



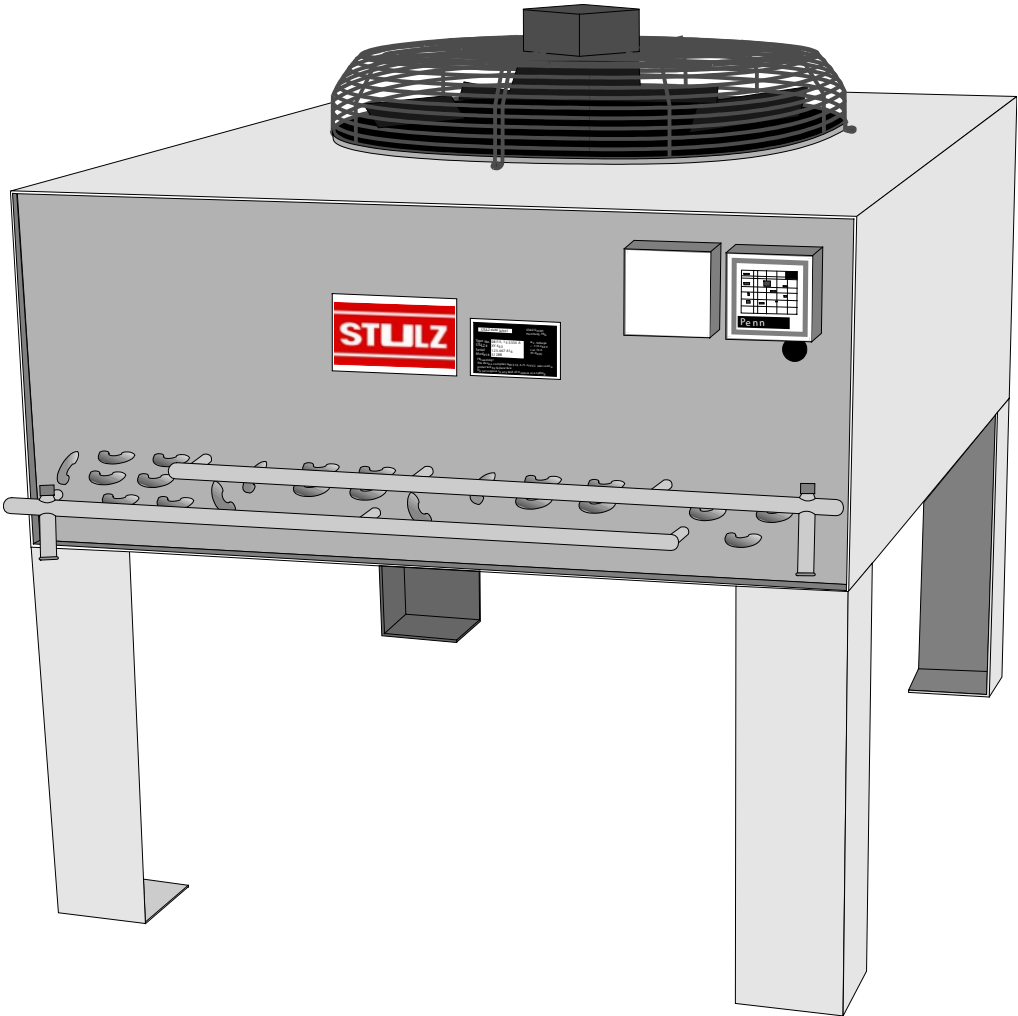
CONDENSERS
230V-50Hz-1Ph

Index 80

Edition 8.06

AIR CONDITIONING

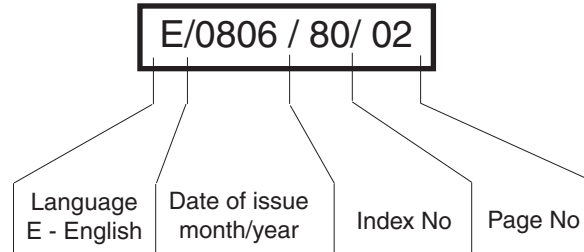
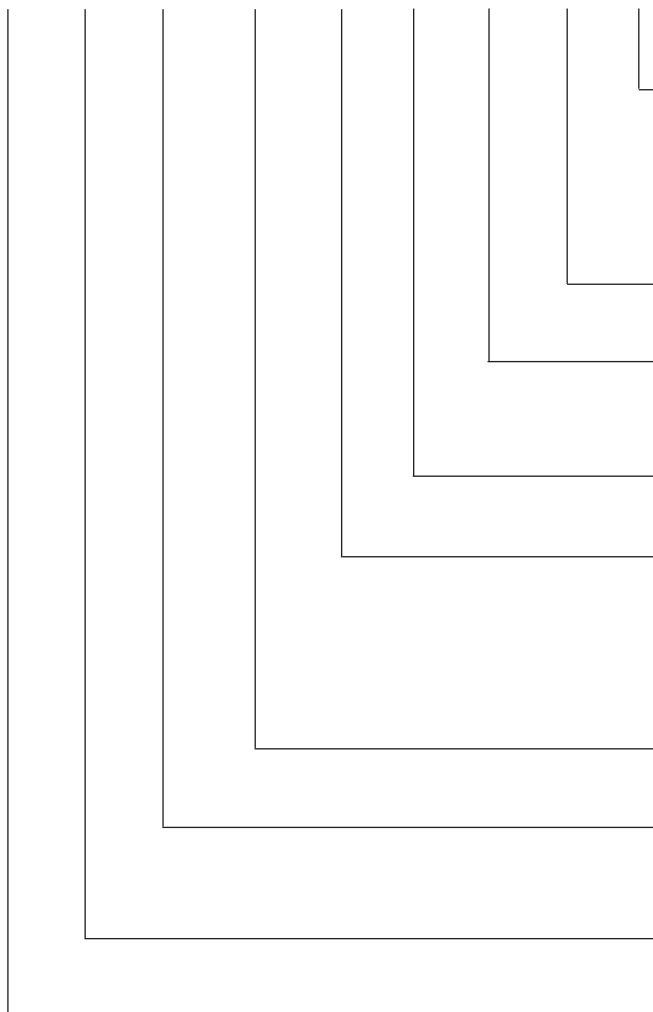
AIR COOLED CONDENSERS



TECHNICAL DATA

Contents

1. Technical Data	5
1.1 Capacity calculation	9
2. Dimensions & Connections.....	10
3. Installation.....	21
3.1 Supply connections	22
3.2 Condenser pressure switch.....	23
3.2.1 Description	23
3.2.2 Adjustment	23
3.2.3 Technical Data.....	23
3.3 Option Speed controller	24
3.3.1 Function description.....	24
3.3.2 Technical data	24
3.3.3 Installation.....	25
3.3.4 Electrical connection	25
3.3.5 Operation	26
4. Service and Maintenance	27
Appendix.....	28

Page key**Model identification****K S V 036 X 2 5 1 A****noise grade**

A: 60 dB(A)*

B: 50 dB(A)* * sound level at 5 m

C: 40 dB(A)* distance, **no** reflection**number of phases****frequency**

(5= 50 Hz, 6= 60 Hz)

number of fans**operation range**X = 32°C / t_c = 48°CY = 37°C / t_c = 50°CZ = 42°C / t_c = 52°C**cooling capacity in kW****air flow**

(H= horizontal, V= vertical)

STULZ**Type****K = air cooled condenser****R = Dry cooler**

1. Technical Data

Noise level group 1 - 60 dB(A) in 5m distance without reflexion
Aluminium casing

Q _c [kW]	T _a [°C]	T _c [°C]	Stulz Type	Condenser Ref. No.	I [A]	Fan Ref. No.	Dwg. Nro	Weight [kg]
6	32	48	KSV 006 X 151 C	M21003	0,55	M21073	1A	25
	37	50	KSV 006 Y 151 C	M21004	0,55	M21073	1A	26
	42	52	KSV 006 Z 151 C	M21006	0,73	M21074	1B	29
8	32	48	KSV 008 X 151 C	M21007	0,73	M21074	1B	28
	37	50	KSV 008 Y 151 C	M21006	0,73	M21074	1B	29
	42	52	KSV 008 Z 151 B	M23197	0,91	M21075	1D	36
12	32	48	KSV 012 X 151 B	M23198	0,91	M21075	1C	32
	37	50	KSV 012 Y 151 A	M23199	3	M21077	1D	40
	42	52	KSV 012 Z 151 A	M21067	3	M21077	1D	40
16	32	48	KSV 016 X 151 A	M21067	3	M21077	1D	40
	37	50	KSV 016 Y 151 A	M21067	3	M21077	1D	40
	42	52	KSV 016 Z 251 A	M23223	2,7	M21076	2A	63
21	32	48	KSV 021 X 151 A	M21018	3	M21077	1D	45
	37	50	KSV 021 Y 251 A	M23223	2,7	M21076	2A	63
	42	52	KSV 021 Z 251 A	M23204	2,7	M21076	2A	72
36	32	48	KSV 036 X 251 A	M23204	2,7	M21076	2A	72
	37	50	KSV 036 Y 351 A	M21039	2,7	M21076	3A	109
	42	52	KSV 036 Z 351 A	M23205	3	M21077	3A	120
44	32	48	KSV 044 X 251 A	M21025	3	M21077	2A	81
	37	50	KSV 044 Y 251 A	M23206	3,3	M21066	2B	100
	42	52	KSV 044 Z 351 A	M23207	2,7	M21076	3B	164
55	32	48	KSV 055 X 251 A	M23206	3,3	M21066	2B	100
	37	50	KSV 055 Y 351 A	M21027	3	M21077	3A	144
	42	52	KSV 055 Z 351 A	M44124	2,7	M21078	3D	200

Pressostat Type: Johnson Controls P77AAW-9350 Ref. No. : M10975

Fan Type: Ziehl Abegg

Steel sheet casing

Q _c [kW]	T _a [°C]	T _c [°C]	Stulz Type	Condenser Ref. No.	I [A]	Fan Ref. No.	Dwg. Nro	Weight [kg]
8	32	48	KSV 008 X 151 Cs*	M19278	0,73	M23886	1B	40
	42	52	KSV 008 Z 151 Bs	M19276	1,65	M21079	1D	45
12	42	52	KSV 012 Z 151 As	M28625	3	M21077	1D	50
16	32	48	KSV 016 X 151 As	M28625	3	M21077	1D	50
	37	50	KSV 016 Y 151 As	M28625	3	M21077	1D	50
	42	52	KSV 016 Z 251 As	M19134	3	M21077	2A	95
21	32	48	KSV 021 X 151 As	M28686	3	M21077	1D	60
	37	50	KSV 021 Y 251 As	M19134	3	M21077	2A	95
	42	52	KSV 021 Z 251 As	M28685	3	M21077	2A	105
	42	52	KSV 021 Z 351 Cs	M19118	0,72	M21089	3A	130
36	32	48	KSV 036 X 251 As	M28685	3	M21077	2A	105
	32	48	KSV 036 X 351 Cs	M19118	0,72	M21089	3A	130
	37	50	KSV 036 Y 351 As	M19135	1,65	M21079	3A	130
	37	50	KSV 036 Y 351 Bs	M19135	1,65	M21079	3A	130
	42	52	KSV 036 Z 351 As	M28976	3	M21077	3A	115
44	32	48	KSV 044 X 251 As	M28684	3	M21077	2A	115
	32	48	KSV 044 X 351 Bs	M19135	1,65	M21079	3A	130
	37	50	KSV 044 Y 251 As	M28626	2,7	M21078	2B	210
	42	52	KSV 044 Z 351 As	M19277	3	M21077	3B	160
55	32	48	KSV 055 X 251 As	M28626	2,7	M21078	2B	140
	37	50	KSV 055 Y 351 As	M28715	3	M21077	3A	185
	42	52	KSV 055 Z 351 As	M28683	2,7	M21078	3D	220

* s - steel sheet casing

Pressostat Type: Johnson Controls P77AAW-9350 Ref. No. : M10975

Fan Type: Ziehl Abegg

Noise level group 2 - 50 dB(A) in 5m distance without reflexion
Aluminium casing

Q_c [kW]	T_a [°C]	T_c [°C]	Stulz Type	Condenser Ref. No.	I [A]	Fan Ref. No.	Dwg. Nro	Weight [kg]
6	32	48	KSV 006 X 151 C	M21003	0,55	M21073	1A	25
	37	50	KSV 006 Y 151 C	M21004	0,55	M21073	1A	26
	42	52	KSV 006 Z 151 C	M21006	0,73	M21074	1B	29
8	32	48	KSV 008 X 151 C	M21007	0,73	M21074	1B	28
	37	50	KSV 008 Y 151 C	M21006	0,73	M21074	1B	29
	42	52	KSV 008 Z 151 B	M23197	0,91	M21075	1D	36
12	32	48	KSV 012 X 151 B	M23198	0,91	M21075	1C	32
	37	50	KSV 012 Y 151 B	M21029	1,65	M21079	1D	40
	42	52	KSV 012 Z 151 B	M21034	1,95	M21083	1D	49
16	32	48	KSV 016 X 151 B	M21029	1,65	M21079	1D	45
	37	50	KSV 016 Y 251 C	M21047	0,91	M21075	2A	63
	42	52	KSV 016 Z 251 B	M23209	0,91	M21075	2A	72
21	32	48	KSV 021 X 251 B	M23209	0,91	M21075	2A	63
	37	50	KSV 021 Y 251 B	M23209	0,91	M21075	2A	72
	42	52	KSV 021 Z 251 B	M23212	1,65	M21079	2A	81
36	32	48	KSV 036 X 251 B	M21037	1,65	M21079	2A	81
	37	50	KSV 036 Y 351 B	M21039	1,65	M21079	3A	109
	42	52	KSV 036 Z 351 B	M21043	1,65	M21079	3B	164
44	32	48	KSV 044 X 351 B	M21039	1,65	M21079	3A	109
	37	50	KSV 044 Y 351 B	M21044	1,65	M21079	3A	144
	42	52	KSV 044 Z 351 C	M21069	1,65	M21088	3C	192
55	32	48	KSV 055 X 351 B	M21044	1,65	M21079	3A	144
	37	50	KSV 055 Y 351 B	M21069	1,65	M21088	3C	192
	42	52	KSV 055 Z 451 C	M23213	1,65	M21088	4A	249

Pressostat Type: Johnson Controls P77AAW-9350 Ref. No. : M10975

Fan Type: Ziehl Abegg

Noise level group 3 - 40 dB(A) in 5m distance without reflexion
Aluminium casing

Q _c [kW]	T _a [°C]	T _c [°C]	Stulz Type	Condenser Ref. No.	I [A]	Fan Ref. No.	Dwg. Nro	Weight [kg]
6	32	48	KSV 006 X 151 C	M21003	0,55	M21073	1A	25
	37	50	KSV 006 Y 151 C	M21004	0,55	M21073	1A	26
	42	52	KSV 006 Z 151 C	M21006	0,73	M21074	1B	29
8	32	48	KSV 008 X 151 C	M21007	0,73	M21074	1B	28
	37	50	KSV 008 Y 151 C	M21006	0,73	M21074	1B	29
	42	52	KSV 008 Z 151 C	M21015	0,72	M21089	1D	40
12	32	48	KSV 012 X 151 C	M21015	0,72	M21089	1D	40
	37	50	KSV 012 Y 151 C	M21046	0,72	M21089	1D	49
	42	52	KSV 012 Z 251 C	M21047	0,72	M21089	2A	63
16	32	48	KSV 016 X 251 C	M21047	0,72	M21089	2A	63
	37	50	KSV 016 Y 251 C	M21047	0,72	M21089	2A	63
	42	52	KSV 016 Z 251 C	M21049	0,72	M21089	2A	72
21	32	48	KSV 021 X 251 C	M21047	0,72	M21089	2A	63
	37	50	KSV 021 Y 251 C	M21049	0,72	M21089	2A	81
	42	52	KSV 021 Z 351 C	M21054	0,72	M21089	3A	109
36	32	48	KSV 036 X 351 C	M21054	0,72	M21089	3A	109
	37	50	KSV 036 Y 351 C	M21057	0,72	M21089	3A	144
	42	52	KSV 036 Z 351 C	M23214	1,25	M21093	3C	192
44	32	48	KSV 044 X 351 C	M21058	0,72	M21089	3B	164
	37	50	KSV 044 Y 351 C	M23215	1,25	M21093	3C	192
	42	52	KSV 044 Z 351 C	M21069	1,65	M21088	3C	192
55	32	48	KSV 055 X 351 C	M23215	1,25	M21093	3C	192
	37	50	KSV 055 Y 451 C	M21059	1,25	M21093	4A	182
	42	52	KSV 055 Z 451 C	M23213	1,65	M21088	4A	249

Pressostat Type: Johnson Controls P77AAW-9350 Ref. No. : M10975

Fan Type: Ziehl Abegg

1.1 Capacity calculation

Under different conditions the effective capacities of the air cooled condensers have to be converted by following:

$$\dot{Q}_C = \dot{Q}_{\text{eff}} \cdot f_t \cdot f_1 \cdot f_2$$

Q_C = catalogue capacity

Q_{eff} = effective condenser capacity

f_t = factor at (condensing temp. - ambient temp.) $\neq 16 \text{ K}$ ¹⁾

f_1 = factor at ambient temp. $\neq 32^\circ \text{ C}$ ²⁾

f_2 = factor at location $> 0 \text{ m}$ above sea level ³⁾

1) Factor f_t

$$f_t = \frac{16 \text{ K}}{\Delta t_C}$$

Δt_C = variable temperature difference [K]
(catalogue value refer to 16 K)

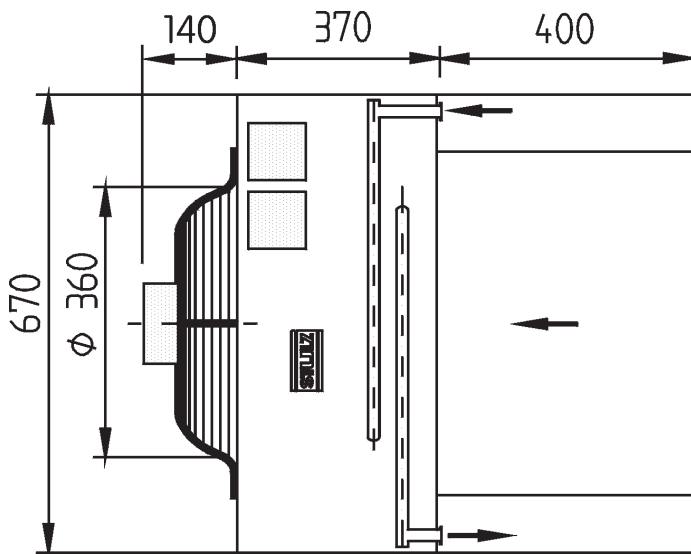
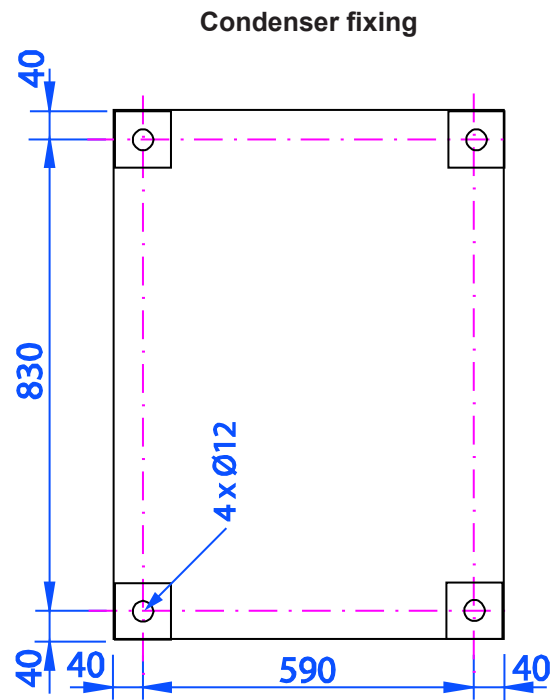
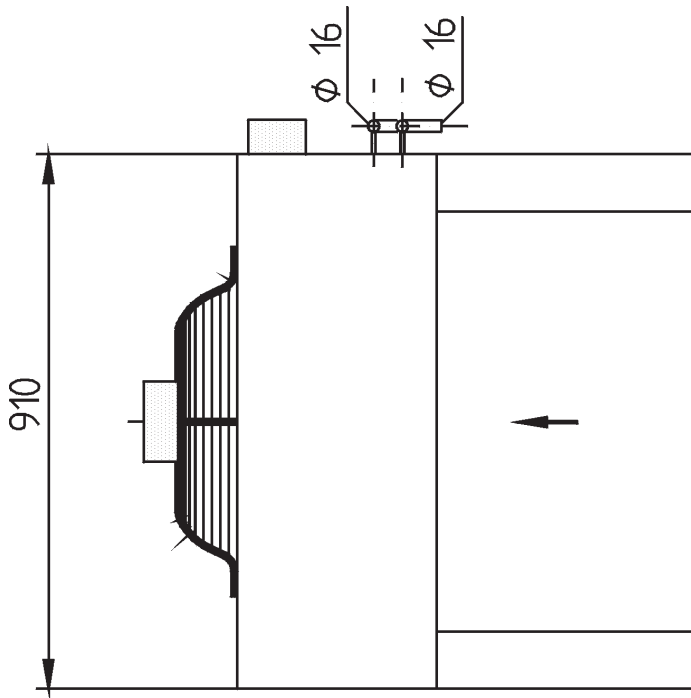
2) Factor f_1

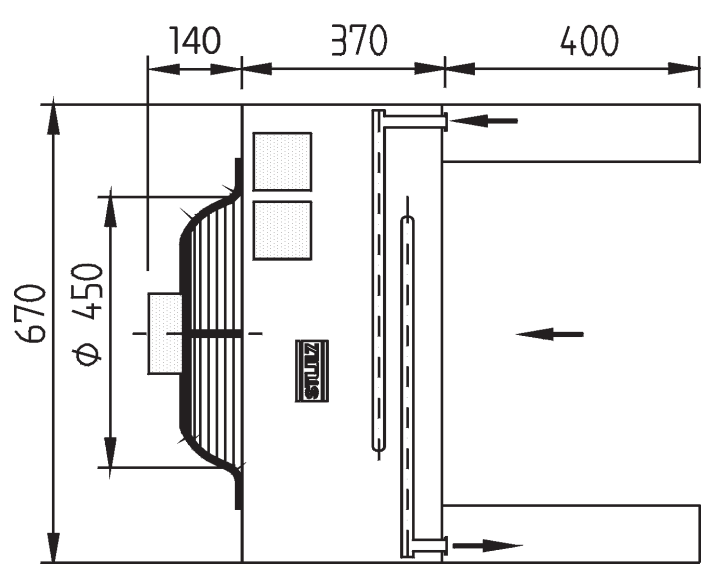
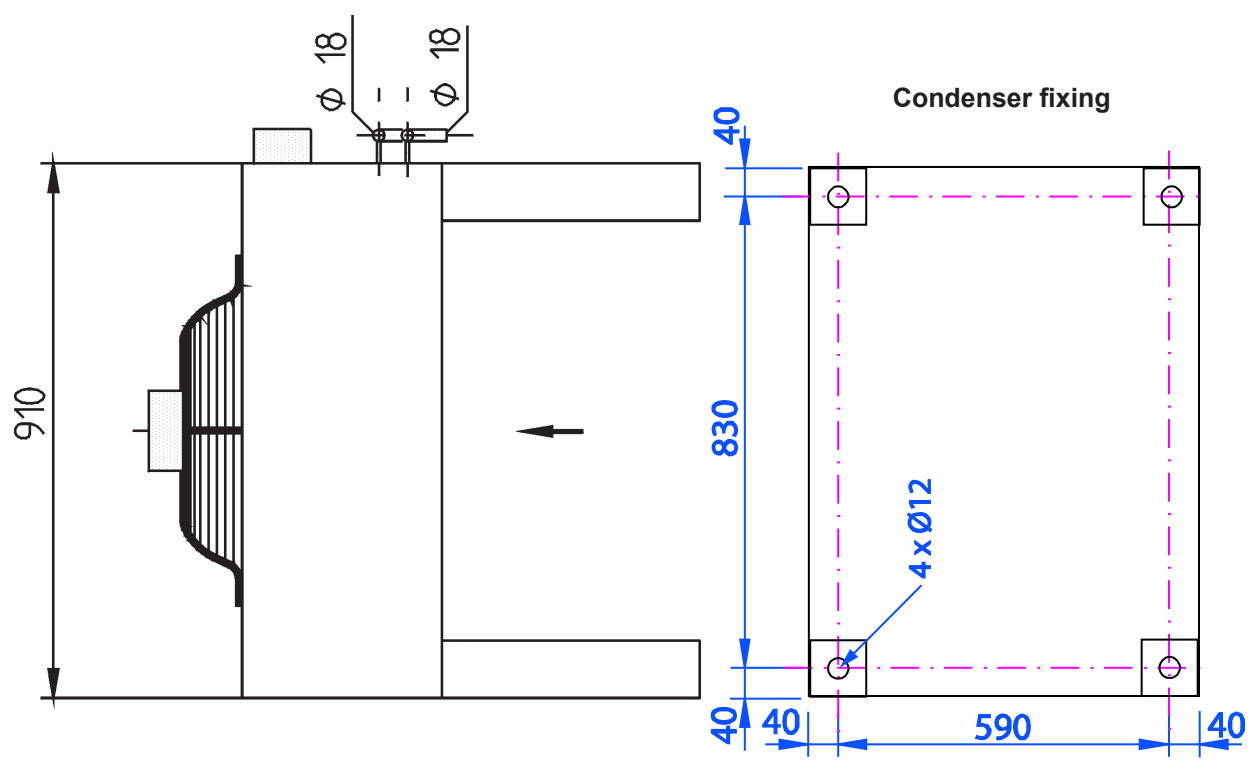
Ambient temperature [$^\circ \text{ C}$]	20	25	30	32	35	40	45
Factor f_1	0.971	0.982	0.995	1.0	1.006	1.017	1.029

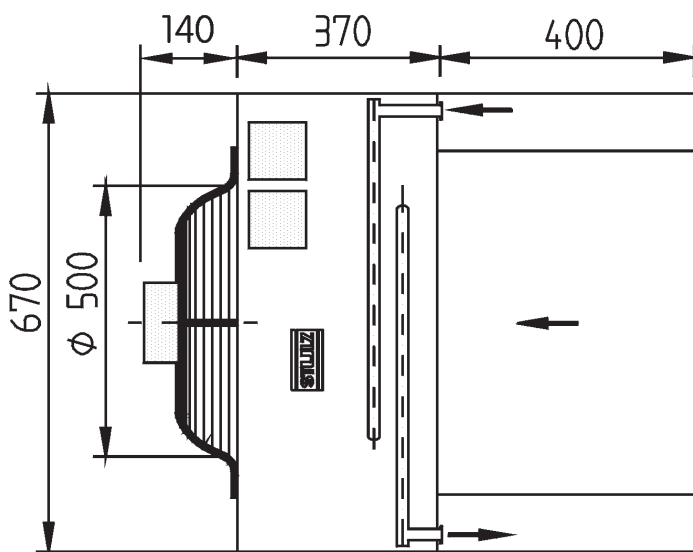
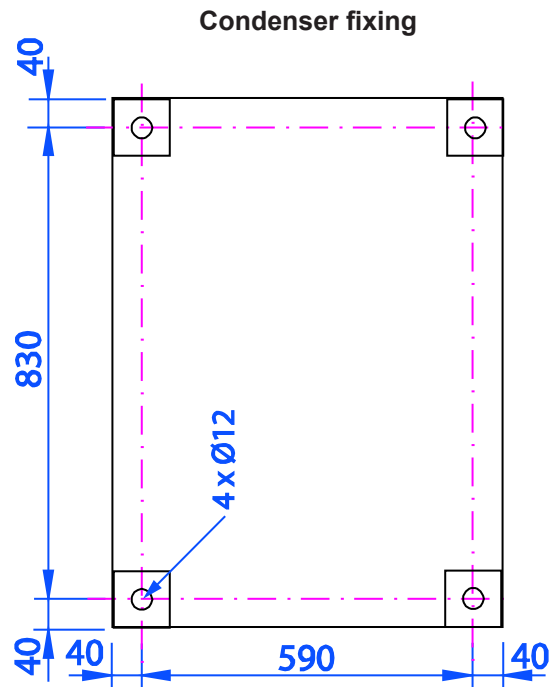
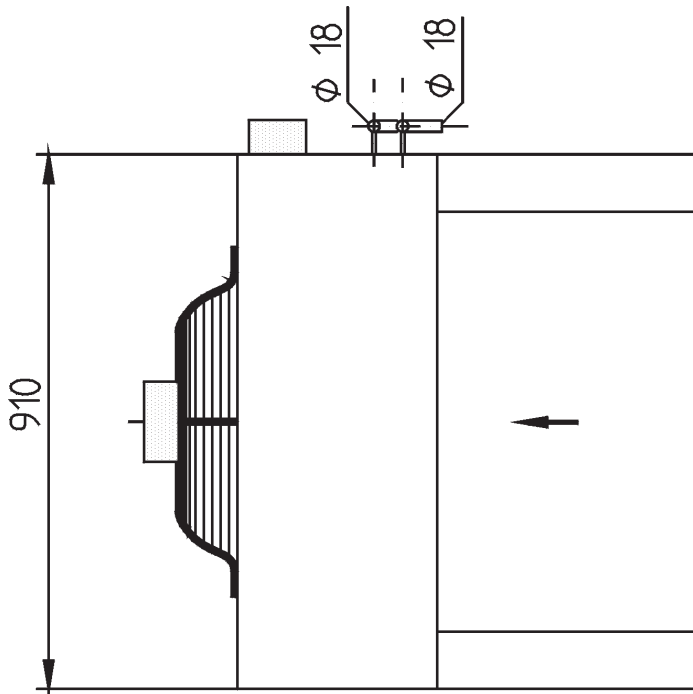
3) Factor f_2

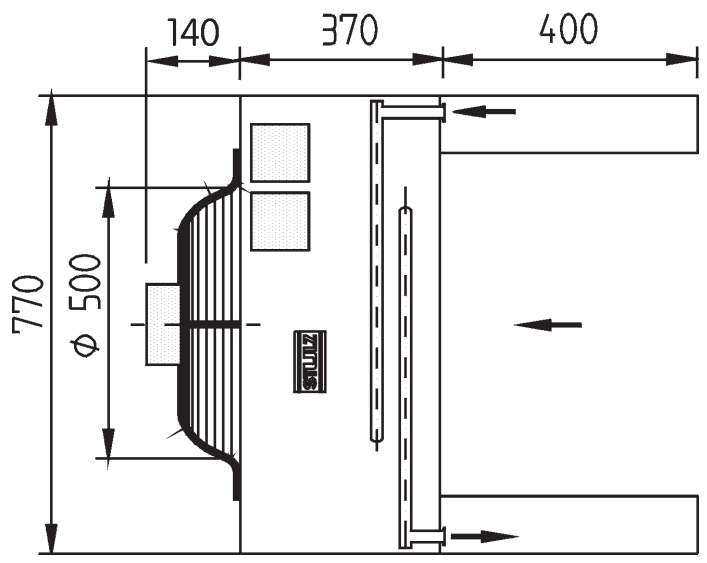
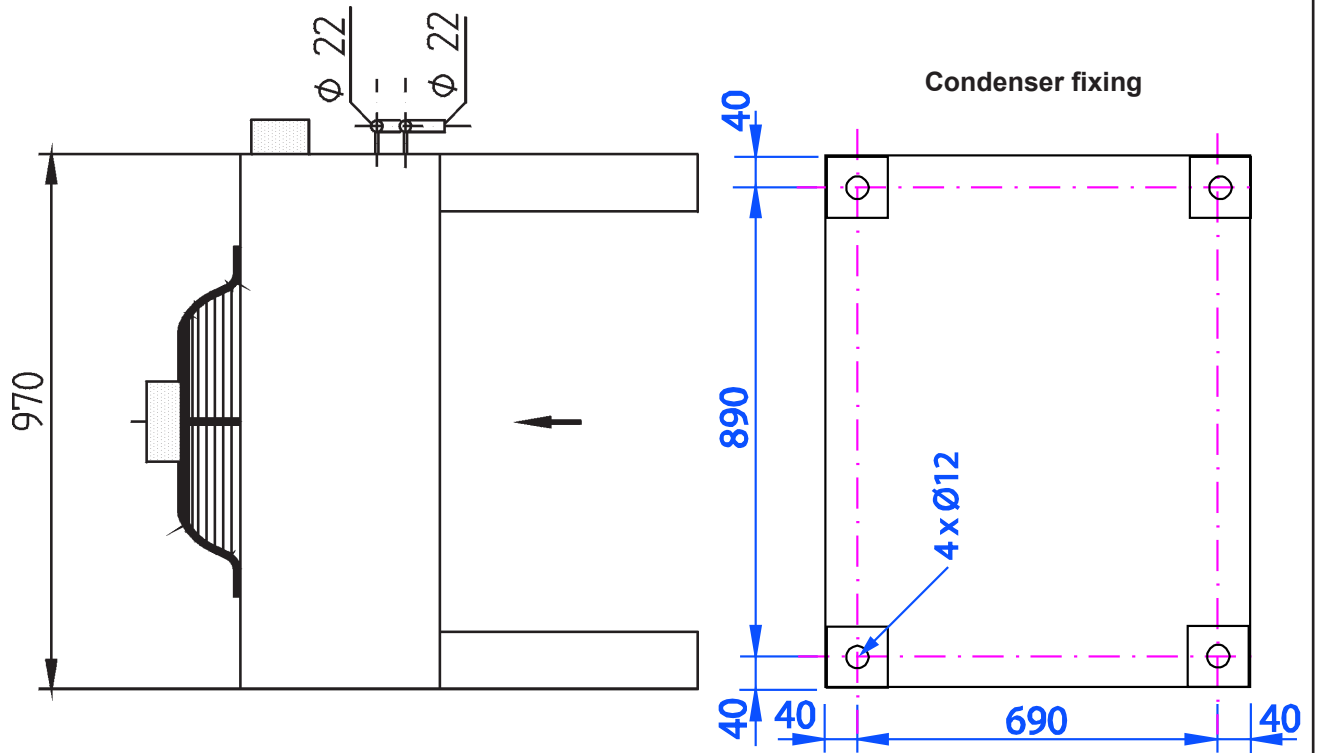
Meters above sea level	0	500	1000	1500	2000	2500
Factor f_1	1.0	1.04	1.09	1.14	1.19	1.24

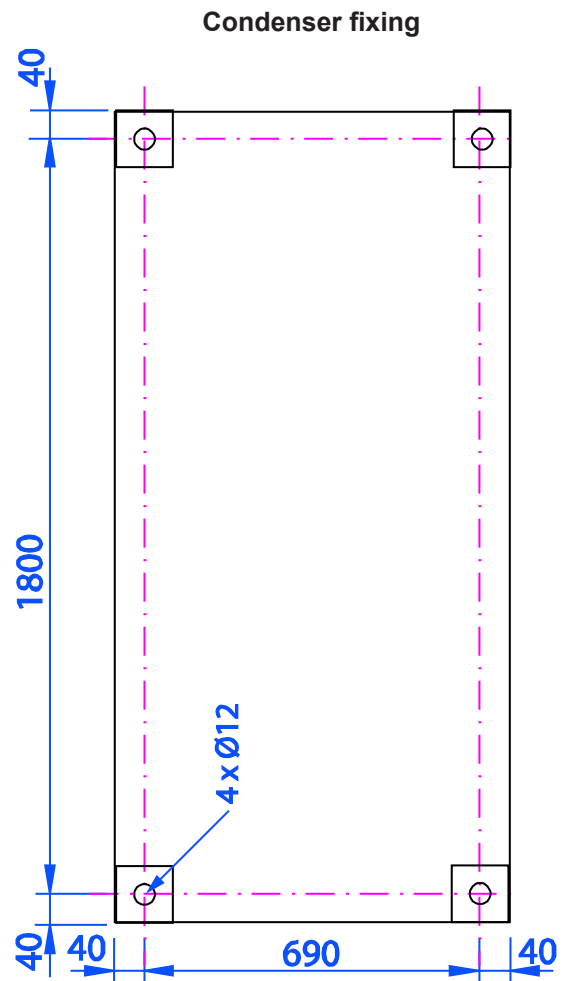
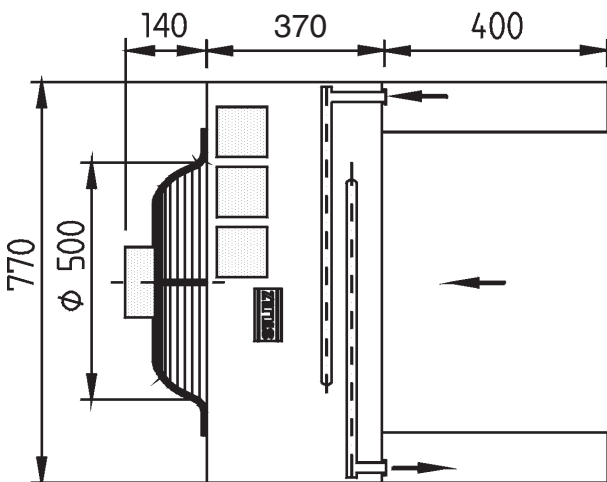
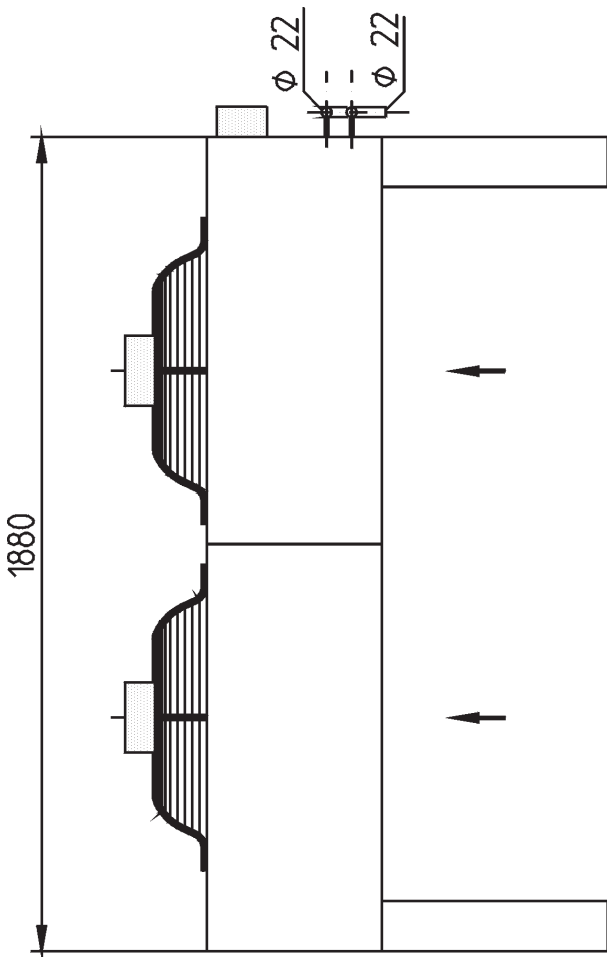
2. Dimensions & Connections

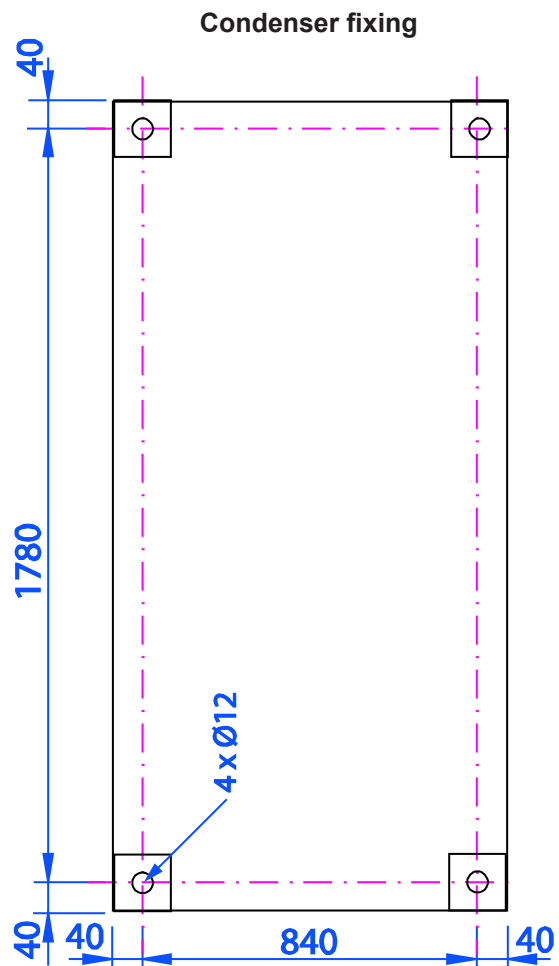
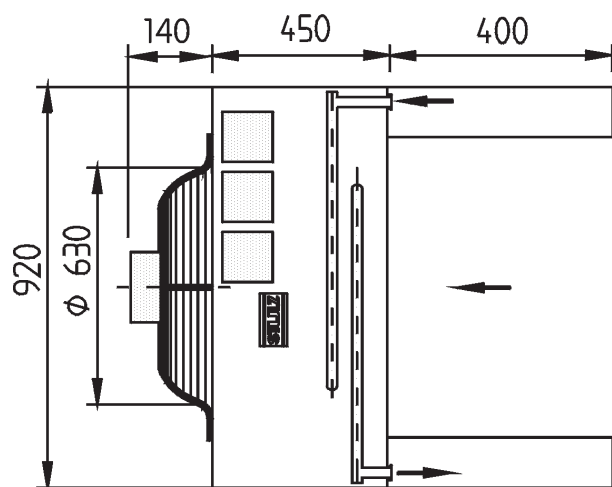
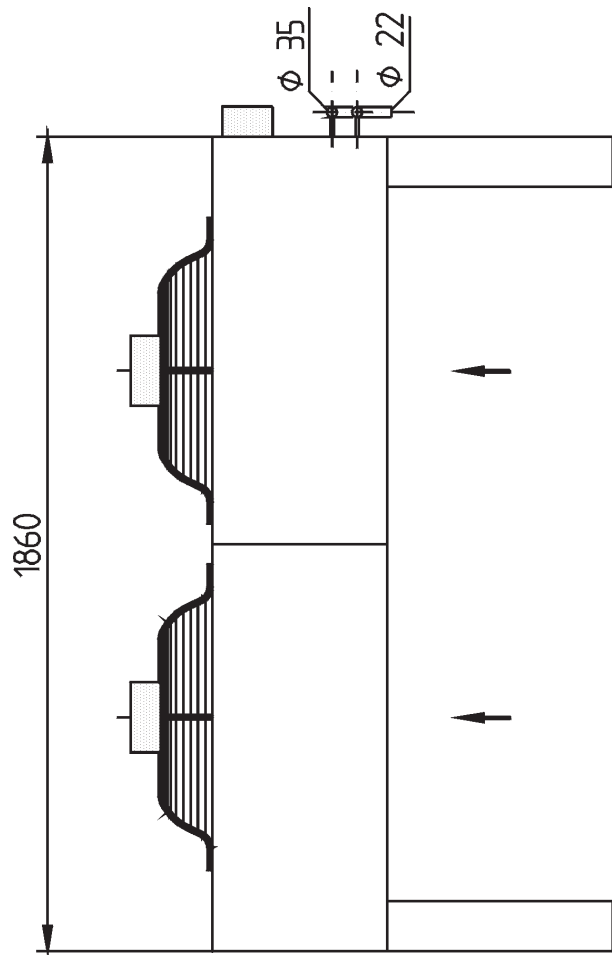


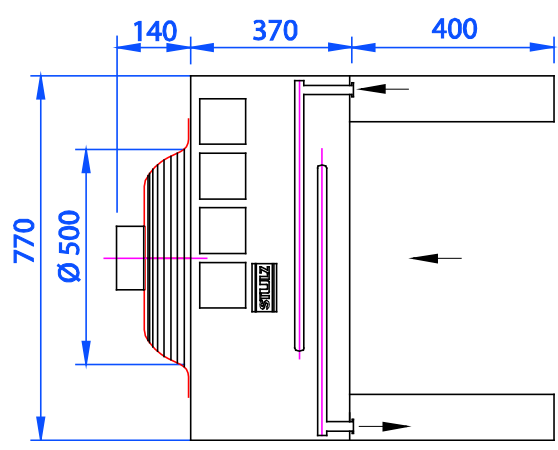
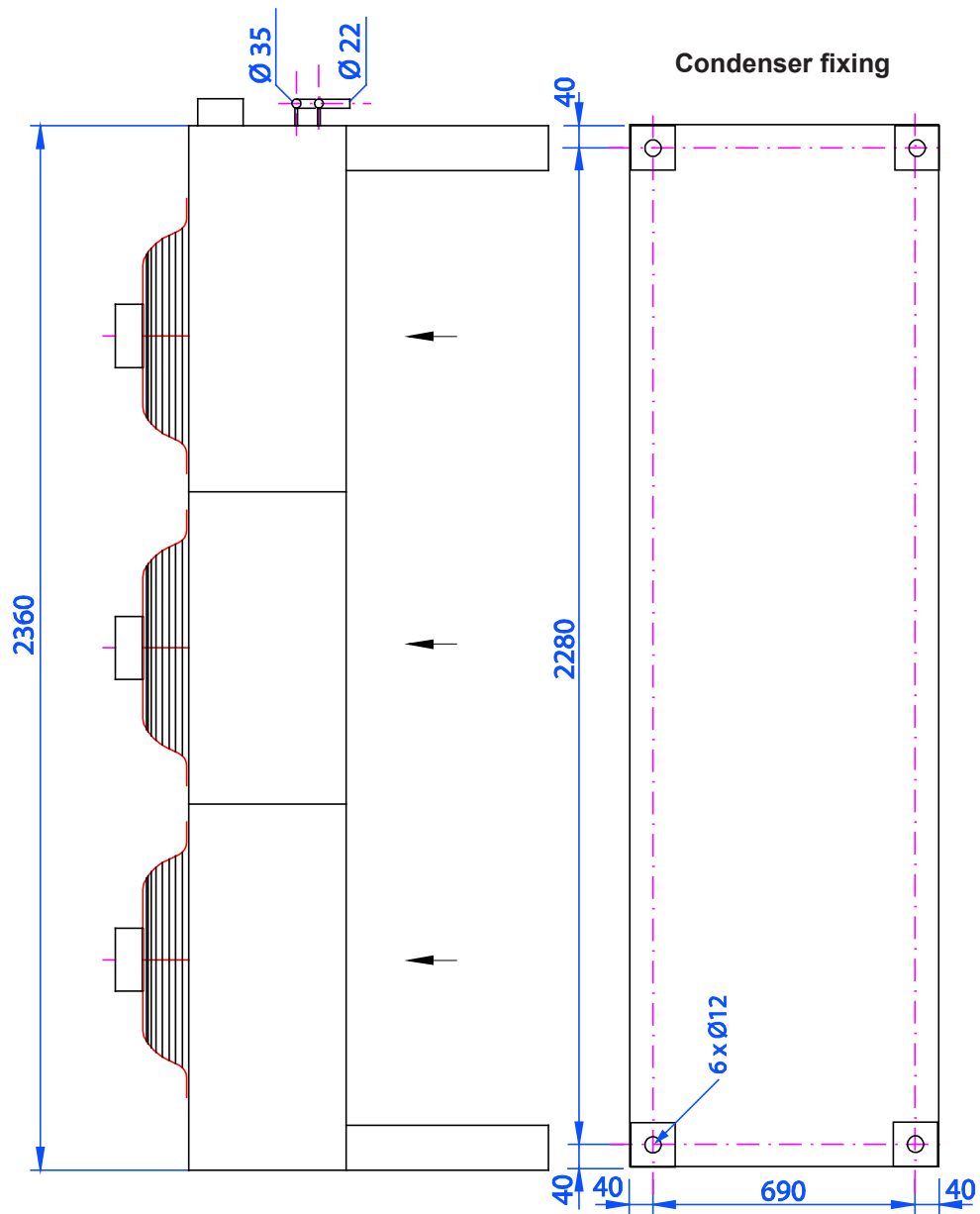




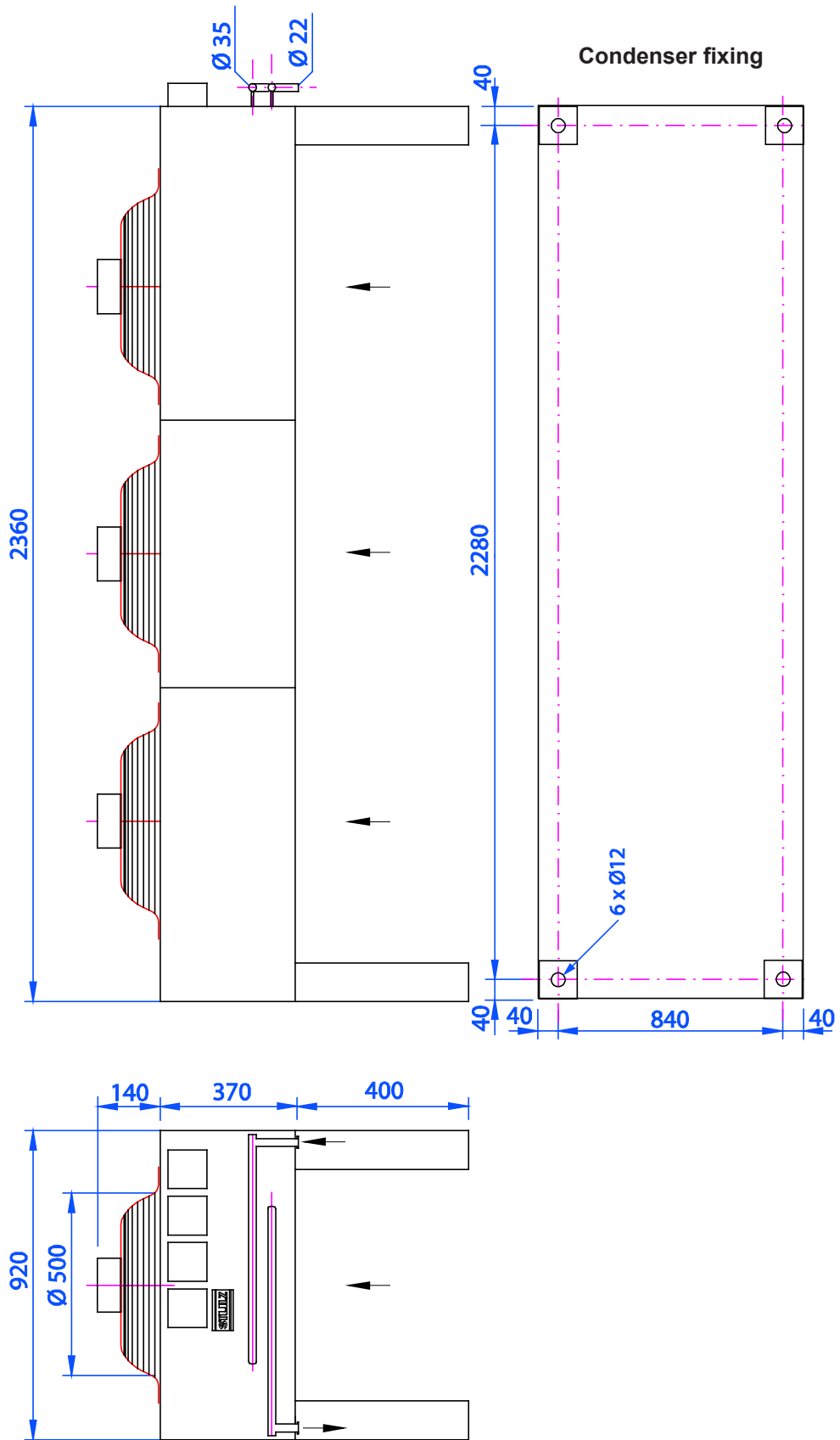




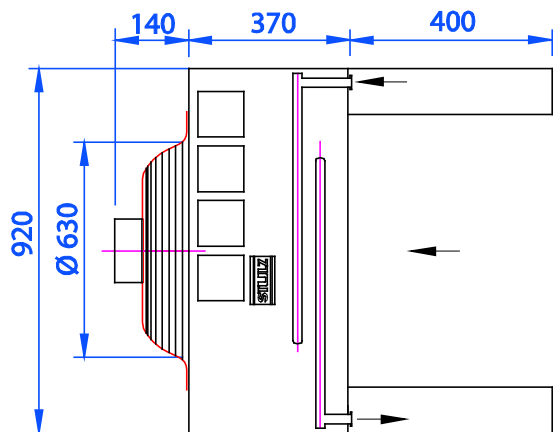
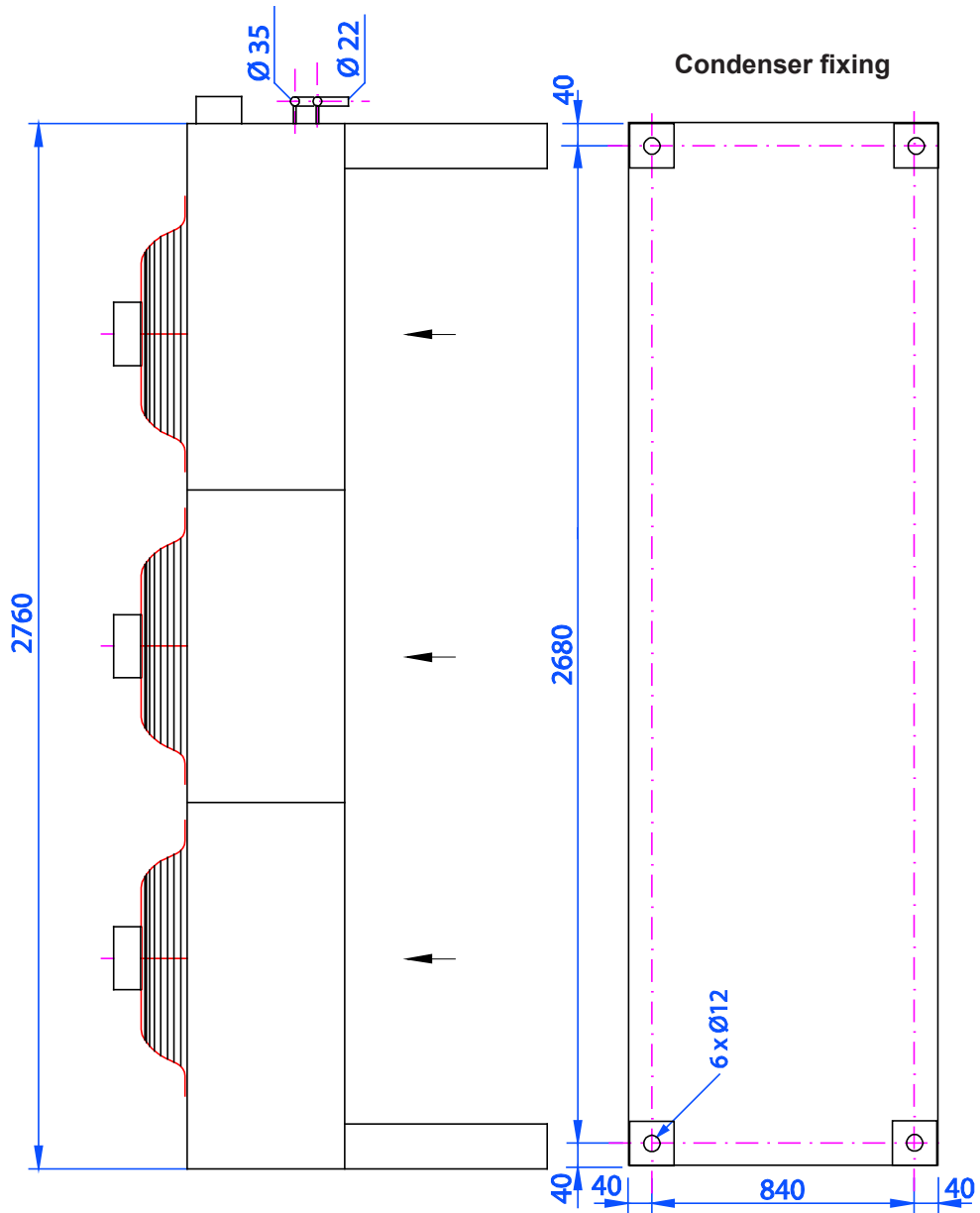




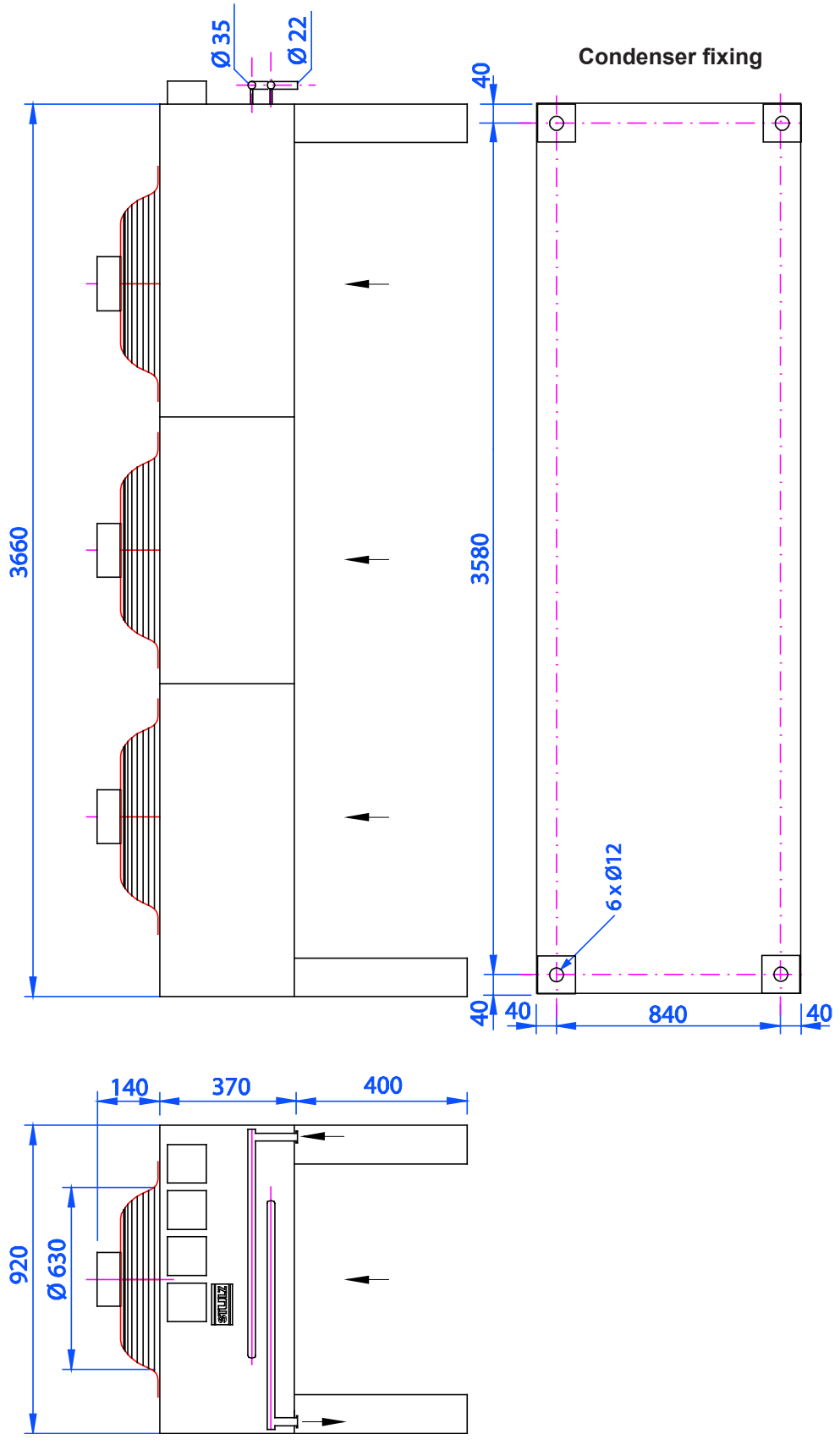
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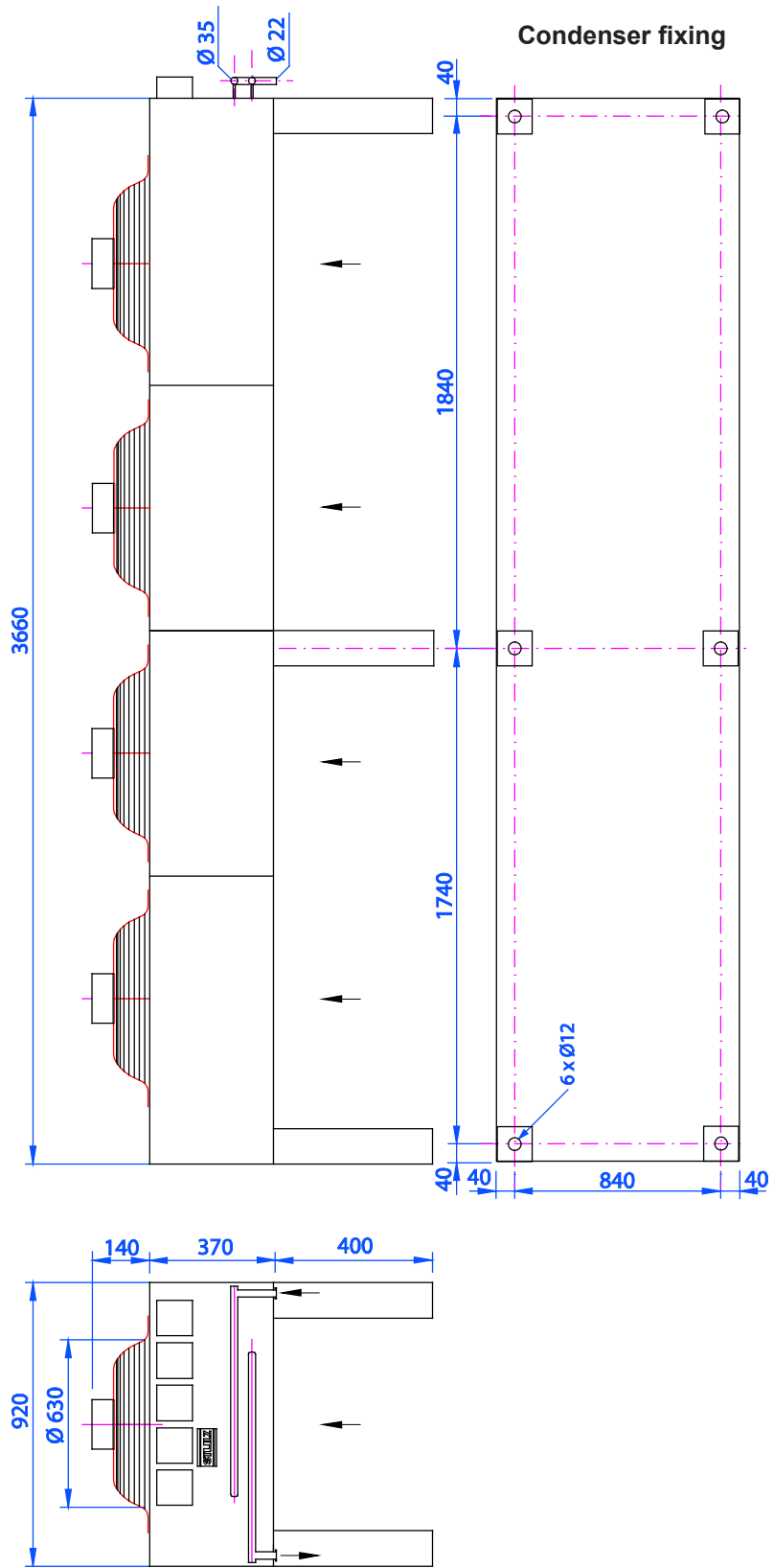
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No.: 3C



No.: 3D



No.: 4A

3. Installation

Transport

When moving the condenser, follow transport instructions (sticker on packing)

Positioning

The condenser should be installed approx. 1 m (3 feet) away from the adjacent wall. In case of open-air installation the discharge should be facing the wind direction. Provide free air access and exit.

Refrigerant connections

If there is a gas holding charge (1 bar) use the Schrader valve to drain before starting the installation. The brazed-on backplate can be removed.

All remote-type condensers have copper connections for brazing. It is extremely advisable to incorporate **anti-vibration** components for safe operation when connecting to pipework.

Electrical installation

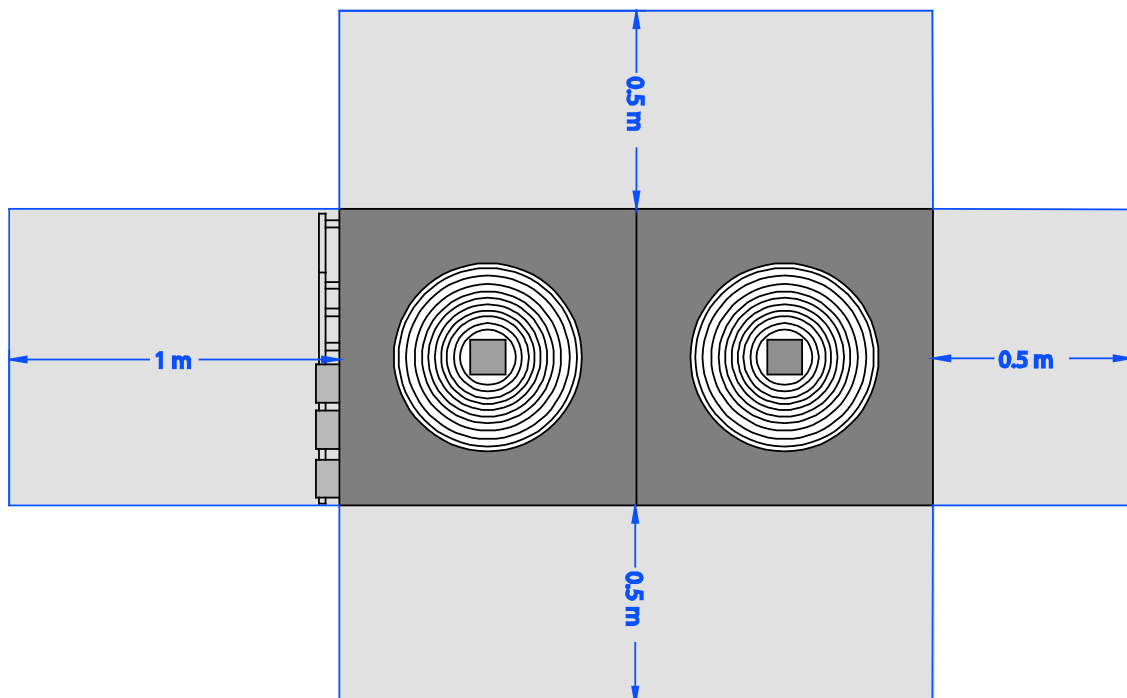
Local regulations concerning electrical installations should be observed. It is absolutely necessary to provide suitable weather-proof glands.

For motor connection please refer to the schedule in the terminal box. For aligning the motor safety switch to the intensity of the current please refer to the motor's label.

When cycling off fans the power consumption should be checked at all speeds.

Maintenance clearance

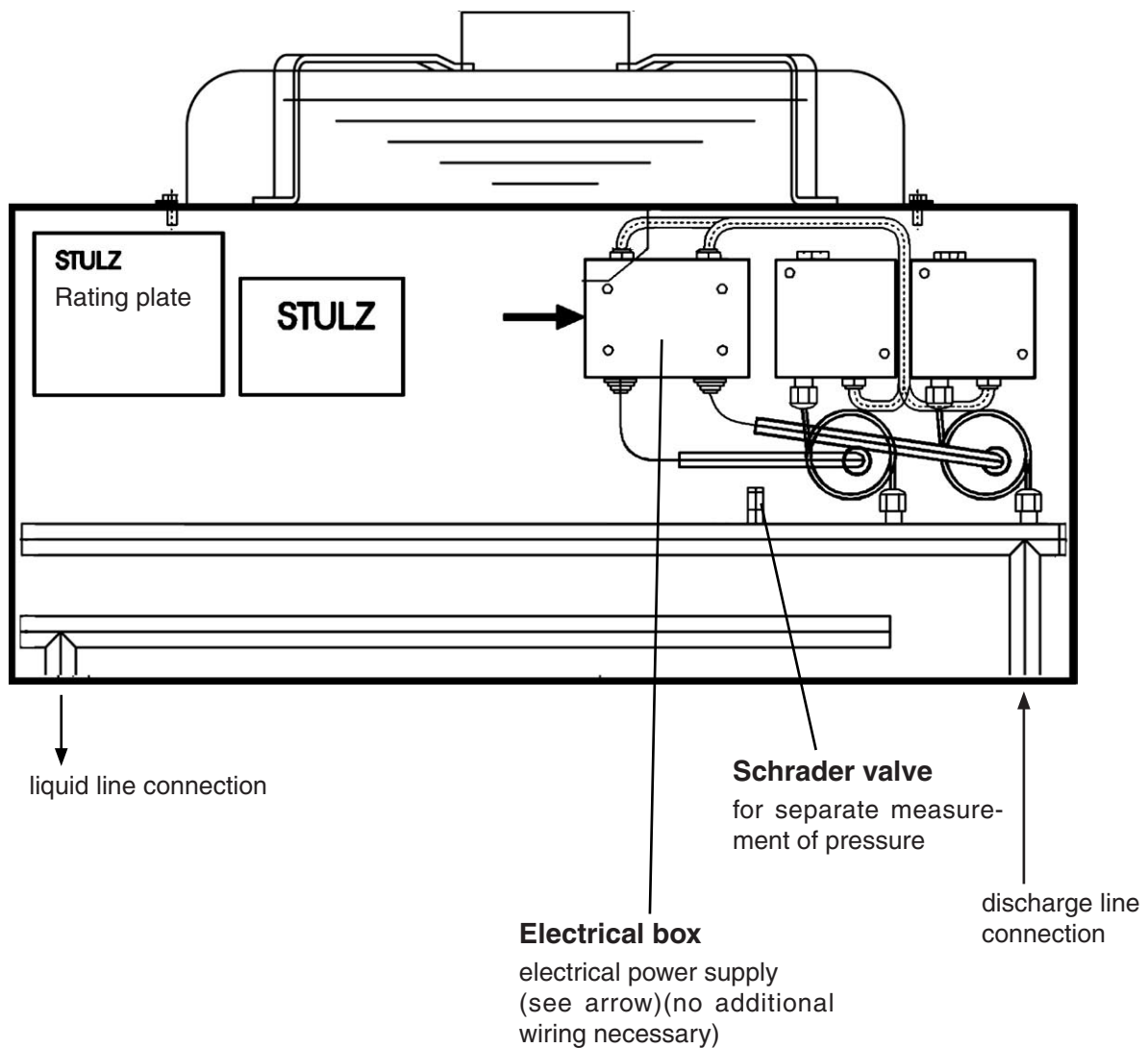
Example for a two-fan condenser



3.1 Supply connections

Example for a two-fan condenser

The sketch shows the position of the electrical box and the pressure switches for a condenser unit with two fans.



3.2 Condenser pressure switch

3.2.1 Description

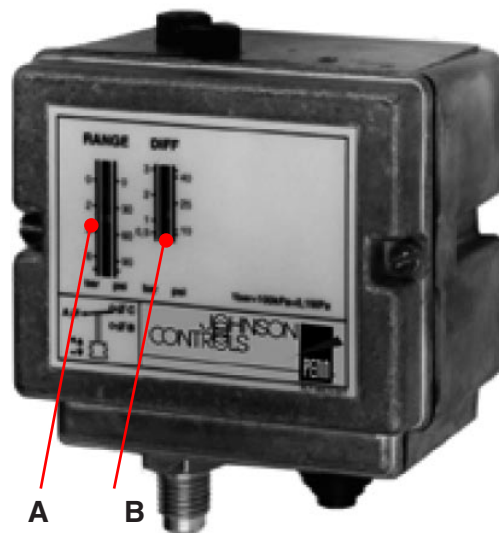
The pressure switches are equipped with two adjustment screws which serve to set the triggering pressure and the pressure difference.

Reaching the triggering pressure the switch closes the contact and starts the fan motor. If the condenser pressure falls below the triggering pressure reduced by the adjusted pressure difference, the contact is opened and the fan motor is stopped.

A scale at the front side indicates the adjusted pressures. Triggering pressure (A), pressure difference (B).

For condensers with several fans it is useful to switch on the motors cascadingly dependent on the condenser pressure in order to approach the function of a speed control.

The table below shows the switch on/-off pressures recommended by ourselves in relation to the fan number.

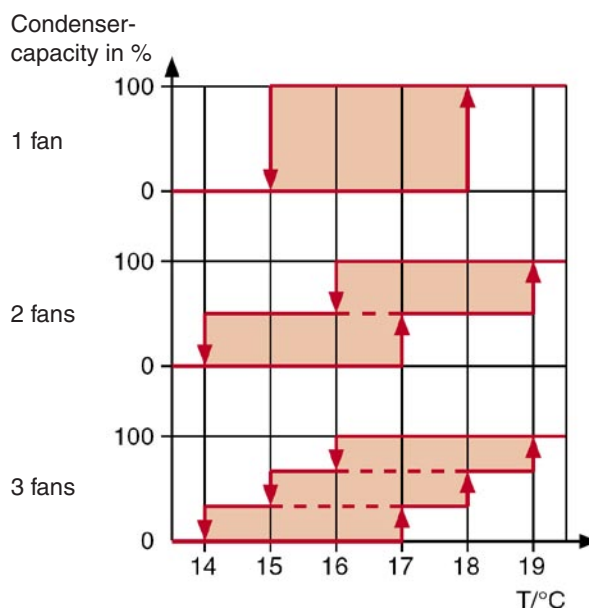


3.2.2 Adjustment

Number of fans per condenser	1st fan		2nd fan		3rd fan	
	On	Off	On	Off	On	Off
1	18	15	-	-	-	-
2	17	14	19	16	-	-
3	17	14	18	15	19	16

3.2.3 Technical Data

Pressure range	3 - 30 bar
Difference	3 - 12 bar
Ambient temperature	-50 bis +50°C
Commutation capacity	380 VAC, 16A



3.3 Option Speed controller

3.3.1 Function description

The speed controller for air-cooled condensers measures pressure alterations in the refrigerant circuit and controls the speed of fan motors in direct dependence on the refrigerant pressure.

It controls the speed proportionally with very few losses due to phase cut (TRIAC). The voltage which supplies the motor (the output voltage of the speed controller) is modified proportionally to the refrigerant pressure. A rise of the condensation pressure results in a rise of the fan speed.

If the pressure falls below the adjusted setpoint, the speed decreases gradually until the lower end of the proportional range is reached (at 4 bar below the setpoint), here the output voltage tends to 0 V and the motor stops. If a minimum speed is set, the speed decreases to this point.

If the pressure rises again, the motor is started as soon as the lower end of the proportional range is exceeded. Reaching the pressure setpoint, the output voltage amounts to 90% of the supply voltage.

If the pressure continues rising, the output voltage increases to 95% of the supply voltage. If a minimum speed is set, the speed increases from this point.

A fixed hysteresis prevents the motor from frequent on/off cycles.



3.3.2 Technical data

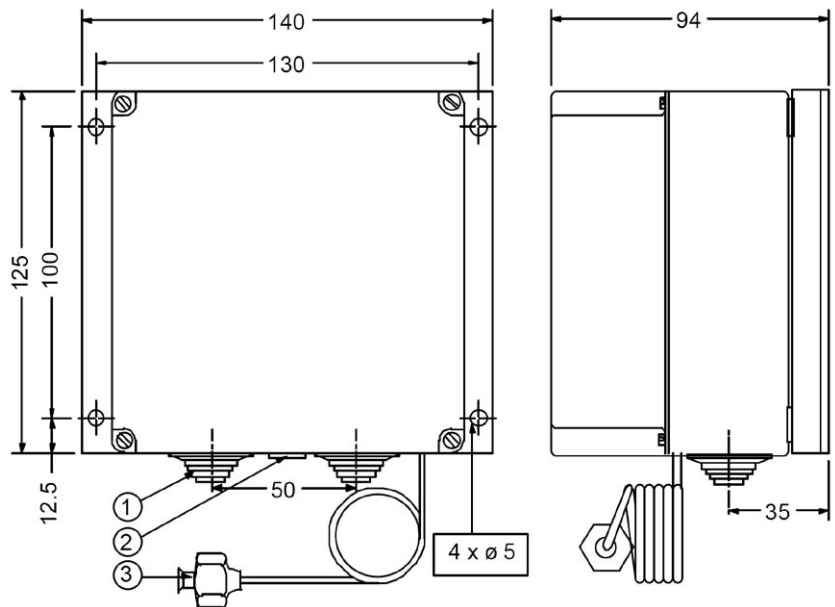
Pressure range	14 to 24 bar
Max. overrun pressure	40 bar
Proportional band	4 bar
Pressure connection	90 cm capillary tube
Operating ambient temp.	-20 to +55°C
Storage temperature	-40 to +85°C
Ambient humidity	10 to 98% r.F. (non-condensing)
Supply voltage	230 V AC (+10/-15%) 50 Hz
Maximum current	8 A rms
Minimum current	0,1 A
Output voltage	0 bis 95% Netzspannung
Enclosure	IP 54
Fuse	max. 16 A, slow

3.3.3 Installation

Mount the controller in a vertical position on a plain surface by 4 screws. For proper air-circulation there should be a clearance around the controller of at least 10 mm.

The pressure connection is made on the high pressure side.

The copper seal ring has to be replaced after the pressure disconnection.



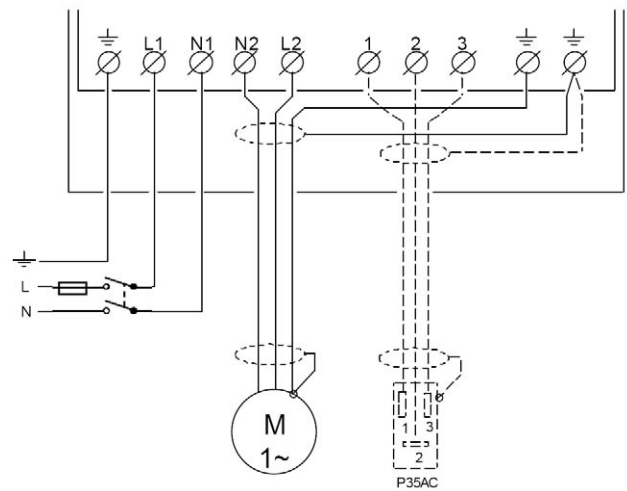
3.3.4 Electrical connection

The speed controller is not equipped with a power switch. Therefore an additional switch to isolate the device should be used in the power supply wiring. Also the controller should be externally fused against miswiring or short circuits. Use a thermal/current overload relay with a current rating according to the motor.

To meet the EMC directive shielded cable has to be used for motor wiring. Non shielded cable may be used if the control and motor are mounted in one frame. Both sides of the shield have to be connected to earth. To prevent stray current, the earth connections of the transducer, the controller, the motor earth connection as well as the cable shield, all have to be connected to one earthing pole. More motors can be wired in parallel, provided that the total current will not exceed 8 A rms.

For measuring Amp. or Volt. values a true rms meter should be used.

- V_{rms} = output voltage to motor in percentage of line voltage.



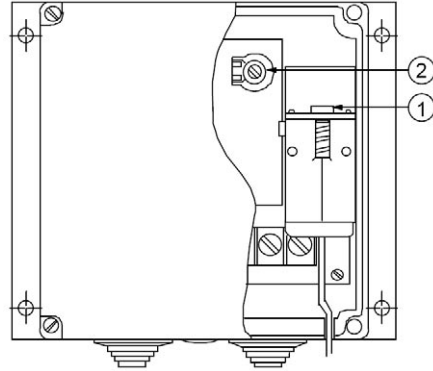
To prevent electrical shock or damage to equipment, the utmost care should be taken when the cover is removed (authorized personnel only) for adjustments or check-out. In all other cases when the cover is removed, the power should be switched off.

Electro magnetic compatibility

The speed controller has a built-in suppression filter. The suppression meets the directive 89/336/EEC and exceeds the requirements according to IEC801-2 grade 4. Furthermore the speed controller meets the european directive 72/23/EEC.

3.3.5 Operation

The controller is adjusted by two adjusting devices. You can adjust the minimum speed by means of potentiometer no. 2. This setting, to prevent fan speed reduction below desirable levels, can be adjusted between 45 % and 90 % of the line voltage. By turning this potentiometer clockwise into the minimum speed section, the output to the motor stays at a higher level. The minimum speed setting influences the proportional band. A higher setting of the minimum speed results in a smaller proportional band. see diagram 1: $P_b \text{ eff}$ indicates the width of the remaining proportional band.



If minimum speed is not required, turn the potentiometer completely counter-clockwise. The output to the motor drops to 0V when the pressure decreases below setpoint pressure minus proportional band. (16 bar - 4 bar = 12 bar) see diagram 2.

Setpoint setting

By means of screw no. 1 you can adjust the setpoint within the range of 14 to 24 bar. The factory setting is 16 bar.

Maximum speed

The maximum speed will be obtained, when the pressure rises by approx. 6 bar above the pressure at which the output voltage to the motor is 45% of the supply voltage (at approx. 2 bar above the setpoint).

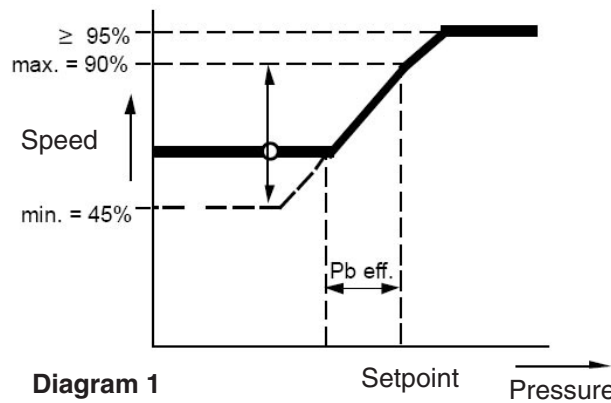


Diagram 1

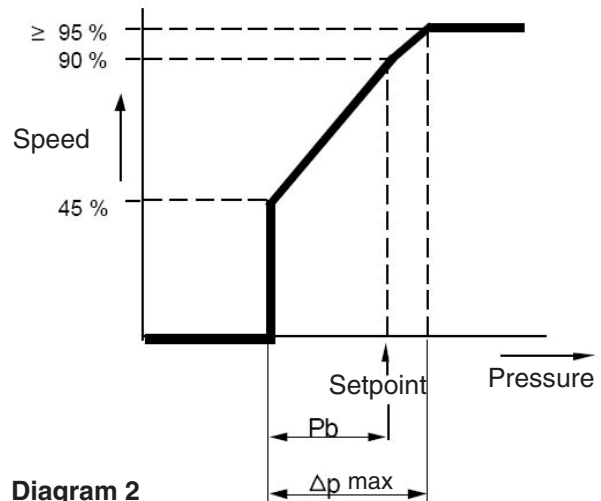


Diagram 2

4. Service and Maintenance

Fan

Before opening the fan casing turn off the main switch or unplug fuses and make sure the electrical insulation of the unit is complete.

Heat exchanger

Inspect the heat exchanger for possible excess of dirt (due to dirty cooling air) at regular intervals and eventually clean it with the motors switched off.

Remove dirt by

- hosing with steam against the flow of air
- hosing with water against the flow of air
- using any standard detergent

Cleaning is required when the air volume is reduced by more than 10 to 15% (as compared to clean coil).

Use the electric control switch to check air volume (only for installations without mechanical air volume control). It is recommended to clean the coil if the intensity drops by approximately 10%.

All other unit components do not require servicing.

Appendix

The following manuals are available for the product ranges:

Product range	Index	Type of manual
CyberAir	12	Operating instructions
MINI-SPACE	20	Operating instructions
Compact-Line CW	22	Operating instructions
Compact DX	28	Operating instructions
C 1002	50	Operating instructions
C 5000	52	Operating instructions
C 6000	54	Operating instructions
C 6000 - Chiller	56	Operating instructions
C 7000	57	Operating instructions
TeleCompTrol	62A	Operating instructions
MIB7000	66B	Operating instructions
Condensers	80	Technical Data
Internal condensers	81	Operating instructions

For further information please contact our marketing department.

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