

Technical guide



File in:
Vitotec technical guide folder, register 4



Vitocrossal 300, up to 142 kW
(type CM3)



Vitocrossal 300, 187 to 635 kW
(type CT3)



Vitocrossal 300, from 787 kW
(type CR3)

Vitocrossal 300

Gas fired condensing boiler

Vitocrossal 300 (type CM3) for natural gas E and LL
87 to 142 kW, with MatriX radiant burner

Vitocrossal 300 (type CT3) for natural gas E, LL and LPG
187 to 635 kW
187 kW with MatriX radiant burner (only for natural gas E and LL)

Vitocrossal 300 (type CR3) for natural gas E, LL and LPG
787 and 978 kW

Vitotrans 333

Flue gas/water heat exchanger
for gas or oil fired boilers up to 6600 kW

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1.1 Vitocrossal 300

Gas fired condensing boiler

- 87 to 187 kW for natural gas E and LL
- 248 to 978 kW for natural gas E, LL and LPG

with Inox-Crossal heating surfaces.

Rated output 87 to 978 kW

Permissible operating temperature up to 100 °C

Permissible safety temperature up to 110 °C

Permissible operating pressure

87 to 142 kW (type CM3) 4 bar
187 to 635 kW (type CT3) 4 bar
(408 to 635 kW with 5.5 bar, on request)
787 and 978 kW (type CR3) 6 bar

For operation with modulating boiler water temperature.

CE designation in accordance with the European guideline for gas fired devices
Type CM3 CE-0085 BN 0569
Type CT3 CE-0085 AQ 0257
Type CR3 CE-0085 AQ 0315

Advantages

- Vertical stainless steel Inox-Crossal heating surfaces for high operational reliability and long service life.
 - Vertical hot gas flues let condensate drain easily downwards and out. This prevents concentrations through re-evaporation of condensate.
 - Increased self-cleaning effect through smooth stainless steel surface.
- Highly efficient heat transfer and high condensation rate through
 - heat exchanger surfaces which intensely turbulate the flue gas flow
 - boiler water and hot gases flow in counterflow.
- Standard efficiency up to 109% through intensive condensation. The flue gas temperature is only approx. 5 to 15 K higher than the return temperature.
- Clean combustion – through low loading of the straight-through combustion chamber.
- Two return connectors – the heating circuits with lower return temperature are connected separately. This leads to increased hot gas condensation.
- Narrow design and low weight for easy transport into boiler rooms; from 187 kW also available as two parts.
- Burner up to 978 kW – matched up and prewired ready for connection. Boiler size 87 to 187 kW also available with modulating Viessmann Matrix radiant burner for particularly quiet and environmentally responsible operation.

1.2 Operating conditions with Vitotronic boiler control units

	Requirements
1. Heating water volume flow	None
2. Boiler return temperature (min. value)	None
3. Lower boiler water temperature	None
4. Two-stage burner operation	None
5. Modulating burner operation	None
6. Reduced mode	None – total reduction is possible
7. Weekend setback	None – total reduction is possible

► Note

For water quality requirements, see page 28.

1.3 Boiler control units

1.3 Boiler control units

(for a comprehensive description see datasheets of boiler control units)

A matching boiler control unit is part of the standard delivery of every Viessmann boiler. This control unit has been specially developed for energy-saving and environmentally friendly operation.

The temperature sensors are precisely matched to the boiler characteristics.

Vitocrossal control panels with weather-compensated control unit Vitotronic 333 (type MW1S) for 1 to

4 boilers and 2 heating circuits with mixer and additional Vitotronic 050, type HK1S or HK3S for 1 or up to 3 heating circuits with mixer can be supplied for Vitocrossal 300.

The following control units are available for the condensing boilers:

For the operation of single boiler systems

Vitotronic 100 (type GC1)

- Electronic boiler circuit control for operation with constant temperature or weather-compensated operation in conjunction with a Vitocrossal control panel with Vitotronic 333 type MW1S) or an external control unit
- for **two-stage** or **modulating burners**
- with cylinder thermostat
- with control unit for cylinder loading system with mixing assembly or alternatively for regulating a constant return with regulated three-way valve
- with integral diagnostic system
- optional function extension to supply a default set boiler water temperature via a 0-10 V input (accessory).

(According to the Energy Savings Order [Germany], a weather-compensated or room temperature dependent control unit with timer programming for reduced mode must be installed downstream of the boiler.)

External demands:

- Enable boiler/open butterfly valve
- Burner stage 1 ON
- Burner stage 1 and 2 ON

A zero volt contact must be provided for each command.

Connect the zero volt contacts to LV plug-in connectors [143](#) and [146](#).

For the operation of multi-boiler systems

Every boiler in a multi-boiler system should be equipped with a Vitotronic 100 (type GC1). Vitotronic 333 (type MW1) is part of the standard boiler supply (see price list) and should be installed separately.

The LON communication module must be fitted into Vitotronic 100. See price list.

In multi-boiler systems with external control unit, the load-dependent burner and boiler control as well as the cylinder thermostat, must be implemented by the overriding (external) control unit.

Vitotronic 200 (type GW1)

- Weather-compensated digital boiler control unit
- for **single boiler systems**
- for **two-stage** or **modulating burners**
- with time switch with day and week programs
- with programming unit with clear text display
- with separately adjustable periods
- with cylinder thermostat
- with control unit for cylinder loading system with mixer assembly or alternatively for regulating a constant return with regulated three-way valve
- with integral diagnostic system
- optional function extension to supply a default set boiler water temperature via a 0-10 V input (accessory).

Vitotronic 300 (type GW2)

- Weather-compensated digital boiler and heating circuit control
- for **single boiler systems**
- for **max. 2 heating circuits with mixer**
- for **two-stage** or **modulating burners**
- with time switch with day and week programs
- with programming unit with clear text display
- with separately adjustable periods and heating curves
- with cylinder thermostat
- with control unit for cylinder loading system with mixer assembly or alternatively for regulating a constant return with regulated three-way valve
- with integral diagnostic system
- optional function extension to supply a default set boiler water temperature via a 0-10 V input (accessory).

An extension kit is required for **each heating circuit with mixer**. The LON communications module is required to make the equipment **able to communicate** (LON BUS).

Vitotronic 100 (type GC1)

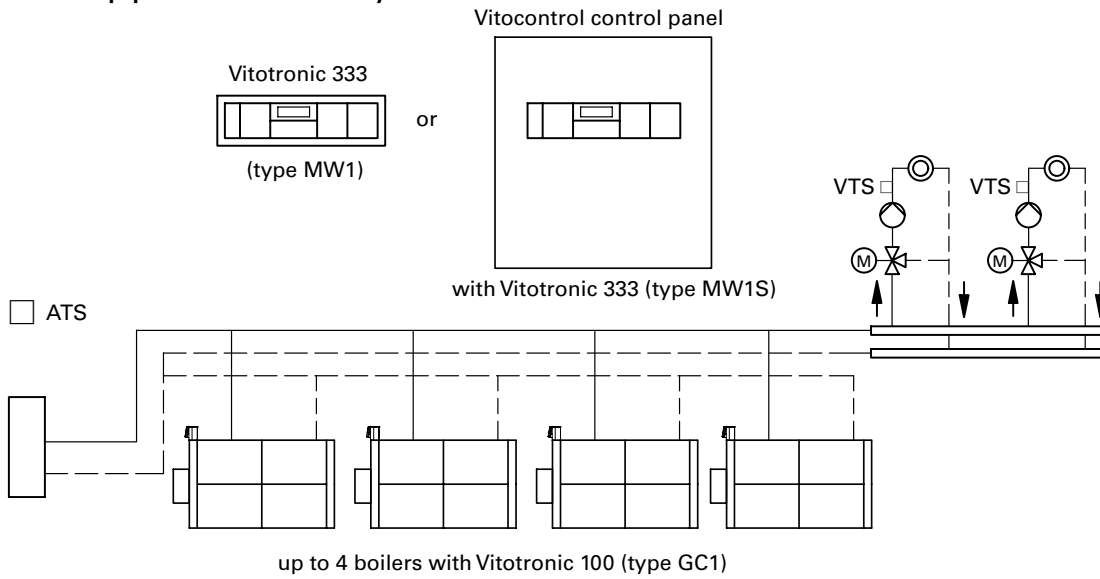
- Electronic boiler control unit
- for **two-stage** or **modulating burners**
- communication ability via LON BUS.

Vitotronic 333 (type MW1)

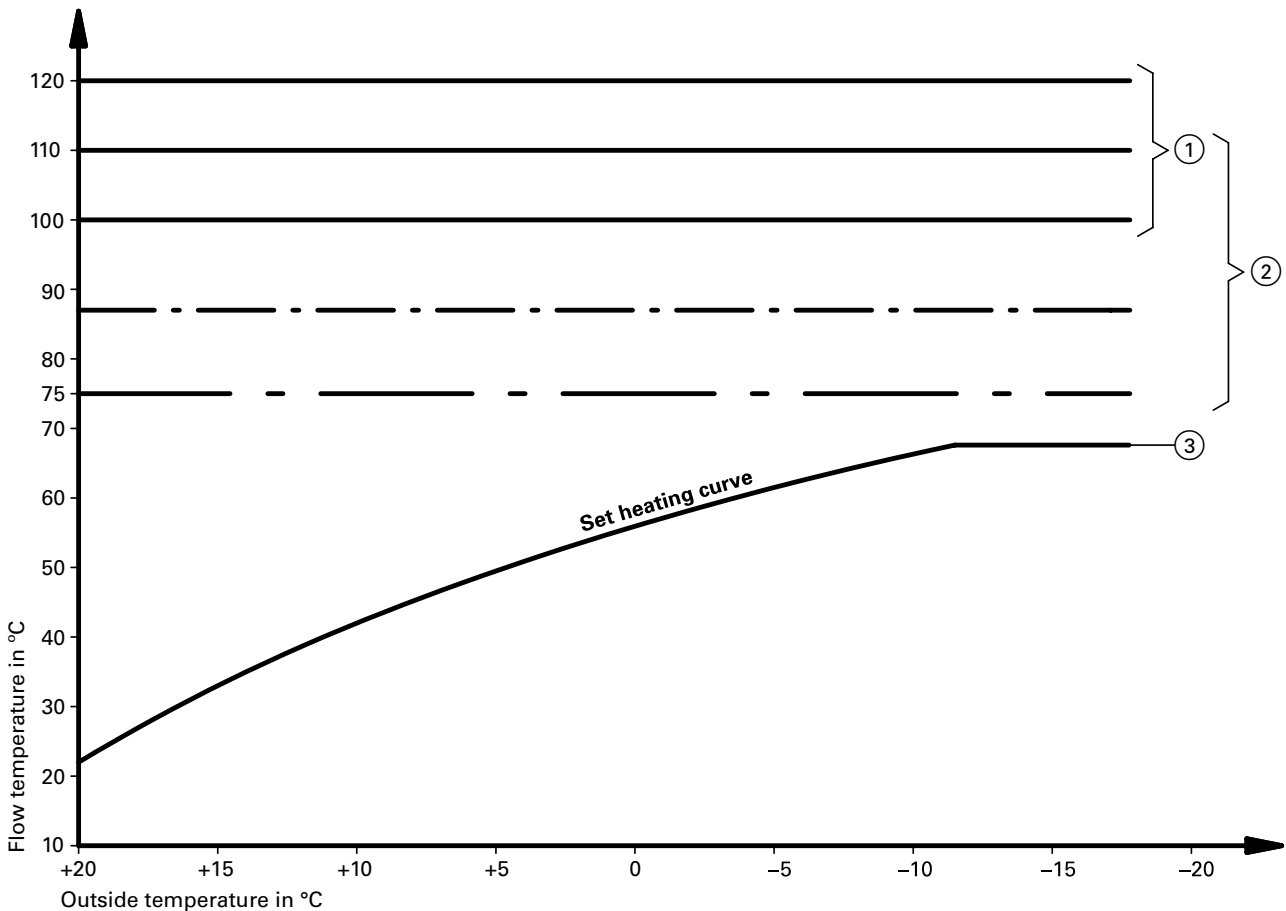
- Weather-compensated cascade control unit for multi-boiler systems with up to 4 boilers with Vitotronic 100 (type GC1)
- for **max. 2 heating circuits with mixer**
- with time switch with day and week programs
- incl. programming unit with clear text display
- with cylinder thermostat
- with control unit for cylinder loading system with mixer assembly
- with automatic lead boiler selection
- communication ability via LON BUS
- with integral diagnostic system and additional functions
- optional function extension to supply a default set system flow temperature via a 0-10 V input (accessory).

An extension kit is required for **each heating circuit with mixer**.

Control equipment for multi-boiler systems



1.4 Switching points and temperature limits



5822 198 GB ① Setting options for the high limit safety cut-out of the Vitotronic boiler control units (as delivered condition 120 °C, must be changed to 110 or 100 °C)

② Setting options of the control thermostat of the Vitotronic boiler control units (as delivered condition 87 °C)

③ Set max. boiler water temperature

1.5 Vitotrans 333 flue gas/water heat exchanger

1.5 Vitotrans 333 flue gas/water heat exchanger – Product information and operating conditions

Vitotrans 333 flue gas/water heat exchanger in conjunction with Vitoplex, Vitorond and Vitomax boilers as condensing unit to DIN 4702-6 or -7.

Vitotrans 333 flue gas/water heat exchanger for Vitoplex and Vitorond up to 500 kW.

Permissible flow temperature (= safety temperature) up to 110 °C.
Permissible operating pressure 4 or 6 bar.

Vitotrans 333 flue gas/water heat exchanger for Vitoplex and Vitorond from 500 kW as well as Vitomax up to 6600 kW.
Permissible flow temperature (= safety temperature) up to 110 °C.
Permissible operating pressure up to 6 or 10 bar.

- High operational reliability and long service life due to corrosion-resistant stainless steel. Stainless steel grade 1.4571 for gas fired operation and short-term use with fuel oil EL; stainless steel grade 1.4539 for constant use with fuel oil EL.
- Vitotrans 333 flue gas/water heat exchanger with Inox-Crossal heating surface for boilers from 80 to 1750 kW.
- Vitotrans 333 flue gas/water heat exchanger with Inox-Tubal heating surface for boilers from 1860 to 6600 kW.
- Vertical stainless steel Inox-Crossal and Inox-Tubal heating surfaces for high operational reliability and long service life.
 - Vertical hot gas flues let condensate drain easily downwards and out. This prevents concentrations through re-evaporation of condensate.
 - Increased self-cleaning effect through smooth stainless steel surface.

- Highly efficient heat transfer and high condensation rate through
 - Heat exchanger surfaces which intensely turbulate the flue gas flow
 - Boiler water and hot gases flow in counterflow.
- Matching neutralising systems are available for Vitotrans 333 flue gas/water heat exchangers.

Installation of a Vitotrans 333 flue gas/water heat exchanger downstream for higher efficiency

The installation of a Vitotrans 333 flue gas/water heat exchanger downstream of a boiler significantly increases its efficiency. By condensing the flue gases inside the heat exchanger, the boiler turns into a condensing boiler according to the requirements of the Efficiency Directive 92/42/EEC.

- In the case of gas fired boilers, efficiency can increase by up to 12%.
- When using fuel oil EL, efficiency can be raised by up to 6%, because of the lower water content and the lower dew point temperature, compared to gas.

Vitotrans 333 flue gas/water heat exchangers are designed to enable retrofitting in existing heating systems.

Vitotrans 333 for oil fired operation

Vitotrans 333 flue gas/water heat exchangers are available with surfaces which are in contact with flue gas, made from high-grade stainless steel 1.4539 to enable constant or prolonged operation with fuel oil EL.

Energy savings from using Vitotrans 333 flue gas/water heat exchangers

The increase in efficiency and, therefore, the energy savings, compared to systems without flue gas/water heat exchanger, are significantly influenced by the return temperature of the return water flowing through the heat exchanger.

The return temperatures are influenced by the system design and reduce with increasing outside temperatures.

For heating systems with design temperatures of 75/60 °C and 40/30 °C, the development of the return temperature subject to outside temperature is illustrated in the diagram on page 7.

The increased efficiency achievable through the downstream flue gas/water heat exchanger in gas operation with various heating system temperatures

is illustrated in the following table. The possible increases in efficiency are based on the modulating development of the return temperature, and subject to outside temperature.

The various increases in efficiency result from the different flue gas temperatures of the boiler installed upstream.

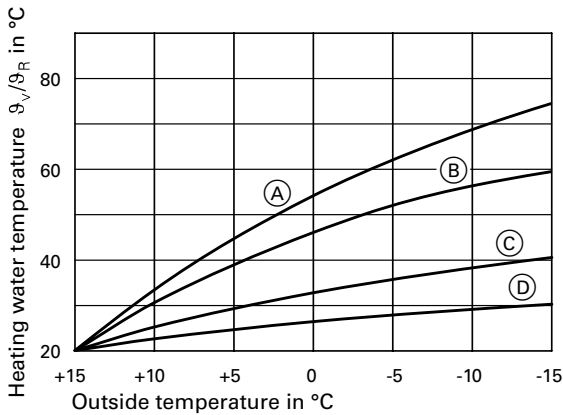
Heating system design temperature	Increases in efficiency through Vitotrans 333 and Vitoplex 300, Vitomax 200 and 300	Increase in efficiency through Vitotrans 333 and Vitoplex 100, Vitorond 200 and Vitomax 100
75/60 °C	9.0%	10.0%
60/50 °C	10.0%	11.0%
40/30 °C	11.5%	12.5%
90/70 °C	6.0%	7.0%

1.5 Vitotrans 333 flue gas/water heat exchanger

The overall efficiency of the condensing unit comprising a gas fired boiler and Vitotrans 333 flue gas/water heat exchanger is achieved by adding the standard efficiency of the boiler and the

increase in standard efficiency derived from the respective system temperature of the heat exchanger.

Example:
Standard efficiency of Vitoplex 300 = 96%
Increase in standard efficiency of Vitotrans 333 at 75/60 °C = 9% results in an overall standard efficiency of the condensing unit of 96% + 9% = 105%.



- Ⓐ Flow temperature at heating system 75/60 °C
- Ⓑ Return temperature at heating system 75/60 °C
- Ⓒ Flow temperature at heating system 40/30 °C
- Ⓓ Return temperature at heating system 40/30 °C

Calculation of possible energy savings (B_E)

- Annual heating load Q_a of a boiler system with $\dot{Q}_k = 460$ kW and 1650 full utilisation hours (b_a) p.a.:

$$Q_a = b_a \times \dot{Q}_k = 1650 \text{ h/p.a.} \times 460 \text{ kW} = 759000 \text{ kWh/p.a.}$$

- Annual consumption B_N of natural gas LL (net calorific value $H_u = 8.83$ kWh/m³) when using a Vitoplex 300 low temperature boiler with a standard efficiency $\eta_N = 96\%$

$$B_N = \frac{Q_a}{\eta_N \cdot H_u} = \frac{759000 \text{ kWh/a}}{0.96 \cdot 8.83 \text{ kWh/m}^3} = 89500 \text{ m}^3/\text{h}$$

- Increase in efficiency η_{AWT} through the downstream installation of a Vitotrans 333 flue gas/water heat exchanger. The design temperature of the heating system routed through the heat exchanger is 75/60 °C.

$$\eta_{AWT} = 9\% \text{ (as in table on page 6)}$$

$$\eta_{tot} = \eta_N + \eta_{AWT} = 96\% + 9\% = 105\%$$

- Annual consumption B_B of natural gas LL (calorific value $H_u = 8.83$ kWh/m³) when using a Vitoplex 300 with a Vitotrans 333 flue gas heat exchanger installed downstream of the boiler

$$B_B = \frac{Q_a}{\eta_{tot} \cdot H_u} = \frac{759000 \text{ kWh/a}}{1.05 \cdot 8.83 \text{ kWh/m}^3} = 81860 \text{ m}^3/\text{h}$$

- Savings in natural gas LL in m³/p.a.

$$B_E = B_N - B_B = 89500 \text{ m}^3/\text{p.a.} - 81860 \text{ m}^3/\text{p.a.} = 7640 \text{ m}^3/\text{p.a.}$$

- Savings in percent

$$\frac{7640 \cdot 100}{89500} = 8.5\%$$

By using a Vitotrans 333 flue gas/water heat exchanger downstream, approx. 8.5% fuel can be saved. Substantially higher savings are realised when modernising an outdated boiler system with low levels of efficiency.

Application examples see chapter 3.2

2.1 General design information

2.1 General design information

Performance limits in regulations

In many regulations the conditions to be met depend on the rated boiler output. In these, the output at T_V/T_R 80/60 °C is decisive.

However, the stated ratings in this Technical Guide relate to the specification at T_V/T_R 50/30 °C (type CM3 and CR3) and 40/30 °C (type CT3) which is now more commonly applied.

The ratings at both T_V/T_R can be found in the table on page 9.

Delivery, handling and installation

Delivery

We deliver the equipment to site on a vehicle with crane facility and will unload the equipment without special requirements.

Handling and installation

A number of lifting eyes will be provided in each boiler, to which lifting gear may be attached.

Vitocrossal 300 (type CT3) with 187 to 635 kW may be delivered in sections. The front part of the combustion chamber can then be removed for easier handling (please specify when ordering).

The boilers may be placed onto concrete without special foundations. However, to facilitate cleaning of the boiler room it is appropriate to position the boiler on a plinth.

Vitocrossal 300 (type CR3) boilers can be supplied with a split combustion chamber and heat exchanger for easier handling in individual pieces (chargeable option; please state when ordering). The longitudinal foot rails simplify handling. Our experts can undertake the handling and installation on prepared foundations upon request (chargeable option).

For recommended minimum wall clearances for installation and maintenance purposes, see the relevant boiler datasheet.

Anti-vibration feet or boiler supports may be used if anti-vibration measures are required.

Location

General requirements

The boiler location must meet the standards laid down by the regulations for combustion equipment for the relevant country.

In rooms where *air contamination through halogenated hydrocarbons* may occur, such as hairdressing salons, printing shops, chemical cleaners, laboratories, etc., the boiler may only be installed if adequate measures can be taken to provide a supply of uncontaminated combustion air. If in doubt, please contact us.

Boilers should not be installed in areas subject to very dusty conditions or very high humidity. The boiler location must be kept free from frost and must be adequately ventilated.

If these instructions are not observed, any consequential loss directly related to any of these causes will be excluded from our warranty.

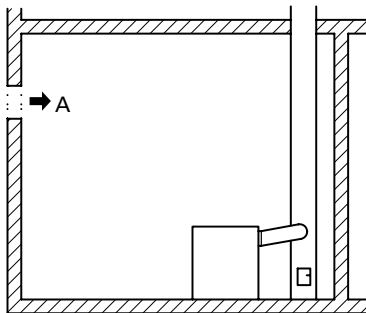
These boilers are particularly suitable for installation in attics. They require no high chimneys as they are operated with a pressurised combustion chamber.

Requirements of the sample combustion order

Requirements laid down for installation rooms are listed in the sample combustion regulation. The respective Building Regulations and Combustion Orders of the individual country apply, which are essentially based on the requirements of the following sample Combustion Regulations.

Combustion air supply

For open flue combustion equipment with a total rated output in excess of 50 kW, the fresh air supply is deemed to have been verified if the combustion equipment is located in areas which provide an aperture or pipe leading outdoors. The cross-section of the aperture must be at least 150 cm² and must be 2 cm² larger for each additional kW above 50 kW rated output. Pipes must be sized to provide equivalent flow rates. The required cross-section may be split to a maximum of two apertures or pipes.



$$A = 150 \text{ cm}^2 + 2 \frac{\text{cm}^2}{\text{kW}} \times (\sum \dot{Q}_N - 50 \text{ kW})$$

$\sum \dot{Q}_N$ = Total of all rated outputs in kW

Fresh air apertures and pipes must never be closed or blocked if no dedicated safety equipment installed can adequately ensure that the combustion equipment can only be operated when the aperture is open. The required cross-section must not be restricted by

the cover or grille.

An adequate combustion air supply can also be verified by other means.

Locations for combustion equipment

Combustion equipment for gaseous or liquid fuels with a total rated output above 50 kW should only be installed in areas

- which are not used for other purposes, except the installation of heat pumps, CHP stations or permanently installed combustion engines, as well as the storage of fuels
- which do not have apertures leading to other rooms, except door openings
- whose doors are tight and self-closing, and
- which can be ventilated.

The burner and the fuel supply must be able to be switched OFF at any time by a switch (emergency stop) installed outside the boiler room. Provide a sign adjacent to the emergency stop switch with the inscription EMERGENCY STOP SWITCH – COMBUSTION.

As an alternative to these regulations for installation areas, combustion devices may also be installed in other areas, if

- the utilisation of these rooms makes this necessary and the combustion equipment can be safely operated, or
- these rooms are located in stand-alone buildings whose only function is the operation of the combustion equipment and as fuel storage area.

Further requirements regarding the installation of combustion equipment

Fuel lines **must** be equipped with a device in front of gas fired combustion equipment installed in the boiler room, which

- is able to automatically shut off the fuel supply in the case of an external thermal load in excess of 100 °C being exerted, and
- must be designed so that up to a temperature of 650 °C and over a period of at least 30 minutes, not more than 30 l/h – measured as air volume flow – can flow through or out of the fuel line.

Combustion equipment for LPG (propane, butane and their mixtures) may only be installed in rooms whose floor is more than 1 m below ground level at every point if

- the combustion equipment is equipped with a flame monitoring device, and
- it can be assured that LPG cannot escape from the fuel lines inside the boiler room in dangerous quantities or will be safely extracted via a mechanical ventilation system, even if the combustion equipment has been switched OFF.

Combustion equipment must be installed far enough away from combustible materials and built-in furniture or be shielded from them, to safeguard that, at the rated output of the combustion equipment, they will never be subjected to temperatures higher than 85 °C. Otherwise maintain a distance of at least 40 cm.

System design

Flow temperatures

To keep distribution losses to a minimum, we recommend that the

- heat distribution system and the
 - DHW heating
- are designed for a max. of 70 °C (flow temperature).

For boilers supplied with a boiler control unit, limit the max. boiler water temperature to 75 °C. The flow temperature may be increased by changing the control thermostat.

Pump controlled pressure maintaining systems

In heating systems with automatic pressure maintaining systems, and in particular pump controlled systems with integral degassing, we recommend an individual diaphragm expansion vessel to protect each boiler. The diaphragm expansion vessel must be able to accept the expansion volume of the heating water, relative to the boiler size used. This reduces the frequency and severity of pressure fluctuations. This contributes substantially to the improvement of operation reliability and service life of system components. Damage on boiler or other system components may result if these recommendations are not followed.

Safety temperatures

Viessmann boilers correspond to EN 303 and DIN 4702 and are all type-tested. They are suitable for installation in sealed heating systems to EN 12828. Permiss. flow temperatures (= safety temperatures): up to 110 °C. Maximum possible flow temperature: approx. 15 K (Kelvin) below the safety temperature.

High limit safety cut-out of the boiler control unit

As delivered condition	Adjustable to
120 °C	110 or 100 °C

For Vitocrossal 300, the high limit safety cut-out must be changed over to 110 or 100 °C.

Note

Once changed, the high limit safety cut-out cannot be reset to the higher value.

Selection of rated output

Select boilers according to the required heat demand.

The level of efficiency of low temperature and condensing boilers is consistent across a wide boiler loading range. Therefore, the rated output for low temperature boilers, condensing boilers and multi-boiler systems may be higher than the calculated heat demand of the building in question.

The output of condensing boilers is substantially influenced by the return temperature and the condensation gain which depends on that temperature. Lower condensation can be caused particularly in winter, when a high output is required, and therefore higher return temperatures result.

We therefore recommend to base the selection of rated output on the output data relative to T_V/T_R 80/60 °C. The following table compares the rated output at various flow and return temperatures.

Temperature Flow/return (T _V /T _R)	Rated output in kW											
	—	—	—	187	248	314	408	508	635	—	—	—
40/30 °C	—	—	—	187	248	314	408	508	635	—	—	—
50/30 °C	87	115	142	—	—	—	—	—	—	787	978	—
80/60 °C	80	105	130	170	225	285	370	460	575	720	895	—

2.2 Water connection

2.2 Water connection

Heating connections

Existing systems

Flush the heating system thoroughly before connecting the condensing equipment to an existing heating system, to remove dirt and sludge deposits. Otherwise, dirt and sludge will be deposited inside the boiler and can lead to local overheating, noise and corrosion. Boiler damage caused by such deposits is excluded from our warranty. Where necessary, install dirt traps.

Boiler circuit pumps

These boilers require no boiler circuit pumps because of their design, their large water content and low internal primary pressure drop.

Heating return

Channel the return water from all consumers or heating circuits via the return connector into the condensing equipment. Vitocrossal 300 is equipped with two boiler return connectors. If only one heating circuit is installed, connect this to connector KR1. Either some or the entire volume flow can be routed through Vitotrans 333.

If several heating circuits are installed, connect the heating circuit with the lowest temperature level to connector KR1 (e.g. underfloor heating systems). Connect at least 15% of the rated output to connector KR1. This achieves an optimum boiler efficiency. If several heating circuits with identical temperature levels are installed, connect these to connector KR1 or distribute them equally over both connectors.

Heating circuits

For underfloor heating, we recommend the use of impermeable pipes to prevent the infusion of oxygen through the pipe walls. Provide system segregation in underfloor heating systems with plastic pipes (DIN 4726) which are non-impermeable. We supply separate heat exchangers for this purpose.

Water connection for the utilisation of condensing technology

■ Install only three-way mixing devices in heating circuits, because the utilisation of condensing technology demands low return temperatures. Do not use four-way mixers.

The high standard efficiency of Vitocrossal 300 condensing boilers or condensing units with Vitotrans 333 can be further improved by the following measures:

- Design heating circuits for the lowest possible temperatures, preferably 40/30 °C or 50/40 °C.
- If several heating circuits with various temperature levels are installed, connect the heating circuits with the lowest temperature to connector KR1 of Vitocrossal 300 or to Vitotrans 333.

■ Reduce the water flow in the heating circuits through variable speed pumps, or pumps whose speed is governed subject to flow and return temperatures.

- Measures taken to limit the return temperature may lead to increases in the standard efficiency.
- Do not install overflow valves between the central heating flow and return.

Heating circuit pumps

Heating circuit pumps in heating systems with rated output > 25 kW should be equipped and designed in such a way that the power consumption will be automatically matched to the operational capacity requirements in at least three stages if no safety concerns relating to the **boiler** make demands to the contrary.

System accessories

Divicon heating circuit distributor

Pre-assembled heating circuit distributor for connecting up to 4 heating circuits to Vitocrossal 300, 87 to 314 kW in single boiler systems. The Divicon pipe connections should be provided on site. See the Divicon heating circuit distributor datasheet.

Application examples

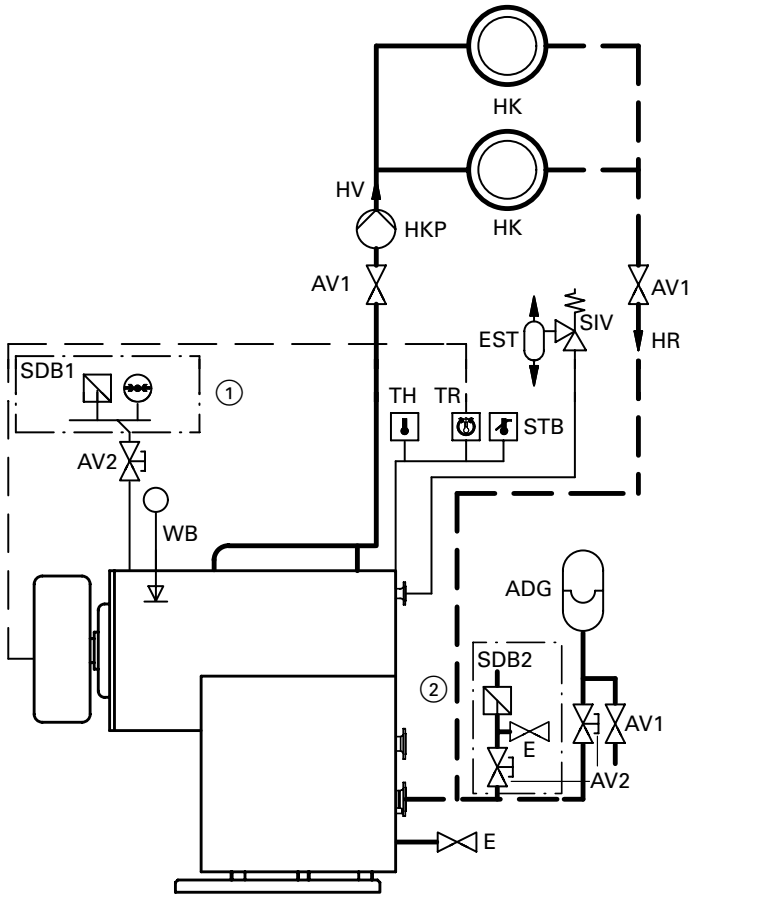
► See chapter 3.1 and 3.2

These application examples are merely recommendations, and must therefore be checked on site for completeness and function. Connect three-phase consumers via additional contactors.

2.3 Safety equipment to EN 12828

EN 12828 applies to the design of hot water heating systems with permissible safety temperatures up to 110 °C.

This standard contains safety requirements laid down for heat generators and heat generator systems.

Safety equipment to EN 12828	Required safety equipment
 <p>① Standard delivery of Viessmann maximum pressure limiting assembly ② Standard delivery of Viessmann minimum pressure limiting assembly</p>	<p>ADG Sealed expansion vessel AV1 Shut-off valve AV2 Shut-off valve (protected against unintentional closing, e.g. cap valve) E Drain EST Flash trap MA Pressure gauge assembly SDB1 Safety pressure limiter max. SDB2 Safety pressure limiter min. SIV Safety valve STB High limit safety cut-out TH Thermometer TR Control thermostat WB Water level limiter</p> <hr/> <p>Further legends</p> <p>HK Heating circuit HKP Heating circuit pump HR Heating water return HV Heating water flow</p>

General notes

Low water indicator

According to EN 12828, boilers must be equipped with a low water indicator (boil-dry protection) or a minimum pressure switch (up to 142 kW).

Maximum pressure limiter

Required for all boilers in systems where the rated boiler output is > 300 kW. For this purpose, boilers from 187 kW are equipped with a R½" connector on the top of the boiler.

Minimum pressure switch

Only required for systems with flow temperatures in excess of 100 °C; one per system required in multi-boiler systems.

Safety valve

Equip the boilers according to EN 12828 for hot water heating system with a max. safety temperature of 110 °C and in accordance with their type approval with a type-tested safety valve.

This valve should be identified in accordance with TRD 721, i.e. with

- H up to 3.0 bar permissible operating pressure and max. 2700 kW output,
- D/G/H for all other operating conditions.

The pipework between the boiler and the safety valve must not be able to be shut off. Pumps, fittings or restrictions must not be present in this pipework.

Flash trap

For boilers above 300 kW, install a flash trap with blow off and drain line adjacent to the safety valve. Lead the blow-off line outdoors. Any expelled steam must not endanger anyone.

The blow-off line from the safety valve must be designed and constructed so as to prevent the possibility of increases in pressure.

Arrange the outlet of the drain so that any water expelled from the safety valve can be safely observed and drained off. A flash trap and blow-off line are not required if a second high limit safety cut-out and a second maximum pressure limiter are installed.

2.3 Safety equipment

Selection table for safety equipment for Vitocrossal 300

This table indicates the safety accessories required for each system to EN 12828.
(x = required, — = not required)

Rated boiler output	≤ 300 kW	> 300 kW
Safety temperature (high limit safety cut-out setting* ¹ , high limit safety cut-out part of boiler control unit standard delivery)	110 °C	110 °C
Control thermostat Standard delivery of the boiler control unit	x	x
Boiler thermometer Standard delivery of the boiler control unit	x	x
Pressure gauge assembly Pressure gauge (as separate accessory) or as part of the maximum pressure limiter or the safety equipment block (only up to 142 kW))	x	x
Safety valve A 3 bar safety valve is part of the safety equipment block (applicable up to 142 kW)	x	x
Water level limiter * ² as low water indicator for vertical installation into the boiler	x	x
Max. pressure limiting assembly incl. pressure gauge, lockable shut-off valve, drain and additional connector for a further high limit safety cut-out	—	x
Minimum pressure limiter * ³ incl. lockable shut-off valve and drain	—	x
Flash trap	—	x on-site* ⁴
High limit safety cut-out * ⁵ (additional)	—	x
Safety pressure limiter * ⁵ (additional) (maximum pressure limiter)	—	x

*¹In its delivered state, the high limit safety cut-out (STB) for Vitotronic is set to 120°C and must be adjusted.

*²As alternative to a low water indicator, a minimum pressure switch can be installed (accessory) for Vitocrossal 300, 87 to 142 kW.

*³Only required for systems with flow temperatures in excess of 100°C; one per system required in multi-boiler systems.

*⁴See Vitoset price list.

*⁵According to EN 12828, the flash trap may be **omitted** if an additional high limit safety cut-out plus safety pressure limiter (maximum pressure switch) are installed (components are available as accessory flash trap alternative set).

Vitotrans 333 safety equipment

Boilers equipped with Vitotrans 333 flue gas/water heat exchangers must be equipped in accordance with TRD 702 or local regulations. Equip the Vitotrans 333 flue gas/water heat exchanger with a safety valve and a pressure gauge (see TRD 702) if their primary side can be shut off against the heat sources.

2.4 Fuels

Vitocrossal 300

Vitocrossal 300 boilers are suitable for the combustion of natural gas, town gas and LPG to EN 437 on test gases, test pressures or in accordance with local regulations. Viessmann MatriX radiant burners are only suitable for the combustion of natural gas E and LL.

Vitotrans 333

Vitotrans 333 flue gas/water heat exchangers can be operated temporarily with fuel oil EL (for a max. of 6 weeks during any heating season), when using an oil/gas combination burner. The fuel oil EL must comply with DIN 51603 and may contain a max. of 0.2% sulphur.

Thoroughly clean the Vitotrans 333 flue gas/water heat exchanger of combustion residues after a combustion of fuel oil. Chemical cleaning processes may be applied. Afterwards, thoroughly flush with tap water and check and/or maintain the function of the neutralising system.

2.5 Burner

Suitable burners

Pressure jet gas burner

The burner must be tested to EN 676 and should carry the CE designation in accordance with guideline 90/396/EEC.

Unit burners

Viessmann Unit pressure jet gas burners are available as MatriX radiant burners for Vitocrossal 300 with 87 to 187 kW. The residual head of these burners is 70 Pa. Pressure jet gas burners made by Weishaupt are available for Vitocrossal 300 with 248 kW to 978 kW. See price list. Supplied direct by Weishaupt. Further suitable burners available upon request.

Applications

The boiler operates with positive pressure in the combustion chamber. Use a burner which is suitable for the respective resistance on the flue gas side and the required flue pipe draught (see the datasheet for the respective boiler).

The material of the burner head must be suitable for operating temperatures of at least 500 °C.

Burner versions

You may use multi-stage or variable (modulating) burners.

Burner installation

Vitocrossal 300 (type CM3 and CT3), 87 to 187 kW with MatriX radiant burner: The boiler door for mounting the MatriX radiant burner is part of the standard burner delivery.

Vitocrossal 300 (type CT3), 248 to 635 kW: The hole circle for burner mounting and the blast tube insertion hole comply with the dimensions of a variety of renowned burner makes.

Initially drill the fixing holes into the burner plate and burn out the blast tube insertion hole, then mount the burner plate on the boiler door if the dimensions vary from the standard supplied.

Vitocrossal 300 (type CR3), 787 and 978 kW: The burner aperture meets the requirements of EN 303-1.

Use the burner plate (part of the standard delivery) to mount the burner.

Burner plates may be factory-prepared on request (chargeable). For this purpose, please state the burner make and type when ordering.

A drilled burner plate is part of the standard delivery when purchasing a Unit burner made by Weishaupt.

Please check with the manufacturer, if a burner is used, whose blast tube diameter is larger than the blast tube insertion hole.

For further details, see datasheet.

2.6 Flue gas routing

2.6 Flue gas routing

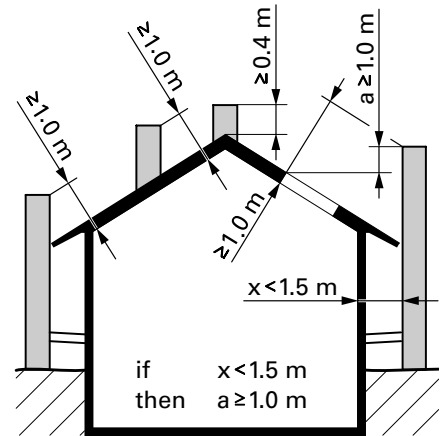
Flue gas systems

Requirements for flue gas systems are contained in the TRGI and in the sample Combustion Order which forms the basis of the Building Regulations and the Combustion Order of each Federal State. Accordingly, the following are required:

- Flue gas systems must be sized in clearance diameter and height and, if necessary, also according to the heat throughput resistance and the internal surface to ensure that the flue gases will be expelled to the outside under all operating conditions and so that no dangerous pressures can be created in any rooms.
- Flue gases from combustion equipment fired by liquid or gaseous fuels can be piped into chimney stacks or into flue pipes.
- Flue pipes mounted on the side of buildings must be at least 20 cm away from windows.

- Outlets from chimneys or flue pipes must be
 - at least 40 cm higher than the roof ridge or be at least 1 m away from the roof surface.
 - at least 1 m higher than roof mounted structures and openings to rooms, if their distance towards chimneys and flue pipes is less than 1.5 m.
 - at least 1 m higher than open structural parts made from combustible material, except roof coverings or be at least 1.5 m away from them.
 - Further deviating requirements may apply if there is danger or unacceptable nuisance must be expected.

We recommend you seek advice from your relevant flue gas inspector (or local authority).



Flue gas systems for condensing boilers

Vitocrossal 300 cools the flue gases, depending on the heating water return temperature, into the condensing range which then leave the system with a relative humidity of 100%. The flue gas temperature is only approx. 5 to 15 K higher than the central heating return temperature. It may therefore, subject to system conditions, be between 30 and 110 °C. The low flue gas temperature and the resulting low draught plus the additional condensation of the flue gases inside the flue gas system require that the flue gas system manufacturer sizes the system and makes it from suitable materials.

Also, special requirements apply to the condensing combustion system regarding their design and installation.

Condensing boilers must be connected to tested and approved flue pipes. Flue pipes must comply with Building Regulations.

Flue gas temperature sensor

According to the guideline for flue pipe approval, point 3.12, only components which have Building Regulation approval as part of a flue pipe may be connected to or be incorporated into flue pipes serving condensing boilers.

Therefore, apertures for the installation of flue gas temperature sensors must be designed by the manufacturer and should be tested together with the flue pipe.

Subsequent drilling and fitting of components by other manufacturers is not permitted.

Vitocrossal 300 condensing boilers may also be connected to moisture-resistant chimneys. According to EN 13384, the chimney manufacturer provides suitability verification, giving due consideration to the flue gas values of the boiler (see specification in the respective datasheet).

The flue pipes must be routed to above the roof line through an existing or a newly constructed chimney (casing without internal pipe). In view of the size and design of the chimney we would therefore recommend contacting a flue pipe manufacturer or flue pipe supplier at the design stage.

Flue gas systems for Vitotrans 333

Vitotrans 333 flue gas/water heat exchangers cool the flue gases, subject to the heating water return temperature, into the condensing range, and then exit the system with a relative humidity of 100%. The flue gas temperature is only 10 to 25 K higher than the central heating return temperature. It may therefore, subject to system conditions, be between 30 and 130 °C. The max. flue gas temperature of 130 °C may be reached with a safety temperature of 120 °C if the boiler control unit thermostat is set to 110 °C.

The low flue gas temperature and the resulting low draught plus the additional condensation of the flue gases inside the flue gas system require that the flue gas system manufacturer sizes the system and makes it from suitable materials.

Also, special requirements apply to the condensing combustion system regarding their design and installation.

Condensing combustion equipment must be connected to tested and approved flue pipes. Flue pipes must comply with Building Regulations.

Flue gas temperature sensor

According to the guideline for flue pipe approval, point 3.12, only components which have Building Regulation approval as part of a flue pipe may be connected to or be incorporated into flue pipes serving condensing units.

Therefore, apertures for the installation of flue gas temperature sensors must be designed by the manufacturer and should be tested together with the flue pipe.

Subsequent drilling and fitting of components by other manufacturers is not permitted.

- Flue gas values of boiler with Vitotrans 333 flue gas water/heat exchanger (details in the specification of the relevant datasheet)
- local conditions (heating water return temperature, union design, etc.).

The flue pipes listed in price list register 9 cannot be used.

The flue pipes must be raised above roof level inside an existing or a newly constructed chimney (casing without internal pipe). In view of the size and design of the chimney we would therefore recommend you contact a flue pipe manufacturer or supplier during the design stage.

2.7 Flue gas system

2.7 Flue gas system for Vitocrossal 300

Because of the low flue gas temperature and the resulting low draught forces as well as the additional condensation of the flue gases inside the flue gas system, a pressure sealed, corrosion proof flue gas system suitable for Vitocrossal 300, 87 to 508 kW is offered as accessory.

Flue gases are expelled from the flue gas system with overpressure.

The size of the flue gas system matches the requirements of Vitocrossal 300, is made from suitable materials, tested and Building Regulations-approved [in Germany] for use with condensing boilers.

Approval number: Z-7.2.-1104

Applicant:
Messrs. Skoberne
Ostendstr. 1
64319 Pfungstadt

Flue pipes made of plastic are flue pipes according to type B (max. permissible flue gas temperature 120 °C).

Flue pipes may only be routed inside buildings in their own, longitudinally ventilated ducts or channels which meet the requirements for domestic chimneys to DIN 18160-1 (issue December 2001) Sections 4.4 to 4.9 or which offer a fire resistance of 90 minutes (F90/L90), and which provide the stated minimum internal duct dimensions.

The flue gas system must provide at least one inspection aperture for checking and cleaning as well as for checking the pressure.

If the flue pipe is inaccessible from the roof, a second inspection aperture must be provided in the attic behind the chimney cleaning hatch.

The condensate drain from the flue pipe **to the boiler** must be safeguarded by an appropriate **slope of at least 3°**.

The flue gas system must protrude clear of the roof.

Where the flue pipe is to be installed in an existing chimney, seal any apertures with appropriate materials and clean the inside of the chimney.

This does not apply to any cleaning or test ports, which must be provided with chimney cleaning covers with the appropriate test mark.

Note

A flue gas temperature protection in conjunction with Vitocrossal 300 is not required, as the maximum permissible flue gas temperature of 120 °C (flue pipe type B) will not be exceeded in any operating or fault condition.

Subject to duct size, install spacers every 2 to 5 m and at each profiled piece of the flue pipe (e.g. inspection piece or bend).

Approval certificate for the PPs flue gas system for Vitocrossal 300

Allgemeine bauaufsichtliche Zulassung	
Zulassungsnummer:	Z-7.2-1104
Antragsteller:	ALPHACAN Omniplast GmbH 35627 Ehringshausen Willi Skoberne Albert-Einstein-Ring 20 64342 Seeheim-Jugenheim Cox Geelen b.v. Emmastraat 92 6245 HZ Eijsden NIEDERLANDE
Zulassungsgegenstand:	Rohre und Formstücke aus Polypropylen einschließlich Dichtungen für Abgasleitungen
Geltungsdauer bis:	14. März 2006
Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen. * Diese allgemeine bauaufsichtliche Zulassung umfasst acht Seiten und 30 Anlagen.	
	
* Diese allgemeine bauaufsichtliche Zulassung ersetzt die allgemeine bauaufsichtliche Zulassung vom 15. März 1995, geändert durch Bescheid vom 26. August 1996, ergänzt durch Bescheide vom 18. März 1998 und 5. März 1999.	
28964.01	

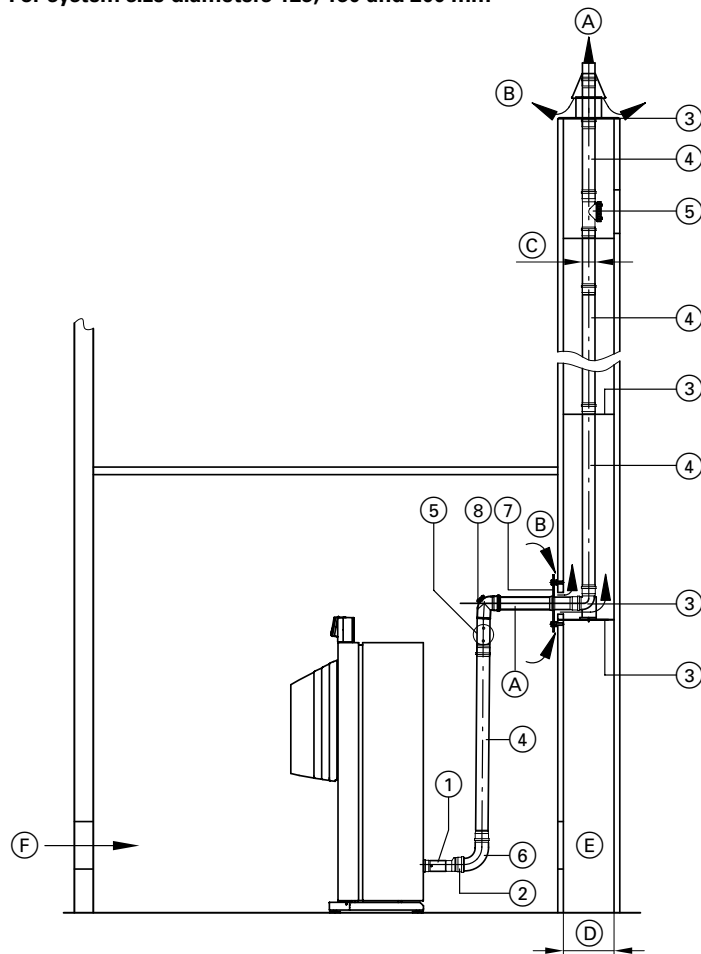
2.7 Flue gas system

For **open** flue operation, a flue pipe is required between the gas fired condensing boiler and the duct as well as for routing through the duct (type B₂₃ to TRGI '86/96, item 2.3.2).

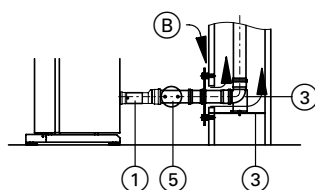
System size flue pipe \varnothing 125, 150 and 200 mm.
Also order a boiler adaptor for connecting to Vitocrossal 300.

For routing through longitudinally ventilated ducts and channels meeting the requirements for domestic chimneys to DIN 18160-1 or which offer a fire resistance of 90 minutes (F90/L90).

For system size diameters 125, 150 and 200 mm

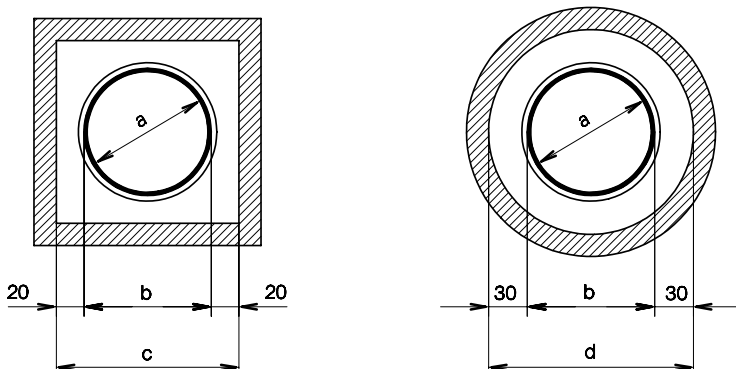


- (A) Flue gas
- (B) Secondary ventilation
- (C) Flue pipe diameter
- (D) Min. internal duct size
- (E) Inspection aperture
- (F) Ventilation air



①	Boiler adaptor (order separately)
②	Extension piece required for system sizes 150 and 200 mm
③	Basic duct unit Comprising: ■ Support bend ■ Support rail ■ Duct cover ■ Spacer (3 pieces) Spacers (3 pieces)
④	Pipe 2 m long (2 pieces = 4 m long) 2 m long (1 piece) 1 m long (1 piece) 0.5 m long (1 piece)
⑤	Inspection piece, straight (1 piece)
⑥	Flue pipe bend 87° (1 piece) 45° (2 pieces)
⑦	Ventilation flashing (1 piece) Flue pipe bend (for use in corbelled ducts) 30° (2 pieces) 15° (2 pieces)
⑧	Inspection bend 87° (1 piece) Reducer (from system sizes 150 to 125) Condensate drain

Minimum distance for secondary ventilation between the clearance cross-section of the duct and the connection dimension:



Minimum internal duct dimension (D)

System size	External dimension (\varnothing mm)	Minimum internal duct dimension (D) (mm)	
		d round \varnothing mm	c rectangular \square mm
125	145	205	185 × 185
150	184	244	224 × 224
200	227	287	267 × 267

For vertical roof outlets (short-stemmed chimney) where Vitocrossal 300 to 142 kW is installed in the attic (type B₃₃ according to TRGI '86/96)

Only use the roof outlet where the ceiling of the installation room is part of the roof structure.

In constructing the roof outlet, a minimum distance to combustible material is not required.

Secondary ventilation ensures that temperatures over 85 °C do not occur at the surface near the roof outlet. According to TRGI '86/96, a minimum clearance to the flue pipe (union) of 100 mm must be maintained.

Max. extended pipe length 6 m for a max. number of bends

- 87° 2 pieces
- or 45° 2 pieces

For a different number of bends, deduct or add to the given max. extended length 1 m for 87° bends or 0.75 m for 45° bends.

Inside the installation room, install an inspection aperture for checking and cleaning the flue pipe.

Vertical flat roof outlet

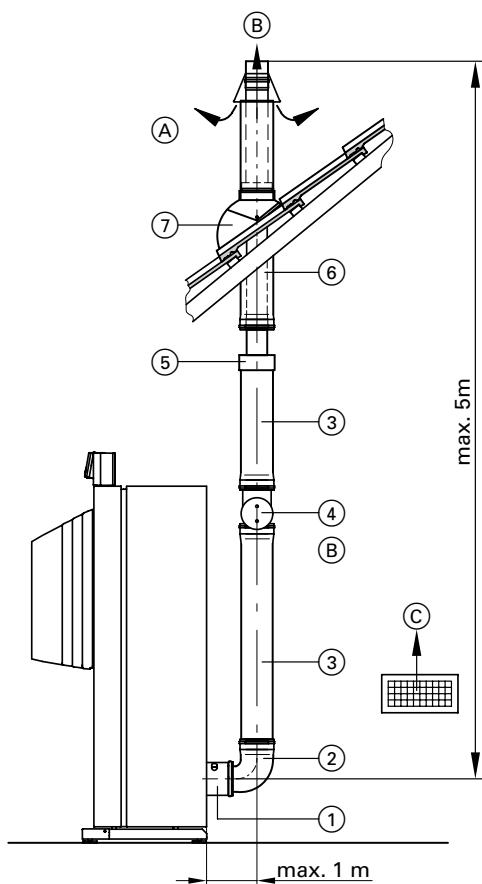
Integrate the flat roof collar into the roof skin according to the flat roof guidelines (see page 25).

Insert the roof outlet from above and push onto the flat roof collar.

Note

The ceiling opening should provide a diameter of at least 185 mm.

Secure the roof outlet on site with a clamp, only after the installation has been completed.



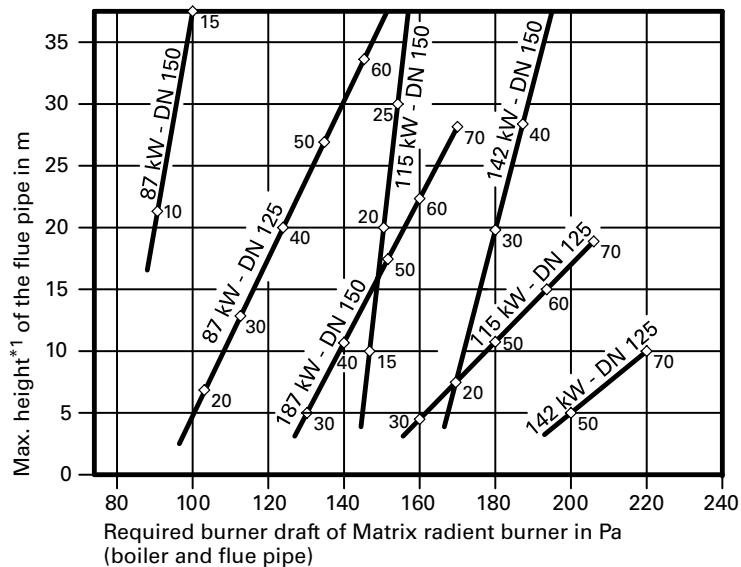
- (A) Secondary ventilation
- (B) Flue gas
- (C) Ventilation air
(ventilation opening 1 × 150 cm² or 2 × 75 cm²)

- | | |
|---|---|
| ① | Boiler adaptor
(order separately) |
| ② | Flue pipe bend
87° (1 piece)
45° (2 pieces) |
| ③ | Pipe (∅ 125 mm)
2 m long (1 piece)
1 m long (1 piece)
0.5 m long (1 piece) |
| ④ | Inspection piece
straight (1 piece) |
| ⑤ | Reducer
DN 125/100
(order with Vitocrossal 300, 87 to 115 kW, and install next to the coaxial roof outlet) |
| ⑥ | Vertical coaxial roof outlet
(∅ 100 mm)
Length 1.95 m
(below the roof 0.30 m and 1 m above the roof)
Colour black
or
roof tile red |
| ⑦ | Universal roof tile
(colour black or roof tile red)

or
flat roof collar |

2.7 Flue gas system

Calculating the max. pipe lengths and diameters



Roughly calculate the flue pipe height (in m) to the boiler adaptor using the adjacent diagrams.

Note

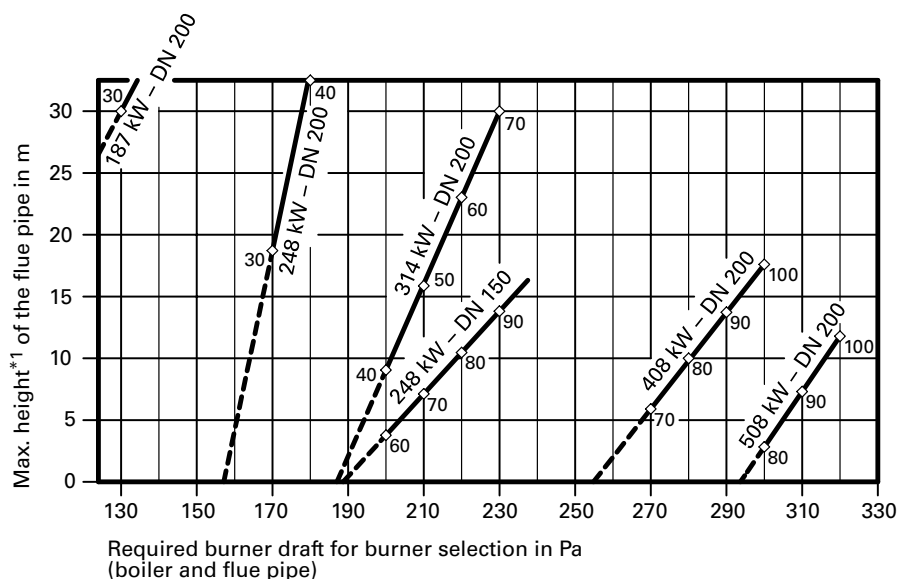
With Vitocrossal 300 with MatriX radiant burner, a draught of 70 Pa is available at the flue outlet.

*1 Measured from the height of the flue outlet on the boiler to the top edge of the flue gas system.

Diagram 1 for Vitocrossal 300 with 87 to 187 kW

Assumptions:

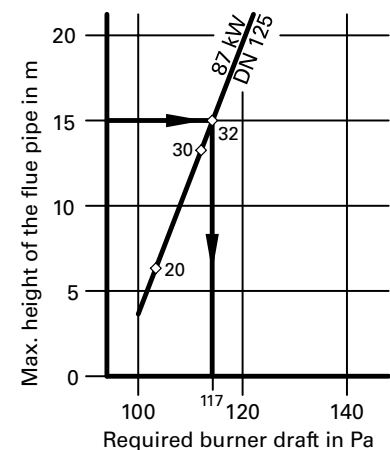
- Union diameter for Vitocrossal 300, 87 to 142 kW: DN 125
- Union diameter for Vitocrossal 300, 187 kW: DN 150
- Union length 2 m
- Three bends with 87° (incl. support bends)



Example

Vitocrossal 300 with 314 kW
Flue pipe height 16 m

The following diagram shows how to check the required draught for a flue gas system using the adjacent diagrams.



*2 Required draught at the flue outlet

- At a flue pipe height of 16 m, the intersection with the performance/diameter curve results in a required draught at the flue outlet of 50 Pa.
- Dropping the plumb line onto the axis below results in a required total burner draught of 210 Pa.

*1 Measured from the height of the flue outlet on the boiler to the top edge of the flue outlet.

Diagram 2 for Vitocrossal 300 with 187 to 508 kW

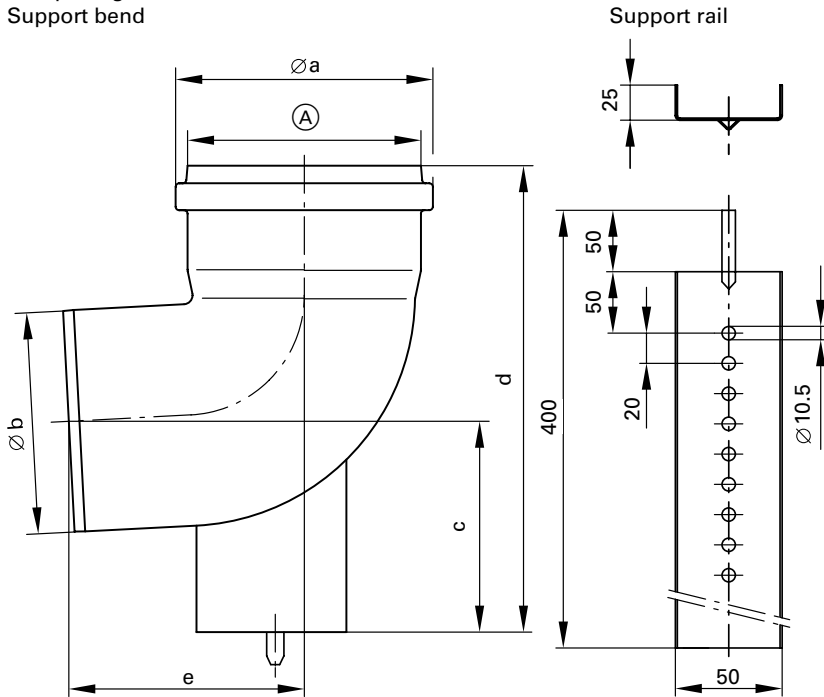
Assumptions:

- Union diameter DN 200
- Union length 2 m
- Three bends with 87° (incl. support bends)

Individual components of the plastic flue gas system

Basic duct unit

Comprising:
Support bend

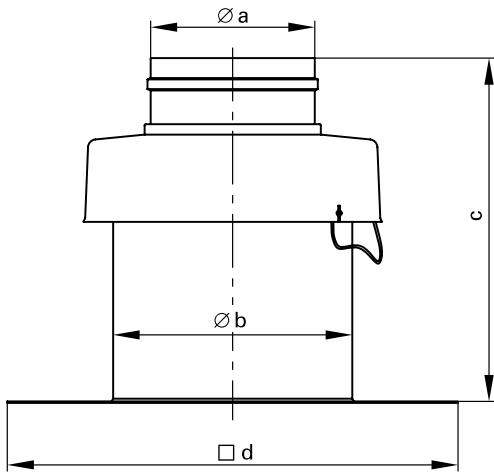


System size		125	150	200
a	Ø mm	145	184	227
b	Ø mm	125	160	200
c	mm	120	137	153
d	mm	264	296	490
e	mm	147	163	310

Ⓐ System size 125, 150 or 200

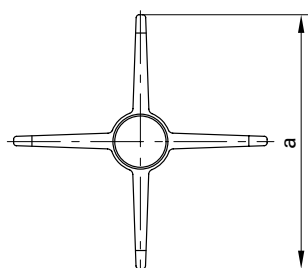
Duct cover

(fixing material for securing the duct cover on the cover plate is part of the standard delivery)



System size		125	150	200
a	Ø mm	126	161	202
b	Ø mm	185	228	260
c	mm	257	258	261
d	□ mm	350	350	480

Spacers (3 pieces)



System size		125	150	200
a	mm	402	402	734

5822 198 GB

2.7 Flue gas system

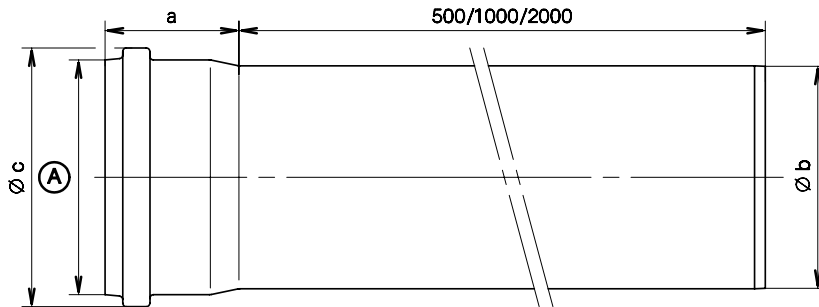
Pipe, 2 m long (2 pieces)

Pipe, 2 m long (1 piece)

Pipe, 1 m long (1 piece)

Pipe, 0.5 m long (1 piece)

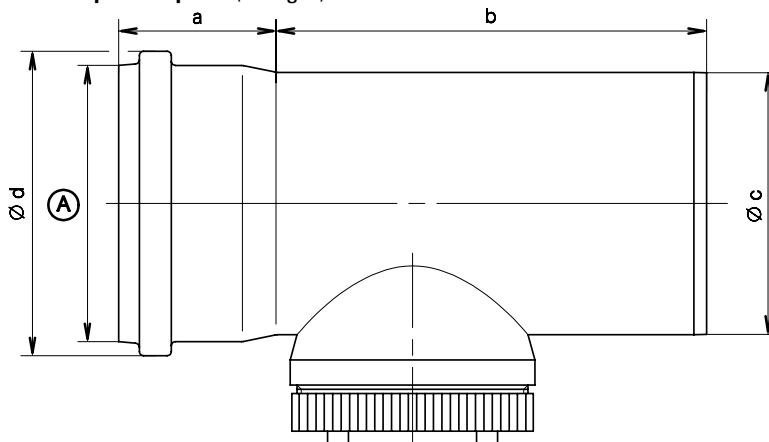
(these pipes may be trimmed if necessary)



System size		125	150	200
a	mm	75	83	122
b	Ø mm	125	160	200
c	Ø mm	145	184	227

Ⓐ System size 125, 150 or 200

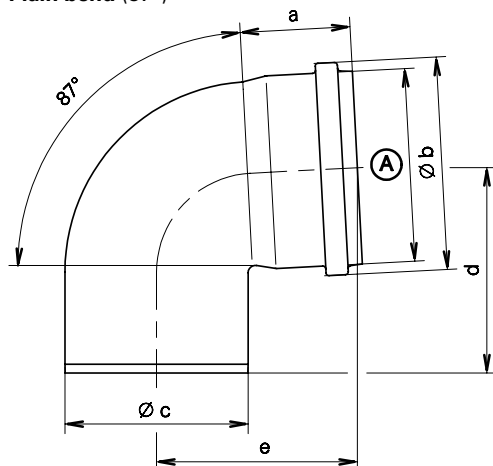
Plain inspection piece (straight)



System size		125	150	200
a	mm	75	83	122
b	mm	205	225	300
c	Ø mm	125	160	200
d	Ø mm	145	184	227

Ⓐ System size 125, 150 or 200

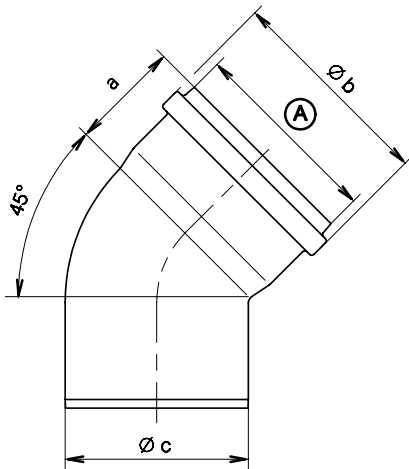
Plain bend (87°)



System size		125	150	200
a	mm	75	83	122
b	Ø mm	145	184	227
c	Ø mm	125	160	200
d	mm	150	170	350
e	mm	150	170	310

Ⓐ System size 125, 150 or 200

Plain bend (45°)



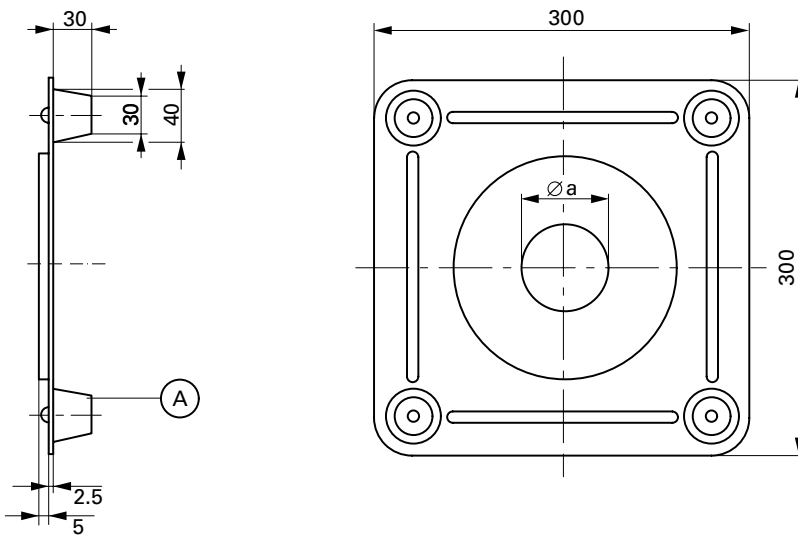
System size		125	150	200
a	mm	75	83	122
b	Ø mm	145	184	227
c	Ø mm	125	160	200

Ⓐ System size 125, 150 or 200

Plain bend (30°)

Plain bend (15°)

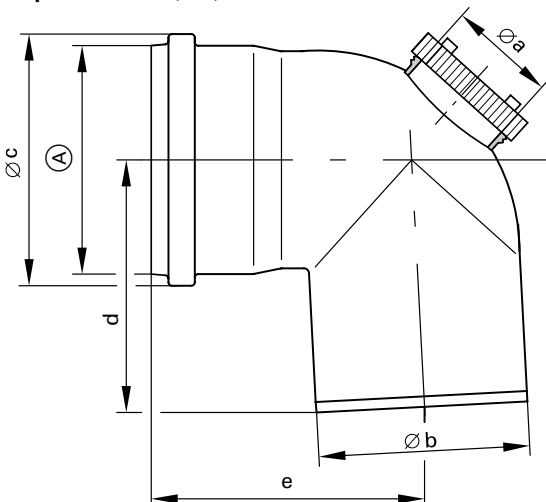
Ventilation flashing



System size		125	150	200
a	Ø mm	125	160	200

Ⓐ Spacer

Inspection bend (87°)



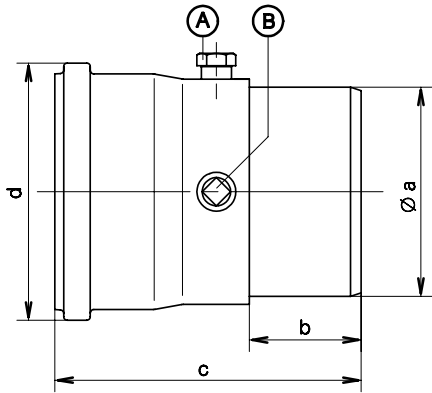
System size		125	150	200
a	Ø mm	100	100	100
b	Ø mm	125	160	200
c	Ø mm	145	184	227
d	mm	148	163	310
e	mm	148	159	350

Ⓐ System size 125, 150 or 200

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2.7 Flue gas system

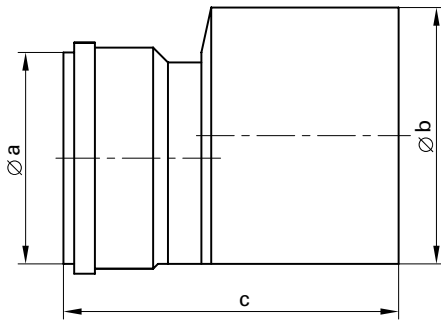
Boiler adaptor (order separately)



Boiler adaptor	125/ 125	200/ 150	200/ 200	250/ 200
a Ø mm	125	200	200	250
b mm	—	150	—	150
c mm	275	270	270	310
d Ø mm	145	184	227	227

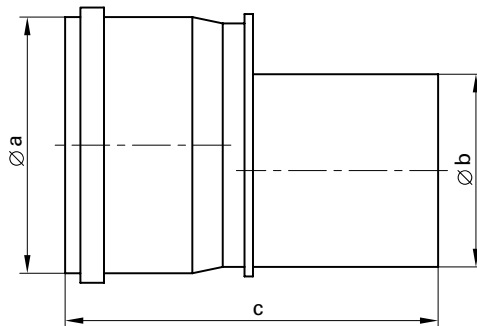
- (A) Test nipple
- (B) Optional connection for a flue gas high limit safety cut-out

Reducer



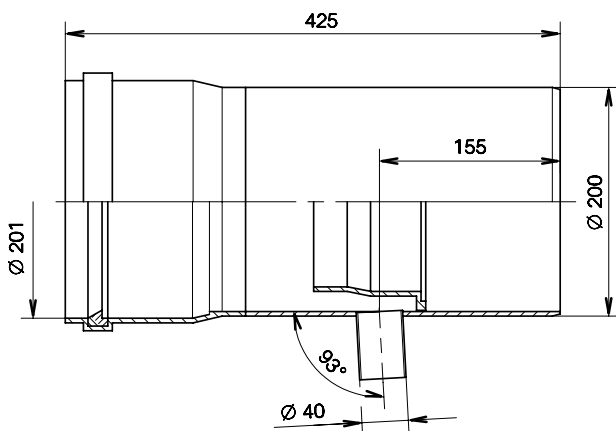
Reducer	100/125	125/150	150/200
a Ø mm	100	125	150
b Ø mm	125	150	200
c mm	170	205	270

Extension

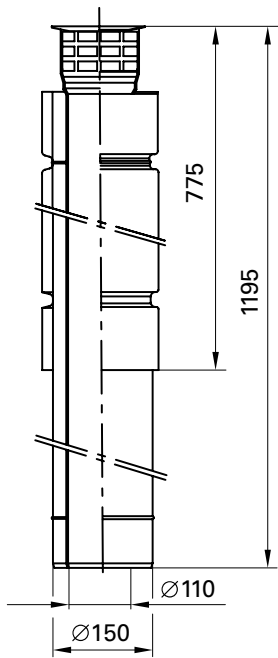


Extension	125/150	150/200
a Ø mm	125	150
b Ø mm	150	200
c mm	210	310

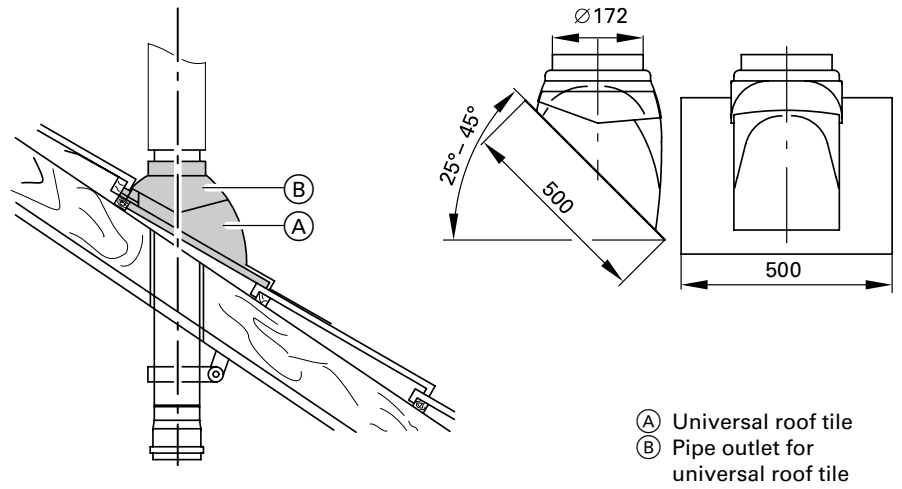
Condensate drain (incl. siphon)



Vertical coaxial roof outlet

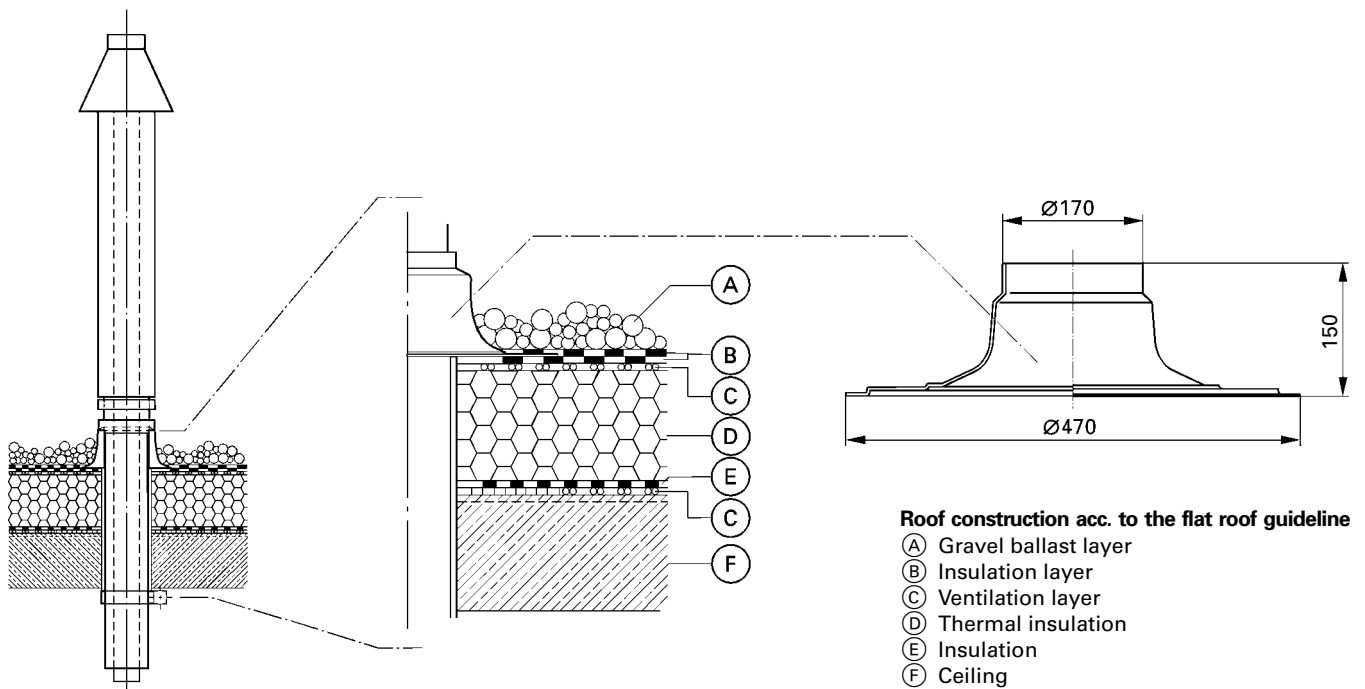


Universal roof tile (suitable for roofs with slopes of 25 to 45°)



- (A) Universal roof tile
- (B) Pipe outlet for universal roof tile

Flat roof collar

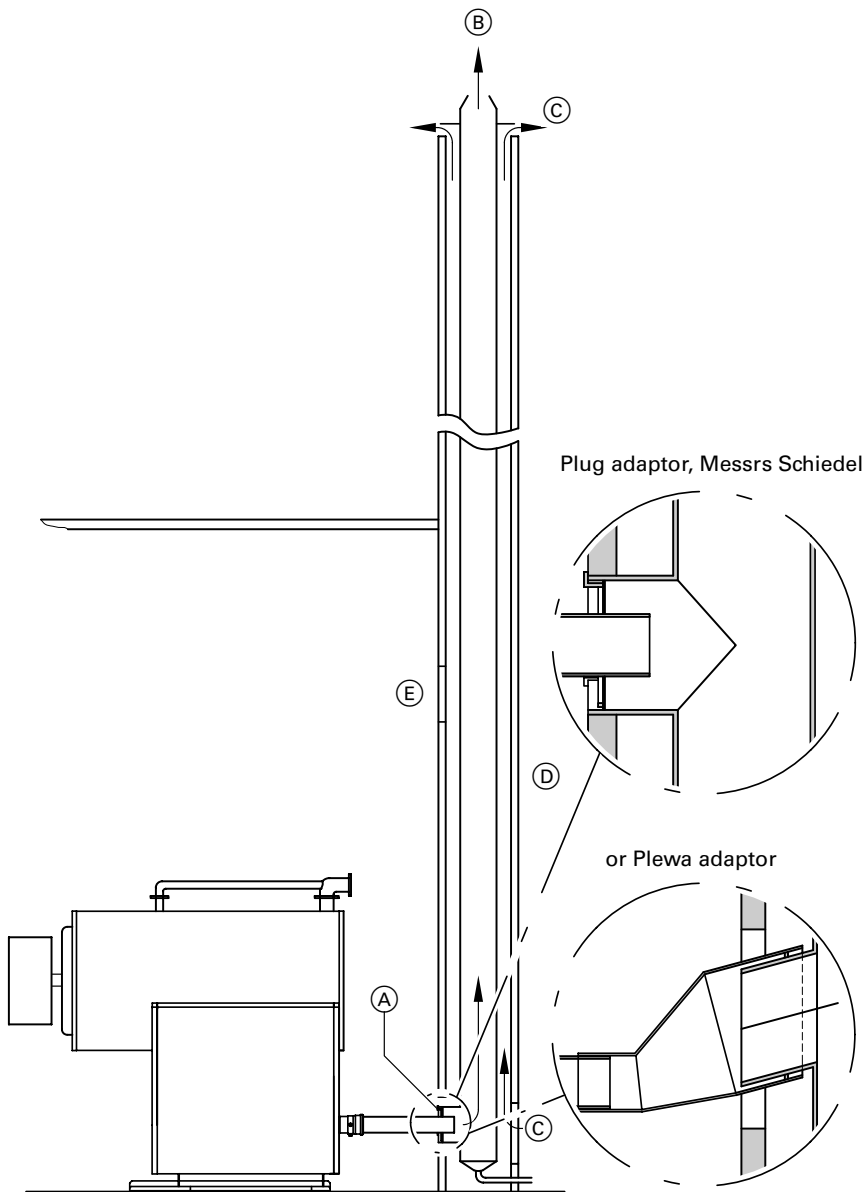


Roof construction acc. to the flat roof guideline

- (A) Gravel ballast layer
- (B) Insulation layer
- (C) Ventilation layer
- (D) Thermal insulation
- (E) Insulation
- (F) Ceiling

2.7 Flue gas system

Connection with plastic flue pipe (PPs) to a moisture-resistant chimney (MR chimney, operation with negative pressure)



Vitocrossal 300 condensing boilers may also be connected to **moisture-resistant chimneys**, if the chimney manufacturer can provide the calculated verification required by EN 13384.

Install a flue pipe as union, which is pressure sealed and moisture resistant in accordance with Building Regulations. You can obtain the union from the flue pipe to the MR chimney from Plewa direct or, upon request, from Schiedel quoting reference Schiedel Steck-Adapter.

Addresses:

Plewa-Werke GmbH
54662 Speicher/Eifel

Schiedel GmbH&Co.
Hauptverwaltung
Lerchenstraße 9
80995 Munich

- Ⓐ Adaptor
- Ⓑ Flue gas
- Ⓒ Secondary ventilation
- Ⓓ MR chimney
- Ⓔ Inspection aperture

2.8 Sound insulation

The burner/boiler systems, circulation pumps and other drives used in heating systems generate noise.

This noise is transferred from the boiler room via floorboards, ceiling and walls to neighbouring rooms and via the flue gas system as well as the ventilation air and exhaust air apertures into other rooms and into the open, where they may cause a nuisance.

To avoid this happening, additional protective measures may be required which should be considered at the design stage.

Subsequent measures to reduce noise nuisance frequently require extensive effort and expenditure.

Airborne noise attenuation

Frequently, modern boilers are equipped with silencer hoods or sound insulated ventilation air inlet housings. Additional silencer hoods may be used where more stringent anti-noise measures are required.

These measures may be implemented later with a minimum of effort.

Silencer hoods are offered for various levels of noise attenuation and are generally designed and built in accordance with specific system conditions (boiler type, fuel supply, building characteristics).

For larger systems, it may be necessary to route the ventilation air through a sound-insulated channel, in order to avoid a noise nuisance outside the building.

Flue gas silencers are generally only required where higher noise protection measures are called for. Whether or not a flue gas silencer is required can be predicted only with some difficulties, because of the complexity of the creation and propagation of flame noise, the interaction between the burner, boiler and the flue gas system as well as the operating mode (flue gas system operating with positive or negative pressure).

It is advisable, therefore, to assess the noise emission into the neighbourhood, to consider the sound pressure level measured at the flue gas system outlet. It should be considered at the planning stage whether silencers might become necessary later.

In this connection, it is important that sufficient space for the flue gas silencer is available behind the boiler. According to EN 13384, the flue gas pressure drop of the flue gas silencer will be required for calculating the flue gas system.

Anti-vibration measures

Anti-vibration foundations for the heat generator are an economical and effective measure. For this purpose, anti-vibration supports are offered.

When sizing such supports, take the entire operating weight of the boiler system and, when using longitudinal anti-vibration brackets, the condition of the supporting surface into consideration. Effective anti-vibration measures are particularly important when installing boilers into an attic. Compensators may be used to physically separate the combustion equipment from the building. These should be installed into the boiler flow, return and safety pipe and as near as possible to the boiler.

Also insulate any braces or hanging arrangements, if installed, against sound/vibration transmission to the building. Detailed information for reducing noise emissions by combustion equipment in heating systems can be found in information sheet no. 10 of the BDH (Bundesverband der Deutschen Heizungsindustrie e.V.).

2.9 Standard values for water quality

2.9 Standard values for water quality

The life of any heat generator as well as that of the complete heating system is influenced by the quality of the water.

In any event, the cost of a water treatment facility is less than the cost of repairing damage to the heating system.

Observing the following requirements is necessary to safeguard your warranty rights.

The manufacturer's warranty excludes damage due to corrosion and scaling.

The following is a summary of essential requirements for water quality.

For comprehensive information, see the separate technical guide on standard values for water quality.

For filling and commissioning, Viessmann offers a mobile water treatment system on loan.

Heating systems with rated operating temperatures up to 100 °C (VDI 2035)

Many years of experience show that scaling cannot be completely prevented to avoid damage. VDI guideline 2035 therefore permits, subject to the total boiler output of the heating system, a certain total amount of calcium hydrogen

carbonate to enter the system along with the fill water (see also the corresponding explanatory remarks in the original text of the relevant guideline).

This total fill volume includes the first fill and water used for top-up and refilling (exception: when the boiler is descaled).

Heating water requirements

Total boiler output of the system [\dot{Q}]	Calcium hydrogen carbonate concentration [$\text{Ca}(\text{HCO}_3)_2$] for fill and top-up water	Max. permissible fill and top-up [V_{max}]
$\dot{Q} \leq 100 \text{ kW}$	No requirement *1	No requirement *1
$100 \text{ kW} < \dot{Q} \leq 350 \text{ kW}$ $350 \text{ kW} < \dot{Q} \leq 1000 \text{ kW}$	$\text{Ca}(\text{HCO}_3)_2 \leq 2.0 \text{ mol/m}^3$ $\text{Ca}(\text{HCO}_3)_2 \leq 1.5 \text{ mol/m}^3$	$V_{\text{max}} [\text{m}^3] = 3 \text{ times system volume}$ (or calculation V_{max} as under line: $1000 \text{ kW} < \dot{Q}$)
$1000 \text{ kW} < \dot{Q}$	—	$V_{\text{max}} [\text{m}^3] =$ *2 $0.0313 \times \frac{\dot{Q} [\text{kW}]}{\text{Ca}(\text{HCO}_3)_2 [\text{mol/m}^3]}$

*1 The requirements for systems with $\dot{Q} > 100 \text{ kW}$ apply to the replacement of the boiler in systems with originally $\dot{Q} > 100 \text{ kW}$ and a system water volume $\geq 20 \text{ litre/kW}$.

*2 Apply this equation for heating systems $< 100 \text{ kW}$ with a specific system volume $\geq 20 \text{ litres/kW}$.

Prevention of damage due to corrosion of the water side

The corrosion resistance of ferrous materials on the primary side of heating systems and boilers depends on the absence of oxygen in the heating water. The oxygen introduced into the heating system with both the first fill and with top-up water reacts with the system materials, without causing damage. The characteristic blackening of the water after some time in use indicates that free oxygen is no longer present. The Technical Rules and in particular VDI guideline 2035-2 therefore recommend that heating systems are designed and operated so that a constant ingress of oxygen into the heating water is prevented.

Oxygen can normally only enter during operation via:

- Open expansion vessels overflowing
- Negative system pressure
- Gas-permeable components.

Correctly sized sealed systems operating at the correct pressure, e.g. systems with diaphragm expansion vessels, offer good protection against the ingress of atmospheric oxygen into the system. At every part of the heating system, even at the suction side of the pump and under all operating conditions, the system pressure should be above ambient atmospheric pressure.

Check the charge pressure of the diaphragm expansion vessel during the annual maintenance procedure, at the least.

The use of gas-permeable components, e.g. non-impermeable plastic pipes in underfloor heating systems, should be avoided. Provide system separation if such components are used.

This must separate the water flowing through the plastic pipes from other heating circuits, e.g. from the heat generator, by the provision of a corrosion resistant heat exchanger.

From a corrosion point of view, hot water heating systems which are sealed, where the above points were considered, make

additional corrosion protection measures unnecessary. However, take additional precautions where there is a danger of oxygen ingress, e.g. by adding oxygen binder sodium sulphite (5-10 mg/litre into the excess).

The pH value of the heating water should be between 8.2 and 9.5.

Different conditions apply for systems including aluminium components.

If chemicals are used to protect the system against corrosion, we would recommend that your chemical supplier certifies the suitability of additives vis-à-vis the boiler materials and the materials of other heating system components.

We recommend you refer to the respective specialist in questions of water treatment.

For further details, see the VDI guideline 2035-2.

2.10 Condensate and neutralisation

Drain the acidic condensate created during the heating operation in the condensing boiler and in the flue pipe in accordance with appropriate regulations. During combustion, it will have pH values between 3 and 4.

According to Code of Practice ATV-DVWK-A 251, which is generally based on the local waste water regulations, condensate from condensing boilers determines conditions for draining condensate from gas fired condensing boilers into the public sewer system.

The constituency of condensate drained from Vitocrossal 300 condensing boilers meets the requirements of ATV-DVWK-A 251 on condensate from condensing boilers – Introduction of condensate from gas or oil fired combustion equipment into the public sewer system and small sewerage treatment plants.

According to ATV-DVWK-A 251, a condensate volume of 0.14 kg per kWh should be assumed for gas combustion.

Up to a rated output of 200 kW, the condensate from gas fired condensing boilers can generally be introduced into the public sewer system without prior neutralisation.

Gas combustion above 200 kW

Condensate from this type of system should generally be neutralised. After leaving Vitocrossal 300, the condensate is neutralised in the neutralising system, and its pH value raised from 6.5 to approx. 9.

Any condensate treated as described may be introduced into the mains sewer system.

The neutralising medium will be gradually consumed by the condensate. Since the consumption of neutralising medium depends on the operating mode of the system, determine the required top-up quantity during the first year of operation by regular checks. Establish the consumption through inspections over a longer period of time.

Oil combustion (only Vitotrans 333)

Condensate from this type of system must be neutralised. For gas fired boilers use an active carbon filter in addition to a neutralising system.

Design notes regarding draining condensate

The condensate drain to the sewer connection must be able to be inspected. Route it with a gradient and equip the pipe with a stench trap; also provide suitable facilities for taking samples. The bottom drain should be located below the anti-flooding level of the flue gas collector box.

Condensate drains must only be made from corrosion resistant materials (e.g. fibre reinforced hoses). Never use any galvanised materials or those containing copper for pipes, connectors, etc. Install a U-bend in the condensate drain to prevent flue gases from escaping.

Ensure that the domestic drainage systems are made from materials which are resistant to acidic condensate.

According to Code of Practice ATV-DVWK-A 251, these are:

- Stoneware pipes
- Hard PVC pipes
- PVC pipes
- PE-HD pipes
- PP pipes
- ABS/ASA pipes
- Stainless steel pipes
- Borosilicate pipes

Local waste water regulations and/or specific technical circumstances may prescribe designs which vary from those described in the above Codes of Practice. It would be appropriate to make contact with your local authority with responsibility for waste water management prior to the installation, to inform yourself about local regulations.

2.10 Condensate and neutralisation

Neutralising system

Matching neutralising systems **are available for Vitocrossal 300** condensing boilers:

- Granulate neutralising system for boilers up to 508 kW
- Granulate neutralising system with lift pump and granulate re-fill indicator for boilers between 635 and 978 kW.

Matching neutralising systems are available for **condensing units** comprising Viessmann Vitoplex/Vitorond/Vitomax boilers and Viessmann **Vitotrans 333** flue gas/water heat exchangers installed downstream of the boiler:

- Granulate neutralising system for gas fired boilers up to 460 kW with Vitotrans 333
- Granulate neutralising system with lift pump and granulate re-fill indicator for gas fired boilers up to 1400 kW with Vitotrans 333
- Liquid neutralising system for gas fired boilers from 1750 kW with Vitotrans 333
- Neutralising systems for oil fired boilers with Vitotrans 333.

For specifications regarding neutralising equipment or systems and accessories, see boiler accessories datasheets.

2.11 Important safety regulations and requirements

General

The boiler has been built in accordance with TRD 702 and is used in heating systems to EN 12828. Observe the operating conditions stated in these guidelines. With regard to the stated rated output and the requirements laid down for heating equipment, it meets EN 677.

During installation and commissioning of this boiler, observe all local Building Regulations and regulations concerning combustion systems, as well as the following standards, regulations and directives:

- **EN 12828:** Heating system in buildings – designing hot water heating systems.
- **EN 13384:** Flue gas systems – thermal and flow calculations.
- **DIN 4753:** DHW water heating systems for drinking and process water.
- **DIN 1988:** Technical Regulations for Drinking Water Installations (TRWI).
- **EN 298:** Burner control units for gas burners and pressure jet or atmospheric gas fired devices.
- **EN 676:** Pressure jet gas burner.
- **DVGW-TRGI '86 (issue 1996):** Technical rules for gas installations.
- **DVGW Code of Practice G 260/I and II:** Technical rules for gas quality.

Gas installation

The gas installation should be carried out by the registered installer in accordance with the technical connection requirements stipulated by the gas supply company. Operate the system in accordance with the above conditions.

Pipe connections

All pipe connections to the boiler should be made free from stress and torque.

Electrical installation

The electrical connection and electrical installation should meet VDE regulations (DIN VDE 0100 and DIN VDE 0116) or local regulations, as well as the technical connection conditions of the local electricity supply company.

- **DIN VDE 0100:** Installation of HV systems with rated voltages up to 1000 V.
- **DIN VDE 0116:** Electrical equipment for combustion systems.

Operating instructions

According to EN 12828, section 5 and EN 12828, section 5, and EN 12170/12171, the system installer must produce operating instructions for the whole system.

Flue gas system

Use flue pipes for condensing boilers which meet local Building Regulations.

Fill and top-up water

- **VDI 2035:** Prevention of damage through corrosion and scaling in hot water heating systems with rated operating temperatures up to 100 °C.

Checks as part of the Building Regulations approval procedure

As part of the Building Regulations approval procedure [in Germany], condensing combustion systems are tested by the flue gas inspector, for adherence to all relevant Building Regulations and recognised technical rules which must be observed. The State Building Regulations, their implementation orders and the combustion equipment orders, as well as the general building approvals and permits of the higher supervisory authority, in individual cases, are part of the Building Regulations requirements.

3.1 Vitocrossal 300 – Application example 1

Application example 1 – Single boiler system with Vitocrossal 300 boiler

System

Single boiler system with:
 ■ Vitocrossal 300 (87 to 978 kW)
 ■ Vitotronic 300 (type GW2)
 or
 Vitotronic 200 (type GW1)
 or
 Vitotronic 100 (type GC1) incl.
 Vitocontrol control panel with
 weather-compensated control unit
 or
 Vitotronic 100 (type GC1) and external,
 weather-compensated control unit.

Function description

Vitocrossal 300 is operated via a weather-compensated boiler control unit with modulating boiler water temperature – two-stage or modulating burners are controlled.

During heating operation, a boiler water temperature is created which is higher than the highest heating circuit flow temperature by an adjustable differential.

Advantages

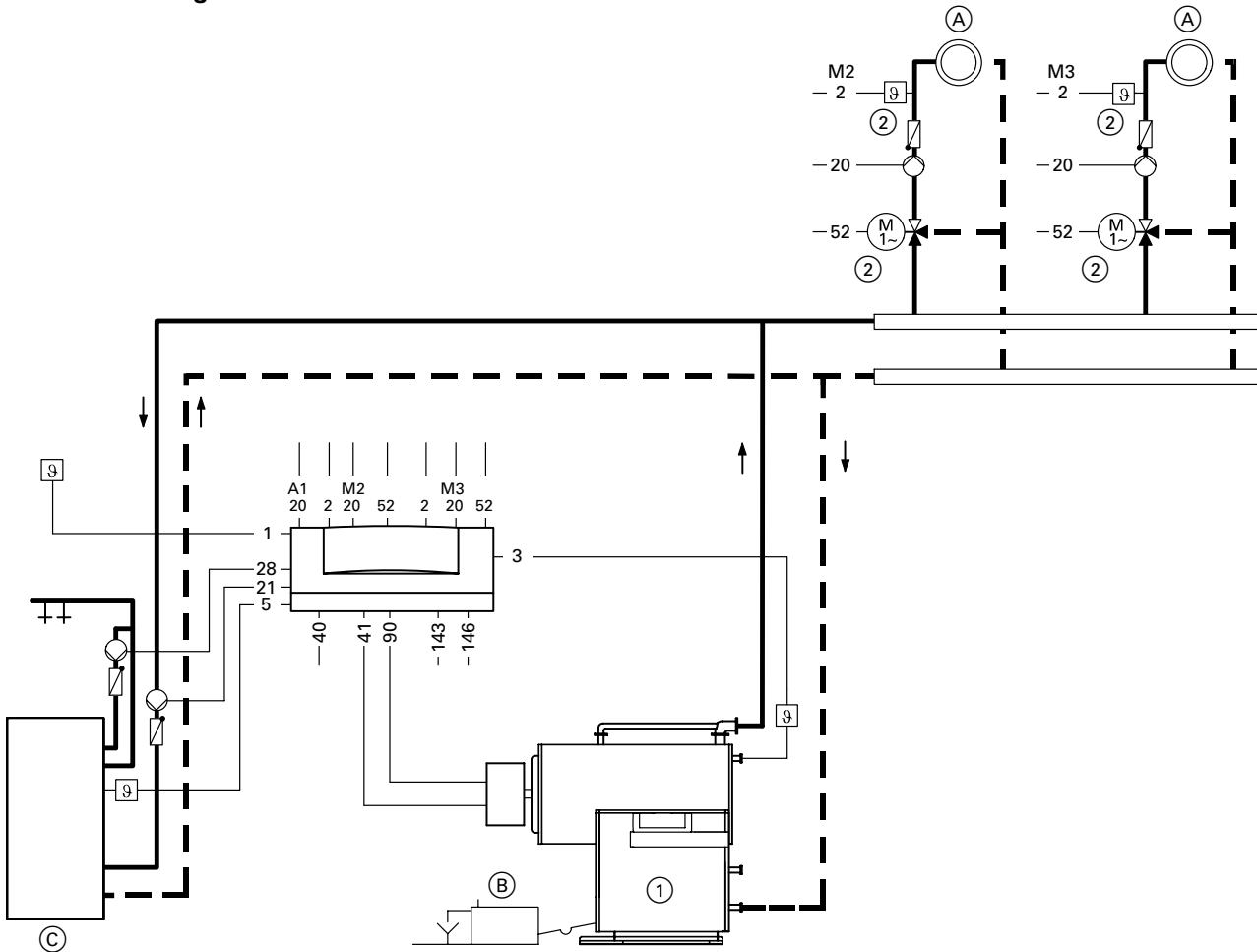
Both heating circuits connected to Vitotronic 300 (type GW2) are controlled without major installation requirements. A remote control unit can be connected for each heating circuit.

Equipment required

(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Boiler with Vitotronic	1	as per price list
②	Expansions for heating circuit with mixer in conjunction with Vitotronic 300 (type GW2)		
	– Extension kit for one heating circuit with mixer	1 or 2	7450 650
	or		
	– mixer motor for flanged mixer and plug-in connector and	1 or 2	as per price list
	– contact temperature sensor	1 or 2	7450 642
	or		
	– immersion temperature sensor (incl. sensor well) (for additional heating circuit control units see price list)	1 or 2	7450 641

Installation diagram



Plug-in connector

- 1 Outside temperature sensor*1
- 2 M2 Flow temperature sensor, mixer*2
- 2 M3 Flow temperature sensor, mixer*2
- 3 Boiler temperature sensor
- 5 Cylinder temperature sensor (accessory for Vitotronic 100)
- 20 M2 Heating circuit pump mixer*2
- 20 M3 Heating circuit pump mixer*2

- 20 A1 Heating circuit excl. mixer (if installed)
- 21 Cylinder loading pump
- 28 DHW circulation pump*1
- 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations
- 41 Burner (stage 1)

- 52 M2 Mixer motor*2
- 52 M3 Mixer motor*2
- 90 Burner (stage 2/modulation)
- 143 External hook-up and
- 146 External hook-up
see from page 50

(A) Heating circuit with mixer

(B) Neutralising system (see also page 30)

(C) DHW cylinder

*1 Only for Vitotronic 200 and 300.

*2 Only for Vitotronic 300.

Application example 2 – Single boiler system with Vitocrossal 300 boiler with several heating circuits and one low temperature heating circuit

System

Single boiler system with

- Vitocrossal 300 (87 to 978 kW)
- Vitotronic 300 (type GW2)
 - or
 - Vitotronic 100 (type GC1) incl. Vitocontrol control panel with weather-compensated control unit
 - or
 - Vitotronic 100 (type GC1) and external, weather-compensated control unit.

Possible applications:
For heating circuits with varying temperatures.

Function description

Vitocrossal 300 is operated via a weather-compensated boiler control unit with modulating boiler water temperature – two-stage or modulating burners are controlled.

Vitocrossal 300 is equipped with two return connectors.

The heating circuits with higher return temperature are connected to return connector KR 2, and those with lower return temperatures to return connector KR1.

Note: Connect at least 15% of the rated output to return connector KR1.

During the heating operation, a boiler water temperature will be established which will be higher than the highest heating circuit flow temperature, by an adjustable differential.

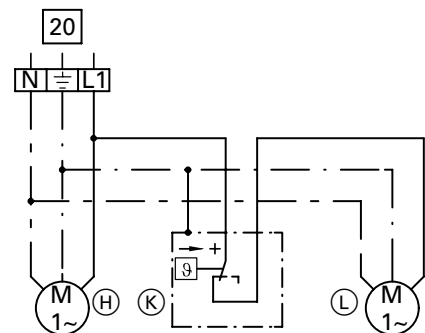
Advantages

Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.

Both heating circuits connected to Vitotronic 300 are controlled without major installation requirements. A remote control unit can be connected for each heating circuit.

Wiring diagram

Pump connections for the underfloor circuit.



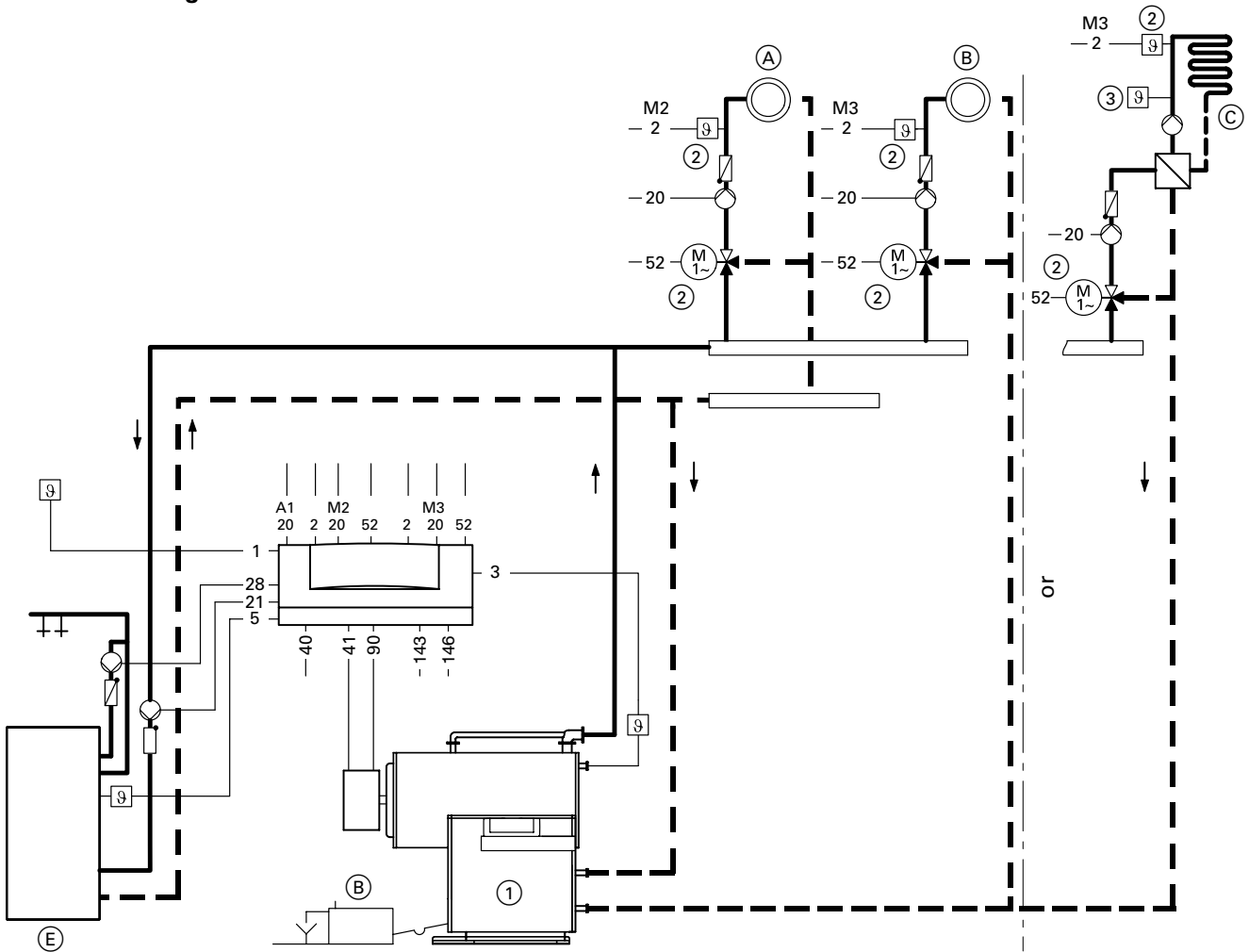
- 20 Heating circuit control
- H Primary pumps – underfloor heating circuit
- K Maximum temperature limiter for underfloor heating circuit ③
- L Secondary pump – underfloor heating circuit (downstream of the system separation)

Equipment required

(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Boiler with Vitotronic	1	as per price list
②	Expansions for heating circuits with mixer in conjunction with Vitotronic 300 (type GW2)		
	– Extension kit for one heating circuit with mixer	1 or 2	7450 650
	or		
	– mixer motor for flanged mixer and plug-in connector and	1 or 2	as per price list
	– contact temperature sensor	1 or 2	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	1 or 2	7450 641
	(for additional heating circuit control units see price list)		
③	Temperature limiter for limiting the max. temperature of underfloor heating systems		
	– Immersion thermostat	1	7151 728
	or		
	– contact thermostat	1	7151 729

Installation diagram



Plug-in connector

- 1 Outside temperature sensor*¹
- 2 M2 Flow temperature sensor, mixer*¹
- 2 M3 Flow temperature sensor, mixer*¹
- 3 Boiler temperature sensor
- 5 Cylinder temperature sensor (accessory for Vitotronic 100)
- 20 M2 Heating circuit pump mixer*¹
- 20 M3 Heating circuit pump mixer*¹

- 20 A1 Heating circuit pump for one heating circuit without mixer*¹
- 21 Cylinder loading pump
- 28 DHW circulation pump*¹
- 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations
- 41 Burner (stage 1)

- 52 M2 Mixer motor*¹
- 52 M3 Mixer motor*¹
- 90 Burner (stage 2/modulation)
- 143 External hook-up and
- 146 External hook-up
see from page 50

(A) Heating circuit with mixer

(B) Low temperature heating circuit or

(D) Neutralising system (see also page 30)

(C) Underfloor heating circuit with mixer

(E) DHW cylinder

*¹Only for Vitotronic 300.

3.1 Vitocrossal 300 – Application example 3

Application example 3 – Multi-boiler system with Vitocrossal 300 boiler with several heating circuits and one low temperature heating circuit

System

- Multi-boiler system with
- Vitocrossal 300 (87 to 978 kW)
 - Vitotronic 100 (type GC1) for every boiler in the multi-boiler system **and** Vitotronic 333 (type MW1) once for the multi-boiler system
- or
- Vitotronic 100 (type GC1) for every boiler of a multi-boiler heating system incl. Vitocontrol control panel with weather-compensated control unit or external, weather-compensated cascade control unit with cylinder thermostat
 - Vitotronic 050.

Function description

Vitocrossal 300 is operated via a weather-compensated boiler control unit with modulating boiler water temperature – two-stage or modulating burners are controlled.

Vitocrossal 300 is equipped with two return connectors. The heating circuits with higher return temperature are connected to return connector KR2, and those with lower return temperatures to return connector KR1.
 Note: Connect at least 15% of the rated output to return connector KR1.

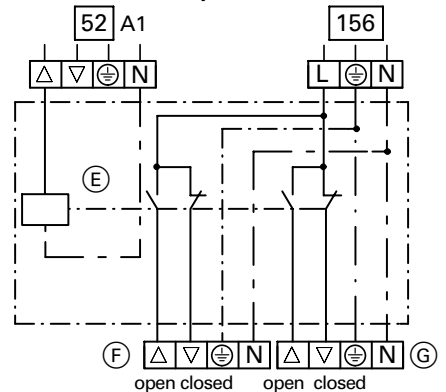
During the heating operation, a boiler water temperature will be established which will be higher than the highest heating circuit flow temperature, by an adjustable differential.

Advantages

Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.

The heating circuits connected to Vitotronic 333 or 050 are controlled without major installation effort. A remote control unit can be connected for each heating circuit.

Wiring diagram for the connection of the motorised butterfly valves



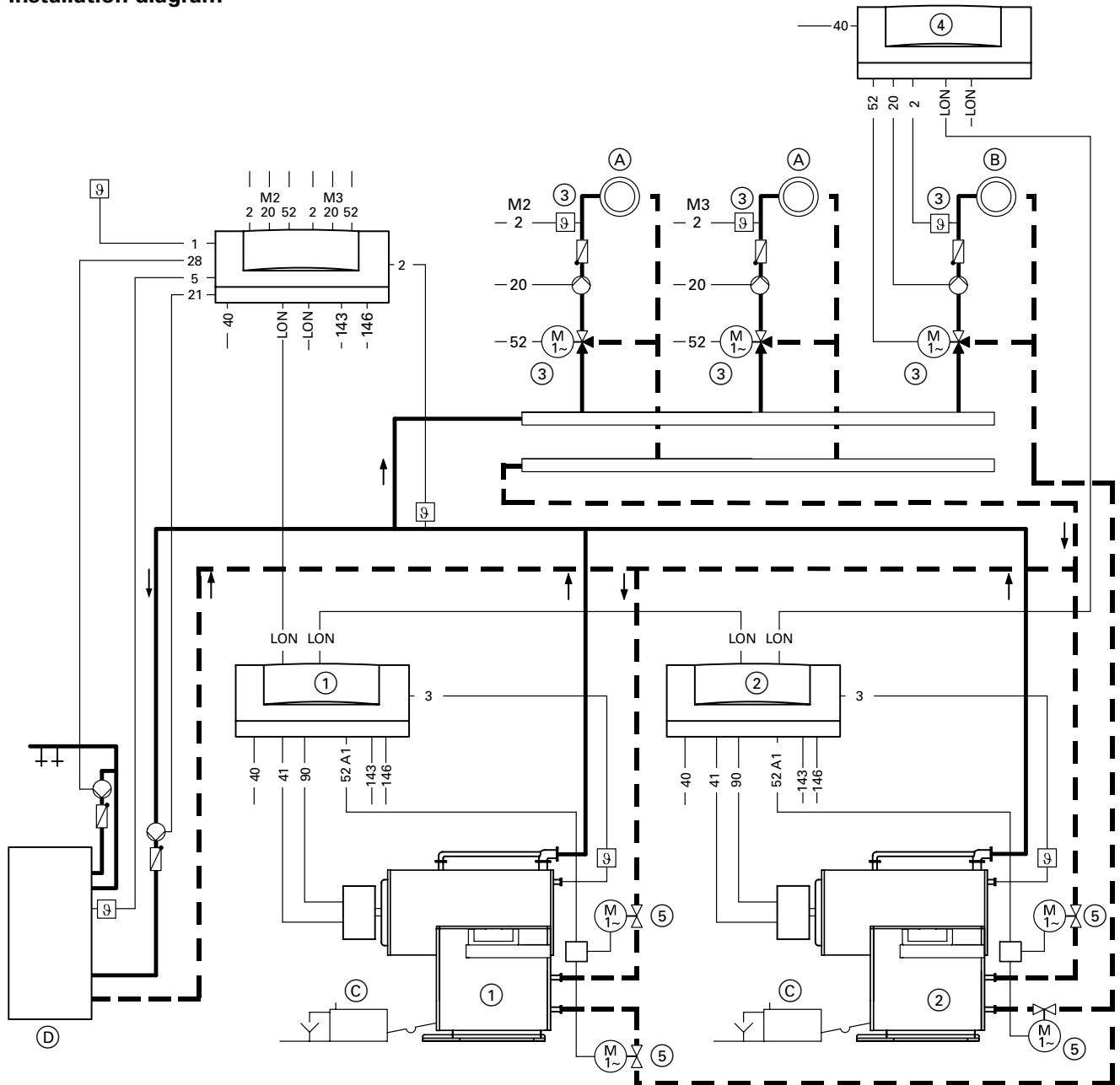
- 52 A1 Plug-in connector to Vitotronic 100
- 156 Plug-in connector to Vitotronic 100
- (E) Contactor relay, part no. 7814 681
- (F) Motorised butterfly valve 1
- (G) Motorised butterfly valve 2

Equipment required

(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Boiler with Vitotronic 100 and Vitotronic 333	1	as per price list
②	Boiler with Vitotronic 100	1 to 3	as per price list
③	Expansions for heating circuits with mixer in conjunction with Vitotronic 333 and 050 – Extension kit for one heating circuit with mixer	corresponding heating circuits	7450 650
	or		
	– mixer motor for flanged mixer and plug-in connector	corresponding heating circuits	as per price list
	and		
	– contact temperature sensor	corresponding heating circuits	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	corresponding heating circuits	7450 641
④	Vitotronic 050 (requires communication module LON)	corresponding heating circuits	as per price list
⑤	Motorised butterfly valve	2 to 8	on-site

Installation diagram



Plug-in connector

- 1 Outside temperature sensor*1
- 2 FlowFlow temperature sensor common heating flow*1
- 2 M2 Flow temperature sensor, mixer*1
- 2 M3 Flow temperature sensor, mixer*1
- 2 Flow temperature sensor Vitotronic 050
- 3 Boiler temperature sensor
- 5 Cylinder temperature sensor*1

- 20 M2 Heating circuit pump mixer*1
- 20 M3 Heating circuit pump mixer*1
- 20 Heating circuit pump Vitotronic 050
- 21 Cylinder loading pump*1
- 28 DHW circulation pump*1
- 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations
- 41 Burner (stage 1)

- 52 A1 Motorised butterfly valve
- 52 M2 Mixer motor*1
- 52 M3 Mixer motor*1
- 52 Mixer motor Vitotronic 050
- 90 Burner (stage 2/modulation)
- 143 External hook-up and
- 146 External hook-up see from page 52
- LON Connection LON BUS (available connections with terminator)

- (A) Heating circuit with mixer
- (B) Low temperature heating circuit

- (C) Neutralising system (see also page 30)

- (D) DHW cylinder

*1Only for Vitotronic 333.

3.1 Vitocrossal 300 – Application example 4

Application example 4 – Multi-boiler system with Vitocrossal 300 and Vitoplex boiler with several heating circuits and one low temperature heating circuit

System	Function description	Advantages
<p>Multi-boiler system with</p> <ul style="list-style-type: none"> ■ Vitocrossal 300 (87 to 978 kW) and ■ Vitoplex 100 (80 to 500 kW, type PX1 or SX1) or Vitoplex 300 (80 to 1750 kW, type TX3) ■ Vitotronic 100 (type GC1) for every boiler in the multi-boiler system and Vitotronic 333 (type MW1) once for the multi-boiler system <p>or</p> <ul style="list-style-type: none"> ■ Vitotronic 100 (type GC1) for every boiler of a multi-boiler heating system with Vitocontrol control panel with weather-compensated control unit or external, weather-compensated cascade control unit with cylinder thermostat ■ Therm-Control for operating Vitoplex 300 boilers without return temperature raising facilities ■ Vitotronic 050. 	<p>The Vitocrossal 300 (lead boiler) and the next Vitoplex are operated via a weather-compensated control system with modulating boiler water temperature and load-dependent sequential control – two-stage or modulating burners are controlled. The control system, which is connected via the LON BUS, regulates a boiler water flow temperature which is higher than the highest heating circuit flow temperature, by an adjustable differential. The heating system can be operated according to a separate heating curve.</p> <p>Vitocrossal 300 is equipped with two return connectors. The heating circuits with higher return temperature are connected to return connector KR2, and those with lower return temperatures to return connector KR1. Note: Connect at least 15% of the rated output to return connector KR1.</p> <p>The Vitoplex Therm-Control affects the motorised butterfly valve and must reduce the boiler water volume flow of Vitoplex during the start-up phase (e.g. during commissioning or night or weekend shutdown).</p> <p>Boilers without Therm-Control should be equipped with a return temperature raising facility according to prevailing operating conditions.</p>	<p>Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.</p> <p>For Vitotronic control systems, the Vitotronic 100 boiler control units are interconnected with the weather-compensated cascade control unit Vitotronic 333 and the heating circuit control unit Vitotronic 050 via a LON-BUS. This controls various regulator groups without additional installation effort. Through setting Vitotronic 333, the condensing boiler can always be selected as lead boiler. This ensures a high standard efficiency at all times.</p>

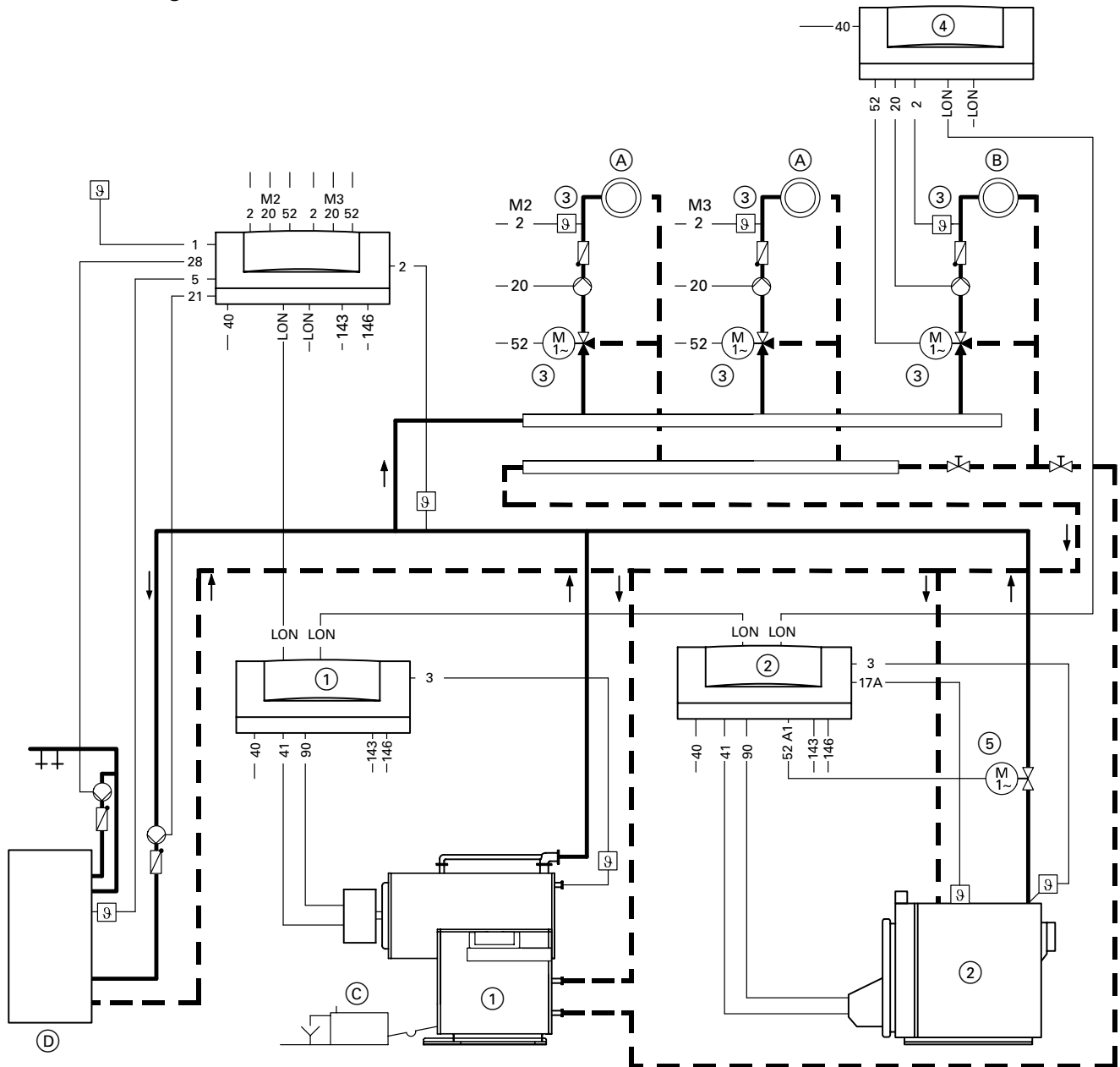
Equipment required

(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Vitocrossal 300 with Vitotronic 100 and Vitotronic 333	1	as per price list
②	Boiler with Vitotronic 100*1	1 to 3	as per price list
③	Expansions for heating circuits with mixer in conjunction with Vitotronic 333 and 050 – Extension kit for one heating circuit with mixer	corresponding heating circuits	7450 650
	or – mixer motor for flanged mixer and plug-in connector	corresponding heating circuits	as per price list
	and – contact temperature sensor	corresponding heating circuits	7450 642
	or – immersion temperature sensor (incl. sensor well)	corresponding heating circuits	7450 641
④	Vitotronic 050 (requires communication module LON)	corresponding heating circuits	as per price list
⑤	Motorised butterfly valve	1 to 3	on-site

*1Combinations of up to four boilers (incl. two or three Vitocrossal 300 and one to three Vitoplex) are feasible.

Installation diagram



Plug-in connector

- 1 Outside temperature sensor*1
- 2 FlowFlow temperature sensor common heating flow*1
- 2 M2 Flow temperature sensor mixer*1
- 2 M3 Flow temperature sensor mixer*1
- 2 Flow temperature sensor Vitotronic 050
- 3 Boiler temperature sensor
- 5 Cylinder temperature sensor*1

- 17 A Temperature sensor Therm-Control
- 20 M2 Heating circuit pump mixer*1
- 20 M3 Heating circuit pump mixer*1
- 20 Heating circuit pump Vitotronic 050
- 21 Cylinder loading pump*1
- 28 DHW circulation pump*1
- 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations

- 41 Burner (stage 1)
- 52 A1 Motorised butterfly valve
- 52 M2 Mixer motor*1
- 52 M3 Mixer motor*1
- 52 Mixer motor Vitotronic 050
- 90 Burner (stage 2/modulation)
- 143 External hook-up and
- 146 External hook-up see from page 52
- LON Connection LON BUS (available connections with terminator)

- (A) Heating circuit with mixer
- (B) Low temperature heating circuit

- (C) Neutralising system (see also page 30)

- (D) DHW cylinder

*1 Only for Vitotronic 333.

3.1 Vitocrossal 300 – Application example 5

Application example 5 – Multi-boiler system with Vitocrossal 300 and Vitoplex boiler with several heating circuits and one low temperature heating circuit – Vitoplex with shunt pump

System	Function description	Advantages
<p>Multi-boiler system with</p> <ul style="list-style-type: none"> ■ Vitocrossal 300 (87 to 978 kW) and ■ Vitoplex 100/300 (80 to 1750 kW) ■ Vitotronic 100 (type GC1) for every boiler in the multi-boiler system and Vitotronic 333 (type MW1) once for the multi-boiler system <p>or</p> <ul style="list-style-type: none"> Vitotronic 100 (type GC1) for every boiler of a multi-boiler heating system incl. Vitotronic control panel with weather-compensated control unit or external, weather-compensated cascade control unit with cylinder thermostat ■ Shunt pumps and motorised butterfly valves ■ Vitotronic 050. 	<p>The Vitocrossal 300 (lead boiler) and the next Vitoplex are operated via a weather-compensated control system with modulating boiler water temperature and load-dependent sequential control – two-stage or modulating burners are controlled. The control system, which is connected via the LON BUS, regulates a boiler water flow temperature which is higher than the highest heating circuit flow temperature, by an adjustable differential. The heating system can be operated according to a separate heating curve.</p> <p>Vitocrossal 300 is equipped with two return connectors. The heating circuits with higher return temperature are connected to return connector KR2, and those with lower return temperatures to return connector KR1. Note: Connect at least 15% of the rated output to return connector KR1.</p> <p>The return temperature raising facility for Vitoplex low temperature boilers is available as accessory or must be provided on site. Raising the return temperature is affected by shunt pumps and closing the butterfly valve. Temperature sensor T1 affects the butterfly valve. Temperature sensor T2 switches the shunt pump.</p>	<p>Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.</p> <p>For Vitotronic control systems, the Vitotronic 100 boiler control units are interconnected with the weather-compensated cascade control unit Vitotronic 333 and the heating circuit control unit Vitotronic 050 via a LON-BUS. This controls various regulator groups without additional installation effort.</p> <p>Through setting Vitotronic 333, the condensing boiler can always be selected as lead boiler. This ensures a high standard efficiency at all times.</p>

Equipment required

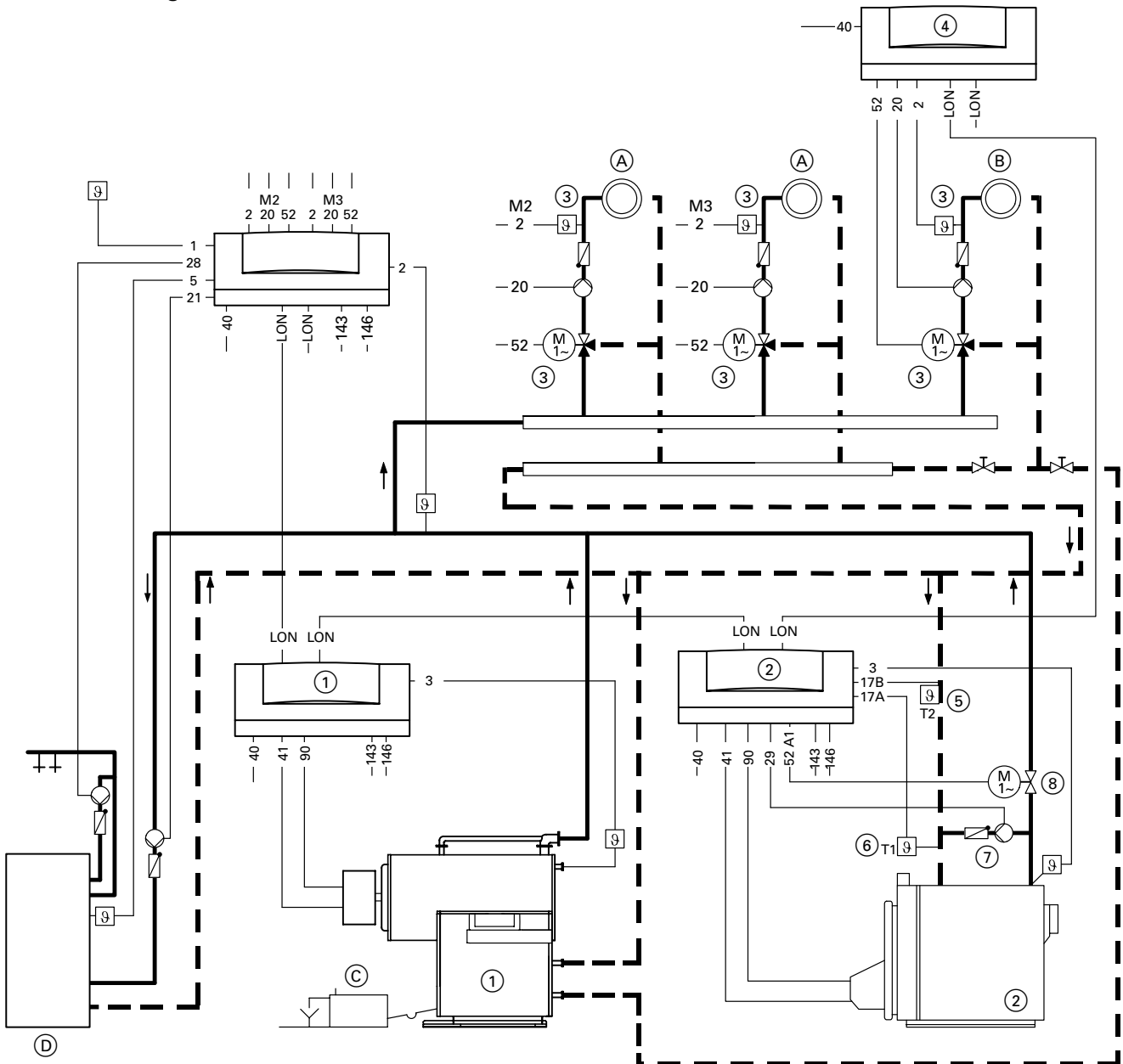
(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Vitocrossal 300 with Vitotronic 100 and Vitotronic 333	1	as per price list
②	Boiler with Vitotronic 100* ¹	1 to 3	as per price list
③	Expansions for heating circuits with mixer in conjunction with Vitotronic 333 and 050 – Extension kit for one heating circuit with mixer	corresponding heating circuits	7450 650
	or		
	– mixer motor for flanged mixer and plug-in connector	corresponding heating circuits	as per price list
	and		
	– contact temperature sensor	corresponding heating circuits	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	corresponding heating circuits	7450 641
④	Vitotronic 050 (requires communication module LON)	corresponding heating circuits	as per price list
⑤	Temperature sensor T2 – Contact temperature sensor	1 to 3	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	1 to 3	7450 641
⑥	Temperature sensor T1* ² – Contact temperature sensor	1 to 3	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	1 to 3	7450 641
⑦	Shunt pump	1 to 3	on-site
⑧	Motorised butterfly valve	1 to 3	on-site

*¹Combinations of up to four boilers (incl. two or three Vitocrossal 300 and one to three Vitoplex) are feasible.

*²An immersion sensor without sensor well is part of the standard delivery of Vitoplex 100 (up to 460 kW) and Vitoplex 300 (type TX3).

Installation diagram



- | | | |
|--|--|--|
| <p>Plug-in connector</p> <ul style="list-style-type: none"> 1 Outside temperature sensor*1 2 FlowFlow temperature sensor common heating flow*1 2 M2 Flow temperature sensor, mixer*1 2 M3 Flow temperature sensor, mixer*1 2 Flow temperature sensor Vitotronic 050 3 Boiler temperature sensor 5 Cylinder temperature sensor*1 | <ul style="list-style-type: none"> 17 A Temperature sensor T 1 17 B Temperature sensor T 2 20 M2 Heating circuit pump mixer*1 20 M3 Heating circuit pump mixer*1 20 Heating circuit pump Vitotronic 050 21 Cylinder loading pump*1 28 DHW circulation pump*1 29 Shunt pump 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations | <ul style="list-style-type: none"> 41 Burner (stage 1) 52 A1 Motorised butterfly valve 52 M2 Mixer motor*1 52 M3 Mixer motor*1 52 Mixer motor Vitotronic 050 90 Burner (stage 2/modulation) 143 External hook-up and 146 External hook-up see from page 52 LON Connection LON BUS (available connections with terminator) |
|--|--|--|

- (A) Heating circuit with mixer
- (B) Low temperature heating circuit

- (C) Neutralising system (see also page 30)

- (D) DHW cylinder

*1 Only for Vitotronic 333.

Application example 6 – Multi-boiler system with Vitocrossal 300 and Vitoplex boiler with several heating circuits and one low temperature heating circuit – Vitoplex with Therm-Control and boiler circuit pump

System

- Multi-boiler system with
- Vitocrossal 300 (87 to 978 kW) and
 - Vitoplex 100 (80 to 500 kW, type PX1 or SX1) or Vitoplex 300 (80 to 1750 kW, type TX3)
 - Vitotronic 100 (type GC1) for every boiler in the multi-boiler system and Vitotronic 333 (type MW1) once for the multi-boiler system
- or
- Vitotronic 100 (type GC1) for every boiler of a multi-boiler heating system incl. Vitocrossal control panel with weather-compensated control unit or external, weather-compensated cascade control unit with cylinder thermostat
 - Therm-Control for operating Vitoplex 300 boilers with boiler circuit pump
 - Vitotronic 050.

Possible applications:
For heating circuits with temperature differentials ≥ 20 K.

System-specific coding

On Vitotronic 333 change 3B to 3 – sequential switching of boilers with flow temperature sensor. On Vitotronic 100 of Vitoplex change 4D to 3 – Therm Control to boiler circuit pump.

Function description

The Vitocrossal 300 (lead boiler) and the next Vitoplex 300 are operated via a weather-compensated control system with modulating boiler water temperature and load-dependent sequential control – two-stage or modulating burners are controlled. The control system, which is connected via the LON BUS, regulates a boiler water temperature which is higher than the highest heating circuit flow temperature, by an adjustable differential. The heating system can be operated according to a separate heating curve.

Vitocrossal 300 is equipped with two return connectors. The heating circuits with higher return temperature are connected to return connector KR2, and those with lower return temperatures to return connector KR1.
Note: Connect at least 15% of the rated output to return connector KR1. Upon demand, the pre-heated heating water from Vitocrossal 300 will be pumped by the boiler circuit pump into Vitoplex. There, it will be reheated and reintroduced into the common flow pipe. The boiler circuit pump transfers the entire system water volume corresponding to the temperature differential for the design point. The boiler circuit pump head corresponds to the primary pressure drop from the flow connection via Vitoplex up to the re-entry into the system flow.

The Therm-Control of Vitoplex 300 affects the boiler circuit pump and should reduce the **total boiler water volume flow** of Vitoplex 300 during the **start-up phase** (e.g. during commissioning or night or weekend shutdown).

Boilers without Therm-Control must be equipped with a return temperature raising facility according to prevailing operating conditions.

Advantages

Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.

For Vitotronic control systems, the Vitotronic 100 boiler control units are interconnected with the weather-compensated cascade control unit Vitotronic 333 and the heating circuit control unit Vitotronic 050 via a LON-BUS. This controls various regulator groups **without additional installation effort**.

Through setting Vitotronic 333, the condensing boiler can always be selected as lead boiler. This ensures a high standard efficiency at all times.

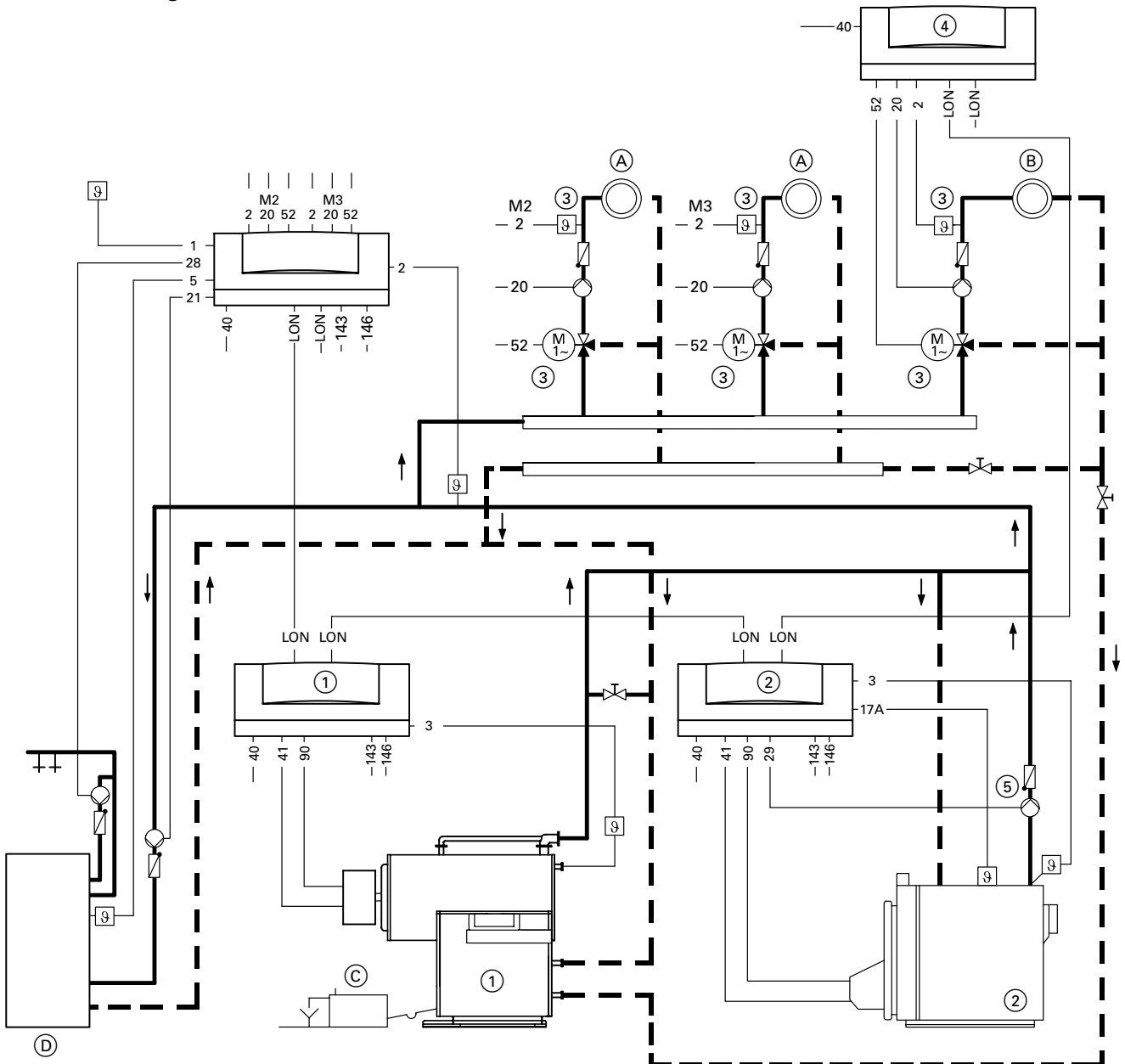
Equipment required

(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Vitocrossal 300 with Vitotronic 100 and Vitotronic 333	1	as per price list
②	Boiler with Vitotronic 100* ¹	1 to 3	as per price list
③	Expansions for heating circuits with mixer in conjunction with Vitotronic 333 and 050 – Extension kit for one heating circuit with mixer	corresponding heating circuits	7450 650
	or – mixer motor for flanged mixer and plug-in connector	corresponding heating circuits	as per price list
	and – contact temperature sensor	corresponding heating circuits	7450 642
	or – immersion temperature sensor (incl. sensor well)	corresponding heating circuits	7450 641
④	Vitotronic 050 (requires communication module LON)	corresponding heating circuits	as per price list
⑤	Boiler circuit pump	1 to 3	on-site

*¹Up to four boilers (incl. two or three Vitocrossal 300 and one to three Vitoplex) can be linked up. For Vitoplex 300, the Therm-Control is part of the standard delivery.

Installation diagram



- | | | |
|--|--|---|
| <p>Plug-in connector</p> <ul style="list-style-type: none"> 1 Outside temperature sensor*1 2 FlowFlow temperature sensor common heating flow*1 2 M2 Flow temperature sensor, mixer*1 2 M3 Flow temperature sensor, mixer*1 2 Flow temperature sensor Vitotronic 050 3 Boiler temperature sensor 5 Cylinder temperature sensor*1 | <ul style="list-style-type: none"> 17 A Temperature sensor Therm-Control 20 M2 Heating circuit pump mixer*1 20 M3 Heating circuit pump mixer*1 20 Heating circuit pump Vitotronic 050 21 Cylinder loading pump*1 28 DHW circulation pump*1 29 Boiler circuit pump 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations | <ul style="list-style-type: none"> 41 Burner (stage 1) 52 M2 Mixer motor*1 52 M3 Mixer motor*1 52 Mixer motor Vitotronic 050 90 Burner (stage 2/modulation) 143 External hook-up and 146 External hook-up see from page 52 LON Connection LON BUS (available connections with terminator) |
| <ul style="list-style-type: none"> (A) Heating circuit with mixer (B) Low temperature heating circuit | <ul style="list-style-type: none"> (C) Neutralising system (see also page 30) | <ul style="list-style-type: none"> (D) DHW cylinder |

*1 Only for Vitotronic 333.


Application example 7 – Multi-boiler system with Vitocrossal 300 and Vitoplex boiler with three-way mixing valve and several heating circuits plus one low temperature heating circuit

System

- Multi-boiler system with
- Vitocrossal 300 (87 to 978 kW) and
 - Vitoplex 100/300 (80 to 1750 kW)
 - Vitotronic 100 (type GC1) once for every boiler in the multi-boiler system and
 - Vitotronic 333 (type MW1) once for the multi-boiler system
- or
- Vitotronic 100 (type GC1) for every boiler of a multi-boiler heating system incl. Vitocontrol control panel with weather-compensated control unit or external weather-compensated cascade control unit with cylinder thermostat
 - Three-way mixing valve for raising the return temperature
 - Vitotronic 050.

Possible applications:
For heating circuits with temperature differentials ≥ 20 K.

System-specific code

- On Vitotronic 333
- Change 3B to 3 – sequential switching of boilers with flow temperature sensor.
- On Vitotronic 100 of Vitoplex
- Change 4D to 2 – plug-in connector  for the boiler circuit pump;
- Change 0C to 1 – boiler with constant return temperature raising.

Function description

The Vitocrossal 300 (lead boiler) and the next Vitoplex 300 are operated via a weather-compensated control system with modulating boiler water temperature and load-dependent sequential control – two-stage or modulating burners are controlled.

The control system, which is connected via the LON BUS, regulates a boiler water temperature which is, by an adjustable differential, higher than the highest heating circuit flow temperature. The heating system can be operated according to a separate heating curve.

Vitocrossal 300 is equipped with two return connectors. The heating circuits with higher return temperature are connected to return connector KR2, and those with lower return temperatures to return connector KR1.

Note: Connect at least 15% of the rated output to return connector KR 1. Upon demand, the pre-heated heating water from Vitocrossal 300 will be pumped by the boiler circuit pump into Vitoplex. There, it will be reheated and reintroduced into the common flow pipe. The boiler circuit pump transfers the entire system water volume corresponding to the temperature differential for the design point. The boiler circuit pump head corresponds to the pressure drop on the primary side

from the flow connector via Vitoplex to the re-entry at the system flow.

Temperature sensor T1 senses the return temperature. The boiler control unit regulates the three-way mixing valve to ensure that the system never falls below the minimum return temperature.

Advantages

Because of the separate return connections for heating circuits with high and low return temperatures, high standard efficiencies up to 109% will also be achieved if the larger proportion of consumers is operated at high temperatures.

For Vitotronic control systems, the Vitotronic 100 boiler control units are interconnected with the weather-compensated cascade control unit Vitotronic 333 and the heating circuit control unit Vitotronic 050 via a LON-BUS. This controls various regulator groups **without additional installation effort.**

Through setting Vitotronic 333, the condensing boiler can always be selected as lead boiler. This ensures a high standard efficiency at all times.

Equipment required

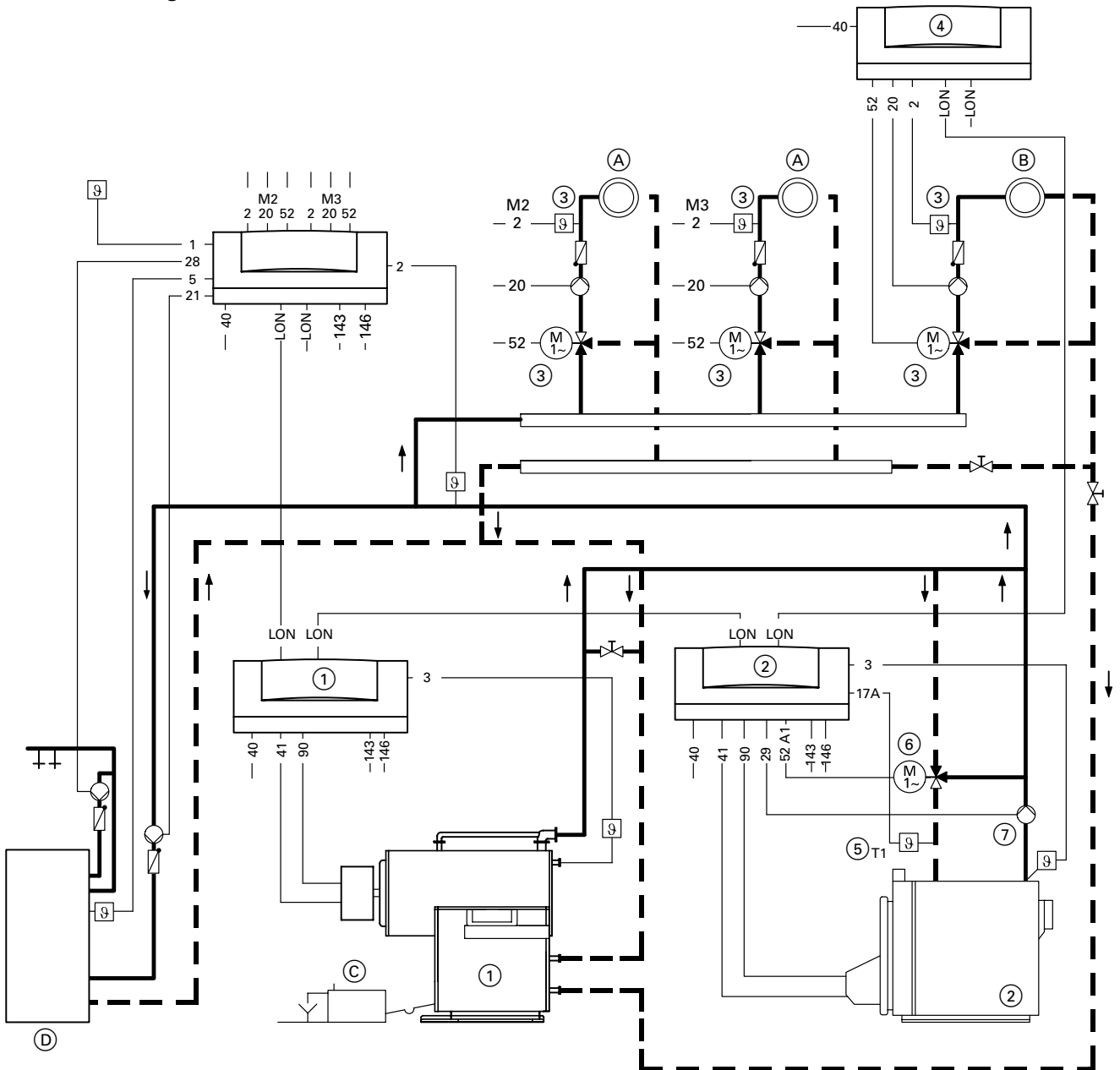
(for standard systems – equipment with additional system modules, see Vitotec folder)

Item	Description	Number	Part no.
①	Vitocrossal 300 with Vitotronic 100 and Vitotronic 333	1	as per price list
②	Boiler with Vitotronic 100*1	1 to 3	as per price list
③	Expansions for heating circuits with mixer in conjunction with Vitotronic 333 and 050 – Extension kit for one heating circuit with mixer	corresponding heating circuits	7450 650
	or		
	– mixer motor for flanged mixer and plug-in connector	corresponding heating circuits	as per price list
	and		
	– contact temperature sensor	corresponding heating circuits	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	corresponding heating circuits	7450 641
④	Vitotronic 050 (requires communication module LON)	corresponding heating circuits	as per price list
⑤	Temperature sensor T1*2 – Contact temperature sensor	1 to 3	7450 642
	or		
	– immersion temperature sensor (incl. sensor well)	1 to 3	7450 641
⑥	Three-way mixing valve	1 to 3	on-site
⑦	Boiler circuit pump	1 to 4	on-site

*1Combinations of up to four boilers (incl. two or three Vitocrossal 300 and one to three Vitoplex) are feasible.

*2For Vitoplex 300, an immersion sensor without sensor well is part of the standard delivery.

Installation diagram



- | | | |
|--|---|---|
| <p>Plug-in connector</p> <ul style="list-style-type: none"> 1 Outside temperature sensor*1 2 FlowFlow temperature sensor common heating flow*1 2 M2 Flow temperature sensor, mixer*1 2 M3 Flow temperature sensor, mixer*1 2 Flow temperature sensor Vitotronic 050 3 Boiler temperature sensor 5 Cylinder temperature sensor*1 | <ul style="list-style-type: none"> 17 A Temperature sensor T1 20 M2 Heating circuit pump mixer*1 20 M3 Heating circuit pump mixer*1 20 Heating circuit pump Vitotronic 050 21 Cylinder loading pump*1 28 DHW circulation pump*1 29 Boiler circuit pump 40 Mains connection, 230 V~/50 Hz
Install the mains electrical isolator in accordance with regulations | <ul style="list-style-type: none"> 41 Burner (stage 1) 52 A1 Three-way mixing valve 52 M2 Mixer motor*1 52 M3 Mixer motor*1 52 Mixer motor Vitotronic 050 90 Burner (stage 2/modulation) 143 External hook-up and External hook-up see from page 52 146 LON Connection LON BUS (available connections with terminator) |
| <ul style="list-style-type: none"> (A) Heating circuit with mixer (B) Low temperature heating circuit | <ul style="list-style-type: none"> (C) Neutralising system (see also page 30) | <ul style="list-style-type: none"> (D) DHW cylinder |

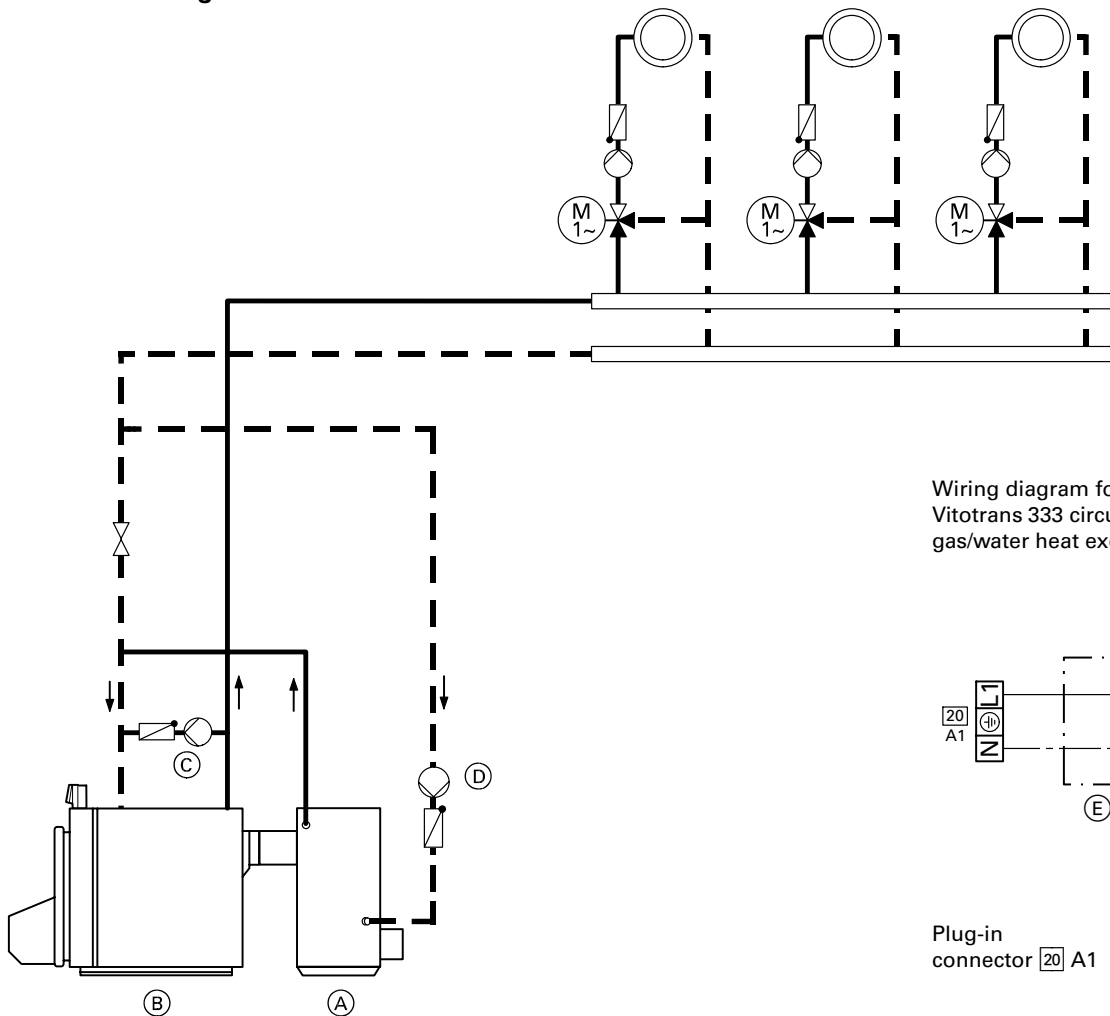
*1Only for Vitotronic 333.

Application example 1 – Single boiler system with boiler and Vitotrans 333 flue gas/water heat exchanger

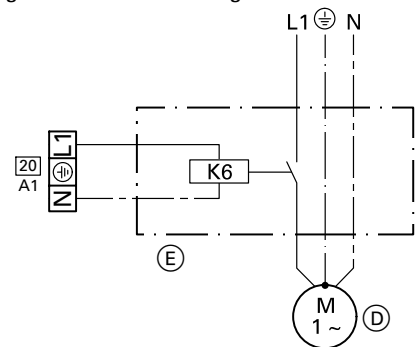
System	Function description	Advantages
Boiler system with <ul style="list-style-type: none"> ■ Vitoplex or ■ Vitorond or ■ Vitomax ■ Shunt pump for raising the return temperature ■ Vitotrans 333 ■ Circulation pump for Vitotrans 333 (only required if the pressure loss is too high for the heating circuit pumps). 	Connect Vitotrans 333 hydraulically in series with the boiler. As option, either the total or a part of the system volume flow can be routed through Vitotrans 333. System-specific coding Change 4C to 3 – plug-in connector 20 A1 for Vitotrans 333 circulation pump.	Utilisation of condensing technology for gas and oil combustion up to 6600 kW rated boiler output is feasible.

For control equipment see the technical guide on Vitoplex/Vitorond/Vitomax, chapter 3.1 example 2.

Installation diagram



Wiring diagram for the connection of the Vitotrans 333 circulation pump flue gas/water heat exchanger



Plug-in connector 20 A1 on Vitotronic 100, Vitotronic 200 or Vitotronic 300

With this type of wiring at plug-in connector 20 A1, the alternative, optional functions should be arranged on site.

- (A) Vitotrans 333 flue gas/water heat exchanger
- (B) Boiler
- (C) Shunt pump
- (D) Circulation pump for Vitotrans 333 (if required)
- (E) Contactor relay (Part no. 7814 681)

Application example 2 – Multi-boiler system with boilers and Vitotrans 333 flue gas/water heat exchanger connected to low temperature heating circuits with shunt pump

System

- Multi-boiler system with
 - Vitoplex or
 - Vitorond or
 - Vitomax
 - Shunt pump for raising the return temperature at each boiler
 - Vitotrans 333
 - Vitotrans 333 circulation pump.

Control equipment, see technical guide Vitoplex/Vitorond/Vitomax chapter 3.1 example 5.

Function description

Vitotrans 333 is hydraulically connected to a low temperature heating circuit. This enables an optimum utilisation of condensing technology. As option, either the total or a part of the volume flow of the connected boilers can be routed through Vitotrans 333.

System-specific coding

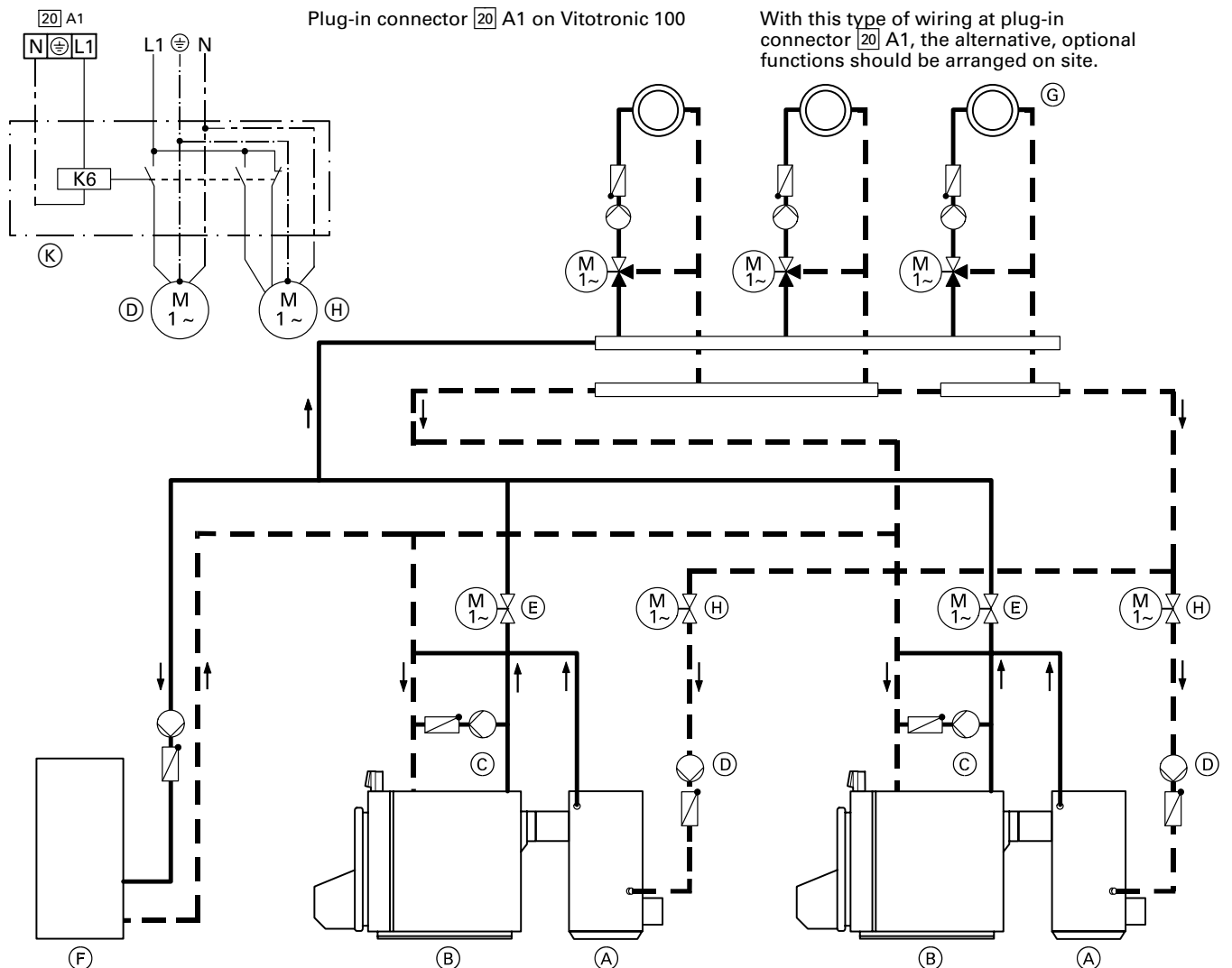
On every Vitotronic 100 Change 4C to 3 – plug-in connector 20 A1 for Vitotrans 333 circulation pump.

Advantages

Utilisation of condensing technology for gas and oil combustion up to 6600 kW rated boiler output is feasible.

Installation diagram

Wiring diagram for the connection of the circulation pump and the motorised shut-off valve of the Vitotrans 333 flue gas/water heat exchanger.



5822 198 GB

- (A) Vitotrans 333 flue gas/water heat exchanger
- (B) Boiler
- (C) Shunt pump

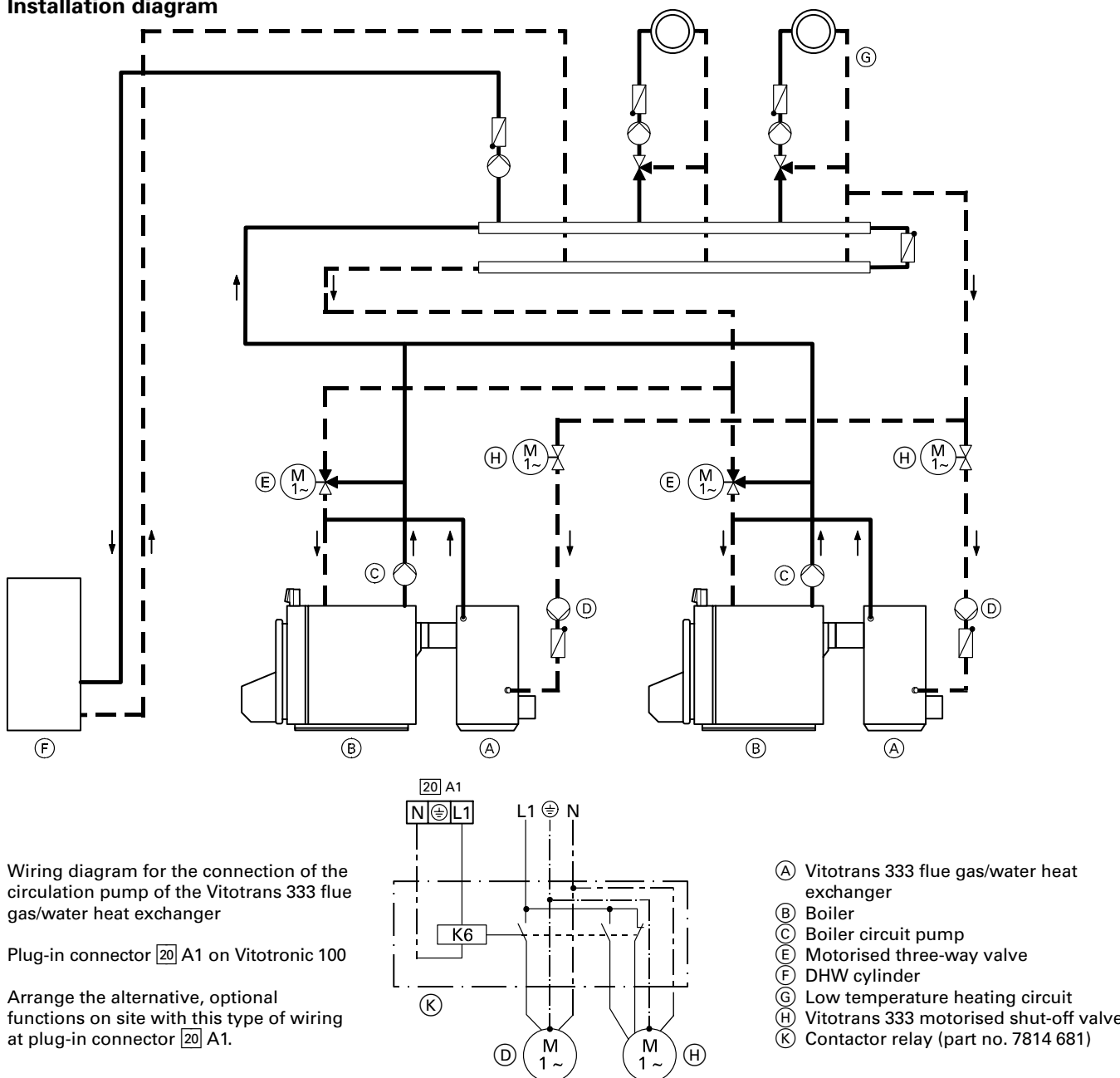
- (D) Vitotrans 333 circulation pump (if required)
- (E) Motorised boiler shut-off valve
- (F) DHW cylinder

- (G) Low temperature heating circuit
- (H) Vitotrans 333 motorised shut-off valve
- (K) Contactor relay (part no. 7814 681)

Application example 3 – Multi-boiler system with boilers and Vitotrans 333 flue gas/water heat exchanger connected to low temperature heating circuits with boiler circuit pump

System	Function description	Advantages
<p>Multi-boiler system with</p> <ul style="list-style-type: none"> ■ Vitoplex or ■ Vitorond or ■ Vitomax ■ Three-way valve for raising the return temperature at each boiler ■ Vitotrans 333 ■ Vitotrans 333 circulation pump. <p>For control equipment see the technical guide Vitoplex/Vitorond/Vitomax, chapter 3.1 example 5.</p>	<p>Vitotrans 333 is hydraulically connected to a low temperature heating circuit. This enables an optimum utilisation of condensing technology. As option, either the total or a part of the volume flow of the connected boiler can be routed through Vitotrans 333.</p> <p>System-specific coding On every Vitotronic 100 Change 4C to 3 – plug-in connector 20 A1 for Vitotrans 333 circulation pump.</p>	<p>Utilisation of condensing technology for gas and oil combustion up to 6600 kW rated boiler output is feasible.</p>

Installation diagram



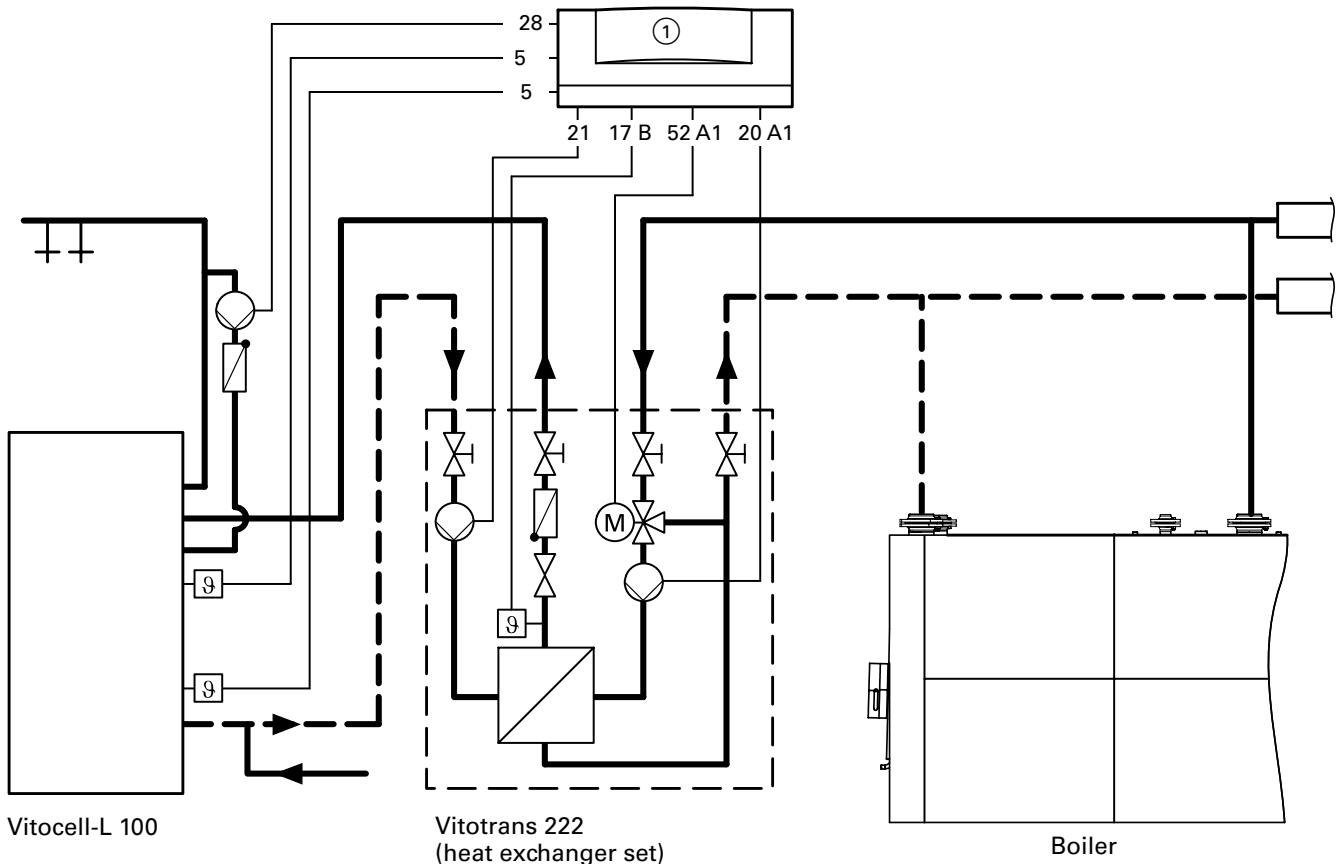
3.3 Heating DHW with a cylinder loading system

The Viessmann cylinder loading system is a combination comprising a Vitocell-L DHW cylinder and a Vitotrans 222 heat exchanger set. The cylinder loading system for DHW heating is a preferred choice for:

- Large cylinder capacities with offset loading and drawing times, e.g. water is drawn off at peak times in schools, sport centres, hospitals, army camps, social buildings, etc.

- Heating circuits requiring a low return temperature or those where the return temperature is limited, e.g. for district heating or condensing boilers. The high DHW spread leads to a low return temperature on the primary side; this brings advantages through high condensation rates when utilising condensing technology.

- Short-term peak loads, i.e. high draw-off rates and various reheating times, e.g. DHW heating in swimming pools, sports facilities, industrial companies etc.
 - Limited space as the cylinder loading system can transmit high performance levels.
- The cylinder loading system can be controlled by one ① Vitotronic 100, 200, 300, 333 or 050.



- Plug-in connector
- 5 Top cylinder temperature sensor (terminals 1 and 2)
 - 5 Bottom cylinder temperature sensor (terminals 2 and 3)
 - 17 B Temperature sensor Vitotrans 222
 - 20 A1 Primary pump connection in the cylinder loading system
 - 21 Secondary pump connection in the cylinder loading system
 - 28 DHW circulation pump (not for Vitotronic 100)
 - 52 A1 Three-way valve Vitotrans 222

- System-specific coding on Vitotronic ①**
- Change 4C to 1 – use plug-in connector 20 as primary pump for the heat exchanger set.
 - Change 4E to 1 – use output 52 as primary control for the heat exchanger set.
 - Change 55 to 3 – use the cylinder thermostat for the heat exchanger set.

Note
The cylinder loading system can be controlled by Vitotronic 100, 200, 300 or 333. Control can be achieved via a mixer control through Vitotronic 050 (type HK1W, HK1S, HK3W or HK3S) if none of these control units is available or if several cylinder loading systems are installed.

Order an additional cylinder temperature sensor when controlling the cylinder loading system by means of Vitotronic 100, type GC1, or Vitotronic 050.
In multi-boiler systems, the cylinder loading systems are controlled by Vitotronic 333.

5822 198 GB Information regarding the application examples (chapter 3.1)

Application examples 3 to 7 (multi-boiler systems)

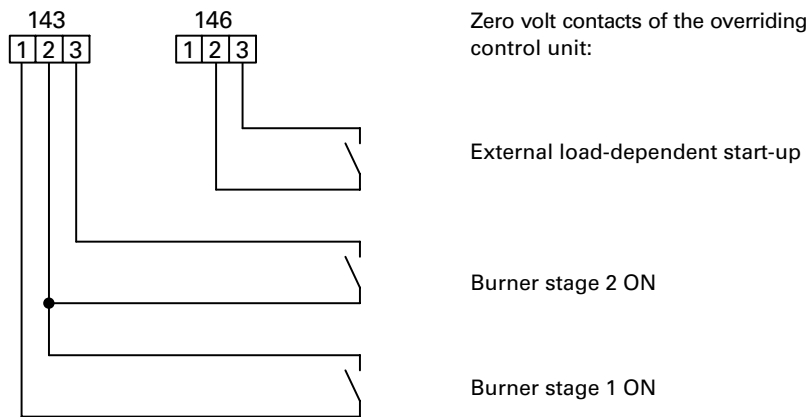
The Vitotrans 222 heat exchanger set is controlled by Vitotronic 333.

3.4 Installation notes

3.4 Installation notes

Connection of an on-site control unit to Vitotronic 100 (type GC1) in single boiler systems

Operation with a two-stage burner



Necessary changeover inside Vitotronic 100 (see service instructions):

Code 01 set to 1 (as delivered condition)

The cylinder thermostat is activated when the cylinder temperature sensor is connected. The boiler water temperature must be set to the lower value.

Settings on Vitotronic 100

The high limit safety cut-out adjustment and further settings can be made in accordance with the system requirements.

High limit safety cut-out	110 °C	100 °C
Control thermostat	100 °C	87 °C
Coding for the electronic maximum temperature limiter of Vitotronic 100 Code 06 set to	95 °C	85 °C
Maximum temperature of the on-site control unit	90 °C	80 °C

External start-up depending on load

The burner of the boiler is started up, subject to load, when the zero volt contact between terminals 2 and 3 at plug-in connector **146** closes. The boiler will be constantly operated at the set temperature.

The boiler water temperature is limited via the maximum set boiler water temperature or the mechanical thermostat. The set value is adjusted via code 9B.

Burner stage 1 start:

Contact at terminals 1 and 2 of plug-in connector **143**

Contact closed:
Burner stage 1 is switched ON. Burner stage 2 is only switched ON for maintaining the minimum temperature. The boiler water temperature is limited by the electronic maximum temperature limiter (see Vitotronic 100 service instructions), if it is set below that of mechanical control thermostat \odot .

Contact open:
Burner stage 1 is switched OFF.

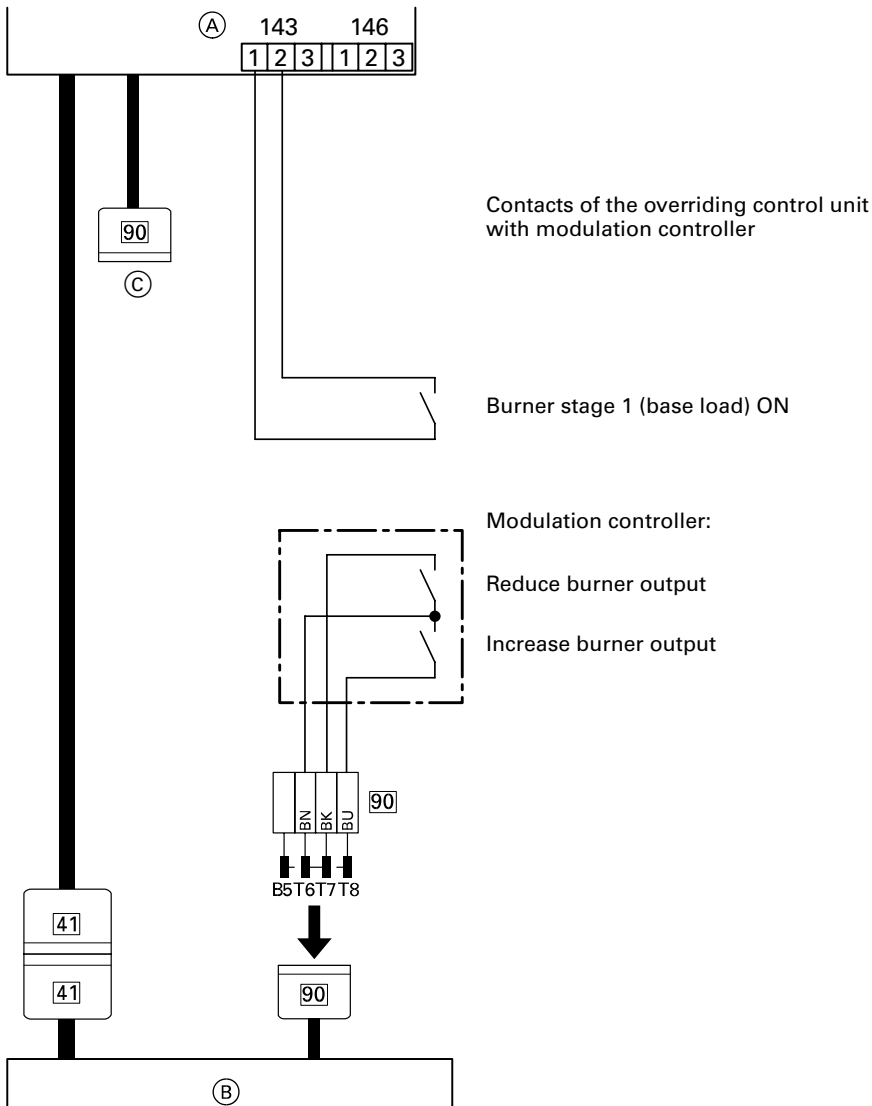
Burner stages 1 and 2 start:

Contact at terminals 2 and 3 of plug-in connector **143**

Contact closed:
Both burner stages are switched ON. The boiler water temperature is limited by the electronic maximum temperature limiter, if it is set below that of mechanical control thermostat \odot . Burner stage 2 is switched OFF 2 K sooner.

Contact open:
Burner stages 1 and 2 are switched OFF.

Operation with a modulating burner fitted to Vitocrossal 300 (on-site modulation controller) in single boiler systems



- Connection modulating burner:
- Burner stage 1 [41] of Vitotronic 100
 - Plug-in connector [90] of Vitotronic 100 remains unused
 - Burner stage 2 [90] modulating under the control of the on-site modulation controller
 - Burner stage 1 is enabled by the modulation controller via external demand [146].

Code 01 set to 1 (as delivered condition)

The cylinder thermostat is activated when the cylinder temperature sensor is connected.

The boiler water temperature must be set to the lower value.

- (A) Vitotronic 100
- (B) Burner control
- (C) Unused

Burner stage 1 start:

Contact at terminals 1 and 2 of plug-in connector [143]

Contact closed:

Burner stage 1 is switched ON. The boiler water temperature is limited by the electronic maximum temperature limiter (see Vitotronic 100 service instructions), if it is set below that of mechanical control thermostat (C).

Contact open:

Burner stage 1 is switched OFF.

Settings on Vitotronic 100

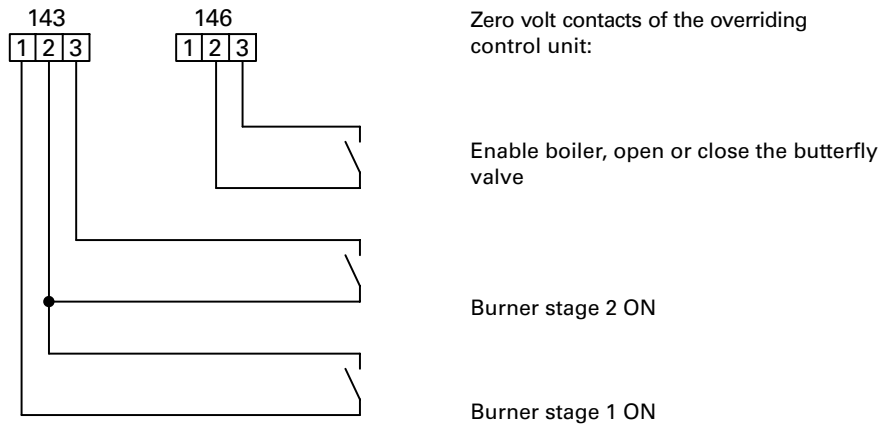
The high limit safety cut-out adjustment and further settings can be made in accordance with the system requirements.

High limit safety cut-out	110 °C	100 °C
Control thermostat	100 °C	87 °C
Coding for the electronic maximum temperature limiter of Vitotronic 100 Code 06 set to	95 °C	85 °C
Maximum temperature of the on-site control unit	90 °C	80 °C

3.4 Installation notes

Connection of an on-site control unit to Vitotronic 100 (type GC1) in multi-boiler systems

Operation with a two-stage burner



Necessary changeover inside

Vitotronic 100 (see service instructions):

Change code 01 to 3

The connections on plug-in connectors **143** and **146** are required when connecting an external control unit. The DHW cylinder temperature and the load-dependent cascade control must be controlled by an external control unit.

Please note

An enable boiler contact is compulsory for multi-boiler systems. This contact **must** always be closed on the lead boiler.

Settings on Vitotronic 100

The high limit safety cut-out adjustment and further settings can be made in accordance with the system requirements.

High limit safety cut-out	110 °C	100 °C
Control thermostat	100 °C	87 °C
Coding for the electronic maximum temperature limiter of Vitotronic 100 Code 06 set to	95 °C	85 °C
Maximum temperature of the on-site control unit	90 °C	80 °C

Enable boiler, butterfly valve:

Contact at terminals 2 and 3 of plug-in connector **146**

Contact closed:

- Vitocrossal 300:
The butterfly valve opens.
- Low temperature boiler:
Initially, the pre-heat function for lag boilers is activated (see Vitotronic 100 service instructions).
After the preheat function has expired, the boiler minimum temperature will be maintained, and the burner stages can be controlled externally. The butterfly valve opens.

Contact opened:

The butterfly valve is closed after approx. 5 minutes (see Vitotronic 100 service instructions).
Burner stages cannot be switched ON externally; a minimum temperature will not be maintained.

Burner stage 1 start:

Contact at terminals 1 and 2 of plug-in connector **143**

Contact closed:

Burner stage 1 is switched ON.
Burner stage 2 is switched ON only for maintaining the minimum temperature (only low temperature boilers).
The boiler water temperature is limited by the electronic maximum temperature limiter (see Vitotronic 100 service instructions), if it is set below that of mechanical control thermostat \odot .

Contact open:

Burner stage 1 is switched OFF.

Burner stages 1 and 2 start:

Contact at terminals 2 and 3 of plug-in connector **143**

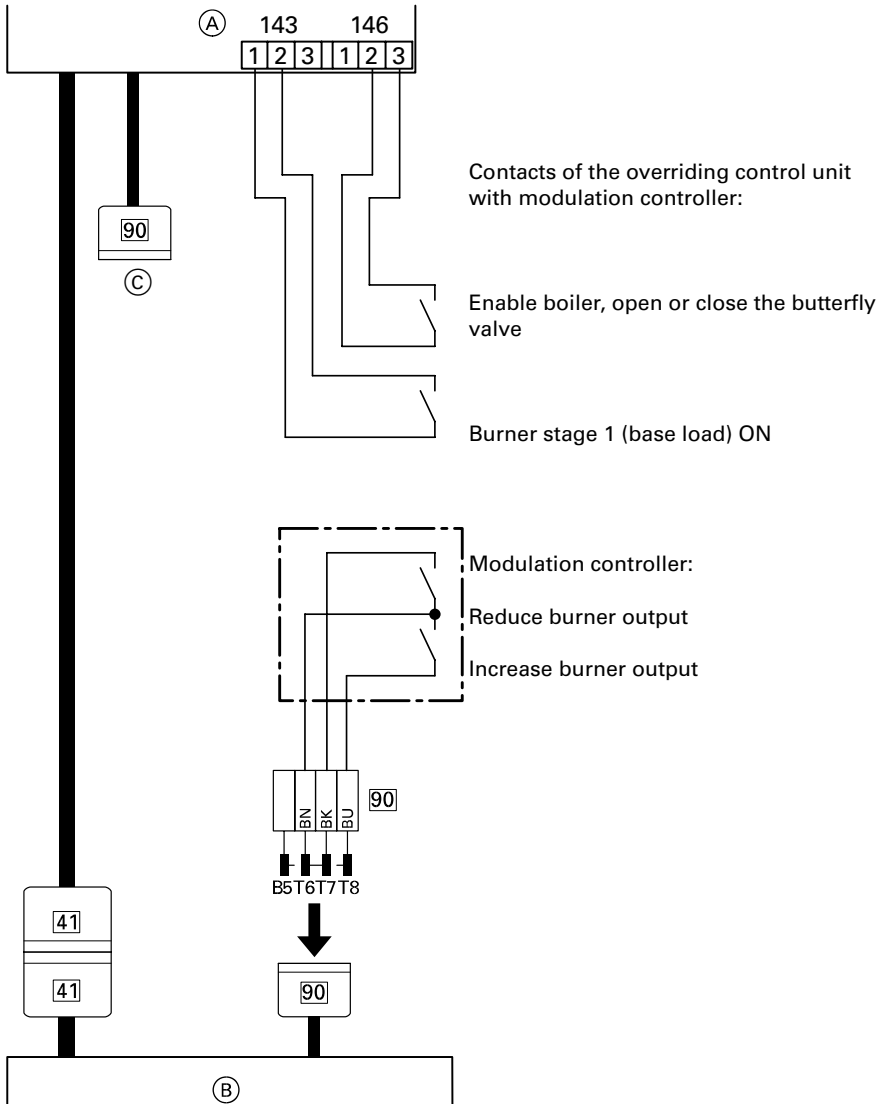
Contact closed:

Both burner stages are switched ON. The boiler water temperature is limited by the electronic maximum temperature limiter, if it is set below that of mechanical control thermostat \odot . Burner stage 2 is switched OFF 2 K sooner.

Contact open:

Burner stages 1 and 2 are switched OFF.

Operation with a modulating burner fitted to Vitocrossal 300 (on-site modulation controller) in multi boiler systems



- (A) Vitotronic 100
- (B) Burner control
- (C) Unused

Connection modulating burner:

- Burner stage 1 [41] of Vitotronic 100
- Plug-in connector [90] of Vitotronic 100 remains unused
- Burner stage 2 [90] modulating under the control of the on-site modulation controller
- Burner stage 1 is enabled by the modulation controller via external demand [146].

Necessary changeover inside Vitotronic 100 (see service instructions):

Change code 01 to 3.

The connections on plug-in connectors [143] and [146] are required when connecting an external control unit. The DHW cylinder temperature and the load-dependent cascade control must be controlled by an external control unit.

Please note

*An enable boiler contact is compulsory for multi-boiler systems. This contact **must** always be closed on the lead boiler.*

Enable boiler, butterfly valve:

Contact at terminals 2 and 3 of plug-in connector [146]

Contact closed:
The burner can be externally switched. The butterfly valve opens.

Contact open:
The butterfly valve is closed after approx. 5 minutes (see Vitotronic 100 service instructions).

Burner stages cannot be externally switched ON.

Burner stage 1 start:

Contact at terminals 1 and 2 of plug-in connector [143]

Contact closed:
Burner stage 1 is switched ON. The boiler water temperature is limited by the electronic maximum temperature limiter (see Vitotronic 100 service instructions), if it is set below that of mechanical control thermostat \odot .

Contact open:
Burner stage 1 is switched OFF.

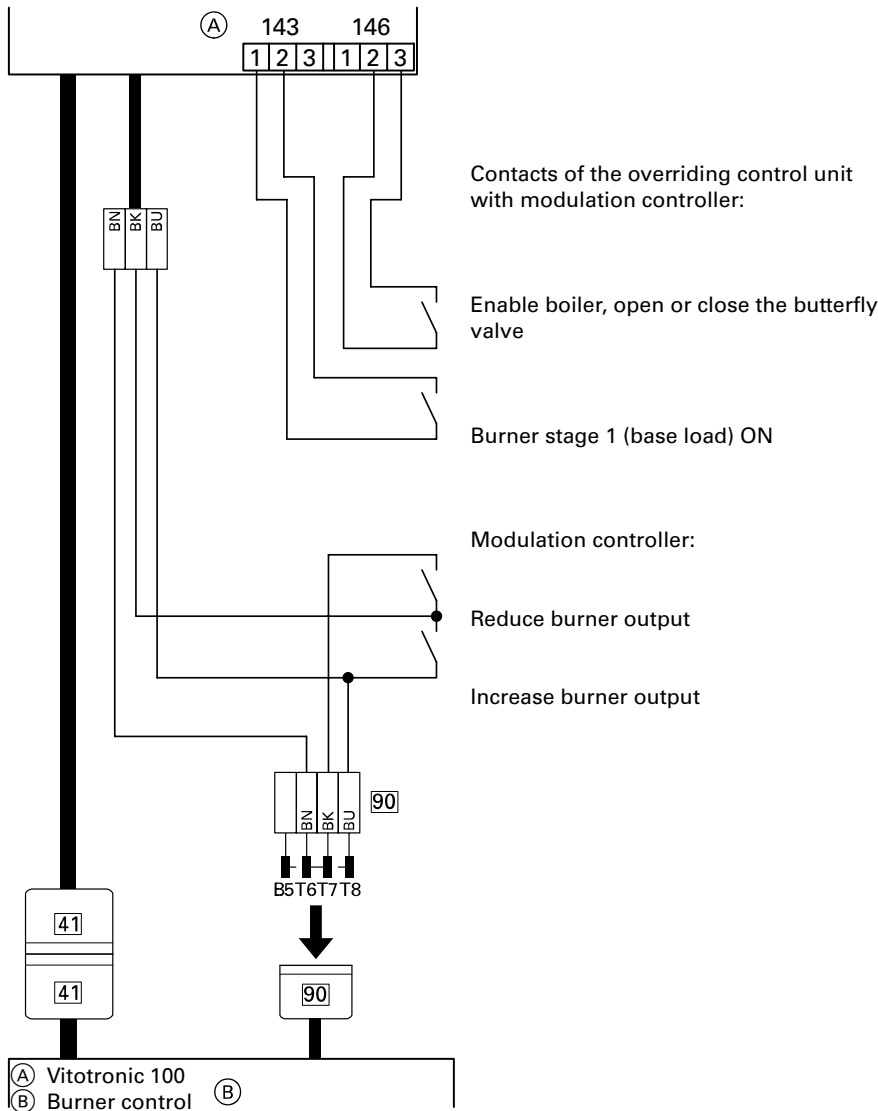
Settings on Vitotronic 100

The high limit safety cut-out adjustment and further settings can be made in accordance with the system requirements.

High limit safety cut-out	110 °C	100 °C
Control thermostat	100 °C	87 °C
Coding for the electronic maximum temperature limiter of Vitotronic 100 Code 06 set to	95 °C	85 °C
Maximum temperature of the on-site control unit	90 °C	80 °C

3.4 Installation notes

Operation with a modulating burner fitted to a low temperature boiler (on-site modulation controller) in multi-boiler systems



Connection modulating burner:

- Burner stage 1 [41] of Vitotronic 100
- Plug-in connector [90] from Vitotronic 100 via the modulation controller (on site) to burner plug-in connector [90].
- Set the minimum temperature at the overriding control unit with modulation controller 5 K higher than the lower boiler water temperature (see operating conditions in the boiler datasheet).

Necessary changeover inside Vitotronic 100 (see service instructions):

Change code 01 to 3.
Code 02: 1 must remain set as is.

The connections on plug-in connectors [143] and [146] are required when connecting an external control unit. The DHW cylinder temperature and the load-dependent cascade control must be controlled by an external control unit.

Please note

An enable boiler contact is compulsory for multi-boiler systems. This contact **must** always be closed on the lead boiler.

Enable boiler, butterfly valve:

Contact at terminals 2 and 3 of plug-in connector [146]

Contact closed:

Initially, the pre-heat function for lag boilers is activated (see Vitotronic 100 service instructions). After the pre-heat function has expired, the boiler minimum temperature will be maintained, and the burner stages can be controlled externally.

Contact open:

The butterfly valve is closed after approx. 5 minutes (see Vitotronic 100 service instructions). Burner stages cannot be switched ON externally; a minimum temperature will not be maintained.

Burner stage 1 start:

Contact at terminals 1 and 2 of plug-in connector [143]

Contact closed:

Burner stage 1 is switched ON. The full load is switched ON only for maintaining the minimum temperature. The boiler water temperature is limited by the electronic maximum temperature limiter (see Vitotronic 100 service instructions), if it is set below that of mechanical control thermostat \odot .

Contact open:

Burner stage 1 is switched OFF.

Settings on Vitotronic 100

The high limit safety cut-out adjustment and further settings can be made in accordance with the system requirements.

High limit safety cut-out	110 °C	100 °C
Control thermostat	100 °C	87 °C
Coding for the electronic maximum temperature limiter of Vitotronic 100 Code 06 set to	95 °C	85 °C
Maximum temperature of the on-site control unit	90 °C	80 °C

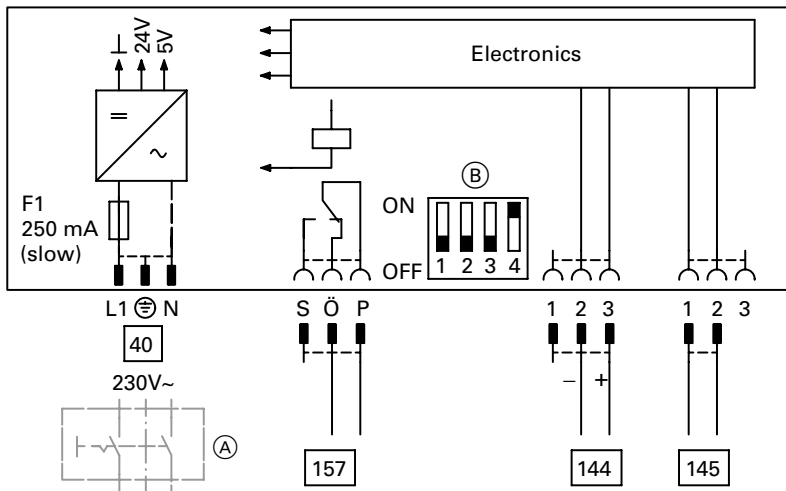
Connection of the function extension 0 – 10 V and additional functions

Function extension 0 – 10 V

- to control a feed pump
- with switching contact to signal reduced operation and regulate a heating circuit pump to a lower speed.

Use of the function extension for Vitotronic control units from software version 7 with the serial number stated in the installation instructions

Electrical connections



- 40** Mains power connection
- 144** 0 - 10 V input
- 145** KM BUS
- 157** Zero volt contact for switching the
 - heating circuit pump to a lower speed in reduced mode or
 - feed pump, e.g. to a substation
- A** Mains electrical isolator (if required)
- B** DIP switch (see below)

Functions

Function	Vitotronic				DIP switch (see above)
	100	200/300	333	050	
Defaulting an additional set boiler water temperature via 0 – 10 V input 144 (see page 56)	x	x	x	–	4 : ON 10 to 100 °C 4 : OFF 30 to 120 °C
Defaulting an additional set boiler water temperature and boiler enable in multi-boiler systems via 0 – 10 V input 144 (see page 56)	x	–	–	–	
Night contact (signalling reduced operation and switching the heating circuit pump to a lower speed) via zero volt contact 157 (see page 57)	–	x	x	x	1 : ON System circuit A1/ Mixer circuit M1 2 : ON Mixer circuit M2 3 : ON Mixer circuit M3 Note Set only one switch to ON.
Switching a feed pump via zero volt contact 157 (see page 57)	–	–	–	x	1 to 3 : OFF

3.4 Installation notes

Default additional set value (plug 144)

Single boiler system with	Function	Preconditions
Vitotronic 200 and 300	Demand from the Vitotronic control operation, 0-10 V hook-up actuates additional set value	—
Vitotronic 100	Demands to the boiler in accordance with the set operating mode and set temperature; 0-10 V hook-up actuates additional set value	Code 01 : 1

Multi-boiler system with Vitotronic 333	Function	Preconditions
Vitotronic 100 with Vitotronic 333 cascade control unit	Demand from the Vitotronic control operation, 0-10 V hook-up actuates additional set value	Code 01 : 2 at Vitotronic 100
Connecting the function extension to Vitotronic 333		

Multi-boiler system with external cascade	Function	Preconditions
Vitotronic 100 with enable command via 0-10 V signal	Boiler control via 0-10-V hook-up:	Code 01 : 3 at Vitotronic 100
Connecting the function extension to Vitotronic 100	<ul style="list-style-type: none"> ■ 0 to 1 V <ul style="list-style-type: none"> – Boiler blocked – Butterfly valve closed – Boiler circuit or shunt pump OFF ■ 1 to 10 V <ul style="list-style-type: none"> – Boiler temperature default – Boiler enabled; boiler is held to minimum temperature – Butterfly valve open – Boiler circuit or shunt pump enabled 	<p>Note On the lead boiler the voltage must be 1 V higher.</p>
Vitotronic 100 with 0-10 V signal and enable via switching output 146	The boiler is enabled; the minimum temperature is maintained	Code 01 : 3 at Vitotronic 100
Connecting the function extension to Vitotronic 100	1-10 V additional temperature default	Contact at terminals 2 and 3 of plug 146 closed
		<p>Note This contact must always be closed on the lead boiler.</p>

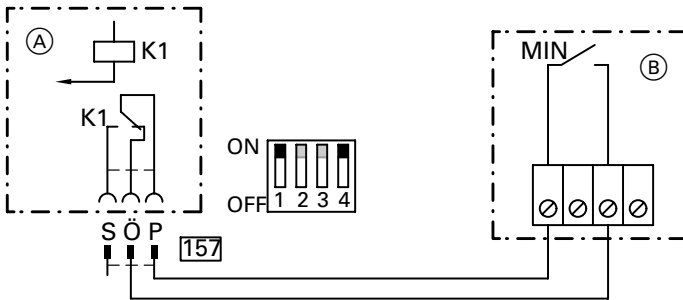
Switching output 157

The output **optionally** switches

- the heating circuit pump to a lower speed in **reduced mode**
or
- a feed pump, if there is a demand from a heating circuit or the DHW cylinder of Vitotronic 050.
- Rated current: 8(4) A~

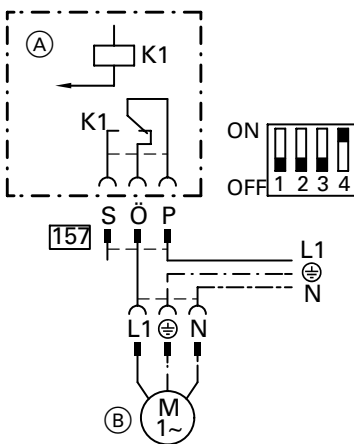
The function of the switching output is determined via the **DIP switches** (see also page 55).

Heating circuit pump connection



- (A) Function extension
- (B) Heating circuit pump

Feed pump connection



- (A) Function extension
- (B) Feed pump

3.4 Installation notes

Optional connections to Vitotronic 200, 300 and 333

External start-up depending on load

By closing the zero volt contact between terminals 2 and 3 at plug-in connector [146](#), the boiler burner and possibly the burners of further boilers (in the case of Vitotronic 333) may be switched ON subject to load.

The boiler water temperature is limited via the maximum set boiler water temperature or via the mechanical thermostat.
The set value is adjusted via coding 9B.

External blocking or mixer close

The burner is shut down or the mixers closed by closing the zero volt contact between terminals 2 and 3 at plug-in connector [143](#).

The boiler is excluded from the sequential control, the associated pumps are switched OFF and the shut-off equipment is closed.

Note


The frost protection of the relevant boiler or heating circuit is no longer effective during the controlled shutdown or when the mixer closes. A lower boiler water temperature or the flow temperature will no longer be maintained.






You can pre-select via code 99, to which circuit input [143](#) applies. Closing the external blocking contact on Vitotronic 333 and codes 99: 8 to 99:15 blocks all boilers.

Code 99	Burner OFF	Heating circuit 1 (mixer circuit M1)	Heating circuit 2 (mixer circuit M2)	Heating circuit 3 (mixer circuit M3)
0				
1		x		
2			x	
3		x	x	
4				x
5		x		x
6			x	x
7		x	x	x
8	x			
9	x	x		
10	x		x	
11	x	x	x	
12	x			x
13	x	x		x
14	x		x	x
15	x	x	x	x

External changeover of heating program/mixer open

Also applicable to Vitotronic 050

The manually pre-selected heating program can be changed or the connected mixers can be opened via the zero volt switching contact at plug-in connector  between terminals 1 and 2.

Manually pre-selected heating program (heating program with open contact)		Code 2 enables a changeover after	↔	Changed heating program Changes can be made in all listed heating programs (heating program with closed contact)
	Central heating OFF/DHW OFF	D5 : 0 (as delivered condition)	↔	 Central heating OFF/DHW ON
	Central heating OFF/DHW ON	D5 : 1	↔	-----  Central heating constantly ON/DHW ON
	Central heating ON/DHW ON			

Code 91 enables the external heating program changeover to be allocated to individual heating circuits:

Code 91	Heating circuit 1 (mixer circuit M1 or directly connected heating circuit A1)	Heating circuit 2 (mixer circuit M2)	Heating circuit 3 (mixer circuit M3)
0			
1	x		
2		x	
3	x	x	
4			x
5	x		x
6		x	x
7	x	x	x

External mixer open

Code 9A enables the external function mixer open to be allocated to individual heating circuits:

Code 9A	Heating circuit 1 (mixer circuit M1)	Heating circuit 2 (mixer circuit M2)	Heating circuit 3 (mixer circuit M3)
0			
1	x		
2		x	
3	x	x	
4			x
5	x		x
6		x	x
7	x	x	x

3.4 Installation notes

External changeover of stepped/modulating burners

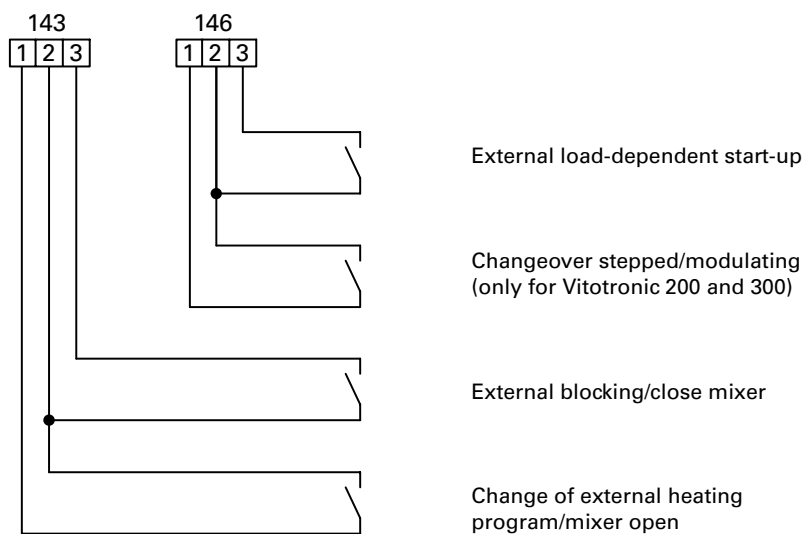
Connect the zero volt contact at terminals 1 and 2 of plug-in connector 146.

Contact open: mod. operation,
Contact closed: two-stage operation
In code 1, set the burner type to modulating (code 02: 2).

Note
When scanning the burner version, modulation appears even after an external changeover (no rewriting).

External connections to Vitotronic 200, 300 or 333

The connection is made on site via terminals 1 and 2 of plug-in connector 146.



Optional connections to Vitotronic 100 (type GC1) when operating in conjunction with Vitotronic 333 (type MW1 or MW1S)

Block boiler

Connect the zero volt contact at terminals 1 and 2 of plug-in connector 143.

Contact closed:

The boiler is blocked. It is taken out of the boiler sequence, i.e. the butterfly valve or the three-way mixing valve for constant return temperature control is closed, and the shunt or boiler circuit pumps are switched OFF. The other boilers must provide the required heating.

⚠ Safety instruction

The heating system is no longer protected against frost if all boilers are blocked or there are no other boilers on standby.

Contact open:

The boiler is reinstated into the current boiler sequence.

Start boiler as the last one in the boiler sequence

Connect the zero volt contact at terminals 2 and 3 of plug-in connector 143.

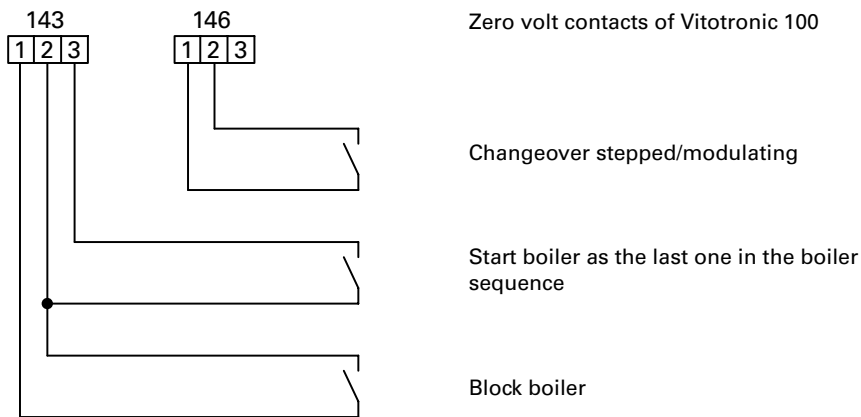
Contact closed:

The boiler is started as the last one in the boiler sequence. The heating system is being supplied by the other boilers. This boiler is started if the other boilers do not provide sufficient heat.

Contact open:

The boiler is reinstated into the current boiler sequence.

External connections to Vitotronic 100 (type GC1) when operating in conjunction with Vitotronic 333 (type MW1 or MW1S)



Plug-in adaptor for external safety equipment

Several additional pieces of safety equipment may be connected:

- Low water indicator
- Minimum pressure limiter
- Maximum pressure limiter
- Additional high limit safety cut-out and three external fault messages (e.g. pump or neutralising system).

The plug-in adaptor enables faults to be displayed at the respective control unit and the transfer via communication equipment to mobile phones, fax or a control centre. The respective fault can be displayed in plain text.

3.5 On-site control equipment via LON BUS

3.5 Hook-up of on-site control equipment via LON BUS

Vitotronic control units are equipped with an open standard interface, i.e. the LON BUS (Local Operating Network). This universal, decentralised network for automated building control systems not only allows communication between Vitotronic control units, but also the hook-up of on-site systems and equipment by various manufacturers.

It enables, for example, individual room control units or building management systems to be directly connected to Vitotronic control units. Further modifications, expansions and maintenance work can be carried out at any time with the system in operation.

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