



AKL

COOLING UNITS FOR WATER-BASED FLUIDS SERIES C

DESCRIPTION

The AKL cooling unit series achieves high energy-saving performance thanks to its built-in DAIKIN original IPM motor inverter controlled. The IPM motor allows for very accurate temperature control. The power consumption can be monitored on the control panel. The AKL cooling units are available as basic or configurable models, with pump and tank either integrated or external.

These cooling units can control the temperature in three ways:

- Set the fluid temperature according to the ambient temperature or to the machinery temperature
- Hold the fluid temperature constant
- Cool the fluid at constant cooling capacity

An auto-tuning function that automatically sets the control gain according to the system installed (water volume in the tank, piping, etc.) reduces adjustment time significantly at the trial run.

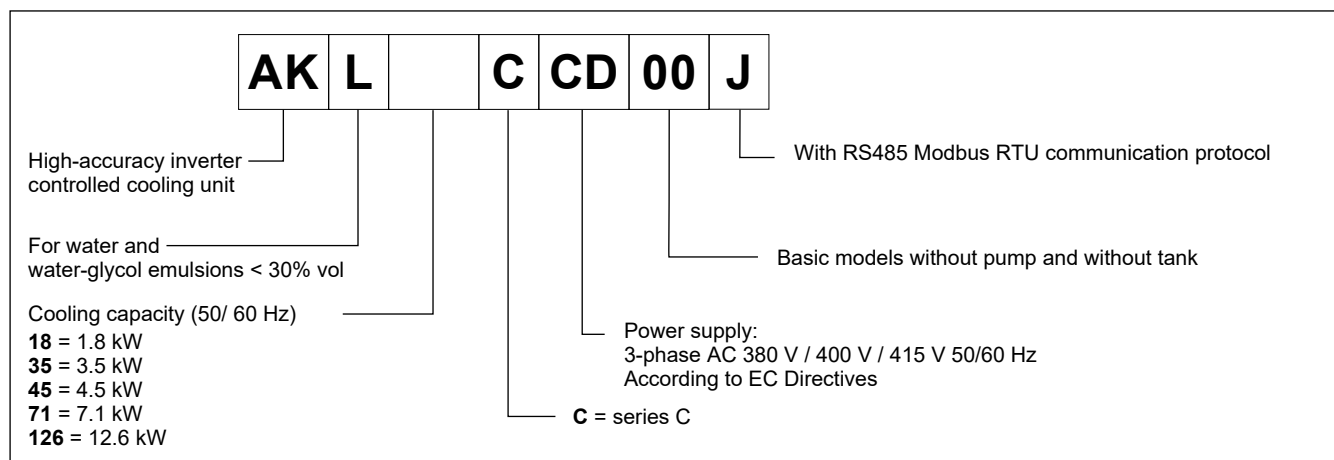
The AKL cooling units are perfect in applications that demand a strict control of the temperature, such as machining centres, NC lathes, semiconductor production equipment, laser cutting machines/laser oscillators, electrical discharge machines, beam welding machines and medical equipment.

MAIN CHARACTERISTICS

Cooling capacity range 50/60 Hz	kW	1.8 ÷ 12.6 (see detailed specifications at points 2, 12 and 18)
Accuracy of the temperature control	°C	±0.1 (load range from 0% to 100%)
Supply power voltage main circuit operating circuit		three-phase AC 380/400/415 V ±10% 50/60Hz 12/24 V DC
Power consumption (400V 50/60Hz)	kW	0.99 ÷ 5.92 (see detailed specifications at points 2, 12 and 18)
Current consumption (400V 50/60Hz)	A	2.1 ÷ 11.4 (see detailed specifications at points 2, 12 and 18)
Admitted fluids		purified water for industrial purpose, ethylene glycol emulsion (30 vol% or less)
Ambient operating temperature	°C	+5 to +45
Evaporator outlet fluid temperature	°C	+5 to +45
Refrigerant gas		R454C contained in a hermetically sealed circuit
Relative humidity range	%RH	20 ÷ 85
Protection class Electric component housing		IP2X IP54 with proper cable glands and connectors

1 - IDENTIFICATION CODE FOR BASIC MODELS, WITHOUT PUMP AND WITHOUT TANK

NOTE: Models with pump and tank are illustrated starting from page 12.



2 - SPECIFICATIONS FOR BASIC MODELS, WITHOUT PUMP AND WITHOUT TANK

		AKL18	AKL35	AKL45	AKL71	AKL126
Cooling capacity at standard point (NOTE 1)	kW	1.8	3.5	4.5	7.1	12.6
Cooling capacity at reference point (NOTE 1)	kW	1.6	2.9	4.0	6.0	10.7
Supply power		three-phase AC 380/400/415 V ±10% 50/60Hz				
Supply voltage main circuit control circuit		three-phase AC 380/400/415 V ±10% 50/60Hz 12/24 V DC				
Max power consumption (400V 50/60 Hz)	kW	0.99	1.73	1.83	3.92	5.17
Max current consumption (400V 50/60 Hz)	A	2.1	3.4	3.6	7.8	9.6
Compressor (hermetic DC swing type)	kW	0.4 max	0.75 max	1.1 max	1.5 max	2.2 max
Evaporator		brazed plate type				
Condenser		cross-fin coil type				
Propeller fan motor		Ø240, 54 W	Ø300, 54 W		Ø400, 100 W	Ø455, 100 W
Refrigerant control		Compressor rotation control via inverter + electronic expansion valve opening				
Refrigerant gas R454C (NOTE 2) refrigerant charge CO ₂ equivalent	kg t	0.50 0.08	0.90 0.14	1.00 0.15	1.12 0.17	1.61 0.24
Cooling fluid withstand pressure	bar	5			10	
Circulating volume rated range	l/min	10 6 ÷ 15	15 10 ÷ 20	15 10 ÷ 30	25 13 ÷ 30	40 25 ÷ 45
Noise level (front 1 m, height 1.55 m)	dB(A)	62	63	64	67	69
Applicable fluid		purified water for industrial purpose, ethylene glycol emulsion (30 vol% or less)				
Exterior colour		Ivory white				
Net weight / transport weight	kg	42	47	48	73	91
Operating weight		43	48	49	75	93
ELCB (mandatory, in the customer's charge)	A	10			20	

NOTE 1: Cooling capacity values are specified with water as the circulating fluid at the rated flow rate and 1 atm, at the standard point (outlet fluid temperature: 25 °C, room temperature: 25 °C) and the reference point (outlet fluid temperature: 20 °C, room temperature: 35 °C).
Product tolerance: approx. ±5%. Cooling capacity decreases when using ethylene glycol solution.

NOTE 2: R454C refrigerant contained in a fully hermetic circuit. SDS (Safety Data Sheet) supplied. GWP: 146. 'Global Warming Potential' (GWP) is defined as the climate impact of 1 kg of refrigerant if released into the atmosphere, expressed in tonnes of CO₂ equivalent over a 100-year time horizon.

3 - TEMPERATURE CONTROL MODES

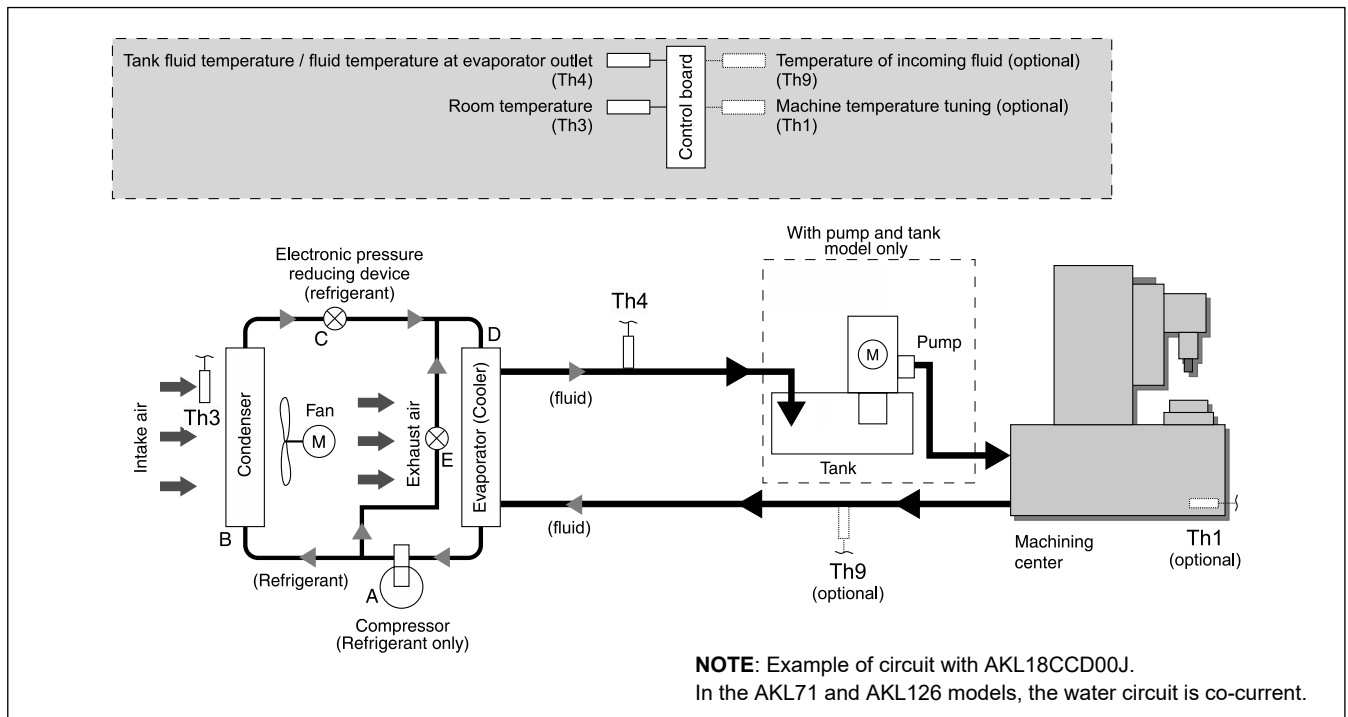
The AKL cooling units can control the temperature of the fluid in three different modes, thanks to the thermistors located along the fluid circuit.

- Set the fluid (water) temperature according to the ambient temperature (standard mode).
Control is done by keeping a constant temperature difference between the evaporator outlet fluid temperature and the ambient temperature. The AKL71 and AKL126 cooling units, unlike other models, are equipped with a thermistor at the evaporator inlet and are therefore factory-set using the inlet fluid temperature as a reference. By installing optional thermistors on the machinery or on the fluid piping, other control modes are possible.
The setting range is $\pm 9.9\text{ }^{\circ}\text{C}$ relative to the reference temperature.
- Hold the fluid (water) temperature constant:
Control is achieved by maintaining the control target at a constant temperature.
The setting range is $5 + 45\text{ }^{\circ}\text{C}$
- Cool the fluid at constant capacity
The temperature control is disabled. Cooling is based on the cooling capacity, set via the control command. This mode is useful during commissioning, maintenance, etc.
The setting range is $0 + 100\%$.

Some operating modes require an additional thermistor to be installed directly on the machinery to be cooled or positioned along the fluid circuit. These thermistors must be ordered separately, and their installation is the responsibility of the customer. See point 23.

The operating mode can be selected from the control panel. For detailed information, please refer to the *Instruction Manual*.

4 - SYSTEM OUTLINE



4.1 - Refrigeration circuit

- Compression:** the compressor increases the pressure and temperature of the refrigerant gas, directing it towards the condenser. Thanks to inverter technology, the compressor varies its rotational frequency based on the thermal load of the application. This modulates the refrigerant flow rate in real time, optimising energy consumption.
- Condensation:** within the air-cooled condenser, the refrigerant rejects heat to the ambient air, changing from a gaseous to a liquid state and accumulating the energy required for the process.
- Expansion:** the electronic expansion valve drastically reduces the pressure of the liquid. This transforms the refrigerant into a cold, low-pressure mixture optimized to ensure maximum heat transfer in the next stage.
- Evaporation:** the main heat transfer takes place inside the evaporator, where the refrigerant absorbs heat from the process fluid, cooling it down. During this phase, the refrigerant evaporates completely and returns to the compressor as a gas.
- Load Modulation (HGB Bypass):** to ensure maximum temperature stability under minimal loads, a hot gas bypass valve partially modulates the chiller's capacity in combination with the inverter, preventing continuous compressor start/stop cycles.

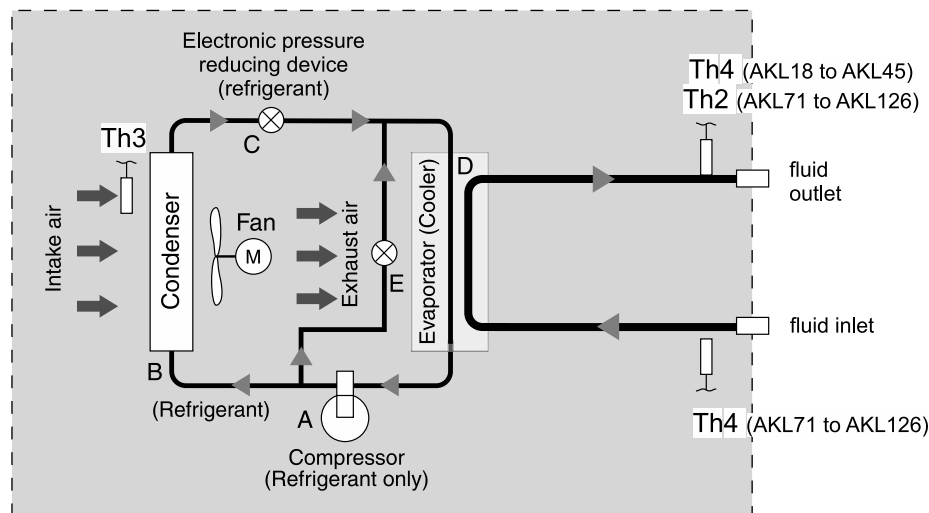
4.2 - Process fluid circuit

The fluid to be cooled enters the evaporator directly from the supply line. Once cooled, the fluid is returned to the main machine; any pump and tank are located downstream of the cooling process (pump and tank can be built-in or customer-supplied, depending on the model).

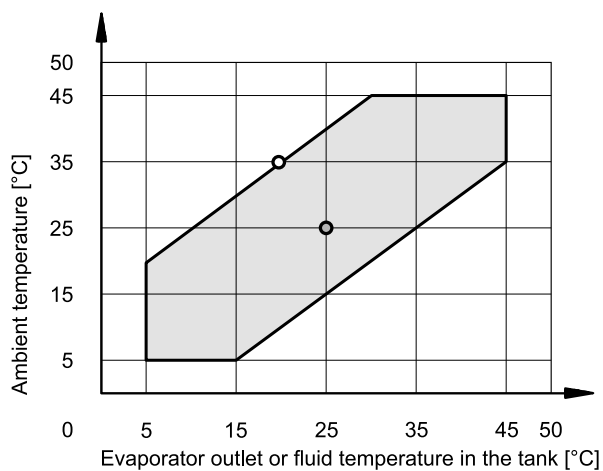
5 - CIRCUIT DIAGRAM

5.1 - Basic model

In the AKL71 and AKL126 models, the water circulates in co-current flow with the refrigerant circuit, and a thermistor is also present on the inlet piping.



6 - OPERATING TEMPERATURE RANGE



- Admissible operating temperature range. Operation outside of this range may cause unit failure.
- Standard point (fluid temperature and ambient temperature 25 °C)
 - Reference point (fluid temperature 20 °C and ambient temperature 35 °C)

6.1 - Applicable fluids

Use only industrial purified water that meets the standards specified below (including the dilution of the ethylene glycol solution).

The water quality guidelines were established by the Japan Refrigeration and Air Conditioning Industry Association (JRAIA) in the document JRA-GL-02-1994.

Although the parameters meet the water quality requirements, total prevention of corrosion cannot be guaranteed.

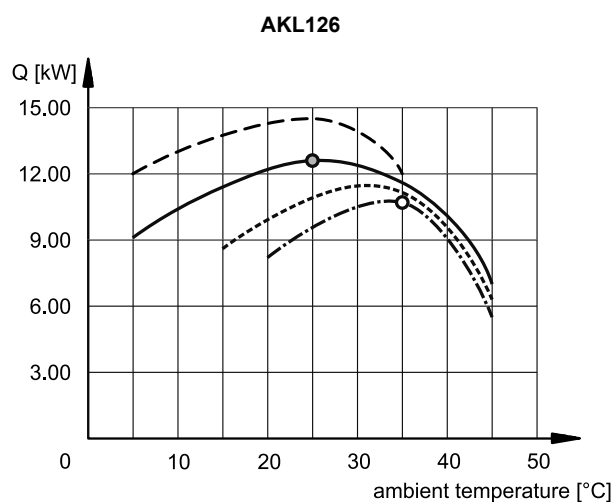
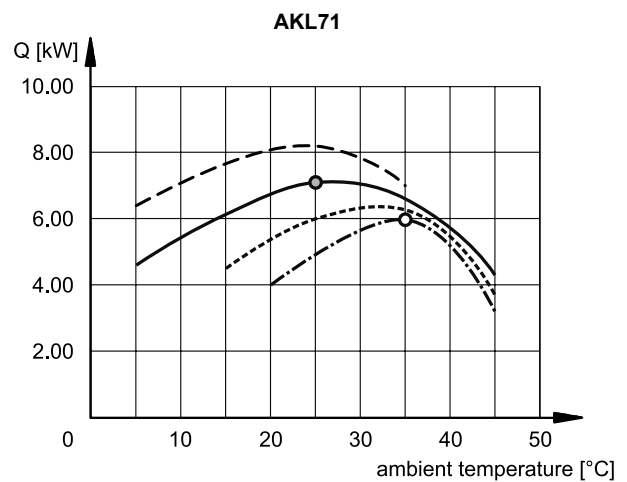
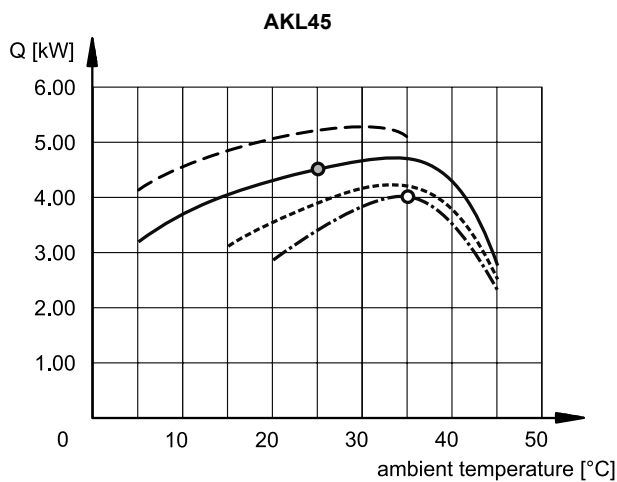
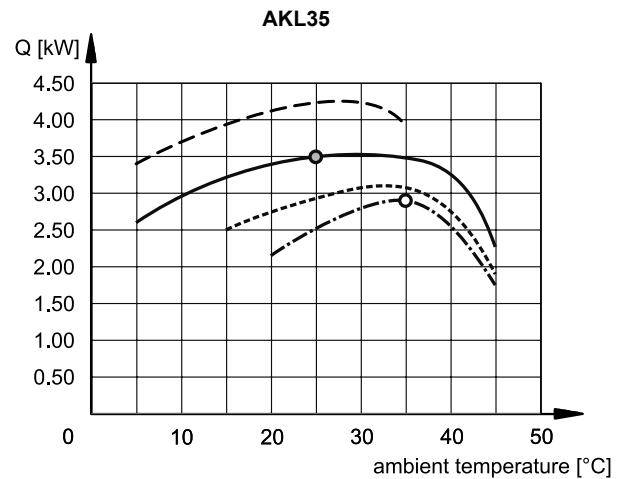
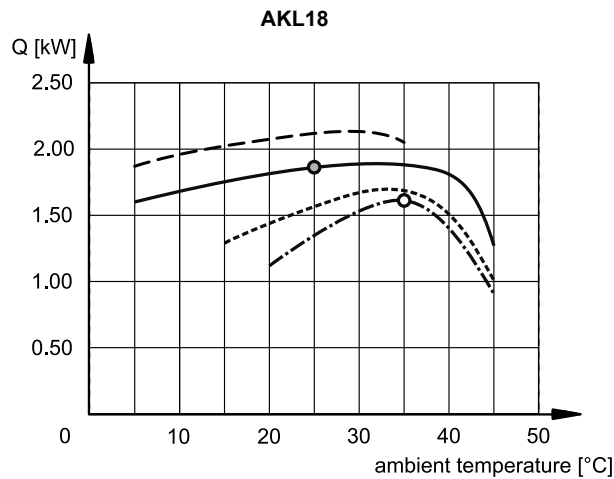
	Item		Unit	Standard Value	Tendency	
					Corrosion	Scale Generation
Standard parameters	pH (25°C)		-	6.0 to 8.0	■	■
	Electrical conductivity (25 °C)		mS/m	max 30	■	■
	Chloride ion	Cl ⁻	mg/l	max 50	■	
	Sulfate ion	SO ₄ ²⁻		max 50	■	
	Acid consumption (pH 4.8)	CaCO ₃		max 50		■
	Total hardness	CaCO ₃		max 70		■
	Calcium hardness	CaCO ₃		max 50		■
	Ionic silica	SiO ₂		max 30		■
Reference parameters	Iron	Fe	mg/l	max 0.3	■	■
	Copper	Cu		max 0.1	■	
	Sulfate ion	S ²⁻		not to be detected	■	
	Ammonium ion	NH ₄ ⁺		max 0.1	■	
	Residual chlorine	Cl		max 0.3	■	
	Free carbon dioxide	CO ₂		max 4.0	■	

7 - CHARACTERISTICS OF THE BASIC MODELS, WITHOUT PUMP AND WITHOUT TANK

Values obtained and rated at the standard point. Fluid used: H₂O.

7.1 - Temperature control

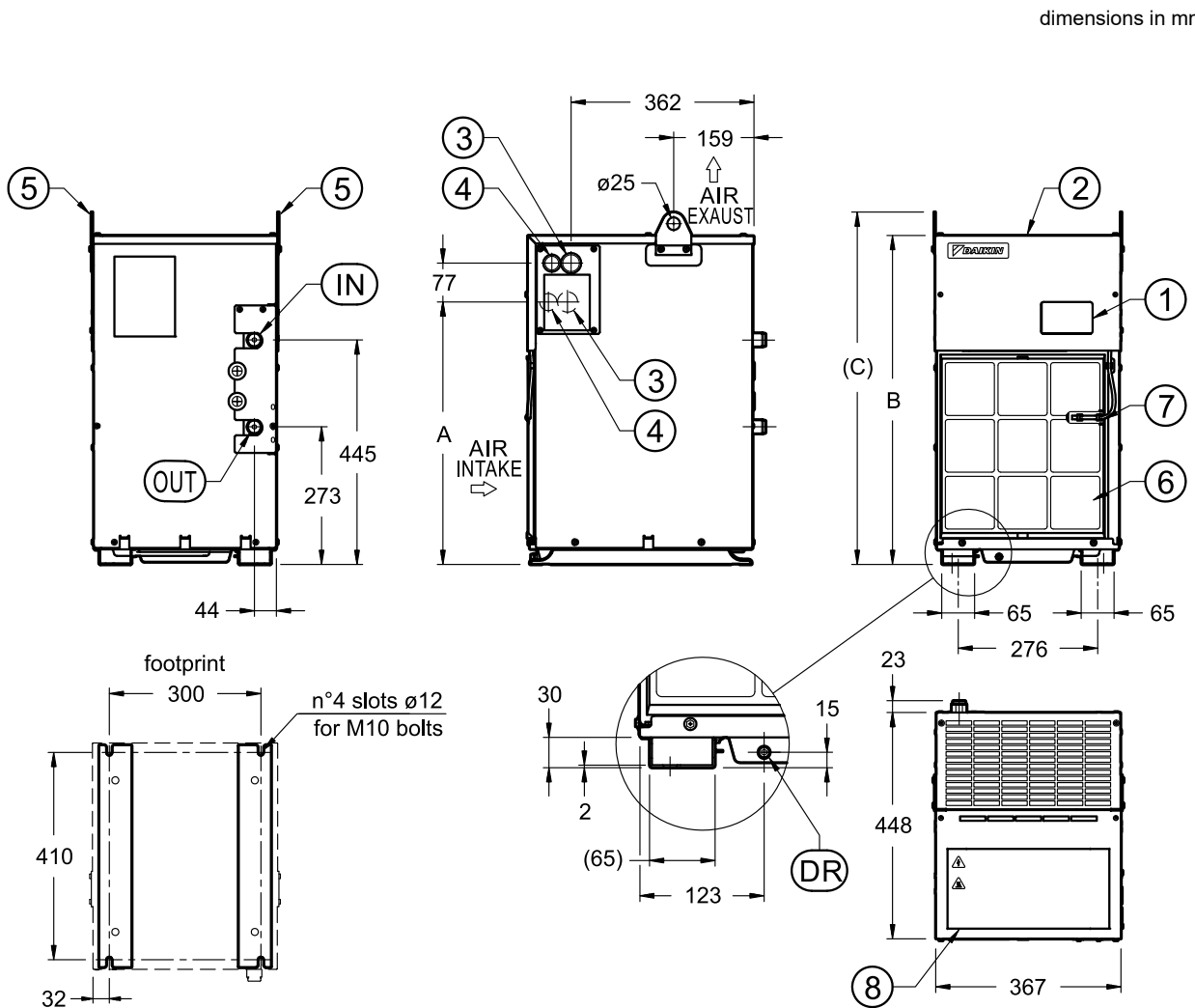
Cooling capacity (kW) as a function of ambient temperature.



- H₂O temperature = ambient temperature
- - - H₂O temperature = ambient temperature +10 °C
- ... H₂O temperature = ambient temperature -10 °C
- · - · H₂O temperature = ambient temperature -15 °C
- standard point (H₂O temperature and ambient temperature 25 °C)
- reference point (H₂O temperature 20 °C and ambient temperature 35 °C)

8 - OVERALL DIMENSIONS AND MOUNTING - BASIC MODELS, WITHOUT PUMP AND WITHOUT TANK

8.1 - AKL18CCD00J, AKL35CCD00J and AKL45CCD00J



	AKL18	AKL35	AKL45
A	520	645	745
B	650	775	875
C	700	825	925

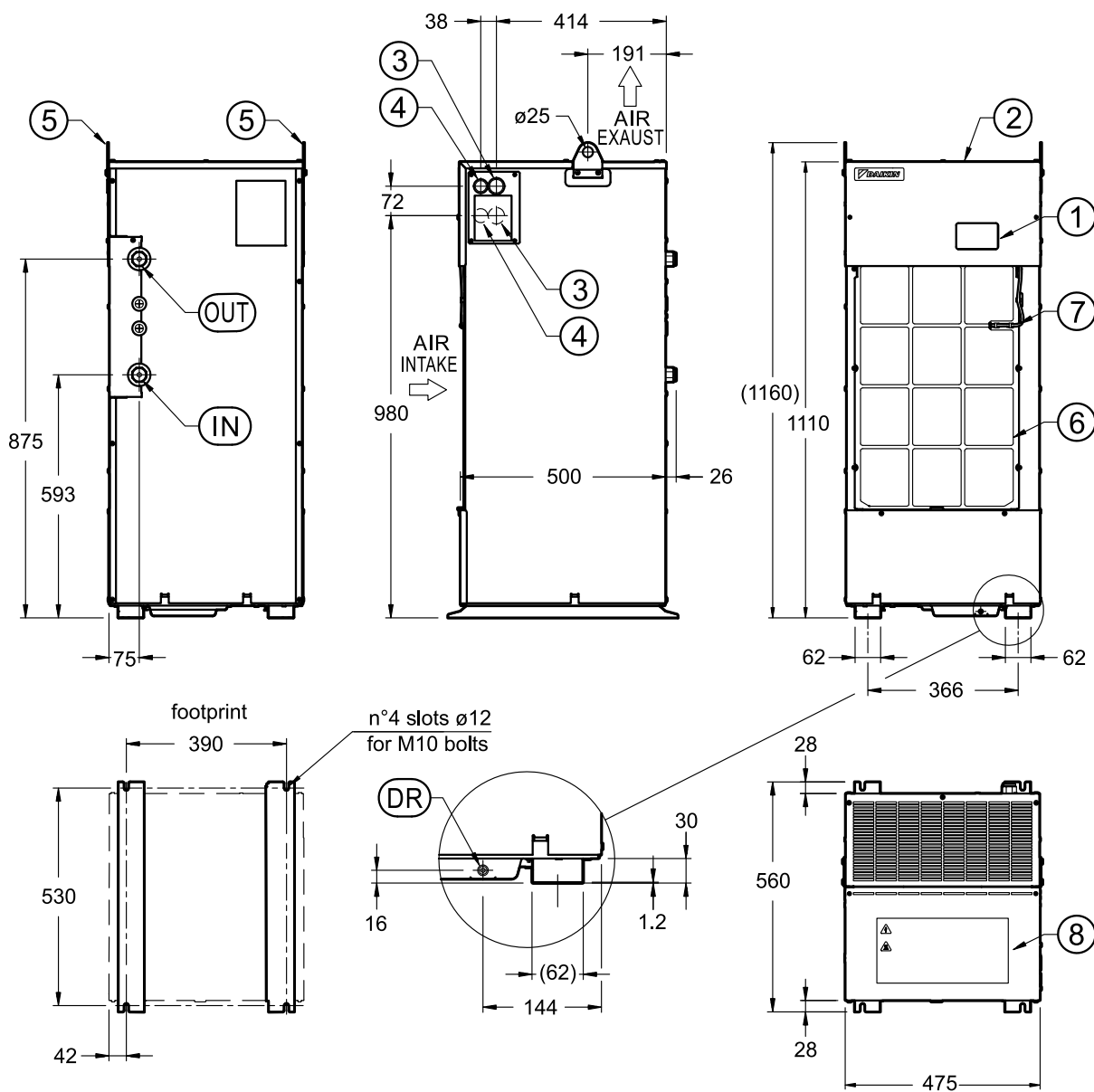
NOTE 1: Do not place objects that could obstruct or reduce the airflow within 50 cm of the intake and discharge openings.

NOTE 2: BSP fittings are available separately, see point 23.

IN	Fluid inlet: 1/2" Rc
OUT	Fluid outlet: 1/2" Rc
DR	Drain pan (M6 plug)
1	Control panel
2	Switch box cover
3	Power cable entry Ø28 mm (right/left)
4	Signals cable entry Ø22 mm (right/left)
5	Eye plate for handling
6	Air filter
7	Th3 thermistor (ambient temperature)
8	Wiring diagram label inside

8.2 - AKL71CCD00J

dimensions in mm



NOTE 1: Do not place objects that could obstruct or reduce the airflow within 50 cm of the intake and discharge openings.

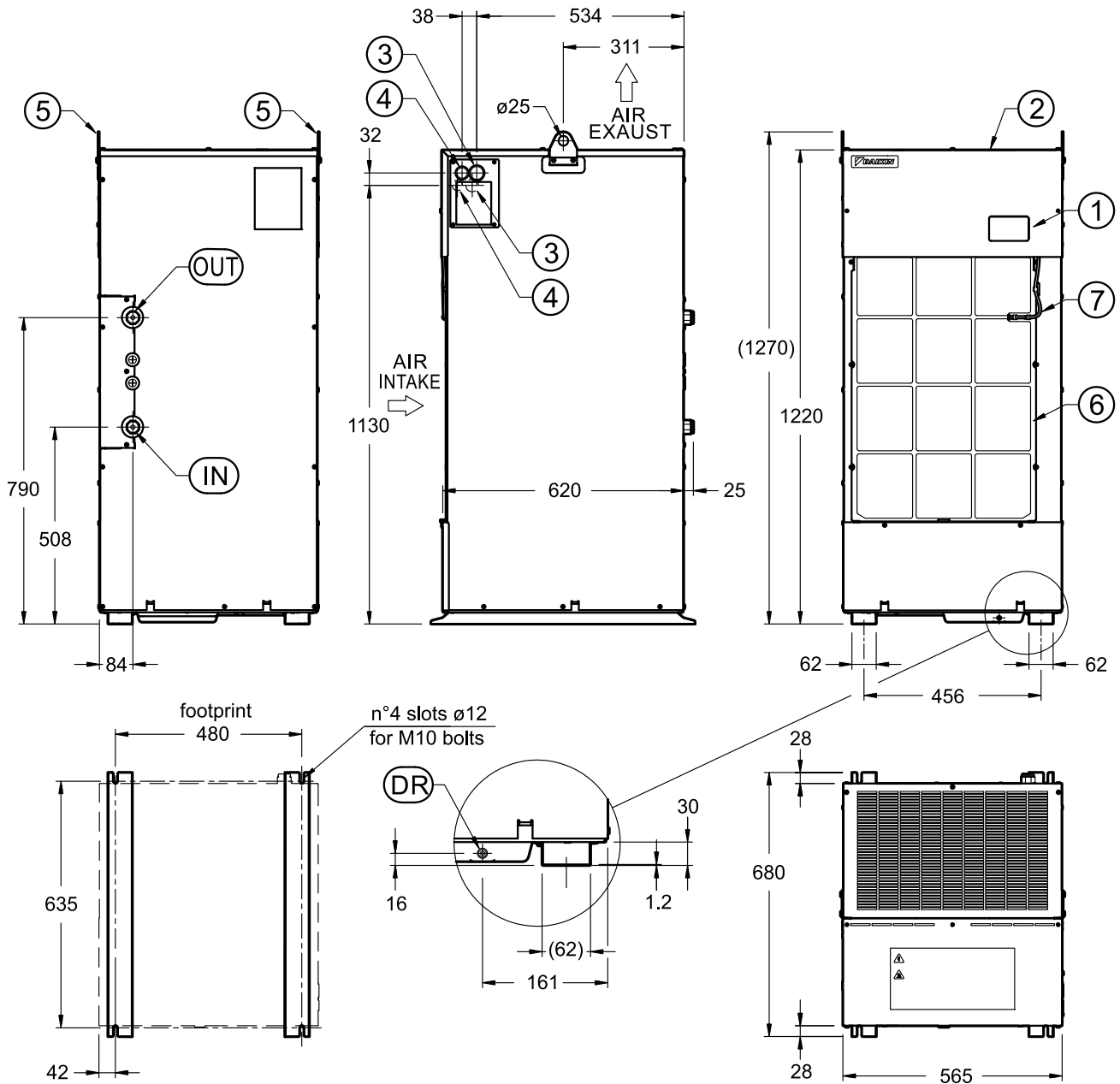
NOTE 2: BSP fittings are available separately, see point 23.

IN	Fluid inlet: 3/4" Rc
OUT	Fluid outlet: 3/4" Rc
DR	Drain pan (M6 plug)
1	Control panel
2	Switch box cover

3	Power cable entry Ø28 mm (right/left)
4	Signals cable entry Ø22 mm (right/left)
5	Eye plate for handling
6	Air filter
7	Th3 thermistor (ambient temperature)
8	Wiring diagram label inside

8.3 - AKL126CCD00J

dimensions in mm



NOTE 1: Do not place objects that could obstruct or reduce the airflow within 50 cm of the intake and discharge openings.

NOTE 2: BSP fittings are available separately, see point 23.

IN	Fluid inlet: 3/4" Rc
OUT	Fluid outlet: 3/4" Rc
DR	Drain pan (M6 plug)
1	Control panel
2	Switch box cover

3	Power cable entry Ø28 mm (right/left)
4	Signals cable entry Ø22 mm (right/left)
5	Eye plate for handling
6	Air filter
7	Th3 thermistor (ambient temperature)
8	Wiring diagram label inside

9 - EMC 2014/30/EU COMPLIANCE

The AKL cooling units are classified as over-voltage category III.



Connect a dedicated earth leakage circuit breaker (ELCB) of suitable rating, provided by the customer, to the cooling unit power supply. When a moulded case circuit breaker (MCCB) is used, additional earth leakage protection measures shall be provided.



A protective earth conductor shall be installed. Because the cooling unit is equipped with a noise filter, the absence of a protective earth connection may result in an electric shock hazard.



Before opening the electrical panel cover, **disconnect the power supply and wait at least 5 minutes to allow the internal high-voltage circuits to discharge completely**. Do not energise the unit while the electrical panel is open.

To avoid the effects of potential electrical interference, cut the power cable to an appropriate length, cut the power cable to an appropriate length and prevent excess cable from coming into contact with the control circuit board or other internal components.

10 - WIRING

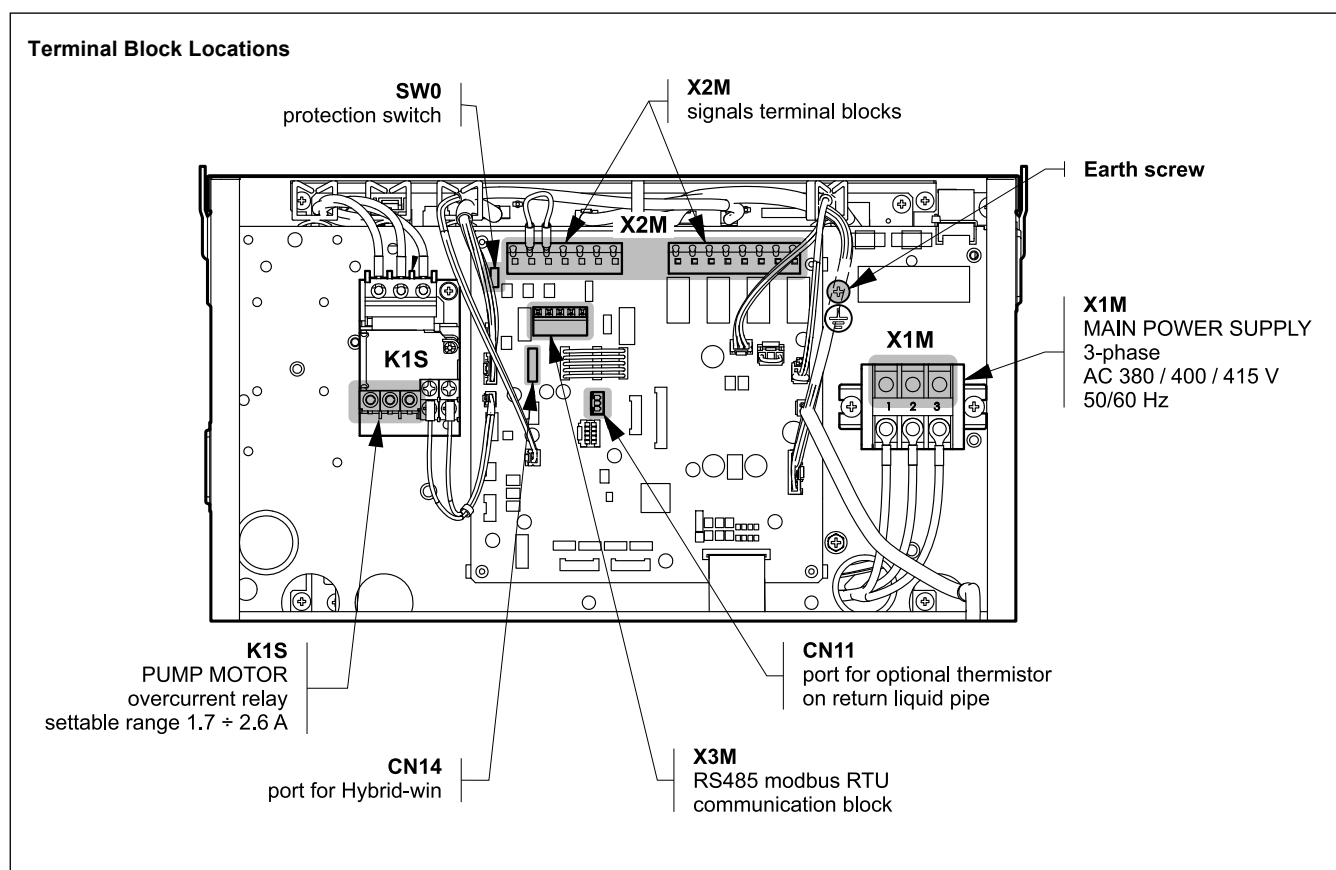
Remove the electrical panel cover to access the electrical enclosure. Keep the special fixing screws for reassembly and take care not to damage the sealing gasket located on the edge of the cover.

Use cable glands and cables rated IP54 or higher to ensure that the electrical panel maintains an IP54 degree of protection.

The main power supply (X1M), pump (K1S), signal terminal block (X2M) and RS485 communication with the main machine (X3M) shall be connected by the customer.



Refer to the *Instruction Manual* and to the *PIM00605 Modbus Communication Function Instruction Manual* for wiring details.



10.1 - Earth Screw

Connect the earth cable to the earth terminal. Use a green/yellow earth cable.

10.2 - Main Power Supply (X1M)

AKL71 and AKL126: M5 screw terminal. Use 4-core cables with a cross section of $\geq 4 \text{ mm}^2$.

Other models: M4, M5 screw terminals. Use 4-core cables with a cross section of $\geq 2.5 \text{ mm}^2$.

10.3 - Pump Motor (K1S)

M3.5 screw terminals. Use ring terminals without soldering and cables with a cross section of $\geq 1.5 \text{ mm}^2$.

10.4 - Signal Terminal Block (X2M)

Use twisted 2-core cables with a cross-sectional area of 0.5 to 1.5 mm^2 and suitable pin ferrules. If stripped conductors are used, remove 9 to 10 mm of insulation. For thermistors with cable lengths exceeding 10 m, shielded cables shall be used in areas with electrical noise.

Wiring of the signal terminal block X2M, customer side		
	9	Unassigned (Do not connect)
	10	Remote control short-circuited at factory
	11	
	12	Optional protection equipment (OP)
	13	
	30	Optional Th1 thermistor for machine synchronization mode
	31	
	60	Normal
	61	
	62	
	63	
	64	Warning output
	65	
	66	Warning output
	67	

load	function / notes
NC	Unused
min load: 12 V DC 5 mA	Remote control. Remove the factory-installed short-circuit link between [10] and [11] and install an operation switch (customer's charge) The cooler can trigger an alarm upon receiving a signal from external protection devices (e.g. flow switch, level switch). Parameter [n002].
	Use a shielded cable for thermistors with a cable length exceeding 10 m and in environments subject to electromagnetic noise.
min load: 10 mV DC 10 µA max load: 30 V DC, 2A	The alarm signal is triggered based on the value set in parameter [n001]. Contact capacity 30 V DC, 2A. Refer to the <i>instruction manual</i> to configure the options
NC	Unused
min load: 10 mV DC 10 µA max load: 30 V DC, 2A	The warning signal depends on the value of parameter [n001], for normal status (RUN), first-level warning (LOCK), second-level warning, and power failure (POWER FAILURE)

10.5 - Main Machine Communication (X3M)

The RS485 communication interface, with integrated termination resistor, enables communication with supervisory systems such as PLCs, HMIs and industrial computers.

The maximum communication cable length is 200 m. Communication is based on the Modbus RTU protocol.

The cooling unit operates as a Modbus slave device.

Please refer to the *Modbus Communication Function Instruction Manual* for detailed information.

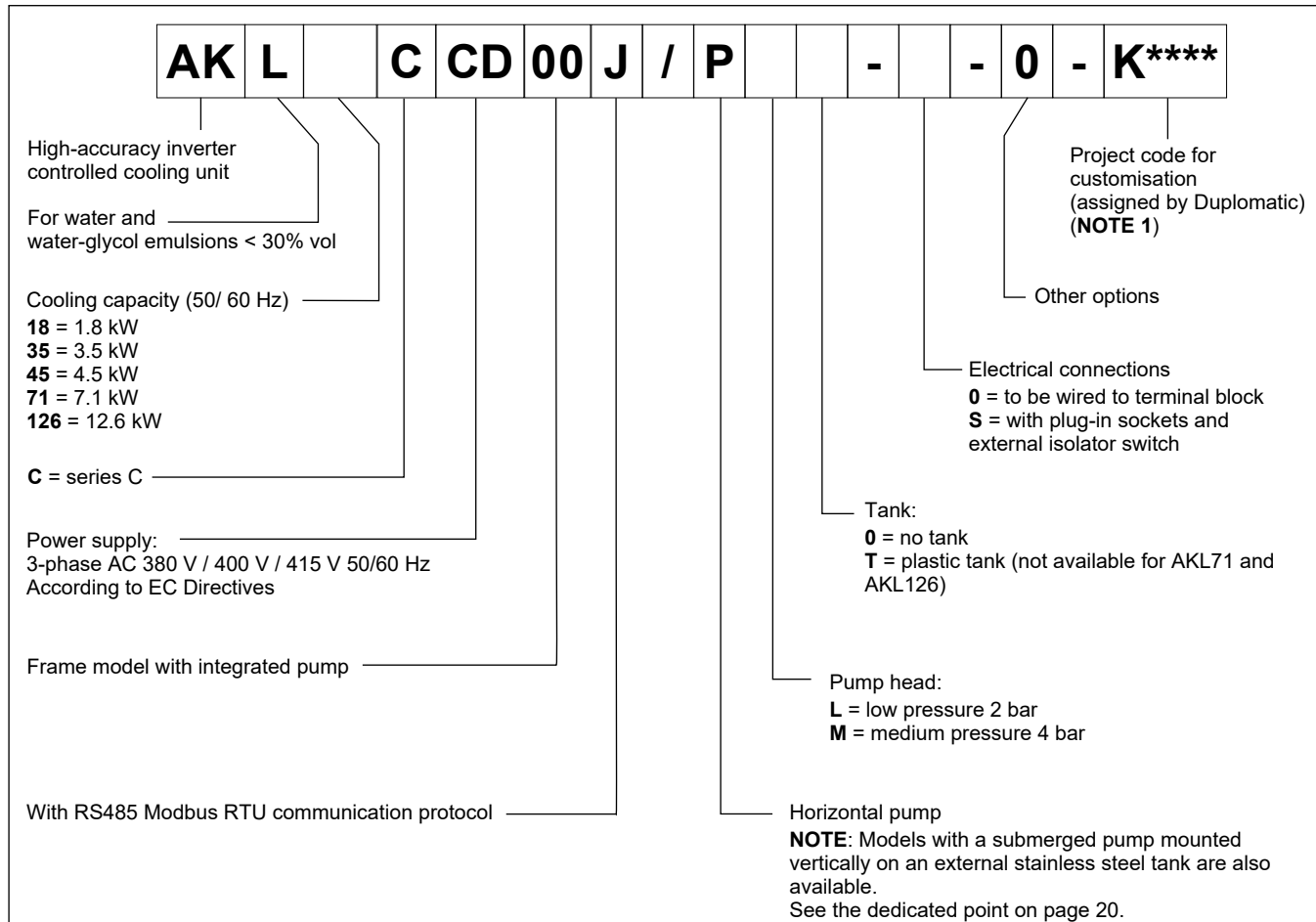
10.6 - Optional Thermistor Connection on Return Pipe (CN11)

Connect the optional thermistor cable to the CN11 port.

10.7 - Error Prevention Switch (SW0)

The AKL cooling units are equipped with an error prevention/protection switch (SW0) to disable settings from the control panel. The default setting for this switch is OFF, but some non-standard units may be set to ON.

11 - IDENTIFICATION CODE - CONFIGURABLE MODELS WITH INTEGRATED PUMP



NOTE 1: Customised Options

The cooling unit can be customised according to the customer's requirements by liaising with the pre-sales service.

Customisations include the installation of optional protection devices (flow switch, level switch, pressure gauge on pump outlet), castors, Rc / BSP adapter fittings, wiring of optional thermistors supplied by us, and programming different from the factory standard.

Separately available for purchase are: the plug for the Modbus communication socket, adapter fittings, long-life filters, and the cable kit for connection with Hybrid Win software. See catalogue 90 661 - AK* ACCESSORIES.

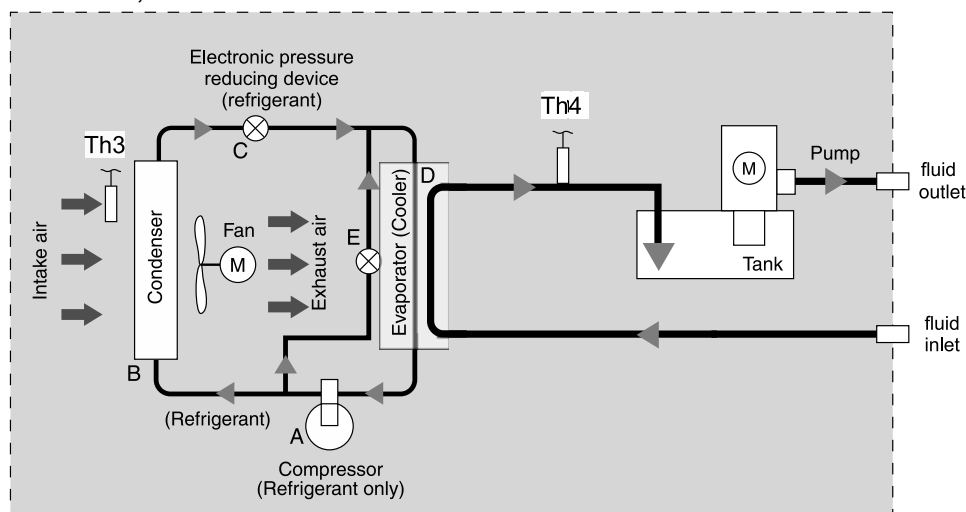
12 - SPECIFICATIONS FOR CONFIGURABLE MODELS WITH INTEGRATED PUMP

NOTE: The value refers to the motor pump only. Add this value to the one shown in the specifications table on page 2 to obtain the total power consumption of the chiller. Refer to the same table for any specifications not listed here.

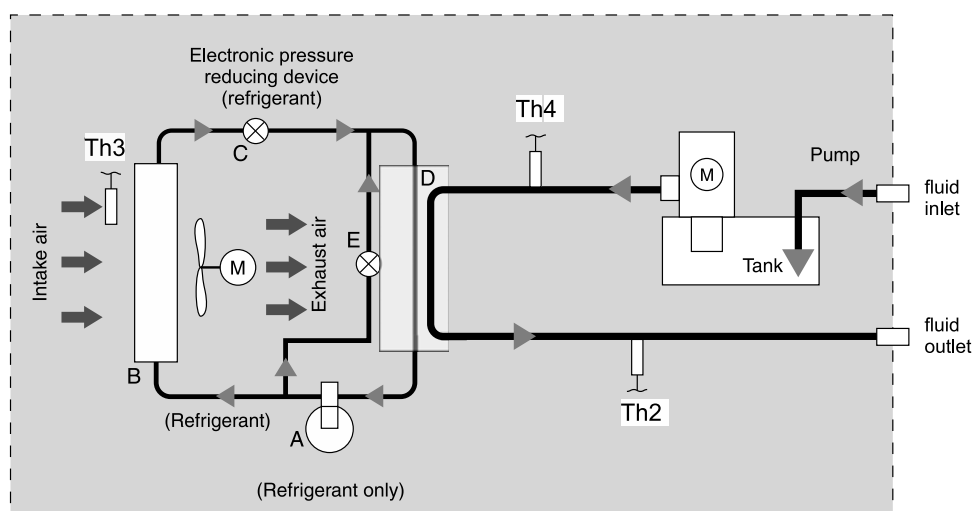
		AKL18	AKL35	AKL45	AKL71	AKL126
Power supply		three-phase AC 380/400/415 V $\pm 10\%$ 50/60Hz				
L-type motor pump input power (NOTE)		0.45 kW / 1 A				
M-type motor pump input power (NOTE)		0.55 kW / 1.2 A				0.75 kW / 1.8 A
Circulating volume rated range	l/min	10 6 ÷ 15	15 10 ÷ 20	15 10 ÷ 30	25 13 ÷ 30	40 25 ÷ 45
Nominal head 50/60 Hz: L-type pump M-type pump	m	28 / 38 35 / 48	26 / 37 34 / 46	26 / 37 34 / 46	24 / 36 30 / 42	20 / 30 34 / 52
T-type tank volume	l	7	7	7	-	-
Weight with L-type pump net / transport operating	kg	68 76	73 81	74 82	83 88	101 106
Weight with M-type pump net / transport operating	kg	68 76	73 81	74 82	84 89	104 109

13 - CIRCUIT DIAGRAM OF CONFIGURABLE MODELS

13.1 - AKL18, AKL35 and AKL45



13.2 - AKL71 and AKL126

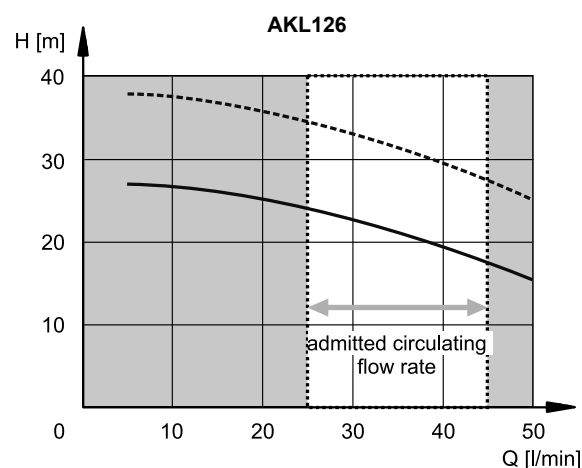
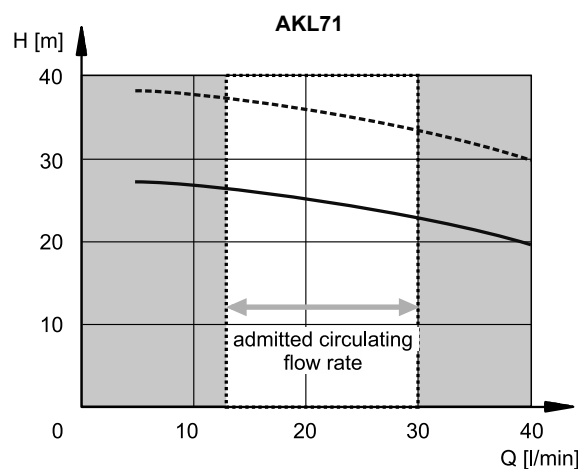
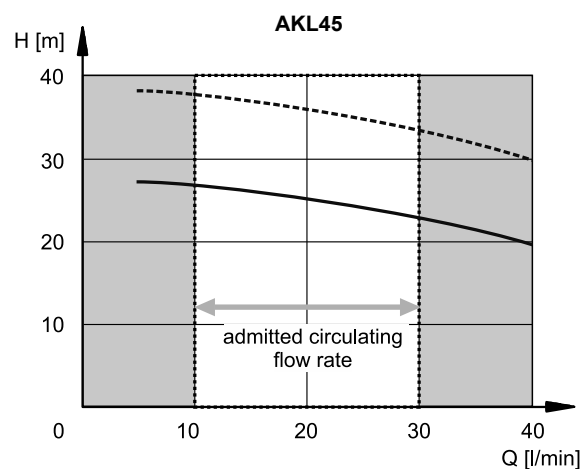
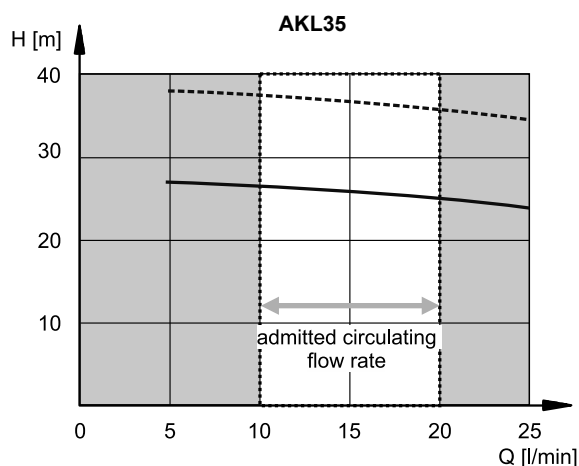
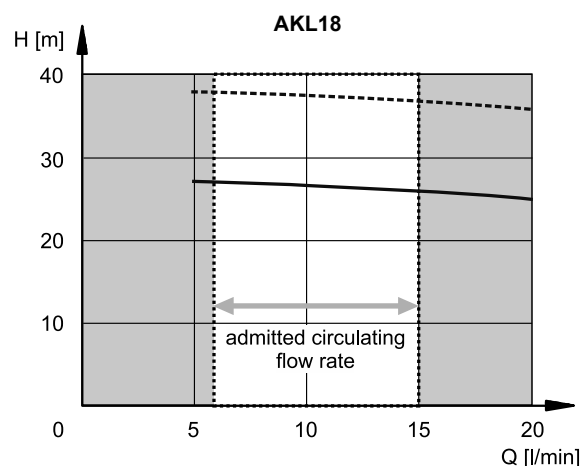


14 - PUMP FLOW RATE CHARACTERISTICS - CONFIGURABLE MODELS WITH INTEGRATED PUMP AND TANK

14.1 - L-type pump

The diagrams show the performance curves of AKL chillers with the dual-frequency L-type pump at 50 Hz and 60 Hz, with water as the heat transfer fluid. When using a water-glycol emulsion, the flow rate will be lower at the same head.

Select the pipe diameter and length to keep the circulating flow within the allowable range.

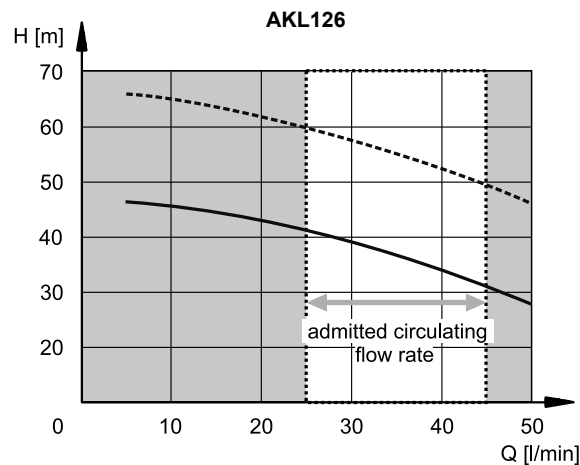
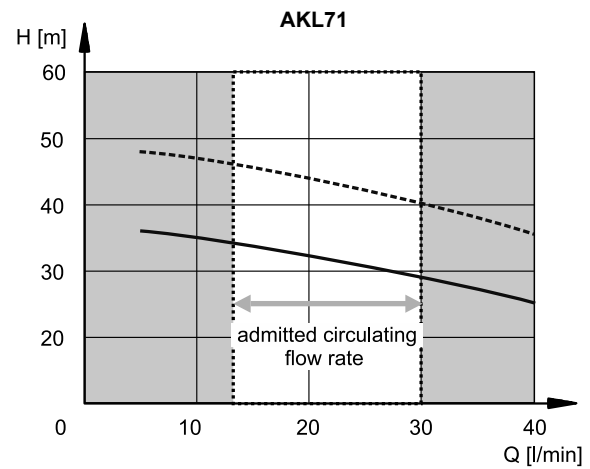
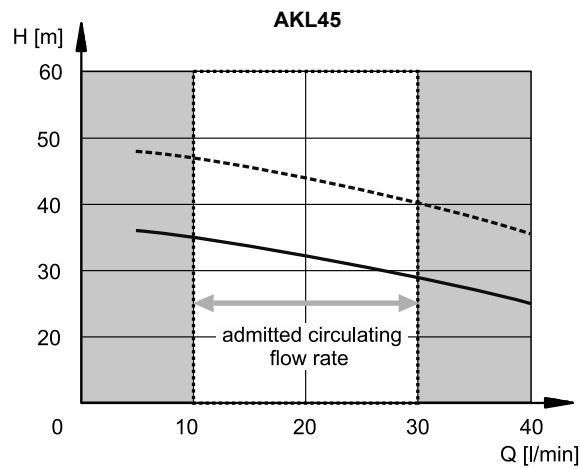
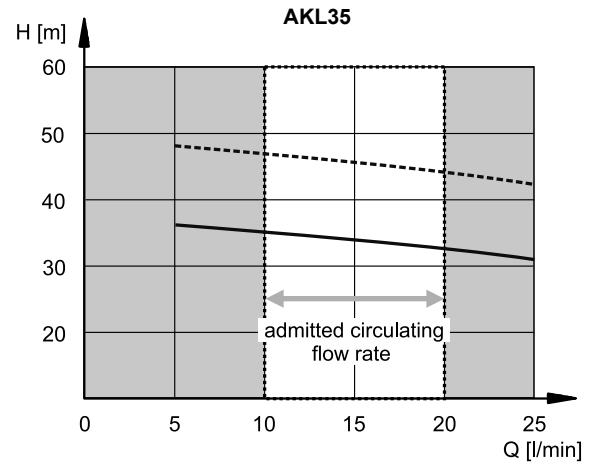
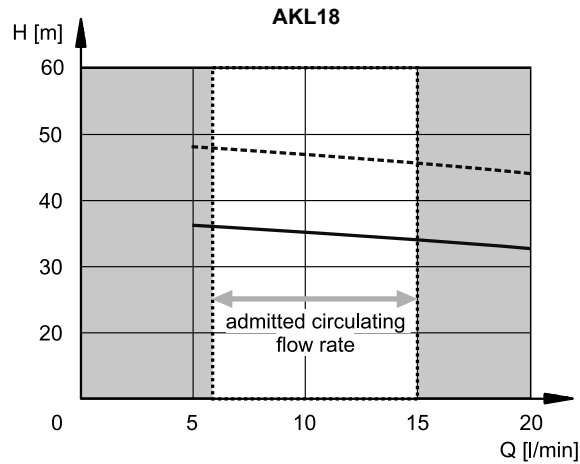


— 50 Hz
 - - - 60 Hz

14.2 - M-type pump

The diagrams show the performance curves of AKL chillers with the dual-frequency M-type pump at 50 Hz and 60 Hz, with water as the heat transfer fluid. When using a water-glycol emulsion, the flow rate will be lower at the same head.

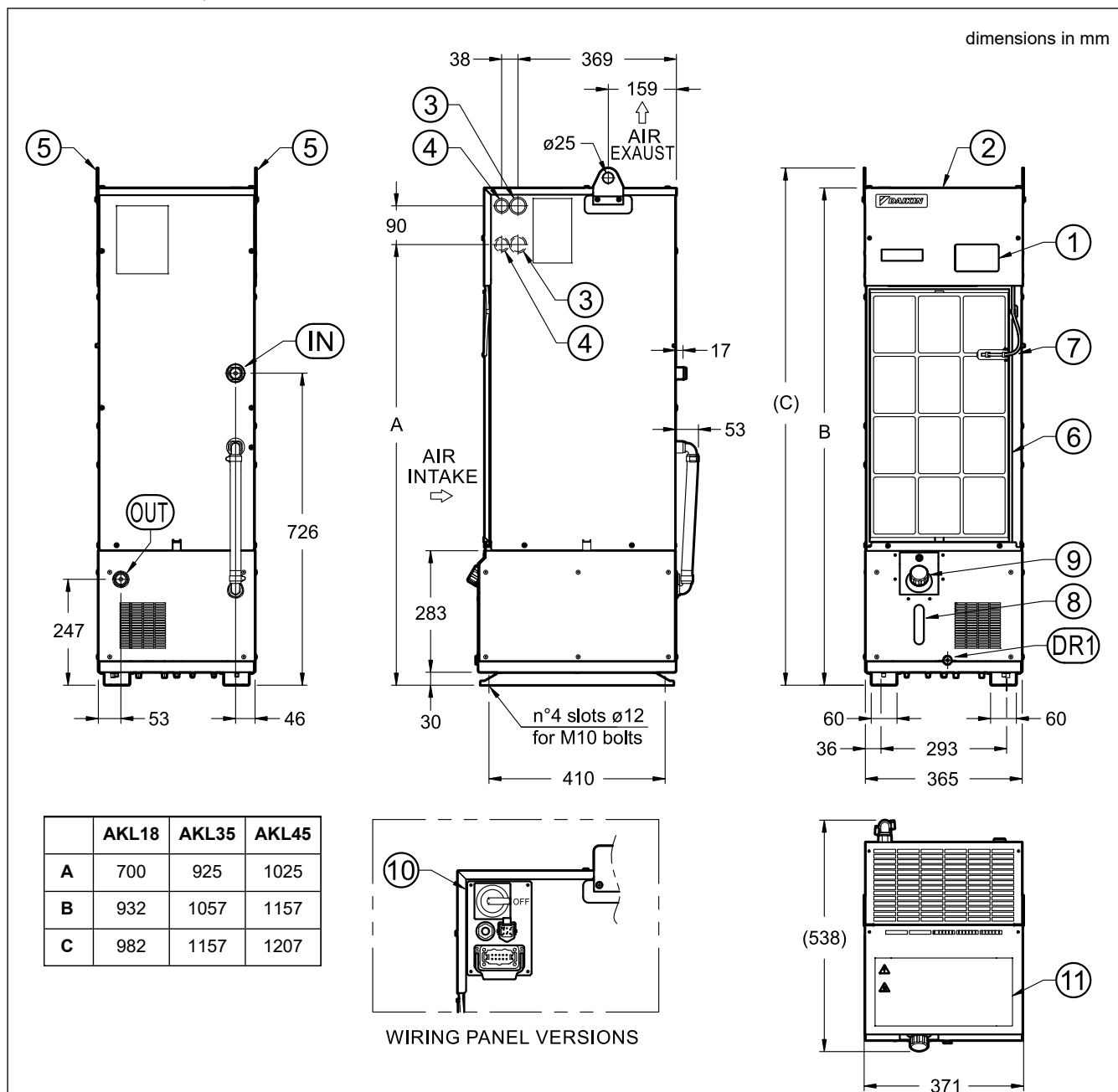
Select the pipe diameter and length to keep the circulating flow within the allowable range.



— 50 Hz
 --- 60 Hz

15 - OVERALL DIMENSIONS AND MOUNTING - CONFIGURABLE MODELS WITH INTEGRATED PUMP AND TANK

15.1 - AKL18CCD00J/P, AKL35CCD00J/P and AKL45CCD00J/P



IN	Fluid inlet: 1/2" Rp
OUT	Fluid outlet: 1/2" Rp
DR1	Tank drain: 1/4" Rp
1	Control panel
2	Switch box cover
3	Power cable entry Ø28 mm (right/left)
4	Signals cable entry Ø22 mm (right/left)
5	Eye plate for handling (NOTE 2)
6	Air filter

7	Th3 thermistor (ambient temperature)
8	Tank fluid-level indicator: max 7 L; min 4 L
9	Charge and air breather
10	Panel with electrical connections and isolator switch
11	Wiring diagram label inside

NOTE 1: Do not place objects that may obstruct or reduce the airflow within 50 cm of the intake and of the discharge openings.

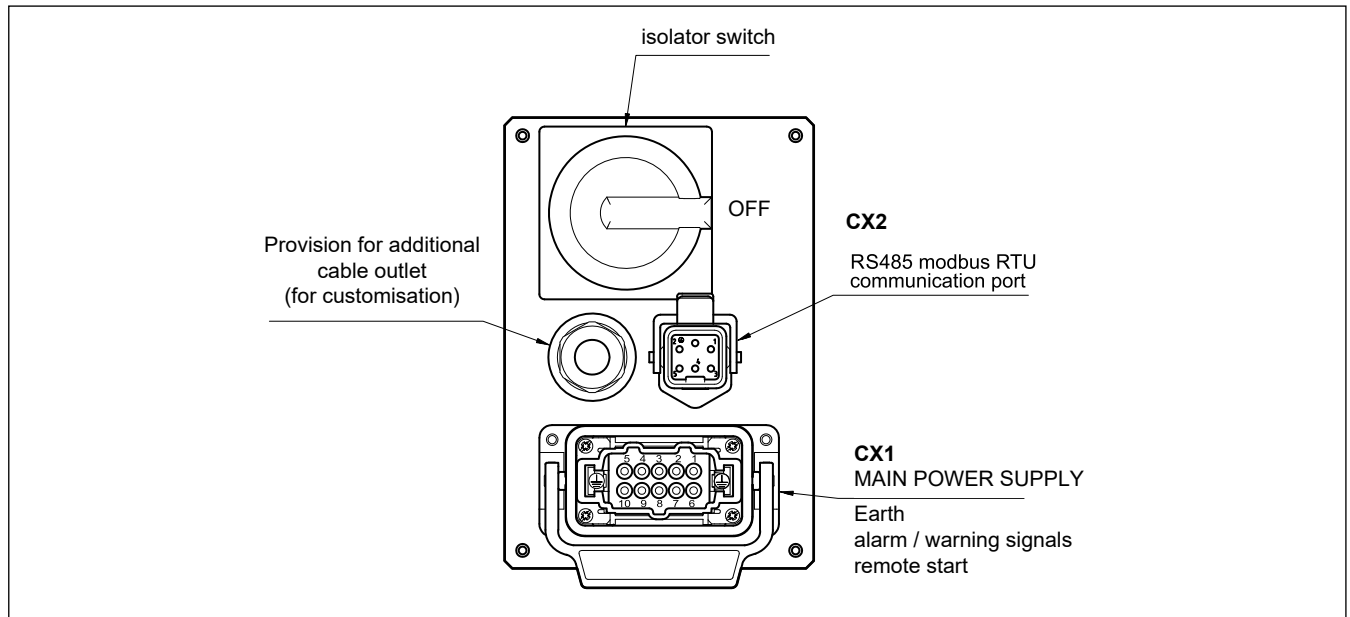
NOTE 2: Handle the cooling unit using both eye plates on the top.

15.1 - Other configurations

The overall dimensions of these versions are identical to those of the basic models. Please refer to points 8.1 to 8.3 for dimensions.

16 - ELECTRICAL CONNECTIONS

Below are the instructions for the models with the panel featuring a switch and plug-in sockets (code S). For models with a direct connection to the internal terminal block of the cooling unit's electrical panel (code 0), refer to the wiring diagram on page 10.



16.1 - Pinout of CX1 socket

The plug is supplied.

internal AKL pin		CX1	cable	description
M5 screw		PE	6 mm ²	Earth
L1 (X1M)		1	6 mm ²	Main Power Supply Three-phase AC 380/400/415 V 50/60 Hz ±10%
L2 (X1M)		2		
L3 (X1M)		3		
-		4	NC	-
60 (X2M)		5	0.75 mm ²	Normal Operation (RUN) Min load: 5V DC, 1 mA - Max load: 24V 1A
61 (X2M)		6		
66 (X2M)		7	0.75 mm ²	Warning Signal Output (LOCK) Min load: 5V DC, 1 mA - Max load: 24V 1A
67 (X2M)		8		
10 (X2M)		9	1 mm ²	Remote Start (Optional upon request)
11 (X2M)		10		

16.2 - Pinout of CX2 socket

The plug can be ordered separately; see point 23.

internal AKL pin		CX2	cable	description
		PE	NC	-
1 (X3M)		1	1 mm ²	Communication with main machine using Modbus RTU protocol RS485 serial interface
2 (X3M)		2		
3 (X3M)		3		
4 (X3M)		4		
5 (X3M)		5		

17 - IDENTIFICATION CODE - CONFIGURABLE MODELS WITH EXTERNAL PUMP AND TANK

AK	L	C	CD	00	J	/	G	I	-	0	-	K****
-----------	----------	----------	-----------	-----------	----------	----------	----------	----------	----------	----------	----------	--------------

High-accuracy inverter controlled cooling unit

For water and water-glycol emulsions < 30% vol

Cooling capacity (50/ 60 Hz)

18 = 1.8 kW
35 = 3.5 kW
45 = 4.5 kW
71 = 7.1 kW
126 = 12.6 kW

C = series C

Power supply:
3-phase AC 380 V / 400 V / 415 V 50/60 Hz
According to EC Directives

Frame model with immersed pump and stainless steel tank.

With RS485 Modbus RTU communication protocol

Project code for customisation (assigned by Duplomatic) (**NOTE 1**)

Other options

Electrical connections
0 = to be wired to terminal block
S = with plug-in sockets and external isolator switch

Stainless steel tank

Pump head:
L = low pressure 2 bar
M = medium pressure 4 bar
H = high pressure 5 - 10 bar

Immersed pump, vertical mounting

NOTE 1: Customised Options

The cooling unit can be customised according to the customer's requirements by liaising with the pre-sales service.

Customisations include the installation of optional protection devices (flow switch, level switch, pressure gauge on pump outlet), castors, Rc / BSP adapter fittings, wiring of optional thermistors supplied by us, and programming different from the factory standard.

Separately available for purchase are: the plug for the Modbus communication socket, adapter fittings, long-life filters, and the cable kit for connection with Hybrid Win software. See catalogue 90 661 - AK* ACCESSORIES.

18 - SPECIFICATIONS FOR CONFIGURABLE MODELS WITH EXTERNAL PUMP AND TANK

NOTE: The value refers to the motor pump only. Add this value to the one shown in the specifications table on page 2 to obtain the total power consumption of the chiller. Refer to the same table for any specifications not listed here.

		AKL18	AKL35	AKL45	AKL71	AKL126
Power supply		three-phase AC 380/400/415 V ±10% 50/60Hz				
Motor pump input power (400 V 60 Hz) NOTE		0.55 kW x 2P				
Circulating volume rated range	l/min	10 6 ÷ 15	15 10 ÷ 20	15 10 ÷ 30	25 13 ÷ 30	40 25 ÷ 45
Nominal head: L-type pump M-type pump H-type pump	m	25 58 78				
Max ambient temperature	°C	40				
Tank volume	l	10			20	
Weight with L-type pump net / transport operating	kg	66 77	71 82	72 83	111 133	139 161
Weight with M-type pump net / transport operating	kg	68 79	73 84	74 85	113 135	141 163

18.1 - Circuit diagrams

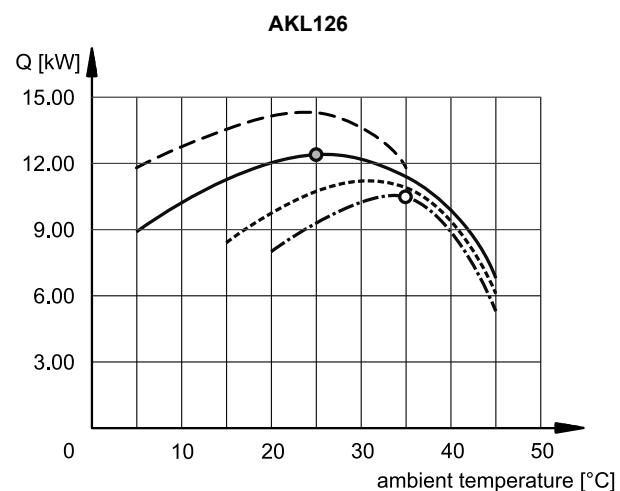
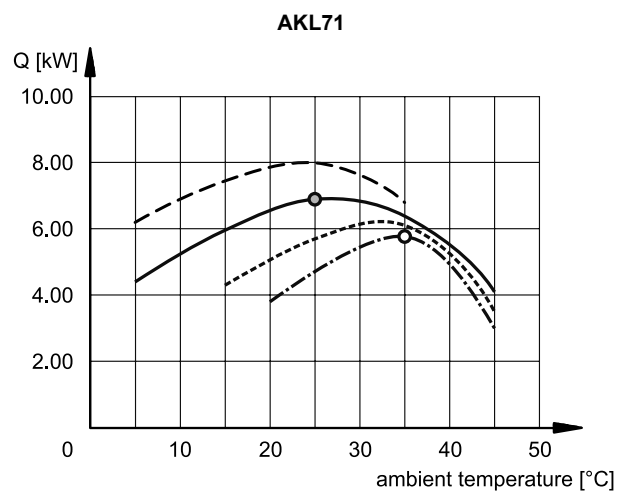
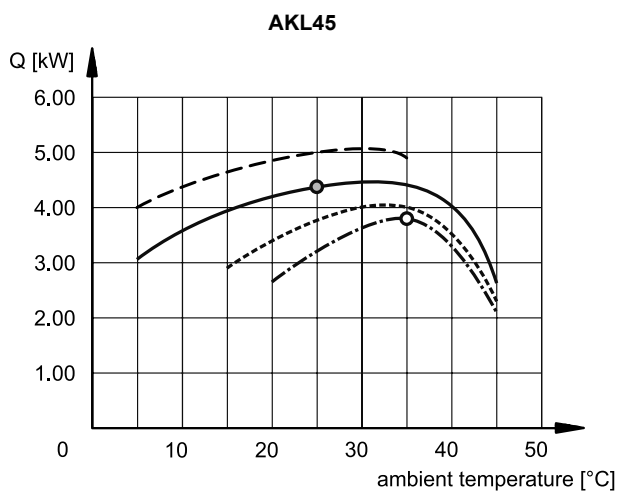
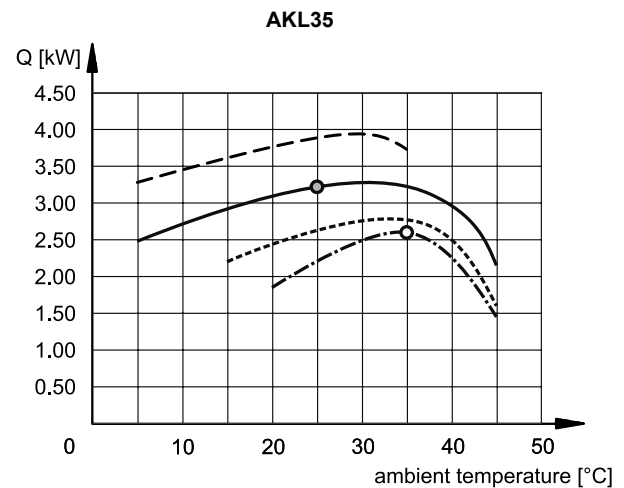
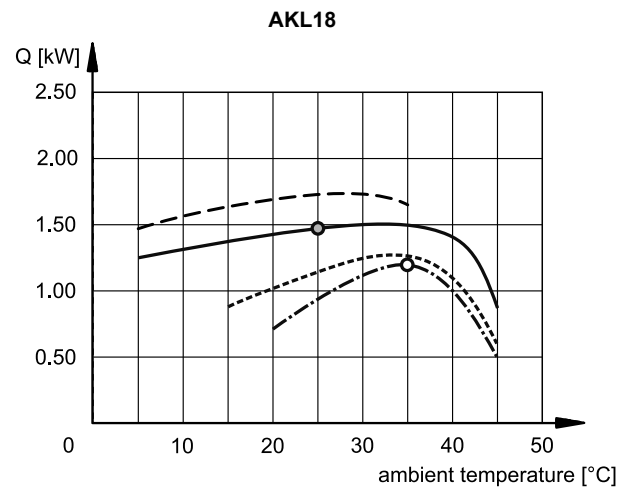
The diagram in point 13.1 is valid for all chiller sizes.

19 - CHARACTERISTICS OF THE CONFIGURABLE MODELS WITH EXTERNAL PUMP AND TANK

Values obtained and rated for standard point with standard pump model, ambient temperature: 25 °C and fluid temperature: 25 °C. Fluid used: H₂O.

19.1 -Temperature control

Cooling capacity (kW) according to the ambient temperature.

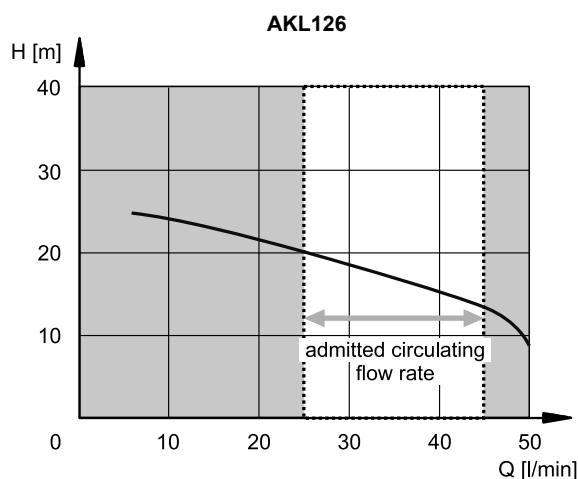
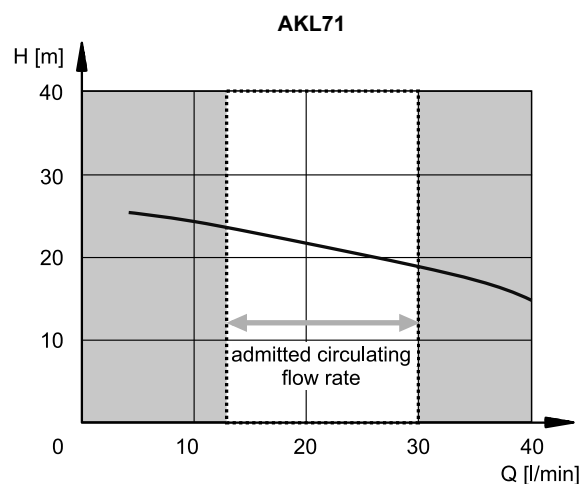
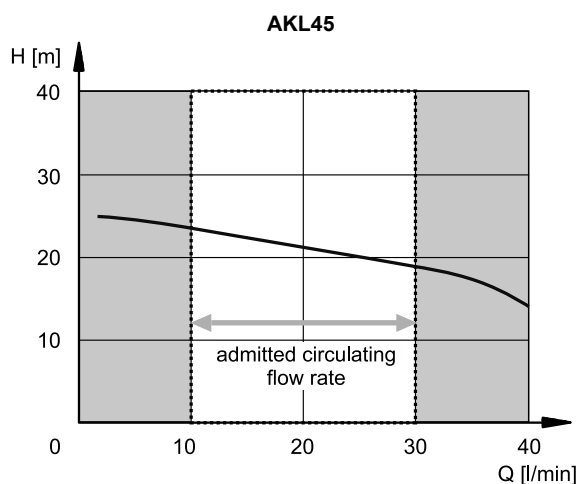
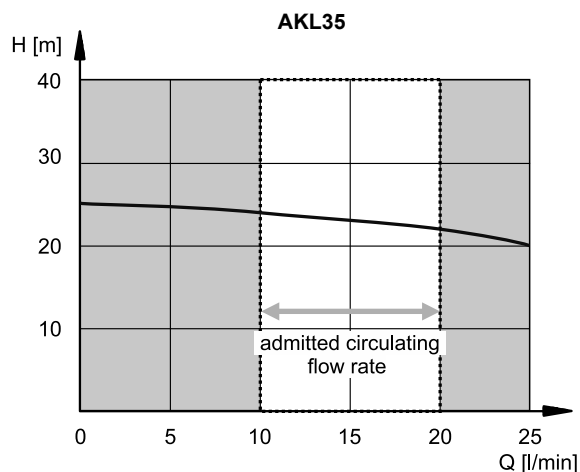
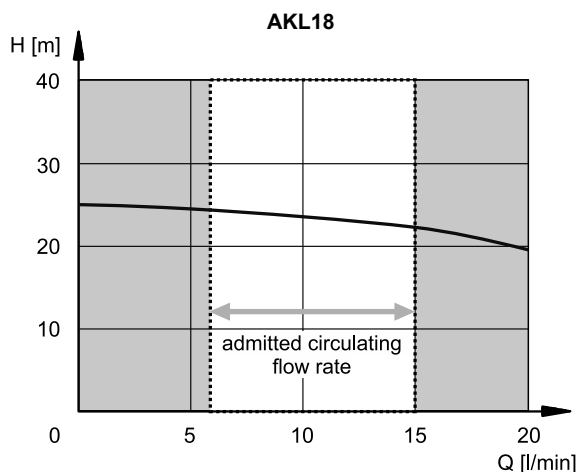


- H₂O temperature = ambient temperature
- - - H₂O temperature = ambient temperature + 10 °C
- ... H₂O temperature = ambient temperature - 10 °C
- · - · H₂O temperature = ambient temperature - 15 °C
- standard point (H₂O temperature and ambient temperature 25 °C)
- reference point (H₂O temperature 20 °C and ambient temperature 35 °C)

19.2 - Pump flow characteristics (type L)

The diagrams show the performance curves of AKL chillers with type L immersion pumps at 20 °C and 50 Hz, with water-glycol emulsion as the heat transfer fluid.

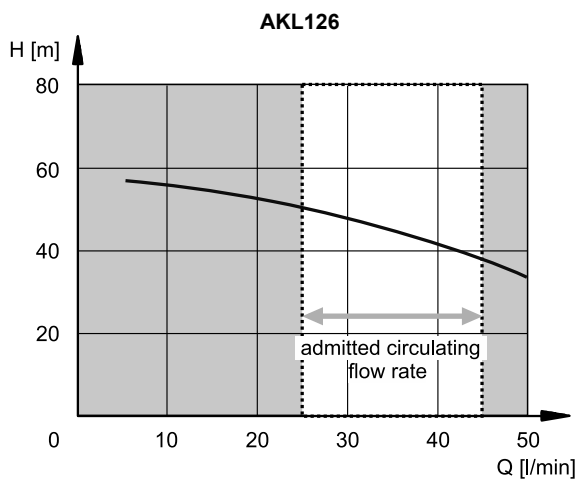
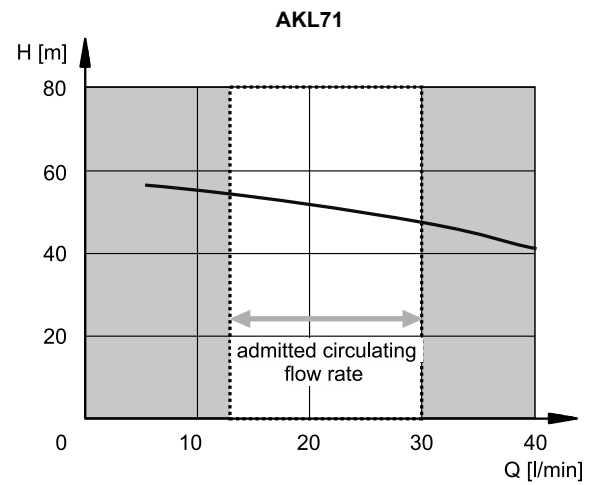
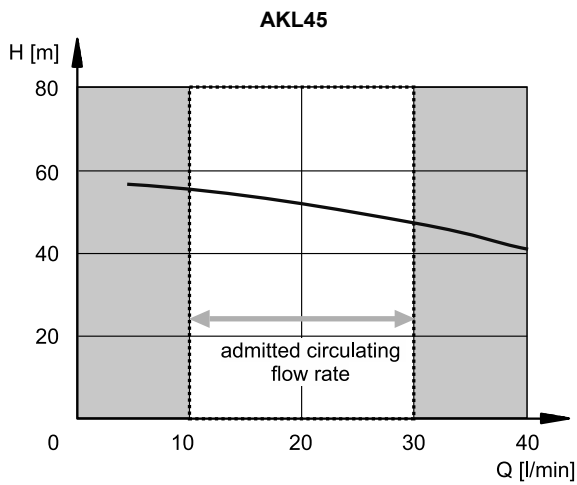
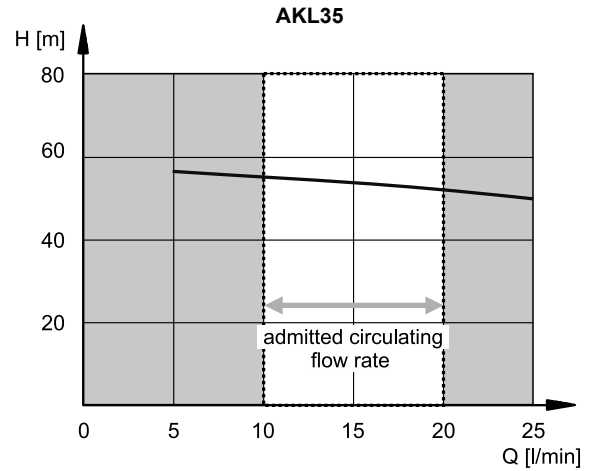
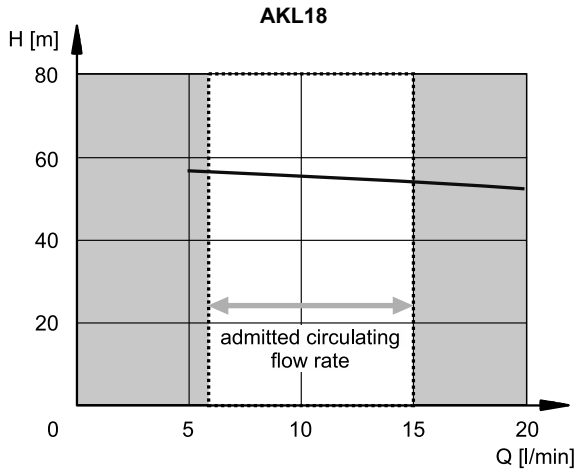
Select the pipe diameter and length to keep the circulating flow within the allowable range. Flow characteristics outside the standard specifications can also be supported.



19.3 - Pump flow characteristics (type M)

The diagrams show the performance curves of AKL chillers with type M immersion pumps at 20 °C and 50 Hz, with water-glycol emulsion as the heat transfer fluid.

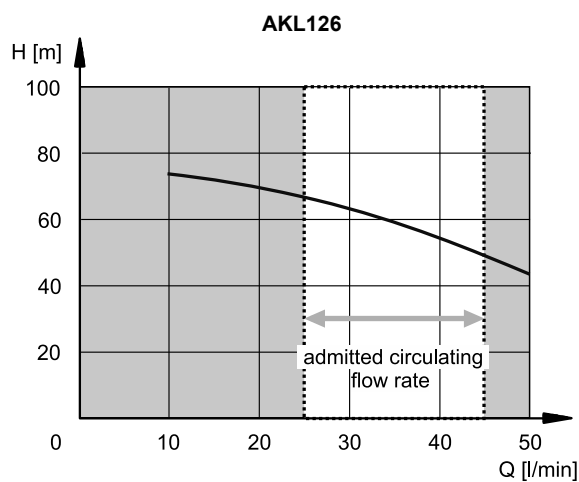
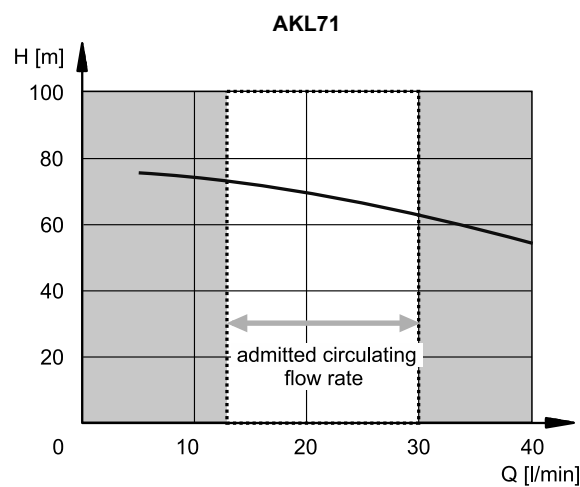
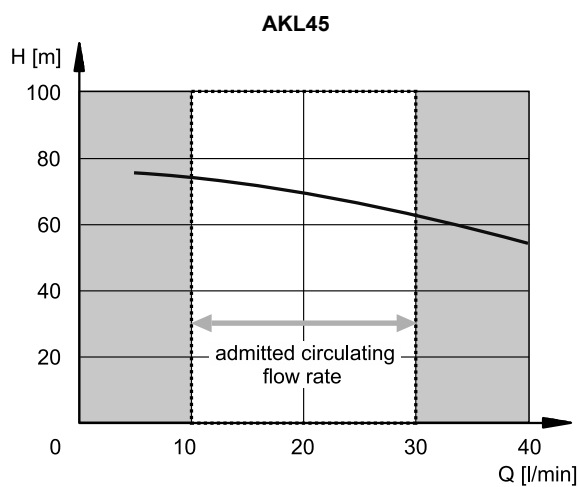
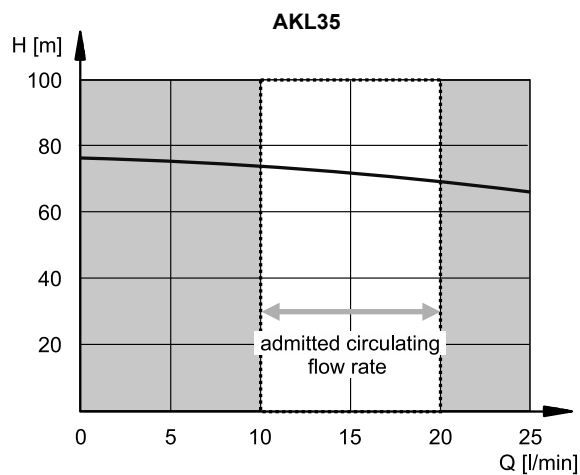
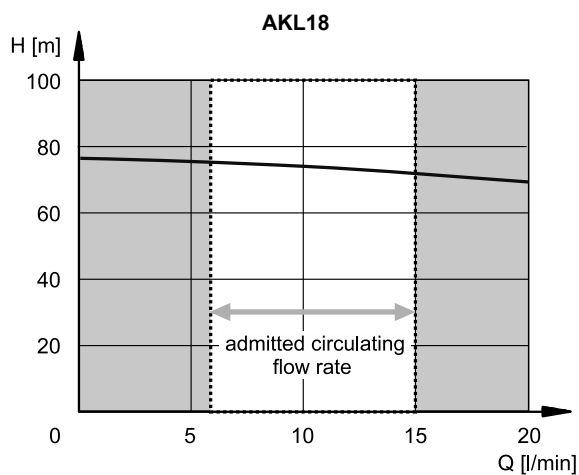
Select the pipe diameter and length to keep the circulating flow within the allowable range. Flow characteristics outside the standard specifications can also be supported.



19.4 - Pump flow characteristics (type H)

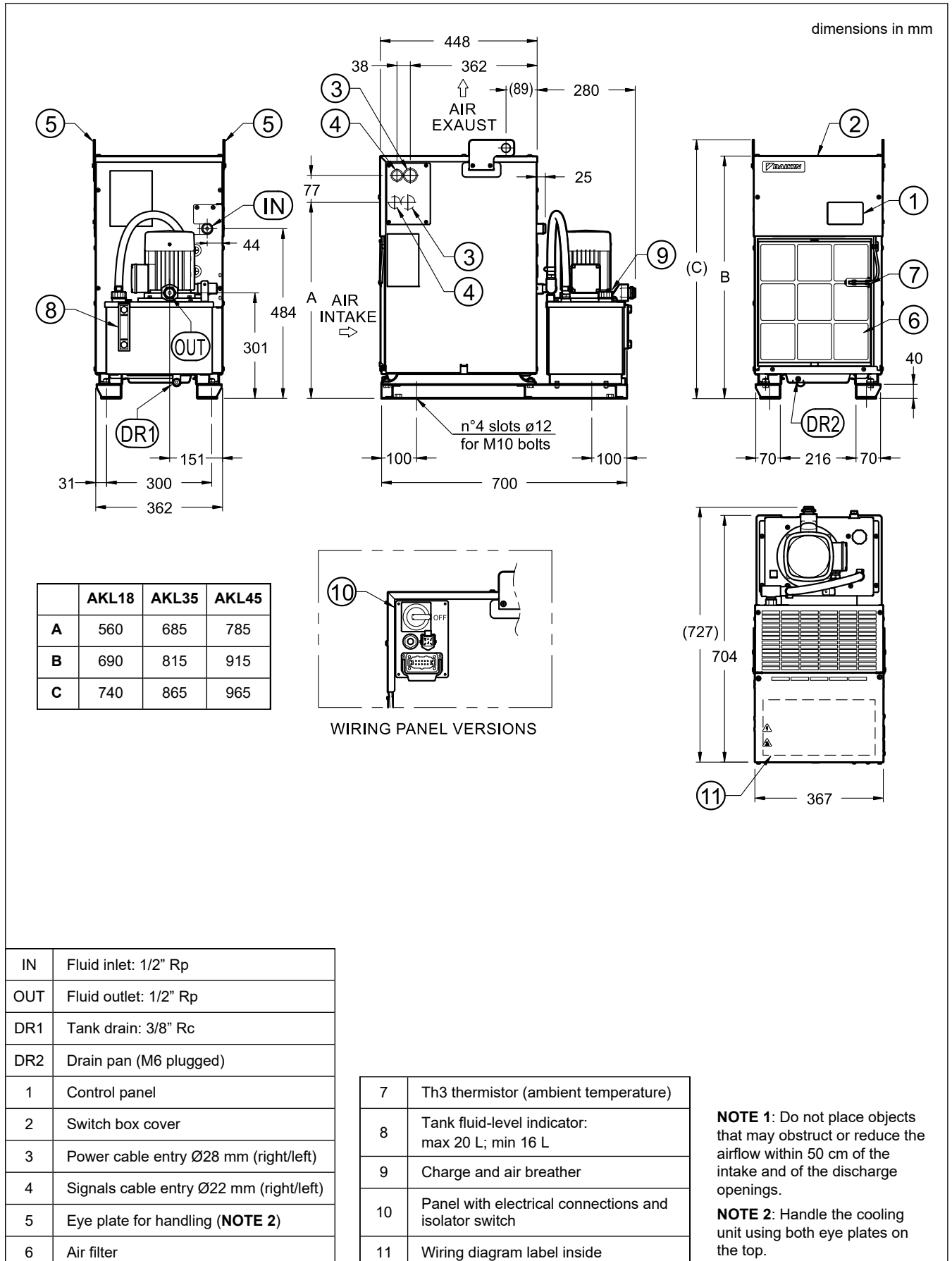
The diagrams show the flow characteristics of type H immersion pumps at 20°C and 50 Hz, with water-glycol emulsion.

Select the pipe diameters and lengths to keep the circulation volume within the permitted limits. Flow characteristics outside the standard specifications can also be supported.



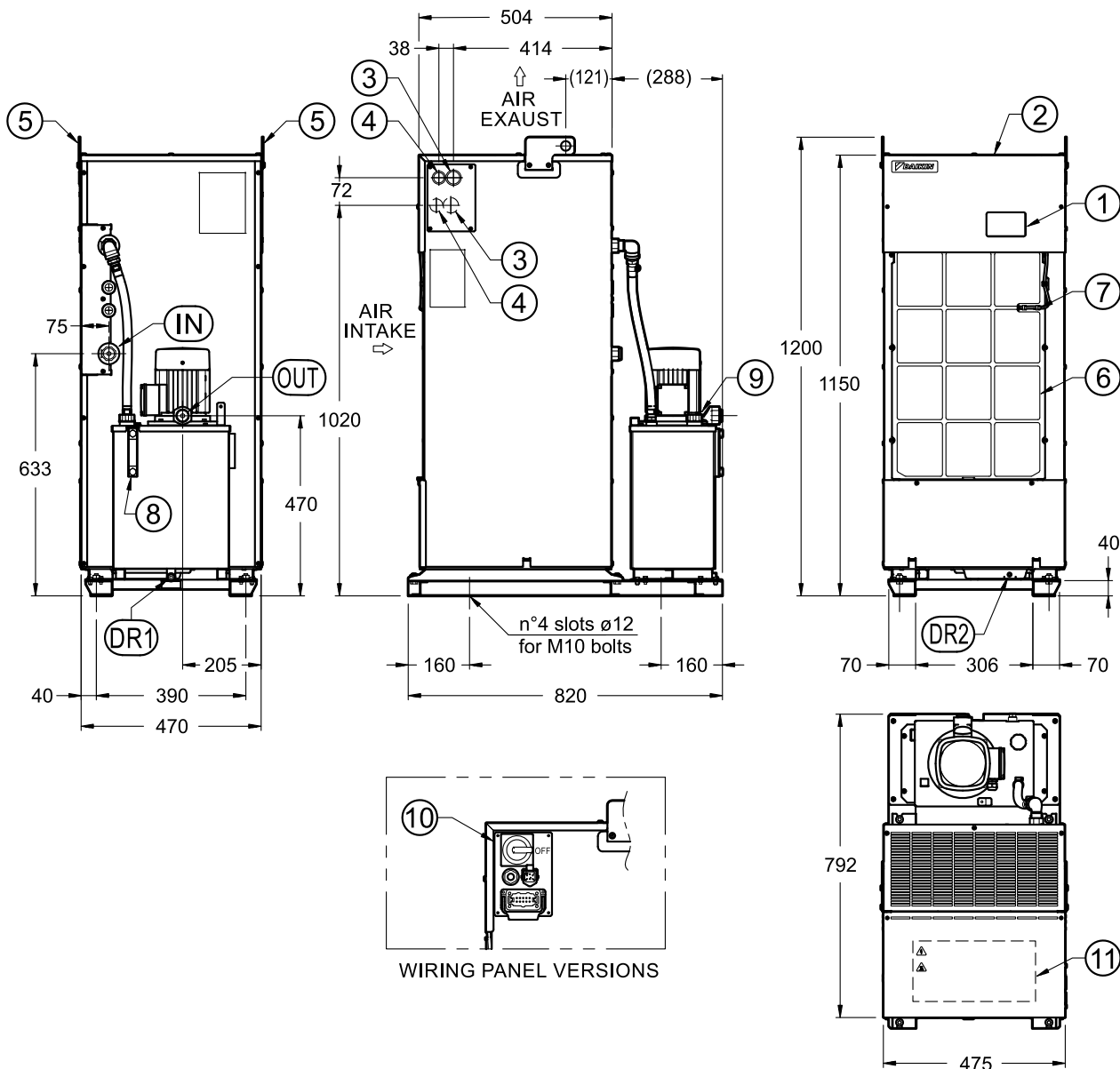
20 - OVERALL DIMENSIONS AND MOUNTING - CONFIGURABLE MODELS WITH EXTERNAL PUMP AND TANK

20.1 - AKL18CCD00J/G, AKL35CCD00J/G and AKL45CCD00J/G



20.2 - AKL71CCD00J/G

dimensions in mm



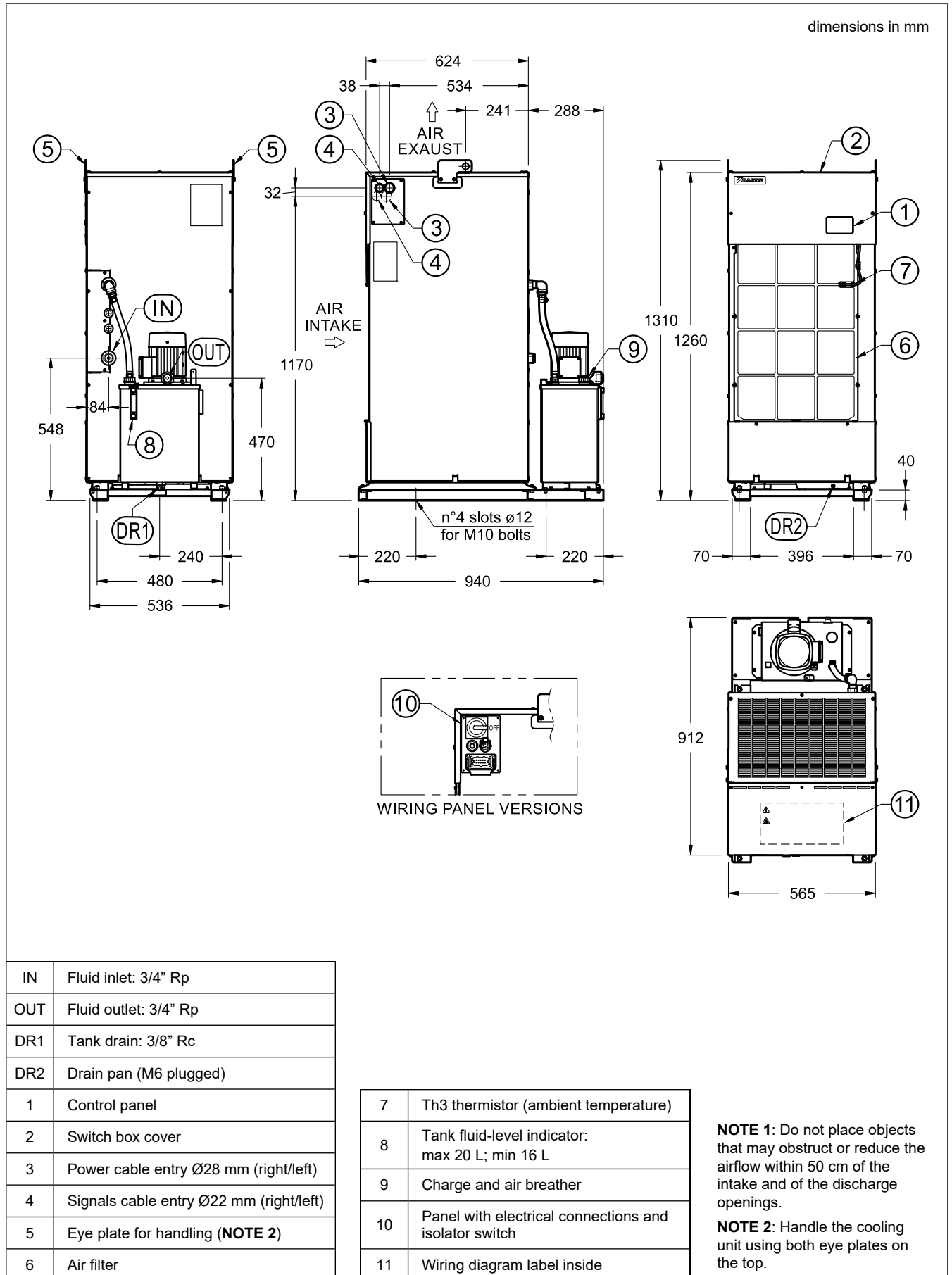
IN	Fluid inlet: 3/4" Rp
OUT	Fluid outlet: 3/4" Rp
DR1	Tank drain: 3/8" Rc
DR2	Drain pan (M6 plugged)
1	Control panel
2	Switch box cover
3	Power cable entry Ø28 mm (right/left)
4	Signals cable entry Ø22 mm (right/left)
5	Eye plate for handling (NOTE 2)
6	Air filter

7	Th3 thermistor (ambient temperature)
8	Tank fluid-level indicator: max 20 L; min 16 L
9	Charge and air breather
10	Panel with electrical connections and isolator switch
11	Wiring diagram label inside

NOTE 1: Do not place objects that may obstruct or reduce the airflow within 50 cm of the intake and of the discharge openings.

NOTE 2: Handle the cooling unit using both eye plates on the top.

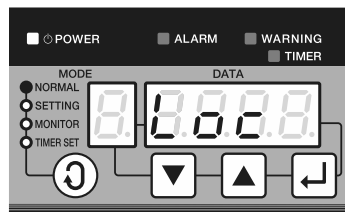
20.3 - AKL126CCD00J/G



21 - ELECTRICAL CONNECTIONS

For models with a panel featuring plug-in sockets and an isolator switch (code S), refer to the electrical connections shown in point 16. For models with direct connections to the terminal block inside the cooling unit electrical panel (code 0), refer to the wiring diagram shown in point 10.

22 - DEVICE SETUP



AKL cooling units can be configured via the display, which allows parameters and alarms to be set and monitored at any time. The units can also be controlled remotely from the main machine control board.

At the time of shipment, the machine is preset to LOCK mode (STOP mode) to prevent accidental changes. Therefore, during commissioning, the unit must be unlocked via the control panel before any parameter changes can be made.

The unlocking procedure is described in the *Instruction Manual*.

23 - ACCESSORIES

23.1 - Hybrid-win software

The software allows real-time monitoring of operating data via a graphical interface. It must be installed on devices running the Microsoft Windows operating system.

The connection is made via wiring, directly to the main board inside the cooling unit. The AKPC cable kit (comprising a USB converter, special cable, and wiring) must be ordered separately. For details, please refer to catalogue 90 661.

The Hybrid-win software can be easily downloaded from the product page on Diplomatic MS's website: Accessories for cooling units.

23.2 - Other accessories

Accessories are sold separately, and their installation on the cooling unit/main machine is the responsibility of the customer. For details on thermistors, long-life filters, fittings, castors, and the cable kit for the Hybrid-win software, refer to catalogue 90 661 - ACCESSORIES FOR AK* COOLING UNITS.

24 - INSTALLATION NOTES

24.1 - Handling, machine side

- When rough transport conditions are expected, special precautions should be taken in the packaging and transportation method so as to avoid the application of excessive force on the cooling unit.
- The cooling unit does not include a flow switch for monitoring the fluid supply or a temperature switch for detecting abnormal temperatures (high or low) of the supplied fluid. Therefore, please ensure that protection devices such as a flow switch and a temperature switch are provided on the machine side.

24.2 - Operation and cooling capacity

- Before starting the unit, ensure that you have carefully read and fully understood the Instruction Manual.
- Do not start the cooling unit if the fluid temperature exceeds 45 °C. Start the cooling unit either simultaneously with the main machine or before the fluid temperature reaches 40 °C.
- **Do not obstruct the airflow within 50 cm of the air intake or outlet.**
- If the air filter is clogged, the cooling capacity will be reduced. Clean the air filter periodically (by washing it with lukewarm water or cleaning it with air) at least every two weeks to prevent clogging. If a long-life filter is installed, replace the filter element and empty the drain pan at least once a year, or whenever the cooling capacity significantly decreases.

25 - INSTRUCTION FOR SAFE OPERATION

General Instructions

- Use the equipment only in accordance with the specified guidelines (as detailed in the brochure, specification sheet, operation manual, and caution plates).
- Do not operate the unit in explosive atmospheres.
- Do not disassemble, repair or modify the unit by yourself.
- Always comply with applicable safety regulations (e.g., Industrial Safety and Health Law, Fire Defense Law).
- If an abnormal condition arises, stop the unit immediately, investigate the cause, and take appropriate corrective actions.
- Do not use the unit in outdoor or extreme environments (e.g., excessive temperature, humidity, dust, contaminants, steam, oil mist, or corrosive gases such as H₂S, SO₂, NO₂ or Cl₂).
- Install a flow switch and a temperature switch on the machine to protect the spindle and other components.
- Do not climb on the unit or place objects on it.
- The unit is designed for installation up to 2,000 m above sea level. Above 1,000 m, cooling capacity decreases by approx. 20–30%; select the unit accordingly.

Refrigerant R454C – Safety Information

Flammable refrigerant – risk of FIRE and SUFFOCATION in case of leakage

Transport by air is not permitted.

Install the unit only in areas where refrigerant leakage cannot create a fire risk or lead to gas accumulation (suffocation).

Avoid in particular:

- areas with ignition sources (e.g., electrical equipment ≥ 5 kVA, open flames, welding, grinding, smoking areas)
- enclosed or poorly ventilated spaces where refrigerant could accumulate

Do not use open flames to detect refrigerant leaks.

Do not puncture or expose refrigerant circuit components to heat or flame.

Operate and store the unit in well-ventilated areas away from ignition sources.

In case of leakage:

- ventilate the area immediately (SUFFOCATION hazard)
- avoid contact with refrigerant (COLD BURNS)
- seek medical attention in case of inhalation of a large amount of gas or contact with eyes/skin

In case of fire, use extinguishing media as specified in the Safety Data Sheet (SDS). The SDS shall be available and can be provided upon request.

Transport

- Handle the unit according to its weight and lifting points.
- Do not lift the unit with non-integral components attached.
- Keep clear of the unit during lifting and transport.
- Prevent tipping or falling during handling. Do not tilt the unit more than 30°.

Installation

- Install on a stable, level surface and secure the unit.
- Keep air intake and discharge areas unobstructed.

Wiring and Piping

- Wiring and piping should be carried out by qualified personnel.
- Always use a commercial power supply: using an inverter power supply may cause damage due to overload.
- Connect the power supply wiring according to the procedure outlined in the wiring diagram provided in the specification sheets and operation manual.
- Ensure that the unit is properly grounded.
- Install the wiring in accordance with the relevant standards and verify the wiring diagram.
- Install a dedicated all-pole (3-pole) earth leakage breaker, sized appropriately for the cooling unit's capacity, at the main power supply.
- Verify that the fluid piping has a pressure rating of 10 bar or more, and install it accordingly.

Commissioning (Trial Run)

- Check that the machine is in a safe status (not activated) before start-up.
- Check that the oil piping and electric wiring are correctly connected to the machine and that there is no leakages in connections and joints.
- Disable the operation lock of the cooling unit before starting the main machine.
- Check that the fluid piping system contains the required amount of fluid, and that the piping is not blocked part way through.

Operation

- Do not expose the unit to water or liquids.
- Do not insert fingers or any foreign objects into the unit's fins.
- Avoid contact with hot air discharge surfaces.

Maintenance and Inspection

- Carry out maintenance and inspections in well-ventilated areas. Working in a confined space may lead to suffocation in the event of refrigerant leakage.
- Always turn off the main power supply before starting maintenance or inspection.
- **Wait at least five minutes** after disconnecting the power supply before beginning maintenance work.
- Do not operate the unit with the electrical panel cover or any other covers open.
- Wear appropriate protective equipment, such as gloves and eye protection, during maintenance, inspection, and cleaning
- Clean the air filter regularly (typically every two weeks).
- Ensure that the water quality and fluid concentration consistently meet the required standards
- Check the fluid level in the tank and ensure it is between the yellow and red lines on the indicator.
- Inspect and drain the condensate pan underneath the cooling unit every six months. If any fluid has accumulated, drain it through the drainage port.

Unit Selection

- Select a cooling capacity at least 20-30% higher than the expected heat load generated by the machine tool.
- Consider ambient temperature and required fluid temperature when sizing the unit.



AKL
SERIES C

DUPLOMATIC
MOTION SOLUTIONS
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