Regulus

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RGMAT E R 1F

Installation and Operation Manual
RegulusRGMAT E R 1F LOAD UNIT
for heating systems

EN

RGMAT E R 1F

1. Introduction

RegulusRGMAT E R 1F Load Unit makes solid-fuel boiler and fireplace installation quicker as it contains all important components needed for boiler circuit circulation and boiler protection against low-temperature corrosion. It is designed to be installed directly on a boiler return piping. The distance of pipe axis from a wall shall be at least 100 mm to enable insulation removal if needed. This Load Unit is intended for hydronic fireplaces and solid-fuel boilers.

2. Description of RGMAT E R 1F Load Unit

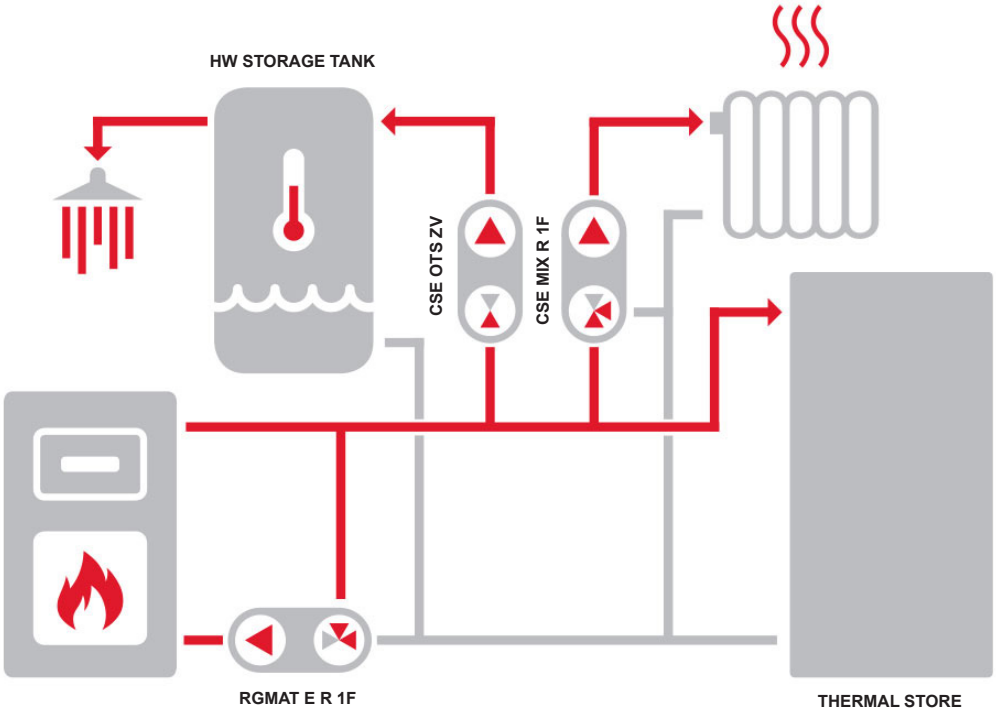
Main Features	
Function	The load valve integrated in the load unit ensures keeping min. inlet temperature to a boiler (fireplace) above the temperature of the flue gas condensation, thereby preventing low-temperature corrosion of the boiler combustion chamber. The load unit thereby contributes to significantly reducing the process of tarring and fouling of the boiler, increasing the efficiency of fuel combustion and extending the service life of the boiler.
Application	The load unit is intended for use in systems with solid-fuel boilers and fireplaces.
Description	The Load Unit consists of: • RPA Pump, • ball valve with union nut, • TSV3B Load Valve w. outer threads and automatic bypass balancing, • thermometer, • insulation.
Working fluid	Water; water/glycol mixture (max. 1:1). pH range 6.5-8.5. We recommend placing a filter with a mesh size of max. 0.6 mm upstream of the pump – e.g. Magnet FilterBall – see the Catalogue for codes.
Installation	On return piping, min. dist. of the pipe axis from a wall is 100 mm.

Opening temperature [°C]	Pump	Code	Max. boiler output [kW]
45	RPA 25-6	22040	47
	RPA 25-8	21374	54
50	RPA 25-6	22041	43
	RPA 25-8	22038	49
55	RPA 25-6	22042	37
	RPA 25-8	21115	42
60	RPA 25-6	22043	33
	RPA 25-8	22039	37
65	RPA 25-6	22044	27
	RPA 25-8	21122	30
70	RPA 25-6	22045	23
	RPA 25-8	21375	26

Data for Load Unit	
Fluid working temperature	5 - 95 °C
Max. working pressure	6 bar
Min. working pressure	0.5 bar
Ambient temperature	5 - 40 °C
Max. rel. humidity	80% non condensing
Control range	$t_{valve.opening}$ + 5 °C
Valve Kvs (A ►AB direction)	6.2 m³/h
Valve Kvs (B ►AB direction)	4.4 m³/h
Insulation material	EPP RG 60 g/l
Overall dimensions	325 x 140 x 155 mm
Total weight	3.0 kg
Connections	3x G 1" F

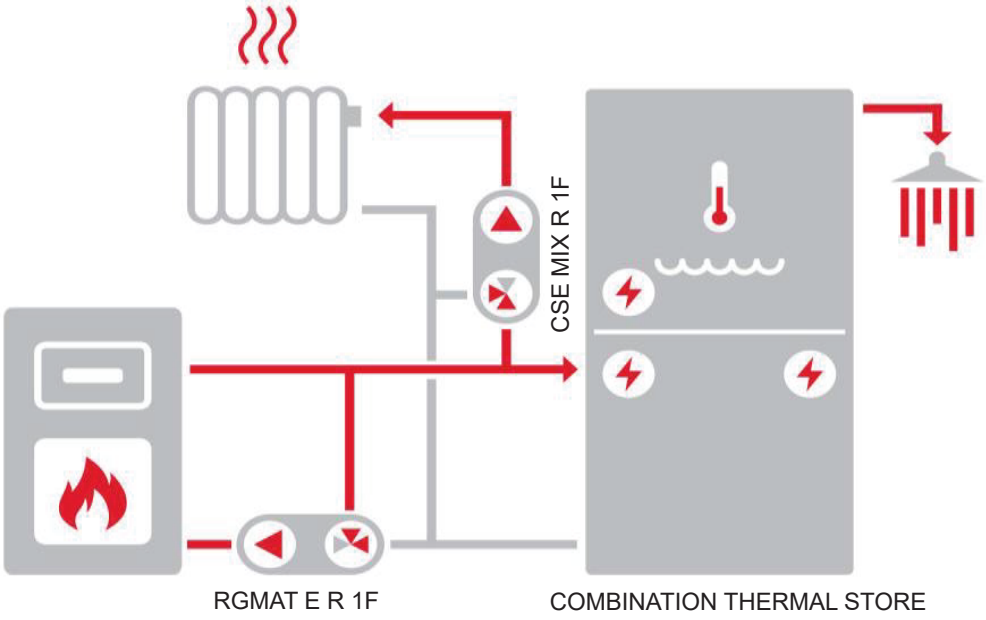
3. RGMAT E R 1F Connection Diagram

Example of possible connection I



The diagram shows a typical connection of a solid fuel boiler, thermal store and heating circuit (with the recommended CSE MIX R 1F pump station – not included in supply). If the boiler is used also for hot water heating, it is recommended to install a CSE OTS ZV pump station (not included in supply).

Example of possible connection II



The diagram shows a typical connection of a solid fuel boiler, combination thermal store and heating circuit (with the recommended CSE MIX R 1F pump station – not included in supply).

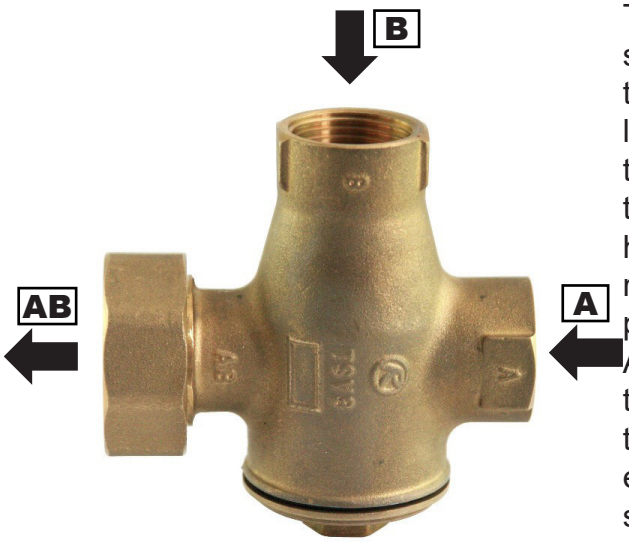
Install the Load Unit respecting the following instructions:

Connect the Load Unit outlet marked ***AB*** to the piping entering the boiler. Connect the return line from the heating system to the ***A*** inlet, and the outlet pipe from the boiler to the ***B*** inlet via a T-piece. Take care to install shut-off valves and filter where necessary to avoid draining the whole system for valve cleaning or replacing the thermostatic element.

When the connecting pipes are not arranged or sloped properly, the load valve may get blocked by air inside. This may hinder or even disable its operation.

Always respect valid rules and boiler manufacturer’s data during installation.

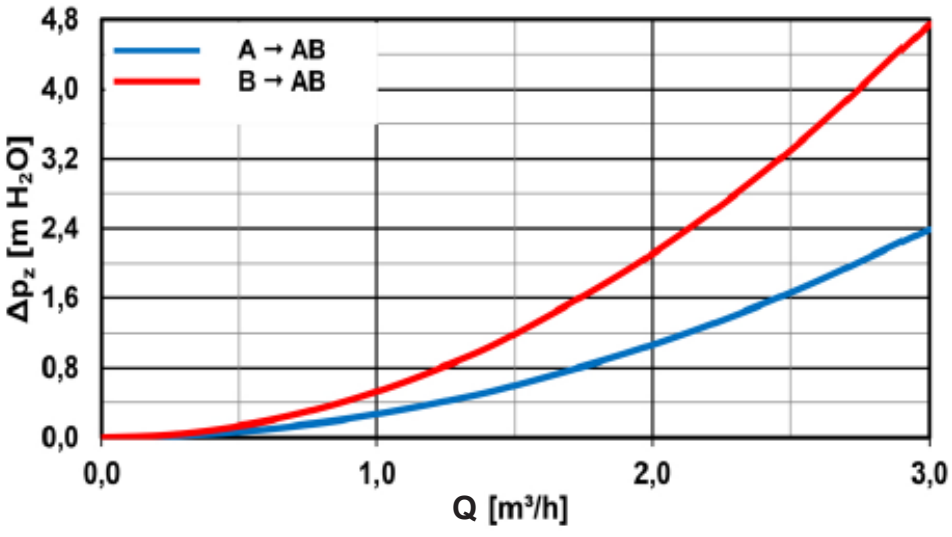
4. Function Description of TSV3B Valve



The TSV3B load valve is fitted with an integrated thermostatic insert that will close the A inlet (from a heating system), if the return water temperature to the boiler (AB outlet) is lower than the opening one. As soon as the opening temperature is reached, the thermostat starts opening the A inlet slowly and mixing the cold return water with the hot water from the B inlet (boiler flow) with the aim to reach the opening temperature (AB outlet) in the return pipe.
At the same time, the valve closes the B inlet, limiting so the hot water flow coming from the bypass till its complete tight closure. Thanks to this, no balancing valve is needed. The load valve is made of brass, element and plug seals are in EPDM, cone seal is made of NBR.

Technical Data	
Valve opening temperature	depending on the thermostatic element
Control range	$t_{valve.opening}$ + 5 °C
Valve Kvs (A→AB direction)	6.2 m³/h
Valve Kvs (B→AB direction)	4.4 m³/h
Nominal inner diameter	DN 25

Valve pressure drop graph



The pressure drop value moves between the two curves depending on the mixing ratio during mixing.

5. RPA Circilation Pump

5.1. General Information

The high efficiency circulation pumps of the RPA series are used exclusively for the circulation of liquids in hot water heating systems. Operating the pump in other systems or in systems containing too little water, air bubbles or not pressurized can lead to its rapid destruction.

5.2. Pump Description

High efficiency wet-running ON/OFF circulation pump designed for circulation of fluids in heating systems; the pump is equipped with an anti-blocking motor and integrated electronic performance control; LED indication of operation for an easy check; choice between constant speed mode I, II, III, PP mode for variable differential pressure or CP mode for constant differential pressure.

5.3. Permissible and prohibited positions of the pump station

5.4.Pump Wiring

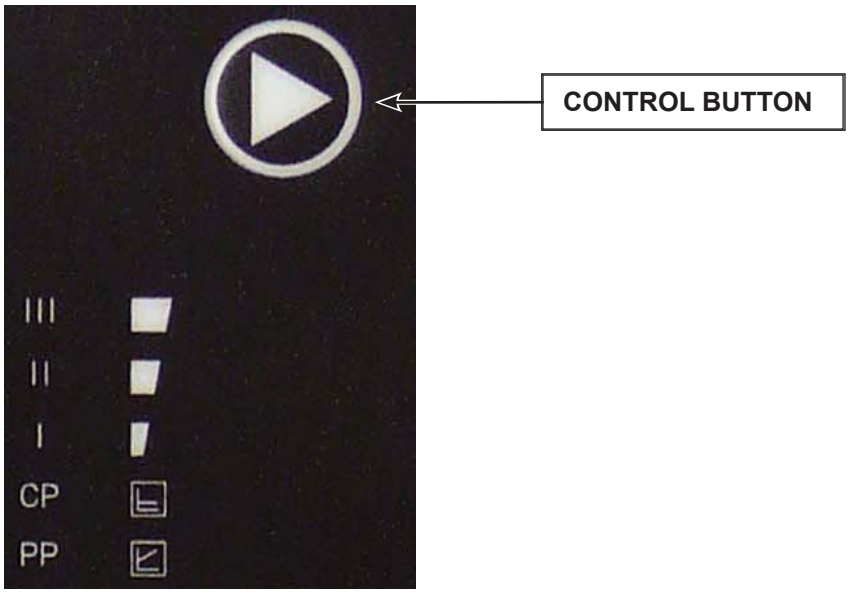
Connecting/disconnecting the pump must be done by a professionally qualified person!

Insert the power cable into the connector on the pump. Connect the wires at the other end of the cable to the corresponding terminals in the terminal block.

5.5. Pump Control

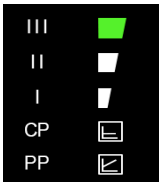
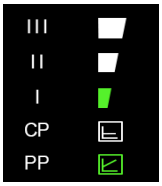
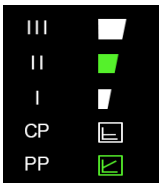
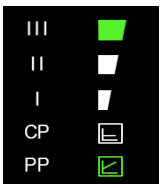
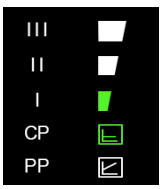
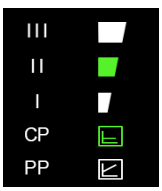
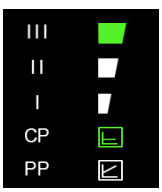
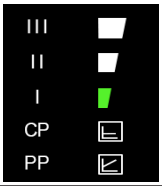
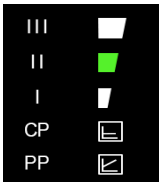
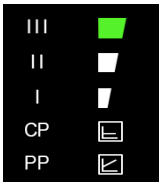
In the factory settings of the RPA pump, the Constant Speed (CS) operating mode and the pump performance curve III are preset. After switching on, the pump runs at the factory setting or at the last setting.

The settings can be changed using the control button, see below.



By briefly pressing the control button:

You select the **operating mode** of the pump: constant speed (CS), proportional pressure (PP) or constant pressure (CP) and the pump **performance curve** (I, II, III). The LED lights show the pump settings (operating mode and performance curve).

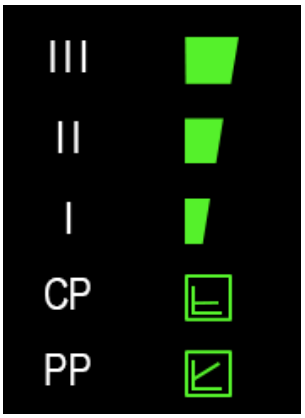
NUMBER OF PRESSES	OPERATING MODE		LED INDICATORS
0	CS III (factory setting)	constant speed III	
1	PP I	proportional pressure I	
2	PP II	proportional pressure II	
3	PP III	proportional pressure III	
4	CP I	constant pressure I	
5	CP II	constant pressure II	
6	CP III	constant pressure III	
7	CS I	constant speed I	
8	CS II	constant speed II	
9	CS III	constant speed III	

PUMP AIR VENTING

If the pump is aerated:

Activate the vent function by pressing and holding the control button for 5 seconds. Venting is indicated by five flashing LED lights - see picture.

The pump alternately switches on and off during venting. Venting lasts for 5 minutes, after which the pump switches to normal mode.

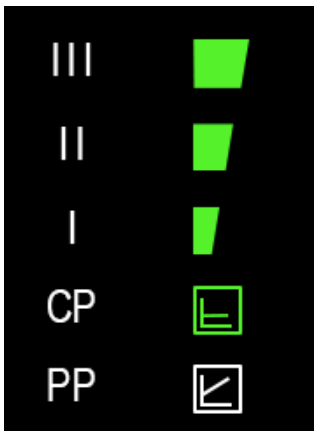


MANUAL RESTART

In case the pump has been stopped for a long time or is blocked, activate the manual restart by holding the control button for 8 seconds. A manual restart is signalled by four flashing LED lights - see the pic., and during it the pump alternately switches on and off.

Manual restart lasts for 5 minutes, after which the pump switches to normal mode.

If the pump is not unblocked, contact a specialist technician.



PUMP OPERATING MODES

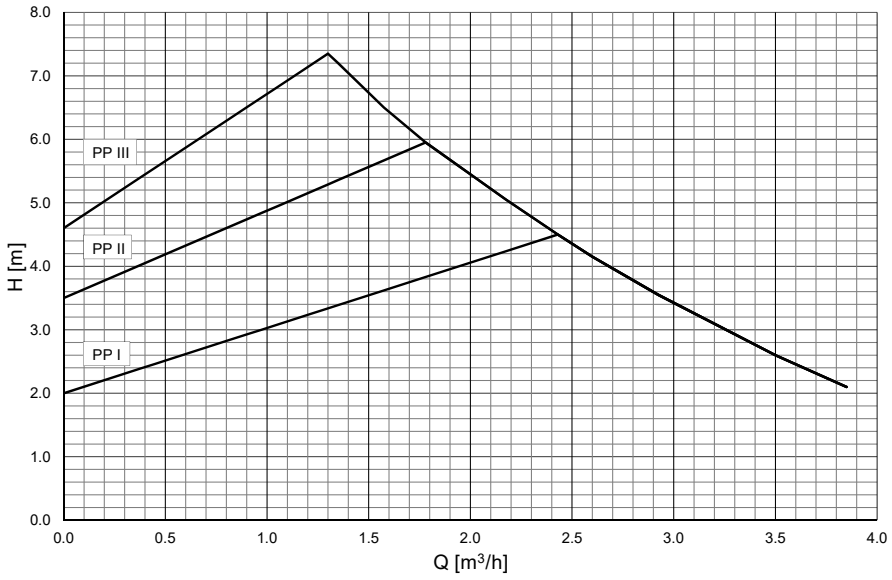
Proportional pressure PP

The operating mode „proportional pressure“ is recommended in systems where it is appropriate to reduce the pump discharge pressure together with the decrease of the required flow rate. A typical example is a heating circuit with radiators equipped with thermostatic valves, when choosing this operating mode can reduce the noise of the thermostatic valves, which is usually caused by closing of a larger number of radiators in the system. **This mode, on the other hand, is unsuitable for circuits of heat sources where a decrease in head together with flow rate can even cause that these sources stop working.**

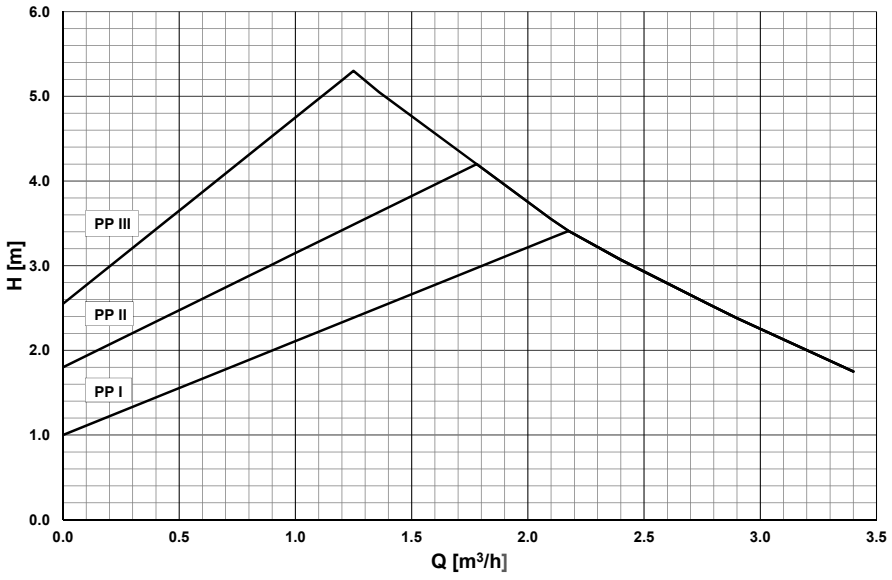
As the pump also reduces the head when reducing the flow rate, there is a substantial reduction in the pump power consumption and thus also the operating costs. For larger heating circuits and for circuits where there are significant differences in the heating performance requirements in separate heating zones, this mode can temporarily cause underheating. For these systems, it may be more appropriate to switch the pump to constant pressure mode CP.

Performance curves

RPA 25-8



RPA 25-6



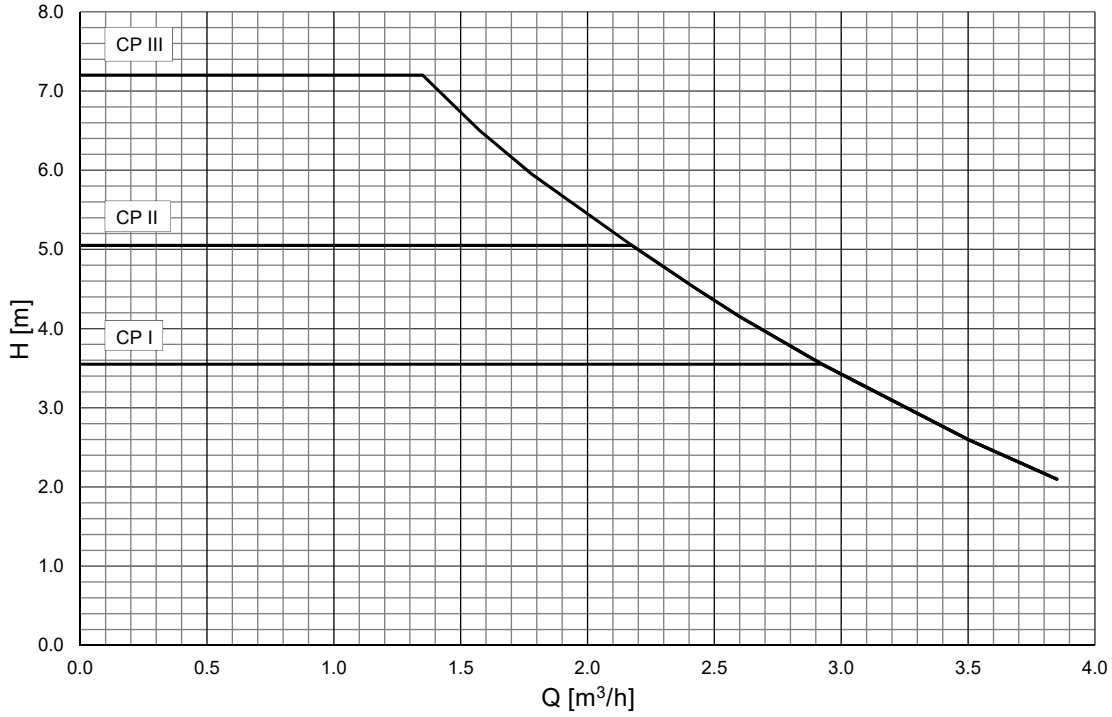
Constant pressure CP

The operating mode „constant pressure“ (constant head) is suitable for hydraulic circuits of heat sources (boilers, heat pumps, solar thermal systems, etc.), hot water tanks, hot water heaters, floor heating systems and extensive heating circuits where the previous PP mode could cause underheating by reducing the head.

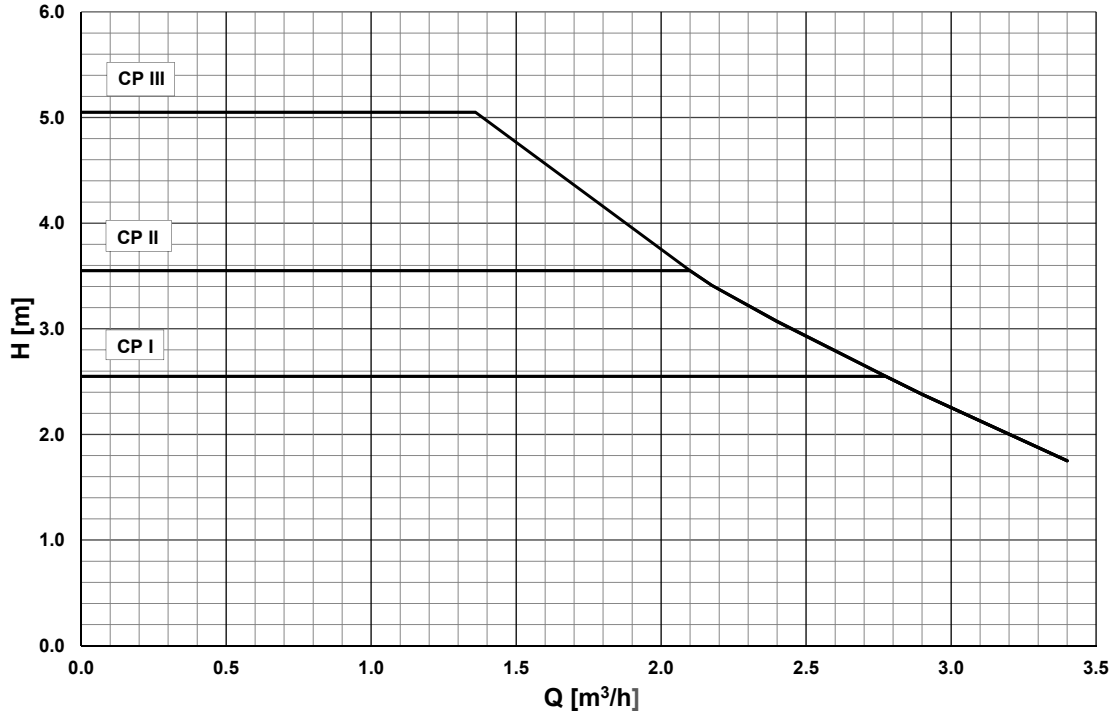
By reducing the required flow, the pump maintains a constant head, so the reduction of pump performance is more gradual than in the PP mode.

Performance curves

RPA 25-8



RPA 25-6



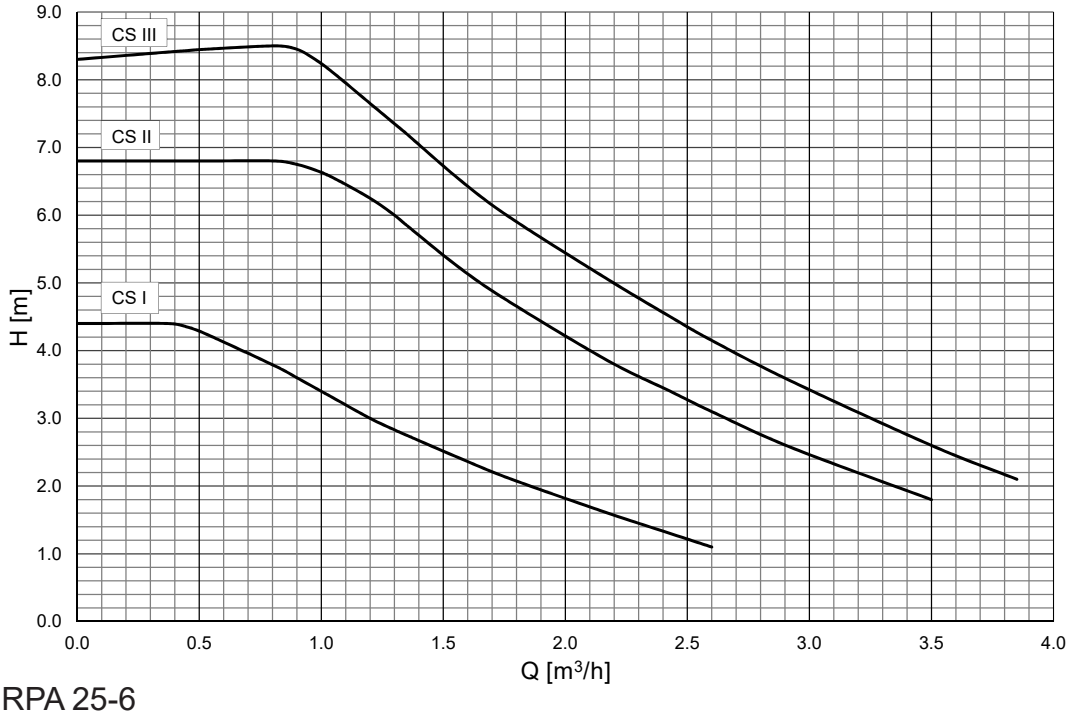
Constant speed CS

The operating mode „constant speed“ means that the pump does not adjust its speed in any way depending on the flow rate or head of the hydraulic circuit. The flow rate and head of the pump is therefore completely dependent on the set speed level (I, II, III) and on the setting of the hydraulic circuit. This mode is used where the more economical CP mode is not suitable. This is the same mode that older types of classic circulation pumps had, where the speed mode I, II, III was selected with a switch.

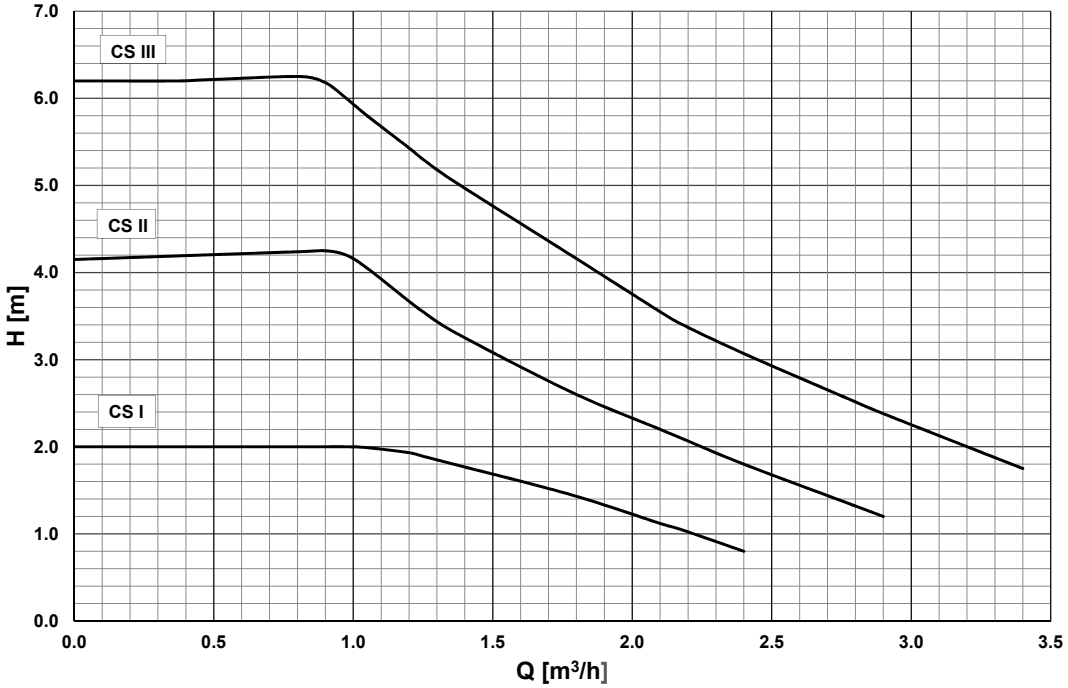
The mode may be suitable e.g. for older types of circuits where the flow rate is regulated by a throttle and the requirement is to maintain it. Furthermore, it can be suitable for solid fuel boilers that are equipped with older types of TSV valves with balancing by means of a manual throttle valve, or in other similar specific cases of a requirement for a constant pumping performance of the pump.

Performance curves

RPA 25-8



RPA 25-6



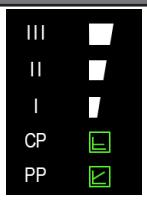
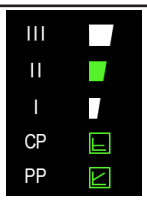
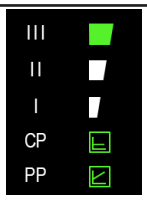
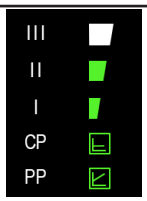
5.6. Technical Data

Electric Data	
Power supply	1~230 V, 50/60 Hz
Max. power consumption	65 W - RPA 25-8 pump 45 W - RPA 25-6 pump
Max. current	0.65 A - RPA 25-8 pump 0.42 A - RPA 25-6 pump
IP rating	IP 44
Insulation class	F
Motor protection	not needed (block resistant)
Power cable length	3 m

5.7. FAULTS, THEIR CAUSE AND TROUBLESHOOTING

FAULT	PROBABLE CAUSE	TROUBLESHOOTING
Pump not running	Loose cable or power interruption	Check the power supply and power cable connection
	Damaged pump control electronics	Replace the pump
	Blocked pump impeller	Disconnect the actuator and clean the pump
Noise in heating system / pump	Low pump suction pressure	Increase the pressure above the min. working pressure value - see chap. 2
	Air in the system or pump	Vent the system and the pump
Pump is running but no fluid circulation through system	Closed valve in system	Check that valves are open
	Air in the system	Vent the system

Some types of faults are signaled on the pump with LED lights:

FAULT	SIGNAL	PROBABLE CAUSE	TROUBLESHOOTING
Blocked pump impeller		Impurities in the pump	Remove the actuator and clean the pump
Overvoltage or undervoltage		The mains voltage is too high or too low	Check that the power cable is correctly atta-ched and that the mains voltage is correct
Power phase interruption in-side the pump		Broken motor winding or other interruption of the power pha-se inside the pump	Replace the pump
Electrical short circuit inside the pump		Damaged motor winding or other electrical short inside the pump	Replace the pump

If the fault cannot be rectified, contact a specialist technician.

6. Installation Options

This Load Unit comes in the version for horizontal installation to the right of a boiler. However, it can be installed also into vertical piping or horizontally to the left of a boiler. When being installed horizontally to the left of a boiler, the Load Unit needs to be turned by 180° and the TSV3 valve turned as shown in the pics below.

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