ALPHA1 L

Circulator pumps

50/60 Hz

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think
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Table of contents

1. Product introduction

TM06 8028 1117

Fig. 1 ALPHA1 L

Product description

The redesigned ALPHA1 L model C can be integrated in all kinds of heating applications with either variable or constant flow rate. High-efficiency ECM (Electronically Commutated Motor) pumps, such as ALPHA1 L, must not be speed-controlled by an external speed controller varying or pulsing the supply voltage.

The speed can be controlled by a low-voltage PWM (Pulse Width Modulation) signal.

Features

- Three constant curves/constant speed curves.
- Radiator heating mode.
- Underfloor heating mode.
- PWM A profile. The PWM signal is a method for generating an analog signal using a digital source.
- Low EEI (Energy Efficiency Index).
- Deblocking screw.
- Maintenance-free.
- Low noise level.
- Very simple installation.

Type key

Example	**ALPHA1 L**	**25 - 40**	**180**

Pump range

Nominal diameter (DN) of inlet and outlet ports [mm]

Maximum head [dm]

[ ]: Cast-iron pump housing
A: Pump housing with air separator
N: Stainless-steel pump housing

Port-to-port length [mm]

ALPHA1 L Performance range

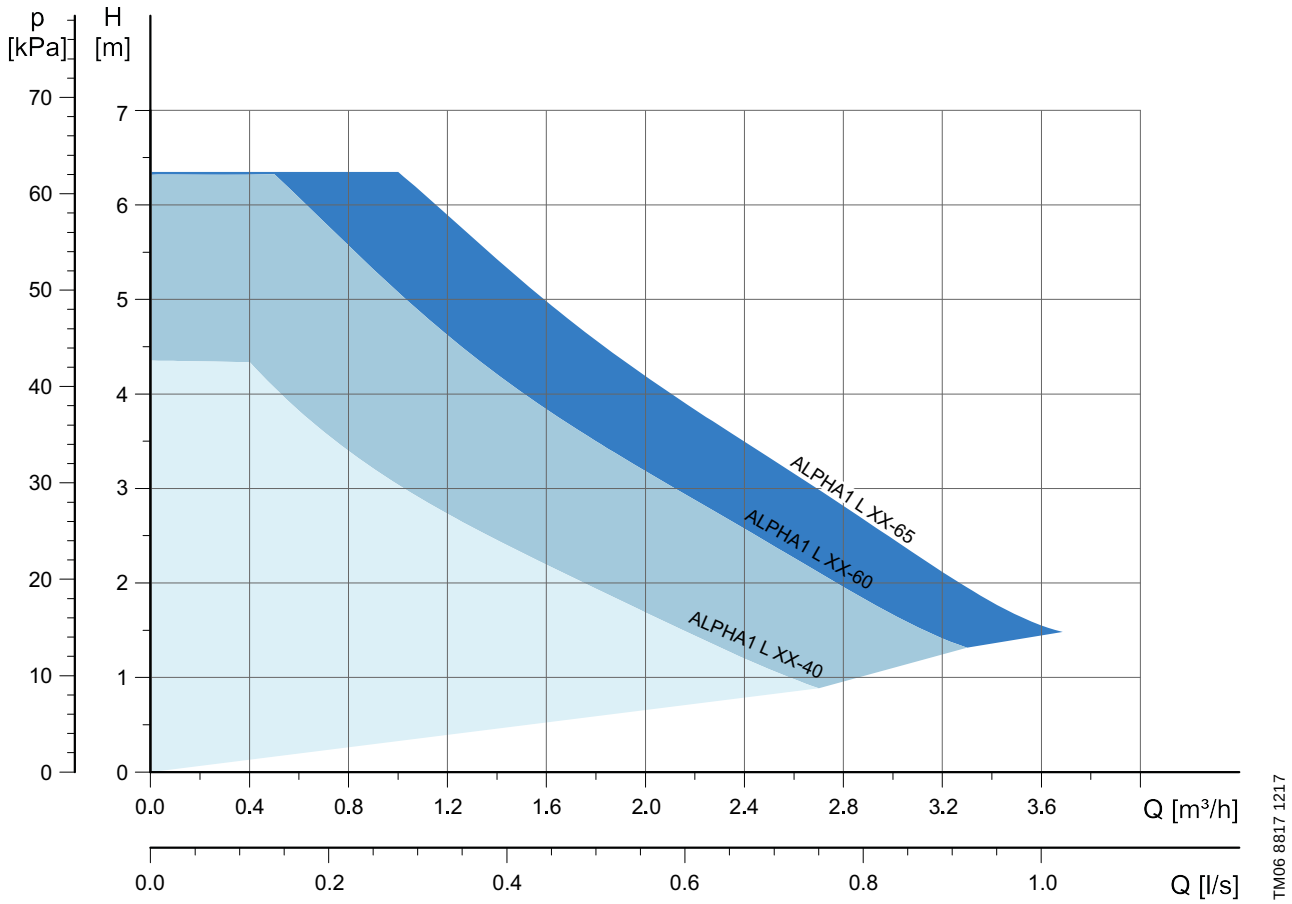

Fig. 2 Performance range

2. Functions

System applications

ALPHA1 L is designed for circulating liquids in heating systems.

The pumps are suitable for the following systems:

- Systems with constant or variable flows where it is desirable to optimise the pump duty point.
- Systems with variable flow-pipe temperature.

ALPHA1 L is especially suitable for the following:

- Installation in existing systems where the differential pressure of the pump is too high during periods of reduced flow demand.
- Installation in new systems for automatic adjustment of the performance to flow demands without the use of bypass valves or similar expensive components.

Examples of systems

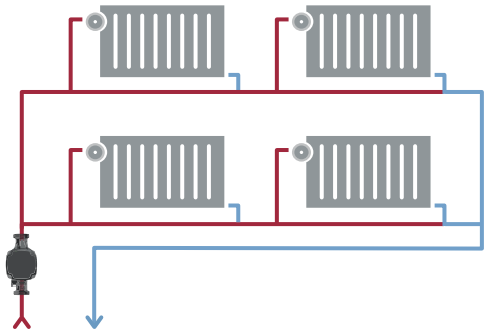

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Fig. 3 One-pipe heating system

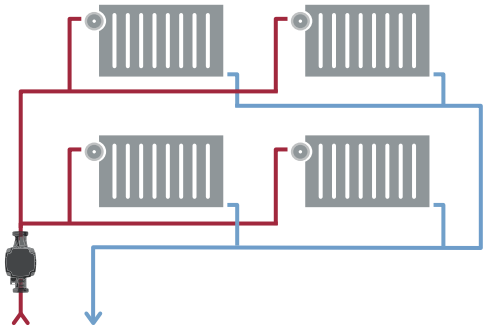

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Fig. 4 Two-pipe heating system

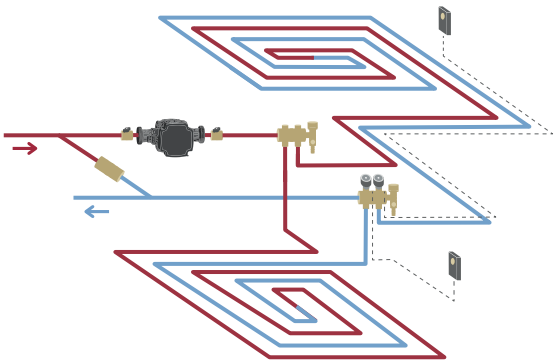

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Fig. 5 Underfloor heating system

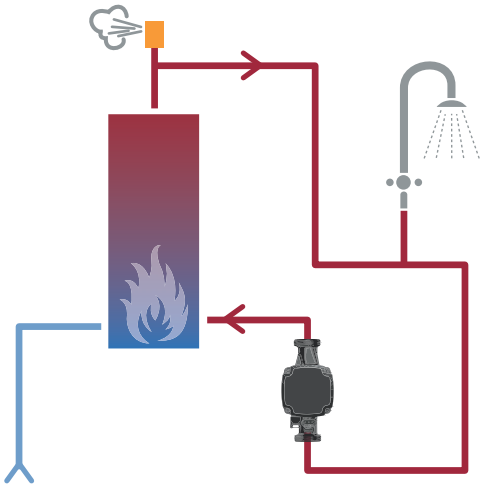

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Fig. 6 Domestic hot-water recirculation system

Selection of control mode

The heating required in a building varies greatly during the day due to changing outdoor temperatures, solar radiation and heat emanating from human beings, electrical appliances, etc.

Add to this that the need for heating may vary from one section of the building to another and that the thermostatic valves of some radiators may be turned down by the users.

These circumstances will cause an uncontrolled pump to produce an excessive differential pressure when the heating demand is low.

Possible consequences:

- too high energy consumption
- irregular control of the system
- noise in thermostatic valves and similar fittings.

ALPHA1 L automatically controls the differential pressure by adjusting the pump performance to the actual heating demand without the use of external components.

PWM input signal profile A (heating)

At high PWM signal percentages (duty cycles), a hysteresis prevents the circulator from starting and stopping if the input signal fluctuates around the shifting point. At low PWM signal percentages, the circulator speed is high for safety reasons. In case of a cable breakage in a gas boiler system, the circulators will continue to run at maximum speed to transfer heat from the primary heat exchanger. This is also suitable for heat circulators to ensure that the circulators transfer heat in case of a cable breakage.

If no PWM signal is available, you can set ALPHA1 L to proportional-pressure control, constant-pressure control or constant speed, by the controller.

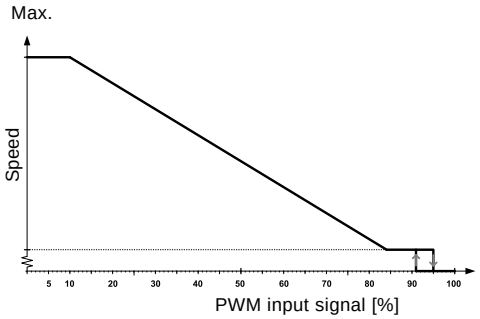

Fig. 7 PWM input profile A (Heating)

PWM input signal [%]	Pump status
≤ 10	Maximum speed: max.
> 10 / ≤ 84	Variable speed: min. to max.
> 84 / ≤ 91	Minimum speed: min.
> 91/95	Hysteresis area: on/off
> 95 / ≤ 100	Standby mode: off

Advantages of pump control

In ALPHA1 L, control is effected by adapting the differential pressure to the flow (proportional- and constant-pressure control).

Contrary to an uncontrolled pump, the proportional-pressure-controlled ALPHA1 L pump reduces the differential pressure in case of falling heating demand.

If the heating demand falls, for instance due to solar radiation, the radiator valves will close, and, for the uncontrolled pump, the flow resistance of the system will rise for instance from A_1 to A_2.

In a heating system with an uncontrolled pump, this situation will cause a pressure rise in the system by ΔH_1.

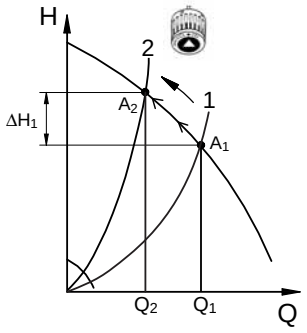

Fig. 8 Uncontrolled pump

In a system with a ALPHA1 L pump, the pressure will be reduced by ΔH_2.

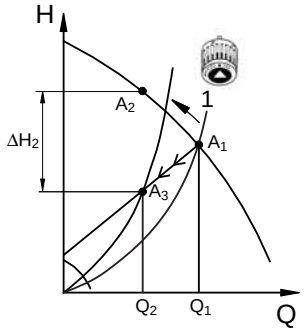

Fig. 9 Pump in proportional-pressure control mode

In a system with an uncontrolled pump, a pressure rise will often cause flow-generated noise in the thermostatic valves. This noise will be reduced considerably with the ALPHA1 L.

The pump has the following control modes:

- radiator heating mode
- underfloor heating mode
- constant curve/constant speed mode.

Radiator control mode

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Fig. 10 Radiator control mode symbol on control panel

Proportional-pressure control adjusts the pump performance to the actual heat demand in the system, but the pump performance follows the performance curve. See fig. 11 and *Overview of pump performance* for further information.

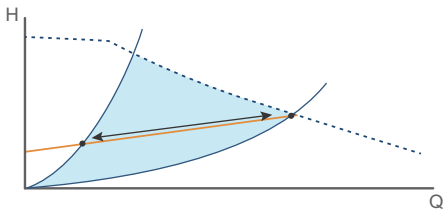

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Fig. 11 Proportional-pressure curve/setting

Underfloor control mode

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Fig. 12 Underfloor control symbol on control panel

Constant-pressure control adjusts the pump performance to the actual heat demand in the system, but the pump performance follows the performance curve. See fig. 13 and *Overview of pump performance* for further information.

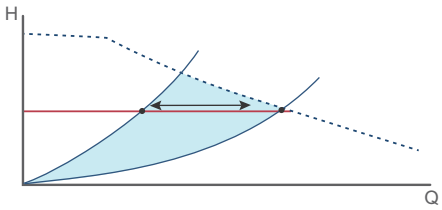

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Fig. 13 Constant-pressure curve/setting

Constant curve/constant speed control

Constant curve/constant speed control symbol on control panel:

I, II, III

At constant curve/constant speed operation, the pump runs at a constant speed, independent of the actual flow demand in the system. The pump performance follows the selected performance curve I, II or III. See fig. 14 where II has been selected. See *Overview of pump performance* for further information.

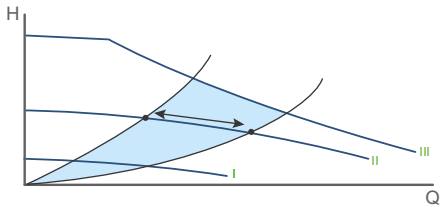

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Fig. 14 Three constant curve/constant speed settings

The selection of the right constant curve/constant speed setting depends on the characteristics of the heating system in question and the number of taps likely to be opened at the same time.

Overview of control mode

Application	Control mode
Floor heating	Underfloor heating mode
Two-pipe system	Radiator heating mode
Ventilation	Speed 1, 2 or 3
Boiler-shunt	Speed 1, 2 or 3
One pipe system	Speed 1, 2 or 3 or underfloor heating mode
Domestic hot water	Speed 1, 2 or 3

3. Operating the product

Control panel and display

The control panel is designed with a single push button, one red/green LED and four yellow LEDs.

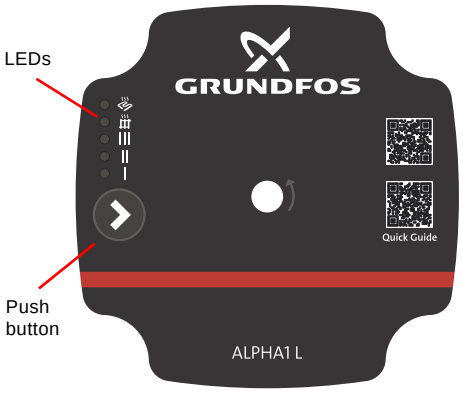

Fig. 15 Control panel with one push button and five LEDs

The control panel shows the following:

- settings view, after pressing the button
- alarm status, control panel
- operating status.

Operating status

During operation, the display shows the actual operating status or the alarm status.

Alarm status

If the circulator has detected one or more alarms, the first LED switches from green to red. When an alarm is active, the LEDs indicate the alarm type as defined in the table below. If multiple alarms are active at the same time, the LEDs only show the error with the highest priority. The priority is defined by the sequence of the table.

When there is no active alarm anymore, the control panel switches back to operating status.

Control panel	Description
	Blocked
	Supply voltage low
	Electrical error

Setting the pump

Using the push-button on the control panel, the electronically controlled pump can be set to three constant speed curves, radiator heating mode, underfloor heating mode or external PWM signal control with profile A, see fig. 16.

Factory setting

The pump has been factory-set to radiator heating mode. See fig. 16.

Fixed proportional pressure curve

As a second option to the radiator heating mode, a fixed proportional pressure curve can be selected by pressing the push-button for 3 seconds, see fig. 16.

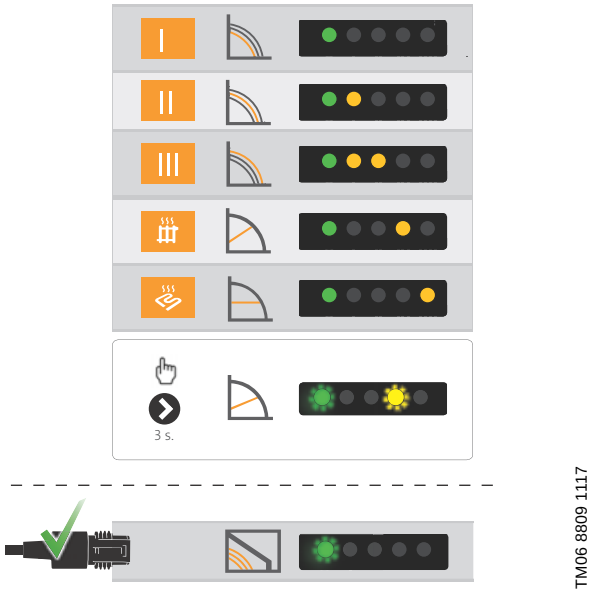

Fig. 16 Operating mode

Setting	Description
I	Constant curve I
II	Constant curve II
III	Constant curve III
	Radiator heating mode
	Underfloor heating mode
	Fixed proportional pressure curve
	PWM A profile

Overview of pump performance

The operating mode can be changed by pressing the control panel push-button as indicated in fig. 17 and the table below.

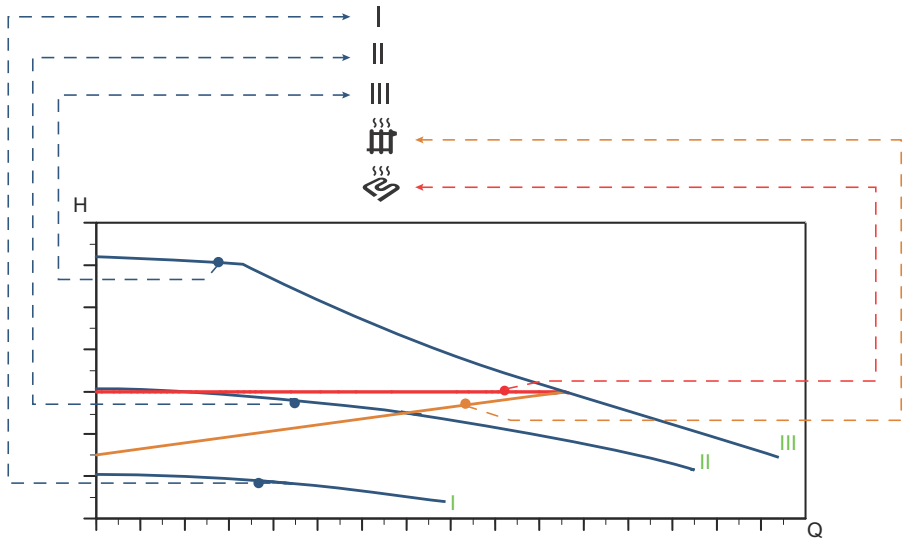

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Fig. 17 Pump setting in relation to performance

Setting	Pump curve	Function
	Proportional-pressure curve	The duty point of the pump will move up or down on the proportional-pressure curve, depending on the heat demand in the system. See fig. 17. The head (pressure) is reduced at falling heat demand and increased at rising heat demand.
	Constant-pressure curve	The duty point of the pump will move out or in on the constant-pressure curve, depending on the heat demand in the system. See fig. 17. The head (pressure) is kept constant, irrespective of the heat demand.
III	Speed III	The pump runs at a constant speed and consequently on a constant curve. At speed III, the pump is set to run on the maximum curve under all operating conditions. See fig. 17. Quick venting of the pump can be obtained by setting the pump to speed III for a short period.
II	Speed II	The pump runs at a constant speed and consequently on a constant curve. At speed II, the pump is set to run on the intermediate curve under all operating conditions. See fig. 17.
I	Speed I	The pump runs at a constant speed and consequently on a constant curve. At speed I, the pump is set to run on the minimum curve under all operating conditions. See fig. 17.

4. Operating conditions

Pumped liquids

The pump is suitable for clean, thin, non-aggressive and non-explosive liquids, not containing solid particles, fibres or mineral oil.

The pump must not be used for the transfer of flammable liquids, such as diesel oil, petrol and similar liquids.

Maximum water/propylene glycol mixture is 50 %.

Max. 10 mm^2/s viscosity

Note: The water/propylene glycol mixture reduces the performance due to higher viscosity.

For other liquids please look in Grundfos Product Center (GPC) for further information on curve date sheet.

Technical data

Liquid temperature

2-95 °C and 0-55 °C ambient temperature.

To avoid condensation in the control box and stator, the liquid temperature must always be higher than the ambient temperature.

System pressure

PN 10: Maximum 1.0 MPa (10 bar).

Inlet pressure

To avoid cavitation noise and damage to the pump, the following minimum pressures are required at the pump inlet port.

Liquid temperature	75 °C	95 °C
Pressure	0.005 MPa	0.05 MPa
	0.05 bar	0.5 bar

Electrical data

Supply voltage	1 x 230 V - 15 %/+ 10 %, 50/60 Hz, PE
Motor protection	The pump requires no external motor protection.
Enclosure class	IPX4D
Relative air humidity	Maximum 95 %
Insulation class	F

5. Construction

ALPHA1 L is designed for long and trouble- free operation, i.e. pump and motor form an integral unit without shaft seal and with only two gaskets for sealing. The bearings are lubricated by the pumped liquid. These constructions ensure maintenance-free operation.

The pumps are characterised by the following:

- permanent-magnet/compact-stator motor which contributes to high efficiency and high starting torque
- ceramic shaft and radial bearings which contribute to long life
- carbon thrust bearing which contribute to long life
- stainless-steel rotor can, bearing plate and rotor cladding which contribute to corrosion-free long life
- composite impeller which contributes to corrosion-free long life
- stainless-steel or cast-iron pump housing which contributes to flexibility
- the pump is self-venting through the system for easy commissioning
- compact design featuring pump head with integrated power supply control panel which fit into most common installations.

Stainless-steel versions N

The pump housing of the stainless-steel versions is in stainless steel. The stainless-steel versions can be identified by the N in the type key or by the silver pump housing. See fig. 18.

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Fig. 18 Stainless-steel version N

Exploded view and sectional view

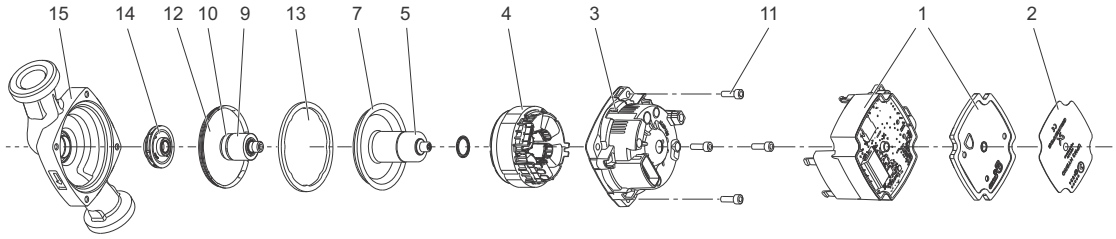

Fig. 19 ALPHA1 L exploded view

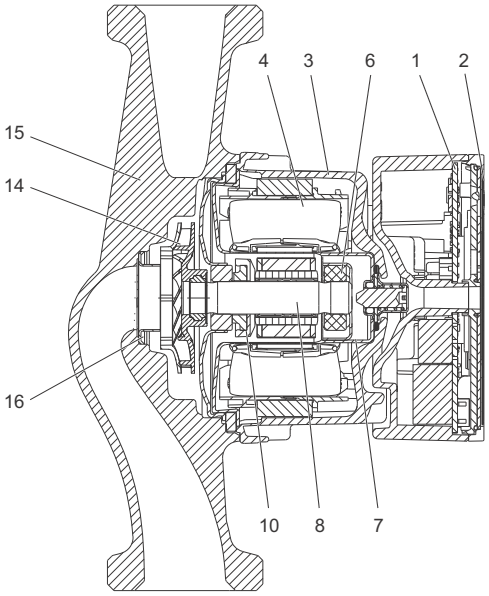

Fig. 20 ALPHA1 L sectional view

Material specification

Pos.	Component	Material	EN/DIN
1	Control box	Composite PC-GF10 FR	
	Control electronics	PCB with SMD components	
	Control box heat sink	Aluminium	
2	Front foil	LEXAN 8A13F	
3	Stator housing	Aluminium, silumin	
4	Stator	Copper wire	
	Stator lamination	Laminated iron	
5	Push deblocking device		
	Plunger	Stainless steel	1.4404
	Spring	Stainless steel	1.4310
	Housing for spring	Stainless steel	1.4401
	Guide disc	Stainless steel	1.4401
	Housing for sealing	Stainless steel	1.4401
	Sealing	EPDM	

Pos.	Component	Material	EN/DIN
6	Radial bearing	Ceramics	
7	Rotor can	Stainless steel	1.4401
8	Shaft	Ceramics	
9	Rotor	NdFeB	
	Rotor tube	Stainless steel	1.4521
	Rotor cladding	Stainless steel	1.4401/ 1.4301
	Bush	Stainless steel	1.4301
10	Thrust bearing	Carbon	
	Thrust bearing retainer	EPDM	
11	Screws	Steel, eco-lubric coated	
12	Bearing plate	Stainless steel	1.4301
13	Gasket	EPDM	
14	Impeller	Composite/PES 30 % GF	
15	Pump housing	Cast iron GG15	EN-GJL-150
		Stainless steel	1.4308
16	Neck ring	Stainless steel	1.4301

6. Installation and startup

Installation

In most cases, the installation of the ALPHA1 L is reduced to the mechanical installation and the connection to the power supply.

The pump must always be installed with horizontal motor shaft.

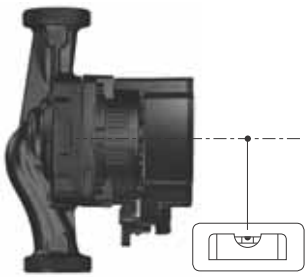

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Fig. 21 Horizontal motor shaft

Power supply positions

The circulator pump control box can be mounted in all positions.

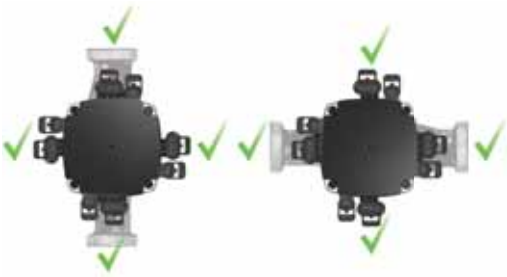

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Fig. 22 Possible control box positions

Power supply connection

The circulator pump must be connected to the power supply with the installer plug. See figs 23 and 24.

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Fig. 23 Installer plug

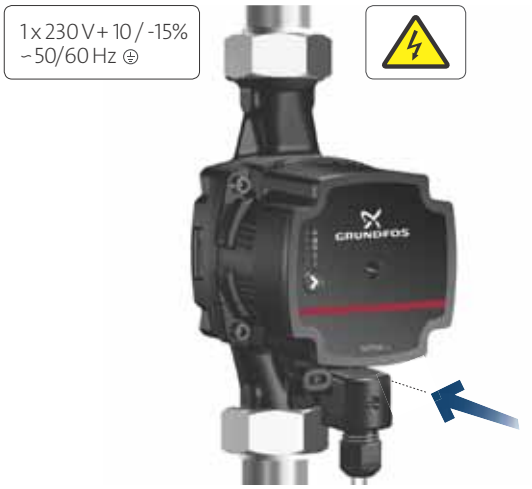

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Fig. 24 Installer plug in pump

Startup

The pump must not be started until the system has been filled with liquid and vented. Furthermore, the required minimum inlet pressure must be available at the pump inlet. The system cannot be vented through the pump.

The pump is self-venting and does not require venting before startup.

For more information about installation and startup, please visit:

net.grundfos.com/qr/i/99157402

QR99157402

7. Guide to performance curves

Energy labelling

The ALPHA1 L is energy-optimised and complies with the EuP Directive (Commission Regulation (EC) No. 641/2009) which has been in effect since 1 January 2013.

For more information about the new energy directive, please visit:

Energy.grundfos.com

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Curve conditions

The guidelines below apply to the performance curves on the following pages:

- Test liquid: airless water.
- The curves apply to a density of ρ = 998.2 kg/m^3 and a liquid temperature of 20 °C.
- All curves show average values and should not be used as guarantee curves. If a specific minimum performance is required, individual measurements must be made.
- The curves for speeds I, II and III are marked.
- The curves apply to a kinematic viscosity of υ = 1.004 mm^2/s (1.004 cSt).
- The conversion between head H [m] and differential pressure ρ [kPa] has been made for water with a temperature of 60 °C, ρ = 983.2 kg/m^3.
- Curves obtained according to EN 16297.

The pump is energy-optimised and complies with the EuP Directive, Commission Regulation (EC) No 641/2009 and 622/2012, which has been effective as from 1 January 2013.

For ALPHA1 L pumps, the energy efficiency index (EEI) is ≤ 0.20 (ALPHA1 L XX-65 EEI ≤ 0.23).

Figure 25 shows the energy consumption index for a typical circulator pump compared to the various EEI limits.

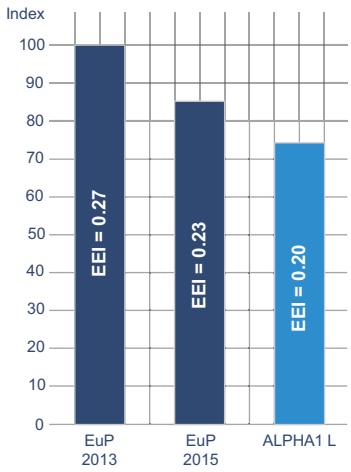

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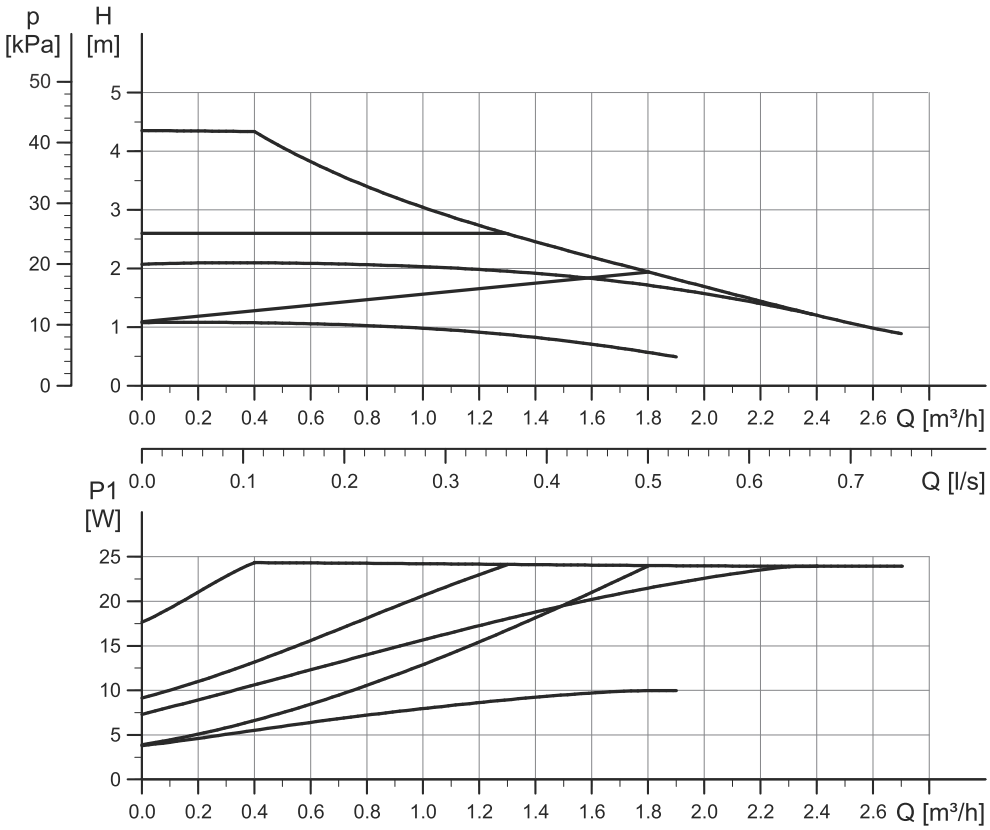
Fig. 25 EEI limits and the current positioning of the ALPHA1 L

With an energy efficiency index (EEI) below the EuP 2015 requirement level, you can achieve considerable energy savings compared to a typical circulator pump and thus a remarkably fast return on investment.

8. Performance curves and technical data

ALPHA1 L xx-40



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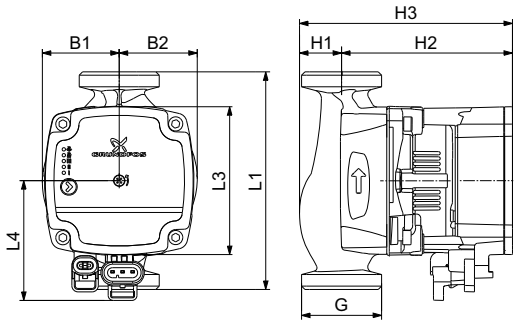
Speed	P1 [W]	I_1 [A]
Min.	3.4	0.05
Max.	25	0.26

The pump incorporates overload protection.

Liquid temperature: 2-95 °C (TF 95).

System pressure: Maximum 1.0 MPa (10 bar).

Specific EEI: ≤ 0.20



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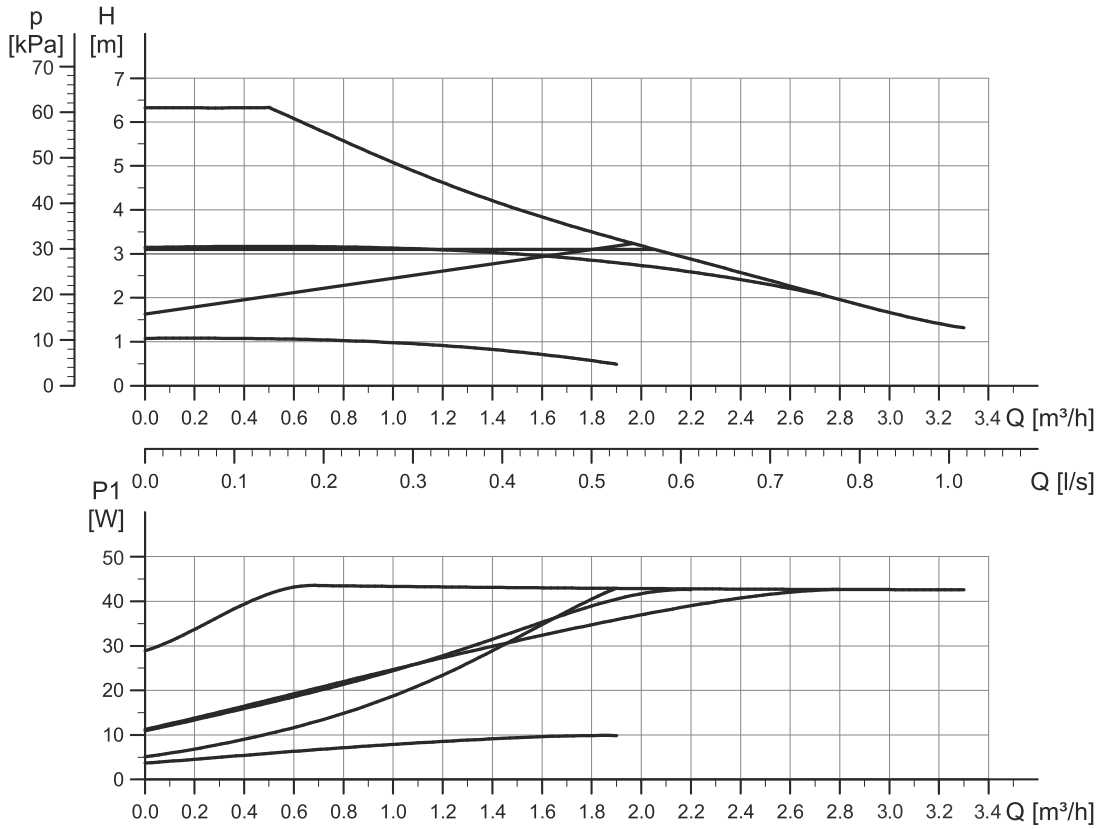
Pump type	Dimensions [mm]									Weights [kg]		Ship. vol. [dm³]
	L1	L3	L4	B1	B2	H1	H2	H3	G	Net	Gross	
ALPHA1 L 15-40	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1	1.8	2.0	3.83
ALPHA1 L 20-40	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1 1/4	1.8	2.0	3.83
ALPHA1 L 20-40 N	150	90	71.6	48.6	48.8	26.8	102.1	128.9	G 1 1/4	2.1	2.3	3.83
ALPHA1 L 25-40	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1 1/2	1.9	2.1	3.83
ALPHA1 L 25-40	180	88.3	71.6	46.3	46.4	25.3	102.1	127.4	G 1 1/2	1.9	2.1	3.83
ALPHA1 L 25-40 A	180	88.3	71.6	31.7	64.7	49.7	112	161.7	G 1 1/2	2.8	3.0	3.83
ALPHA1 L 25-40 N	180	90	71.6	48.6	48.8	26.8	102.1	128.9	G 1 1/2	2.2	2.4	3.83
ALPHA1 L 32-40	180	88.3	71.6	46.3	47.7	26.3	102.1	128.4	G 2	2.1	2.3	3.83

ALPHA1 L xx-60



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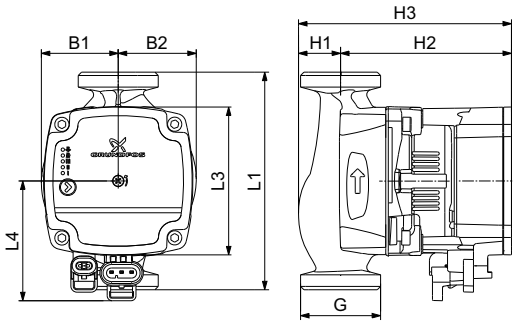
Speed	P1 [W]	I_1 [A]
Min.	3.4	0.05
Max.	45	0.42

The pump incorporates overload protection.

Liquid temperature: 2-95 °C (TF 95).

System pressure: Maximum 1.0 MPa (10 bar).

Specific EEI: ≤ 0.20



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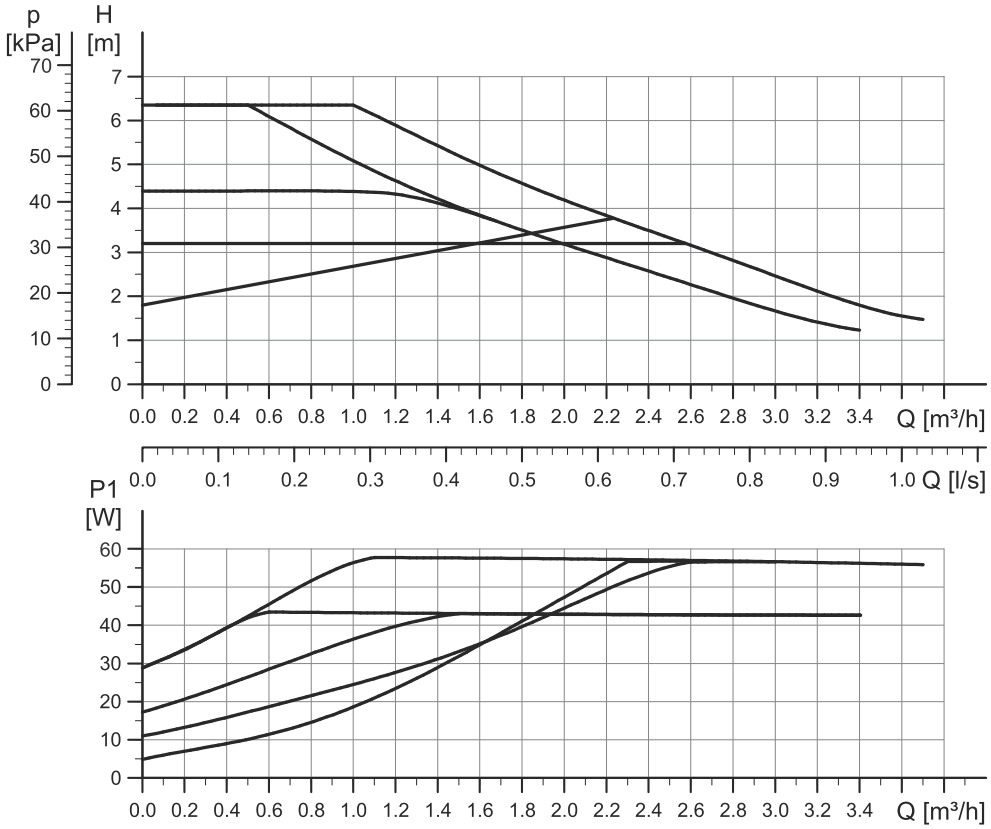
Pump type	Dimensions [mm]									Weights [kg]		Ship. vol. [m³]
	L1	L3	L4	B1	B2	H1	H2	H3	G	Net	Gross	
ALPHA1 L 15-60	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1	1.8	2.0	3.83
ALPHA1 L 20-60	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1 1/4	1.8	2.0	3.83
ALPHA1 L 20-60 N	150	90	71.6	48.6	48.8	26.8	102.1	128.9	G 1 1/4	2.1	2.3	3.83
ALPHA1 L 25-60	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1 1/2	1.9	2.1	3.83
ALPHA1 L 25-60	180	88.3	71.6	46.3	46.4	25.3	102.1	127.4	G 1 1/2	1.9	2.1	3.83
ALPHA1 L 25-60 A	180	88.3	71.6	31.7	64.7	49.7	112	161.7	G 1 1/2	2.8	3.0	3.83
ALPHA1 L 25-60 N	180	90	71.6	48.6	48.8	26.8	102.1	128.9	G 1 1/2	2.2	2.4	3.83
ALPHA1 L 32-60	180	88.3	71.6	46.3	47.7	26.3	102.1	128.4	G 2	2.1	2.3	3.83

ALPHA1 L xx-65



TM06 8821 1717

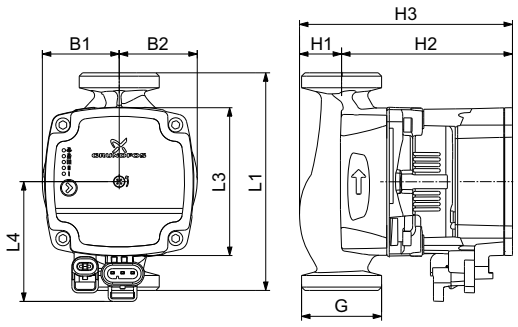
Speed	P1 [W]	I_1 [A]
Min.	4	0.05
Max.	60	0.52

The pump incorporates overload protection.

Liquid temperature: 2-95 °C (TF 95).

System pressure: Maximum 1.0 MPa (10 bar).

Specific EEI: ≤ 0.23



TM06 8814 1217

Pump type	Dimensions [mm]									Weights [kg]		Ship. vol. [m³]
	L1	L3	L4	B1	B2	H1	H2	H3	G	Net	Gross	
ALPHA1 L 15-65	130	88.3	71.6	45.9	46.6	25.1	102.1	127.2	G 1	1.8	2.0	3.83

9. Accessories and spare parts

Unions and valve kits

		Product numbers, unions														
		Rp			R		Rp			mm		mm				
ALPHAx	Connection	3/4	1	1 1/4	1	1 1/4	3/4	1	1 1/4	∅22	∅28	∅15	∅18	∅22	∅28	∅42
25-xx	G 1 1/2	529921	529922	529821	529925	529924										
25-xx N	G 1 1/2	529971	529972				519805	519806	519807	519808	519809		529977	529978	529979	
32-xx	G 2		509921	509922												

G-threads have a cylindrical form in accordance with the EN-ISO 228-1 standard. R-threads have a conical form in accordance with the ISO 7-1 standard. In the case of a thread of size 1 1/2", the threads are specified as G 1 1/2 or R 1 1/2. You can only screw male G-threads (cylindrical) into female G-threads. You can screw male R-threads (conical) into female G- or R-threads. See fig. 26.

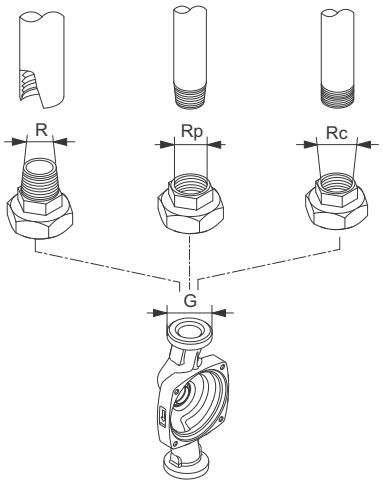


Fig. 26 G-threads and R-threads

Insulating shells

The insulating shells, which are tailored to the individual pump type, can be ordered as accessories. It is easy to fit the insulating shells around the pump.

Pump type	Product number
ALPHA1 L XX-XX (N)	99270706

Control box connections

The ALPHA1 L control box has two electrical connections on one side: the power supply and signal connection.

Power supply

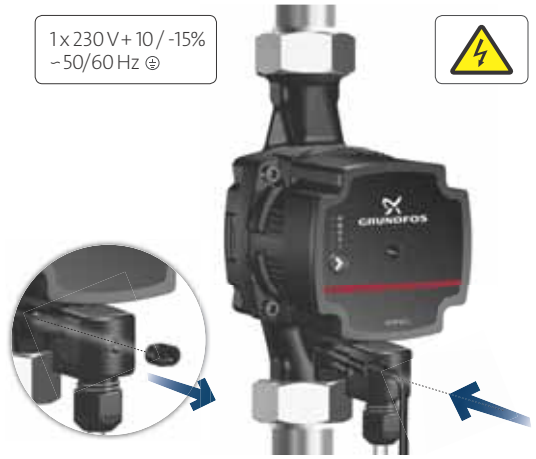
The installer plug is supplied with the pump and is available as a spare part.

Power cable adapters are also available as accessories.

Control signal connection

The control signal cable connection has three leads: signal input, signal output and signal reference. Connect the cable to the control box by a mini superseal plug. See fig. 28. The optional signal cable can be supplied with the circulator as an accessory.

The PWM signal connection is covered by a blind plug from the factory. See fig. 27.



TM06 7633 1217

Fig. 27 Control signal connection

TM06 58210216

Fig. 28 Mini superseal plug

Cables and plugs

Picture	Product description	Length [mm]	Product number
	Installer plug		99165345
	Signal cable with mini superseal	2000	99165309
	Superseal Molex cable adapter, overmoulded	150	99165311
	Superseal Volex cable adapter, overmoulded	150	99165312

10. Product numbers

Note: Click on the relevant product number, and go directly to the performance curve in Grundfos Product Center (GPC).

Pump type	Product number	Data sheet Page
ALPHA1 L 15-40 130	99160550	15
ALPHA1 L 15-60 130	99160574	16
ALPHA1 L 15-65 130	99165123	17
ALPHA1 L 20-40 130	99160575	15
ALPHA1 L 20-60 130	99160577	16
ALPHA1 L 25-40 130	99160578	15
ALPHA1 L 25-40 180	99160579	15
ALPHA1 L 25-40 A 180	99160580	15
ALPHA1 L 25-60 130	99160583	16
ALPHA1 L 25-60 180	99160584	16
ALPHA1 L 25-60 A 180	99160586	16
ALPHA1 L 32-40 180	99160587	15
ALPHA1 L 32-60 180	99160590	16
Stainless-steel versions		
ALPHA1 L 20-40 150 N	99160595	15
ALPHA1 L 20-60 150 N	99160598	16
ALPHA1 L 25-40 180 N	99160592	15
ALPHA1 L 25-60 180 N	99160594	16

11. Further product information

Grundfos for installers

Grundfos for Installers brings together the best tools and information for you to access easily, at any time. Select and bookmark the country site most relevant to you, start exploring the tools and knowledge you find interesting and let Grundfos for Installers make your working day easier.

Grundfos for Installers is under constant development and is continually updated with new tools, features and information. Access your country-specific site quickly and conveniently from your computer, tablet or smartphone.

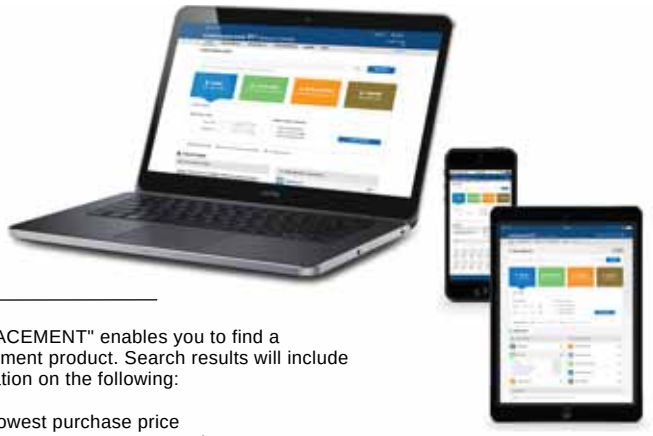
For more information about the Grundfos for installers site, please visit:

http://www.grundfos.com/grundfos-for-installers-global.html

Grundfos Product Center GPC

Online search and sizing tool to help you make the right choice.

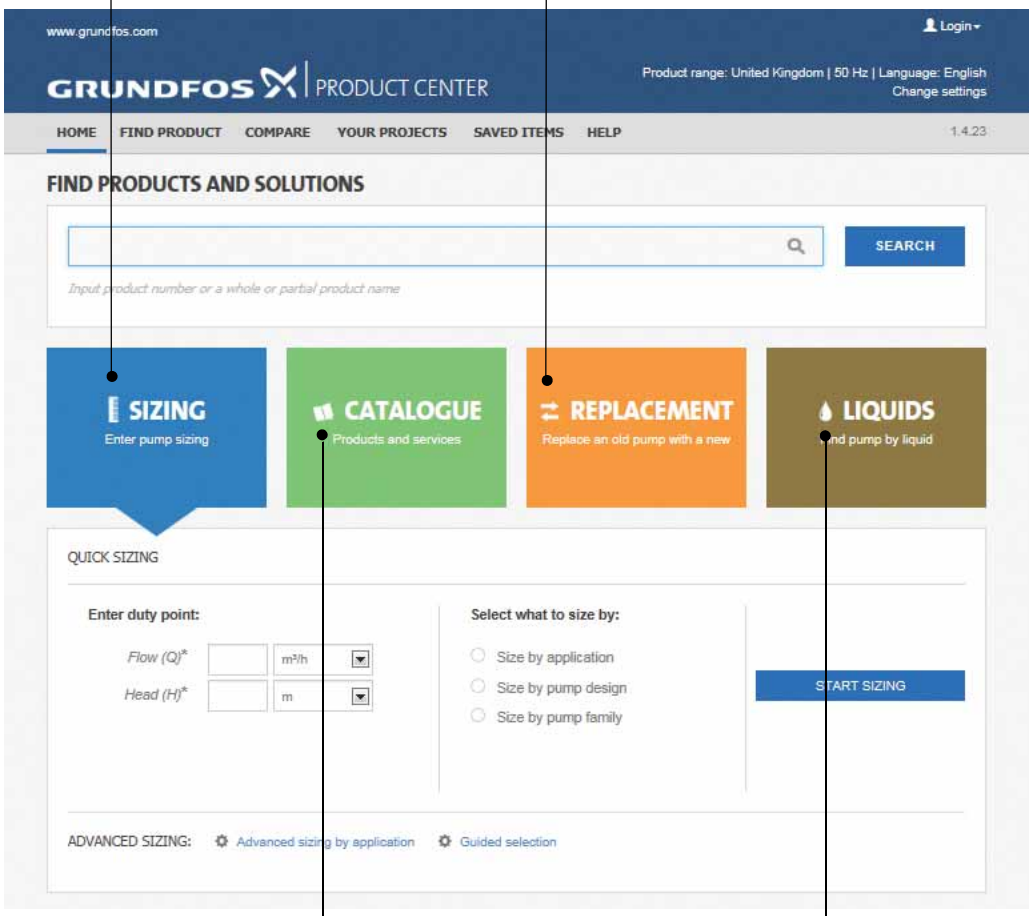
http://product-selection.grundfos.com



"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product. Search results will include information on the following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



"CATALOGUE" gives you access to the Grundfos product catalogue.

"LIQUIDS" enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

Subject to alterations.

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ECM: 1209451

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