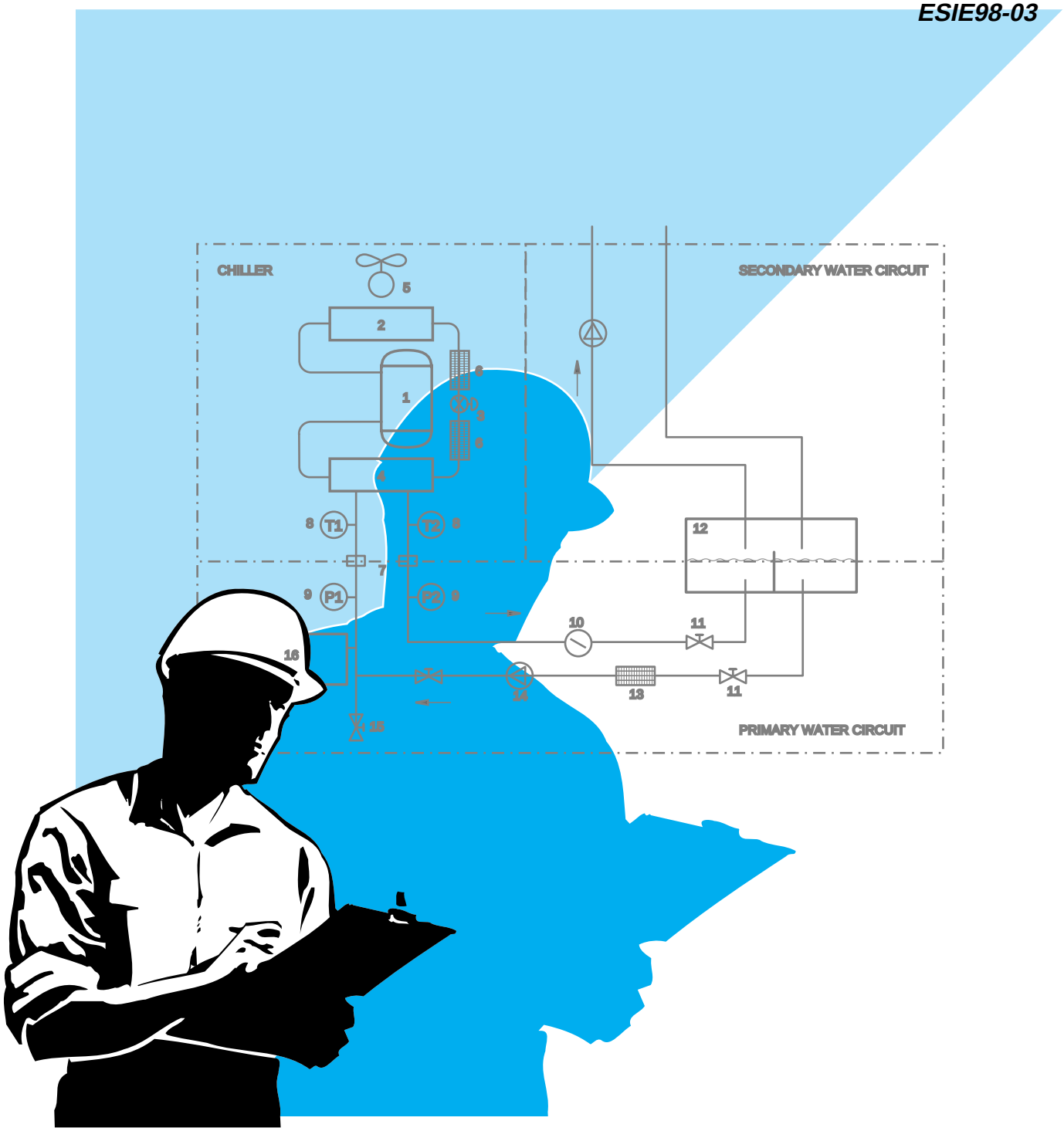
ESIE98-03



Service Manual

EUWA(*)40-120K(X)

Air-cooled waterchillers

Daikin Europe NV

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1 Introduction

1.1 About This Manual

EUWA(*)40-120K(X) chiller types

The Daikin EUWA(*)40-120K(X) air-cooled water chillers are designed for outdoor installation. The units are available in 6 standard sizes for cooling applications only.

The EUWA(*)40-120K(X) units can be combined with Daikin fan coil units or air handling units for air conditioning purposes. They can also be used to supply water for process cooling.

Before starting up the unit for the first time, make sure that it has been properly installed. Consult the check lists in ‘Pre-Test Run Checks’ on page 4-3.

You will find the following tools at the back of the manual:

- a list of parts in function of the integrated photos. Refer to Appendix A Photo parts.
- a list of drawings. Refer to Appendix B Drawings.
- an index. Refer to Index.

Usage of the manual

The present service manual gives you all the information you need to do the necessary repair and maintenance tasks for these waterchillers operating with HCFC 22 (EUWA(*)40-120K) and HFC 134a (EUWA(*)40-120KX). It is intended for and should only be used by qualified engineers. It is not intended to replace technical know-how acquired through training and experience.

The basic rules of good workmanship still apply, but should be more strictly applied on R-134a (EUWA(*)40-120KX) applications.

Approvals

The asterix (*) in EUWA(*)40-120K(X) refers to B, M, T, S or D, which are abbreviations for:

T= ‘TuV’ approval (Germany)
S= Swedish approval (Sweden)
M= ‘Service des Mines’ approval (France)
D= ‘RLK’ approval (the Netherlands)
B= Standard unit (Italian approval)

Using icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

Icon	Type of information	Description
	Note	A ‘note’ provides information that is not indispensable, but may nevertheless be valuable to the reader, such as tips and tricks.
	Caution	A ‘caution’ is used when there is danger that the reader, through incorrect manipulation, may damage equipment, loose data, get an unexpected result or has to restart (part of) a procedure.

Icon	Type of information	Description
	Warning	A ‘warning’ is used when there is danger of personal injury.
	Reference	A ‘reference’ guides the reader to other places in this binder or in this manual, where he/she will find additional information on a specific topic.

Part 1
System Outline

Introduction

The purpose of this part is to give an outline of all the relevant elements in an installation of the EUWA(*)40-120K(X) chiller types. Once all the elements of the installation are described in short and the installation set-up is understood, a functional description of all elements will be given in the following parts of this book.

What is in this part?

This part contains the following chapters:

1

1 General Outline

1.1 What Is in This Chapter

Introduction

In this chapter you will find the outlook drawing and the installation outline of the air-cooled water chillers EUWA(*)40-120K(X).

Overview

This chapter covers the following topics:

1

1.2 Technical Specifications

EUWA(*)40-60K In the following table you will find the technical specifications of chiller types EUWA(*)40-60K:

Model	EUWA(*)40K	EUWA(*)50K	EUWA(*)60K
Nominal cooling capacity(1)	101 kW	129 kW	161 kW
Nominal cooling input(1)	38.5 kW	52.7 kW	59 kW
Capacity steps	100-70-40	100-70-40	100-70-40
MAIN COMPONENTS			
Compressor			
type	semi-hermetic single screw	semi-hermetic single screw	semi-hermetic single screw
speed	2880 rpm	2880 rpm	2880 rpm
crankcase heater	150 W	150 W	150 W
model x n°	ZH3LSFLYE	ZH5MLFLYE	ZH5LLFLYE
Evaporator			
type	2 pass, 1 circuit, shell & tube dry expansion: EHS/S 155 SX BT	2 pass, 1 circuit, shell & tube dry expansion: EHS/S 155 SX BT	2 pass, 1 circuit, shell & tube dry expansion: EHS/S 220 SX BT
min.water volume system	1700 l	1700 l	2100 l
water flow rate	Min: 185 Max: 737 l/min	Min: 187.5 Max: 750 l/min	Min: 230 Max: 920 l/min
nom. water pressure drop	21 kPa	25 kPa	23 kPa
insulation material	PVC nitril foam	PVC nitril foam	PVC nitril foam
Condenser			
type	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins
rows x stages x fin pitch	2 x 50 x 2.0mm	2 x 50 x 2.0mm	3 x 50 x 2.0mm
face area	8.4 m²	8.4 m²	8.4 m²
nominal air flow	960 m³/min	1092 m³/min	960 m³/min
discharge	vertical	vertical	vertical
fan type	direct drive propeller	direct drive propeller	direct drive propeller
n° of fans	4	4	4
n° of motors x output	4 x 500 W	4 x 1200 W	4 x 1200 W
nominal speed	750 rpm	900 rpm	900 rpm
Piping connections			
evap. water in/outlet	3'' gas	3'' gas	flexible joint Ø 114.3
evaporator water drain	1/2" gas	1/2" gas	1/2" gas
relief device outlet	compressor 1"NPT	compressor 2x1"NPT	compressor 2x1"NPT
Refrigerant circuit			
refrigerant type	R-22	R-22	R-22
refrigerant charge	33 kg	39 kg	45 kg
refrigerant control	thermostatic expansion valve	thermostatic expansion valve	thermostatic expansion valve
oil type	SUNISO 4GSD	SUNISO 4GSD	SUNISO 4GSD
oil charge volume	7.5 l	10 l	10 l
n° of circuits	1	1	1
Dimensions (h x w x d)	2135 x 3980 x 1110 mm	2135 x 3980 x 1110 mm	2135 x 3980 x 1110 mm
Weight			
machine weight	1205 kg	1345 kg	1530 kg
operation weight	1245 kg	1385 kg	1585 kg
Casing			
material	polyester painted galvanised steel plate	polyester painted galvanised steel plate	polyester painted galvanised steel plate
colour	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1

Model	EUWA(*)40K	EUWA(*)50K	EUWA(*)60K
Sound power level	88 dB	92 dB	94 dB
Safety & functional devices	■ double TuV high pressure switches ■ low pressure protection ■ compressor motor thermal protector ■ compressor motor overcurrent relay ■ discharge temperature controller ■ pressure relief valve on compressor ■ reverse phase protector ■ recycling and guard timer ■ digital display controller with electronic temperature control		
Options (all factory mounted)	■ glycol applications ZH: leaving water evaporator=-5 °C ZL: leaving water evaporator=-10 °C ■ OP10: anti-freeze protection kit (evaporator heatertape) ■ OP12: suction stopvalve ■ OP52: main isolator switch ■ OP57: ampere & voltmeter		

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input:
  compressor + control circuit
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

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EUWA(*)80-120K In the following table you will find the technical specifications of chiller types EUWA(*)80-120K:

Model	EUWA(*)80K	EUWA(*)100K	EUWA(*)120K
Nominal cooling capacity(1)	202 kW	258 kW	300 kW
Nominal cooling input(1)	77 kW	106 kW	115 kW
Capacity steps	100-85-70-50-35-20-0	100-85-70-50-35-20-0	100-85-70-50-35-20-0
MAIN COMPONENTS			
Compressor			
type	semi-hermetic single screw	semi-hermetic single screw	semi-hermetic single screw
speed	2880 rpm	2880 rpm	2880 rpm
crankcase heater	150 W	150 W	150 W
model x n°	2 x ZH3LSFLYE	2 x ZH5MLFLYE	2 x ZH5LLFLYE
Evaporator			
type	2 pass, 1 circuit, shell & tube dry expansion: EHD/S 270 SX BT	2 pass, 1 circuit, shell & tube dry expansion: EHD/S 310 SX BT	2 pass, 1 circuit, shell & tube dry expansion: EHD/S 420 SX BT
min.water volume system	2400 l	3000 l	3600 l
water flow rate	Min: 290 Max: 1080 l/min	Min: 370 Max: 1160 l/min	Min: 460 Max: 1660 l/min
nom. water pressure drop	14.4 kPa	19.25 kPa	13 kPa
insulation material	PVC nitril foam	PVC nitril foam	PVC nitril foam
Condenser			
type	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins
rows x stages x fin pitch	2 x 50 x 2.0mm	2 x 50 x 2.0mm	3 x 50 x 2.0mm
face area	16.8 m²	16.8 m²	16.8 m²
nominal air flow	1920 m³/min	2184 m³/min	1920 m³/min
discharge	vertical	vertical	vertical
fan type	direct drive propeller	direct drive propeller	direct drive propeller
n° of fans	8	8	8
n° of motors x output	8 x 500 W	8 x 1200 W	8 x 1200 W
nominal speed	750 rpm	900 rpm	900 rpm
Piping connections			
evap. water in/outlet	flexible joint Ø 141.3	flexible joint Ø 141.3	flexible joint Ø 168.3
evaporator water drain	1/2" FPT	1/2" FPT	1/2" FPT
relief device outlet	compressor 2x1"NPT	compressor 2x2x1"NPT	compressor 2x2x1"NPT
Refrigerant circuit			
refrigerant type	R-22	R-22	R-22
refrigerant charge	2x36 kg	2x40 kg	2x47 kg
refrigerant control	thermostatic expansion valve	thermostatic expansion valve	thermostatic expansion valve
oil type	SUNISO 4GSD	SUNISO 4GSD	SUNISO 4GSD
oil charge volume	7.5 l	10 l	10 l
n° of circuits	2	2	2
Dimensions (h x w x d)	2156 x 3980 x 2210 mm	2156 x 3980 x 2210 mm	2156 x 3980 x 2210 mm
Weight			
machine weight	2500 kg	2750 kg	2950 kg
operation weight	2595 kg	2840 kg	3085 kg
Casing			
material	polyester painted galvanised steel plate	polyester painted galvanised steel plate	polyester painted galvanised steel plate
colour	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1
Sound power level	93 dB	96 dB	95 dB

Model	EUWA(*)80K	EUWA(*)100K	EUWA(*)120K
Safety & functional devices	■ double TuV high pressure switches ■ low pressure protection ■ compressor motor thermal protector ■ compressor motor overcurrent relay ■ discharge temperature controller ■ pressure relief valve on compressor ■ reverse phase protector ■ recycling and guard timer ■ digital display controller with electronic temperature control		
Options (all factory mounted)	■ glycol applications ZH: leaving water evaporator=-5 °C ZL: leaving water evaporator=-10 °C ■ OP10: anti-freeze protection kit (evaporator heatertape) ■ OP12: suction stopvalve ■ OP52: main isolator switch ■ OP57: ampere & voltmeter		

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input:
  compressor + control circuit
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

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EUWA(*)40-60KX In the following table you will find the technical specifications of chiller types EUWA(*)40-60KX:

Model	EUWA(*)40KX	EUWA(*)50KX	EUWA(*)60KX
Nominal cooling capacity(1)	111 kW	140 kW	160 kW
Nominal cooling input(1)	39.1 kW	53.7 kW	64 kW
Capacity steps	100-75-55	100-75-55	100-75-55
MAIN COMPONENTS			
Compressor			
type	semi-hermetic single screw	semi-hermetic single screw	semi-hermetic single screw
speed	2880 rpm	2880 rpm	2880 rpm
crankcase heater	150 W	150 W	150 W
model x n°	ZHA5LLFLYE / ZHA5LLFLTE	ZHA7SLFLYE / ZHA7SLFLTE	ZHA7MLFLYE / ZHA7MLFLTE
Evaporator			
type	2 pass, 1 circuit, shell & tube dry expansion: ES-185	2 pass, 1 circuit, shell & tube dry expansion: ES-220	2 pass, 1 circuit, shell & tube dry expansion: ES-270
min.water volume system	2400 l	2750 l	3600 l
water flow rate	Min: 150 Max: 600 l/min	Min: 200 Max: 715 l/min	Min: 235 Max: 950 l/min
nom. water pressure drop	13 kPa	20 kPa	11 kPa
insulation material	PVC nitril foam	PVC nitril foam	PVC nitril foam
Condenser			
type	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins
rows x stages x fin pitch	2 x 50 x 2.0mm	3 x 50 x 2.0mm	3 x 50 x 2.0mm
face area	8.4 m²	8.4 m²	8.4 m²
nominal air flow	960 m³/min	1092 m³/min	960 m³/min
discharge	vertical	vertical	vertical
fan type	direct drive propeller	direct drive propeller	direct drive propeller
n° of fans	4	4	4
n° of motors x output	4 x 500 W	4 x 1200 W	4 x 1200 W
nominal speed	750 rpm	900 rpm	900 rpm
Piping connections			
evap. water in/outlet	flexible joint Ø 114.3	flexible joint Ø 114.3	flexible joint Ø 141.3
evaporator water drain	1/2" FPT	1/2" FPT	1/2" FPT
relief device outlet	compressor 1"NPT	compressor 1"NPT	compressor 1"NPT
Refrigerant circuit			
refrigerant type	R-134a	R-134a	R-134a
refrigerant charge	30 kg	45 kg	50 kg
refrigerant control	thermostatic expansion valve	thermostatic expansion valve	thermostatic expansion valve
oil type	IDEMITSU FVC68D	IDEMITSU FVC68D	IDEMITSU FVC68D
oil charge volume	7.5 l	10 l	10 l
n° of circuits	1	1	1
Dimensions (h x w x d)	2135 x 3980 x 1110 mm	2135 x 3980 x 1110 mm	2135 x 3980 x 1110 mm
Weight			
machine weight	1391 kg	1600 kg	1705 kg
operation weight	1439 kg	1655 kg	1798 kg
Casing			
material	polyester painted galvanised steel plate	polyester painted galvanised steel plate	polyester painted galvanised steel plate
colour	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1
Sound power level	91 dB	97 dB	95 dB

Model	EUWA(*)40KX	EUWA(*)50KX	EUWA(*)60KX
Safety & functional devices	■ double TuV high pressure switches ■ low pressure protection ■ compressor motor thermal protector ■ compressor motor overcurrent relay ■ discharge temperature controller ■ pressure relief valve on compressor ■ reverse phase protector ■ recycling and guard timer ■ digital display controller with electronic temperature control ■ freeze-up protection		
Options (all factory mounted)	■ glycol applications ZH: leaving water evaporator=-5 °C ZL: leaving water evaporator=-10 °C ■ OP03: dual pressure relief valve (condenser) ■ OP10: anti-freeze protection kit (evaporator heatertape) ■ OP52: main isolator switch ■ OP57: ampere & voltmeter		

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input:
  compressor + control circuit + fans + pumps
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

1

EUWA(*)80-120KX In the following table you will find the technical specifications of chiller types EUWA(*)80-120KX:

Model	EUWA(*)80KX	EUWA(*)100KX	EUWA(*)120KX
Nominal cooling capacity[(1)]	-	-	-
Nominal cooling input[(1)]	-	-	-
Capacity steps	-	-	-
MAIN COMPONENTS			
Compressor			
type	semi-hermetic single screw	semi-hermetic single screw	semi-hermetic single screw
speed	2880 rpm	2880 rpm	2880 rpm
crankcase heater	-	-	-
model x n°	2xZHA5LLFLYE / 2xZHA5LLFLTE	2xZHA7SLFLYE / 2xZHA7SLFLTE	2xZHA7MLFLYE / 2xZHA7MLFLTE
Evaporator			
type	2 pass, 1 circuit, shell & tube dry expansion: ES-360	2 pass, 1 circuit, shell & tube dry expansion: ES-420	2 pass, 1 circuit, shell & tube dry expansion: ES-470
min.water volume system	-	-	-
water flow rate	Min: 300 Max: 1165 l/min	Min: 390 Max: 1565 l/min	Min: 450 Max: 1665 l/min
nom. water pressure drop	-	-	-
insulation material	PVC nitril foam	PVC nitril foam	PVC nitril foam
Condenser			
type	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins	cross fin coil / Hi-X-tubes and chromate coated waffle louvre fins
rows x stages x fin pitch	-	-	-
face area	-	-	-
nominal air flow	1920 m³/min	1920 m³/min	1920 m³/min
discharge	vertical	vertical	vertical
fan type	direct drive propeller	direct drive propeller	direct drive propeller
n° of fans	8	8	8
n° of motors x output	8 x 500 W	8 x 1300 W	8 x 1300 W
nominal speed	-	-	-
Piping connections			
evap. water in/outlet	flexible joint Ø 141.3	flexible joint Ø 168.3	flexible joint Ø 168.3
evaporator water drain	1/2" FPT	1/2" FPT	1/2" FPT
relief device outlet	-	-	-
Refrigerant circuit			
refrigerant type	R-134a	R-134a	R-134a
refrigerant charge	30 kg	45 kg	50 kg
refrigerant control	thermostatic expansion valve	thermostatic expansion valve	thermostatic expansion valve
oil type	IDEMITSU FVC68D	IDEMITSU FVC68D	IDEMITSU FVC68D
oil charge volume	7.5 l	10 l	10 l
n° of circuits	2	2	2
Dimensions (h x w x d)	2156 x 2210 x 3980 mm	2156 x 2210 x 3980 mm	2156 x 2210 x 3980 mm
Weight			
machine weight	2523 kg	2884 kg	3005 kg
operation weight	2603 kg	3018 kg	3130 kg
Casing			
material	polyester painted galvanised steel plate	polyester painted galvanised steel plate	polyester painted galvanised steel plate
colour	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1	ivory white / Munsell code 5Y7.5/1
Sound power level	-	-	-

Model	EUWA(*)80KX	EUWA(*)100KX	EUWA(*)120KX
Safety & functional devices	■ double TuV high pressure switches ■ low pressure protection ■ compressor motor thermal protector ■ compressor motor overcurrent relay ■ discharge temperature controller ■ pressure relief valve on compressor ■ reverse phase protector ■ recycling and guard timer ■ digital display controller with electronic temperature control ■ freeze-up protection		
Options (all factory mounted)	■ glycol applications ZH: leaving water evaporator=-5 °C ZL: leaving water evaporator=-10 °C ■ OP03: dual pressure relief valve (condenser) ■ OP10: anti-freeze protection kit (evaporator heatertape) ■ OP52: main isolator switch ■ OP57: ampere & voltmeter		

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input:
  compressor + control circuit + fans + pumps
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

Some of the data of EUWA(*)80-120KX were not available when this Service Manual was composed. Therefore, we refer to Engineering Data to obtain this information.

1

1.3 Electrical specifications

EUWA(*)40-120K In the following table you will find the electrical specifications of chiller type EUWA(*)40-120K:

Model	EUWA(*)40K	EUWA(*)50K	EUWA(*)60K	EUWA(*)80K	EUWA(*)100K	EUWA(*)120K
Power supply	Y1	Y1	Y1	Y1	Y1	Y1
Compressor						
phase	3~	3~	3~	3~	3~	3~
starting current	129 A	171 A	234 A	129 A	171 A	234 A
max. running current	87 A	111 A	133 A	87 A	111 A	133 A
starting method	star-delta	star-delta	star-delta	star-delta	star-delta	star-delta
voltage	400 V	400 V	400 V	400 V	400 V	400 V
nominal running current	61 A	80 A	94 A	61 A	80 A	94 A
Nominal distribution system voltage						
phase	3~	3~	3~	3~	3~	3~
frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
voltage	400 V	400 V	400 V	400 V	400 V	400 V
voltage tolerance	±10 V	±10 V	±10 V	±10 V	±10 V	±10 V
Control circuit						
phase	1~	1~	1~	1~	1~	1~
recommended fuses	factory installed	factory installed	factory installed	factory installed	factory installed	factory installed
voltage	230 V	230 V	230 V	230 V	230 V	230 V
Unit						
nominal running current(1)	71 A	94 A	108 A	142 A	188 A	212 A
starting current	129 A	171 A	234 A	226 A	296 A	381 A
recommended fuses	3 x 125 aM	3 x 160 aM	3 x 160 aM	3 x 200 aM	3 x 250 aM	3 x 315 aM
max. running current	97 A	125 A	147 A	194 A	250 A	294 A

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input:
  compressor + control circuit
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

EUWA(*)40-120KX In the following table you will find the electrical specifications of chiller types EUWA(*)40-120KX:

Model	EUWA(*)40KX	EUWA(*)50KX	EUWA(*)60KX	EUWA(*)80KX	EUWA(*)100KX	EUWA(*)120KX
Power supply	Y1/T1	Y1/T1	Y1/T1	Y1/T1	Y1/T1	Y1/T1
Compressor						
phase	3~	3~	3~	3~	3~	3~
starting current	172 A/363 A	193 A/400 A	250 A/504 A	-	-	-
max. running current	86.5 A/145 A	111 A/210 A	133 A/245 A	-	-	-
starting method	star-delta	star-delta	star-delta	star-delta	star-delta	star-delta
voltage	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V
nominal running current	62 A/107 A	89 A/161 A	99 A/180 A	62 A/107 A	89 A/161 A	99 A/180 A
recommended fuses	factory installed	factory installed	factory installed	factory installed	factory installed	factory installed
Nominal distribution system voltage						
phase	3~	3~	3~	3~	3~	3~
frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
voltage	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V	400 V/230 V
voltage tolerance	±10 V	±10 V	±10 V	±10 V	±10 V	±10 V
Control circuit						
phase	1~	1~	1~	1~	1~	1~
recommended fuses	factory installed	factory installed	factory installed	factory installed	factory installed	factory installed
voltage	230 V	230 V	230 V	230 V	230 V	230 V
Unit						
nominal running current(1)	76 A/130 A	104 A/186 A	114 A/205 A	152 A/260 A	208 A/372 A	228 A/410 A
starting current	172 A/363 A	193 A/400 A	250 A/504	-	-	-
recommended fuses	3 x 125 aM/ 3 x 200 aM	3 x 160 aM/ 3 x 250 aM	3 x 160 aM/ 3 x 315 aM	3 x 200 aM/ 3 x 400 aM	3 x 250 aM/ 3 x 500 aM	3 x 315 aM/ 3 x 630 aM
max. running current	101 A/168 A	126 A/235 A	148 A/270 A	202 A/336 A	252 A/470 A	296 A/540 A

(1): Nominal conditions are as follows:

- entering/leaving water temperature 12/7 °C
- ambient air temperature 35 °C
- power input is total input: compressor + control circuit
- leaving evaporator water temperature from 4 °C to 20 °C (pull-down condition to 25 °C).

The data of EUWA(*)80-120KX were not available when this Service Manual was composed. Therefore, we refer to Engineering Data to obtain this information.

1

1.4 Outlook Drawing

Introduction

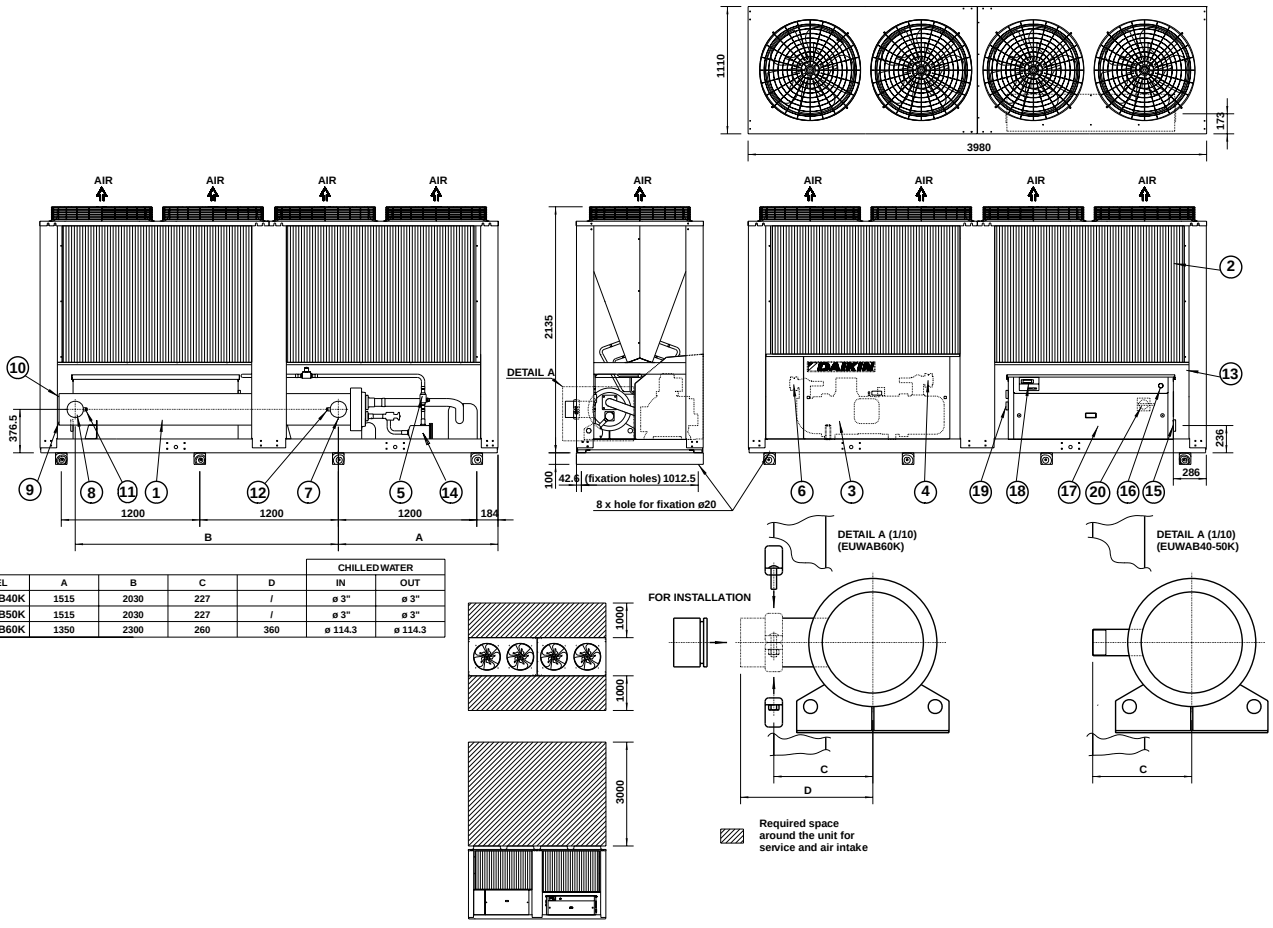
Below you will find the outlook drawings of the EUWA(*)40-120K(X) chiller types.

The diagrams indicate the following important items:

- dimensions
- service space
- main components location
- operation space

EUWA(*)40-60K

The figure below displays the outlook of the chiller type EUWA(*)40-60K:



TOESTEL	A	B	C	D	CHILLED WATER IN	CHILLED WATER OUT
EUWAB40K	1515	2030	227	/	ø 3"	ø 3"
EUWAB50K	1515	2030	227	/	ø 3"	ø 3"
EUWAB60K	1350	2300	260	360	ø 114.3	ø 114.3

For a description of the components of the outlook drawings, refer to ‘Main components table’ on page 1-18.

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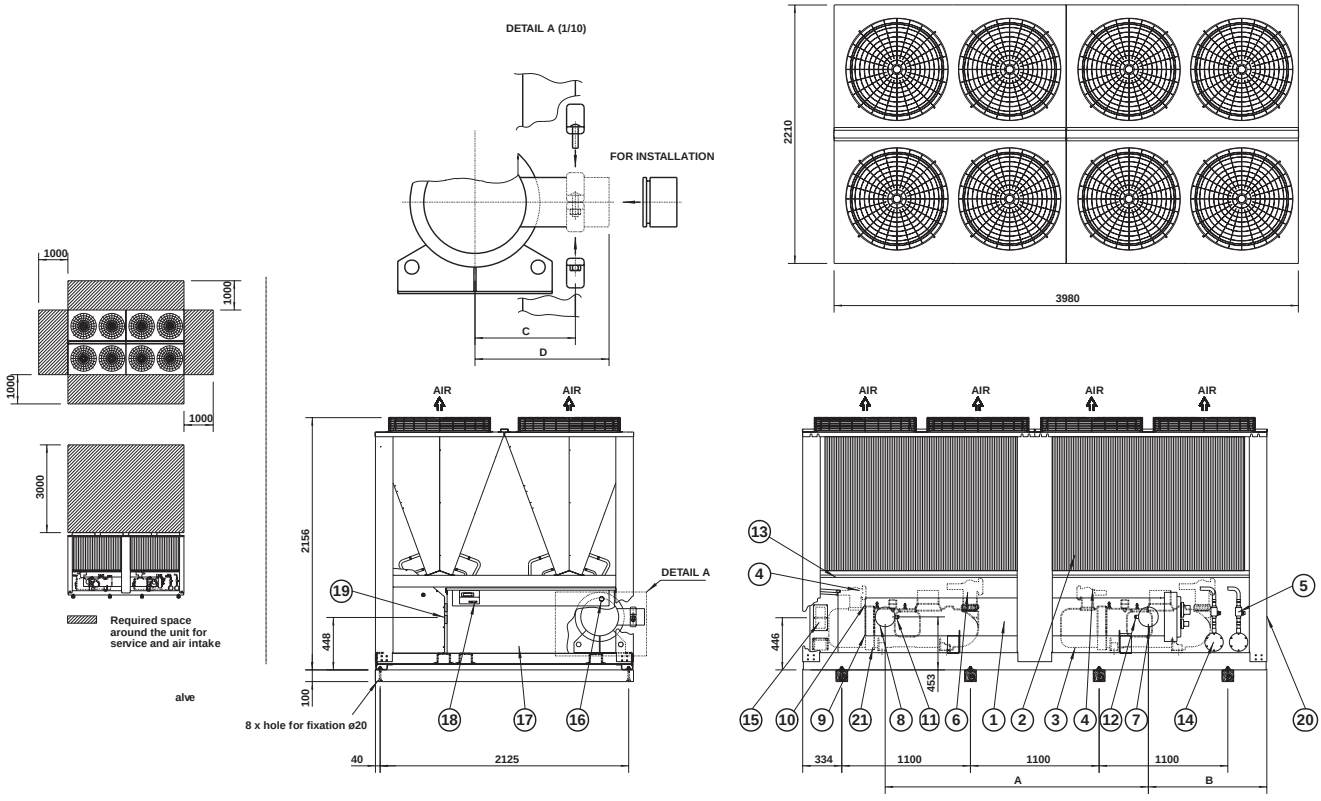
Photo display of EUWA(*)40-120K(X)

The photo below displays the outlook of the chiller type EUWA(*)40-60K(X):

EUWA(*)80-120K

The figure below displays the outlook of the chiller type EUWA(*)80-120K:

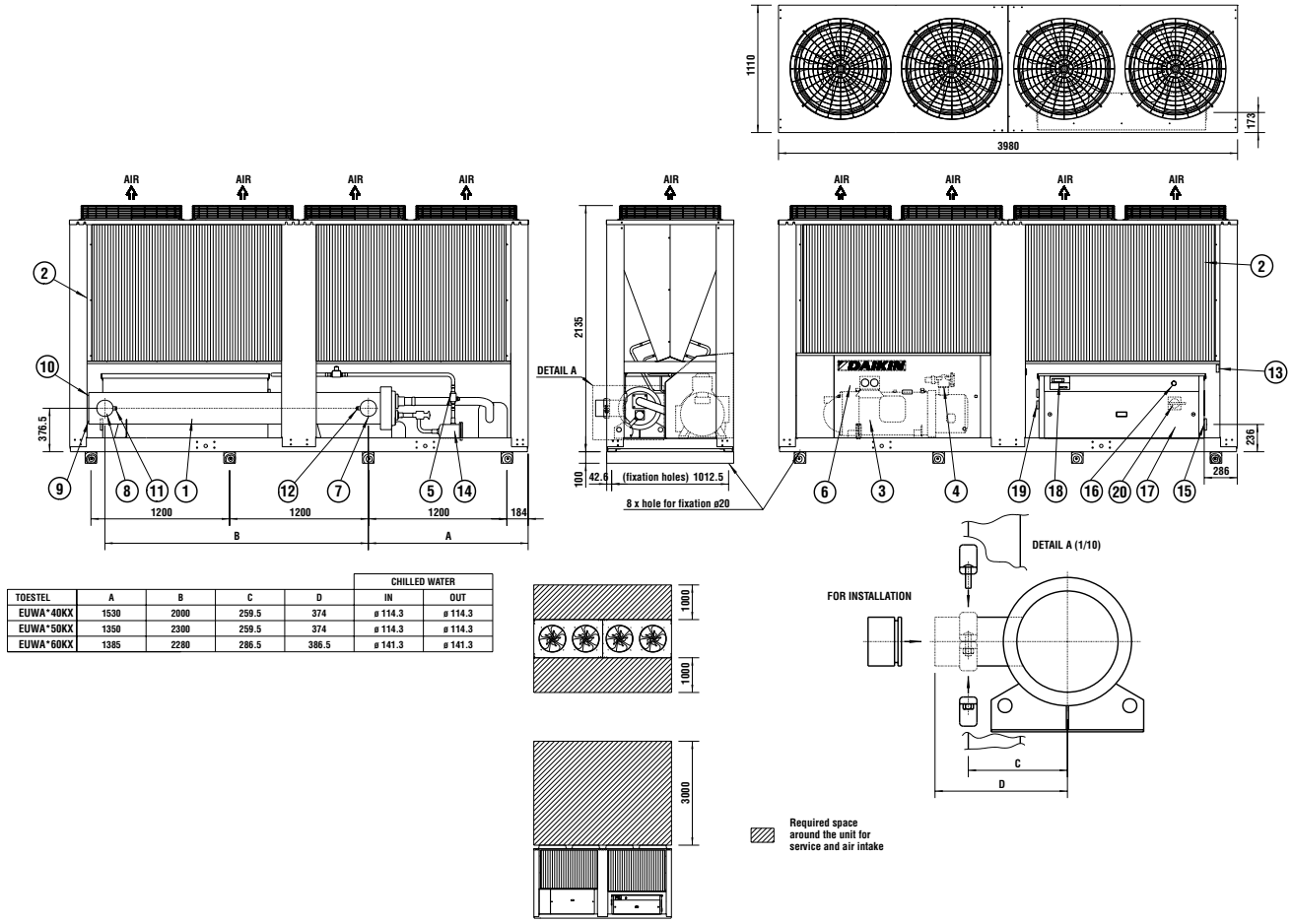


TOESTEL	A	B	C	D	CHILLED WATER IN	CHILLED WATER OUT
EUWAB80K	2280	970	287	387	ø 141.3	ø 141.3
EUWAB100K	2280	970	287	387	ø 141.3	ø 141.3
EUWAB120K	2250	1013	362	512	ø 168.3	ø 168.3

For a description of the components of the outlook drawings, refer to ‘Main components table’ on page 1-18.

1

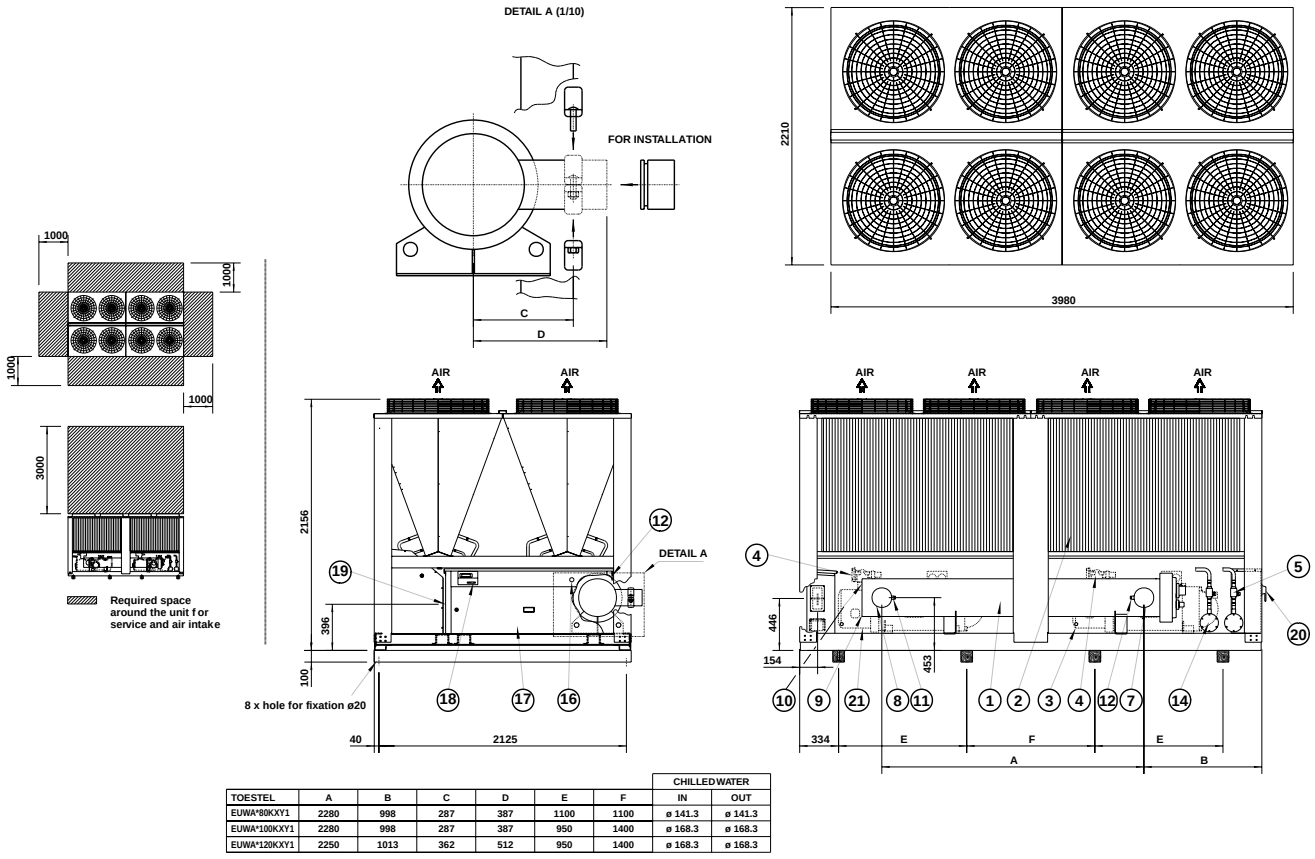
EUWA(*)40-60KX The figure below displays the outlook of the chiller type EUWA(*)40-60KX:



TOESTEL	A	B	C	D	CHILLED WATER IN	CHILLED WATER OUT
EUWA*40KX	1530	2000	259.5	374	ø 114.3	ø 114.3
EUWA*50KX	1350	2300	259.5	374	ø 114.3	ø 114.3
EUWA*60KX	1385	2280	286.5	386.5	ø 141.3	ø 141.3

For a description of the components of the outlook drawings, refer to ‘Main components table’ on page 1-18.

EUWA(*)80-120KX The figure below displays the outlook of the chiller type EUWA(*)80-120KX:



TOESTEL	A	B	C	D	E	F	CHILLED WATER IN	CHILLED WATER OUT
EUWA*80KXY1	2280	998	287	387	1100	1100	ø 141.3	ø 141.3
EUWA*100KXY1	2280	998	287	387	950	1400	ø 168.3	ø 168.3
EUWA*120KXY1	2250	1013	362	512	950	1400	ø 168.3	ø 168.3

For a description of the components of the outlook drawings, refer to ‘Main components table’ on page 1-18.

1

Main components table

The following table introduces the different parts of the outlook drawings for EUWA(*)40-120K(X):

N°	Components
1	Evaporator
2	Condenser
3	Compressor 1 with pressure relief valve
4	Discharge stopvalve
5	Liquid stopvalve
6	Suction stopvalve* (optional)
7	Chilled water in
8	Chilled water out
9	Water drain evaporator
10	Air purge evaporator
11	Leaving water temperature sensor
12	Entering temperature sensor
13	Ambient temperature sensor
14	Drier + charge valve
15	Power supply intake
16	Emergency stop
17	Switch box
18	Digital display controller
19	Field wiring intake
20	Main isolator switch (optional)
21	Compressor 2 with pressure relief valve. Compressor 2 is only available for the chillers EUWA(*)80-120K(X).

*: Standard for EUWAS40-120K(X) and EUWAD40-120K(X).

1.5 Installation Outline

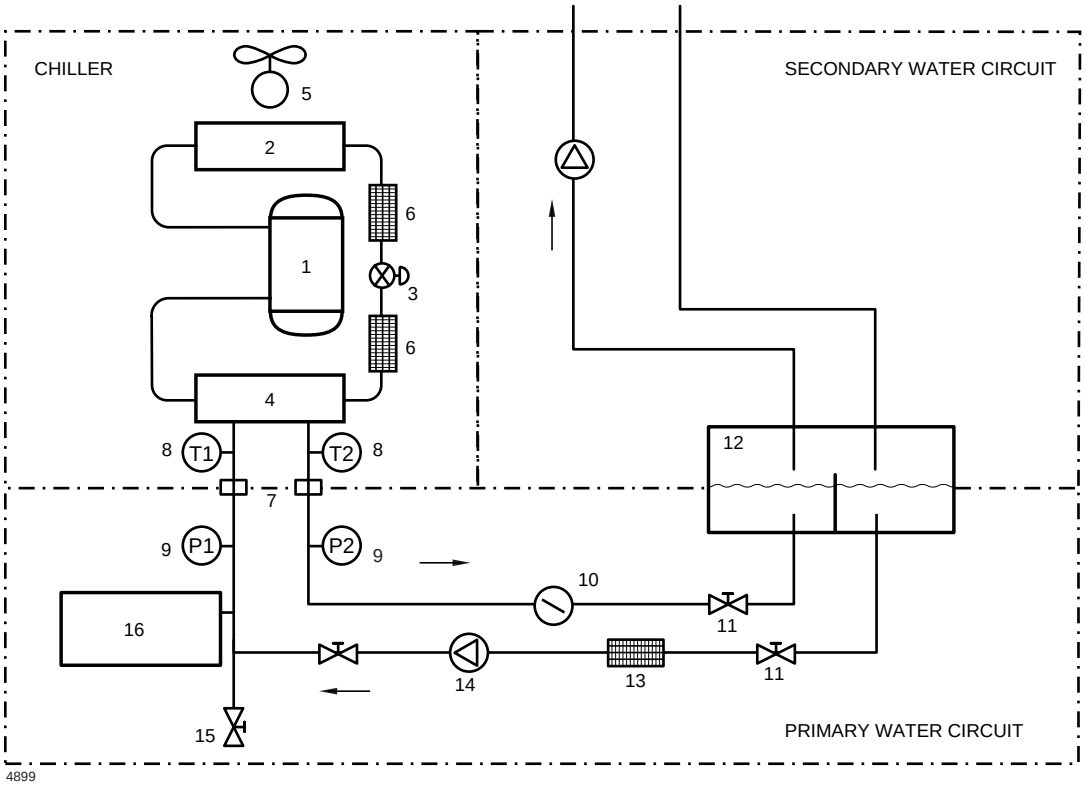
Introduction

The installation outline gives an overview of the main parts in a typical installation. We consider three main parts:

- chiller
- primary water circuit
- secondary water circuit.

Typical installation outline

The illustration below shows you a typical installation outline. Some of these installation parts are not necessarily included in all the chillers described in this manual.



CHILLER

1	compressor
2	air heat exchanger
3	expansion valve
4	water heat exchanger
5	fan motor
6	refrigerant filter strainer
7	water connections
8	measurement points for temperature

sPRIMARY WATER CIRCUIT

9	measurement points for pressure
10	flow switch
11	shut-off valves
12	buffer tank
13	water filter
14	water pump
15	drain valve
16	expansion tank

1

2 Piping Layout

2.1 What Is in This Chapter

Introduction

In this chapter we will only explain the internal refrigeration circuit. The water piping is considered common practice and is therefore not explained.

Overview

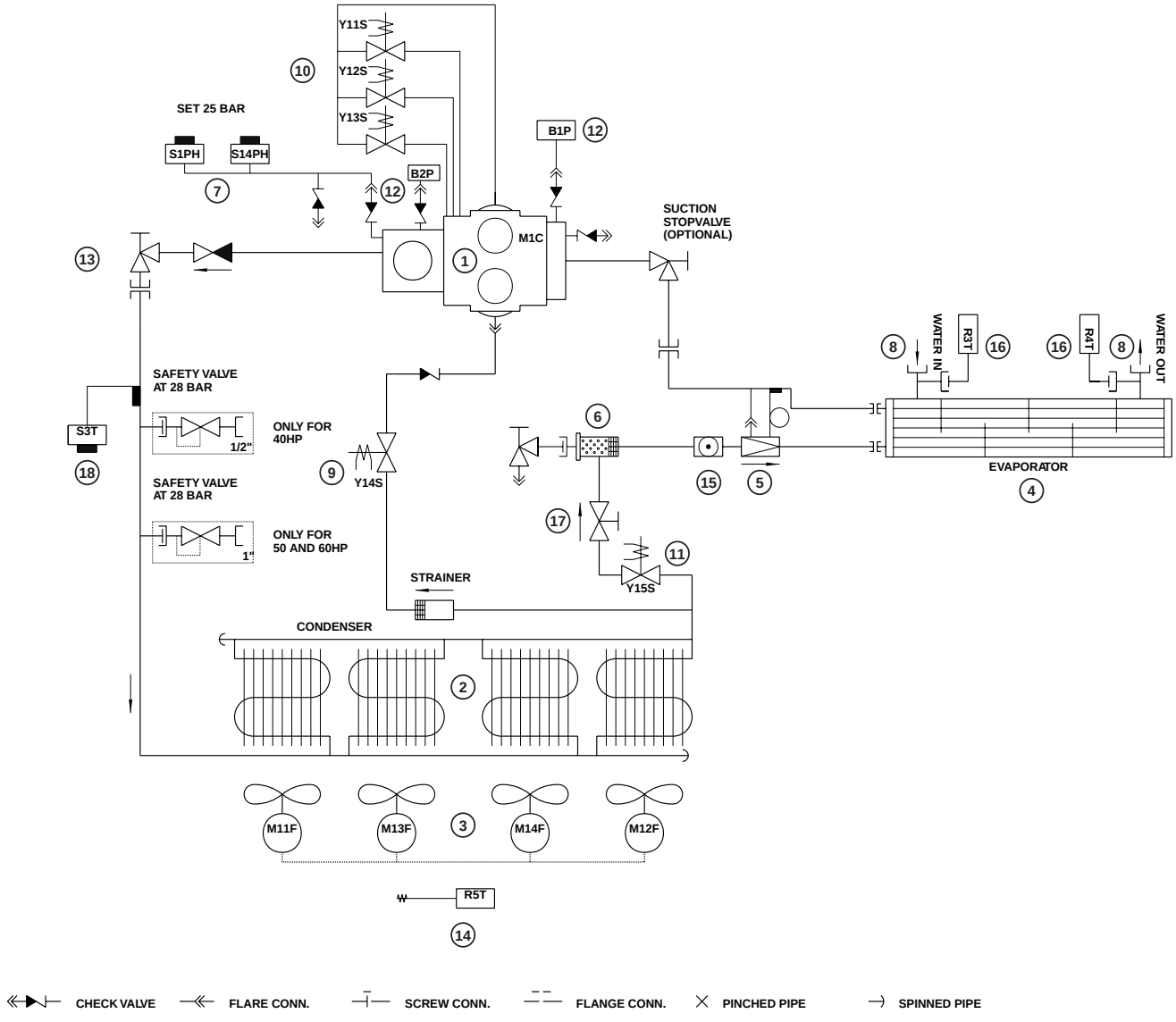
This chapter covers the following topics:

1

2.2 Functional Diagram Refrigeration Circuit

Functional diagram EUWA(*)40-60K

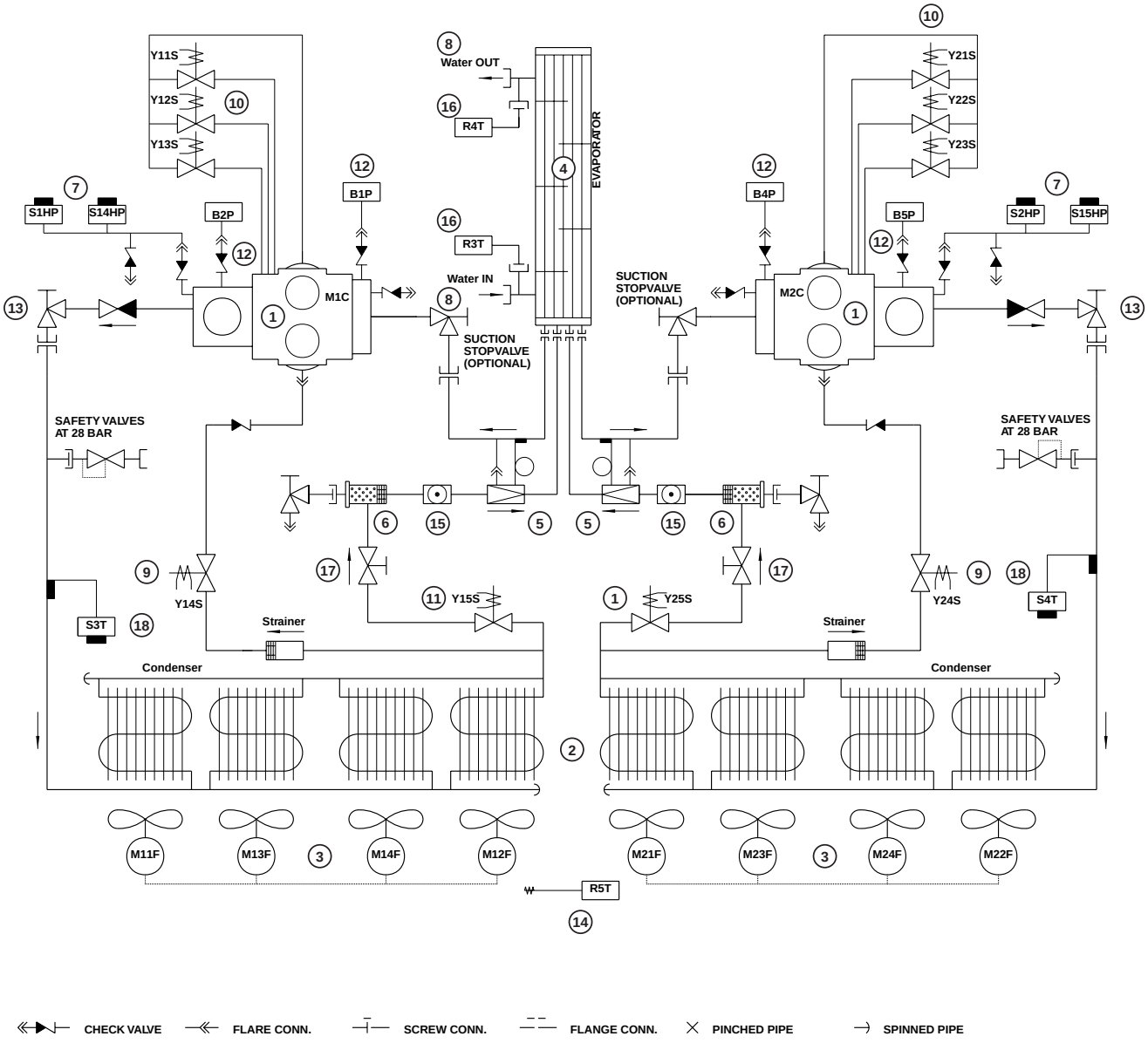
The figure below displays the functional diagram of the refrigeration circuit of the chiller types EUWA(*)40-60K:



1

Functional diagram EUWA(*)80-120K

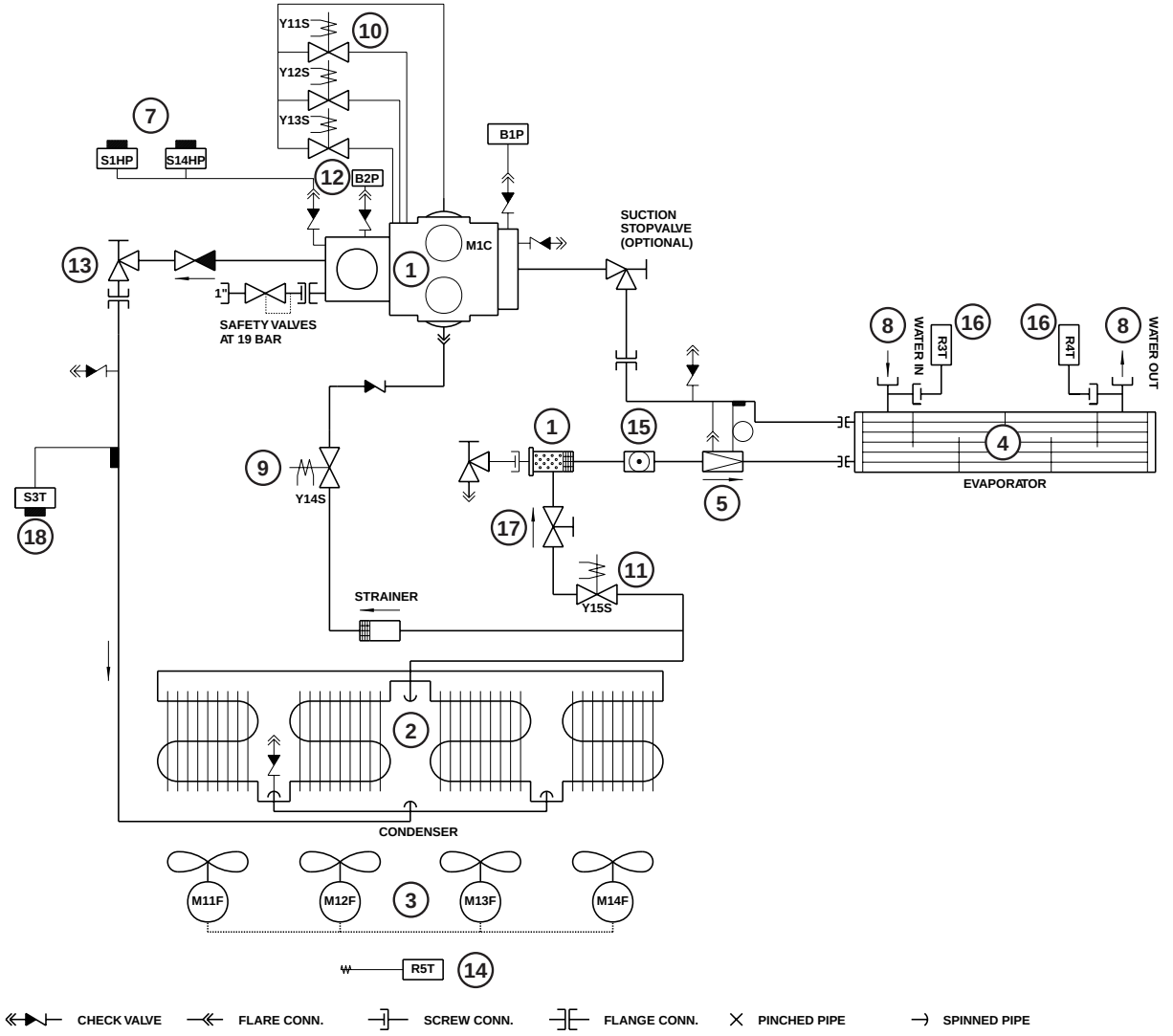
The figure below displays the functional diagram of the refrigeration circuit of the chiller types EUWA(*)80-120K:



1

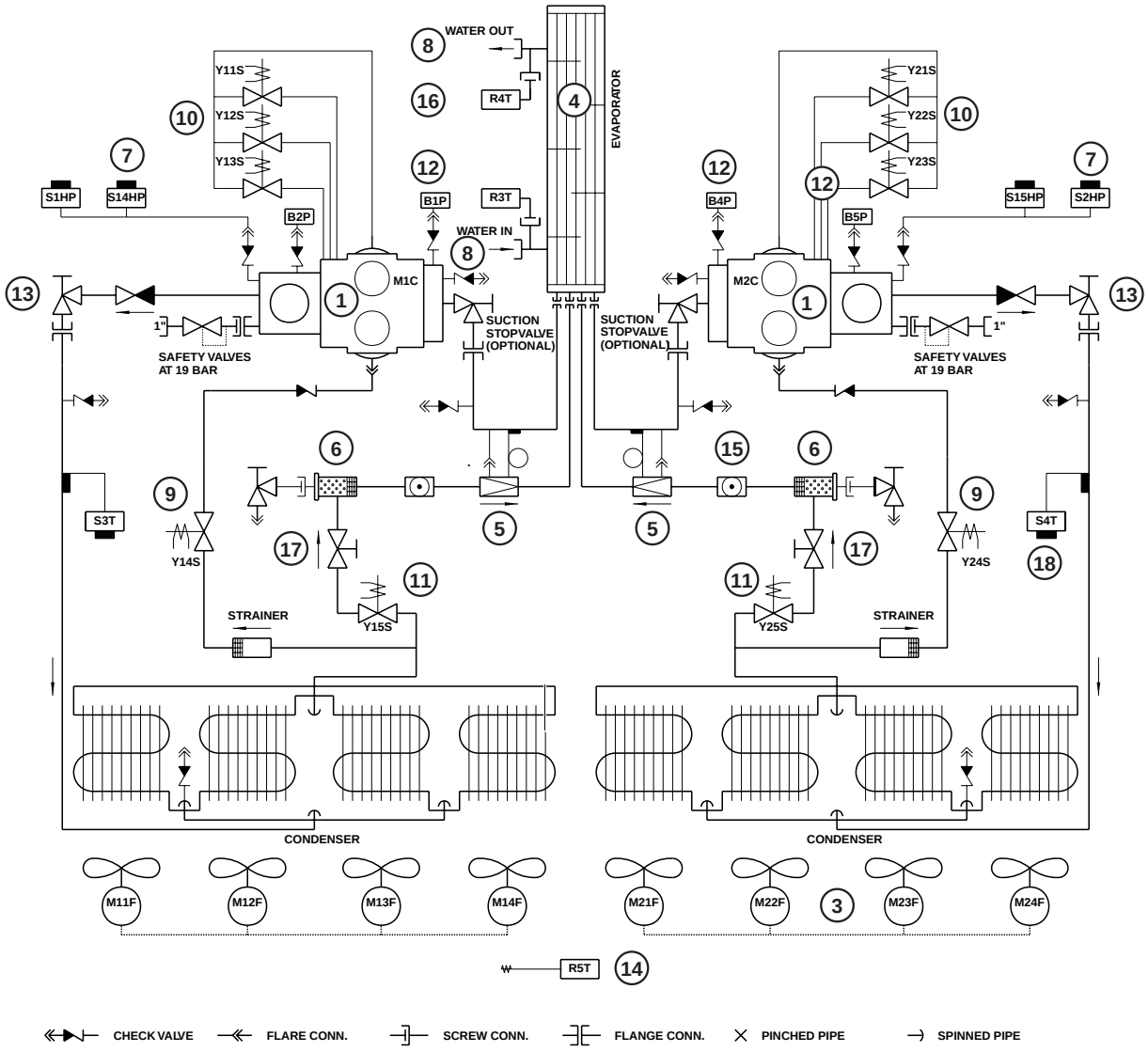
Functional diagram EUWA(*)40-60KX

The figure below displays the functional diagram of the refrigeration circuit of the chiller types EUWA(*)40-60KX:



Functional diagram EUWA(*)80-120KX

The figure below displays the functional diagram of the refrigeration circuit of the chiller types EUWA(*)80-120KX:



1

2.3 Parts Table of the Refrigeration Circuit

Parts table

The numbers in the table below refer to the numbers in the piping diagrams on the previous pages.

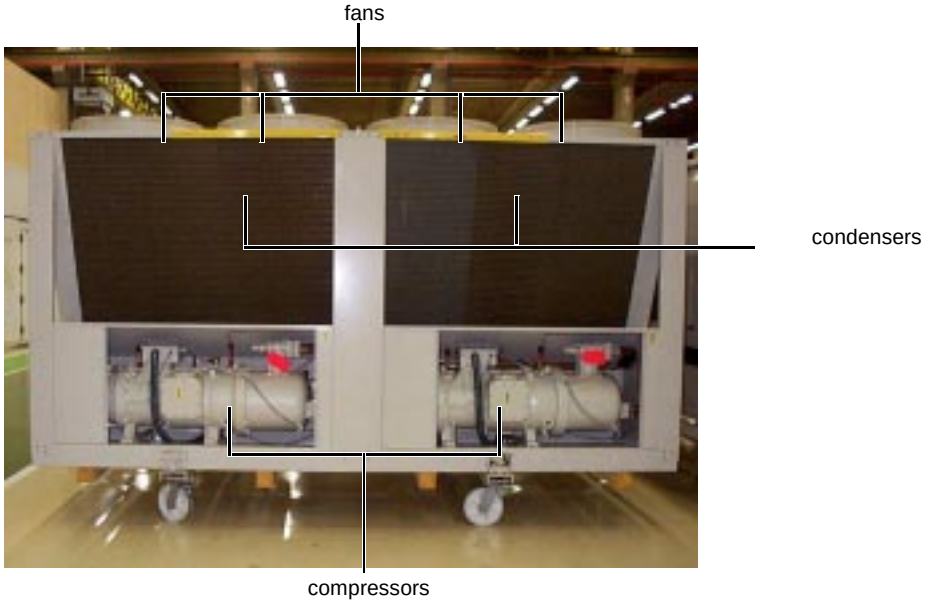
N°	Part name	Code	Function
1	Compressor	M1C, M2C	All compressors are semi-hermetic screw types with an oil separator and crankcase heater. There are no suction or discharge valves and no oil pump is required.
2	Air-heat exchanger (condenser)	-	The air-heat exchanger is of the cross fin coil type with Hi-X-tubes and chromate coated waffle louvre fins. The air-cooling discharge is upward.
3	Fan	M11F-M14F, M21F-M24F	All fan motors are directly driven single or two speed motors.
4	Water-heat exchanger (evaporator)	-	The water-heat exchanger is a direct expansion, shell and tube type with refrigerant flowing through the tube and water flowing through the shell via baffle plates. The internal finned tubes provide an extended surface, creating a turbulence between the freon liquid as well as a gas improving capacity.
5	Expansion valve	-	The thermostatic expansion valve is set up to control the superheat between 5 °C and 7 °C.
6	Dryer with charge valve	-	The replaceable filter dryer will keep the refrigerant system dry. It is equipped with a charge valve.
7	High pressure switch	S1PH, S14HP, S2HP, S15HP	The refrigerant circuit(s) contains 2(4) high pressure switches in order to act as a safety for the compressor to switch off.
8	Water in- and outlet connections	-	The water connections exist out of flexible joints or gas pipe connections straight to the evaporator.
9	Liquid injection solenoid valve	Y14S, Y24S	The liquid injection valve maintains the discharge temperature of the compressor by cooling with liquid from the condenser. It opens on compressor start and closes on compressor stop. A shortage of refrigerant may trip this discharge temperature safety.
10	Unloading solenoid valves	Y11S, Y12S, Y13S, Y21S, Y22S, Y23S	The compressor has 3 unloader solenoid valves on the top. From the 3 valves on the top, the first one is 70 %, the middle one is 40% and the last one is 12 %. The valves are powered up to go to the unloading condition and only 1 valve is powered per unloaded condition.
11	Liquid line solenoid valve	Y15S, Y25S	This valve shuts off the refrigerant flow when the compressor stops or in case of a power failure. It is used to prevent liquid backflow from the condenser to the evaporator in order to avoid wet start and liquid pumping.
12	Low and high pressure transmitter	B1P, B4P, B2P,B5P	The low and high pressure transmitters (or sensors) are used to gain information in order to perform some controls and also act as safety.
13	Head pressure stop valve	-	This stop valve is used during pump down and service work in combination with the liquid line stop valve.

N°	Part name	Code	Function
14	Ambient temperature sensor	R5T	The ambient temperature is measured to control the fans during head pressure control. Refer to ‘Fan Speed Control after Start-up (Head Pressure Control)’ on page 2-7.
15	Sight glass with moisture indicator	-	The sight glass with moisture indicator is used to check the refrigerant shortage and/or moisture level in the system.
16	Water temperature sensor	R3T,R4T	The water temperature sensors are used to control the thermostat function in the outlet or inlet water control. They can also act as safety.
17	Liquid stop valve	-	The liquid stop valve shuts off the liquid line in case of pump down and in case of the procedure to replace the drier filter. Refer to 4.6 – Filter Procedure on page 3-29.
18	Discharge temperature protector	S3T, S4T	The discharge temperature protector uses bimetals to control the discharge temperature.

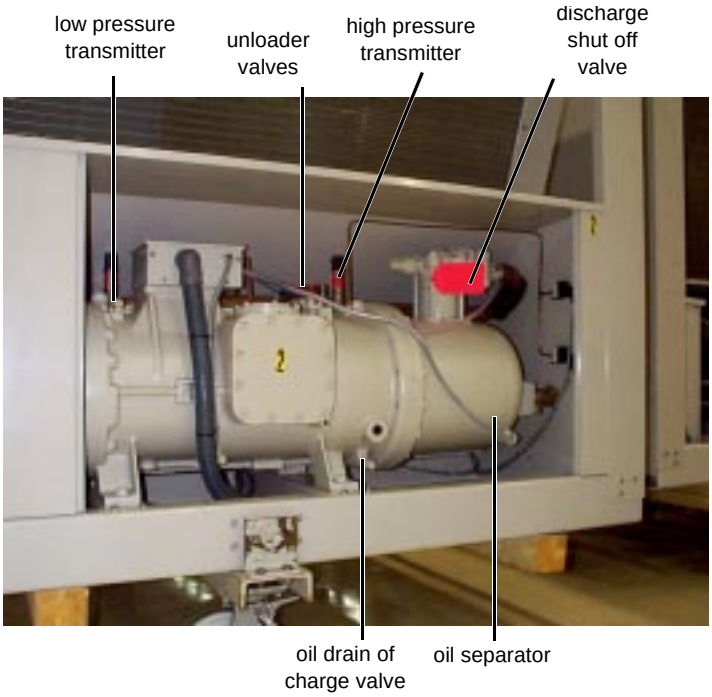
Details are given in ‘1.2 – Technical Specifications on page 1-4’.

Visualising the parts

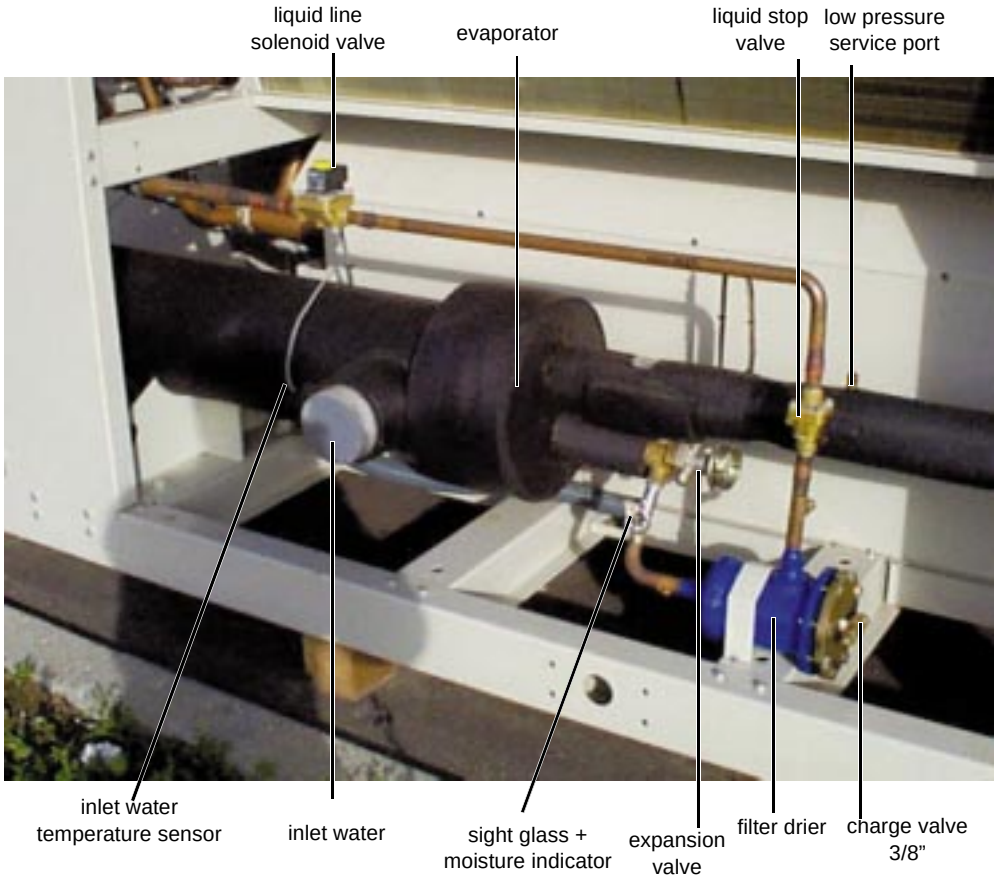
The following pictures give you a visual view of the different parts of the refrigeration circuit:



1

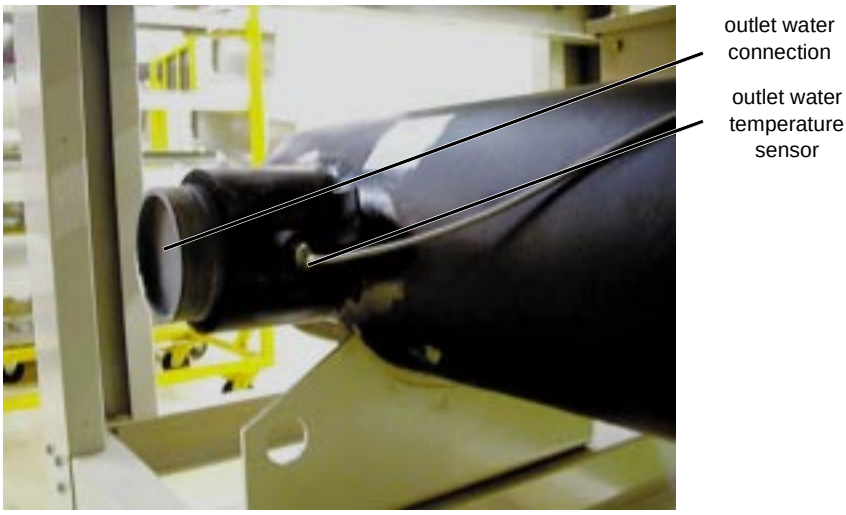


Compressor F-Type




12%
40%
70%


ambient thermistor


outlet water connection
outlet water temperature sensor

1

3 Wiring Layout

3.1 What Is in This Chapter

Introduction

The purpose of this chapter is to guide you through the switch box and the wiring diagrams. Therefore, we have used schematic drawings, which indicate and locate the necessary information on both the switch box and the wiring diagram.

Overview

This chapter covers the following topics:

1

3.2 Switch box Layout

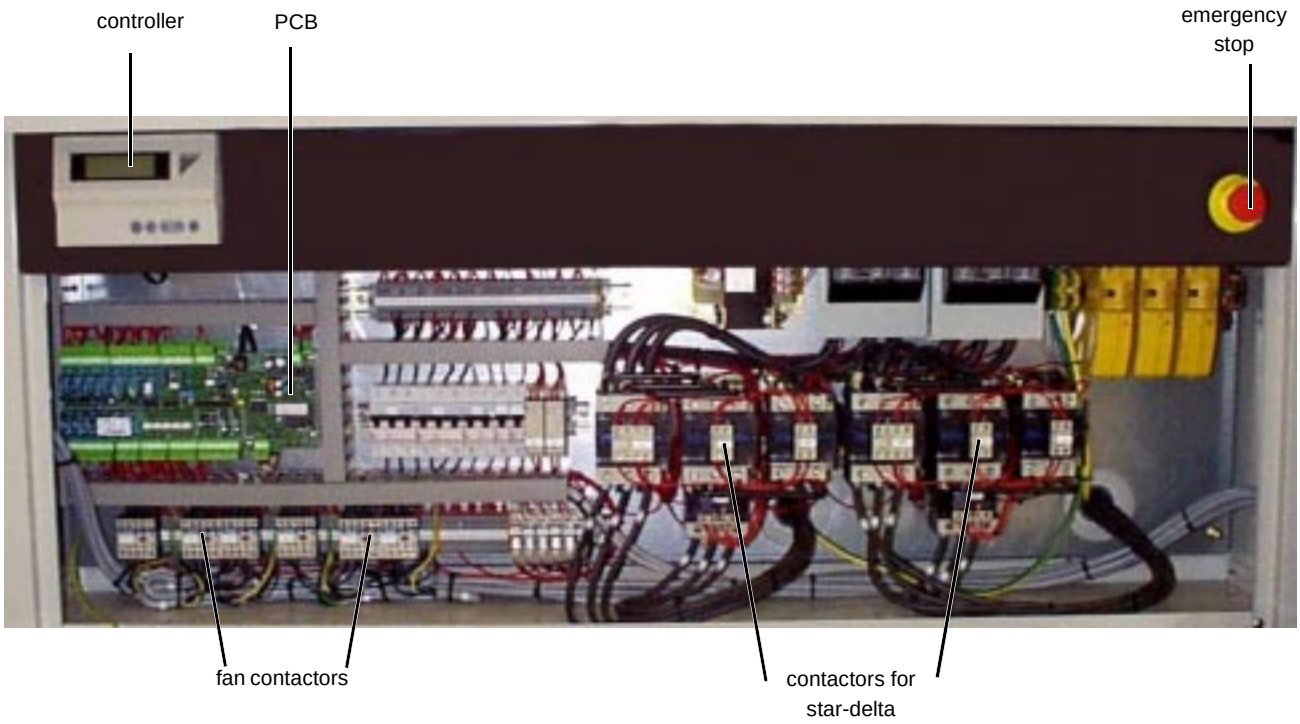
Location

The chiller types EUWA(*)40-120K(X) have only one switch box.

- For the models EUWA(*)40-60K(X) the switch box is located in the front
- For the models EUWA(*)80-120K(X) the switch box is located at the side.

Photo switch box

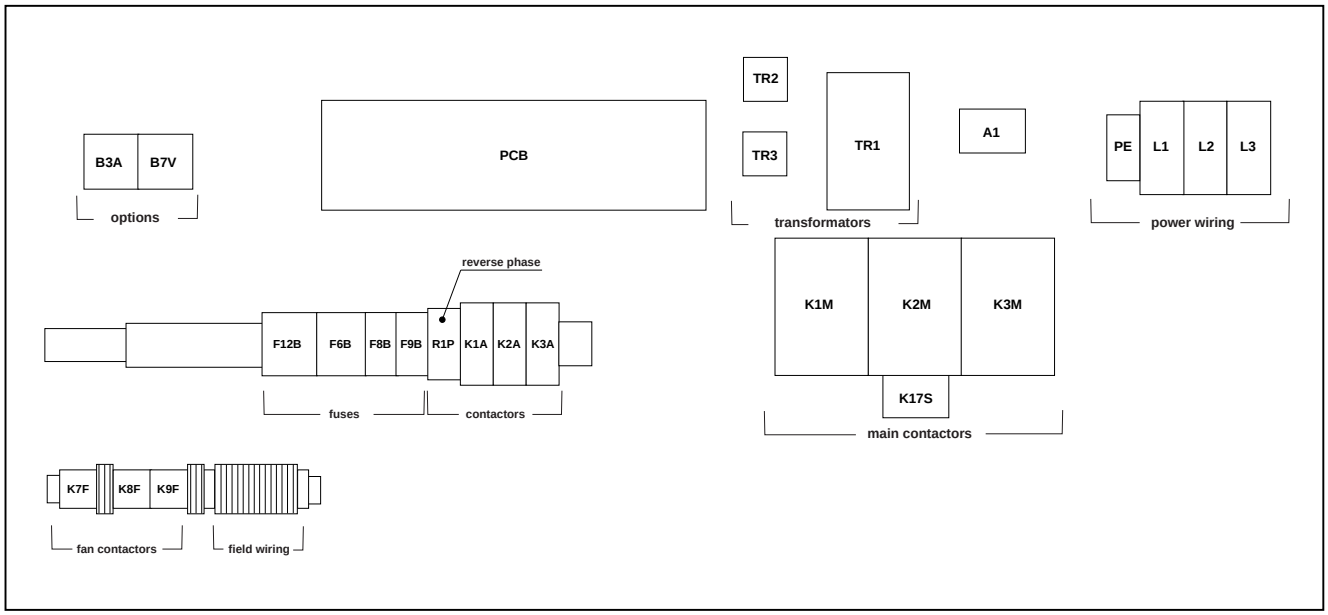
The following picture shows a the main components of the switch box of EUWA(*)80-120K(X):



1

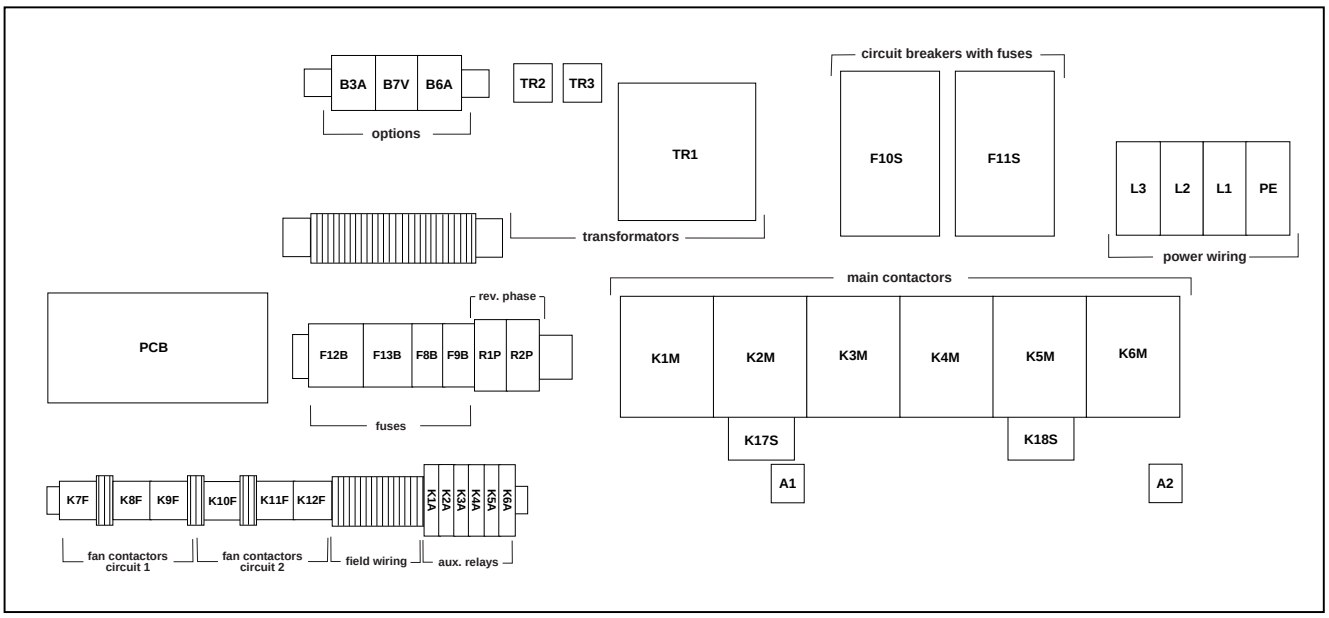
Switch box EUWA(*)40-60K(X)

The following figure shows the layout of the switch box for the EUWA(*)40-60K(X) types:



Switch box EUWA(*)80-120K(X)

The following figure shows the layout of the switch box for the EUWA(*)80-120K(X):

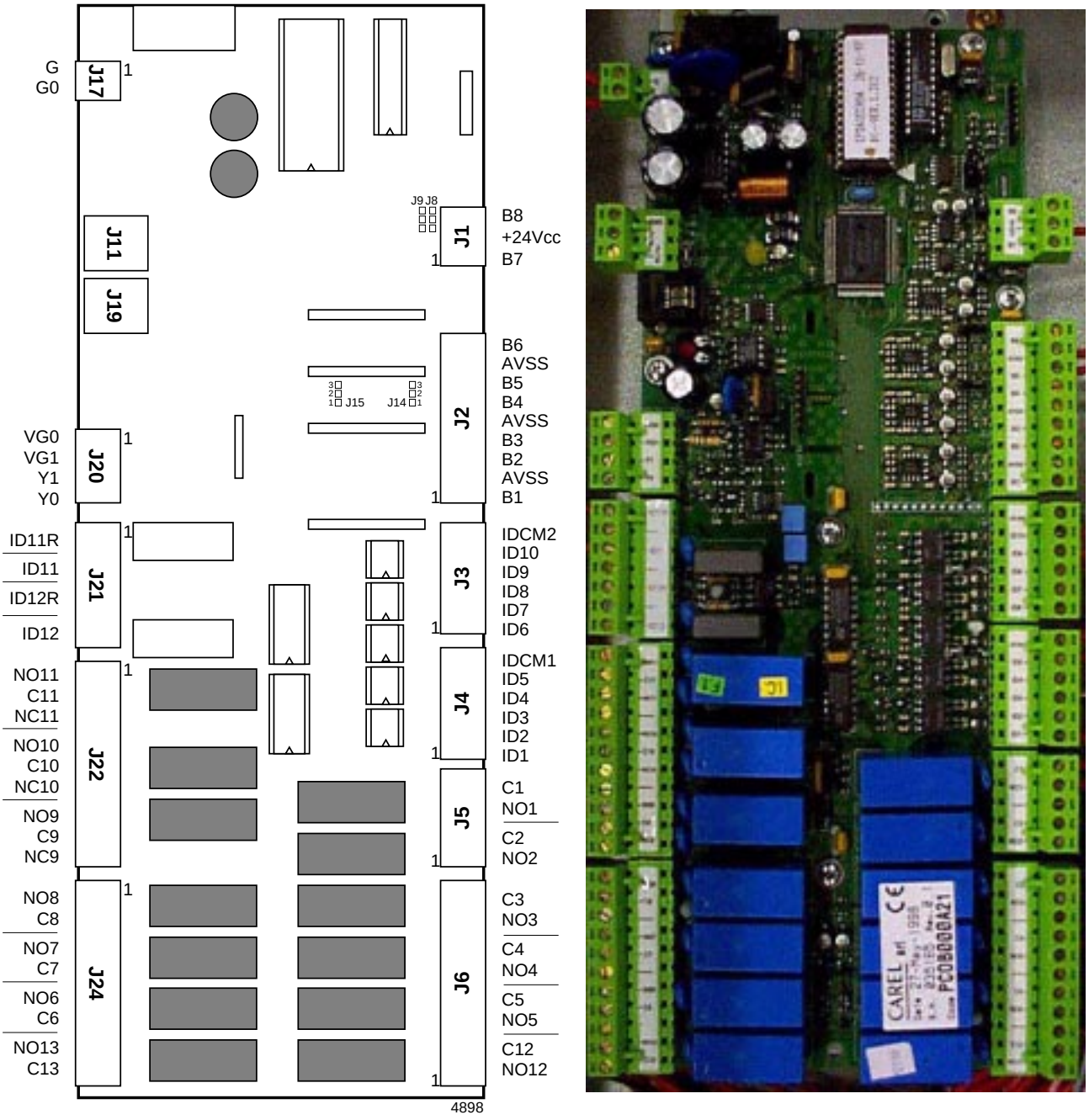


1

3.3 Main PCB Layout

Main board EUWA(*)40-120K(X)

The figure below shows the main PCB board of the chiller type EUWA(*)40-120K(X):



The EUWA(*)80-120K(X) types contain 2 PCB boards connected through a T-device.

Description PCB EUWA(*)40-60K(X)

The following table explains the different components of the EUWA(*)40-60K(X) PCB:

Block	Connection	Wiring diagram symbol	Description
J1	B7	B2P	high pressure transmitter
	B8	B1P	low pressure transmitter
J2	B1	R5T	ambient temperature sensor
	B2	R3T	evaporator inlet water temperature sensor
	B3	R4T	evaporator outlet water temperature sensor
	B5	B3A (field wiring) A1	current transmitter current transfo An optional A-meter must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
	B6	B7V (field wiring) V1	voltage transmitter An optional V-meter must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
J3	ID6	K2A	auxiliary relay compressor thermal protector
	ID7	S8L/S9L (field wiring)	flow switch/pump contact 2
	ID8	—	controller bypass (optional)
	ID9	S10S (field wiring)	dual setpoint selection switch
	ID10	S6S (field wiring)	remote start/stop switch
J4	ID1	S1PH	high pressure switch
	ID2	S14PH	high pressure switch
	ID3	R1P	reverse phase protector
	ID4	K17S	overcurrent relay
	ID5	K3A	auxiliary relay for discharge thermal protector
J5	C1-NO1	K3M	star contactor
	C2-NO2	K2M	delta contactor

1

Block	Connection	Wiring diagram symbol	Description
J6	C3-NO3	K1M	compressor on
	C4-NO4	H1P (field wiring)	pump contact and general operation indication
	C5-NO5	H2P (field wiring)	alarm indication
	C12-NO12	E3H (field wiring)	evaporator heater An optional heatertape must be installed (refer to 'Options for EUWA(*)40-120K' on page 1-43 and 'Options for EUWA(*)40-120KX' on page 1-43).
J17	G-GO	—	power supply controller
J21	ID11-ID11R	S5E	emergency stop button
	ID12-ID12R	—	—
J22	C9-NO9-NC9	K7F	fan step 1 contactor
	C10-NO10-NC10	K8F	fan step 2 contactor
	C11-NO11-NC11	K9F	fan step 3 contactor
J24	C6-NO6	Y11S	12% capacity step for compressor
	C8-NO8	Y12S	40% capacity step for compressor
	C13-NO13	Y13S	70% capacity step for compressor

Description PCB's EUWA(*)80-120K(X)

The following table explains the different blocks of the EUWA(*)80-120K(X) PCB A and B:

Block	Connection	Wiring diagram symbol	Description
J1A	B7	B2P	high pressure transmitter circuit 1
	B8	B1P	low pressure transmitter circuit 1
J1B	B7	B5P	high pressure transmitter circuit 2
	B8	B4P	low pressure transmitter circuit 2

Block	Connection	Wiring diagram symbol	Description
J2A	B1	R5T	ambient temperature sensor
	B2	R3T	evaporator inlet water temperature sensor
	B3	R4T	evaporator outlet water temperature sensor
	B5	B3A (field wiring) A1	current transmitter circuit 1 current transfo An optional A-meter must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
	B6	B7V (field wiring) V1	voltage transmitter An optional V-meter must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
J2B	B1	—	—
	B2	—	—
	B3	—	—
	B5	B6A (field wiring) A2	current transmitter circuit 2 current transfo An optional A-meter must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
	B6	—	—
J3A	ID6	K2A	auxiliary relay compressor thermal protector circuit 1
	ID7	S8L/S9L (field wiring)	flow switch/pump contact
	ID8	—	controller bypass (optional)
	ID9	S10S (field wiring)	dual setpoint selection switch
	ID10	S6S (field wiring)	remote start/stop switch
J3B	ID6	K5A	auxiliary relay compressor thermal protector circuit 2
	ID7	S11S (field wiring)	switch that disables circuit 1 when closed
	ID8	S12S(field wiring)	switch that disables circuit 2 when closed
	ID9	—	—
	ID10	—	—

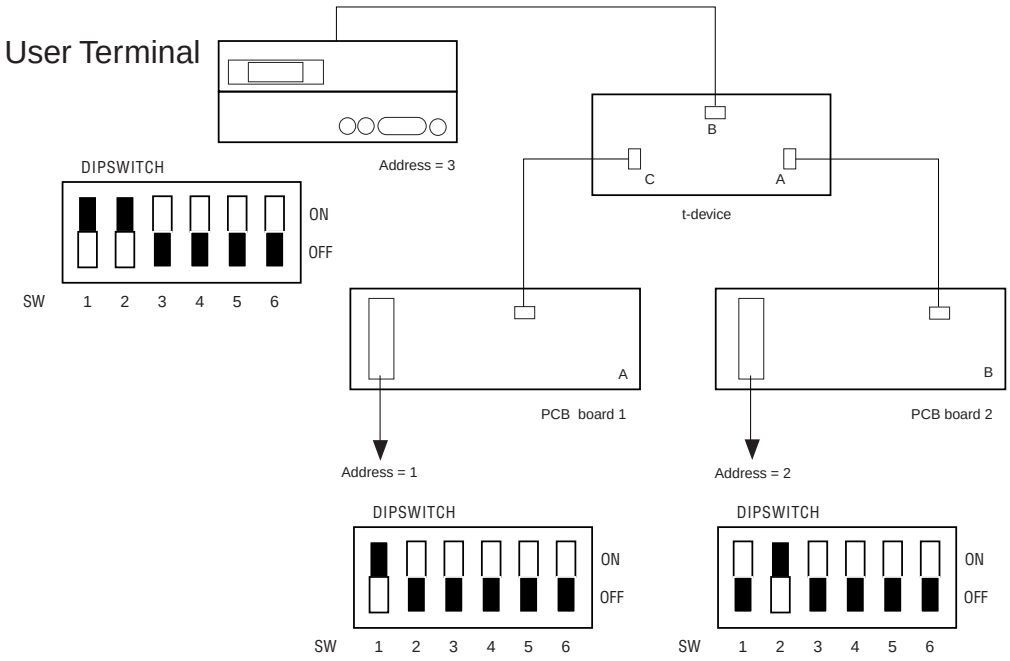
1

Block	Connection	Wiring diagram symbol	Description
J4A	ID1	S1PH	high pressure switch circuit 1
	ID2	S14PH	high pressure switch circuit 2
	ID3	R1P	reverse phase protector circuit 1
	ID4	K17S	overcurrent relay circuit 1
	ID5	K3A	auxiliary relay for discharge thermal protector circuit 1
J4B	ID1	S2PH	high pressure switch circuit 2
	ID2	S15PH	high pressure switch circuit 2
	ID3	R2P	reverse phase protector circuit 2
	ID4	K18S	overcurrent relay circuit 2
	ID5	K6A	auxiliary relay for discharge thermal protector circuit 2
J5A	C1-NO1	K3M	star contactor circuit 1
	C2-NO2	K2M	delta contactor circuit 1
J5B	C1-NO1	K6M	star contactor circuit 2
	C2-NO2	K5M	delta contactor circuit 2
J6A	C3-NO3	K1M	compressor 1 on
	C4-NO4	H1P (field wiring)	pump contact and general operation indication
	C5-NO5	H2P (field wiring)	alarm indication
	C12-NO12	E3H (field wiring)	evaporator heater An optional heatertape must be installed (refer to ‘Options for EUWA(*)40-120K’ on page 1-43 and ‘Options for EUWA(*)40-120KX’ on page 1-43).
J6B	C3-NO3	K4M	compressor 2 on
	C4-NO4	—	—
	C5-NO5	—	—
	C12-NO12	—	—
J17A	G-GO	—	power supply controller
J17B	G-GO	—	power supply controller
J21A	ID11-ID11R	S5E	emergency stop button
	ID12-ID12R	—	—
J21B	ID11-ID11R	—	—
	ID12-ID12R	—	—

Block	Connection	Wiring diagram symbol	Description
J22A	C9-NO9-NC9	K7F	fan step 1 contactor circuit 1
	C10-NO10-NC10	K8F	fan step 2 contactor circuit 1
	C11-NO11-NC11	K9F	fan step 3 contactor circuit 1
J22B	C9-NO9-NC9	K10F	fan step 1 contactor circuit 2
	C10-NO10-NC10	K11F	fan step 2 contactor circuit 2
	C11-NO11-NC11	K12F	fan step 3 contactor circuit 2
J24A	C6-NO6	Y11S	12% capacity step for compressor circuit 1
	C8-NO8	Y12S	40% capacity step for compressor circuit 1
	C13-NO13	Y13S	70% capacity step for compressor circuit 1
J24B	C6-NO6	Y11S	12% capacity step for compressor circuit 2
	C8-NO8	Y12S	40% capacity step for compressor circuit 2
	C13-NO13	Y13S	70% capacity step for compressor circuit 2

T-device between PCB A and PCB B

EUWA(*)80-120K(X) contain 2 PCB boards A and B that are connected through a T-device. This device enables contact with the address cards on the PCB boards. The following figure shows the connection group:



1

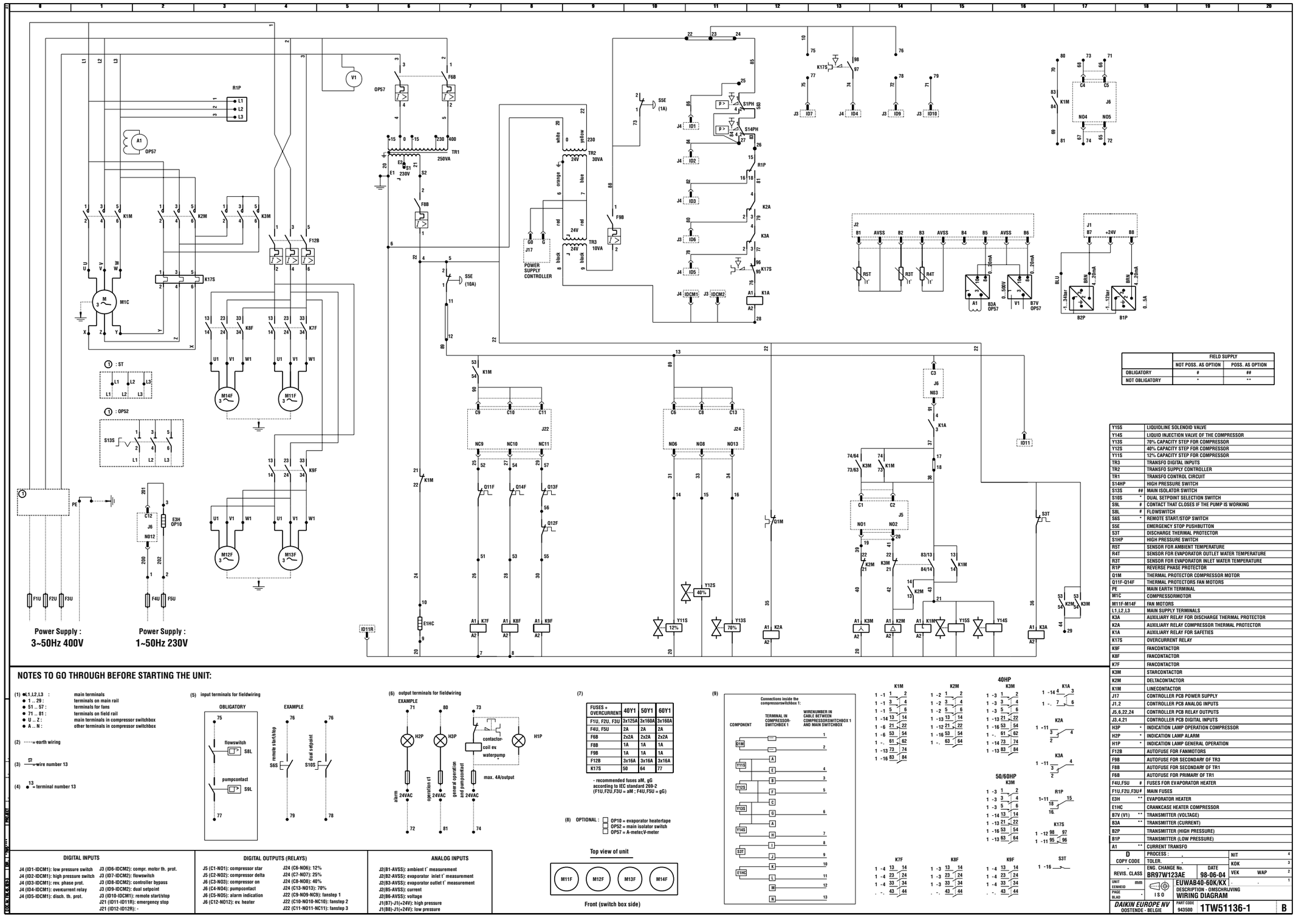
3.4 Wiring Diagrams

Overview

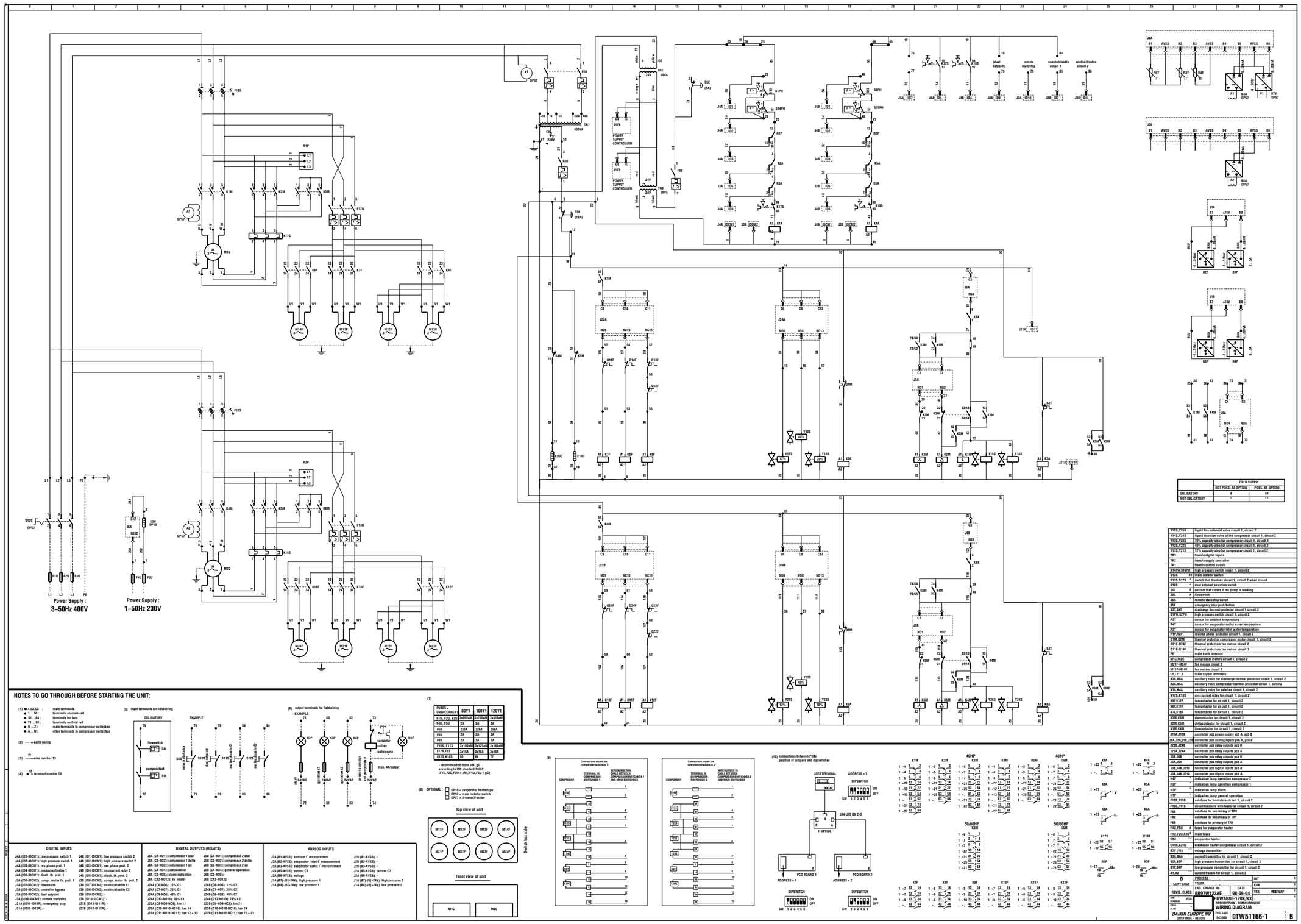
The wiring diagrams of the following chiller types are displayed on the following pages:

Chiller type	See page …
EUWA(*)40-60K(X)	page 1-41
EUWA(*)80-120K(X)	page 1-42

Wiring diagram
EUWA(*)40-60K(X)



Wiring diagram
EUWA(*)80-120K(X)



3.5 Field Wiring

Schematic drawings

The schematic drawings on the following pages will help you to locate the field wiring connections on the wiring diagrams and the switch boxes.

Field wiring components overview

The tables on the following pages give an overview of all possible field wiring connections for each unit. The item numbers will be repeated throughout the explanation to show the position on both wiring diagram and switch box layout.

Options for EUWA(*)40-120K

The following devices are optionally available for EUWA(*)40-120K:

Code	Description
OP10	evaporator heatertape
OP12	suction stopvalve
OP52	main isolator switch
OP57	A-meter, V-meter
EKEM	emergency operation
ZH	glycol applications (leaving water evaporator=-5 °C)
ZL	glycol applications (leaving water evaporator=-10 °C)

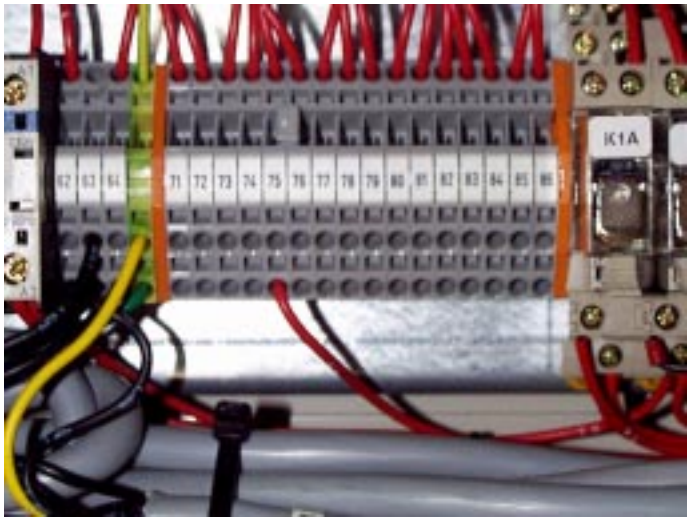
Options for EUWA(*)40-120KX

The following devices are optionally available for EUWA(*)40-120KX:

Code	Description
OP03	dual pressure relief valve (condenser)
OP10	evaporator heatertape
OP52	main isolator switch
OP57	A-meter, V-meter
ZH	glycol applications (leaving water evaporator=-5 °C)
ZL	glycol applications (leaving water evaporator=-10 °C)

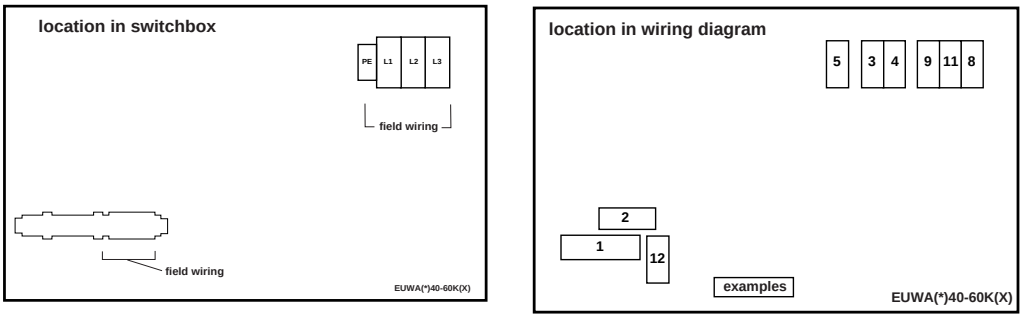
Field wiring view

The following photo gives a visual view of field wiring terminals:



1

EUWA(*)40-60K(X) location



EUWA(*)40-60K(X) terminal connections

Item	Code	Description	Terminals	Remarks
1	L1/L2/L3/PE	power supply to unit	L1/L2/L3/PE	
2	S13S	mains isolator switch	L1/L2/L3	3
3	S10S	dual set point switch	76-78	
4	S6S	remote start/stop	76-79	1,2
5	S8L/S9L	flow switch / pump contact	75-77	2
8	H2P	alarm indication	71-72	2
9	H3P	operation compressor indication	80-81	2
11	H1P	general operation indication and pump contact	73-74	2
12	E3H	evaporator heater	1-2	3

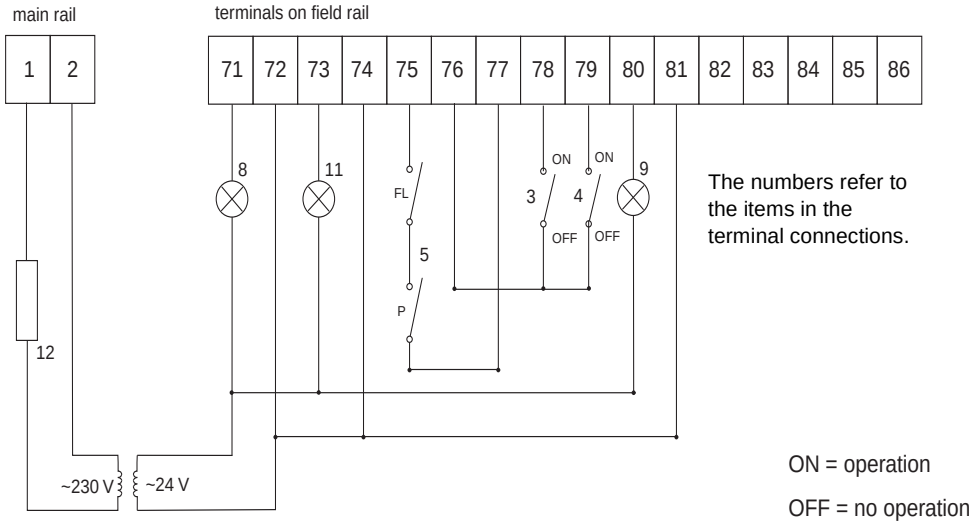
Remarks:

[1]: These require programming; see page 2-27.

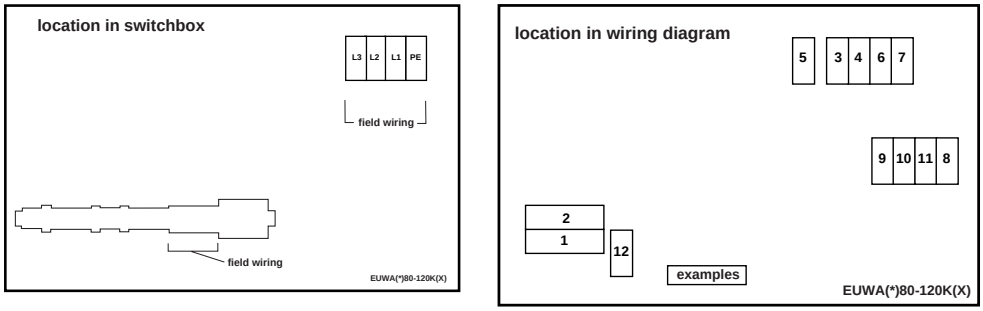
[2]: The inputs and outputs can also be consulted in the ‘Input/Output Menu’ on page 2-37.

[3]: Available as an option.

Example



EUWA(*)80-120K(X) location



EUWA(*)80-120K(X) terminal connections

Item	Code	Description	Terminals	Remarks
1	L1/L2/L3/PE	power supply to unit	L1/L2/L3/PE	
2	S13S	mains isolator switch	L1/L2/L3	3
3	S10S	dual set point switch	76-78	
4	S6S	remote start/stop	76-79	1,3
5	S8L/S9L	flow switch / pump contact	75-77	2
6	S11S	enable/disable circuit 1	84-85	
7	S12S	enable/disable circuit 2	84-86	
8	H2P	alarm indication	71-72	2
9	H3P	operation compressor 1 indication	80-81	2
10	H4P	operation compressor 2 indication	82-83	2
11	H1P	general operation indication and pump contact	73-74	2
12	E3H	evaporator heater	1-2	3

Remarks:

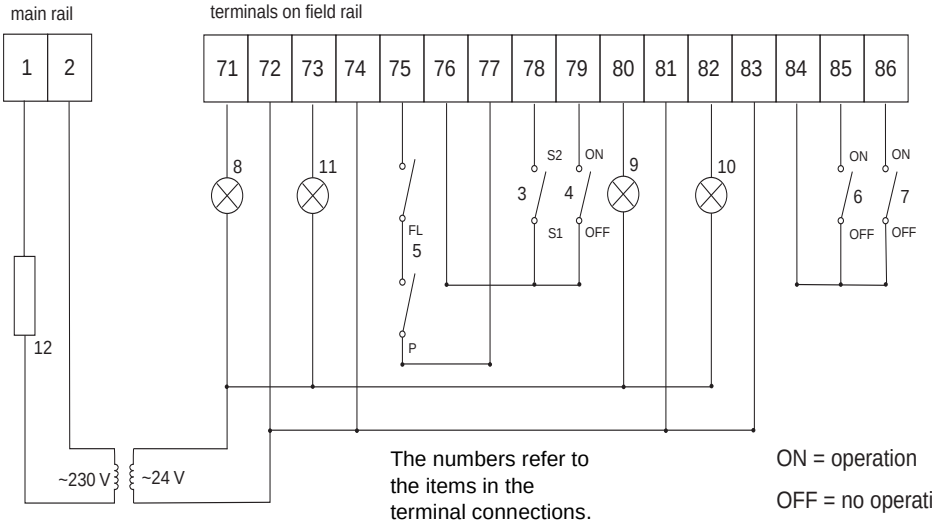
[1]: These require programming, see page 2-27.

[2]: The inputs and outputs can also be consulted in the ‘Input/Output Menu’ on page 2-37.

[3]: Available as an option.

1

Example



The numbers refer to the items in the terminal connections.

ON = operation

OFF = no operation

FL = flow switch

P = pump contact

Part 2
Functional Description

Introduction

This part gives more detailed information on the functions and controls in the unit. This information is used as background information for troubleshooting. An extensive overview of the functioning of the controller is also given in this part. Knowledge of the controller is indispensable to gain valuable information prior to servicing and troubleshooting.

What is in this part?

This parts contains the following chapters:

1 Functional Control

1.1 What Is in This Chapter

Introduction

This chapter will give more detailed information on the functions used to control the system. Understanding these functions is vital when diagnosing a malfunction, which is related to the functional control.

Overview

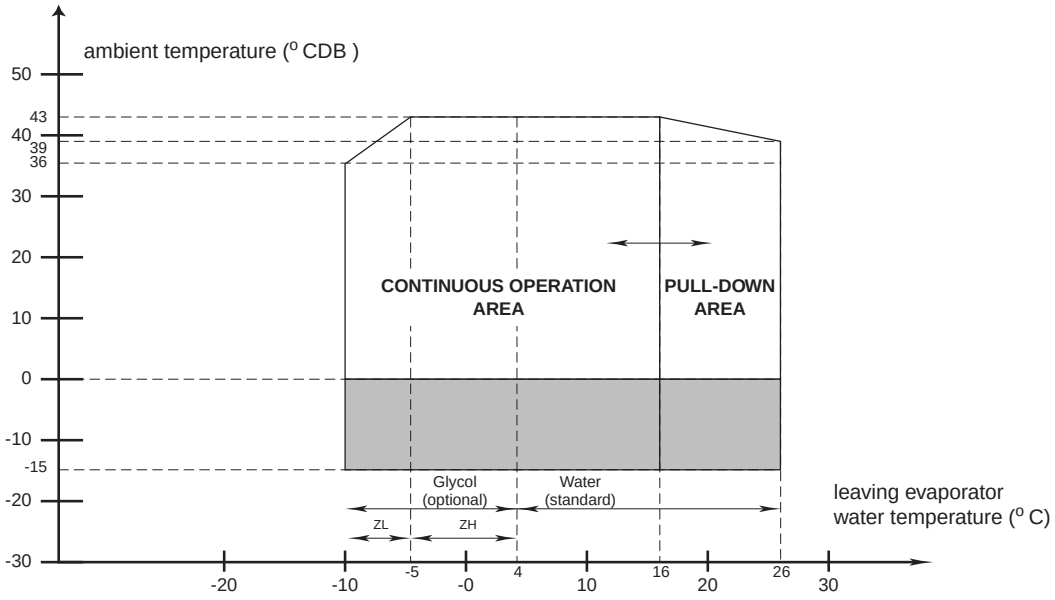
This chapter covers the following topics:

1.2 Operation Range

Operation range EUWA(*)40-120K

The following figure shows the operation range of EUWA(*)40-120K:

EUWA(*) 40 - 50 - 60 - 80 - 100 - 120K

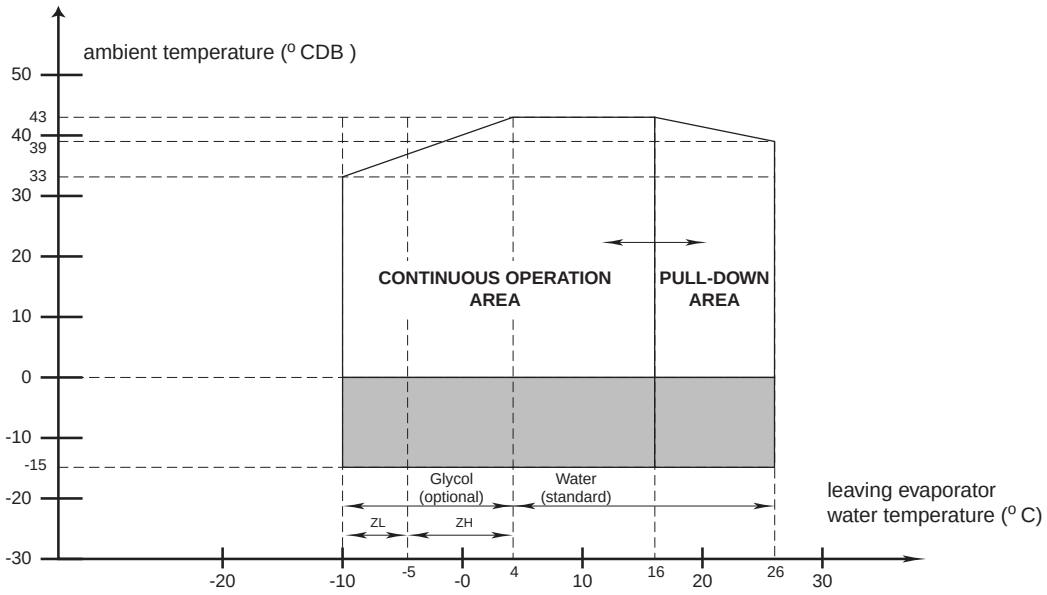


Protect the water circuit against freezing ambient conditions:
- or heater tape (optional for EUWAB, M, S, K, standard for EUWAT)
- or filling up the system with a glycol concentration related to your lowest expected ambient condition.

Operation range EUWA(*)40-120KX

The following figure shows the operation range of EUWA(*)40-120K:

EUWA(*) 40 - 50 - 60 - 80 - 100 - 120KX



Protect the watercircuit against freezing ambient conditions:
- or heater tape (optional)
- or filling up the system with a glycol concentration related to your lowest expected ambient condition.

For the EUWAS 40 - 120 KX the maximum ambient temperature is 38 degr. C.

1.3 Thermostat Control

Introduction

The unit is equipped with a thermostat, which controls the cooling capacity of the unit.
Three different controls exist:

- manual control mode or a control of the capacity by the operator
- inlet control mode or a control using the entering evaporator water temperature
- outlet control mode or a control using the leaving evaporator water temperature.

Manual mode versus automatic mode

The following table shows the difference between manual and automatic mode:

If...	then there is...
manual capacity control (= fixed capacity step control)	no thermostat control.
automatic control	an inlet or outlet thermostat control.

Thermostat steps

The following table shows the maximum number of thermostat steps for each chiller type:

Chiller type	Maximum number of thermostat steps
EUWA(*)40-60K(X)	3
EUWA(*)80-120K(X)	7 (when equal start-up or no equal start-up)

For more information about equal start-up, refer to ‘Lead-lag Control (only for EUWA(*)80-120K(X))’ on page 2-12.

Display controller

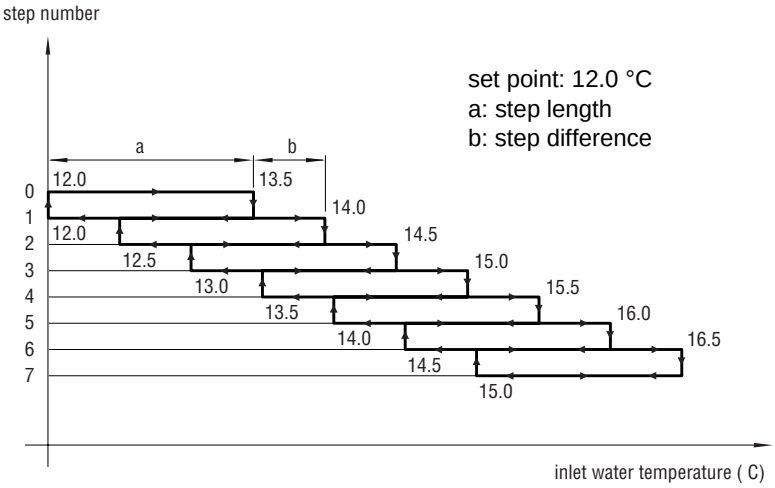
Screen 3 of the user settings menu provides the ability to modify the thermostat parameters. Refer to the user settings menu on page 2-27.

Line n°	Display	Description	Lower limit	Upper limit	Step	Default
1	THERM. SETTINGS	screen title				
2	STPLENGTH (°C)	step length (a)	0.4	2.0	0.1	1.5 (inlet) 0.6 (outlet)
3	STEPDIFFERENCE (°C)	step difference (b)	0.2	0.8	0.1	0.5 (inlet) 0.2 (outlet)
4	LOADUP	load up time (s)	15	300	1	180 (inlet) 30 (outlet)
5	DWN	loaddown time (s)	15	300	1	20 (inlet) 15 (outlet)

2

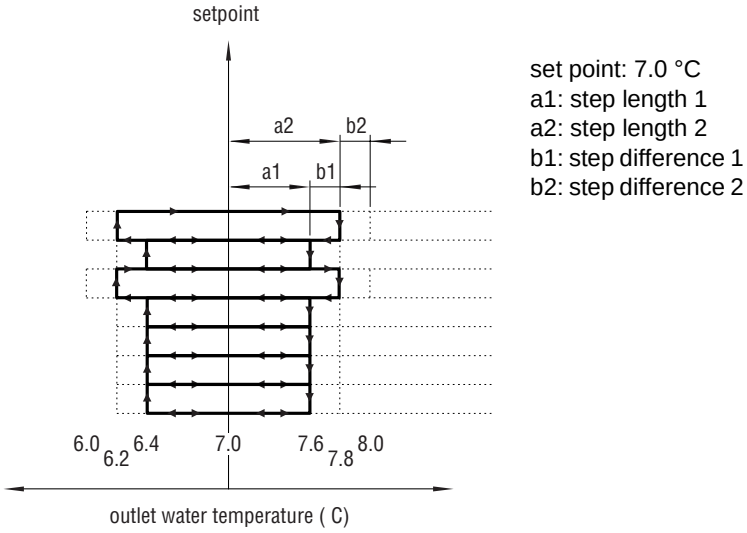
Inlet water temperature control

The figure below clarifies the inlet water temperature control:



Outlet water temperature control

The figure below clarifies the outlet water temperature control (in equal start-up):



In general, the parameters a1 and b1 are used.
In case a compressor has to start up or shut down, a2 and b2 are used.

In the following table you will find the limit and default values of a1, a2, b1 and b2:

Thermostat parameters		**Lower limit**	**Upper limit**	**Step**	**Default**
Step length 1	a1[1]	0.4	2	0.1	0.6
Step length 2	a2	a1 + 0.2	a1 + 0.2	0.1	a1 + 0.2
Step difference 1	b1[2]	0.2	0.8	0.1	0.2
Step difference 2	b2[2]	0.2	0.8	0.1	0.2

[1]: Parameter a1 is the set-up as parameter a in the software.
[2]: Parameters b1 and b2 are always equal and are set up as parameter b in the software.

1.4 Fan Speed Control after Start-up (Head Pressure Control)

Functional description

The chiller types EUWA(*)40-120K(X) are equipped with a fan control to assure a minimum high pressure when the ambient temperature is low. In the wiring diagram this head pressure control is positioned in block J22 for EUWA(*)40-60K(X) and J22A and J22B for EUWA(*)80-120K(X). The following features enable the fan speed control:

- During normal operation or when no signal is sent, all fans rotate at high speed.
- During head pressure control, a set of fan steps is executed in order to switch off the corresponding fan motors. This execution enables the control of the condensing pressure.

Overview fan steps

The following table clarifies the different fan steps:

Fan step	Action for EUWA(*)40-60K(X)	Action for EUWA(*)80-120K(X)
1	Ry1 (controlling NC9) is energized in order to **switch off** fan motor **M11F**	Ry1 (controlling NC9) is energized in order to **switch off M11F** and **M21F**
2	Ry2 (controlling NC10) is energized in order to **switch off** fan motor **M14F**	Ry2 (controlling NC10) is energized in order to **switch off M14F** and **M24F**
3	Ry3 (controlling NC11) is energized in order to **switch off M12F** and **M13F**	Ry3 (controlling NC11) is energized in order to **switch off M12F, M13F, M22F** and **M23F**

Fan sequence

In the tables below you will find an overview of the 4 steps of relay and fan:

STEP 0 means **high** speed (standard)	Ry1=OFF, Ry2=OFF and Ry3=OFF	**all fans are on**

STEP 1 means **medium** speed								
Fan step 1	Circuit 1				Circuit 2			
Ry1=ON, Ry2=OFF, Ry3=OFF	**M11F**	**M12F**	**M13F**	**M14F**	**M21F**	**M22F**	**M23F**	**M24F**
EUWA(*)40-60K(X)	OFF	ON	ON	ON	—	—	—	—
EUWA(*)80-120K(X)	OFF	ON	ON	ON	OFF	ON	ON	ON

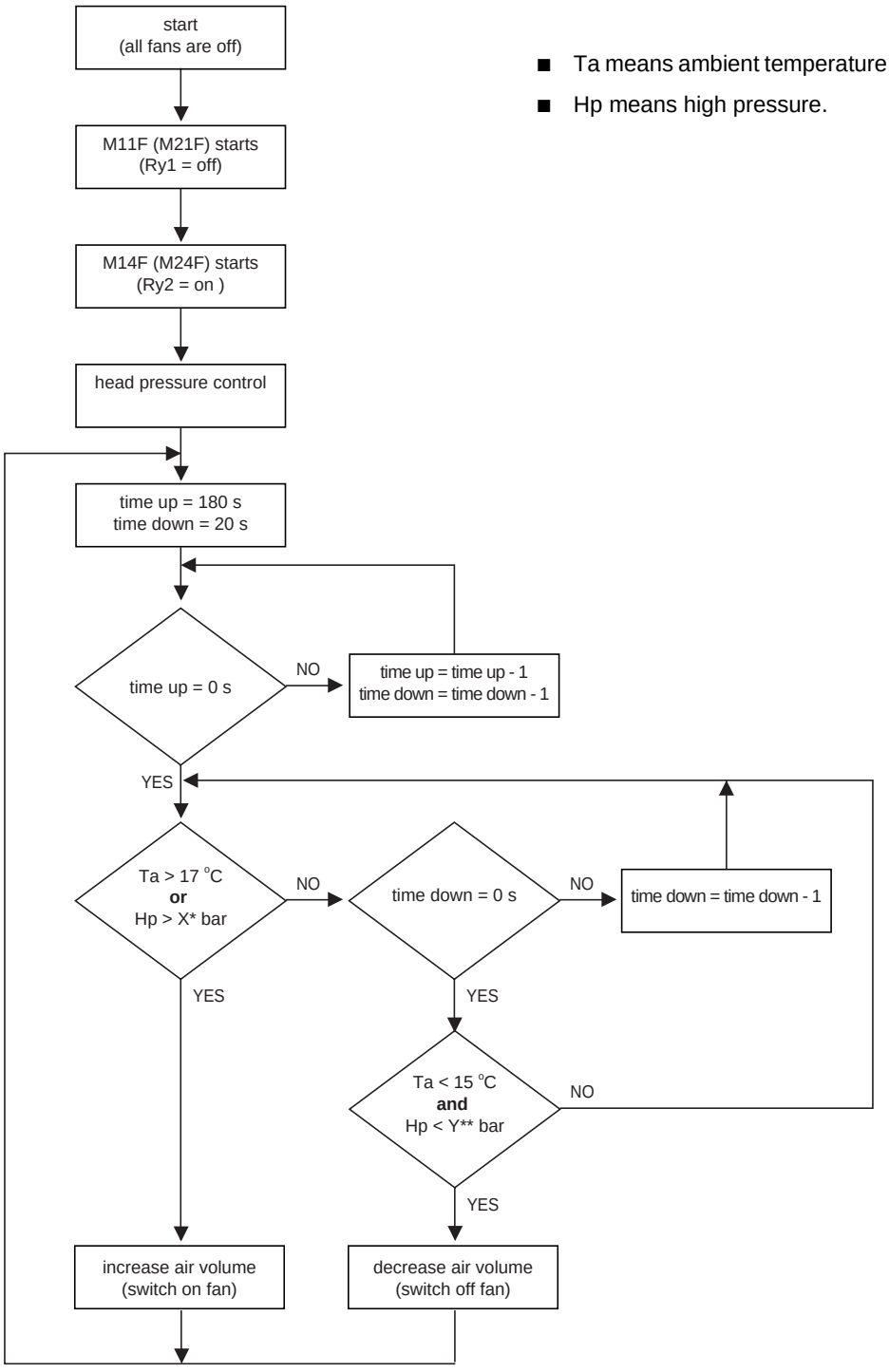
STEP 2 means **low** speed								
Fan step 1+2	Circuit 1				Circuit 2			
Ry1=ON, Ry2=ON, Ry3=OFF	**M11F**	**M12F**	**M13F**	**M14F**	**M21F**	**M22F**	**M23F**	**M24F**
EUWA(*)40-60K(X)	OFF	ON	ON	OFF	—	—	—	—
EUWA(*)80-120K(X)	OFF	ON	ON	OFF	OFF	ON	ON	OFF

STEP 3 means **no** speed	Ry1=ON, Ry2=ON and Ry3=ON	**all fans are off**
Fan step 1+2+3		

2

Fan control procedure

The following procedure explains head pressure control in case of inlet water control:



- Ta means ambient temperature.
- Hp means high pressure.

with *: X = 8 bar for R-134a, X = 13.5 bar for R-22
**: Y = 5.7 bar for R-134a, Y = 9.5 bar for R-22.

1.5 Start-up Sequence of Fans and Compressor

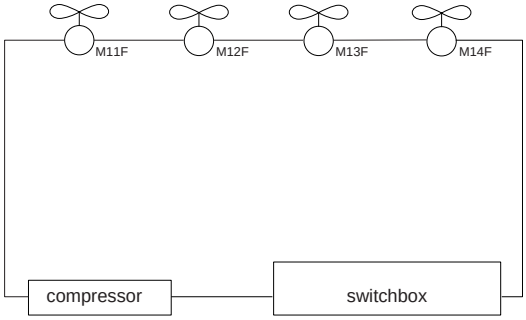
Introduction

The following part allows you to understand the different phases of the start-up process of the fans related to the compressor.

This explanation is based on the types EUWA(*)40-60K(X).

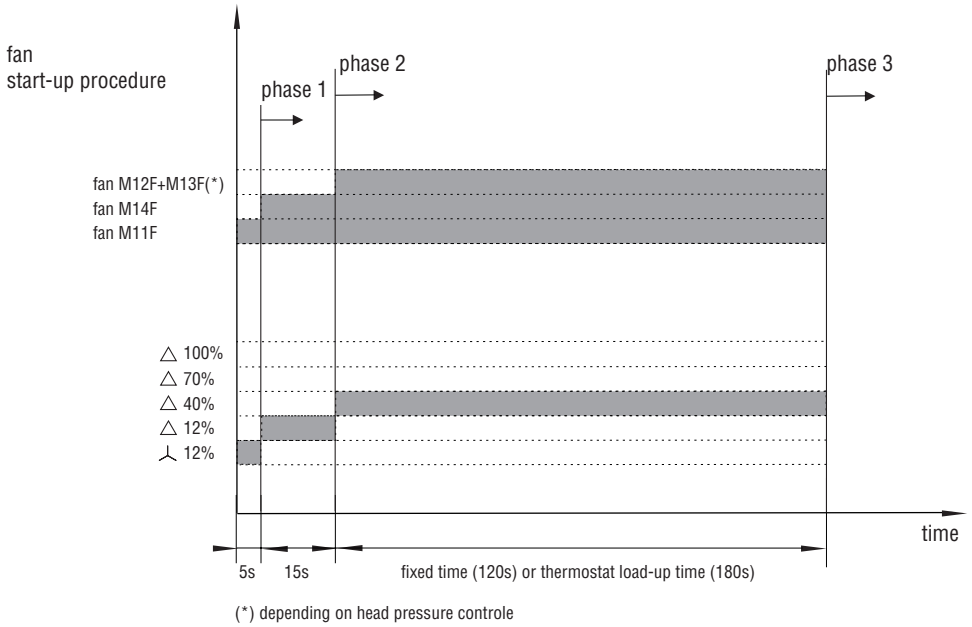
Fans location

The following illustration shows the position of the fans according to the compressor.



Start-up of the compressor

The following diagram explains the start-up procedure of the compressor and fans in a time frame. The total start-up period is 140 s in case of manual mode or 200 s in case of automatic mode.



(*) depending on head pressure controle

Phase	Description
Initial	Initially, the compressor starts up in star wiring and only fan M11F operates.
Phase 1	At the beginning of phase 1, the compressor start-up turns from star to delta. The capacity remains 12%. This action also starts fan M14F.
Phase 2	From phase 2, you can put the fans on and off according to the settings in manual mode or according to the head pressure control in automatic mode. Refer to ‘Fan Speed Control after Start-up (Head Pressure Control)’ on page 2-7. The compressor remains at 40%.
Phase 3	From phase 3, the compressor turns in the desired capacity steps according to the settings in manual mode or according to the thermostat in automatic mode. Refer to ‘Thermostat Control’ on page 2-5.

1.6 Freeze-up Control

Introduction

Freeze-up control defines 2 controls:

- Freeze-up prevention
- Freeze-up protection.

2

Freeze-up prevention

Freeze-up prevention will be activated before the actual freeze-up protection in an attempt to prevent the actual protection by loading down the thermostat step.

Freeze-up prevention overview

In the following table you will find all the characteristics of the freeze-up prevention:

Characteristics	Freeze-up prevention
control device	sensor
diagram name	R3T, R4T
activation result	outlet water temperature < M.O.W. -1K (3°C for standard unit) loaddown of 1 thermostat step
reset result	outlet water temperature > 4°C normal mode

Freeze-up protection

Freeze-up protection is a protection against ice formation in the water circuit at the evaporator outlet. It is controlled by the software using the outlet water temperature sensor.

Freeze-up protection overview

In the following table you will find all the characteristics of the freeze-up protection:

Characteristics	Freeze-up protection
control device	sensor
diagram name	R3T, R4T
activation result	outlet water temperature < M.O.W. - 1.5 K (=2.5°C for standard unit) unit disabled + register inlet water temperature
reset result	inlet temperature is raised with 1.5 K (= 1 thermostat step)(1) unit enabled

(1): Alarm is on hold and reset goes automatically.

General overview

The following table shows a general view of freeze-up temperatures in case of protection and prevention:

	Minimum outlet water (M.O.W.)	Freeze-up protection	Freeze-up prevention
Standard	4 °C	2.5 °C	3 °C
	2 °C	0.5 °C	1 °C
	0 °C	-1.5 °C	-1 °C
ZH	-5 °C	-6.5 °C	-6 °C
	-7 °C	-8.5 °C	-8 °C
ZL	-10 °C	-11.5 °C	-11 °C
	-12 °C	-13.5 °C	-13 °C

1.7 Lead-lag Control (only for EUWA(*)80-120K(X))

Description

Lead-lag control will determine the circuit start-up sequence in case of capacity demand. It prevents the unit from always starting up the same circuit.

2

Available modes

The lead-lag control is available in 3 modes as explained in the table below:

Mode	Description
automatic	The controller decides whether circuit 1 or circuit 2 starts up first.
manual C1 > C2	Circuit 1 starts up before circuit 2. If circuit 1 is de-activated due to a failure, circuit 2 will start up instead.
manual C1 < C2	Circuit 2 starts up before circuit 1. If circuit 2 is de-activated due to a failure, circuit 1 will start up instead.

Lead-lag hours in automatic mode

When the lead-lag control is done automatically, the software calculates the difference in operation time between the circuits. When this time is higher than the preset lead-lag hour value, the start sequence of both circuits is swapped. The compressor that started first will then start as second.

The limit values of the lead-lag hours are the following:

- lower limit: 100 hours
- upper limit: 1000 hours
- default value: 1000 hours

This value is important for maintenance purposes. It should be set high enough so that both circuits do not require maintenance at the same time and that at least one circuit can remain constantly active.

Equal start-up

The following table gives an explanation of the possible settings:

Equal start-up	Description
Y (yes)	Both circuits will try to go up in capacity alternatingly.
N (no)	The leading circuit will try to go to full capacity before the lagging circuit can start up.

To program the settings of the lead-lag control, consult screen 6 of the user settings menu on page 2-27.

Lead-lag working

The following table shows the different compressor steps in case of an equal start-up or no equal start-up:

If equal start-up, then			**If no equal start-up, then**		
Steps (lead) compressor 1	Steps (lag) compressor 2	Capacity %	Steps (lead) compressor 1	Steps (lag) compressor 2	Capacity %
0	0	0	0	0	0
40	0	25	40	0	25
70	0	38	70	0	38
40	40	50	100	0	50
70	40	63	70	40	63
70	70	76	100	40	76
100	70	88	100	70	88
100	100	100	100	100	100

1.8 Discharge Temperature Protector

Protector

The discharge temperature protectors S3T and S4T(only for EUWA(*)80-120K(X)) are bimetal devices, which are placed on the discharge pipe of the compressor.

2

Conditions

The discharge temperature protector will activate when:

- the discharge temperature rises above 135 °C.

The reset is done when:

- the discharge temperature decreases below 115 °C.

Illustration

The following photo shows the position of the sensor S3T:

1.9 Heatertape (optional)

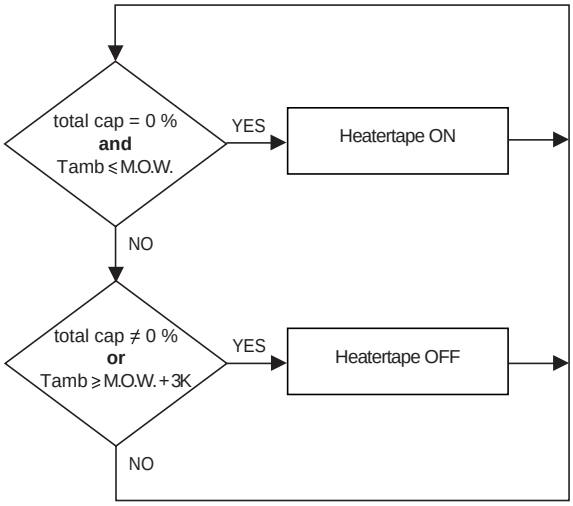
Introduction

This heatertape can be installed to prevent freezing up of the evaporator. The evaporator heatertape needs a separate 220V field supply.

During the winter, never switch off the field supply of the heatertape if you want to activate it.

Heatertape procedure

The following procedure explains the procedure of the heatertape:



General overview

The following table shows a general view of freeze-up temperatures in case of protection and prevention:

	Minimum outlet water (M.O.W)	FP Set (Freeze-up protection)	FP Solution	Glycol weight
Standard	4 °C	2.5 °C	0 °C	0 %
ZH	-5 °C	-6.5 °C	-16 °C	30 %
ZL	-10 °C	-11.5 °C	-22 °C	40 %

with FP Set: DDC-software of the freeze point equal to M.O.W.
with FP Solution: actual freeze-point value of the water glycol solution.

1.10 Head Pressure Setback

Introduction

The following table explains wen a high pressure (HP) setback can occur:

If...	and...	then...
HP (R-134a) >15.5 bar (59°C)	compressor step=100%	compressor step becomes 70%.
HP (R-22) >23.5 bar (59°C)	compressor step=100%	compressor step becomes 70%.

Reset

Once activated, the head pressure setback will stop after 3 minutes.

2 The Digital Controller

2.1 What Is in This Chapter

Introduction

In this chapter you will learn to work with the controller for the chiller types EUWA(*)40-120K(X).

Overview

This chapter covers the following topics:

2.2 The Digital Controller

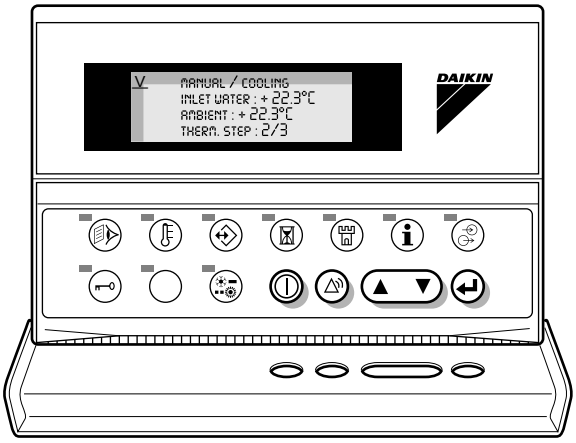
Digital controller

The EUWA(*)40-120K(X) units are equipped with a digital controller offering a user-friendly way to configure, use and maintain the unit. The digital controller consists of:

- an alphanumeric LCD display
- 14 keys (5 general keys and 8 menu keys)
- 10 LEDs next to the menu keys indicating the selected menu.

Front panel

The illustration below shows the front panel of the controller (with open cover).



read-out
set points
user settings
timers
history
information
input/output
password

not used
start/stop
alarm
▲ ▼ scroll through screens/change value
enter key

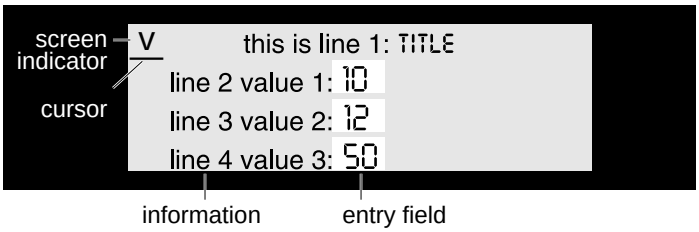
How to go from one screen to another

Each menu contains a number of screens. You can go from one screen to another using the ▲ ▼ key. In the upper-left corner of the screen you will find a screen indicator, indicating whether there is a previous or next screen. An overview is given below:

The screen indicator	indicates that you can …
^	return to the previous screen.
v	go to the next screen.
÷	either return to the previous screen or go to the next screen.

Screen detail

Each screen contains 4 lines which give information about a setting (a description and an entry field). The entry fields can be adjusted using the ▲ ▼ key. The cursor is marked by the sign _. You can move the cursor between the screen indicator and the entry fields using the ↵ key.
You can move the cursor directly to the screen indicator by pressing the active menu key.



Make sure that the cursor is at the screen indicator position when scrolling through the screens.

To avoid damage to the LCD display of the digital controller, never switch off the power supply during winter.

2.3 Start/Stop and Temperature Setting

At power on

- The initialization takes 10 seconds.
- The controller automatically enters the readout menu, displaying the first read-out screen.

Remote start/stop

The procedure to start or stop the unit depends on the setting of the remote start/stop.

For more information, refer to page 2-27.

How to start or stop

To start or stop the unit, proceed as follows:

Remote start/stop	Start or stop	Action	Result: ⏻ LED …
no	start	press ⏻	lights up
	stop	press ⏻	goes off
yes	initial	press ⏻*	blinks
	start	pull switch remote start	lights up
	stop	pull switch remote stop	blinks

*: The local start/stop button ⏻ must be enabled (blinking) before the remote start/stop is active. If the remote start/stop is not enabled, then the led ⏻ is off.

Emergency stop

In case of emergency, switch off the unit by pushing the emergency stop button.

Temperature setting

To adjust the inlet or outlet water temperature, use the set points menu (℉ key), refer to page 2-26.

2.4 What Happens in Case of an Alarm

Two kinds of safety devices

The units are equipped with two kinds of safety devices:

	Unit alarm	Circuit alarm
Function	Protects the unit in general.	Protects the individual circuits.
Description	■ all compressors are shut down ■ the red LED inside the ⚠ key lights up ■ the buzzer is activated.	■ the compressor of the corresponding circuit is shut down ■ the red LED inside the ⚠ key lights up ■ the buzzer is activated.
Action to take	Press ⚠ to acknowledge the alarm.	Press ⚠ to acknowledge the alarm.
Result	■ The buzzer stops. ■ The ⚠ LED starts blinking.	■ The buzzer stops. ■ The ⚠ LED starts blinking.
Display example	UNIT SAFETY FLOW SWITCH (1) INL. OUTL. AMB.	CIRCUIT 1/2 SAFETY HIGH PRESSURE SWITCH (1) INL. OUTL. AMB.

(1) The safeties that may occur are listed in the table below:

The unit safeties are:	The circuit safeties are:
emergency stop	high pressure switches
flow switch	overcurrent relay
freeze-up protection	discharge thermal protector
	compressor motor thermal protector
	reverse phase protector

For more information on what to do in case of an alarm, refer to page 3-8.

2.5 Menu Overview

An overview of the menus is given in the table below.

Menu key	Access	Screen n°	Task description	See page...
Read-out	direct	Screen 1	To consult the settings.	page 2-24
		Screen 2	To consult information about the status of the circuits.	page 2-24
		Screen 3	To consult information about the pressures of circuit 1.	page 2-24
		Screen 4	To consult information about the pressures of circuit 2[2].	page 2-25
		Screen 5	To consult the voltage and compressor current (optional).	page 2-25
		Screen 6	To consult the ambient temperature and the total running hours of the compressors.	page 2-25
Set points	direct or password[1]	Screen 1	To enter a password[1].	page 2-26
		Screen 2	To consult and adjust the inlet and outlet water temperature set points.	page 2-26
User settings	password	Screen 1	To enter the password.	page 2-27
		Screen 2	To activate remote control.	page 2-27
		Screen 3	To adjust and activate manual control mode.	page 2-27
		Screen 4	To adjust the thermostat settings.	page 2-28
		Screen 5	To adjust the BMS settings (optional).	page 2-29
		Screen 6	To define the lead-lag mode of both circuits[2].	page 2-29
		Screen 7	To assign password protection to the set point menu[1].	page 2-29
Timers	direct	Screen 1	To read the actual value of the general timers.	page 2-30
		Screen 2	To read the actual value of the compressor timers.	page 2-30
		Screen 3	To read the actual value of the compressor start-up timers.	page 2-30
History	direct	Screen 1	To read the unit safety information after a shutdown.	page 2-33
		Subscreen 1-1	To read the high and low pressure of the refrigerant circuit 1.	
		Subscreen 1-2	To read the high and low pressure of the refrigerant circuit 2.	
		Subscreen 1-3	To read the compressor voltage and current.	
		Subscreen 1-4	To read the total running hours of the compressors and the capacity steps.	
		Screen 2	To read the safety information of circuit 1 after a shutdown.	page 2-34
			Subscreens are identical to the subscreens above.	
		Screen 3	To read the safety information of circuit 2[2] after a shutdown.	page 2-35
			Subscreens are identical to the subscreens above.	
Info	direct	Screen 1	To consult the unit information.	page 2-36
		Screen 2	To consult additional unit information.	page 2-36

2

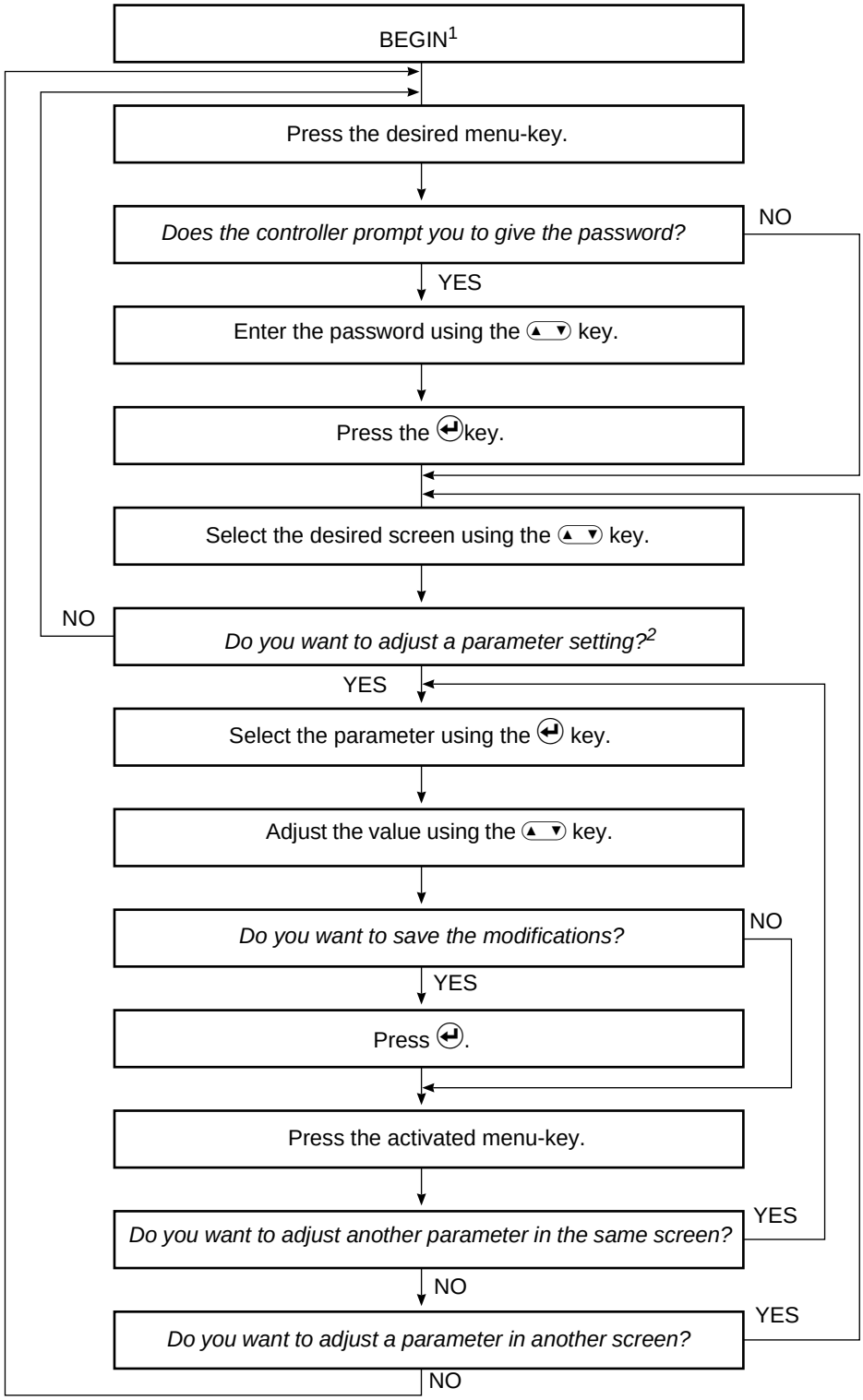
Menu key	Access	Screen n°	Task description	See page...
Input/output	direct	Screen 1	To read the status of the emergency stop, the flow switch and the bypass mode.	page 2-37
		Screen 2	To read the status of the low and high pressure switch and of the reverse phase protector of circuit 1.	page 2-37
		Screen 3	To read the status of the low and high pressure switch and of the reverse phase protector of circuit 2[2].	page 2-37
		Screen 4	To read the status of the overcurrent relay, the discharge thermal protector and the compressor thermal protector of circuit 1.	page 2-38
		Screen 5	To read the status of the overcurrent relay, the discharge thermal protector and the compressor thermal protector of circuit 2[2].	page 2-38
		Screen 6	To read the status of the remote dual set point switch and the remote start/stop.	page 2-38
		Screen 7	To read the status of the remote ‘compressor disable’ switches.	page 2-38
		Screen 8	To read the status of the power relays of circuit 1.	page 2-39
		Screen 9	To read the status of the power relays of circuit 2[2].	page 2-39
		Screen 10	To read the capacity mode of circuit 1.	page 2-39
		Screen 11	To read the capacity mode of circuit 2[2].	page 2-39
		Screen 12	To read the status of the fan speed relays of circuit 1.	page 2-40
		Screen 13	To read the status of the fan speed relays of circuit 2[2].	page 2-40
		Screen 14	To read the status of the pump, the alarm and the evaporator heater contacts.	page 2-40
Password	password	Screen 1	To change the password.	page 2-41

[1]: You can assign a password protection to the set point menu (refer to page 2-29).
[2]: Only for EUWA(*)80-120K(X).

2.6 How to Read or Adjust Parameter Settings: the Programming Procedure

Programming procedure

The following flow chart explains the way to program:



[1]: The display shows a screen of the last menu used.
[2]: Only for the menus Ⓕ, Ⓜ and Ⓚ.

2.7 Read-out Menu

Operational information

Using this menu you can read the actual operational information, such as the cooling set points, the inlet and outlet water temperature, the circuits status, etc. This menu provides 6 screens.

Screen 1

This screen shows information about the operation mode, the set points and the temperatures:

Line n°	Display	Description
1	MANUAL MODE	manual control mode
	INLSETP1/2	automatic control mode: inlet water setpoint 1 or 2
	OUTLSETP1/2	automatic control mode: outlet water setpoint 1 or 2
2	INLET WATER	actual inlet water temperature
3	OUTLET WATER	actual outlet water temperature
4	THERMOSTAT STEP	actual thermostat step

Screen 2

This screen shows information about the status of the circuits:

Line n°	Display	Description
1	UNIT STATUS	screen title
2-3	C1/ C2	circuit 1 / circuit 2
circuiit OFF	40 %	status information (circuit ON) this percentage refers to the activated capacity value of the circuit
	BYPASS MODE	the internal controller is being bypassed and the unit is controlled by an external controller
	SAFETY ACTIVE	one of the circuit safety devices is activated
	DISABLE	the circuit is disabled by a remote contact (only for EUWA(*)80-120K(X))
	TIMERS BUSY	one of the software timers is counting (refer to page 2-30)
	CAN START UP	the circuit is ready to start up when extra cooling load is requested
4	UNIT CAPACITY	the percentage refers to the actual cooling capacity of the unit

When a circuit is in a high pressure setback, the indication 70% will be flashing. A high pressure setback is a loaddown from 100% to 70% caused by a too high pressure.

Screen 3

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	ACTUAL PRESSURES	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Screen 4

This screen shows information about the pressures of circuit 2 (only for EUWA(*)80-120K(X)):

Line n°	Display	Description
1	ACTUAL PRESSURES	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Screen 5

This screen shows information about the voltage and compressor current.

This screen is available if optional voltage and current transmitters are installed.

Line n°	Display	Description
1	VOLTAGE + CURRENT	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Screen 6

This screen shows information about the ambient temperature and the total running hours of the compressors:

Line n°	Display	Description
1	EXTRA READOUT	screen title
2	AMBIENT	ambient temperature
3	RUNN. HOURS 1	total running hours compressor circuit 1
4	RUNN. HOURS 2	total running hours compressor circuit 2

2.8 Set Points Menu

Screen 1: password

Depending on the settings in screen 7 of the user settings menu on page 2-29, the system may require the password to enter the screens in this menu.

Line n°	Display	Description
1	ENTER PASSWORD	screen title
2	PASSWORD: 0000	to enter the correct password

The units leave the factory with password 0000.

Screen 2: two temperature set points

This menu provides the ability to set the inlet and outlet water temperature. You can adjust two sets of temperature set points. Each set contains an inlet and an outlet water temperature set point. These set points will only be active in automatic control mode.

Line n°	Display	Description	Default value	Limit value*	Step value
1	SETP. IN 1	inlet water temp. set point 1	+12.0 C	+7.0 to +23.0 C	0.1 C
2	SETP. IN 2	inlet water temp. set point 2	+12.0 C	+7.0 to +23.0 C	0.1 C
3	SETP. OUT 1	outlet water temp. set point 1	+7.0 C	+4.0 to +16.0 C	0.1 C
4	SETP. OUT 2	outlet water temp. set point 2	+7.0 C	+4.0 to +16.0 C	0.1 C

- The actual active setpoint can be consulted in the read-out menu (refer to page 2-24).
- To change the settings, refer to ‘Entering the factory menu’ on page 3-26.

* For glycol units the lower limit of the cooling temperature set point can be adapted in the factory menu. The following values apply:

- inlet: 5°C, 3°C, -2°C, -7°C, -12°C
- outlet: 2°C, 0°C, -5°C, -10°C, -15°C.

For more information about these temperatures, refer to ‘General overview’ on page 2-11.

Selection between set point 1 and 2

You can select set point 1 or 2 by the remote dual set point switch (if installed), refer to ‘Field Wiring’ on page 1-43.

Selection between inlet and outlet control

The selection is done in screen 3 of the user settings menu on page 2-27. Use the programming procedure on page 2-23.

2.9 User Settings Menu

Password

You need the password to enter this menu. The units leave the factory with password 1914.

To create your own password, refer to page 2-41.

Menu description

This menu allows a full customizing of the units and provides the following 6 screens:

Screen n°	Display	Description	See page
1	ENTER PASSWORD	To enter the password.	page 2-27
2	REMOTE CONTROL	To activate remote control	page 2-27
3	CONTROL SETTINGS	To adjust and activate manual control mode.	page 2-27
4	THERMOST. SETTINGS	To adjust the thermostat settings.	page 2-28
5	BMS SETTINGS	To adjust the BMS settings.	page 2-29
6	LEAD-LAG SETTINGS	To define the lead-lag mode of both circuits (only for EUWA(*)80-120K(X))	page 2-29
7	SETPOINT PASSWORD	To assign password protection to the set points menu.	page 2-29

Screen 1

You need to enter the correct password before you can consult the screens in this menu:

Line n°	Display	Description
1	ENTER PASSWORD	screen title
2	PASSWORD: 0000	to enter the correct password

Screen 2

This screen provides the ability to activate remote control:

Line n°	Display	Description	Possible settings
1	REMOTE CONTROL	screen title	
2	REMOTE ON/OFF	to activate remote start/stop	Y/N

The procedure to start or stop the unit is given in ‘Start/Stop and Temperature Setting’ on page page 2-19.

Screen 3

This screen provides the ability to modify the control settings:

Line n°	Display	Description	Possible settings
1	CONTROL SETTINGS	screen title	
2	MODE	to select the control mode	MANUAL CONTROL INLET WATER CONTROL OUTLET WATER CONTROL
3	F1* / F2*	fan speed circuit 1/2 (manual mode)	OFF/ LOW/ MEDIUM/ HIGH
4	CIR1 / CIR2	capacity step circuit 1/2 (manual mode)	0%, 40%, 70%, 100%

2

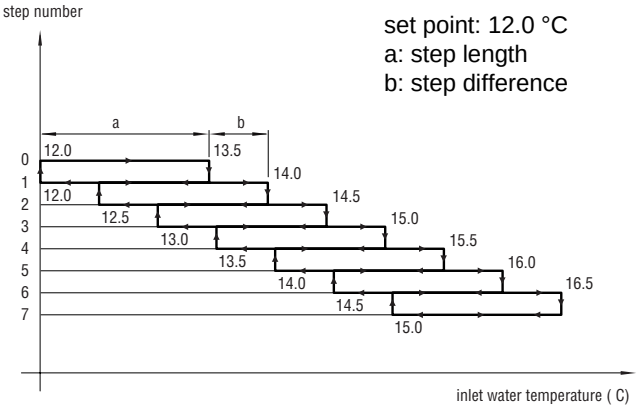
Screen 4

This screen provides the ability to modify the thermostat parameters:

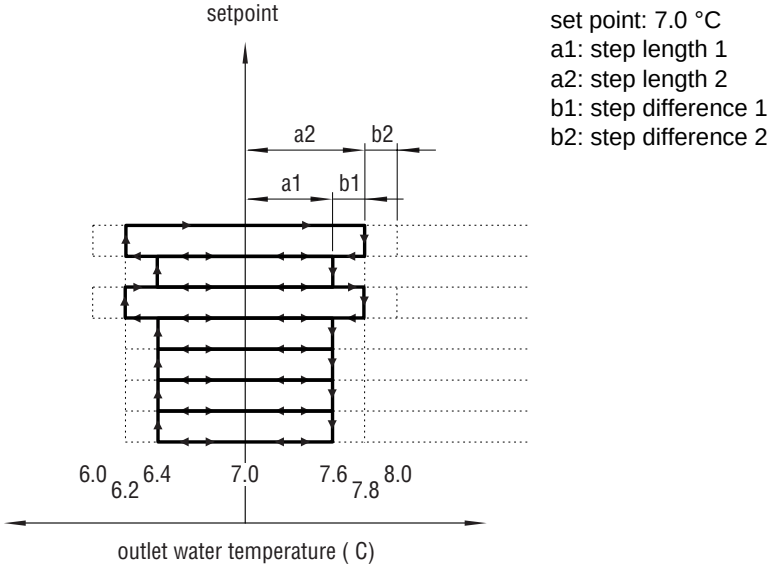
Line n°	Display	Description	Lower limit	Upper limit	Step	Default
1	THERM. SETTINGS	screen title				
2	STPLENGTH (°C)	step length (a)	0.4	2.0	0.1	1.5 (inlet) 0,6 (outlet)
3	STEPDIFFERENCE (°C)	step difference (b)	0.2	0.8	0.1	0.5 (inlet) 0,2 (outlet)
4	LOADUP (30 s)	load up time (s)	15	300	1	180 (inlet) 30 (outlet)
4	DWN (30 s)	loaddown time (s)	15	300	1	20 (inlet) 15 (outlet)

Inlet water thermostat control

The figure below shows the inlet water thermostat control:



The figure below shows the outlet water thermostat control:



For more information on thermostat control, refer to ‘Thermostat Control’ on page 2-5.

Screen 5 (optional)

You can install an optional PCB to control the unit from a PC (this feature is under development). The BMS (Building Management System) parameters provide communication between the unit and the PC. This screen provides the ability to activate the PC control mode and to modify the BMS settings:

Line n°	Display	Description	Possible settings
1	BMS SETTINGS	screen title	
2	BMS CONTROL ALLOWED	to select PC control mode	Y/N
3	UNIT ADDRESS	used to address the unit if more than one unit is connected to the PC	00-99
4	PROTOCOL	indicates the communication protocol	CAREL

This screen will only be displayed if the optional BMS-PCB is installed (under development).

Screen 6

This screen provides the ability to adjust the lead-lag settings.

Lead-lag control is only available on chiller types EUWA(*)80-120K(X).

Line n°	Display	Description	Possible settings
1	LEAD-LAG SETTINGS	screen title	
2	LEAD-LAG MODE	The controller decides whether circuit 1 or circuit 2 starts up first.	AUTOMATIC
		Circuit 1 starts up before circuit 2. If circuit 1 is de-activated due to a failure, circuit 2 will start up instead.	C1>C2 (manual)
		Circuit 2 starts up before circuit 1. If circuit 2 is de-activated due to a failure, circuit 1 will start up instead.	C2>C1 (manual)
3	LEAD-LAG HOURS	The maximum difference between the running hours of both circuits (in automatic mode).	lower limit: 100 h upper limit: 1000 h default value: 1000 h
4	EQUAL STARTUP	Both circuits will try to go up in capacity alternatingly.	Y (yes)
		The leading circuit will try to go to full capacity before the lagging circuit starts up.	N (no)

For a functional description of the lead-lag control, refer to ‘Lead-lag Control (only for EUWA(*)80-120K(X))’ on page 2-12.

Screen 7

This screen provides the ability to assign password protection to the set point menu:

Line n°	Display	Description	Possible settings
1	SETPOINT PASSWORD	screen title	
2	PASSWORD NEEDED TO CHANGE SETPOINTS	assign password protection to set point menu	Y/N

2.10 Ⓜ Software Timers Menu

Software timers Using this menu you can read the actual value of the software timers. This menu provides 3 screens.

Screen 1 This screen shows the actual value of the general timers:

Line n°	Display	Description
1	GENERAL TIMERS	screen title
2	LOADUP	delay timer for loading up; during countdown, the unit is unable to enter a higher thermostat step (default: 180 s)
	DWN	delay timer for loaddown; during countdown, the unit is unable to enter a lower thermostat step (default: 20 s)
3	FLOWSTART	delay timer to enable a continuous water flow through the evaporator before start-up of the compressor (default: 15 s)
	FLOWSTOP	delay timer that starts counting when the water flow through the evaporator stops during normal operation; if the water flow has not restarted during the countdown, the unit will shut down (default: 5 s)
4	COMPR. STARTED	delay timer to start the next compressor; used in manual mode or when only one thermostat step is set up (default: 10 s)

Screen 2 This screen shows the actual value of the compressor timers:

Line n°	Display	Description
1	COMPRESSOR TIMERS	screen title
2 3	GRD 1 AREC 1 GRD 2 AREC 2	guard timer: delay timer to prevent the compressor from restarting after a shutdown (default: 60 s) antirecycling: delay timer to prevent the compressor from restarting after the compressor has started; used to limit the number of restarts (default: 600 s)

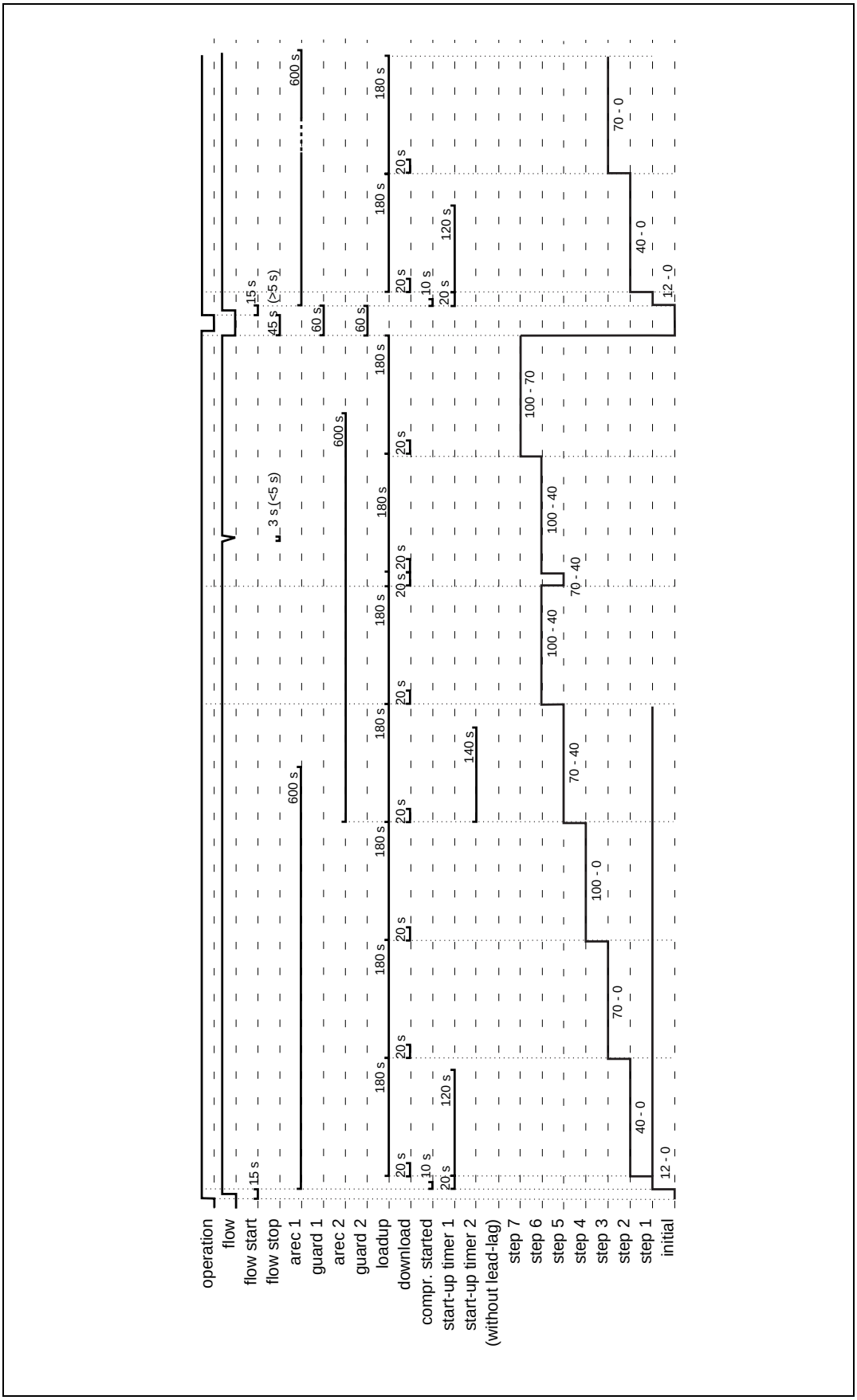
Screen 3 This screen shows the actual value of the compressor start-up timers:

Line n°	Display	Description
1	COMPRESSOR TIMERS	screen title
2 3	STARTUPTIME 1 STARTUPTIME 2	start-up timer: delay timer to limit the compressor capacity to 40 % during the countdown (default: 140 s)

Overview timers An overview of the software timers is shown in the example on the next page.

Example

The following view shows an example of the working of the timers:



2.11 History Menu

Reading safety info after shutdown

Using this menu you can at all times read the information of the latest shutdowns:

- the number of times a unit safety or circuit safety occurred
- the unit status at the moment of the last shutdown.

2

Overview screens and subscreens

The table below gives an overview of the screens and sub-screens in this menu:

Activated safety	**Unit safety**	**Circuit 1 safety**	**Circuit 2 safety**
Screens	Screen 1	Screen 2	Screen 3
Sub-screens	Subscreen 1-1	Subscreen 2-1	Subscreen 3-1
	Subscreen 1-2	Subscreen 2-2	Subscreen 3-2
	Subscreen 1-3	Subscreen 2-3	Subscreen 3-3
	Subscreen 1-4	Subscreen 2-4	Subscreen 3-4

You can go from one screen to another using the ▲ ▼ key.

You can go from one sub-screen to another and from a screen to a subscreen using the ↵ key.

The subscreens automatically disappear after 20 seconds.

Screen 1

This screen shows the unit history:

Line n°	Display	Description
1	UNIT HISTORY : XXX	x = the total number of unit shutdowns
2	FLOW SWITCH	the unit safety
3	INL. OUTL.	inlet/outlet water temperature
4	AMB.	ambient temperature

Subscreen 1-1

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	UNIT HISTORY : XXX	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Subscreen 1-2

This screen shows information about the pressures of circuit 2:

Line n°	Display	Description
1	UNIT HISTORY : XXX	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Subscreen 1-3

This screen shows information about the voltage and compressor current.

This screen is available if optional voltage and current transmitters are installed.

Line n°	Display	Description
1	UNIT HISTORY : XXX	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Subscreen 1-4

This screen shows information about the total running hours of the compressors and the capacity steps:

Line n°	Display	Description
1	UNIT HISTORY : XXX	screen title
2	RUNN. HOURS 1	total running hours compressor circuit 1
3	RUNN. HOURS 2	total running hours compressor circuit 2
4	C1 C2	compressor capacity steps

Screen 2

This screen shows the circuit 1 history:

Line n°	Display	Description
1	C1 HISTORY : XXX	x = the total number of circuit 1 shutdowns
2	HIGH PRESSURE SWITCH	activated circuit 1 safety
3	INL. OUTL.	inlet/outlet water temperature circuit 1
4	AMB.	ambient temperature circuit 1

Subscreen 2-1

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	C1 HISTORY : XXX	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Subscreen 2-2

This screen shows information about the pressures of circuit 2:

Line n°	Display	Description
1	C1 HISTORY : XXX	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Subscreen 2-3

This screen shows information about the voltage and compressor current.

This screen is available if optional voltage and current transmitters are installed.

Line n°	Display	Description
1	C1 HISTORY : XXX	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Subscreen 2-4

This screen shows information about the total running hours of the compressors and the capacity steps:

Line n°	Display	Description
1	C1 HISTORY : XXX	screen title
2	RUNN. HOURS 1	total running hours compressor circuit 1
3	RUNN. HOURS 2	total running hours compressor circuit 2
4	C1 C2	compressor capacity steps

Screen 3

This screen shows the circuit 2 history:

Line n°	Display	Description
1	C2 HISTORY : XXX	x = the total number of circuit 2 shutdowns
2	HIGH PRESSURE SWITCH	activated circuit 2 safety
3	INL. OUTL.	inlet/outlet water temperature circuit 2
4	AMB.	ambient temperature circuit 2

Subscreen 3-1

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	C2 HISTORY : XXX	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Subscreen 3-2

This screen shows information about the pressures of circuit 2:

Line n°	Display	Description
1	C2 HISTORY : XXX	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Subscreen 3-3

This screen shows information about the voltage and compressor current.

This screen is available if optional voltage and current transmitters are installed.

Line n°	Display	Description
1	C2 HISTORY : XXX	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Subscreen 3-4

This screen shows information about the total running hours of the compressors and the capacity steps:

Line n°	Display	Description
1	C2 HISTORY : XXX	screen title
2	RUNN. HOURS 1	total running hours compressor circuit 1
3	RUNN. HOURS 2	total running hours compressor circuit 2
4	C1 C2	compressor capacity steps

2.12 ⓘ Info Menu

Additional unit information

Using this menu you can consult additional information about the unit. There are two screens.

2

Screen 1

This screen shows the unit information:

Line n°	Display	Description
1	UNIT INFORMATION	screen title
2	UNITNAME	the unit name
3	REFRIGERANT	the used refrigerant
4	MANUFACT. NR.	the manufacturing (serial) number

Screen 2

This screen shows extra unit information:

Line n°	Display	Description
1	UNIT INFORMATION	screen title
2	SOFTWARE VERSION	the controller's software version
3		not used
4		not used

2.13 Input /Output Menu

Reading the status of inputs and outputs

Using this menu you can read the status of the digital inputs and the status of the relay outputs.

- Screens 1 to 7 provide status information of the digital inputs.
- Screens 8 to 14 provide status information of the relay outputs.

Screen 1

This screen shows the status of the emergency stop, the flow switch and the bypass mode:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	EMERGENCY STOP	emergency stop button	OK/NOT OK
3	FLOWSWITCH	flow switch	FLOW OK/NO FLOW
4	BYPASS MODE	bypass controller	YES/NO

Screen 2

This screen shows the status of the low and high pressure switch and of the reverse phase protector of circuit 1:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	HIGH PR. SWITCH 1	high pressure switch circuit 1	OK/NOT OK
3	HIGH PR. SWITCH 1	high pressure switch circuit 1	OK/NOT OK
4	REV. PH. PROT. 1	reverse phase protector circuit 1	OK/NOT OK

You can find more information in ‘Switch box EUWA(*)40-60K(X)’ on page 1-33 and in ‘Main board EUWA(*)40-120K(X)’ on page 1-34.

Screen 3

This screen shows the status of the low and high pressure switch and of the reverse phase protector of circuit 2:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	HIGH PR. SWITCH 2	high pressure switch circuit 2:	OK/NOT OK
3	HIGH PR. SWITCH 2	high pressure switch circuit 2	OK/NOT OK
4	REV. PH. PROT. 2	reverse phase protector circuit 2	OK/NOT OK

You can find more information in ‘Switch box EUWA(*)80-120K(X)’ on page 1-33 and in ‘Main board EUWA(*)40-120K(X)’ on page 1-34.

Screen 4

This screen shows the status of the overcurrent relay, the discharge thermal protector and the compressor thermal protector of circuit 1:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	OVERCURRENT 1	overcurrent relay circuit 1	OK/NOT OK
3	DISCH. TH. PR. 1	discharge thermal protector circuit 1	OK/NOT OK
4	COMPR. TH. PR. 1	compressor thermal protector circuit 1	OK/NOT OK

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)40-60K(X)’ on page 3-4.

Screen 5

This screen shows the status of the overcurrent relay, the discharge thermal protector and the compressor thermal protector of circuit 2:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	OVERCURRENT 2	overcurrent relay circuit 2	OK/NOT OK
3	DISCH. TH. PR. 2	discharge thermal protector circuit 2	OK/NOT OK
4	COMPR. TH. PR. 2	compressor thermal protector circuit 2	OK/NOT OK

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

Screen 6

This screen shows the status of the remote dual set point switch and the remote start/stop:

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	DUAL SETPOINT	dual set point switch	SETP1/2
3	REM. START/STOP	remote start/stop	YES/NO

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)40-60K(X)’ on page 3-4 and in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

Screen 7

This screen shows the status of the remote ‘compressor disable’ switches.

The ‘compressor disable’ switches are only available on chiller types EUWA(*)80-120K(X):

Line n°	Display	Description	Possible settings
1	DIGITAL INPUTS	screen title	
2	EN./DISABLE 1	remote ‘compressor disable ‘ switch circuit 1	ENABLE/DISABLE
3	EN./DISABLE 2	remote ‘compressor disable ‘ switch circuit 2	ENABLE/DISABLE

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

Screen 8

This screen shows the status of the power relays of circuit 1:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2	CIRCUIT 1 ON	indicates whether circuit 1 is on	YES/NO
3	CIRCUIT 1 STAR	indicates whether circuit 1 is in star mode	YES/NO
4	CIRCUIT 1 DELTA	indicates whether circuit 1 is in delta mode	YES/NO

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)40-60K(X)’ on page 3-4.

Screen 9

This screen shows the status of the power relays of circuit 2:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2	CIRCUIT 2 ON	indicates whether circuit 2 is on	YES/NO
3	CIRCUIT 2 STAR	indicates whether circuit 2 is in star mode	YES/NO
4	CIRCUIT 2 DELTA	indicates whether circuit 2 is in delta mode	YES/NO

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

Screen 10

This screen shows the capacity mode of circuit 1:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2	C1(12%):	indicates if the 12 % capacity valve of circuit 1 is activated	Y/N
3	C1(40%): C1(70%)	indicates if the 40/70 % capacity valve of circuit 1 is activated:	Y/N

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)40-60K(X)’ on page 3-4.

Screen 11

This screen shows the capacity mode of circuit 2:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2	C2(12%):	indicates if the 12 % capacity valve of circuit 2 is activated	Y/N
3	C2(40%): C2(70%)	indicates if the 40/70 % capacity valve of circuit 2 is activated	Y/N

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

Screen 12

This screen shows the status of the fan speed relays of circuit 1:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2-4	C1 FANSTEP 1/2/3	fan speed steps (1/2/3) circuit 1	OPEN/CLOSED

You can find more information in ‘Fan Speed Control after Start-up (Head Pressure Control)’ on page 2-7.

Screen 13

This screen shows the status of the fan speed relays of circuit 2:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2-4	C2 FANSTEP 1/2/3	fan speed steps (1/2/3) circuit 2	OPEN/CLOSED

You can find more information in ‘Fan Speed Control after Start-up (Head Pressure Control)’ on page 2-7.

Screen 14

This screen shows the status of the pump, the alarm and the evaporator heater contacts:

Line n°	Display	Description	Possible settings
1	RELAY OUTPUTS	screen title	
2	PUMPCONTACT	indicates the status of the pump contact	OPEN/CLOSED
3	GEN. ALARM	indicates the status of the general alarm contact	OPEN/CLOSED
4	EVAP. HEATER	indicates the status of the evaporator heater contact	OPEN/CLOSED

You can find more information in ‘Overview of Inputs and Outputs of EUWA(*)40-60K(X)’ on page 3-4 and in ‘Overview of Inputs and Outputs of EUWA(*)80-120K(X)’ on page 3-5.

2.14 Password Menu

Password

The password protects the access to:

- the user settings menu
- the set points menu

The password is a 4-digit number between 0000 and 9999.

The units leave the factory with userpassword 0000. The general factory password is 1914.

To reset a pre-defined user password, press and simultaneously.

Screen

Using this menu you can change the password:

Line n°	Display	Description
1	CHANGE PASSWORD	screen title
2	NEW PASSWORD	the controller requests the new password
3	CONFIRM	the controller requests the new password a second time (for safety reasons)

How to change the password

To change the password, proceed as follows:

Step	Action
1	Adjust the password using the programming procedure on page 2-23.
2	Repeat step 1 (confirmation).

Part 3
Troubleshooting

Introduction

The large chillers (EUWA(*)40-120K(X)) are equipped with electronic PCBs. These PCBs use the information gained from the input signals to control the output signals. If the unit is not performing properly, first check the input devices, then the PCBs and finally the output devices. The chapters in this part are arranged according to this sequence.

What is in this part?

This parts contains the following chapters:

1 Overview of Inputs and Outputs

1.1 What Is in This Chapter

Introduction

The first step in a troubleshooting sequence is to check the inputs and outputs. In this chapter an overview is given.

Overview

This chapter covers the following topics:

1.2 Overview of Inputs and Outputs of EUWA(*)40-60K(X)

The following table describes the relation between the wiring diagram symbols and the wiring connections of chiller types EUWA(*)40-60K(X). We refer to the wiring diagram and the PCB layout to find the exact location on both wiring diagram and switch box.

Type	Detail	Wiring diagram symbol	Wiring connection terminal	Description
analog input	sensor	R5T	J2/B1	ambient temperature sensor
		R3T	J2/B2	evaporator inlet water temperature sensor
		R4T	J2/B3	evaporator outlet water temperature sensor
	transmitter	B3A	J2/B5	current transmitter (optional)
		B7V	J2/B6	voltage transmitter (optional)
		B2P	J1/B7	high pressure transmitter
		B1P	J1/B8	low pressure transmitter
digital input	transducer	R1P	J4/ID3	reverse phase protector
		K17S	J4/ID4	overcurrent relay
		K3A	J4/ID5	auxiliary relay discharge thermal protector
		K2A	J4/ID6	auxiliary relay compressor thermal protector
	contact	S1PH	J4/ID1	high pressure switch 1
		S14PH	J3/ID2	high pressure switch 2
		S8L/S9L	J3/ID7	flow switch/pump contact
		—	J4/ID8	controller bypass (optional)
		S10S	J4/ID9	dual set point selection switch
		S6S	J3/I10	remote start/stop switch
		S5E	J21/ID11	emergency stop button
digital output	contact	K3M	J5/C1	star contactor
		K2M	J5/C2	delta contactor
		K1M	J6/C3	compressor on
		H1P	J6/C4	general operation and pump contact
		H2P	J6/C5	alarm indication
		E3H	J6/C12	evaporator heater
	transducer	Y11S	J24/C6	12 % capacity step compressor
		Y12S	J24/C8	40 % capacity step compressor
		Y13S	J24/C13	70 % capacity step compressor
		K7F	J22/C9	fan control 1 contactor
		K8F	J22/C10	fan control 2 contactor
		K9F	J22/C11	fan control 3 contactor

1.3 Overview of Inputs and Outputs of EUWA(*)80-120K(X)

The following table describes the relation between the wiring diagram symbols and the wiring connections of chiller types EUWA(*)80-120K(X). We refer to the wiring diagram and the PCB layout to find the exact location on both wiring diagram and switch box.

Type	Detail	Wiring diagram symbol	Wiring connection terminal	Description
analog input	sensor	R5T	J2A/B1	ambient temperature sensor
		R3T	J2A/B2	evaporator inlet water temperature sensor
		R4T	J2A/B3	evaporator outlet water temperature sensor
	transmitter	B3A	J2A/B5	current transmitter for circuit 1 (optional)
		B7V	J2A/B6	voltage transmitter for circuit 1 (optional)
		B2P	J1A/B7	high pressure transmitter circuit 1
		B1P	J1A/B8	low pressure transmitter for circuit 1
		B6A	J1B/B5	current transmitter for circuit 2
		B5P	J1B/B7	high pressure transmitter for circuit 2
		B4P	J1B/B8	low pressure transmitter for circuit 2
digital input	transducer	R1P	J4A/ID3	reverse phase protector for circuit 1
		K17S	J4A/ID4	overcurrent relay for circuit 1
		K3A	J4A/ID5	auxiliary relay discharge thermal protector for circuit 1
		K2A	J4A/ID6	auxiliary relay compressor thermal protector for circuit 1
		R2P	J4B/ID3	reverse phase protector for circuit 2
		K18S	J4B/ID4	overcurrent relay for circuit 2
		K6A	J4B/ID5	auxiliary relay discharge thermal protector for circuit 2
		K5A	J4B/ID6	auxiliary relay compressor thermal protector for circuit 2
	contact	S1PH	J4A/ID1	high pressure switch 1 for circuit 1
		S14PH	J3A/ID2	high pressure switch 2 for circuit 1
		S8L/S9L	J3A/ID7	flow switch/pump contact
		—	J4A/ID8	controller bypass (optional)
		S10S	J4A/ID9	dual set point selection switch
		S6S	J3A/I10	remote start/stop switch
		S5E	J21A/ID11	emergency stop button
		S2PH	J4B/ID1	high pressure switch 1 for circuit 2
		S15PH	J3B/ID2	high pressure switch 2 for circuit 2
		S11S	J3A/ID7	switch that disable circuit 1, when closed
		S12S	J4A/ID8	switch that disables circuit 2, when closed

Type	Detail	Wiring diagram symbol	Wiring connection terminal	Description
digital output	contact	K3M	J5A/C1	star contactor for circuit 1
		K2M	J5A/C2	delta contactor for circuit 1
		K1M	J6A/C3	compressor on for circuit 1
		H1P	J6A/C4	general operation and pump contact
		H2P	J6A/C5	alarm indication
		E3H	J6A/C12	evaporator heater (optional)
		K6M	J5B/C1	star contactor for circuit 2
		K5M	J5B/C2	delta contactor for circuit 2
		K4M	J6B/C3	compressor on for circuit 2
	transducer	Y11S	J24A/C6	12 % capacity step compressor for circuit 1
		Y12S	J24A/C8	40 % capacity step compressor for circuit 1
		Y13S	J24A/C13	70 % capacity step compressor for circuit 1
		K7F	J22A/C9	fan control 1 contactor for circuit 1
		K8F	J22A/C10	fan control 2 contactor for circuit 1
		K9F	J22A/C11	fan control 3 contactor for circuit 1
		Y21S	J24B/C6	12 % capacity step compressor for circuit 2
		Y22S	J24B/C8	40 % capacity step compressor for circuit 2
		Y23S	J24B/C13	70 % capacity step compressor for circuit 2
		K10F	J22B/C9	fan control 1 contactor for circuit 2
		K11F	J22B/C10	fan control 2 contactor for circuit 2
		K12F	J22B/C11	fan control 3 contactor for circuit 2

2 Overview of Fault Indications and Safeties

2.1 What Is in this Chapter

Introduction

In the first stage of the troubleshooting sequence it is important to interpret the fault indication on the controller display. This will help you to find the cause of the problem.

Overview

This chapter covers the following topics:

2.2 Fault Indication

What happens in case of an alarm

The units are equipped with two kinds of safety devices:

	Unit alarm	Circuit alarm
Function	Protects the unit in general.	Protects the individual circuits.
Description	■ all compressors are shut down ■ the red LED inside the ⚠ key lights up ■ the buzzer is activated.	■ the compressor of the corresponding circuit is shut down ■ the red LED inside the ⚠ key lights up ■ the buzzer is activated.
Action to take	Press ⚠ to acknowledge the alarm.	Press ⚠to acknowledge the alarm.
Display example	UNIT SAFETY FLOW SWITCH INL. OUTL. AMB.	CIRCUIT 1/2 SAFETY HIGH PRESSURE SWITCH INL. OUTL. AMB.

For more information about the safety devices, refer to ‘What Happens in Case of an Alarm’ on page 2-20.

What to do in case of an alarm

In case of an alarm, proceed as follows:

Step	Action	Result	
1	Press ⚠ to acknowledge the alarm.	■ The buzzer stops. ■ The ⚠ LED starts blinking. ■ A unit or circuit safety is activated.	
		If the safety is a …	**then consult …**
		unit safety	‘Unit safety screens’ on page 3-9
		circuit safety	‘Circuit safety screens’ on page 3-10
2	Find the cause of the alarm and correct it.	The system is repaired.	
3	Press ⚠ to reset the alarm.	■ The ⚠ LED goes out and the alarm screen is deactivated. ■ The first screen of the readout menu is displayed automatically. After resetting the alarm you can consult the safety information only using the history menu on page 2-32.	
4	Go to the second screen of the readout menu by pressing ▲▼ (refer to page 2-24).	The alarm status of each circuit is displayed.	
5	If all circuits were shut down, switch on the unit by pressing ⏻.	The unit starts again.	

Unit safety screens

If a unit safety occurs, the following screen is displayed:

Line n°	Display	Description
1	UNIT SAFETY	screen title
2	FLOW SWITCH*	activated unit safety
3	INL. OUTL.	inlet/outlet water temperature
4	AMB.	ambient temperature

*: Other unit safeties are emergency stop and freeze-up.

Subscreens

By pressing the ↵ key, you can consult the subscreens. After 20 seconds, these screens automatically disappear.

Subscreen 1

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	UNIT SAFETY	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Subscreen 2

This screen shows information about the pressures of circuit 2:

Line n°	Display	Description
1	UNIT SAFETY	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Subscreen 3

This screen shows information about the voltage and compressor current.

This screen is available if the optional voltage and current transmitters are installed.

Line n°	Display	Description
1	UNIT SAFETY	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Subscreen 4

This screen shows information about the compressors total running hours and the capacity steps:

Line n°	Display	Description
1	UNIT SAFETY	screen title
2	RUNN. HOURS 1	total running hours compressor circuit 1
3	RUNN. HOURS 2	total running hours compressor circuit 2
4	C1 C2	compressor capacity steps

Circuit safety screens

If a circuit safety occurs, the following screen is displayed:

Line n°	Display	Description
1	CIRCUIT 1/2 SAFETY	screen title
2	HIGH PRESSURE SWITCH*	activated circuit safety
3	INL. OUTL.	inlet/outlet water temperature
4	AMB.	ambient temperature

*: Other circuit safeties are overcurrent relay, discharge thermal protector, compressor motor thermal protector and reverse phase protector.

Subscreens

By pressing the ↵ key, you can consult the subscreens. After 20 seconds, these screens automatically disappear.

Subscreen 1

This screen shows information about the pressures of circuit 1:

Line n°	Display	Description
1	CIRCUIT 1/2 SAFETY	screen title
2	HP1	high pressure refrigerant circuit 1 (in bar and equivalent in °C)
3	LP1	low pressure refrigerant circuit 1 (in bar and equivalent in °C)

Subscreen 2

This screen shows information about the pressures of circuit 2:

Line n°	Display	Description
1	CIRCUIT 1/2 SAFETY	screen title
2	HP2	high pressure refrigerant circuit 2 (in bar and equivalent in °C)
3	LP2	low pressure refrigerant circuit 2 (in bar and equivalent in °C)

Subscreen 3

This screen shows information about the voltage and compressor current.

This screen is available if optional voltage and current transmitters are installed.

Line n°	Display	Description
1	CIRCUIT 1/2 SAFETY	screen title
2	VOLTAGE	voltage
3	CURRENT C1	compressor current circuit 1
4	CURRENT C2	compressor current circuit 2

Subscreen 4

This screen shows information about the total running hours of the compressors and the capacity steps:

Line n°	Display	Description
1	CIRCUIT 1/2 SAFETY	screen title
2	RUNN. HOURS 1	total running hours compressor circuit 1
3	RUNN. HOURS 2	total running hours compressor circuit 2
4	C1 C2	compressor capacity steps

2.3 Safeties Overview

Unit safeties

Alarm description	Alarm indication	Activation	Reset	Wiring code	Device
emergency stop	EMERGENCY STOP	push the emergency button	unlock the button and start the unit	S5E	contact
flow switch or pump contact	FLOWSWITCH ACTIVATED OR NOT	no flow for 5 seconds	manual software reset	S8L	contact closed on flow
freeze-up protection	FREEZE-UP	outlet water temperature < 2,5 °C (refer to page 2-10)	manual software reset	R4T	NTC sensor

Circuit safeties

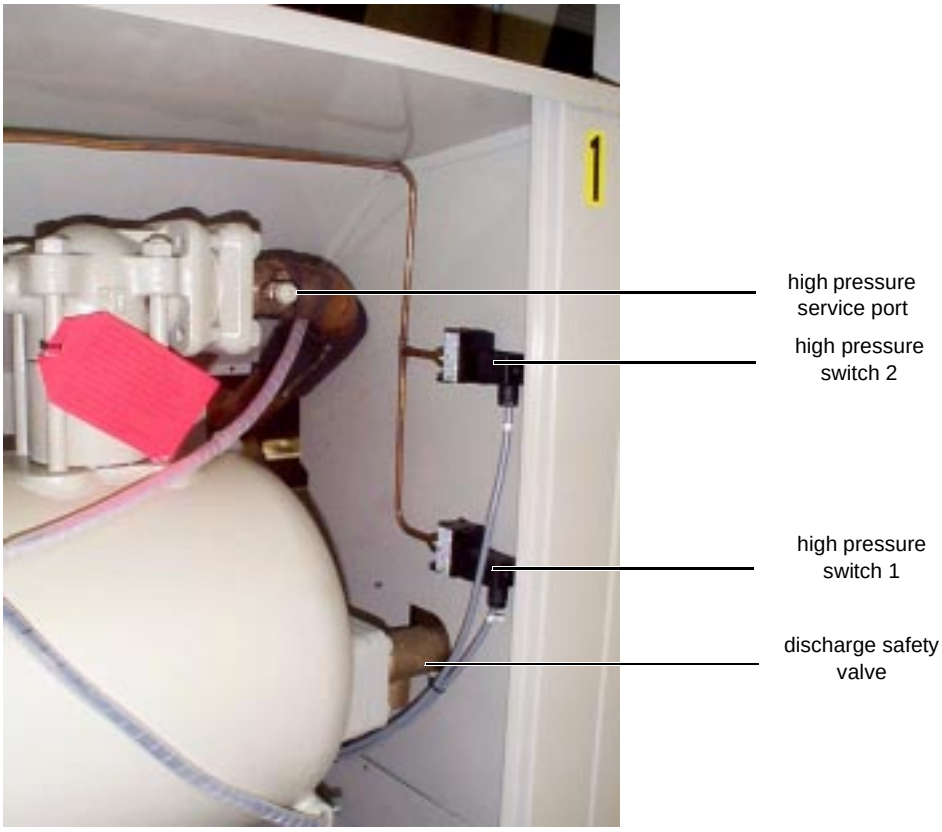
Alarm description	Alarm indication[1]	Activation	Reset	Wiring code	Device
high pressure switch	HIGH PRESSURE SWITCH 1/2	discharge pressure > 17 bar (R-134a) discharge pressure > 25 bar (R-22)	■ manual software reset ■ reset on the switch	S1PH, S2PH, S14PH, S15PH	switch on/off contact
low pressure transmitter	LOW PRESSURE 1/2	< 0.5 bar	manual software reset	B1P	low pressure transmitter
discharge thermal protector	DISCHARGE THERMAL PROTECTION 1/2	discharge temperature > 135 °C	manual software reset when discharge temperature < 115 °C	S3T, S4T	bimetal on/off
overcurrent relay	OVERCURRENT 1/2	overcurrent [2]	■ manual hardware reset ■ manual software reset	K17S, K18S	bimetal on/off
compressor motor thermal protector	COMPRESSOR THERMAL PROTECTOR 1/2	compressor motor windings temperature > 115 °C	automatic reset at 93 °C	Q1M, Q2M	bimetal on/off
reverse phase protector	REVERSE PHASE PROTECTION 1/2	■ single phasing ■ imbalance of more than 20 % between the phases ■ reversed phases ■ no power	correct phase sequence, switch power back on	R1P	contact
fan motor thermal protector	-	fan motor windings temperature > 160 °C ± 10 K	automatic reset at 130 °C ± 15 K	Q11F-Q14F, Q21F-Q24F	bimetal on/off

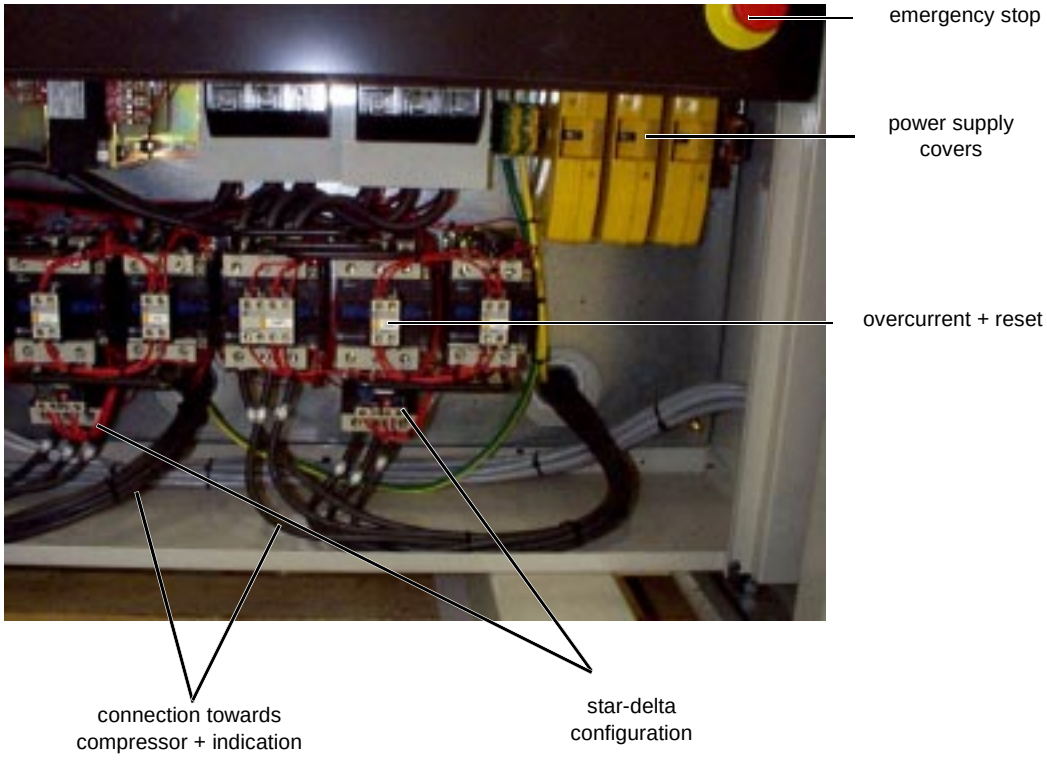
[1]: The circuit 1 or 2 is not indicated on the single circuit units EUWA(*)40-60K(X).

[2]: An overview of the fuses and overcurrent relays is given in ‘Checking the Power Supply and Fuses’ on page 3-19.

Safety devices

The following pictures give a visual view of some of the safety devices:





3 Checking the Inputs and Outputs

3.1 What Is in This Chapter

Introduction

In this chapter you will find information on how to measure and check the most important inputs.

Overview

This chapter covers the following topics:

3.2 Checking the Temperature Sensors

Introduction

If the cause of the problem is related to the temperature sensors, then the sensors should be checked prior to changing the PCB or an output device.

Types of sensors

The following types of temperature sensors:

- sensors connected to the controller PCB: R3T/ R4T/ R5T

For more information about these sensors, refer to ‘Main board EUWA(*)40-120K(X)’ on page 1-34.

How to check

To check the temperature sensors, proceed as follows:

Step	Action
1	Disconnect the sensor from the PCB or discharge thermal protector.
2	Read the temperature and the resistor value.
3	Check if the measured values correspond with the values in the appropriate table.

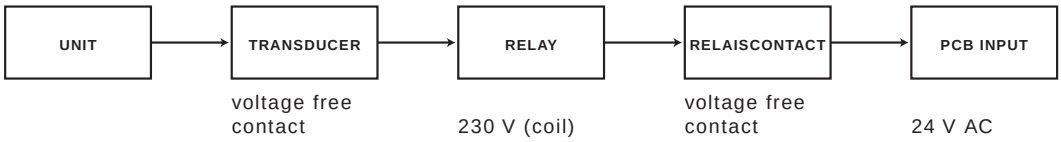
Table 1 In the following table you will find the temperature-resistance values of the controller sensors R3T, R4T and R5T.

Temperature	Resistor value			Temperature	Resistor value			Temperature	Resistor value		
	maximum	standard	minimum		maximum	standard	minimum		maximum	standard	minimum
°C	kΩ	kΩ	kΩ	°C	kΩ	kΩ	kΩ	°C	kΩ	kΩ	kΩ
-50	344.40	329.20	314.70	1	26.64	26.13	25.62	56	3.49	3.42	3.35
-49	324.70	310.70	297.20	2	25.51	25.03	24.55	57	3.39	3.31	3.24
-48	306.40	293.30	280.70	3	24.24	23.99	23.54	58	3.28	3.21	3.14
-47	289.20	277.00	265.30	4	23.42	22.99	22.57	59	3.18	3.11	3.04
-46	273.20	261.80	250.60	5	22.45	22.05	21.66	60	3.09	3.02	2.95
-45	258.10	247.50	237.20	6	21.52	21.15	20.78	61	2.99	2.92	2.86
-44	244.00	234.10	224.60	7	20.64	20.29	19.95	62	2.90	2.83	2.77
-43	230.80	221.60	212.70	8	19.80	19.40	19.15	63	2.81	2.75	2.69
-42	218.50	209.80	201.50	9	19.00	18.70	18.40	64	2.73	2.66	2.60
-41	206.80	198.70	191.00	10	18.24	17.96	17.67	65	2.65	2.58	2.52
-40	195.90	188.40	181.10	11	17.51	17.24	16.97	66	2.57	2.51	2.45
-39	185.40	178.30	171.59	12	16.80	16.55	16.31	67	2.49	2.43	2.37
-38	175.5.	168.90	162.00	13	16.13	15.90	15.87	68	2.42	2.36	2.30
-37	166.20	160.10	154.10	14	15.50	15.28	15.06	69	2.35	2.29	2.24
-36	157.50	151.80	140.20	15	14.89	14.68	14.48	70	2.28	2.22	2.17
-35	149.30	144.00	138.80	16	14.31	14.12	13.93	71	2.21	2.16	2.10
-34	141.60	136.60	131.80	17	13.75	13.57	13.40	72	2.15	2.10	2.04
-33	134.40	129.70	125.20	18	13.22	13.06	12.89	73	2.09	2.04	1.98
-32	127.60	123.20	118.90	19	12.72	12.56	12.41	74	2.03	1.98	1.93
-31	121.20	117.10	113.10	20	12.23	12.09	11.95	75	1.97	1.92	1.87
-30	115.10	111.30	107.50	21	11.77	11.63	11.07	76	1.92	1.87	1.82
-29	109.30	105.70	102.20	22	11.32	11.20	11.07	77	1.86	1.81	1.78
-28	103.80	100.40	97.16	23	10.90	10.78	10.60	78	1.81	1.76	1.71
-27	98.63	95.47	92.41	24	10.49	10.38	10.27	79	1.76	1.71	1.68
-26	93.75	90.80	87.93	25	10.10	10.00	9.90	80	1.71	1.66	1.62
-25	89.15	86.39	83.70	26	9.73	9.63	9.52	81	1.66	1.62	1.57
-24	84.82	82.22	79.71	27	9.38	9.28	9.18	82	1.62	1.57	1.53
-23	80.72	78.29	75.93	28	9.04	8.94	8.84	83	1.57	1.53	1.49
-22	76.85	74.58	72.36	29	8.72	8.62	8.52	84	1.53	1.49	1.44
-21	73.20	71.07	68.99	30	8.41	8.31	8.21	85	1.49	1.45	1.40
-20	69.74	67.74	65.80	31	8.11	8.01	7.91	86	1.45	1.41	1.37
-19	66.42	64.54	62.72	32	7.82	7.72	7.62	87	1.41	1.37	1.33
-18	63.27	61.52	59.81	33	7.55	7.45	7.35	88	1.37	1.33	1.29
-17	60.30	58.66	57.05	34	7.28	7.19	7.09	89	1.34	1.30	1.26
-16	57.49	55.95	54.44	35	7.03	6.94	6.84	90	1.30	1.26	1.22
-15	54.83	53.39	51.97	36	6.79	6.69	6.60	91	1.27	1.23	1.19
-14	52.31	50.96	49.83	37	6.56	6.46	6.37	92	1.23	1.20	1.16
-13	49.93	48.66	47.12	38	6.33	6.24	6.15	93	1.20	1.16	1.13
-12	47.67	46.48	45.31	39	6.12	6.03	5.94	94	1.17	1.13	1.10
-11	45.53	44.41	43.32	40	5.92	5.82	5.73	95	1.14	1.10	1.07
-10	43.50	42.25	41.43	41	5.72	5.63	5.54	96	1.11	1.08	1.04
-9	41.54	40.56	39.59	42	5.53	5.43	5.35	97	1.08	1.05	1.01
-8	39.68	38.76	37.85	43	5.34	5.25	5.17	98	1.05	1.02	0.99
-7	37.91	37.05	36.20	44	5.16	5.08	4.99	99	1.03	0.99	0.96
-6	36.24	35.43	34.03	45	4.99	4.91	4.82	100	1.00	0.97	0.94
-5	34.65	33.89	33.14	46	4.83	4.74	4.66	101	0.98	0.94	0.91
-4	33.14	32.43	31.73	47	4.67	4.59	4.51	102	0.95	0.92	0.89
-3	31.71	31.04	30.39	48	4.52	4.44	4.36	103	0.93	0.90	0.87
-2	30.35	29.72	29.11	49	4.38	4.30	4.22	104	0.91	0.87	0.84
-1	20.00	28.47	27.89	50	4.24	4.16	4.08	105	0.88	0.85	0.82
0	27.83	27.28	26.74	51	4.10	4.02	3.95	106	0.86	0.83	0.80
				52	3.97	3.90	3.82	107	0.84	0.81	0.78
				53	3.84	3.77	3.69	108	0.82	0.79	0.76
				54	3.72	3.65	3.57	109	0.80	0.77	0.74
				55	3.61	3.53	3.46	110	0.78	0.75	0.73

3.3 Checking the Digital Inputs and Outputs

Input route

In the following block diagram the digital input route from the transducer (e.g. thermostat, pressostat, reverse phase, etc.) to the PCB input is shown.

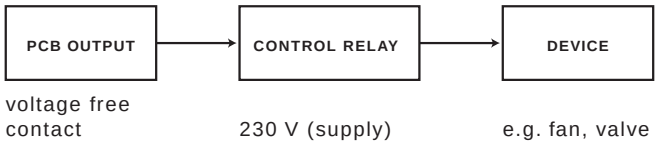


Troubleshooting

In most cases a malfunction occurs in the unit itself and not in the control circuit of the unit. If however the latter is the case, then you should measure the relevant signals using the schematic input route shown above.

Output route

The output is generated from the PCB. If a device does not operate, you should find the relevant output signal from the PCB in order to decide whether the PCB or the device needs replacement. The output route is shown in the block diagram below:



3.4 Checking the Power Supply and Fuses

Overview

The following overview shows the circuits, the voltages and their fuse codes:

Circuit	Wiring code	Type / voltage	Fuse code
main supply	L1+L2+L3	3 phases / 400 V AC	F1U+F2U+F3U
main circuit	L1+L2+L3	3 phases/ 400 V AC	F12B
control circuit (fans + relays)	TR1-prim.	2 phase / 400 V AC	F6B
	TR1-sec.	1 phase / 230 V AC	F8B
control circuit (digital)	TR3-sec.	1 phase / 24 V AC	F9B
heater circuit	OP10	1 phase / 230 V	F4U+F5U

The electrical main power supply should be arranged so that it can be switched on or off independently of the electrical supply to other equipment.

PCBs

All PCBs are supplied with a 24 V AC voltage. The red led on the main board indicates that power is supplied.

Overview fuses and overcurrent EUWA(*)40-60K(X)

The table below gives an overview of the fuses for each chiller type in the range EUWA(*)40-60K(X):

Fuses	EUWA(*)40K(X)	EUWA(*)50K(X)	EUWA(*)60K(X)
F1U, F2U, F3U	3 x 125 aM*	3 x 160 aM*	3 x 160 aM*
F4U,F5U***	2 gG**	2 gG**	2 gG**
F6B	2 x 2 A	2 x 2 A	2 x 2 A
F8B	1 A	1 A	1 A
F9B	1 A	1 A	1 A
F12B	3 x 16 A	3 x 16 A	3 x 16 A
K17S	50 A	64 A	77 A

Overview fuses and overcurrent EUWA(*)80-120K(X)

The table below gives an overview of the fuses for each chiller type in the range EUWA(*)80-120K(X):

Fuses	EUWA(*)80JX	EUWA(*)100JX	EUWA(*)120JX
F1U, F2U, F3U	3 x 200 aM*	3 x 250 aM*	3 x 315 aM*
F4U,F5U***	2 gG**	2 gG**	2 gG**
F6B	2 x 6 A	2 x 6 A	2 x 6 A
F8B	2 A	2 A	2 A
F9B	2 A	2 A	2 A
F10S, F11S	3 x 100 aM	3 x 125 aM	3 x 160 aM
F12B, F13B	3 x 16 A	3 x 16 A	3 x 16 A
K17S, K18S	50 A	64 A	77 A

*: aM: slowly reacting fuses
**: gG: fast reacting fuses
***: means optional in case there is an evaporator heater.

4 Troubleshooting

4.1 What Is in This Chapter

Introduction

When a problem occurs, you have to check all possible faults. This chapter gives a general idea of where to look for defects. Further the general procedures for refrigeration circuit repairs and for electrical circuit repairs are explained.

Not all repair procedures are described. Some procedures are considered common practice.

Overview

This chapter covers the following topics:

4.2 Items to Be Checked

Introduction

In the tables below the most frequent failures and their corrective action are explained. Use these tables when the unit or a circuit does not start.

No malfunction indication

The unit does not start and there is no malfunction indication.

Possible causes	Items to be checked
Power supply problem ■ Main supply ■ Control system supply ■ PCB supply	■ Loose or broken connections ■ Blown fuses (due to short circuit) ■ Defective transformer
The unit is not switched on	■ Check the remote start/stop setup and correct if setup incorrectly ■ Check the field wiring in case of remote control
One of the timers is still active	Check the timers overview in this manual or in the controller and wait until all timers have elapsed
The unit is programmed incorrectly.	Check the settings ℹ The compressor step in manual mode control should not be set to 0%.

Malfunction indication

The unit does not start because of a malfunction.

Problem	Possible causes	Items to be checked
Freeze-up	■ Water flow too low ■ Refrigerant shortage ■ Operation out of range ■ Defective thermostat control	■ Pump operation ■ Water flow (closed valves and blocked circuits) ■ Flow switch operation ■ Operation condition ■ Blocked parts in the refrigerant system ■ Refrigerant leaks
Overcurrent in the compressor	■ Failure on one of the phases ■ Low supply voltage ■ Motor overload	■ Power supply ■ Fuses ■ Mains isolator switch ■ Mains relay contacts ■ Operation condition ■ Compressor windings ■ Current on all 3 phases ■ Reset the overcurrent relay

Problem	Possible causes	Items to be checked
High pressure switch	■ Water flow too low in heating ■ Water temperature too high in heating ■ Defective condenser fan operation in cooling ■ Dirty or blocked condenser ■ Operation out of range	■ Pump operation ■ Water flow (blocked valves) ■ Flow switch operation ■ Operation condition outdoor air temperature < 43 °C leaving condenser water < 30 °C ■ State of the condenser (clean)
Flow switch or pump contact	■ Damaged flow switch ■ Incorrect pump operation ■ Incorrect field wiring ■ Defective control devices (pump relay)	■ Flow switch ■ Pump operation ■ Field wiring ■ Control devices
Discharge thermal protector	■ Refrigerant shortage ■ Operation out of range	■ Refrigerant leak ■ Operation condition
Fan thermal protector	■ Blocked fan ■ Blocked condenser	■ State of the fans (free rotation) ■ State of the condenser
Reverse phase protection	■ Incorrect phase direction ■ One phase missing	■ Swap two phases ■ Connect the loose phase

An overview of the fault indications and safeties is given in ‘Overview of Fault Indications and Safeties’ on page 3-7.

4.3 General Repair Procedures

Refrigeration circuit repairs

The general procedure for refrigeration circuit repairs is explained below:

Step	Action
1	Recover the refrigerant from the unit or perform a pump down (depending on the part that needs to be changed). Refer to ‘Pump Down’ on page 3-28. It is strictly forbidden to release refrigerant into the atmosphere during service or repair jobs. Make use of a recovery unit.
2	Perform the repair according to the normal procedure. There are no special procedures for the replacement of refrigeration parts. We refer to the general DAIKIN air-conditioning service manual for more information on the standard practice of refrigeration works.
3	Pressurise the system. Make sure there are no leaks.
4	Charge with the proper amount of refrigerant.

All refrigeration work must be carried out by a licensed refrigeration engineer, and it must comply with all relevant European and national regulations.

Service tools or equipment coming in contact with R-22 or mineral oils should not be used on R-134a units and vice versa. Therefore, we strongly advice to have a separate set of manifolds, charging units, vacuum pump and oil recipients only to be used with R-134a and polyester oils.

Electrical circuit repairs

The general procedure for electrical circuit repairs is explained below:

Step	Action
1	Perform the measurements needed to locate the defective parts of the system.
2	Switch off the main power supply.
3	Check if all capacitor voltages are loaded down.
4	Perform the repair according to standard procedures.
5	Switch on the power supply.
6	Verify the proper operation of the replaced part by measurements.

All electrical work must be carried out by a licensed electrical engineer, and it must comply with all relevant European and national regulations.

4.4 Procedure for PCB Changing

Changing the PCB

To change the PCB, proceed as follows:

Step	Action
1	Remove the connections of the old PCB.
2	Remove the old PCB. For the chillers EUWA(*)80-120K(X), also remove the address board.
3	Place the new PCB in the same way as the old PCB.
4	Reconnect the PCB. Put also the address board back for the chillers EUWA(*)80-120K(X).

3

Address board for EUWA(*)80-120K(X)

The address boards on the PCBs indicate the addresses of the PCBs of 2 circuits. From factory, the PCB on top refers to circuit 2 and the PCB beneath refers to circuit 1.

- Make sure that the dip switches are correctly set. Refer to ‘T-device between PCB A and PCB B’ on page 1-39.
- Always make sure that PCB 1 is completely configured before PCB 2. If this is not taken into account, this can result in a communication problem between PCB 1 and PCB 2.

Configuration procedure for EUWA(*)40-120K(X)

To start configuration, proceed as follows:

Step	Action	Result
1	Put on the power supply.	Nothing will appear on the screen, because no configuration has been made.
2	Press ⏩, ⓕ and ⏪ simultaneously for 5 seconds.	After a few seconds, the user terminal will enter a screen, in which: TERMINAL ADR: 3 I/O BOARD ADR: 1 (in case of PCB 1) or 2 (in case of PCB 2) If the values on the screen are different from the values above, you can change them using ▲▼.
3	Press ↵.	You have entered the terminal configuration screen.
4	Press ↵ to continue.	

For more information concerning the controller, refer to ‘The Digital Controller’ on page 2-17.

Terminal configuration of EUWA(*)40-120K(X)

To continue the configuration, proceed as follows:

Step	Action	Screen
1	In case of PCB 1, use ▲▼ to change the address for terminal 1 into 3. In case of PCB 2, use ▲▼ to change the address for terminal 1 into none.	TRM1: 03 or TRM1: NONE
2	Press ↵.	
3	In case of PCB 1, use ▲▼ to change the parameter private/shared of terminal 1 into private. In case of PCB 2, use ▲▼ to change the parameter private/shared of terminal 1 into --.	PR or --
4	Press ↵.	
5	Use ▲▼ to change the address for terminal 2 into none.	TRM2:NONE

Step	Action	Screen
6	Press ↵. The parameter private/shared shoud be --.	--
7	Press ↵.	
8	Use ▲▼ to change the address of terminal 3 into none.	TRM3:NONE
9	Press ↵.The parameter private/shared shoud be --.	--
10	Press ↵.	
11	Choose yes using ▲▼.	YES
12	Press ↵ to leave the configuration screen and to enter the read-out menu.	

Entering the factory menu

The factory menu is used to set up the identification parameters of the unit according to its PCB. To enter the factory menu, proceed as follows:

Step	Action	Result
1	Put on the power supply.	After a few seconds, the user terminal will enter the read-out menu. Refer to '◉ Read-out Menu' on page 2-24.
2	Press ◉and ◉simultaneously for 5 seconds.	The leds above ◉and ◉ light up.
3	Scroll using ▲▼ to go to 1914.	
4	Press ↵.	You have entered the factory menu.

For more information concerning the controller, refer to 'The Digital Controller' on page 2-17.

Load defaults

When you have entered the factory menu, proceed as follows:

Step	Action	Result
1	Scroll downwards using ▲▼ to go to the next screen.	
2	Press ↵ 3 times.	The cursor is blinking on N on the load defaults line.
3	Scroll downwards using ▲▼ to change N into Y	
4	Press ↵.	When Y becomes N again, all the default values are loaded into the new PCB.
5	Scroll upwards using ▲▼ to go to the first screen.	You can start initialization.
6	Press ↵.	

Settings

Follow the screens on the next page to insert the settings of the former PCB.

Screen 1 This screen shows the information about the unit type:

Line n°	Display	Description	Default setting	To change the setting:
1	UNIT TYPE	chiller type	EUWA*40J* (1 circuit) EUWA*80J* (2 circuits)	**1** Use ▲▼ to select the correct type. **2** Press ↵.
2	MANUFACT. NR.	manufacturing number	0000000	**1** Use ▲▼ and ↵ to change the digits. **2** Press ↵.
3	REFRIGERANT	refrigerant type	R-134A	**1** Use ▲▼ to select the correct refrigerant. **2** Press ↵.

To go to the next screen, scroll downward using ▲▼ and press ↵ once.

Screen 2 This screen shows the information about the protection settings:

Line n°	Display	Description	Default setting	To change the setting:
1	MIN. OUTL. WATER	minimum outlet water temperature ⚠ When you enter a lower temperature than 4 °C, make sure that you adapt the glycol quantity in the water.	4 C	**1** Use ▲▼ to select the correct temperature. **2** Press ↵.
2	BMS CARD INSTALLED	not available	N	Press ↵.
3	LOAD DEFAULTS	to change the default settings	N	Press ↵.

To go to the next screen, scroll downward using ▲▼ and press ↵ once.

Screen 3 This screen shows the running hours of the compressor:

Line n°	Display	Description	Default setting	To change the setting:
1	RUNN. HOURS 1	running hours of compressor 1	00000H	**1** Use ▲▼ and ↵ to change the digits. **2** Press ↵.
2	RUNN. HOURS 2	running hours of compressor 2 (only for EUWA(*)80-120K(X))	00000H	**1** Use ▲▼ and ↵ to change the digits. **2** Press ↵.

To go to the next screen, scroll downward using ▲▼ and press ↵ once.

⚠ Changing of the running hours is very important when the parts are used as spare parts.

Screen 4 This screen shows the possibilities of the electrical devices:

Line n°	Display	Description	Default setting	To change the setting:
1	V-A METER	V-meter, A-meter (optional)	N	**1** Use ▲▼ to select yes or no. **2** Press ↵.
2	P-TRANSM.	pressure transmitter	DANFOSS	**1** Use ▲▼ to select the correct transmitter. **2** Press ↵.
3	25% CAPP. COILS	not available	N	Do not change default.

To put the cursor back, press ↵.

Exit of factory menu Press a key different from ⏩ and ⊕.

4.5 Pump Down

Precautions

The pump down operation can only be executed when:

- the unit is switched off
- the pressure transmitters are installed
- the system is not working in bypass mode.

Bypass mode means the mode, in which the electronic device is bypassed by an other optional electronic device. This can be in case of failure of the electronic device.

Procedure

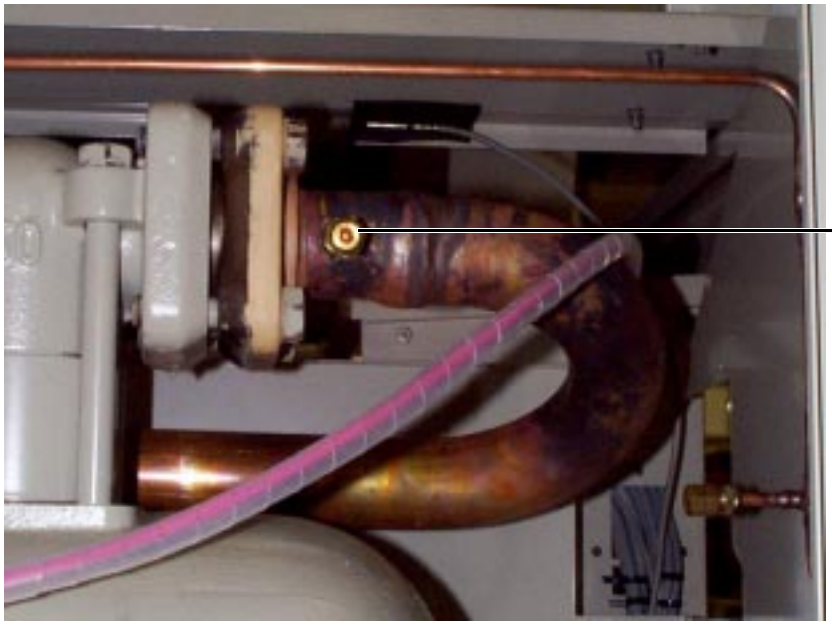
To execute a pump down, proceed as follows:

Step	Action
1	Enter the password menu. Refer to ‘Password Menu’ on page 2-41.
2	Enter your password.
3	Press until you see the circuit chiller. It takes approximately 10 seconds. In case of a double circuit, select the circuit that you want to pump down.
4	Close the liquid line stop valve.
5	Press .
6	Switch on the unit to pump down by pressing .
7	When the buzzer sounds, close the discharge stop valve.
8	Press to stop the buzzer.
9	Use a recovery unit to compartiment the rest of the refrigerant on the low pressure side.

Compartimentation: Pumping of the refrigerant from the low to the high pressure side using a pump out unit. A gas bottle is not needed to recuperate the refrigerant.

Picture

The following picture gives a visual view of the high pressure service port:



4.6 Filter Procedure

Filter core replacement

The following table explains how to replace a filter core:

Step	Action
1	Close the inlet stop valve on the filter dryer.
2	Operate the compressor until the unit pumps down to ± 1.5 bar.
3	Close the outlet stop valve on the filter dryer.
4	Remove the remaining pressure via the 3/8” charging valve on the filter body by connecting the discharge of the pump out unit to the condenser side of the unit (High pressure service point). This step is also named compartimentation. Do not stop the liquid injection to the compressor during pump down. This will cause overheating and compressor damage.
5	Warm up the filter body with a hand-hold heater before opening the filter dryer to avoid moisture deposits within the filter body and liquid line.
6	Prepare the filter cover gasket before opening the new filter core container in order to keep air exposure to a strict minimum.

The compressor suction stop valve (if installed) and discharge stop valve must be closed during service or repair to avoid moisture.

4.7 Oil Changing Procedures

Oil draining

When the oil has degraded or the moisture level becomes to high, the oil has to be drained.
To drain oil, proceed as follows:

Step	Action
1	Pump the unit down to ± 1.5 bar low pressure.
2	Using compartimation, lower the suction pressure to a slight positive pressure in order to force the oil into a receptacle. Compartimentation: Pumping of the refrigerant from low to high pressure using a pump out unit.
3	Remove the oil out of the compressor by untighing the large hexagon nut located under the sight glass.

Oil filter cleaning

The following procedure explains how to clean the oil filter:

Step	Action
1	Follow the oil drain procedure to recover the refrigerant and to drain the oil.
2	Remove the cover of the oil separator.
3	Remove the oil filter for cleaning or changing.
4	Clean the oil separator with an ozone-friendly cleaning solvent.
5	Mount the filter again.
6	Reassemble the oil seperator.

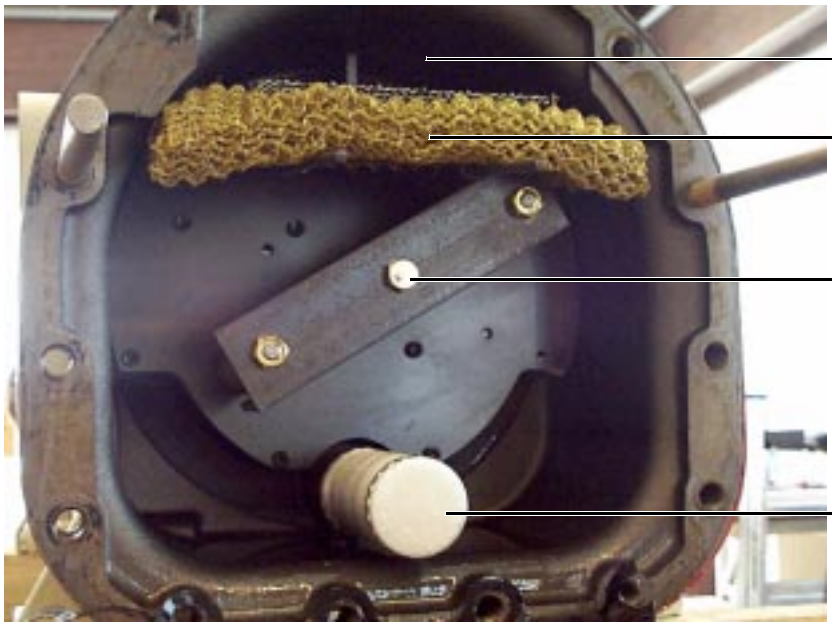
Oil charging

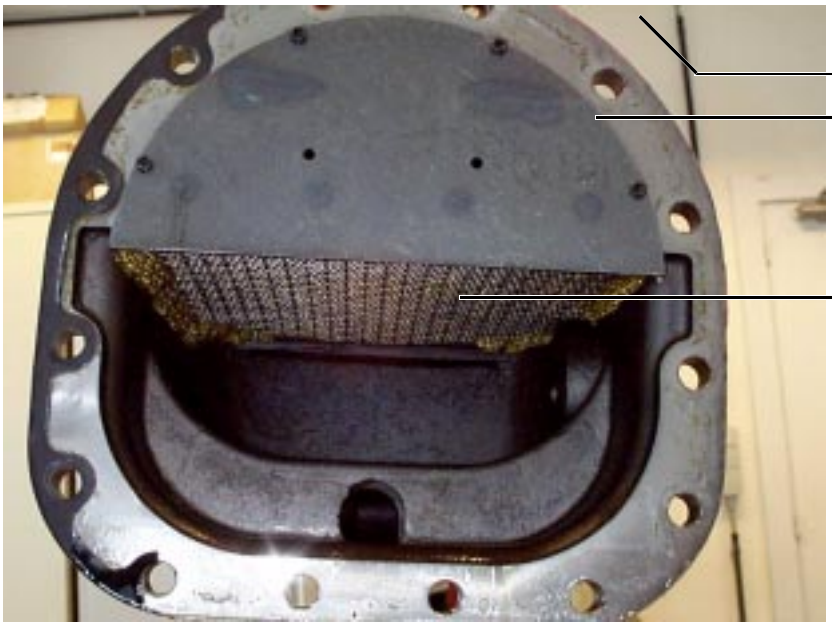
After used oil has been drained, a fresh oil charge is required. This is normally the same amount as was removed and is visually less than the initial charge, because a small part of the oil still remains in some of the parts.
The equipment to charge is a vacuum pump and a charging line fitted with a shut-off valve. A pressure gauge can be useful. The purpose is to get clean oil into a contaminent-free system. Therefore, proceed as follows:

Step	Action
1	Pull a complete vacuum on the compressor before charging new oil.
2	Close the shut-off valve.
3	Stop the vacuum pump.
4	Connect the oil container via a charging hose to the oil charge valve.
5	Purge the oil charge hose and open the oil drain valve.

The oil container should only be opened before charging. Since ester oils are very hygrocopic, use containers corresponding to the required oil charge quantity.

Illustration The following photos shows the content of the oil separator:





4.8 Refrigerant Charging

Refrigerant leak detection

For refrigerant leak detection, use an electronic leak detector sensitive for R-134a or for R-22.

If...	then...
the unit is under the pressure limit	**1** look for oily spots on fittings and flanges. **2** wipe clean. **3** verify at a later stage.

Liquid charging

This method is customary for larger systems. Therefore, a 3/8” charging valve is provided on the filter dryer body so that the refrigerant can be added while the system is operating.

Step	Action
1	Connect the refrigerant to the 3/8” charging port. Use a short 3/8” charging line to minimise contamination or via a dryer if indicated. The cylinder should be upside down if it does not have a liquid/vapour valve.
2	Observe the pressure gauge.
3	Purge the charging line or open the charging line stop valves.
4	Tighten the connections.
5	Open the cylinder valve and check for leaks.
6	Close the liquid line valve at the condenser outlet in order to prevent the condenser pressure from forcing liquid into the cylinder.
7	Slowly open the 3/8” charging port valve while the compressor is running (40%) and charge liquid at a fast rate to prevent the compressor from cutting out on low pressure control. The refrigerant flow can also be controlled by the cylinder valve to avoid ending up with a hose full of liquid refrigerant. The same result will be obtained by closing the cylinder valve when the charging is finished. This will avoid a charging line full of liquid refrigerant.  Stop charging if there is a rapid rise in the discharge pressure.
8	Close the charging port valve.
9	Open the liquid line valve at the condenser outlet.
10	Check the operating unit. If the sight glass is clear and high pressure and low pressure appear normal, then the unit is correctly charged.  Make sure that the compressor rotates at 100 % for at least 15 minutes. This is to assure stabilization.
11	Disconnect the charging line from the 3/8” charging valve.
12	Close the service valves.
13	Replace the caps on the cylinder valve and the charging valve.

Vapour charging

This method is mainly used for smaller systems. However, trim charging through the schroeder valve, mounted on the suction line of the unit, is possible. Follow the following steps:

Step	Action
1	Remove the cap from the schroeder valve mounted on the suction side.
2	Connect a 1/4” charging line to the schroeder valve.
3	Connect the centre line from the manifold to the refrigerant cylinder.
4	Air purge the charging lines or open the charging line stop valves.
5	Open the stop valve on the charging cylinder.
6	Place the charging cylinder on a weighing scale to verify the charge quantity.
7	Open the cylinder valve fully and control the refrigerant flow from the manifold. Head pressure and suction pressure should be stabilized before charging.
8	Close the cylinder valve from time to time and verify the sight glass and suction pressure. If the cylinder pressure drops too low, place the cylinder in a bucket of warm water or use a hand-held heater to increase the pressure. Never use an open flame and never heat above 50°C.
9	Close the charging cylinder
10	Close the charging lines stop valves when the pressure indicated on the manifold is equal to the suction pressure.
11	Disconnect the charging line from the schroader valve and replace the cap.
12	Check for leaks.

Part 4
Commissioning and Test Run

Introduction

Commissioning and test run are well-known practices in service engineering. This part offers a systematic approach to test-run checks and test values, which will guarantee a high quality installation and operation of the units. It is, therefore, recommended to read the chapters in this part with attention.

What is in this part?

This parts contains the following chapters:

1 Pre-Test Run Checks

1.1 What Is in This Chapter

Introduction

As shown in the table below, we have grouped the pre-test run checks into three main groups to facilitate the servicing.

Overview

This chapter covers the following topics:

1.2 General Checks

Checklist

A checklist of general checks is given below:

	Check if …
1	there is external damage.
2	all (yellow) shipping and lifting stays are removed.
3	the unit is well supported and/or if the foundation is properly done.
4	anti-vibration pads are required.
5	there is a drain possibility for the condens water.
6	it is necessary to place a heatertape inside the drain system to prevent ice accumulation and possible drain blockage during winter time.
7	no metal dust or burrs remain after grinding or drilling in the metal construction parts during the installation. This facilitates the rust process and thus shortens the unit's lifetime.
8	the operator has received the operation manual.
9	the installer has received the installation manual.
10	the air volume over the coil is adequate; no blockage (from paper, plastic,...) or air short circuit due to wrong positioning.
11	all shut-off valves indicated by a red label "OPEN THIS VALVE BEFORE OPERATION" are opened EUWA(*)40-60K(X): 2 shut-off valves EUWAS40-60K(X): 3 shut-off valves EUWA(*)80-120K(X): 4 shut-off valves EUWAS80-120K(X): 6 shut-off valves (*)= B, M, T or D

In order to avoid compressor damage, it is necessary to switch on the crankcase heater for at least 8 hours before starting the compressor after a long period of standstill.

1.3 Water Piping Checks

Checklist

A checklist of water piping checks is given below:

	Check if …
1	the water volume is within the limits (see table below).
2	there is adequate water flow (see table below).
3	the water quality meets the standards (see table on the next page).
4	the water piping is properly insulated.
5	measurement points for temperature and pressure are available on the water circuit.
6	the flow switch and pump are properly working.
7	air purge points are installed on the high parts of the water piping, and an air plug on the evaporator.
8	drain taps are installed at the low points of the water piping to permit complete drainage during maintenance or shut-down, and drain plugs to drain the evaporator. Remove the air plug if you drain the evaporator.
9	other parts of the water circuit are properly mounted and installed (e.g. buffer tank, expansion tank, wire mesh strainer at the pump suction, shut-off valves,...).
10	vibration compensators are installed to avoid straining the piping and transmitting vibration and noise.

Water volume, flow and pressure

To assure proper operation of the unit, the water volume and flow must be within the operation range as specified in the following table:

Chiller type	Minimum water volume*	Minimum water flow	Maximum water flow
EUWA(*)40K	1700 l	185 l/min	737 l/min
EUWA(*)40KX	2400 l	150 l/min	600 l/min
EUWA(*)50K	1700 l	185 l/min	737 l/min
EUWA(*)50KX	2750 l	200 l/min	715 l/min
EUWA(*)60K	2100 l	230 l/min	920 l/min
EUWA(*)60KX	3600 l	235 l/min	950 l/min
EUWA(*)80K	2400 l	290 l/min	1080 l/min
EUWA(*)80KX	-	300 l/min	1165 l/min
EUWA(*)100K	3000 l	370 l/min	1160 l/min
EUWA(*)100KX	-	390 l/min	1565 l/min
EUWA(*)120K	3600 l	460 l/min	1660 l/min
EUWA(*)120KX	-	450 l/min	1665 l/min

Refer to ‘Thermostat Control’ on page 2-5.

*: Refer to calculation of the minimum water volume on the next page.

The water pressure should not exceed the maximum working pressure of 10 bar.

Calculation of the minimum water volume

The following calculation method is based on the fact that the water volume in a chiller should be large enough to prevent the compressor from excessive cycling. Sufficient water volume will give a certain inertia to the system so that water (or glycol) temperature does not drop too fast when the unit turns on and that the temperature does not rise too fast when the unit turns off.

$$V = \frac{0{,}5 \times Q \times t}{2 \times \rho \times d \times C_w} \ [m^3]$$

with:

V: Required system volume [m³]
Q: Cooling capacity at the lowest capacity step of each chiller in the system [W]
t: Minimum cycling time allowed by the compressor [s] (default = 600 s)
ρ: Specific mass of the fluid [kg/m³] (default ρ_{water} = 1000 kg/m³)
d: Thermostat step difference [K] (default = 0.2 K for outlet water control and 0.5 K for inlet water control)
C_w: Specific heat capacity of the fluid [J/kgK] (default $C_{w,\ water}$ = 4186 J/kgK).

4

Water quality

In the table below you will find the required water quality specifications:

		Evaporator water		**Tendency if out of criteria**
		Circulating water (< 20 °C)	supply water	
Items to be controlled				
pH	at 25 °C	6.8~8.0	6.8~8.0	corrosion + scale
Electrical conductivity	mS/m (at 25 °C)	< 40	< 30	corrosion + scale
Chloride ion	mg Cl^-/l	< 50	< 50	corrosion
Sulfate ion	mg SO_4^{2-}/l	< 50	< 50	corrosion
M-alkalinity (pH 4.8)	mg $CaCO_3$/l	< 50	< 50	scale
Total hardness	mg $CaCO_3$/l	< 70	< 70	scale
Calcium hardness	mg $CaCO_3$/l	< 50	< 50	scale
Silica ion	mg SiO_2/l	< 30	< 30	scale
Items to be referred to				
Iron	mg Fe/l	< 1.0	< 0.3	corrosion + scale
Copper	mg Cu/l	< 1.0	< 0.1	corrosion
Sulphide ion	mg S^{2-}/l	not detectable	not detectable	corrosion
Ammonium ion	mg NH_4^+/l	< 1.0	< 0.1	corrosion
Remaining chloride	mg Cl/l	< 0.3	< 0.3	corrosion
Free carbide	mg CO_2/l	< 4.0	< 4.0	corrosion
Stability index		–	–	corrosion + scale

1.4 Electrical Checks

Checklist

A checklist of electrical checks is given below:

	Check if …
1	main fuses, earth leak detector and main isolator are installed. An overview of the fuses is given on page 3-19.
2	the main power supply voltage deviates less than 10% from the nominal value.
3	the flow switch and pump contact are properly wired up.
4	the optional wiring for remote indication is installed.
5	the optional wiring for pump start-stop is installed.
6	the optional wiring for remote control is installed. Make sure that the controller is correctly programmed.
7	the flow switch and pump contact are connected in series, so that the unit can only come in operation when the water pumps are running and the water flow is sufficient.
8	the heater tape for the drain system (field supply) is powered up via a separate power supply.

To prevent the evaporator from freezing and to avoid damage to the LCD displays of the digital controller, never switch off the power supply during winter.

2 Test Run & Operation Data

Introduction

The following tables give an overview of the measurements that you can do. Use it as a guideline during commissioning.

For the location of the measurement points we refer to the piping and wiring diagrams in Part 1.

Pressures

Measurement	Value
Suction pressure	1.8 – 4.4 bar (saturated pressure corresponding to leaving chilled water temperature)
Discharge pressure	5.7 – 15.8 bar (saturated pressure corresponding to leaving condenser water temperature)
Maximum water pressure	10 bar

The minimum values are not valid in case of head pressure control.

Temperatures

Measurement	Value
Leaving water temperature	between 4 – 20 °C
Outdoor temperature	between 0 – 43 °C
Temperature difference air side	between 10 – 15 °C
Temperature difference water side	between 3 – 8 °C
Discharge temperature	between 70 – 100 °C

Voltages

Measurement	Value
Power supply voltage	Within ± 10 % of the rated voltage
Phase imbalance	Within ± 2.25 % of the rated voltage
Control circuit voltage	230 VAC for main electromagnetic switches 24 VDC for the controllers

Currents

Unit	Nominal current	Maximum current	Fuses
EUWA(*)40K	71 A	97 A	3x125 aM
EUWA(*)40KX	76(Y1)/130(T1) A	101(Y1)/168(T1) A	3x125(Y1)/3x200(T1) aM
EUWA(*)50K	94 A	125 A	3x160 aM
EUWA(*)50KX	104(Y1)/186(T1) A	126(Y1)/235(T1) A	3x160(Y1)/3x250(T1) aM
EUWA(*)60K	108 A	147 A	3x160 aM
EUWA(*)60KX	114(Y1)/205(T1) A	148(Y1)/270(T1) A	3x160(Y1)/3x315(T1) aM
EUWA(*)80K	142 A	194 A	3x200 aM
EUWA(*)80KX	152(Y1)/260(T1) A	202(Y1)/336(T1) A	3x200(Y1)/3x400(T1) aM
EUWA(*)100K	188 A	250 A	3x250 aM
EUWA(*)100KX	208(Y1)/372(T1) A	252(Y1)/470(T1) A	3x250(Y1)/3x500(T1) aM
EUWA(*)120K	212 A	294 A	3x315 aM
EUWA(*)120KX	228(Y1)/410(T1) A	296(Y1)/540(T1) A	3x315(Y1)/3x630(T1) aM

4

Compressor rotation

Connect your pressure gauges on the suction and the discharge side of the compressor. Start the compressor for about 5 seconds and check if there is a pressure build-up. If not, change two phases of the power supply.

3 Refrigerant R-134a

3.1 What Is in This Chapter?

Introduction

As R-134a, used for EUWA(*)40-120KX, is not on the market for a very long time, we will describe its components and characteristics in this chapter

Overview

This chapter covers the following topics:

3.2 What Is New?

Adapted components

The following components of the chillers are adapted to work with R-134a:

- expansion valves
- dryer: material and shape is changed to increase the capacity
- safety valves: material and the set values are changed
- O-ring in order to withstand R-134a
- pressure switches: set values are changed
- compressor with high pressure =17 bar, low pressure =0.5 bar, bigger diameter of screw rotor in order to increase the pumping volume, different motor windings, insulation and adapted oil supply.

Service tools or equipment in contact with R-22 or mineral oils should not be used on R-134a units and vice versa. Use separate manifolds, charging units, vacuum pump and oil recipients for R-134a and polyester oils.

Humidity control

Ester oil is very hygroscopic. This strong affinity for water increases the water content by hundred PPM in a few hours. While it is very difficult to remove this humidity by means of a vacuum pump, the maximum humidity level is set at 75 PPM after 48 hours operation.

The new filter cores on base of ZEORUM are very sensitive to this humidity. Therefore, a minimum air exposure before installation in the system is a must.

Mineral oil contamination

The maximum contamination of mineral oil in ester oil is 5000 PPM.

Handling R-134a

For more information about the handling of R-134a, refer to ‘Precautions’ on page 5-4.

3.3 Characteristics

Characteristic table

The following table shows the characteristics for R-134a:

Description		
Chemical formula		$CH_2F\text{-}CF_3$
Chemical designation		1.1.1.2-terrafluoroethane
Molar mass	g/mol	102.03
Boiling point at 1.013bar	°C	-26.2
Freezing point	°C	-101
Critical temperature	°C	40.64
Critical pressure (abs.)	bar	0.508
Critical density	kg/l	1.26
Specific heat capacity of the liquid (boiling point)	kJ/(kg.K)	215.5
Heat of vaporization (boiling point)	kJ/kg	14.9
Surface tension (boiling point)	mN/m	1.377
Density of the liquid at boiling point	kg/l	1.207
Density of the liquid at 25°C	kg/l	1.093
Isentropic exponent (30°C,1.013bar)	x	2.2
Solubility in water (25°C,1bar)	g/kg	1.7
Dynamic viscosity (25°C) boiling liquid	mPa.s	0.205
Dynamic viscosity (25°C) saturated vapour	mPa.s	0.012
Thermal conductivity (25°C) boiling liquid	mW/(m.K)	82.3
Thermal conductivity (25°C) saturated vapour	mW/(m.K)	14.3

Data R134a versus R12

The following table compares the working values of R-134a with R-12.The used symbols are:

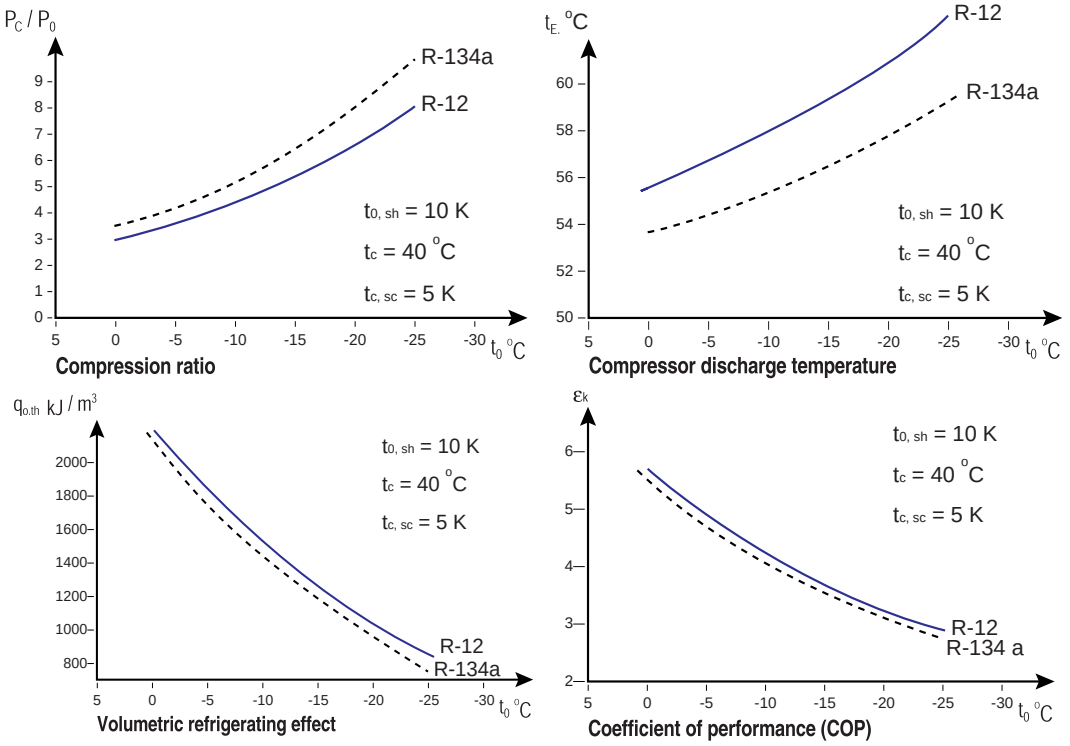
- compression ratio: p_c/p_o
- volumetric refrigerating effect: $q_{0,th}$
- compressor discharge: t_h
- coefficient of performance (COP): ε_k

R-134a				
t_o	p_c/p_o	$q_{0,th}$	t_h	ε_k
°C		kJ/m³	°C	
-25	9.51	748	59.1	2.8
-20	7.63	942	57.7	3.2
-15	6.19	1176	56.5	3.7
-10	5.05	1455	55.4	4.2
-5	4.17	1785	54.5	4.9
0	3.46	2174	53.7	5.8

R-12				
t_o	p_c/p_o	$q_{0,th}$	t_h	ε_k
°C		kJ/m³	°C	
-25	7.78	822	62.6	2.9
-20	6.37	1012	60.8	3.3
-15	5.27	1235	59.3	3.8
-10	4.39	1495	57.9	4.3
-5	3.68	1797	56.6	5.0
0	3.11	2146	55.6	5.8

Diagrams

The following diagrams give a visual view of the comparisons:



Part 5
Maintenance

Introduction

Preventive maintenance should be set up for operation at maximum capacity or to avoid damage. The following chapters explain how to or when to maintain the waterchillers.

What is in this part?

This part contains the following chapters:

1 Maintenance

1.1 What Is in This Chapter

Introduction

As shown in the table below, we have grouped the maintenance in maintenance of the main parts (condenser, compressor and evaporator) and periodical checks.

Overview

This chapter covers the following topics:

1.2 Maintenance of the Main Parts

Precautions

Correct choices and decisions have to be made before any maintenance is done. Opening the refrigerant circuit may cause a loss of refrigerant or system contamination.

- Avoid high gas concentrations.
  While the heavy concentration of the refrigerant gas will raise from the floor level, good ventilation is a must.
- Avoid all contact with open fires or hot surfaces.
  By high temperatures, the refrigerant gas R-134a may decompose into irritating and poisonous gas. Avoid skin and hand contact with the liquid refrigerant and protect your eyes against liquid splashes.

Compressor maintenance

No maintenance is normally required. In case of vibration, check the mechanical operation.
To maintain the oil-level:

Check if...	If not, then...
the oil-level in the sight glass is approximately 3/4 of the sight glass when the compressor is running.	add oil via the stop valve on the bottom section of the oil separator by reducing the air contact to minimum. Reduce the crankcase pressure to 0 before adding oil or use a hand pump.

Do not mix different oils. The oil used for:

- compressor (types EUWA(*)40K and EUWA(*)80K) is SUNISO 4GSD (7.5 l)
- compressor (types EUWA(*)50K, EUWA(*)60K, EUWA(*)100K and EUWA(*)120K) is SUNISO 4GSD (10 l)
- compressor (types EUWA(*)40KX and EUWA(*)80KX) is IDEMITSU FVC68D (10 l)
- compressor (types EUWA(*)50KX, EUWA(*)60KX, EUWA(*)100KX and EUWA(*)120KX) is IDEMITSU FVC68D (13 l)

The compressor suction stop valve, if installed, and discharge stop valve must be closed during service to avoid moisture level increase.

Condenser maintenance

A fouled condenser indicating an abnormally high condensing pressure can result in an increasing power consumption and trip-outs. Verify the saturated condenser pressure temperature difference to the leaving air temperature. If the difference is more than 15°C, clean the outside surface of the condenser by rinsing the coil surface with low pressure fresh water in order to remove possible salt deposits.

Do not damage the fins when cleaning.

Evaporator maintenance

- Inspect the evaporator tubes after the first operating season. This condition indicates the required frequency of cleaning and also whether water treatment is needed in the chilled water circuit.
- Check the air plugs and drain plugs to prevent or detect water leakage.

1.3 Periodical Checks

Electrical checks

Inspection checks and actions	Remarks
Check that all electrical wiring are properly connected and securely tightened.	—
Check the electrical components on damage or loss.	—
Check if the power supply corresponds with the identification label of the unit.	—
Check the operation of the circuit breaker and the earth leak detector of the local supply panel.	—

Refrigerant checks

Inspection checks and actions	Remarks
Check the refrigerant circuit. ■ If the unit leaks, contact your dealer. ■ If the sight glass shows a wet condition or bubbles combined with a full refrigerant charge, then it indicates an refrigerant imbalance or unstable running conditions. If a dry condition is not appeared within 12 operating hours, the filter drier must be changed.	—

Fan check

Inspection checks and actions	Remarks
Clean the cooling ribs of the fan motor if it is dirty.	—

Water checks

Inspection checks and actions	Remarks
Check the water condition. 1. Drain the water from the air release plug. 2. If the water is dirty, replace all the water in the system. 3. Check the water connection.	Dirty water causes a cooling capacity drop as well as corrosion of the water heat exchanger and pipe.

Noise checks

Inspection checks and actions	Remarks
Check for any abnormal noise. 1. Locate the noise producing section and search the cause. 2. If the cause of the noise cannot be located, contact your dealer.	—

5

Appendix A
Photo parts

Introduction

In order to find a visual view of some of the components, the following list will give you the references of the parts according to photos integrated in this manual.

Parts versus photos

The following table shows the page of the photo on which the part is pointed:

Call-outs	See page...
70%	page 1-29
40%	page 1-29
12%	page 1-29
ambient thermistor	page 1-29
charge valve 3/8”	page 1-28
Compressor F-Type	page 1-28
compressors (EUWA(*)80-120K(X))	page 1-27
condensers (EUWA(*)80-120K(X))	page 1-27
connection towards compressor + indication	page 3-13
contactors for star-delta (EUWA(*)80-120K(X))	page 1-32
controller	page 1-32
digital controller	page 2-17
discharge safety valve	page 3-13
discharge shut off valve	page 1-28
discharge temperature protector	page 2-14
emergency stop	page 3-13
evaporator	page 1-28
expansion valve	page 1-28
fan contactors (EUWA(*)80-120K(X))	page 1-32
fans (EUWA(*)80-120K(X))	page 1-27
field wiring	page 1-43
filter drier	page 1-28
high pressure service port	page 3-13

Call-outs	See page...
high pressure switch 1	page 3-13
high pressure switch 2	page 3-13
high pressure transmitter	page 1-28
inlet water	page 1-28
inlet water temperature sensor	page 1-28
liquid line solenoid valve	page 1-28
liquid stop valve	page 1-28
low pressure service port	page 1-28
low pressure transmitter	page 1-28
moisture indicator	page 1-28
oil drain of charge valve	page 1-28
oil filter	page 3-31
oil separator	page 1-28 and page 3-31
outlet water connection	page 1-29
outlet water temperature sensor	page 1-29
outlook chiller EUWA(*)80-120K(X)	page 1-15
overcurrent + reset	page 3-13
PCB	page 1-32 and page 1-34
power supply covers	page 3-13
S3T (bimetal)	page 2-14
schroeder valve	page 3-28
sight glass	page 1-28
star-delta configuration	page 3-13
unloader valves	page 1-28

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Appendix B
Drawings

Introduction

In order to find quickly the drawings inserted in this manual, appendix B offers a list with all the drawings.

Drawings table

The following table shows the page and description of all the drawings:

Call-outs	See page...
coefficient of performance (R-134a versus R-12)	page 4-14
compression ratio (R-134a versus R-12)	page 4-14
compressor discharge temperature (R-134a versus R-12)	page 4-14
Fans location	page 2-9
Fan control procedure	page 2-8
Front panel of the digital controller	page 2-18
Functional diagram EUWA(*)40-60K	page 1-22
Functional diagram EUWA(*)80-120K	page 1-23
Functional diagram EUWA(*)40-60KX	page 1-24
Functional diagram EUWA(*)80-120KX	page 1-25
Heatertape procedure	page 2-15
Inlet water temperature control	page 2-6 and page 2-28
Input route	page 3-18
Installation outline	page 3-18
Location in switchbox EUWA(*)40-60K(X)	page 1-44
Location in switchbox EUWA(*)80-120K(X)	page 1-45
Location in wiring diagram EUWA(*)40-60K(X)	page 1-44
Location in wiring diagram EUWA(*)40-60K(X)	page 1-45
Main board EUWA(*)40-120K(X)	page 1-34
Operation range EUWA(*)40-120K	page 2-4
Operation range EUWA(*)40-120KX	page 2-4
Outlet water temperature control	page 2-6 and page 2-28
Outlook EUWA(*)40-60K	page 1-14

Call-outs	See page...
Outlook EUWA(*)80-120K	page 1-15
Outlook EUWA(*)40-60KX	page 1-16
Outlook EUWA(*)80-120KX	page 1-17
Output route	page 3-18
PCB	page 1-34
Programming procedure	page 2-23
Screen detail of the digital controller	page 2-18
Start-up of the compressor	page 2-9
Switch box EUWA(*)40-60K(X)	page 1-33
Switch box EUWA(*)80-120K(X)	page 1-33
T-device between PCB A and PCB B	page 1-39
Typical installation outline	page 1-19
Volumetric refrigerating effect (R-134a versus R-12)	page 4-14
Wiring diagram EUWA(*)40-60K(X)	page 1-41
Wiring diagram EUWA(*)80-120K(X)	page 1-42

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