number		DIP switch number	
15	Settin	16	Setting
OFF	Normal	OFF	Enabled
ON	Up-to-speed	ON	Disabled

### 12.10 Soft start for single-phase compressor – SOFTM



**Hazardous voltage: will cause death or serious injury. Disconnect power before working on equipment.**

Soft Start option is not available for TLx40 with single phase power supply and refrigerant R407C.

In TLx60 units with 230V/1ph/50Hz power supply and refrigerant R407C is not possible to add other options with Soft Start.



The Soft Start option is available for single phase power supply units up to TLx90, in the units with refrigerant R134a. In TLx40/60 units with 230V/1ph/50Hz power supply and refrigerant R134a is not possible to add other options with Soft Start.

To verify the availability of SOFTM option with 230V/1ph/60Hz power supply, please contact your local partner STULZ.



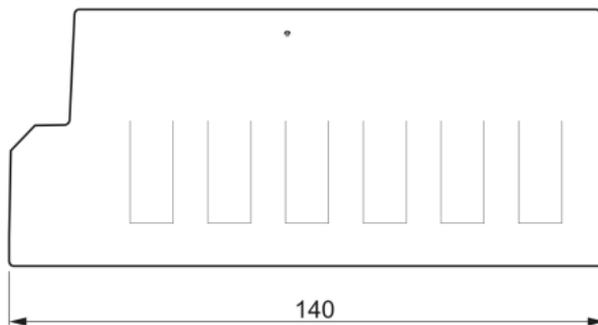
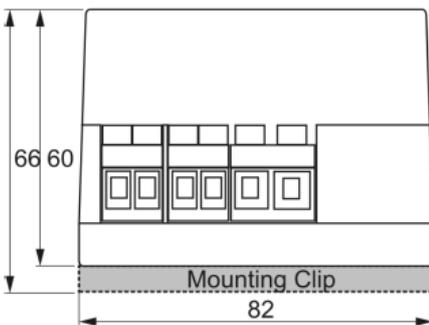
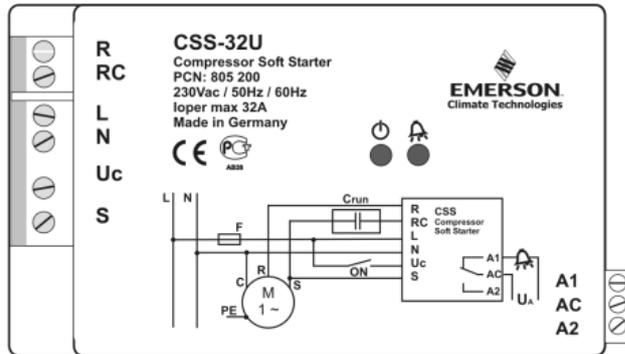
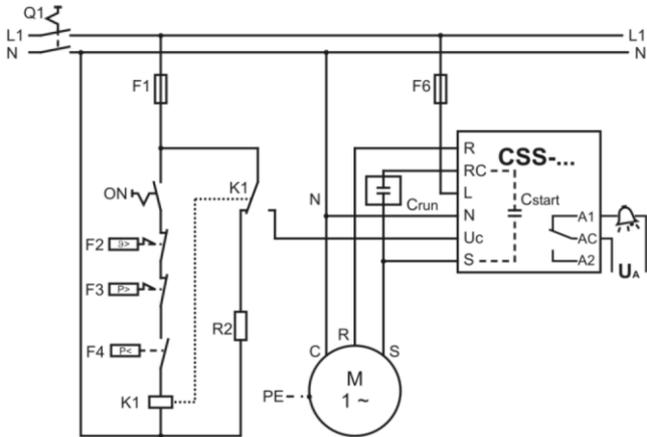
Setting of this component is made in factory and must not be altered.



With SOFTM option, the working limit of the unit is 45°C external temperature.

The soft start is installed inside the e-box on the supply line to the compressor. Its purpose is the reduction of compressor starting current and torque.

Technical data	
Power supply	230 V AC +10% / -15% / 50/60Hz
Nominal operating current	25A / 32A max. / AC-53a; AC-58a
Protection class according to IEC 529	IP 20



### 12.11 Voltage control device – VCC

The voltage control relay, is an additional device which stops the power supply to prevent faults if the voltage not in rated tolerance. The relays monitors according to the respective setting an voltage whether it exceeds or falls below a specified value or is within a certain range (window monitoring). The relay installed in the electrical box has a display and can be parametrized with three keys. The display shows the present value and a symbol that indicates whether the relay is set to monitor whether the voltage exceeds or falls below a specified value or whether it is set to window monitoring. The setting range for the upper and lower threshold values extends from 17 V to 275 V. Reset function: Auto- or manual reset selectable.

### **12.12 WIB1000 / WIB1485**

The WIB1000 / WIB1485 is a single-point Ethernet interface and it's used for the SNMP supervision, web monitoring and OnBoard communication. It's also possible to update the firmware and the parameters list through an USB key, formatted as FAT32.

When present, WIB1000 / WIB1485 is soldered directly on the SPI connector of the mother board. WIB1000 is the option without the serial interface 485, while WIB1485 is the option with serial interface 485.

### **12.13 Seaworthy case packaging - SEAPACK**

Wooden packaging with special treatment suitable for sea freight.

