Installation and Service Instructions

for use by engineers and heating contractors

Vitoflex 300-RF 150, 220, 300, 400 and 540
Wood-fired Boiler
Output range: RF 150 154 - 512 MBH (45- 150 kW)
RF 220 205 - 751 MBH (60- 220 kW)
RF 300 273 - 1024 MBH (80- 300 kW)
RF 400 341 - 1365 MBH (100- 400 kW)
RF 540 478 - 1843 MBH (140- 540W kW)

Vitoflex 300-RF

IMPORTANT

Please ensure that these instructions are read and understood before commencing installation and start-up. Failure to comply with these Installation Instructions will render all warranties null and void.

Working on the equipment

The installation, adjustment, service and maintenance of this product must be performed by a licensed professional heating contractor, who is qualified and experienced in the installation, service and maintenance of hot water heating boilers. There are no user serviceable parts on the boiler or control.
Ensure main power supply to equipment, the heating system and all external controls has been deactivated.

Take precautions in all instances to avoid accidental activation of power during service work.

Improper installation, service or maintenance can cause product/property damage, severe personal injury, and/or loss of life.

Product may not be exactly as shown

IMPORTANT

Read and save these instructions for future reference.

Safety, Installation and Warranty Requirements

Please ensure that these instructions are read and understood before commencing installation and service. Failure to comply with the instructions listed below and details printed in this manual can cause product/property damage, severe personal injury, and/or loss of life. Ensure all requirements below are understood and fulfilled (including detailed information found in manual subsections).

- **Product documentation**
  Read all applicable documentation before commencing installation. Store documentation near boiler in a readily accessible location for reference in the future by service personnel.

  ▶*For a listing of applicable literature, please see section entitled "Important Regulatory and Safety Requirements".*

- **Warranty**
  Information contained in this and related product documentation must be read and followed. Failure to do so renders the warranty null and void.

- **Licensed professional heating contractor**
  The installation, adjustment, service and maintenance of this equipment must be performed by a licensed professional heating contractor.

  ▶*Please see section entitled "Important Regulatory and Installation Requirements".*

- **Contaminated air**
  Air contaminated by chemicals can cause by-products in the combustion process, which are poisonous to inhabitants and destructive to Viessmann equipment.

  ▶*For a listing of chemicals which cannot be stored in or near the boiler room, please see subsection entitled "Mechanical Room".*

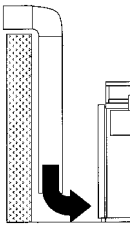
- **Advice to owner**
  Once the installation work is complete, the heating contractor must familiarize the system operator/ ultimate owner with all equipment, as well as safety precautions/requirements, shutdown procedure, and the need for professional service. Refer to the Service and Maintenance Instructions for details.

- **Carbon monoxide**
  Improper installation, adjustment, service and/or maintenance can cause flue products to flow into living space. Flue products contain poisonous carbon monoxide gas.

  ▶*For information pertaining to the proper installation, adjustment, service and maintenance of this equipment to avoid formation of carbon monoxide, refer to the "Safety" section.*

- **Fresh air**
  This equipment requires fresh air for safe operation and must be installed ensuring provisions for adequate combustion and ventilation air exist.

  ▶*For information pertaining to the fresh air requirements of this product, refer to the"Combustion Air Supply" section.*

- **Equipment venting**
  Never operate boiler without an installed venting system. An improper venting system can cause carbon monoxide poisoning.

  ▶*For information pertaining to venting and chimney requirements, refer to the "Safety" section. All products of combustion must be safely vented to the outdoors.*

⚠ WARNING

Installers must follow local regulations with respect to installation of carbon monoxide detectors. Follow manufacturer's maintenance schedule of the boiler contained in the "Service and Maintenance Instructions".

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About These Instructions

Take note of all symbols and notations intended to draw attention to potential hazards or important product information. These include "WARNING", "CAUTION", and "IMPORTANT". See below.

WARNING

Warnings draw your attention to the presence of potential hazards or important product information.

▶ Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial product/property damage.

CAUTION

Cautions draw your attention to the presence of potential hazards or important product information.

▶ Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or product / property damage.

IMPORTANT

▶ Helpful hints for installation, operation or maintenance which pertain to the product.

▶

▶ This symbol indicates to note additional information

▶ This symbol indicates that other instructions must be referenced.

Note: Viessmann Manufacturing Company Inc. reserves the right to make product changes or updates without notice and will not be held liable for typographical errors or omissions in the product literature.

Page

Mechanical *(continued)*

Electrical

Operation

Important Regulatory and Installation Requirements

Take note of all symbols and notations intended to draw attention to potential hazards or important product information. These include "WARNING", "CAUTION", and "IMPORTANT".

Codes

The installation of this unit shall be in accordance with local codes. In the absence of local codes, use: B365-10, Installation Code for Solid-Fuel Burning Appliances and Equipment.

All electrical wiring is to be done in accordance with the latest edition of CSA C22.1 Part 1 and/or local codes. In the U.S. use the National Electrical Code ANSI/NFPA 70 where required by the authority having jurisdiction.

Mechanical room

Ensure the mechanical room complies with the requirements listed in this manual. See section entitled Mechanical Room.

Working on the equipment

The installation, adjustment, service, and maintenance of this boiler must be done by a licensed professional heating contractor who is qualified and experienced in the installation, service, and maintenance of hot water boilers. There are no user serviceable parts on the boiler, or control.

Ensure main power supply to equipment, the heating system, and all external controls have been deactivated. Take precautions to avoid accidental activation of power during service work.

Technical literature

Literature applicable to all aspects of the Vitoflex 300-RF wood-fired boiler:

- Installation and Operating Instructions
- Service and Maintenance Instructions
- Field Wiring Diagram

▶ *Please carefully read this manual prior to attempting installation. Any warranty is null and void if these instructions are not followed.*

For information regarding other Viessmann System Technology componentry, please reference documentation of the respective product.

We offer frequent installation and service seminars to familiarize our partners with our products. Please inquire.

▶ *The completeness and functionality of field supplied electrical controls and components must be verified by the heating contractor. These include low-water cut-offs, flow switches (if used), staging controls, pumps, motorized valves, air vents, thermostats, etc.*

▶ *Leave all literature at the installation site and advise the system operator/ultimate owner where the literature can be found. Contact Viessmann for additional copies.*

▶ *This product comes with several safety instruction labels attached.*
Do not remove!
Contact Viessmann immediately if replacement labels are required.

Product Information

Viessmann solid-fuel boiler may only be installed and serviced by trained personnel.

Steel wood-fired hot water heating boiler.

For operation primarily with modulating boiler water temperatures in closed loop forced circulation hot water heating systems. Under certain conditions, open loop systems may also be considered. Contact Viessmann for details.

Maximum allowable working pressure (water)...30 or 60 psi

Maximum water temperature.....250°F (120°C) (closed loop)

Maximum boiler temperature.....210°F (99°C) (open loop)

This boiler does not require a flow switch.

⚠ WARNING

Exposing the boiler to pressures and temperatures in excess of those listed will result in damages and will render the warranty null and void.

Codes and standards

CSA B366.1-M91
Solid Fuel Fired Central Heating Appliances

CSA C22.2 NO. 3-M1988 (latest edition)
Electrical Features of Fuel Burning Equipment

UL2523
Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters and Boilers

CSA B365-10
Installation Code for Solid Fuel Burning Appliances and Equipment

ASME section IV boilers and pressure vessels

Boiler Description

Description

The Vitoflex 300-RF Rotating Combustion System (patent no: EP 0 905 442 B1) was developed for automatic combustion wood, pellets and wood chips to max. 35% moister content, see section "Wood Fuel Requirements". The Vitoflex 300-RF Rotating Combustion System is characterized by high efficiencies and perfect combustion at all load levels.
The Vitoflex 300-RF Boiler Plant has been built to ASME Sec. IV and has CRN for Canada. It is tested and approved to the applicable CSA / UL safety standards.

Function:

- The in-feed auger conveys the wood fuel diagonally from below into the combustion chamber. The holding devices for the back-burn sensor and the thermal extinguishing valve are situated on the in-feed auger. Above the in-feed auger, there is a metering container with a light barrier to ascertain the level of the fuel insulating layer required.
- The wood fuel is ignited automatically by an electric heat gun, at the time of the boiler start. The gasification of the fuel is carried out on a feed grate moved by a worm-geared motor. The ash falls in an ash bin below. An automatic de-ashing system is optional. The combustion chamber is heavily insulated and lined with fire clay refractory elements.
- The combustion gases rising from the combustion chamber are swept up by the rotary secondary airflow brought to bear from the rotary blower and burned out completely in the round heat exchanger. The thermal energy from the combustion gases is transmitted to the boiler water in horizontal heat exchanger tubes. The heat exchanger is heavily insulated and provided with excellent access through the boiler door in the front.
- A flue gas re-circulation system reduces the temperature in the combustion chamber while maintaining the highest possible degree of efficiency. This increases the service life of the un-cooled refractory elements in the gasification zone. With the basic setting, the ratio of re-circulated gas to fresh air is precisely adjusted according to the amount of wood fuel that is burned. A mechanical adjustable damper provides a constant ratio of the quantity of re-circulated gas to fresh air over the entire output range.
- The flue gas blower is specially designed for wood heating operation and is very quiet. The motor has a solid, heat resistant design with a heat dissipation hub and is spring supported. The blower casing has a round intake port and a round blowout nozzle. Installation is possible on the top, side or rear of the flue gas collector within 360° rotation.

Supplied with:

- Boiler with rotary heat exchanger including supply and return temperature sensors
- Combustion chamber with moving grate and light barriers for ember monitoring
- Automatic igniter
- In-feed auger including insulating layer, safety end switch for maintenance lid, back-burn temperature sensor, extinguisher valve with strainer, extinguisher water container with mounting bracket
- Set of displacement rods
- Flue gas re-circulation system
- Flue gas blower including flue gas temperature sensor and oxygen sensor
- Draft damper for installation in the flue gas pipe
- Boiler cleaning tools for the combustion chamber and heat exchanger
- Installation fittings including pressure relief valve, drain valve, low water cut off, fixed high limit, temperature and pressure gauges

Customer supplied:

- Counter flanges for the boiler supply and return
- Piping to the mixing valve, boiler pump and hot water storage tank
- Piping for the safety heat exchanger
- Wiring to the control panel
- Separate electrical circuit for pneumatic cleaning system air compressor, when used.

Accessories for Vitoflex 300-RF Rotating Combustion System:

- Flue gas cyclone 24 USG (90 L)
- Metal mesh filter
- Automatic de-ashing system in bin, 63 USG (240 L)
- Automatic de-ashing in bin, 211 USG (800 L)
- Automatic de-ashing in base container
- Pneumatic cleaning system
- Operating pressure 30 or 60 psi
- Two-stage in-feed auger
- Insulation for flue gas re-circulation line
- Thermal safety flush valve
- Slide valve / Rotary valve
- Boiler pump and boiler 3-way mixing valve
- Ecotronic control system options:
  - 3 sensor hot water storage tank management system
  - External control module for field supplied extraction system
  - Output module / Input module
  - Input module 0-10V
  - ModBus
  - BacNet gateway
  - Visualization

Transport and Installation

IMPORTANT

Precautions must be taken to avoid accidents and injury during the transportation of the boiler.
Only hoist the boiler when it is entirely empty of water, fuel and ash.

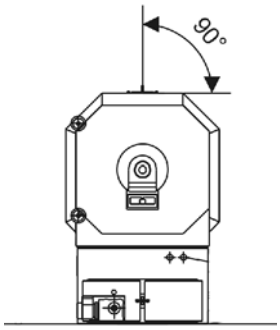
Lifting

A number of lifting lugs will be provided on each boiler and heat exchanger where lifting gear may be attached. A tie bar is required to lift the boiler by the boiler supply and boiler return flanges.

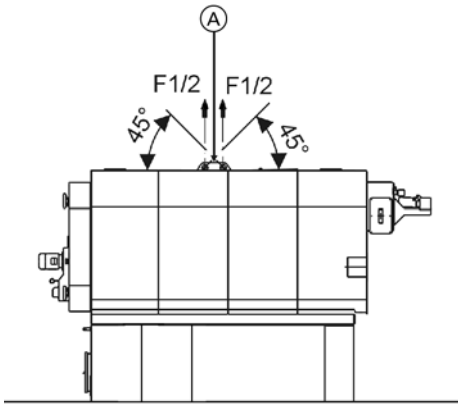
Minimum clearances to walls for installation and maintenance work must be observed. Anti-vibration boiler supports may be used if anti-vibration measures are required.

Vitoflex 300-RF 150 - 300:
Hoist by the lifting lug.

Vitoflex 300-RF 400 - 540:
Hoist by boiler supply and boiler return flanges using a lifting lug.



Ⓐ Lifting lugs



⚠ WARNING

Follow instructions for proper installation.
For wood-fired installations:
This wood-fired boiler must be installed in accordance with local codes if any; if not, follow B 365-10, Installation Code for Solid-Fuel Burning Appliances and Equipment.

Delivery Condition

Standard delivery condition

The standard delivery condition of the Vitoflex 300-RF boiler includes pre-assembled components as well as components that need to be assembled by the contractor in the field.

Components that are attached to the boiler at time of delivery:

- The heat exchanger is mounted to the combustion chamber
- Boiler is fully bricked
- Boiler door is mounted to the heat exchanger including secondary air rotating blower
- Primary air vents are attached to the combustion chamber
- Flue gas collector is attached to the heat exchanger
- Pneumatic cleaning system (optional) is attached to the flue gas collector

Components that are not attached or installed to the boiler at time of delivery (scope of the contractor):

- Electrical components which include temperature sensors, oxygen sensor, light barriers for the combustion chamber, igniter, low water cut off, fixed high limit, and light barriers for the complete extraction system
- All wiring to the control cabinet
- Installation fittings which include pressure relief valve, drain valve, temperature and pressure gauges
- Drive for the combustion chamber grate is detached
- De-ashing system (optional) and drive for the de-ashing system
- Air compressor (optional) and connection to the pneumatic cleaning system (optional)
- The flue gas exhaust blower is not attached to the flue gas collector
- Re-circulation system and insulation (optional)
- Flue gas cyclone (optional) comes in two pieces
- The in-feed auger is detached from the combustion chamber
- Fire extinguishing system for the in-feed auger
- Slide valve (optional) or rotary valve (optional)
- All components of the extraction system (optional), welding for flanges and support legs required
- Glass fiber insulation between any auger connections

Measurements for the fire box as standard delivery condition

Boiler model	RF 150	RF 220	RF 300	RF 400	RF 540
Minimum size door	47¼ in. x 78¾ in. (1200 mm x 2000 mm)	59 in. x 88½ in. (1500 mm x 2250 mm)	59 in. x 88½ in. (1500 mm x 2250 mm)	70¾ in. x 98½ in. (1800 mm x 2500 mm)	70¾ in. x 98½ in. (1800 mm x 2500 mm)
Minimum ceiling opening (W x H)	47¼ in. x 112¼ in. (1200 mm x 2850 mm)	59 in. x 112¼ in. (1500 mm x 2850 mm)	59 in. x 126 in. (1500 mm x 3200 mm)	70¾ in. x 130 in. (1800 mm x 3300 mm)	70¾ in. x 137¾ in. (1800 mm x 3500 mm)
Minimum ceiling opening including pneumatic cleaning system	47¼ in. x 128 in. (1200 mm x 3250 mm)	59 in. x 128 in. (1500 mm x 3250 mm)	59 in. x 141¾ in. (1500 mm x 3600 mm)	70¾ in. x 145¾ in. (1800 mm x 3700 mm)	70¾ in. x 153½ in. (1800 mm x 3900 mm)

Delivery Condition *(continued)*

Special delivery condition (partially disbanded)

For special circumstances like restricted space to bring the boiler into the heating room, the size of the boiler can be reduced by detaching additional components to the ones as described in section “Standard delivery condition”. The assembly of these components require additional assembly time of approximately 6 hours.

The following additional objects will be delivered disbanded:

- The heat exchanger and the combustion chamber are separate
- No brickwork inside the heat exchanger and combustion chamber
- No insulation and panels are attached to the combustion chamber

Measurements of the largest part for reduced boiler size

Boiler model	RF 150	RF 220	RF 300	RF 400	RF 540
Minimum size door	35½ in. x 49¼ in. (900 mm x 1250 mm)	46 in. x 61 in. (1170 mm x 1550 mm)	46 in. x 61 in. (1170 mm x 1550 mm)	55 in. x 67 in. (1400 mm x 1700 mm)	55 in. x 67 in. (1400 mm x 1700 mm)
Minimum ceiling opening (W x H)	39¼ in. x 102¼ in. (1000 mm x 2600 mm)	49¼ in. x 103¼ in. (1250 mm x 2620 mm)	49¼ in. x 118 in. (1250 mm x 3000 mm)	59 in. x 122 in. (1500 mm x 3100 mm)	59 in. x 130 in. (1500 mm x 3300 mm)

Special delivery condition (fully disbanded)

For special circumstances like heavily restricted space to bring the boiler into the heating room, the size of the boiler can be reduced by detaching additional components to the ones as described in section “Standard delivery condition” and “Special delivery condition partially disbanded”. The assembly of these components require welding and additional assembly time of approximately 20 hours.

The following additional objects will be delivered disbanded:

- The heat exchanger is a separate piece
- The flue gas collector is detached from the heat exchanger
- The boiler door is detached from the heat exchanger (welding required)

Measurements of the largest part for reduced boiler size

Boiler model	RF 150	RF 220	RF 300	RF 400	RF 540
Minimum size door	35½ in. x 49¼ in. (900 mm x 1250 mm)	46 in. x 59 in. (1170 mm x 1500 mm)	46 in. x 59 in. (1170 mm x 1500 mm)	55 in. x 67 in. (1400 mm x 1700 mm)	55 in. x 67 in. (1400 mm x 1700 mm)
Minimum ceiling opening (W x H)	39¼ in. x 85 in. (1000 mm x 2160 mm)	49¼ in. x 85¾ in. (1250 mm x 2180 mm)	49¼ in. x 98¾ in. (1250 mm x 2510 mm)	59 in. x 96½ in. (1500 mm x 2450 mm)	59 in. x 110 in. (1500 mm x 2800 mm)

Wood Fuel Requirements

The Vitoflex 300-RF is only suitable for burning fuels listed in this section.

A prerequisite for approval is of a fuel by Viessmann is the approval for the fuel by the responsible public authorities.

Warranty claims for Viessmann Biomass boilers are excluded if the following fuel conditions are not met.

IMPORTANT

If different fuels are used, Viessmann will not assume any liability for the functioning or service life of the boiler plant. Refer to the "Warranty" section in the General Terms and Conditions of Delivery.

- **Burn wood only**
- **Do not use chemicals or fluids to start fire.**
- **Do not burn garbage, gasoline, naphtha, engine oil, or other inappropriate materials.**

Allowed fuels

- Forest wood and plantation wood (complete untreated trees and trunk wood):
  Mature wood from trunks and branches, untreated, chopped to chips
- Compressed wood, pellets conforming to standards, as per CAN/CSA-B366.1-M91, size P1, P2, P4.

Untreated wood with limited bark content, compressed by machine and calibrated

Fuel	Minimal Diameter	Maximal Diameter
P1 - Pellets Small	---	⅜ in. (10 mm)
P2 - Pellets Medium	⅜ in. (10 mm)	¾ in. (20 mm)
P4 - Briquettes (Pellets Large)	¾ in. (20 mm)	2½ in. (60 mm)

- Wood with an increased proportion of bark, tree cuttings from roadside trees (untreated):
  Wood remnants from the forestry and sawmill industries or from landscape conservation (likelihood of elevated ash content).
- Remnants from derived timber products:
  Usually a mixture of untreated and treated wood in the form of shavings from processing machinery and chips from choppers.
- Used wood:
  This is untreated wood that has been used prior to its energetic utilization (e.g. pallets). It is reduced in size by shredders for thermal utilization. The metal parts have to be removed by magnetic separators.

Size of Wood Chips as per CAN/CSA-B366.1-M91, Grade C7

Total mass 100%			G 30 Fine	G 50 Medium
Coarse percentage max. 20%	Max. cross-section	in^2 (cm^2)	½ (3)	¾ (5)
	Max. length	in. (cm)	3⅓ (8.5)	4¾ (12)
	Coarse sieve nominal mesh width	in. (mm)	⅝ (16)	1¼ (31.5)
Main percentage 60 to 100%	Medium sieve nominal mesh width	in. (mm)	⅛ (2.8)	¼ (5.6)
Percentage of fines (incl. ultrafine content) max. 20%	Fine sieve nominal mesh width	in. (mm)	1/25 (1)	1/25 (1)

CAUTION

Chips have to pass through a 1 in. (25 mm) sieve, additionally, a fraction of max. 5% of the fuel with a cross-section of max. ¾ in^2 (500 mm^2) up to a length of max. 6¼ in. (160 mm) can be tolerated.

Size of briquettes:

- Fraction of one-offs. max. 5% with cross-section of max. ¾ $in.^2$ (500 mm^2) up to a length of max. 6¼ in. (160 mm).
- Frayed surface by chopping tools (shredders) or slow-running choppers.
- Briquettes, diameter max. 2⅜ in. (60 mm).

Consequence of overstepping particle size:

- Increased maintenance because of a substantially higher risk of malfunction
- Shortened service life of the conveyor augers and drives

Wood Fuel Requirements *(continued)*

Maximum water content

The maximum allowable water content of the fuel for Vitoflex 300-RF systems is limited to 35%.
The water content impacts the maximum boiler output.

Non-wood fuels

Non-wood fuels, even if consisting of biomass, such as needles, foliage, grain, straw, fruit pits, etc., are unsuited as fuel for boiler operation and may not be used.

Limitation super fines & dust [wood particles smaller than 1/32 in. (1.0 mm)]

Max. 10.0% of the total mass; if fuel does not comply with this limit the following process may occur:
- Temperature peaks
- Slag formation
- Even higher temperature
- This process leads to damage by overheating and can affect refractory materials.

Elevated values are especially critical for remnant wood in combination with elevated values of Chlorine and Sulphur.

Suitable fuel types for Vitoflex 300-RF systems

- Bulk density (**S**) in kg/m³ [lb/ft³], water content (**W**) in %, size C1, C7, P1, P2, P4 as per CAN/CSA-B366.1-M91.

Note: Fuel for Vitoflex 300-RF systems allow for a max. of 35% water content (**W**).

Saw dust

Fuel code	**Bulk Density** kg/m³ [lb/ft³]	Water content %	Fuel Size	Description
a	**S**130 [8.1]	**W**10 to **W**20	C1	Sawdust, untreated (planing shop)
b1	**S**200 [12.5]	**W**20 to **W**35	C1	Sawdust, untreated (sawmill)
c2	**S**250 [15.6]	**W**35 to **W**50	C1	Sawdust, untreated (sawmill)

Wood chips

Fuel code	**Bulk Density** kg/m³ [lb/ft³]	Water content %	Fuel Size	Description
b2	**S**200 [12.5]	**W**20	C7	Forest wood chips, soft, untreated
c1	**S**250 [15.6]	**W**20 to **W**35	C7	Forest wood chips, soft, untreated
d1	**S**300 [18.7]	**W**20 to **W**35	C7	Forest wood chips, soft/hard, untreated
d2	**S**300 [18.7]	**W**35 to **W**50	C7	Forest wood chips, soft, untreated
e1	**S**350 [21.8]	**W**20 to **W**35	C7	Forest wood chips, hard, untreated
e2	**S**350 [21.8]	**W**35 to **W**50	C7	Forest wood chips, soft/hard, untreated
f1	**S**400 [24.9]	**W**35 to **W**50	C7	Forest wood chips, hard, untreated

Shavings and chips

Fuel code	**Bulk Density** kg/m³ [lb/ft³]	Water content %	Fuel Size	Description
g	**S**130 [8.1]	Less than **W**15	C7	Shavings & chips from wood remnants, dry, mixed
h	**S**200 [12.5]	Less than **W**15	C7	Shavings & chips from wood remnants, dry, mixed
i	**S**250 [15.6]	Less than **W**15	C7	Shavings & chips from wood remnants, dry, mixed

Pellets and briquettes

Fuel code	**Bulk Density** kg/m³ [lb/ft³]	Water content %	Fuel Size	Description
j	**S**350 [21.8]	Less than **W**15	P4	Briquettes from wood remnants ¾ in. (20 mm) to max. 2 in. (60 mm)
k1	**S**650 [40.6]	Less than **W**10	P1	untreated up to ⅜ in. (10 mm)
k2	**S**650 [40.6]	Less than **W**10	P2	untreated ⅜ in. to ¾ in. (11 mm to 20 mm)

Note: For size of wood chips, see page 12.

Wood Fuel Requirements *(continued)*

Content limits for non-combustible substances

- No wood fuels may contain any foreign bodies, such as pieces of metal, stones, masonry remnants or plastics.

The following limits (per lb/kg of dry fuel) of contained non-combustible substances apply [ash analyzed at a temperature of 1500°F (815°C)]:

Substance	Limit	Comparative value untreated forest wood
Chlorine (Cl)	max. 300 ppm (300 mg/kg)	10 ppm (10 mg/kg)
Sulphur (S)	max. 1000 ppm (1000 mg/kg)	120 ppm (120 mg/kg)
Total Cl, S	max. 1000 ppm (1000 mg/kg)	130 ppm (130 mg/kg)
Ash content, total	max. 0.25 oz/lb (15.0 g/kg)	0.08 oz/lb (5.0 g/kg)
Alkali oxides in the ash (K2O and Na2O)	max. 0.016 oz/lb (1.0 g/kg)	0.006 oz/lb (0.35 g/kg)
Sintering point of the ash	min. 1800°F (1000°C)	approx. 2200°F (1200°C)

If fuel does not comply with these limits, there is a risk of corrosion within the heat exchanger and early sintering and melting of the ash which leads to:

- Shortened life of the heat exchanger
- Increased maintenance costs (firing, boiler door)

The maintenance instructions need to be complied with in order to avoid a process, which will increasingly cause damage to the boiler.

If maintenance instructions are not complied with the following process may occur:

- Cinders change the airflow
- Temperature peaks
- More slag is produced
- More cinder builds up and changes the airflow more

This process leads to damage by overheating and may affect refractory materials.

Additives in remnant and used wood have to be free of heavy metals and halogen compounds.

Other information

- Ash and cleaning:
  Untreated wood without bark produces less than 0.5% ash of the fuel mass supplied. All the specifications regarding cleaning are based on untreated wood with bark attached with an ash amount of 0.8% of the fuel mass. If the ash content is higher and/or the ash melting point is lower, increased maintenance and/or cleaning are required.
- Changing fuels:
  A substantial change in fuel quality, such as bulk density, water content, dust proportion or ash content might require a manual correction of the firing parameters (see Operating section).

Carbon Monoxide

The U.S. Consumer Product Safety Commission strongly recommends the installation of carbon monoxide detectors in buildings in which wood-burning equipment is installed. Carbon monoxide (CO) is a colorless, odorless gas, which may be produced during incomplete combustion of fuel and/or when the flame does not receive an adequate supply of combustion air. Carbon monoxide can cause severe personal injury or loss of life.

Therefore, carbon monoxide detectors that are in compliance with a nationally recognized standard (e.g. ANSI/UL 2034-2002, CSA 6.19-01) should be installed and maintained in buildings that contain wood-burning equipment.

Note: Viessmann does not test any detectors and makes no representation regarding any brand or type of detector.

For Safe operation

We recommend that you frequently:

- Check for debris which could obstruct the flow of flue gases. The vent or chimney must not be blocked. A blocked or partially blocked vent or chimney can cause flue gases to leak into the structure. Flue gases leaking into the house can cause injury or death. Blocked or partially blocked chimneys must have the blockage removed by a qualified heating contractor.
- Check the pressure gage for correct system (water) pressure. Check for water on the floor from the discharge pipe of the pressure relief valve or any other pipe, pipe joint, valve or air vent.
- Check for moisture, water, or appearance of rust on the flue gas pipes, their joints as well as vent dampers, or side wall vent terminals (if so equipped).
- Ensure that nothing is obstructing the flow of combustion and ventilation air and no chemicals, garbage, gasoline, combustible materials, flammable vapors and liquids are stored (not even temporarily) in the vicinity of the boiler.
- DO NOT allow unsupervised children near the boiler.

Service/inspection of the boiler and the system must be performed on a regular basis. Maintenance, service and cleaning are specified in the “Service and Maintenance Instructions”.

Before the heating season begins, it is recommended that the boiler be serviced by a qualified heating contractor.

WARNING

As there are no user-serviceable parts on the boiler, or control, the end-user must not perform service activities of any kind on system components. Failure to heed this warning can cause property damage, severe personal injury, or loss of life.

WARNING

Improper installation, adjustment, service, or maintenance can cause flue products to flow into living space. Flue products contain poisonous carbon monoxide gas, which can cause nausea or asphyxiation resulting in severe personal injury or loss of life.

WARNING

The operator/ultimate owner is required to have the heating boiler and controls checked, as a minimum once per year, by the original installer or by a competent heating contractor familiar with the equipment. Defects must be corrected immediately.

CAUTION

Do not use this boiler if any part has been under water. Immediately call a qualified heating contractor to inspect the boiler and to replace any part of the control system which has been under water.

Hazardous Material

Fiberglass wool and ceramic fiber materials

⚠ WARNING

Inhaling of fiberglass wool and/or ceramic fiber materials is a possible cancer hazard. These materials can also cause respiratory, skin and eye irritation.

The state of California has listed the airborne fibers of these materials as a possible cancer hazard through inhalation. When handling these materials, special care must be applied.

⚠ WARNING

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause serious injury or loss of life and which are known to the State of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

First aid measures

- If eye contact occurs, flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- If skin contact occurs, wash affected areas gently with soap and warm water after handling.

Suppliers of ceramic fiber products recommend the following first aid measures

- Respiratory tract (nose and throat) irritation:
  If respiratory tract irritation develops, move the person to a dust free location.
- Eye irritation:
  If eyes become irritated, flush immediately with large amounts of lukewarm water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes.
- Skin irritation:
  If skin becomes irritated, remove soiled clothing. Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful.
- Gastrointestinal irritation:
  If gastrointestinal tract irritation develops, move the person to a dust free environment.

Suppliers of fiberglass wool products recommend the following precautions be taken when handling these materials

- Avoid breathing fiberglass dust and contact with skin and eyes.
- Use NIOSH approved dust/mist respirator.
- Wear long-sleeved, loose fitting clothing, gloves and eye protection.
- Wash work clothes separately from other clothing. Rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out and spraying may generate airborne fiber concentration requiring additional protection.

Power Failure Provision

Customers must ensure that there is a supply of water independent of the electrical supply. This design ensures that in case of a power failure, the boiler will be reliably cooled by the thermal safety flush valve.

Backup power supply or backup generator is highly recommended to ensure continious operation in the event of power failure.

Venting Requirements

The Vitoflex 300-RF Rotating Combustion system is equipped with a flue gas exhaust blower.

This boiler must be properly vented. Use a vent material certified for use with solid-fuel fired equipment.

This boiler shall be connected to:

a) a masonry chimney conforming to local regulations or, in the absence of such regulations, to the requirements of the National Building Code.

b) a certified factory-built chimney (refer to the NFPA 211 standard).

A flue pipe serving this boiler shall be constructed of steel or other suitable material with a melting point of not less than 2000°F (1100°C).

IMPORTANT

Do not use galvanized steel.

For installations in Canada:

The boiler venting system must be tested and listed by a Nationally Recognized Testing Lab such as ULC/CSA for solid fuel burning appliances.

The Vitoflex 300-RF rotating combustion system is output-controlled within a range from 30%-100% of the rated boiler output. This produces flue gas temperatures from min. 212°F (100°C) to max. 482°F (250°C).

An insulated chimney should be provided to prevent sooting, condensation and creosote formation.

The distance from the flue gas exhaust blower to the chimney should be as short as possible. 90° elbows should be avoided if possible. Flue gas pipes of more than 3 ft. (1 m) in length must be insulated.

The connection to the chimney should be made such that it rises at an angle of 30°- 45° (to prevent excess ash accumulating in the lateral section of the vent pipe).

The flue gas line, including the lead-in into the chimney, must be gas-tight.

Mechanical Room

Ensure the mechanical room complies with the requirements in these instructions.

Viessmann recommends the installation of an additional electrical disconnect switch and a fuel shut-off valve (if possible) outside the mechanical room or enclosed area of installation.

A separate, dry heating room must always be provided for the Vitoflex 300-RF rotating combustion system. No combustible materials may be stored in the heating room. The heating boiler may only be set up on a fire and temperature resistant floor.

No temperature-sensitive pipes or lines may be installed in the floor beneath the heating boiler.

The temperature in the heating room must not exceed 104°F (40°C) while the system is in operation (in the area approx. 3 ft. (1 m) away from the boiler).

The temperature in the heating room must not fall below 50°F (10°C) while the system is in operation (measured at the inner side of exterior walls).

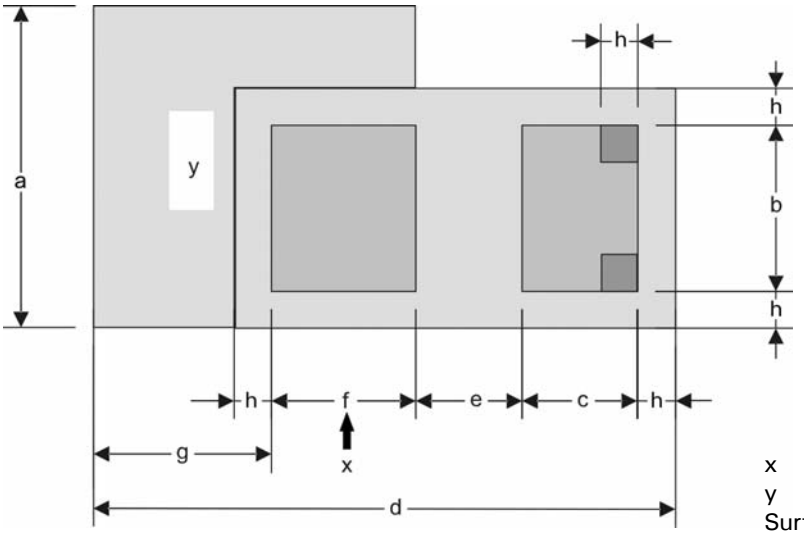
The load-bearing capacity of the heating room floor must be designed for the weight of the system plus filling with water and fuel. The load-bearing capacity of the floor in the area of the boiler bearing surface must be 512 lb/ft² (2500 kg/m²).

IMPORTANT

Always follow the most up-to-date local, municipal and building regulations and codes.

The minimum distance to the walls and ceiling required according to the table of dimensions for proper cleaning and maintenance of the boiler must be complied with.

A sufficient supply of fresh air must be provided directly from outdoors into the heating room. Induced ventilation is necessary for heating rooms that are confined or enclosed.



x Fuel feed to the boiler
y Heat-resistant floor
Surface medium grey Boiler supporting surface

Foundation dimensions

Boiler model RF-		150	220	300	400	540
a	in. (mm)	61 13/16 (1570)	80 11/16 (2050)	80 11/16 (2050	96 7/8 (2460)	96 7/8 (2460)
b	in. (mm)	34 1/4 (870)	45 1/4 (1150)	45 1/4 (1150)	54 3/4 (1390)	54 3/4 (1390)
c	in. (mm)	24 3/8 (620)	26 3/4 (680)	26 3/4 (680)	31 1/2 (800)	31 1/2 (800)
d	in. (mm)	112 3/16 (2850)	123 1/4 (3130)	142 1/4 (3613)	147 1/8 (3738)	161 1/2 (4103)
e	in. (mm)	20 1/2 (520)	20 1/2 (520)	28 1/2 (723)	17 5/8 (448)	21 3/8 (543)
f	in. (mm)	29 1/8 (740)	29 1/8 (740)	34 5/8 (880)	37 13/16 (960)	43 11/16 (1095)
g	in. (mm)	34 1/4 (870)	45 1/4 (1150)	45 1/4 (1150)	54 3/4 (1390)	54 3/4 (1390)
h	in. (mm)	9 7/8 (250)	9 7/8 (250)	9 7/8 (250)	9 7/8 (250)	9 7/8 (250)

Mechanical Room *(continued)*

⚠ WARNING

Incorrect ambient conditions can lead to damage to the heating system and put safe operation at risk.

Mechanical room conditions

Prevent the air from becoming contaminated by homogenate hydrocarbons (e.g. as contained in paints solvents or cleaning fluids) and excessive dust (e.g. through grinding or polishing work. Combustion air for the heating process, and ventilation of the boiler room must be free of corrosive contaminants. To that end, any boiler must be installed in an area that has no chemical exposure.

For the main, currently known sources refer to “sources of combustion and ventilation air contaminants”.

Avoid continuously high levels of humidity (e.g. through frequent drying of laundry).

Never close existing ventilation openings.

⚠ WARNING

The boiler must not be located in areas or rooms where chemicals are stored, or aggressive vapors (i.e. bleach, hair spray, methyl chloride, carbon tetrachloride or perchloroethylene) or high dust levels or humidity levels are present. Heat exchanger corrosion might occur and reduce the lifetime of the boiler significantly. If above criteria are not properly observed and boiler damage results, any warranty on the complete boiler and related components will be null and void.

IMPORTANT

Components which are not tested with the heating system may damage the heating system or affect its functions. Installation or replacement may only be carried out be a qualified heating contractor.

Sources of combustion and ventilation air contaminants

Areas likely to contain contaminants:

- New building construction
- Swimming pools
- Remodeling areas, hobby rooms
- Garages with workshops
- Furniture refinishing areas
- Dry cleaning/laundry areas and establishments
- Auto body shops
- Refrigeration repair shops
- Metal fabrication plants
- Plastic manufacturing plants
- Photo processing plants
- Beauty salons

Products containing contaminants:

- Chlorine-type bleaches, detergents and cleaning solvents found in household laundry rooms
- Paint and varnish removers
- Hydrochloric acid, muriatic acid
- Chlorine-based swimming pool chemicals
- Spray cans containing chlorofluorocarbons
- Chlorinated waxes and cleaners
- Cements and glues
- Refrigerant leaks
- Calcium chloride used for thawing
- Sodium chloride used for water softening salt
- Permanent wave solutions
- Adhesives used to fasten building products and other similar items
- Antistatic fabric softeners used in clothes dryers

Combustion Air Supply

Codes

Provision for combustion and ventilation air must be made in accordance with applicable local codes.
In the absence of local codes, use:
CSA B365-10, Installation Code for Solid Fuel Burning Appliances and Equipment.
Always use latest edition codes.

⚠ WARNING

Failure to provide an adequate supply of fresh combustion air can cause poisonous flue gases to enter living space. Flue gases entering living space can cause carbon monoxide poisoning which can result in severe personal injury or loss of life.

⚠ WARNING

Never cover the boiler or store debris or other materials near the boiler, or in any way block the flow of adequate fresh air to the boiler. Never cover the combustion air opening. Advise system operator / ultimate owner accordingly.

General

This equipment requires fresh air for safe operation and must be installed ensuring provisions for adequate combustion and ventilation air exist.

Whenever possible, install boiler near an outside wall so that it is easy to duct fresh air directly to the boiler area.

The boiler location must never be under negative pressure. Exhaust blowers, attic blowers, or dryer blowers may cause air to be exhausted at a rate higher than air can enter the structure for safe combustion.

The heating contractor shall ensure all of the following requirements are met:

- An adequate supply of combustion air must be available to ensure proper combustion.
- Ambient air temperatures must be maintained within safe operating limits.
- When a damper is provided in any opening intended to admit combustion air into the room within which the appliance is installed, the damper shall be interlocked to prevent any burner from starting before the damper is fully open.
- Each duct used to convey air from the outdoors shall have:
  1. a cross-sectional area throughout its length at least equal to the free area of the inlet and outlet openings which it connects,
  2. making a provision for outside combustion air, the intake shall not be less than 1 ft. (0.3 m) above the anticipated snow level for the location.
- The heating contractor must check with local authorities (municipal building department) for combustion air requirements particular to the area.

Confined spaces

When a furnace or boiler is enclosed in a space that has a volume less than 20% of that to be heated by the appliance, the space shall:

a) have a permanent opening or openings for natural air circulation with a minimum net free area of 1.5 in² / 1000 Btu/h (3300 mm² / kW) input, and

b) connect to another space or spaces such that the total volume of air available for natural air circulation is at least 30% of the total volume to be heated by the appliance.

The minimum dimension of any opening specified in item (a) shall be no less than 1 in. (25 mm) The lower edge of at least one opening shall be located within 1.5 ft. (0.5 m) of the floor of the enclosed space, and the upper edge of at least one opening shall be located within 1.5 ft. (0.5 m) of the ceiling of the enclosed space.

Note: The intent of this Clause is to allow either one long vertical opening or two shorter horizontal openings, one high and the other low, to allow for air circulation to prevent overheating of the appliance.

Unconfined spaces

Where the boiler is located in an unconfined space in a building having insufficient infiltration, additional air for combustion and ventilation shall be obtained from outdoors or from spaces freely communicating with the outdoors. Under these conditions, permanent opening(s) shall be provided so that the total air received through these openings will be at least as much as would be admitted by openings having a total free area of 1 in² / 5,000 Btu/h or (450 mm² / kWh) of the total input rating of all wood-fired appliances.

Louvers and grilles

In calculating free area as specified, consideration shall be given to the blocking effect of louvers, grilles, or screens that protect openings. Screens shall be no smaller than ¼ in. (6 mm) mesh and shall be readily accessible for cleaning. If the free area through a design of louver or grilles is known, it shall be used in calculating the size of opening required to provide the free area specified. If the design and free area are not known, it shall be assumed that wood louvers have 20 - 25% free area and metal louvers and grilles have 60 - 75% free area.

Negative pressure

Systems, including a combination of exhaust fans and a combination of air fans shall not be installed or controlled to permit the creation of a negative pressure in the boiler room relative to the breaching and flue.

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Technical Data

Boiler model		RF 150	RF 220	RF 300	RF 400	RF 540
Maximum output	MBH (kW)	512 (150)	751 (220)	1024 (300)	1365 (400)	1843 (540)
Minimum output[1]	MBH (kW)	154 (45)	205 (60)	273 (80)	341 (100)	478 (140)
Efficiency	--	85%				
Fuel moisture content[2]	%	W 35				
Size of wood chips[3]	--	G 30 / G 50 as per CAN/CSA-B366. 1-M91				
Flue gas figures						
Connection flue gas pipe ∅ A	in. (mm)	9 7/8 (250)	9 7/8 (250)	11 7/8 (300)	13 7/8 (350)	13 7/8 (350)
Mass flow rate; W5; O_2 6%	lb/s (g/s)	0.18 (80.4)	0.26 (117.9)	0.35 (160.8)	0.47 (214.4)	0.64 (289.44)
Volume flow; W5; O_2 6%; 150°C (302° F)	ft³/s (m³/s)	3.1 (0.09)	4.9 (0.14)	6.7 (0.19)	8.8 (0.25)	12.4 (0.35)
Mass flow rate; W35; O_2 8%;	lb/s (g/s)	0.24 (106.9)	0.35 (156.9)	0.47 (213.9)	0.63 (285.2)	0.85 (385.1)
Volume flow;W35; O_2 8%; 150°C (302° F)	ft³/s (m³/s)	4.2 (0.12)	6.7 (0.19)	8.8 (0.25)	12.0 (0.34)	16.2 (0.46)
Average flue gas temperature at full load[4]	°F (°C)	320 (160)				
Average flue gas temperature at partial load[4]	°F (°C)	266 (130)				
Chimney draft required	Pa	±0				
Electrical connections						
Electrical connections, total	kW	2.67	2.85	3.6	3.98	3.63
Igniter	kW	1.6	1.6	1.6	1.6	1.6
Flue gas exhaust blower	kW	0.55	0.55	0.75	1.1	1.1
Rotary blower	kW	0.12	0.12	0.12	0.12	0.12
In-feed auger	kW	0.37	0.55	1.1	1.1	0.75
Grate drive unit	kW	0.03	0.03	0.03	0.06	0.06
Electric power consumption at full load	kW	1.032	1.108	1.521	1.868	1.753
Electric power consumption at partial load	kW	0.355	0.369	0.434	0.480	0.460
Heating						
Water side resistance (diff. 27°F/15 K)	"wc (mbar)	13 (38)	30 (76)	16 (42)	11 (29)	22 (56)
Boiler water volume	USG (L)	114 (430)	209 (790)	238 (900)	350 (1330)	399 (1510)
Heating surface	ft² (m²)	116.3 (10.8)	172.3 (16.0)	222.9 (20.7)	310.1 (28.8)	424.1 (39.4)
Volume on heating gas side	USG (L)	99 (374)	197 (744)	233 (883)	354 (1340)	426 (1613)
Volume of ash container for grate ash	USG (L)	8 (32)	12 (45)	15 (55)	20 (75)	24 (91)
Volume of ash container for flue gas cyclone	USG (L)	24 (90)				
Test pressure[5]	psi (bar)	60 or 90 (4 or 6)				
Maximum allowable working pressure (water)[5]	psi (bar)	30 or 60 (2 or 4)				
Maximum water temperature	°F (°C)	250 (120)				
Minimum return temperature	°F (°C)	149 (65)				
Weight						
Weight of combustion chamber	lb. (kg)	1049 (477)	1278 (581)	1410 (641)	1712 (778)	2061 (937)
Weight of pressure vessel (30 psi) [6]	lb. (kg)	4885 (2216)	6535 (2964)	7408 (3360)	9764 (4429)	11233 (5095)
Weight of pressure vessel (60 psi) [6]	lb. (kg)	4974 (2256)	6667 (3024)	7452 (3380)	9875 (4479)	11453 (5195)
Weight of displacement rods	lb. (kg)	191 (87)	310 (141)	359 (163)	484 (220)	636 (289)
Weight of flue gas exhaust blower	lb. (kg)	88 (40)	88 (40)	99 (45)	136 (62)	136 (62)
Weight of in-feed auger	lb. (kg)	315 (143)	315 (143)	315 (143)	315 (143)	328 (149)
Total weight without water (30 psi) [7]	lb. (kg)	6532 (2963)	8530 (3869)	9595 (4352)	12416 (5632	14401 (6532)
Total weight without water (60 psi) [7]	lb. (kg)	6620 (3003)	8662 (3929)	9639 (4372)	12527 (5682)	14621 (6632)
Total weight with water (30 psi) [7]	lb. (kg)	7485 (3395)	10280 (4663)	11585 (5255)	15340 (6958)	17730 (8042)
Total weight with water (60 psi) [7]	lb. (kg)	7573 (3435)	10412 (4723)	11629 (5275)	15450 (7008)	17950 (8142)

[1] Minimum load: Operation with modulated control (Infinitely variable power control)
Low load with ON Qmin / OFF (Stop-and-go mode)

[2] Moist fuels: >W35 further limitations regarding output, degree of efficiency and control behavior. >35% MC will limit the output, decrease efficiency and introduce sub optimum control of combustion etc. In addition, the quote for Vitoflex 300 RF is insufficient to allow for complete combustion of fuels in excess of 35% moisture content.

[3] Specification: See section on Wood Fuel Requirements

[4] Flue gas temperature: An increase is possible by removing the displacement rods [Full load 86°F (30°C); Partial load 50°F (10°C)]

[5] Pressure: Per ASME Sec. IV

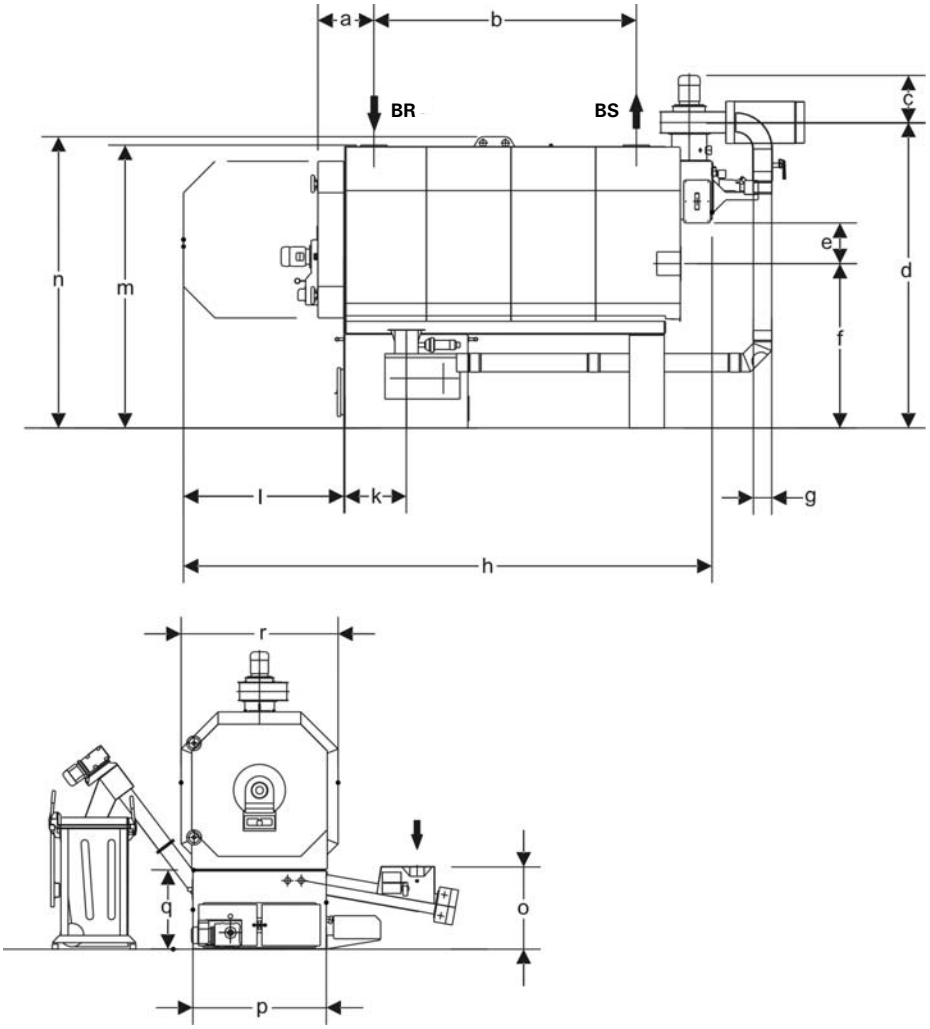
[6] Weight: Includes door and refractory concrete lining

[7] Overall weight: Includes displacement rods

Other influences: Fuel, water content, ash content, pneumatic cleaning system yes/no; track time (number of operating hours without cleaning).
Specifications for the start of the track time [toward the end of the track time there is an increase in the flue gas temperature by approx. 68°F (20°C)]

Boiler Dimensions

BR Boiler Return
BS Boiler Supply



Dimensions

Boiler Model RF-		150	220	300	400	540
a	in. (mm)	15 7/16 (392)	16 (406)	16 (406)	18 3/8 (466)	18 3/8 (466)
b	in. (mm)	60 5/8 (1541)	60 (1525)	73 13/16 (1875)	70 7/8 (1800)	79 15/16 (2030)
c	in. (mm)	14 1/16 (358)	14 1/16 (358)	13 7/8 (352)	14 3/4 (375)	14 3/4 (375)
d	in. (mm)	75 1/8 (1908)	85 3/8 (2168)	86 1/8 (2182)	96 3/4 (2457)	99 1/2 (2527)
e	in. (mm)	11 15/16 (303)	12 7/16 (316)	12 7/16 (316)	12 9/16 (319)	12 9/16 (319)
f	in. (mm)	43 (1093)	46 7/16 (1179)	46 7/16 (1179)	48 (1219)	50 3/8 (1279)
g	in. (mm)	3 (DN 80)	3 (DN 80)	5 (DN 125)	5 (DN 125)	5 (DN 125)
h	in. (mm)	122 13/16 (3120)	134 13/16 (3424)	148 13/16 (3780)	157 5/8 (4004)	166 5/8 (4232)
k	in. (mm)	14 9/16 (370)	14 9/16 (370)	17 5/16 (440)	17 5/16 (440)	24 9/16 (548)
l	in. (mm)	34 1/4 (870)	45 1/4 (1150)	45 1/4 (1150)	54 3/4 (1390)	54 3/4 (1390)
m	in. (mm)	69 1/2 (1765)	79 11/16 (2024)	79 11/16 (2024)	89 1/16 (2262)	91 13/16 (2332)
n	in. (mm)	71 7/8 (1825)	82 1/16 (2084)	82 1/16 (2084)	95 3/8 (2422) ***1**	98 1/8 (2492) ***1**
o	in. (mm)	27 9/16 (700)	27 9/16 (700)	27 9/16 (700)	27 9/16 (700)	29 3/16 (742)
p	in. (mm)	34 1/4 (870)	45 1/4 (1150)	45 1/4 (1150)	54 3/4 (1390)	54 3/4 (1390)
q	in. (mm)	26 1/2 (673)	26 1/2 (673)	26 1/2 (673)	26 1/2 (673)	29 1/2 (750)
r	in. (mm)	41 3/8 (1050)	52 3/8 (1330)	52 3/8 (1330)	61 7/8 (1570)	61 7/8 (1570)

***1** For Vitoflex 300-RF 400/540 - Suspension gear is detachable.

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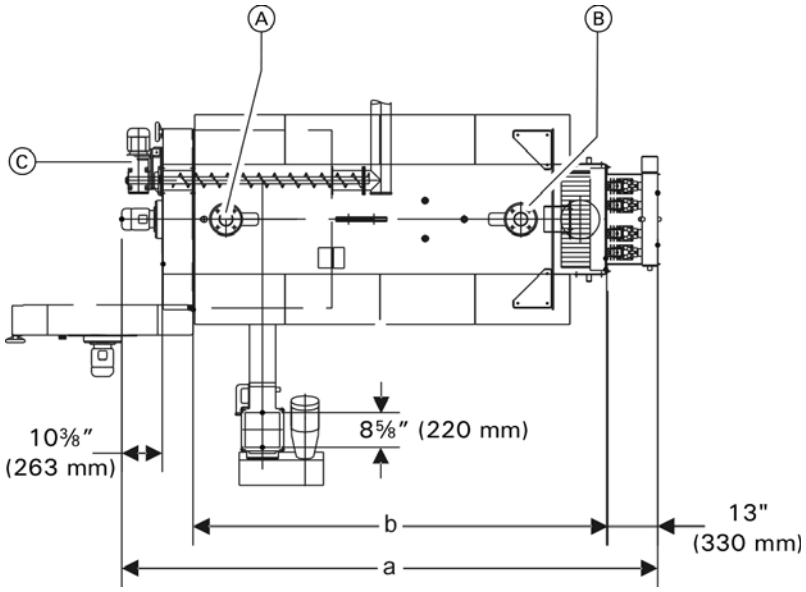
Boiler Dimensions *(continued)*



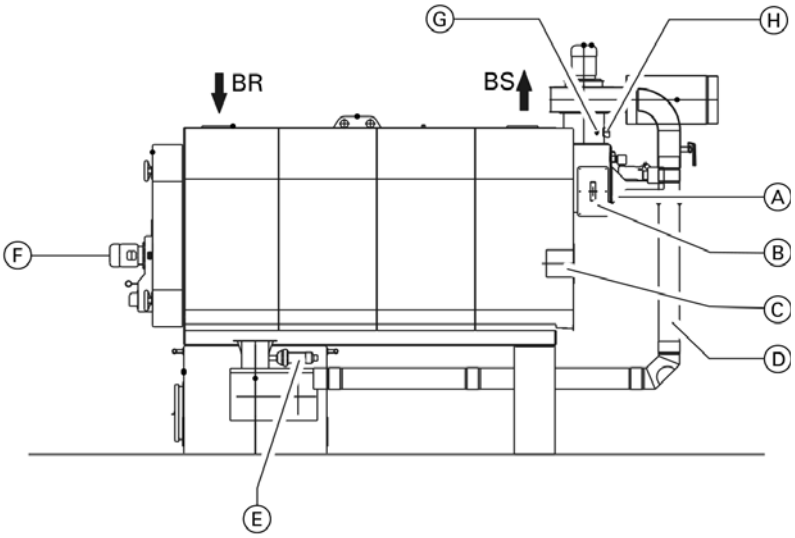
Legend

Ⓐ Boiler Return
Ⓑ Boiler Supply
Ⓒ Automatic de-ashing system (optional)

Dimensions

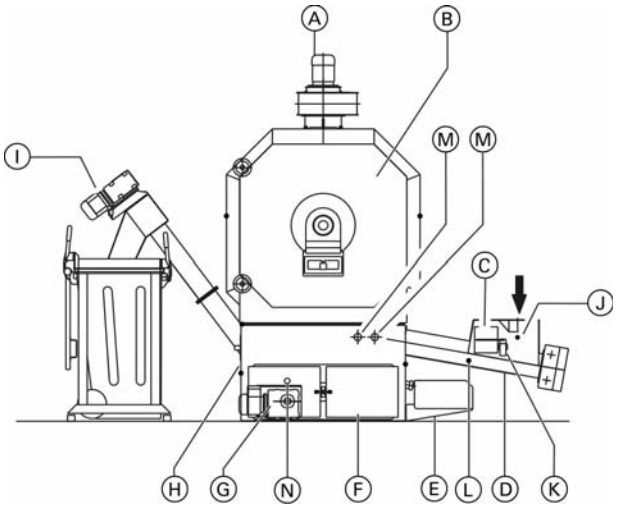
Boiler Model RF-		150	220	300	400	540
a	in. (mm)	119½ (3035)	120½ (3059)	134 7/16 (3415)	136⅛ (3457)	145 1/16 (3685)
b	in. (mm)	88 9/16 (2250)	89½ (2274)	103 9/16 (2630)	102 15/16 (2614)	111 7/16 (2842)

Boiler Components



Legend

Ⓐ Pneumatic cleaning system (optional)
Ⓑ Cleaning cover, flue gas collector, alternate port for the flue gas exhaust blower
Ⓒ Cover with sight glass
Ⓓ Recirculation gas line, line routing variable
Ⓔ Igniter
Ⓕ Rotary blower
Ⓖ Flue gas temperature sensor
Ⓗ Oxygen sensor
BS Boiler Supply
BR Boiler Return



Legend

Ⓐ Flue gas exhaust blower
Ⓑ Boiler door with rotating blower
Ⓒ Extinguishing water connection ¾ in.
Ⓓ In-feed auger
Ⓔ Grate motor
Ⓕ Ash doors of the grate ash container (2 units)
Ⓖ Motor for automatic de-ashing assembly
Ⓗ Fire box
Ⓘ Incline auger for automatic de-ashing assembly
Ⓙ Light barrier for in-feed auger
Ⓚ Limit switch for maintenance cover
Ⓛ Temperature sensor for in-feed auger
Ⓜ Light barrier for ember monitoring (2 locations)
Ⓝ Light barrier for automatic de-ashing system

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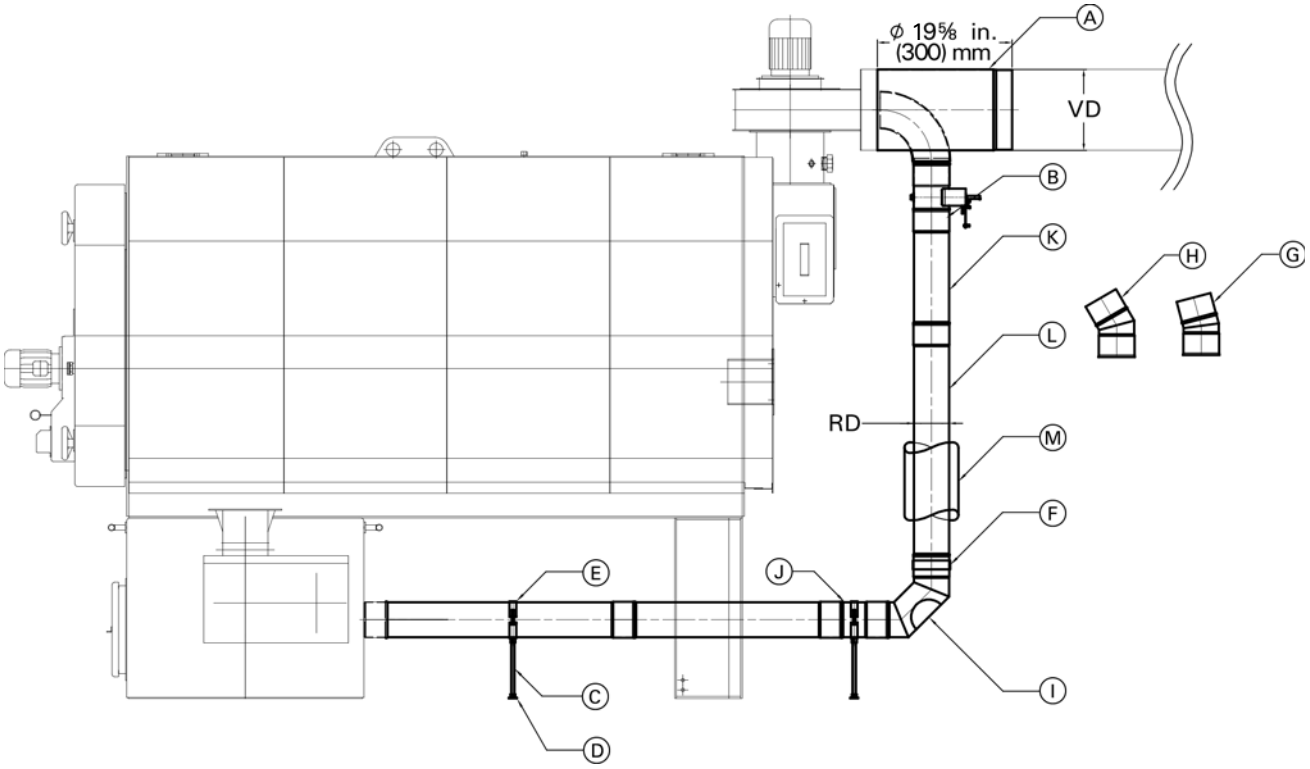
Recirculation System



Legend

Ⓐ Vent piece with recirculation adaptor
Ⓑ Recirculation system damper
Ⓒ Threaded rod M12 39⅜ in. (1000 mm)
Ⓓ Base plate M12 (x4)
Ⓔ Pipe clamp M12 (x4)
Ⓕ Pipe clamp fitting (x16)
Ⓖ Elbow 15° (x2)
Ⓗ Elbow 30° (x2)
Ⓘ Elbow 90° with cleanout (x3)
Ⓙ Pipe 9⅞ in. (250 mm) (x3)
Ⓚ Pipe 19⅝ in. (500 mm) (x3)
Ⓛ Pipe 39⅜ in. (1000 mm) (x3)
Ⓜ Insulation (optional) (x5)

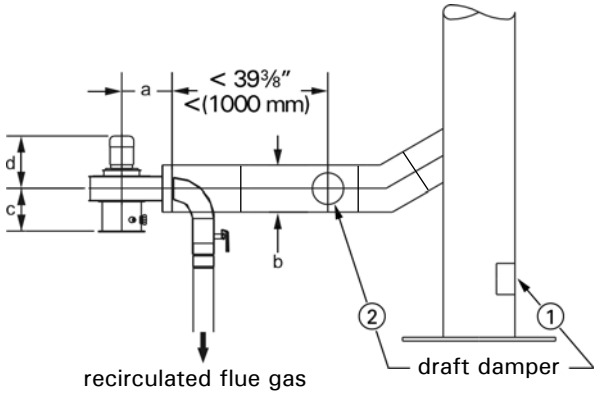
RD Recirculation pipe diameter, for Vitoflex 300-RF 150 and 220 is 3⅛ in. (80 mm), for Vitoflex 300-RF, 400 and 540 is 5⅛ in. (130 mm).

VD Vent pipe diameter, for Vitoflex 300-RF 150 and 220 is 9⅞ in. (250 mm), for Vitoflex 300-RF is 11⅞ in. (300 mm), for Vitoflex 300-RF 400 and 540 is 13⅞ in. (350 mm).

Chimney Connection

It is recommended to install a draft damper in the chimney ①. The draft damper is field supplied.

The optional draft damper can be installed in the flue gas pipe of the biomass boiler ②.
The draft damper should be installed in the flue gas pipe as close as possible to the chimney not closer than 39⅜ in. (1000 mm) to the outlet of the flue gas exhaust blower. The final position has to be arranged with the chimney supplier. The draft damper must be installed in the heating room together with the biomass boiler.



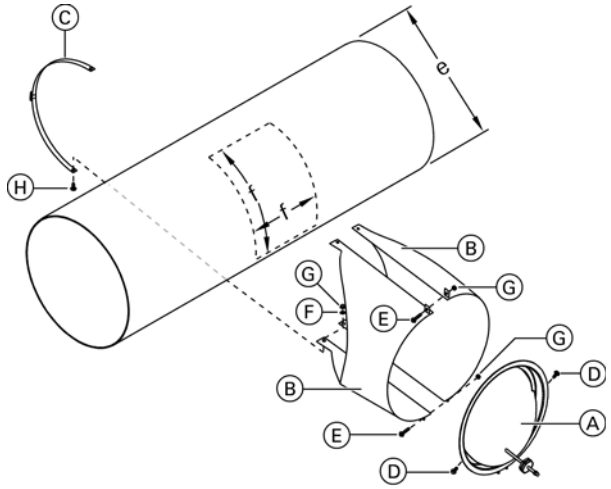
Dimensions

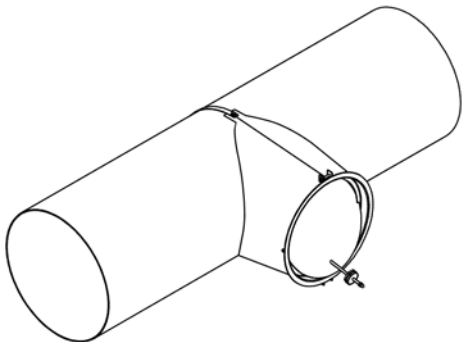
Boiler Model		RF 150	RF 220	RF 300	RF 400	RF 540
a	in. (mm)	11½ (292)	11½ (292)	12 11/16 (323)	12 11/16 (323)	17⅜ (442)
b	in. (mm)	9 7/8 (250)	9 7/8 (250)	11 7/8 (300)	13 7/8 (350)	13 7/8 (350)
c	in. (mm)	9⅛ (232)	10⅛ (257)	10 7/8 (277)	14 (355)	14 (355)
d	in. (mm)	14 1/16 (358)	14 1/16 (358)	13 7/16 (352)	14¾ (375)	14¾ (375)
e	in. (mm)	9 7/8 250	9 7/8 (250)	11¾ (300)	13¾ (350)	13¾ (350)
f	in. (mm)	4 7/8 (125)	4 7/8 (125)	5 7/8 (150)	6 7/8 (175)	6 7/8 (175)

Assembly instructions for the draft damper:

Note: Before installing the draft damper, make sure to install the draft damper door in the right orientation, with the weight located at the bottom.

1. Cut an opening in the flue gas pipe (field supplied) according to the flue gas pipe size (see dimensions in the chart above).
2. Place the clamping band Ⓒ over the flue gas pipe and place one of the draft damper adapters Ⓑ over the clamping band Ⓒ and mark the mounting holes on the clamping band Ⓒ.
3. Cut the clamping band Ⓒ to the outside of the marked holes and drill a 3/16 in. (4 mm) hole in each of the marked areas of the clamping band Ⓒ.
   (refer to the chimney connection drawing above)
4. Assemble the two draft damper adapters Ⓑ with bolt Ⓔ and nut Ⓖ.
5. Fasten the clamping band Ⓒ and the draft damper adaptor assembly over the cut opening with bolt Ⓗ, washer Ⓕ and nut Ⓖ.
6. Insert the draft damper door Ⓐ into the draft damper opening (with the weight to the bottom of the door) and fasten together with screws Ⓓ.
7. Tighten all fasteners and seal all gaps with heat resistant silicon [rated at 650°F (343°C)].
8. Adjust the balancing weight on the draft damper door Ⓐ to 10 Pa or 2 in. (50 mm) from the damper door.





Legend

Ⓐ Draft damper door
Ⓑ Draft damper adapter (x2)
Ⓒ Clamping band
Ⓓ Screw ST3.9x13 (x2)
Ⓔ Bolt M4x30 (x2)
Ⓕ Washer (x2)
Ⓖ Nut M4 (x4)
Ⓗ Bolt M4x12 (x2)

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Flue Gas Cyclone

The flue gas cyclone minimizes dust emissions and is designed as a multi cyclone with axial function. The de-duster is fully insulated and has three covers for cleaning. The flue gas cyclone for 300 RF is an option, and is not generally required when burning pellets but is recommended when burning chips.

The crude gas chamber is cleaned via the side cleaning cover. The clean gas chamber is cleaned via the upper or back cleaning cover (unused blower connection).

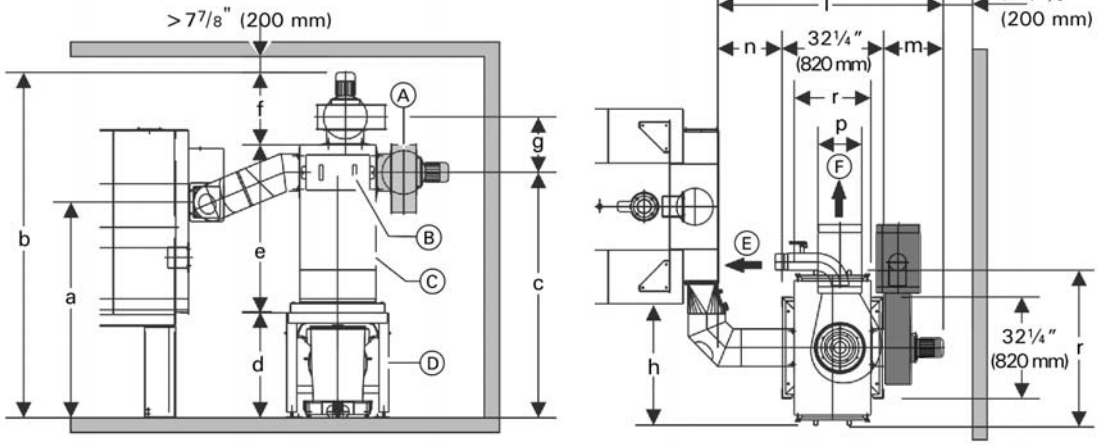
The ash box has a carriage and is connected to the de-duster with quick-action fasteners. It can easily be pulled out for emptying. The blower can be installed either on the side or the top.

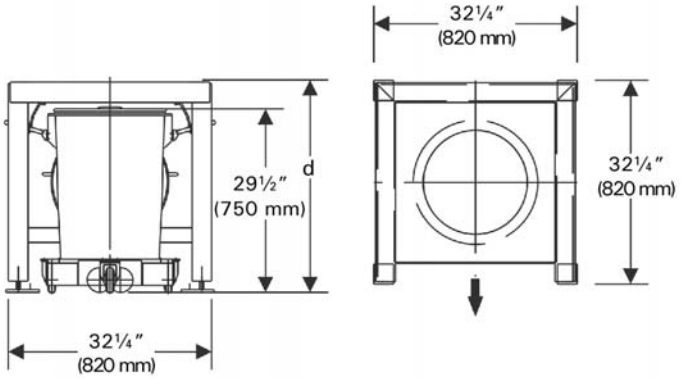
Supplied with:

- 1 flue gas cyclone
- 1 ash container 24 USG (90 L)

CAUTION

The effects of heat can create dangerous conditions.





Legend

- Ⓐ Flue gas exhaust blower (with variable rotation)
  - Either top or side
  - Unused connection as cleaning cover, clean gas space
  - alternate mounting of flue gas exhaust blower (shown in dark grey)
- Ⓑ Cleaning cover (crude gas chamber)
- Ⓒ De-duster (axial cyclone)
- Ⓓ Ash bin support frame 24 USG (90 L)
- Ⓔ Recirculation gas to boiler
- Ⓕ Flue gas to chimney

Ash bin support frame positioning is possible in 4 x 90° (extraction, ash bin)

Boiler Model		RF 150	RF 220/300	RF 400	RF 540
a	in. (mm)	59 7/8 (1521)	64 1/8 (1628)	65 3/4 (1671)	68 9/16 (1741)
b	in. (mm)	90 (2285)	100 1/2 (2552)	106 3/8 (2702)	109 5/16 (2776)
c	in. (mm)	59 3/4 (1518)	69 7/8 (1775)	73 13/16 (1875)	76 3/4 (1949)
d	in. (mm)	33 5/16 (846)	33 5/16 (846)	33 5/16 (846)	36 1/4 (920)
e	in. (mm)	35 7/16 (899)	45 1/2 (1156)	49 7/16 (1256)	49 7/16 (1256)
f	in. (mm)	21 1/4 (540)	21 5/8 (550)	23 5/8 (600)	23 5/8 (600)
g	in. (mm)	16 15/16 (430)	16 11/16 (424)	17 5/8 (447)	17 5/8 (447)
h	in. (mm)	21 7/16 (545)	20 7/8 (530)	38 1/2 (977)	38 1/2 (977)
l	in. (mm)	64 9/16 (1640)	56 11/16 (1440)	70 1/2 (1790)	70 1/2 (1790)
m	in. (mm)	16 5/16 (414)	16 5/16 (414)	18 7/8 (480)	18 7/8 (480)
n	in. (mm)	11 (280)	14 9/16 (370)	14 9/16 (370)	14 9/16 (370)
p	in. (mm)	7 7/8 (200)	9 7/8 (250)	11 13/16 (300)	11 13/16 (300)
r	in. (mm)	30 11/16 (780)	30 11/16 (780)	49 5/8 (1260)	49 5/8 (1260)

Metal Mesh Filter

The metal mesh filter removes dust and fine dust from the flue gas. It is characterized by a particularly high degree of separation. This ensures a fine dust content of less than 20 mg/Nm3 in the clean gas. The flue gas cyclone is not required when using the metal mesh filter.

The metal mesh filter compresses two block shaped units joined together. The compact design enables it to also be used in low level boiler rooms. The filter cartridges are robust and resistant to a shower of sparks.

Function:

The filter is operated under negative pressure. With the cylindrical filter cartridges, the flow is from outside in. The filter cartridges are protected against condensation by means of a heating system and are therefore protected against corrosion.

In the case of boiler demand, the filter cartridges are preheated. If the set filter temperature is reached, boiler start-up operation is enabled. If the temperature falls below the filter temperature set point, the filter heating system starts in heating mode.

The filters are cleaned automatically in the counter current. This means that the dust layer on the mesh is regularly discarded into the ash box.

Filter operation is controlled via the boiler control unit. Operation is carried out via the control unit programming module.

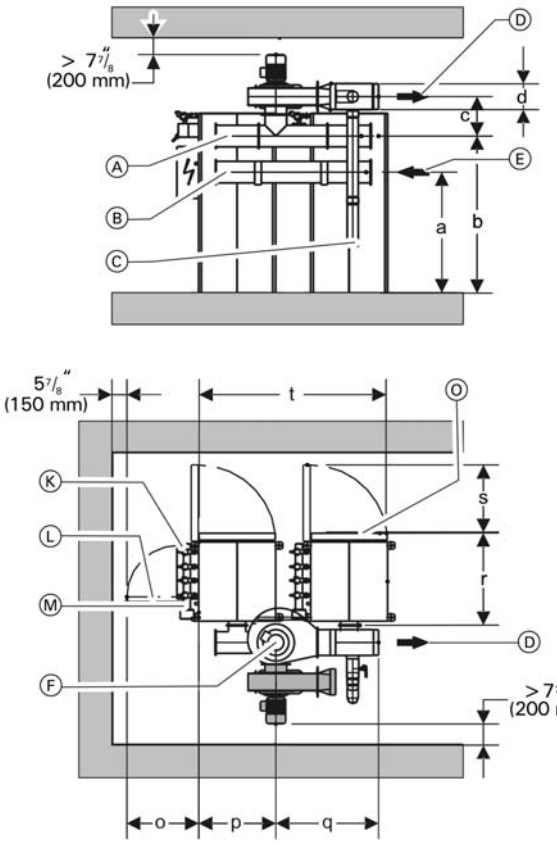
Supplied with:

- Two-part, insulated filter casing with:
  - Hinged doors, lockable by means of a quick-action fastener and lock
  - Maintenance cover for clean gas space
  - Filter cartridges
  - Ash box
- Electric heater
- Pneumatic cleaning
- Flue gas exhaust blower for boiler and filter
- Control panel fully wired.

On-site tasks:

Provision of a compressor or a connection to a compressed air line system [adjustable pressure level 4-6 bar (60-90 psi)] and a power supply of 208/3/60.

Metal Mesh Filter *(continued)*



Legend

- Ⓐ Clean gas collector
- Ⓑ Crude gas distributor (connection possible on both sides)
- Ⓒ Recirculation gas connection
- Ⓓ Clean gas to chimney
- Ⓔ Crude gas from boiler (connection possible on both sides)
- Ⓕ Flue gas exhaust blower (with variable rotation) (alternate mounting of flue gas blower shown in dark grey)
- Ⓖ Control panel Ecotronic
- Ⓗ Power supply 208/3/60
- Ⓚ Pneumatic cleaning system
- Ⓛ Control panel door
- Ⓜ Compressed air connection
- Ⓞ Filter door

Dimensions

Boiler Model RF-		220	300	400
a	in. (mm)	55⅝ (1413)	55⅝ (1413)	55⅝ (1413)
b	in. (mm)	72 3/16 (1833)	72 3/16 (1833)	72 3/16 (1833)
c	in. (mm)	18⅛ (460)	18⅛ (460)	18⅛ (460)
d	in. (mm)	11 13/16 (300)	11 13/16 (300)	13¾ (350)
e	in. (mm)	82 9/16 (2096)	82 9/16 (2096)	82 9/16 (2096)
f	in. (mm)	67¾ (1720)	67¾ (1720)	67¾ (1720)
g	in. (mm)	87 13/16 (2230)	87 13/16 (2230)	87 13/16 (2230)
h	in. (mm)	111 (2820)	111 (2820)	111¼ (2827)
k	in. (mm)	50 (1270)	50 (1270)	55⅛ (1400)
l	in. (mm)	65¾ (1670)	65¾ (1670)	67⅝ (1717)
m	in. (mm)	68⅛ (1730)	68⅛ (1730)	69 11/16 (1770)
n	in. (mm)	88¾ (2255)	88¾ (2255)	94½ (2400)
o	in. (mm)	33 1/16 (840)	33 1/16 (840)	33 1/16 (840)
p	in. (mm)	35 7/16 (900)	35 7/16 (900)	35 7/16 (900)
q	in. (mm)	46 15/16 (1192)	46 15/16 (1192)	47 (1040)
r	in. (mm)	42 15/16 (1069)	42 15/16 (1069)	42 15/16 (1069)
s	in. (mm)	31½ (800)	31½ (800)	31½ (800)
t	in. (mm)	86⅝ (2200)	86⅝ (2200)	86⅝ (2200)
Weight				
Transport weight	lb. (kg)	1036 + 1036 (470 + 470)	1081 + 1081 (490 + 490)	1081 + 1081 (470 + 470)
Total weight	lb. (kg)	2073 (940)	2117 (960)	2161 (980)

Safety Devices

1. Install the pressure relief valve, discharge pipe, air vent and pressure gage as illustrated in section piping and installation of safety devices.

   A 30 or 60 psi pressure relief valve is supplied with the boiler (standard equipment).

2. Install a discharge pipe on the pressure relief valve. The end of the pipe must not be threaded. The pressure relief discharge pipe should extend to a floor drain and end approximately 6 in. (150 mm) above the drain.

IMPORTANT

DO NOT install a shut-off valve in the discharge pipe.
DO NOT reduce the discharge pipe diameter.
DO NOT pipe the discharge to outdoors!

IMPORTANT

Install an approved factory supplied pressure relief valve. Air vent(s) in the system supply must be used to purge the air from the system. To ensure the boiler can be purged of all air, ensure supply / return water lines do not contain restrictive piping where air could be trapped.

⚠ WARNING

Do not install an isolation valve between the boiler and the pressure relief valve. The discharge pipe for the pressure relief valve must be oriented to prevent scalding of attendants. Pipe the pressure relief valve discharge pipe close to floor drain. Never pipe the discharge pipe to the outdoors.

IMPORTANT

This boiler does not require a flow switch.
A low water cut-off may be required by local codes.
If the boiler is installed above radiation level, a low water cut-off device of approved type must be installed in all instances. Do not install an isolation valve between boiler and low water cut-off.

Expansion

With closed expansion, the supply pressure to the expansion tank should be equal to the max. amount of the system pressure plus 3 psi (0.2 bar).

Boiler system with return 3-way mixing valve

To reliably prevent boiler corrosion through condensation of the flue gases, the boiler return temperature must never be below 149°F (65°C).

The stepless control of the Vitoflex 300-RF rotating combustion chamber requires a constant flow through the boiler of the water to be heated. The boiler circuit, the boiler pump and boiler-mixing valve must therefore be installed according to section piping and installation of safety devices.

The boiler circuit should be designed that the temperature difference between the boiler supply and the boiler return temperature is equal to or less than 27°F (15°C).

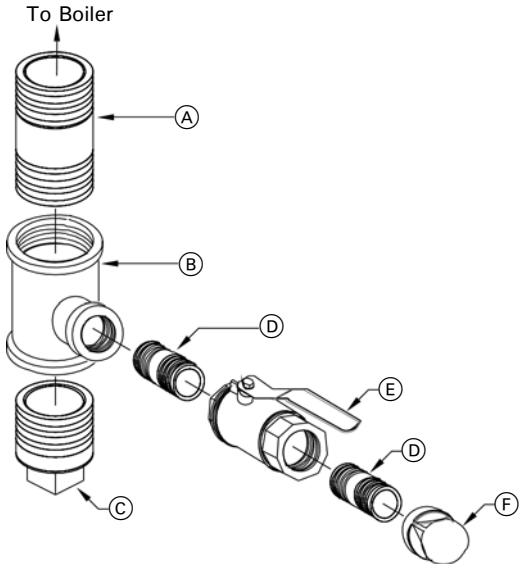
The activation of the boiler pump and boiler mixing valve is integrated in the custom control panel.

Fire extinguishing water tank

The self-activating extinguishing device must be installed next to the boiler feed system. Refer to section fire extinguishing systems for the assembly.

The fire suppression is performed by means of an extinguishing valve, which is not dependent on an electric current. A float-type switch monitors the water level and should be electrically connected (see field wiring diagram).

Drain inspection port



Legend

Ⓐ Nipple, 3 in. x 5 in.
Ⓑ Reducing Tee 3 x 3 x 1½ in.
Ⓒ Plug 3 in.
Ⓓ Nipple 1½ in. x 2
Ⓔ Ball valve 1½ in.
Ⓕ Cap 1½ in.

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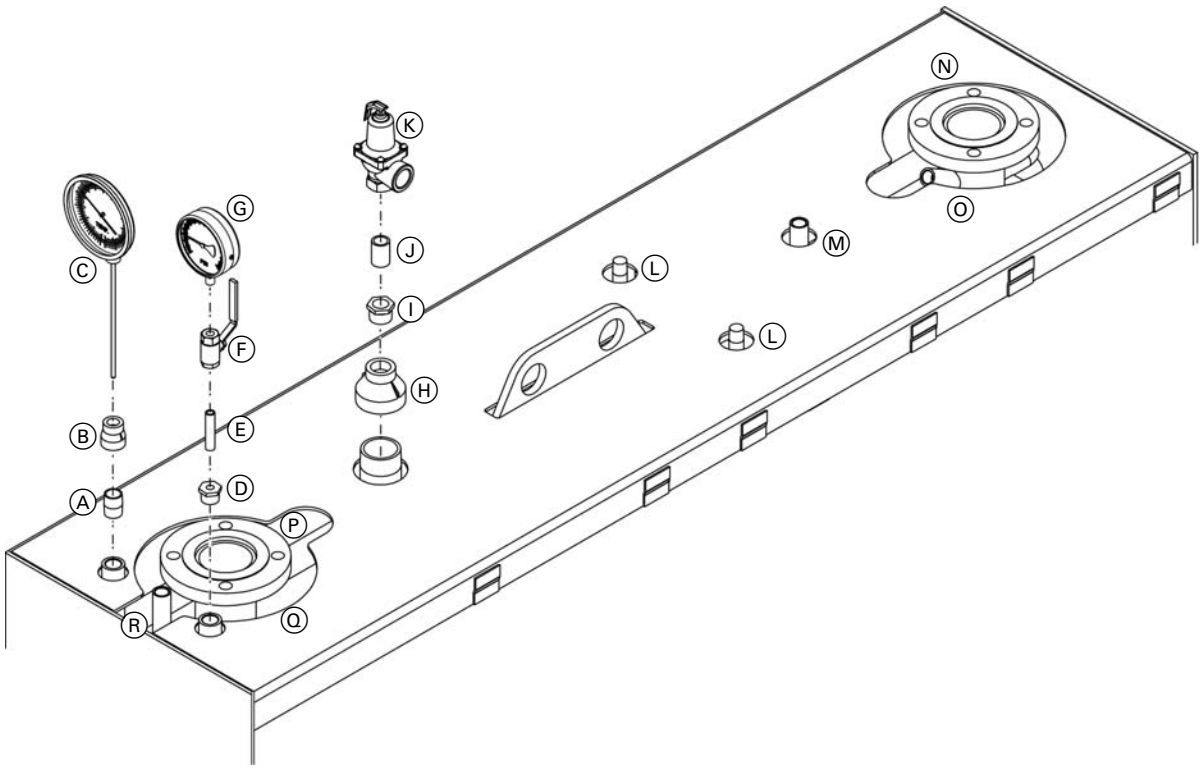
Safety Devices *(continued)*

The safety equipment for the heating installation must be installed by the heating contractor authorized to do so.

Legend

Ⓐ Nipple, ¾ in. x 1½ in.
Ⓑ Reducing coupling, ¾ in. x ½ in.
Ⓒ Boiler water temperature gauge
Ⓓ Bushing ¾ in. x ¼ in.
Ⓔ Nipple ¼ in. x 2½ in.
Ⓕ Ball valve ¼ in.
Ⓖ Pressure gauge
Ⓗ Reducing coupling
Ⓘ Reducing bushing
Ⓙ Nipple
Ⓚ Pressure relief valve, 30 psi or 60 psi
Ⓛ Safety heat exchanger connections, NPTM ½ in. *1*
Ⓜ Sensor well - fixed high limit
Ⓝ 3 in. or 4 in. Boiler supply flange *2*
Ⓞ Supply sensor well (sensor supplied)
Ⓟ Return sensor well (sensor supplied)
Ⓠ 3 in. or 4 in. Boiler return flange *2*
Ⓡ Sensor well for thermal safety flush valve (R½ in.) (sensor supplied)

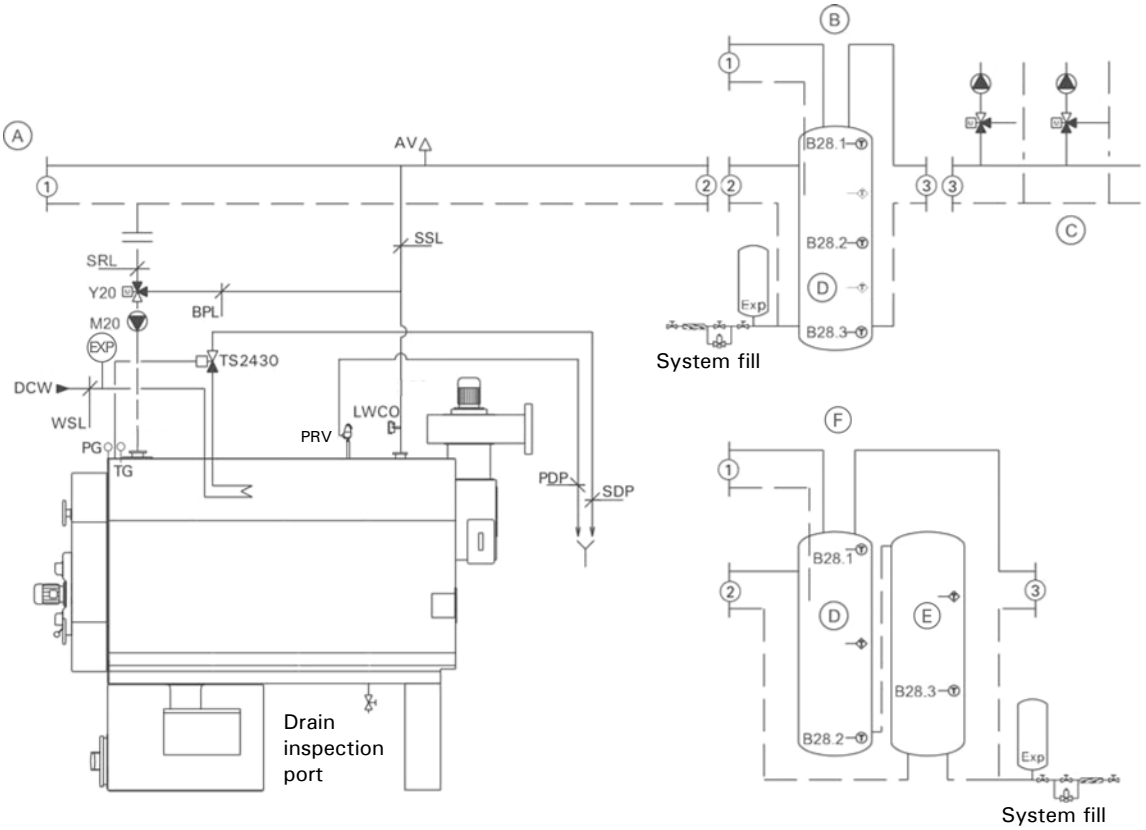


1 See section piping and installation of safety devices

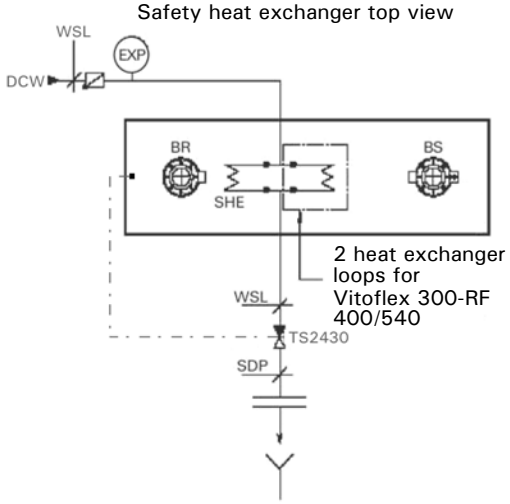
2 3 in. boiler flange for Vitoflex 300-RF 150-300, 4 in. boiler flange for Vitoflex 300-RF 400-540

Note: All fittings shown and sensors indicated are factory supplied. The size and quantity are matched to the specific boiler model.

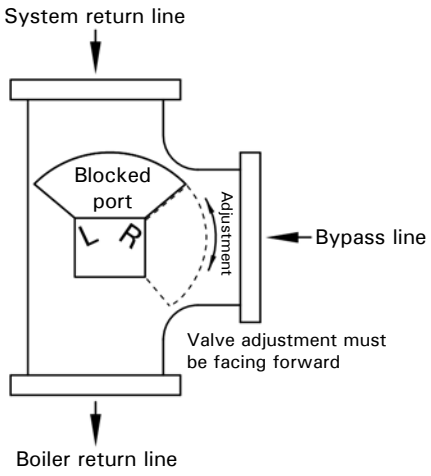
Piping and Installation of Safety Devices



Safety heat exchanger top view



3-Way mixing valve



Legend

Ⓐ Additional heat source
Ⓑ Thermal storage tank as low loss header (option A)
(3 sensors, optionally 5 sensors)
Ⓒ Distributor, heat consumer
Ⓓ Thermal storage tank #1
Ⓔ Thermal storage tank #2
Ⓕ Two thermal storage tanks as low loss header
(option B)(3 sensors, optionally 5 sensors)

Piping and Installation of Safety Devices *(continued)*

Note: To reliably prevent boiler corrosion caused by condensation of flue gases, the boiler return temperature must not under any circumstances be below 150°F (65°C).
A Viessmann sized boiler pump with a boiler 3-way mixing valve are provided according to the tables below. The boiler circuit should be designed that the temperature difference between the supply and the return temperature is equal to or less than Δt 27°F (15°C).
The expansion tank has to be connected to the boiler without any shut-offs.

Safety equipment included in the scope of supply provided by Viessmann:

- **M 20** Boiler pump
- **Y 20** Boiler 3-way mixing valve
- **PRV** Pressure relief valve, pressure set to 30 or 60 psi
- **TS2430** Thermal safety flush valve R ¾ in., approved component; special-purpose, designed for opening at a temperature of 122-248°F (50-120°C), (safety heat exchanger loop built into the boiler). The Vitoflex 300-RF 150 to Vitoflex 300-RF 300 have one safety heat exchanger loop and require one thermal safety flush valve. The Vitoflex 300-RF 400 and Vitoflex 300-RF 540, have two safety heat exchanger loops and require one thermal safety flush valve.
- **LWCO** Low water cut-off
- **PG** Pressure gauge
- **TG** Temperature gauge (thermometer)
- **SHE** Safety heat exchanger, water volume 1.1 USG (4.2 L) per loop, NPTM ½ in.

Design recommendation:

Thermal safety flush valve

Boiler Model RF-	Thermal safety flush valve TS-2430 (Quantity)	Water through-put required at 36 psi (2.5 bar) L/h	GPM	Supply line WSL	Drain pipe SDP[2]
150	1	915	4	R ¾ in.	R 1 in.
220	1	1230	5.4	R ¾ in.	R 1 in.
300	1	1500	6.6	R ¾ in.	R 1 in.
400	1	1880	8.3	R ¾ in.	R 1 in.
540	1	2226	10	R ¾ in.	R 1 in.

Pressure relief valve

Boiler Model RF-	Pressure relief valve Conbraco[1] 30 psi or 60 psi		Pressure relief valve drain pipe PDP[2] 30 psi or 60 psi	
150	1 in.	¾ in.	1¼ in.	1 in.
220	1 in.	¾ in.	1¼ in.	1 in.
300	1¼ in.	1 in.	1½ in.	1¼ in.
400	1¼ in.	1¼ in.	1½ in.	1½ in.
540	1½ in.	1¼ in.	2 in.	1½ in.

1 Threaded connection for supply line
2 Length of the drain pipe up to 13 ft. (4.0 m)

Equipment to be supplied by the installing heating contractor:

- PDP pressure relief valve drain pipe
- DCW Cold water inlet, min. 36 psi (2.5 bar), max. 51 psi (3.5 bar)
- AV Air separator / vent
- ExP Expansion tank closed;
  - for safety heat exchanger required (size according to volume of safety heat exchanger loops and volume of piping)
  - for heating system (optional)
- WSL Water supply line for safety heat exchanger
- SDP Safety heat exchanger drain pipe
- SRL System return line to the boiler from the system
- SSL System supply line from the boiler to the system
- BPL Bypass line
- BR Boiler return
- BS Boiler supply

Piping and Installation of Safety Devices *(continued)*

Design recommendation (continued):

Boiler pump

Boiler model	Pump	Freq.	Voltage and phase	Speed
RF 150	UPS 32-80 F	60 Hz	3 x 208-230V	3
RF 220	UPS 40-80/4 F	60 Hz	3 x 208-230V	1
RF 300	UPS 50-80/4 F	60 Hz	3 x 208-230V	2
RF 400	UPS 80-80/4 F	60 Hz	3 x 208-230V	2
RF 540	UPS 80-80/4 F	60 Hz	3 x 208-230V	3

Mixing valve

Boiler model	Nominal pipe size	Valve
RF 150	2½ in.	3-way mixing valve
RF 220	2½ in.	3-way mixing valve
RF 300	3 in.	3-way mixing valve
RF 400	3 in.	3-way mixing valve
RF 540	4 in.	3-way mixing valve

Viessmann ASME recommended tank sizes (U-stamped)

Boiler model	Tank size	
	L	USG
RF 150	1514	400
RF 220	2006	530
RF 300	2650	700
RF 400	3785	1000
RF 540	5678	1500

Fire Protection

Follow local regulations for wood-fired heating systems.

Power failure provision

The customer must ensure that there is a supply of water independent of the electrical supply. This design ensures that in case of a power failure, the boiler will be reliably cooled by the thermal safety flush valve.

Protection against back-burn for the boiler plant

The following safeguards are part of the scope of supply for the Vitoflex 300-RF Rotating Combustion System:

- **Preventing overfilling of the** combustion chamber
  A level monitor must be installed to prevent overfilling of the combustion chamber. The Vitoflex 300-RF Rotating Combustion System has a light barrier to monitor the embers.
- **Preventing back-burn**
  With a temperature sensor directly on the in-feed auger, any danger of back-burn initiation will be detected and quickly counteracted at an early stage by increasing the fuel conveyance speed into the combustion chamber
- **Back flash safeguard**
  The Vitoflex 300-RF Rotating Combustion System is operated with continuous negative pressure and is equipped with a backflash prevention device. This device prevents backflashes caused by flying embers or combustible gases that may ignite the fuel system.
- **Automatic In-feed auger extinguishing system**
  The supplied fire extinguishing system is necessary on the in-feed auger. This system should reliably prevent back- burn in case of a malfunction (such as a power failure). For safety reasons and to prevent damage by flooding, connecting the extinguishing system directly to the water network is not advisable.

  This extinguishing system must be equipped with a 6.6 USG (25 L) extinguishing water tank with a float-type switch and an adjustable Danfoss extinguisher valve. The tank for the extinguishing system must be equipped with a level monitoring system.

  If there is a shortage of water, the Vitoflex 300-RF Rotating Combustion System will switch off automatically.
  In case of excess temperature, the in-feed auger will be flooded reliably but in a limited fashion.

IMPORTANT

The heating contractor must perform the installation of the fire extinguishing system as specified in section fire extinguishing systems.

Fire Protection *(continued)*

Back-burn safeguard for the fuel supply system
The fire extinguishing system for the conveyor auger and the down pipe depends on specific requirements (location, size of the fuel storage site, material, pressure conditions and regulations), these being accessories to the scope of delivery ordered from Viessmann according to their descriptions.

Automatic triggering system for the fuel supply system
Approved in part as a variation to the shut-off valve in pressure-less fuel storage units.

Slide valve
The slide valve is approved in pressure-less fuel storage units and is a suitable safeguard against back-burn.

The slide valve is optional and closes in case of standstill, danger of back-burn, or power failure, with the help of a spring return motor.

IMPORTANT

We recommend installing a rotary valve for the Vitoflex 300-RF Rotating Combustion System. In addition to being a safeguard against back-burn, this will also prevent any penetration by air leaking in via the in-feed auger.

Rotary valve
The rotary valve is optional and used if remnant wood is moved into fuel storage spaces with blowers, then, in order to reduce pressure applied, at least one rotary valve is necessary to reduce pressure between the fuel storage unit and the boiler. The rotary valve is suited to reduce pressure and at the same time is considered a suitable safeguard against back-burn.

Max. over pressure allowed in fuel storage unit:
+500 Pa / +2.00"wc.

Max. negative pressure allowed in fuel storage unit:
+0 Pa / +0"wc.

Double rotary valve with pressure compensation system
If, due to special circumstances, any mechanically produced negative pressures or extraordinarily high overpressures are expected in the fuel storage unit, then two rotary valves must be installed in the material transport route according to the respective project plan with a pressure compensation line to the outdoors.

Max. over pressure allowed in fuel storage unit:
+3000 Pa /+12"wc.

Max. negative pressure allowed in fuel storage unit:
-3000 Pa / –12"wc.

IMPORTANT

The supplier of the silo must confirm the maximum weight that is to be expected on the rotary valve.

The rotary valve below the silo extraction system can become leaky due to wear of the sealing elements or through large pieces of wood that cannot be conveyed. This leakage can make it possible for low-temperature gases to flow back from the boiler into the silo.

A smoke alarm must be installed between the rotary valve and the silo extraction system, which, when triggered, will disconnect the system and create negative pressure in the silo.

Down pipe
A vertical drop-off section interrupts the connected line of burning material.

Fire protection for fuel storage space
Viessmann does not provide fire protection for the fuel storage space.

IMPORTANT

The local building codes and regulations must be followed by the heating contractor.

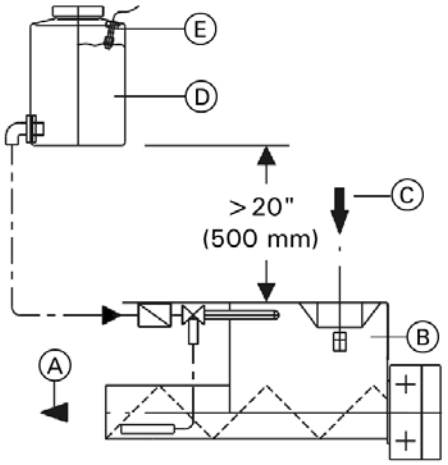
Fire Extinguishing Systems

The fire extinguishing system functions independent from the electrical power and is flooding the material which is still remaining in the in-feed auger in case of a back-burn. The activation temperature is approx. 200°F (95°C).

Fire extinguishing system for the in-feed auger

Note: The fire extinguishing system for the in-feed auger is part of the boiler.

- Line from the extinguishing water container to the ½ in. valve (as short as possible).
- Valve thermostatic, Danfoss AVTA 15 122-194°F (50- 90°C) position 3 equals approximately 176°F (80°C).
- The lines must be executed as hard piping in metal (½ in.).
- It must not be possible to shut off the cold water inlet without the aid of tools.
- Be especially sure to comply with the instruction in the Fire Protection section.

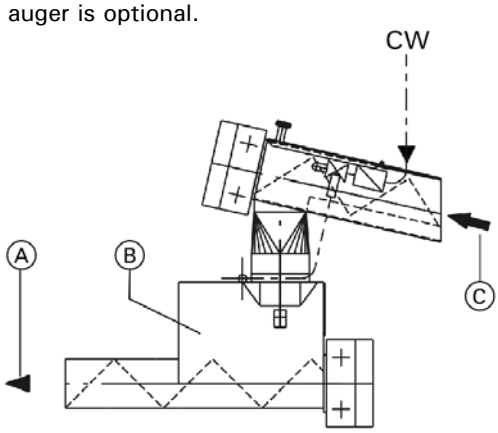


Legend

Ⓐ Combustion
Ⓑ Metering Container
Ⓒ Fuel supply
Ⓓ Extinguishing water container 6.6 USG (25 L)
Ⓔ N1 Floater switch
CW Cold water supply ½ in. min. 30 psi (2.0 bar), max. 45 psi (3.0 bar)

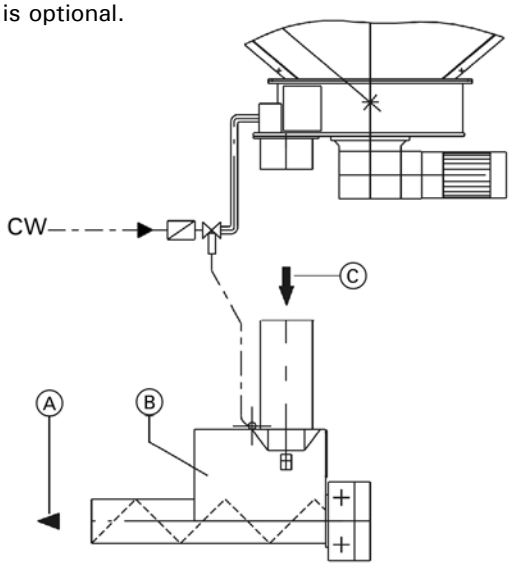
Fire extinguishing system for the conveyor auger

Note: The fire extinguishing system for the conveyor auger is optional.



Fire extinguishing system for the down pipe

Note: The fire extinguishing system for the down pipe is optional.



Note: A slide valve is required as standard for an unpressurized material store or a rotary valve for a material storage with overpressure or under pressure (charging with blower, e.g. wood processing operations).

- The lines must be executed as hard piping in metal (½ in.).
- It must not be possible to shut off the cold water inlet without the aid of tools.
- Be especially sure to comply with the instruction in the Fire Protection section.

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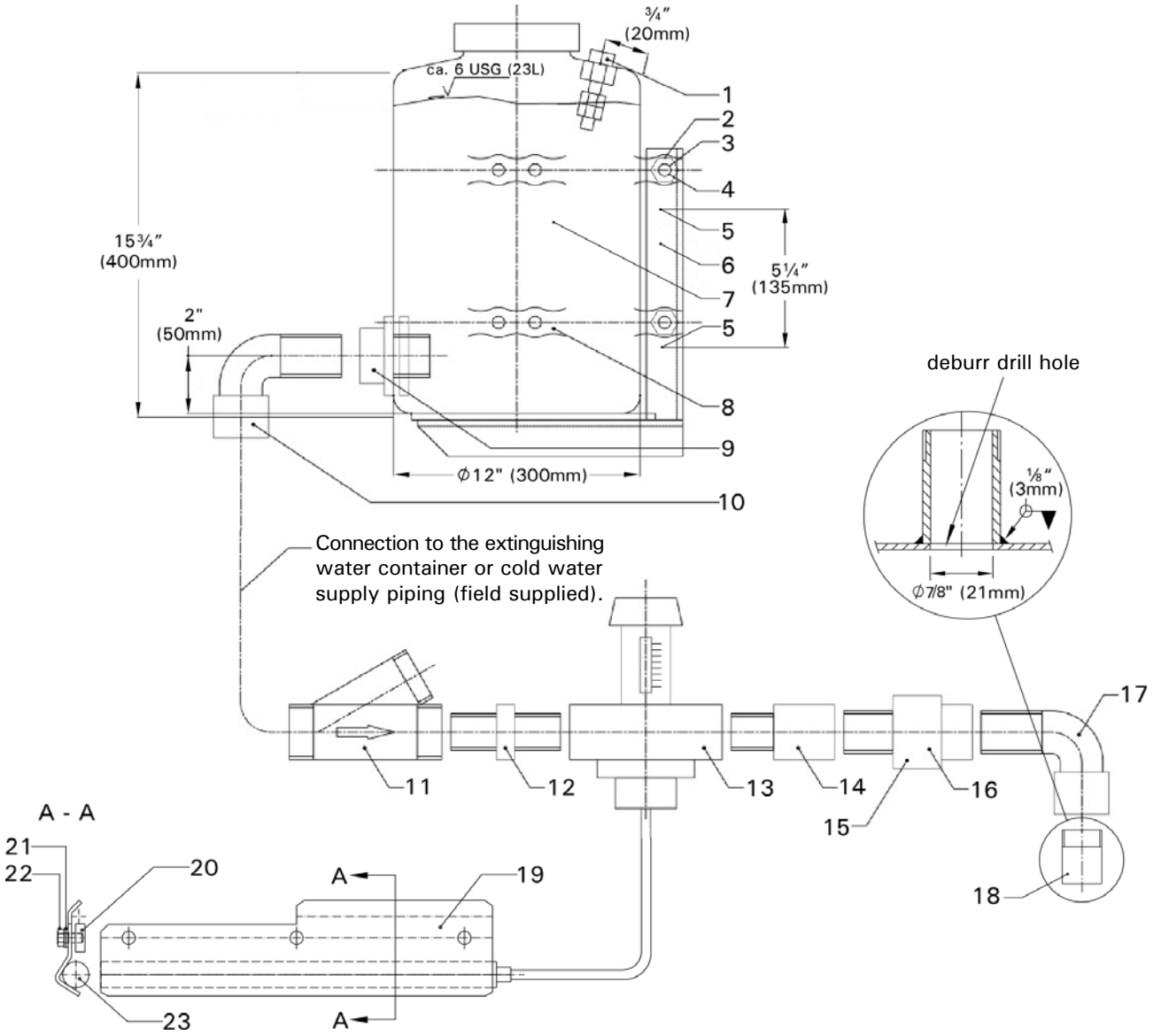
Assembly of the Fire Extinguishing System



Item No.	Quantity	Description
1	1	Floater switch (N1)
2	4	Washer
3	2	Hex nut M6
4	2	Threaded rod M6
5	2	Stud anchor ⅜ in. x 4¼ in. (10 mm x 108 mm)
6	1	Mounting bracket
7	1	Plastic container 6.6 USG (25L)
8	2	Clamping band
9	1	Duct ½ in.
10	1	90° street elbow ½ in.
11	1	Strainer ½ in.

Item No.	Quantity	Description
12	1	Connector ½ in.
13	1	Danfoss AVTA
14	1	Reducer ¾ in. - ½ in.
15	1	Union ¾ in.
16	1	Gasket ¾ in.
17	1	90° street elbow ¾ in.
18	1	Weld on nipple ¾ in.
19	1	Clamp
20	3	Bracket
21	3	Strain washer
22	3	Hex nut
23	1	Sensor

Assembly of the Fire Extinguishing System *(continued)*

The following assembly instructions for the fire extinguishing system are to be used with the layout and description as shown in section Assembly of the Fire Extinguishing System.

- Install the mounting bracket (6) near the in-feed auger at a minimum height of 20 in. (500 mm) with the stud anchors (5) for wall mount.
- Install the plastic container (7) to the mounting bracket (6) with the clamping bands (8), the threaded rods (4), washers (2) and the hex nuts (3).
- Attach the 90° street elbow (10) to the duct (9).
- Assemble the strainer (11), connector (12), thermostatic valve (13), reducer (14), union (15), gasket (16) and the 90° street elbow (17) and connect the assembly to the weld on nipple (18).

Note: The Weld on nipple (18) is pre-installed at the metering container. The Weld on nipple (18) needs to be welded on for the fire extinguishing system for the conveyor auger and the fire extinguishing system for the down pipe (18). The fire extinguishing system for the conveyor auger and the fire-extinguishing system for the down pipe are optional.

- Install a ½ in. line from the 90° street elbow (10) to the strainer (11). This piping is field supplied.
- Install the sensor (23) to the in-feed auger with the clamp (19), the bracket (20) which is welded onto the in-feed auger, the strain washer (21) and the hex nut (22).

Note: Make sure, that the bending radius of the capillary tube does not exceed 2 in. (50 mm).

Control Panel

Mounting of the control panel

A certified electrician shall mount the control panel. Optimum positioning of the control panel will minimize the time and costs of the installation.

The control panel should be in an area where the heat radiation (front side of boiler, rear side of boiler with flue gas cyclone and flue gas exhaust blower as well as recirculation line) and the exposure to dust during cleaning is at a minimum.

The ambient temperature for the control panel (approx. 4 in. (100 mm) away from the control cabinet) should not exceed 104°F (40°C) while the system is in operation. The minimum temperature must not be less than 50°F (10°C). In case of doubt, preference should be given to placing the control panel outside the mechanical room near the heating room door.

Electrical connection

- Install the control panel according to the field wiring diagram. The field wiring diagram is supplied with the control panel.
- In the area of hot parts (flue gas exhaust blower, flue gas pipe), the lines should be installed in steel pipes at an appropriate distance so as to be protected from excessive temperatures. See section “Boiler Wiring”.
- The cable bushings to the motors and equipment must be dust-tight and provided with a strain relief.

General safety instructions

- Retighten all wire holding screws inside the control panel before start-up.
- Provide fuseable disconnect means according to local code.
- DHW safety aquastat is to be installed in the tank well.

The aquastat can be installed on the DHW building supply line if a recirculating DHW pump is used. Please check the local building code.

The DHW safety aquastat does NOT replace scald protection devices required by local code.

⚠ CAUTION

The Viessmann supplied field wiring diagram is not a complete system drawing. It is the installer’s responsibility to assure that the control is suitable for the respective installation, and all necessary safety equipment is installed.

⚠ CAUTION

The information about wire type, wire number and wire gauge made in the wiring diagrams is not obligatory. The final decision of these settings has to be made by the executing installation company taking into consideration the local codes and regulations.

⚠ CAUTION

Any alteration of the control cabinet will void the warranty.

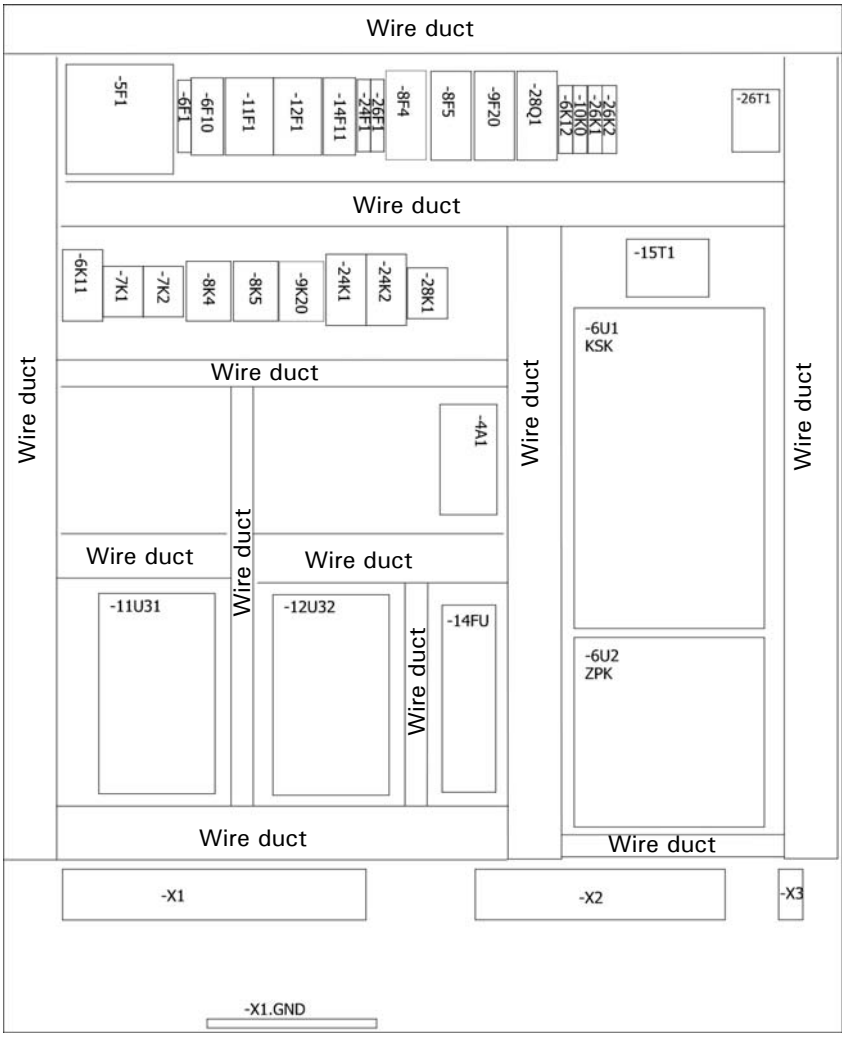
Control Panel *(continued)*

Device tags and designations may vary from project to project. Please refer to the field wiring diagram for details. The wiring diagram will be supplied after the control panel is built or with the receipt of the control panel.

Components installed in the control panel

Device tag	Description
-5F1	Fuse
-6F1	Fuse
-6F10	Circuit breaker
-11F1	Circuit breaker
-12F1	Circuit breaker
-14F11	Circuit breaker
-24F1	Fuse
-26F1	Fuse
-8F4	Motor circuit controller
-8F5	Motor circuit controller
-9F20	Motor circuit controller
-28Q1	Motor circuit controller
-6K12	Relay DPDT
-10K0	Relay DPDT
-26K1	Relay DPDT
-26K2	Relay DPDT
-26T1	Transformer
-6K11	Contactor
-7K1	Contactor
-7K2	Contactor
-8K4	Contactor
-8L5	Contactor
-9K20	Contactor
-24K1	Contactor
-24K2	Contactor
-28K1	Contactor
-15T1	Transformator
-6U1	Main board KSK
-6U2	Slave board ZPK
-4A1	Power supply 24 VDC
-11U31	Soft starter
-11U31	Function module
-12U32	Soft starter
-12U32	Function module
-14FU	Variable Frequency Drive
-14FU	Keypad
-14FU	Function module
-X1	Line voltage connections
-X2	24V connections
-X3	Dry contact outputs

Vitocontrol-C, Ecotronic RF

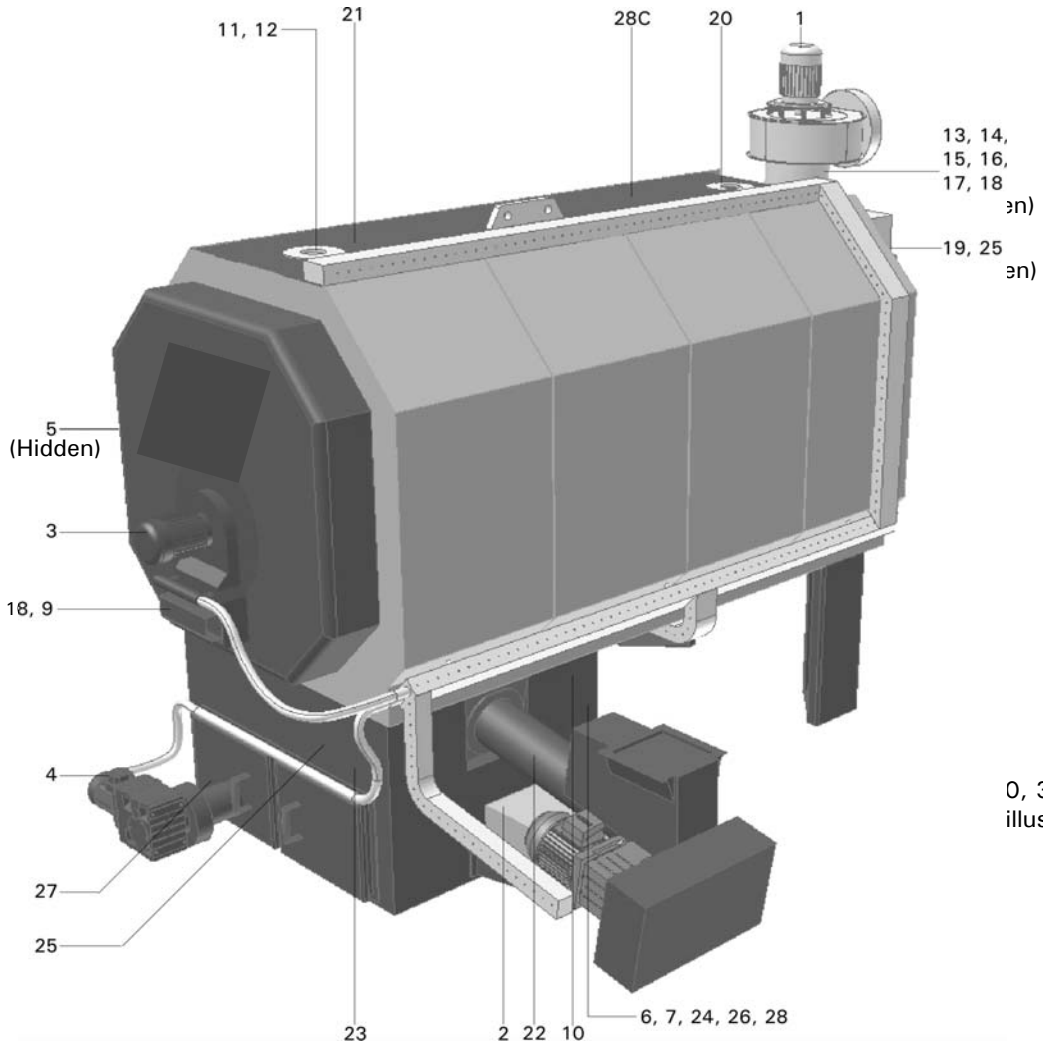


Customer terminal tag	Description
-X1	Line voltage connections
-X2	24V connections
-X3	Dry contact outputs

Components installed in the control panel door

Device tag	Description
-5H1	Panel light
-5Q1	Disconnect
-5S1	Door switch
-15U1	Control module BMK

Electrical Components



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Electrical Components *(continued)*

Component overview

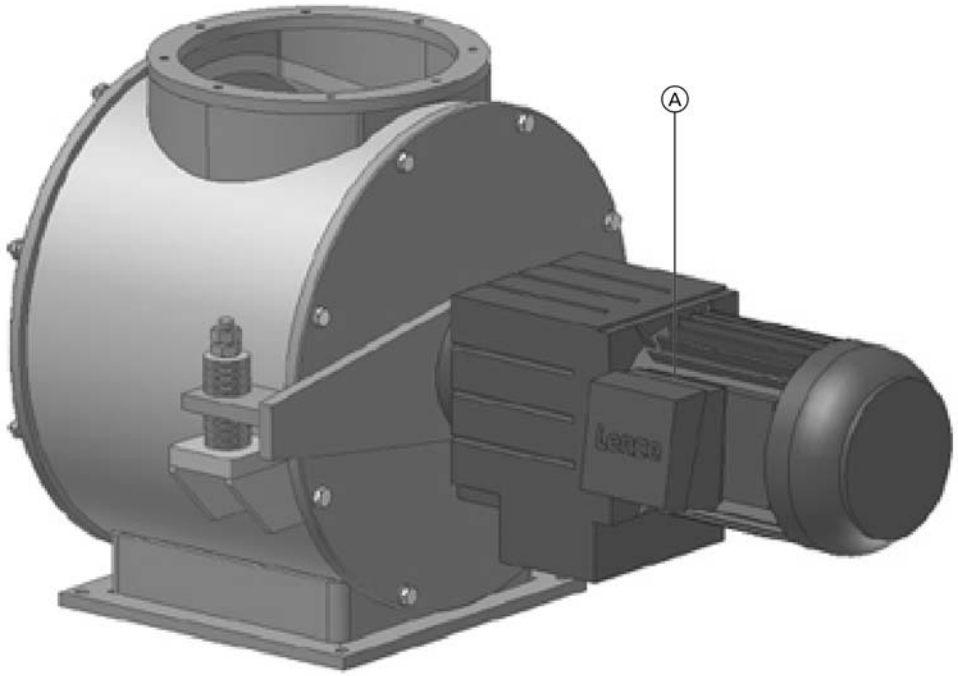
M Hight voltage
Y Low voltage

B Sensors
S Switches
N Sensors

Number	Designation	Device tag	Description
High voltage			
1	M1	-14M1	Flue gas exhaust blower
2	M2	-27M2	Grate drive
3	M3	-28M3	Rotary blower
4	M4	-8M4	De-ashing auger
5	M5	-8M5	De-ashing ascending conveyor auger (not shown)
6	M16	-24M16	Igniter
7	M20	-9M20	Boiler pump
Low voltage			
8	Y10	-21Y10	Primary air valve 1
9	Y11	-21Y11	Primary air valve 2
10	Y13	-21Y13	Secondary air valve 1
11	Y14	-21Y14	Secondary air valve 2
12	Y20	-26Y20	Mixing valve actuator
13	Y21	-29Y21	Solenoid valve 1
14	Y22	-29Y22	Solenoid valve 2
15	Y23	-29Y23	Solenoid valve 3
16	Y24	-29Y24	Solenoid valve 4
17	Y25	-29Y25	Solenoid valve 5
18	Y26	-29Y26	Solenoid valve 6
Temperature sensors			
19	B1	-22B1	Flue gas temperature sensor
20	B20	-22B20	Boiler supply temperature sensor
21	B20.1	-22B20.1	Boiler return temperature sensor
22	B02	-22B02	In-feed auger temperature sensor
Light barriers			
23	B1.1	-16B1.1	Light barrier embers 1 (Transmitter)
24	B1.2	-16B1.2	Light barrier embers 1 (Receiver)
25	B2.1	-17B2.1	Light barrier embers 2 (Transmitter)
26	B2.2	-1782.2	Light barrier embers 2 (Receiver)
27	B4.1	-18B4.1	Light barrier de-ashing system (Transmitter)
28	B4.2	-18B4.2	Light barrier de-ashing system (Receiver)
Sensors			
29	B26	-23B26	Oxygen sensor
30	N1	-19N1	Floater switch for fire extinguishing water container (not shown)
31	N21	-6N21	Fixed high limit
32	N22	-6N22	Low water cut-off (not shown)

Fuel Transport and Extraction Systems

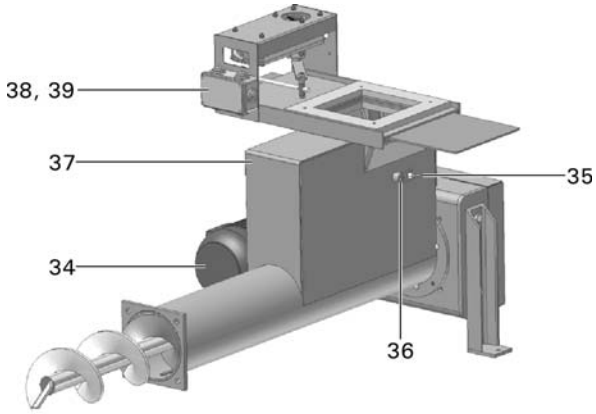
Rotary Valve



Number	Designation	Device tag	Description
Ⓐ	M9	-9 M9	Motor for rotating valve

Fuel Transport and Extraction Systems

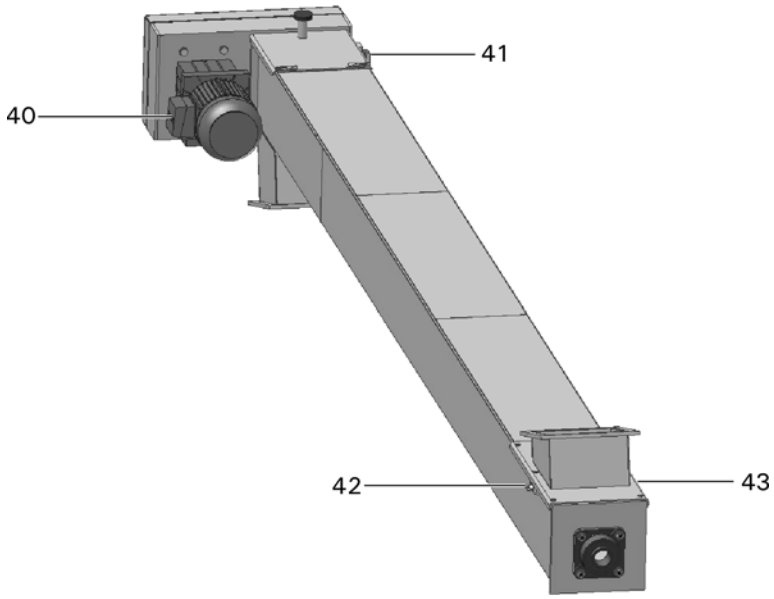
In-feed auger



Number	Designation	Device tag	Description
34	M31	-11M31	Motor for in-feed auger
35	S31.1	-11S31.1	Limit switch for maintenance lid
36	B31.1	-11B31.1	Light barrier metering container (Transmitter)
37	B31.2	-11B31.2	Light barrier metering container (Receiver)
38	Y30.1	-23Y30.1	Slide valve T30
39	Y30.2	-23Y30.2	Slide valve T30

Note: For details on designation, see field wiring diagram.

Pipe/trough conveyor auger

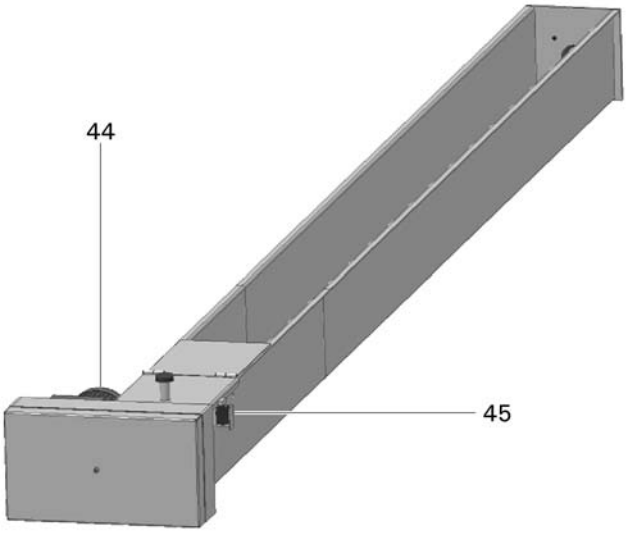


Number	Designation	Device tag	Description
40	M32	-12M32	Motor for pipe/trough conveyor auger
41	S32.1	-12S32.1	Limit switch for maintenance lid
42	B32.1	-12B32.1	Light barrier conveyor auger (Transmitter)
43	B32.2	-12B32.2	Light barrier conveyor auger (Receiver)

Note: For details on designation, see field wiring diagram.

Fuel Transport and Extraction Systems *(continued)*

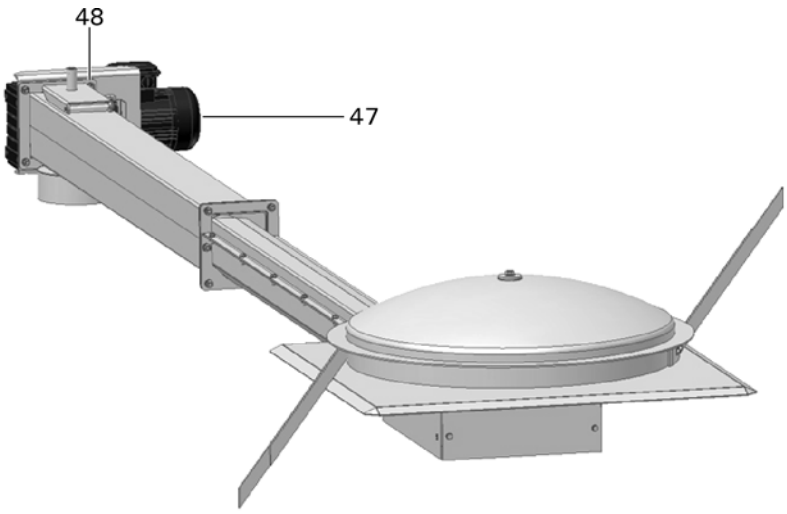
Pellet extraction auger



Number	Designation	Device tag	Description
44	M32	-12M32	Motor for pellet extraction auger
45	S32.1	-12S32.1	Limit switch for maintenance lid
46	S32.2	-12S32.2	Limit switch for silo door (not shown)

Note: For details on designation, see field wiring diagram.

Spring extraction system

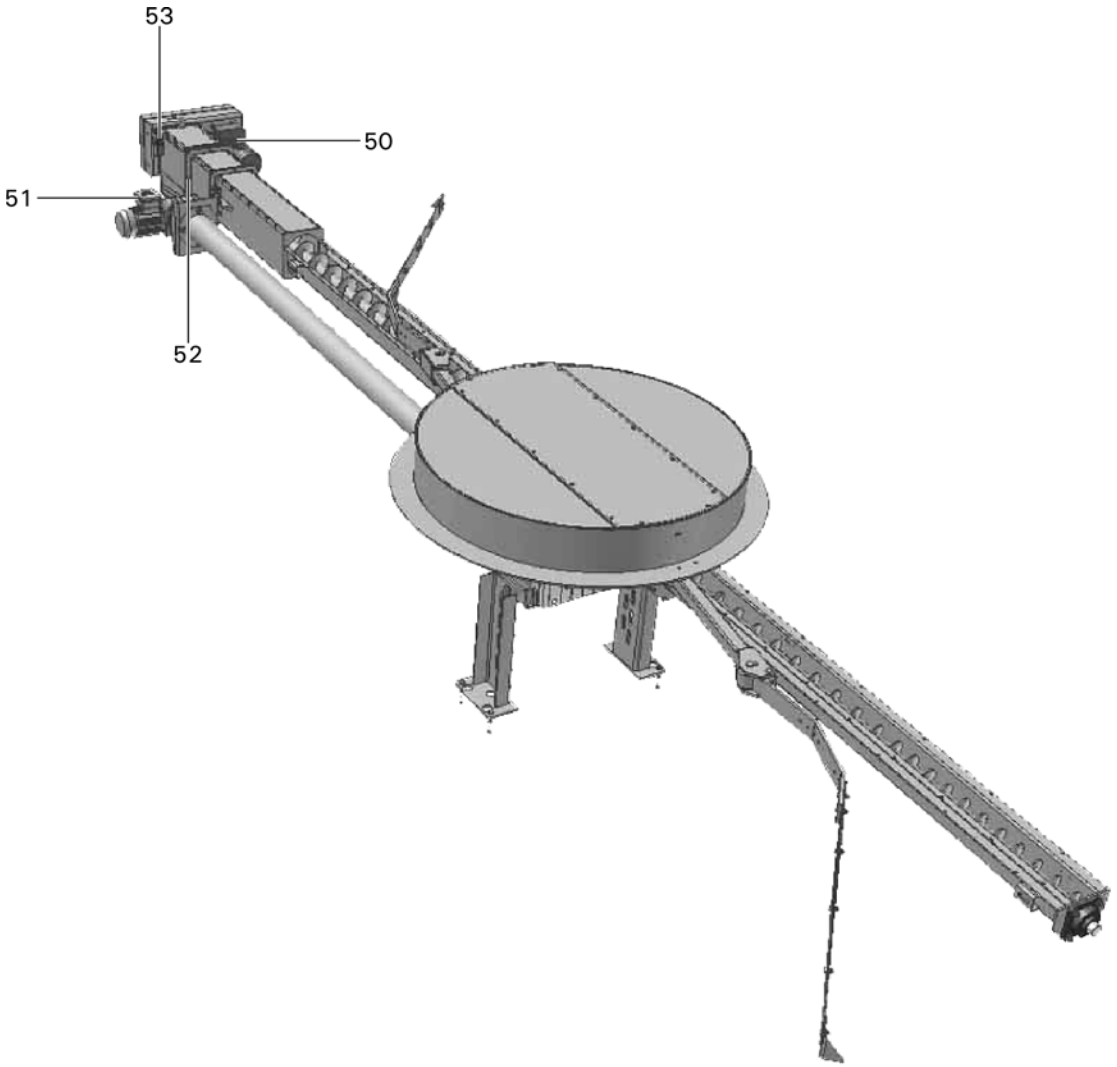


Number	Designation	Device tag	Description
47	M32	-12M32	Motor for spring extraction system
48	S32.1	-12S32.1	Limit switch for maintenance lid
49	S32.2	-12S32.2	Limit switch for silo door (not shown)

Note: For details on designation, see field wiring diagram.

Fuel Transport and Extraction Systems *(continued)*

Horizontal extraction system

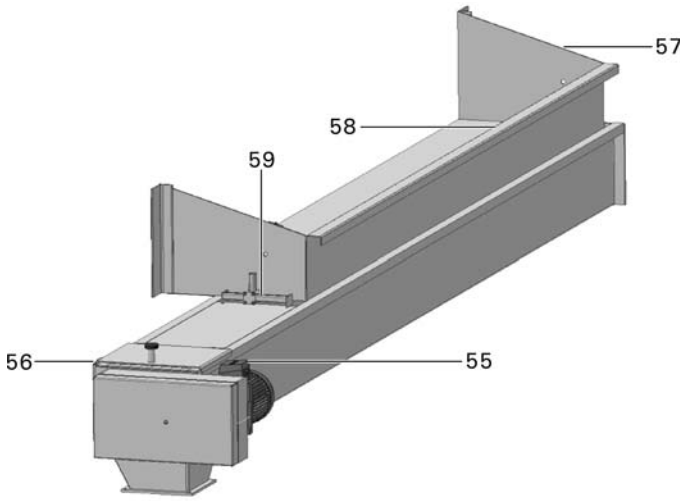


Number	Device tag	Device tag	Description
50	M32	-12M32	Motor for extraction auger
51	M33	-12M33	Motor for agitator
52	B32	-12B32	Light barrier for extraction auger
53	S32.1	-12S32.1	Safety switch for maintenance lid
54	S32.2	-12S32.2	Safety switch for silo door (not shown)

Note: For details on designation, see field wiring diagram.

Fuel Transport and Extraction Systems *(continued)*

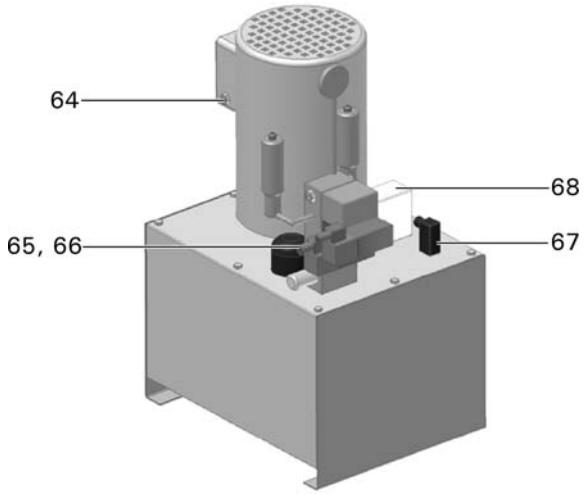
Walking floor auger



Number	Designation	Device tag	Description
55	M3	-6M3	Motor for walking floor auger
56	S3	-68S3	Safety switch for maintenance lid
57	S3.1	-68S3.1	Safety switch for auger cover
58	B3/1	-61B3/1	Light barrier walking floor auger (Transmitter)
59	B3/2	-61B3/2	Light barrier walking floor auger (Receiver)
60	B6.1/1	-61B6.1/1	Light barrier silo distribution top (Transmitter)
61	B6.1/2	-61B6.1/2	Light barrier silo distribution top (Receiver)
62	B6.2/1	-61B6.2/1	Light barrier silo distribution bottom (Transmitter)
63	B6.2/2	-61B6.2/2	Light barrier silo distribution bottom (Receiver)

Note: Items 60 to 63 only apply to the walking floor with filling function.
Note: For details on designation, see field wiring diagram.

Hydraulic unit



Number	Designation	Device tag	Description
64	M6	-7M6	Motor for hydraulic unit
65	Y6.1	-25Y6.1	Silo lid
66	Y6.9	-7Y6.9	Change silo distribution
67	N6.1	-7N6.1	Hydraulic temperature
68	N6.2	-7N6.2	Hydraulic level

Note: For details on designation, see field wiring diagram.

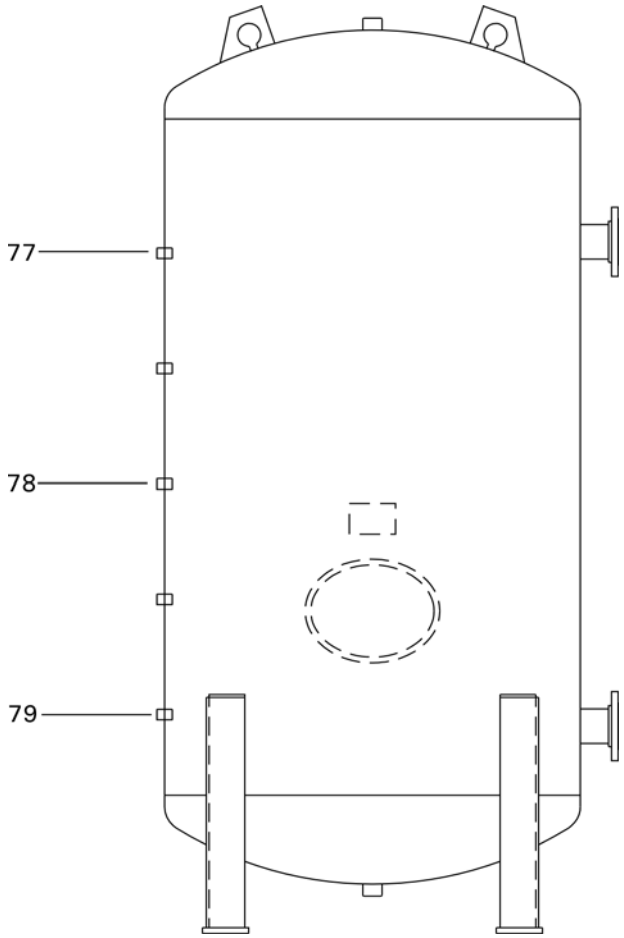
Thermal Storage Tank

Silo Lid

Number	Designation	Device tag	Description
69	Y6.3	-22Y6.3	Solenoid valve silo lid open
70	Y6.4	-22Y6.4	Solenoid valve silo lid close
71	S6.1	-22S6.1	Key operated switch for silo lid
72	M901	-24M901	Vibration motor 1
73	M902	-24M902	Vibration motor 2
74	M903	-24M903	Vibration motor 3
75	S901	-24S901	Key operated switch for vibration motor
76	S5.1	-68S5.1	Safety switch for silo lid

Note: For details on designation see field wiring diagram
Note: The quantity of items 72 to 74 will depend on the size of the silo lid.

Thermal storage tank



Number	Designation	Device tag	Description
77	B28.1	-22B28.1	Thermal storage tank sensor (top)
78	B28.2	-22B28.2	Thermal storage tank sensor (middle)
79	B28.3	-22B28.3	Thermal storage tank sensor (bottom)

Note: For details on designation, see field wiring diagram.

Boiler Wiring

CAUTION

The Viessmann supplied field wiring diagram is not a complete system drawing. It is the installer's responsibility to assure that the control is suitable for the respective installation, and all necessary safety equipment is installed.

CAUTION

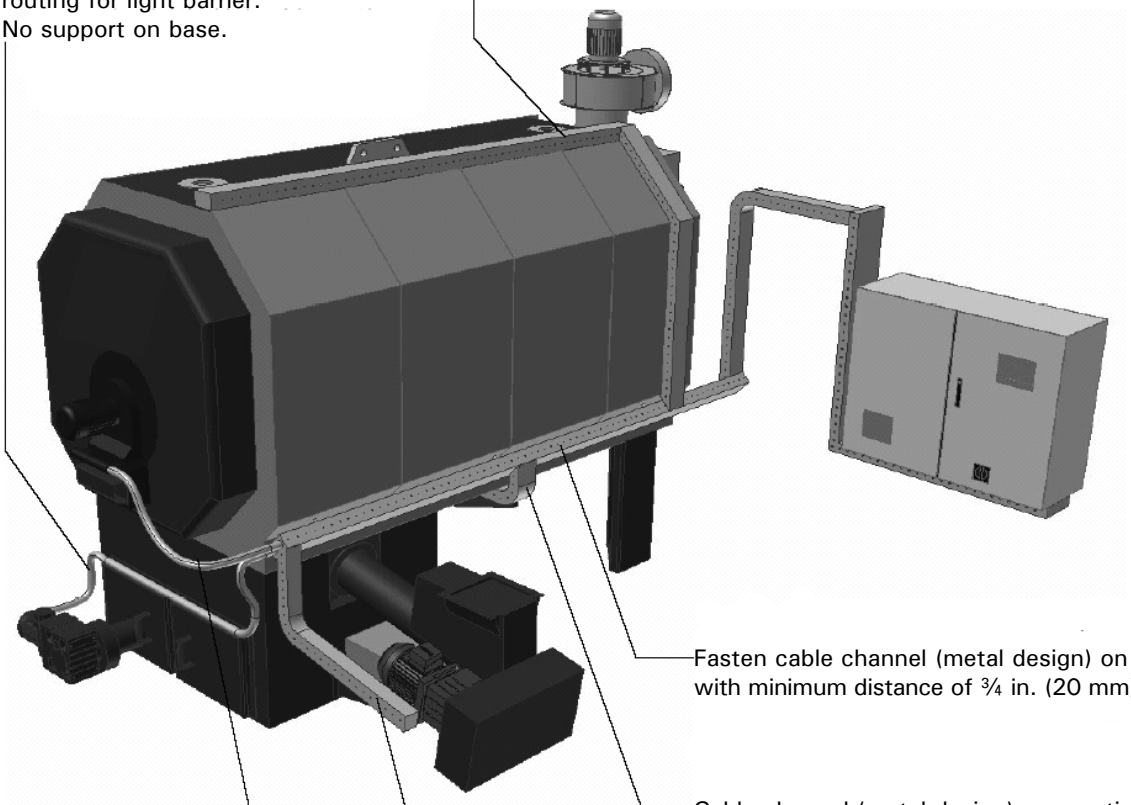
Any alteration of the control cabinet will void the warranty.

CAUTION

The information about wire type, wire number and wire gauge made in the wiring diagrams is not obligatory. The final decision of these settings has to be made by the executing installation company taking into consideration the local codes and regulations.

Lines arranged in metal pipe with minimum distance of 6 in. (150 mm) to the base. Use support with cable routing for light barrier.
No support on base.

Screw cable channel (metal design) onto the footplate on top of the boiler with minimum distance of ½ in. (10 mm).



Fasten cable channel (metal design) on casing with minimum distance of ¾ in. (20 mm).

Cable channel (metal design) over entire width of boiler: fastening on the bottom of the boiler jacket (it is not water-bearing).

Mount cable channel (metal design) with minimum distance of 7¾ in. (200 mm) to the in-feed auger: no support on the in-feed auger.

Arrange lines in protective cable hose with sufficient leeway to open and close the door (mind the door stop).

Commissioning

Initial start up

Only a Viessmann or another trained specialist may put a newly installed system into operation for the first time. Before the system is commissioned, the system must be filled with water, and the fuel for the commissioning and the installation itself must be inspected.

Note: It is mandatory to complete the Viessmann biomass project pre-commissioning form.

IMPORTANT

Be absolutely sure to follow the instructions. No warranties may be claimed for damages in cases of initial start-ups carried out improperly at one's own initiative.

First check:

- Is there enough water in the heating system?
- Has the heating system been bled of air?
- Are the valves open for the heating-system's supply and return flow?
- Can enough fresh air get into the heating room?
- Is the ash bin empty?
- Are the doors and lids on the boiler closed leak-tight?
- For safety, firing and ashpit doors keep tightly closed.

Filling the heating system

The first filling is usually performed with chemically untreated filtered water free of any suspended solids. Ensure that the air is carefully bled out while filling the boiler. Use appropriate water treatment specific to the local water conditions.

Note: The system fill pressure when the system is cold should be approximately 1.5 psi (0.1 bar) greater than the supply pressure of the closed expansion tank.

Fuel for the commissioning

For the commissioning, sufficient dry fuel (max. W 20%) should be stored for approx. 10-24 full operating hours:

Vitoflex 300-RF 150	approx. 2640 lb.
Vitoflex 300-RF 220	approx. 3300 lb.
Vitoflex 300-RF 300	approx. 4400 lb.
Vitoflex 300-RF 400	approx. 5500 lb.
Vitoflex 300-RF 500	approx. 6600 lb.

Since the boiler plant will be cold, and residual moisture will be drawn from the refractory concrete during the initial operation, the material to be burned for the initial operation has to be at least air dry. For the first three hours, the heating-up process should be carried out at low output.

To ensure that the silo extraction system is functioning properly, only place a minimal amount of fuel in the silo in case there is a problem. This enables the extraction system to be cleaned out quickly and the problem to be identified and corrected.

Water quality

Treatment for boiler feed water should be considered in areas with known problems, such as where a high mineral content and hardness exist. In areas where freezing might occur, it recommended that an antifreeze be added to the system water for protection against freezing. Please adhere to the specifications given by the antifreeze manufacturer. Do not use automotive silicate-based antifreeze. Please observe that an antifreeze/water mixture may require a back flow preventer within the automatic water feed and influence components such as diaphragm expansion tanks, radiation, etc. A 40% antifreeze content will provide freeze-up protection to -10°F (-23°C). Do not exceed 50% antifreeze mix ratio and do not use antifreeze other than specifically made for hot water heating systems.

Total output (MBH)	Total Hardness (ppm as ca CO_3)
> 1 Total ≤ 680	≤ 200
> 680 to ≤ 2050	≤ 150
> 2050	≤ 2

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

Oxygen diffusion barrier under floor tubing

The boiler warranty does not cover pressure vessel failure resulting from corrosion caused by the use of underfloor plastic tubing without an oxygen diffusion barrier. Such systems without oxygen diffusion barrier must have the tubing separated from the boiler with a heat exchanger. Viessmann always recommends the use of underfloor plastic tubing with an oxygen diffusion barrier.

CAUTION

Ensure that a Viessmann or another trained specialist is present for the boiler start-up and that it is done in a timely manner.
The warranty becomes null and void if this procedure is not followed.

Commissioning and handover

A qualified person from the owner's side must be present for the commissioning and handover.

The heat dissipation from the boiler plant has to be assured by the operating organization or by the heating contractor.

The heating contractor must confirm that the installation has passed inspection and signed off.

Compliance with these Installation Instructions and the Operating Instructions will ensure a safe and convenient heating with wood.

IMPORTANT

These Installation and Operating Instructions should be kept near the system on a permanent basis.

Filling the Fuel Storage Unit

When storage facilities for wood are required, the wood should be kept at least 5 ft. (1.5 m) from the heating appliance.

Horizontal extraction system and spring extraction system:

If any excess or negative pressure develops in the silo during the filling, the facility has to be switched off using the function button on the control panel. After doing so, complete filling the silo evenly and turn the facility back on, using the function button on the control panel. Carry out refilling in the same manner.

Pellet extraction auger:

Switch off the facility using the function button on the control panel and wait until there is no more fuel in the in-feed auger.

Slowly and evenly fill the silo until the extraction auger is covered approx. 10 in. to 12 in. (250 mm to 300 mm) high over the entire open area. Level out any mounds that form from pouring.

Switch on the facility using the function button on the control panel and wait until the metering container on the in-feed auger has filled. If any excess or negative pressure develops in the silo during the filling, the facility has to be switched off again using the function button on the control panel.

After doing so, complete filling the silo slowly and evenly. The facility can then be turned back on using the function button on the control panel. Carry out refilling in the same manner.

By dumping

Horizontal extraction system and spring extraction system.

Heating system in operation:

- If the articulated arms or spring-mounted plates are still covered by fuel, refilling can be carried out immediately.
- If the articulated arms or spring-mounted plates are no longer covered by fuel, fill the silo evenly to approx. 12 in. (300 mm) above the articulated arm or over the spring-mounted plates. As soon as the articulated arms or spring-mounted plates have retracted through a request for material, the refilling can be continued.

Heating system not in operation:

- If the articulated arms or spring-mounted plates are still covered by fuel, refilling can be carried out immediately.
- If the articulated arms or spring-mounted plates are no longer covered by fuel, fill the silo evenly to approx. 12 in. (300 mm) above the articulated arm or over the spring-mounted plates. Then activate the "SILO FILLING" function. To do so, press the LOADER SYSTEM button (F4) and then the left arrow button (<).
  Select "YES" and confirm with "OK". Wait until the articulated arms or the spring-mounted blades move under the cup washer, complete by evenly filling the silo. The "SILO FILLING" function enables the filling of the fire box.

Note: The "SILO FILLING" function cannot be activated until the heating system has been shut off for one hour.

Walking floor: fuel can be refilled at any time.

Funnel extraction system: it is mandatory that the heating system is in operation!

By blowing in

IMPORTANT

The heating system has to be shut off (danger of excess pressure or negative pressure caused by the action of blowing-in). Filling procedure as described in the section "By dumping".

Fixing malfunctions in the feed system

Refer to the Installation and Operating Instructions for details on the automatic fuel-feeding device.

If fuel hopper is installed, do not alter equipment in any way. The cause of motor malfunctions in-feed systems is usually clogging by large pieces of wood or foreign matter.

Switch off the facility using the function button on the control panel and wait until there is no more fuel in the in-feed auger. Fill the silo evenly to approximately 12 in. (300 mm) above the articulated arm or over the spring-mounted blades, switch on the facility using the function button on the control panel and wait until the articulated arms or the spring-mounted blades go under the cup washer.

⚠ CAUTION

DANGER OF INJURY:
Always turn OFF the main switch before carrying out any repair of a malfunction on feed systems and every time before a maintenance lid is opened or a protective device is removed!

Because of the automatic operation of the system it is impossible to foresee the time the conveying equipment will be turned on.

Note: Viessmann recommends the installation of carbon monoxide detector(s) inside the fuel storage area.

IMPORTANT

The fuel storage area/room must be designed, operated and maintained to national, provincial and local codes and requirements.

⚠ WARNING

The wood chip/pellet storage room must be adequately and permanently ventilated. Ensure the door or latches are securely locked open during presence in the room. No smoking, fires or open flames are permitted.

Excess Conditions

IMPORTANT

Excess temperature/power failure

⚠ CAUTION

DANGER OF THIS EQUIPMENT SUDDENLY GOING UP IN FLAMES:
DO NOT open the doors or lids on the boiler plant!

- Switch on additional heat loads.
- The flue gas exhaust blower shuts down.
- The temperature-limiting safety switch triggers.
- The thermal safety flush valve opens at approximately 203°F (95°C). The excess heat is being dissipated into the drain.

IMPORTANT

If the fixed high limit has triggered, it has to be manually unlocked.
The fixed high limit is situated at the top of the boiler.

To reset, unscrew the black cap and press the button.

Note: Resetting is only possible when the temperature has fallen to approx. 158°F (70°C).

Possible causes for excess temperature:

- Incorrect setting on the control module.
- Defective component of the system (pump or valve).
- Sudden drop in output to zero. The in-feed auger still has to be emptied. The heat yet produced by this can result in surplus temperature.
  Activate “DISSIPATE SURPLUS HEAT” function!

Low water/excess water pressure

Possible causes:

- Low water: Leakage in the heating system.
- Excess water pressure: The expansion tank is not functioning.

In either case, the boiler should be examined by a qualified heating contractor.

Note: Unlock this malfunction with either the reset button for the water level control system or for the overpressure monitor, and by pressing the OK button on the control panel.

Operating the Boiler

Heating up

- Press the F1 key “Vitoflex 300-RF Wood”. The loader modules will be switched on in the appropriate order. When there is enough fuel in the combustion chamber, the entire loader system switches off.
- The automatic ignition then takes place. The ignition process stops as soon as the fire is started.

Operation

- The wood fuel is supplied depending on the light barriers in the metering container and in the combustion chamber, allowing for residual oxygen.
- The primary and secondary air vents adjust the air flow depending on the flue gas temperature and residual oxygen.
- With the setting “Storage Management, Temperature, Storage, Average”, it is possible to keep the facility in continuous high-performance operation for as long as possible - with fewer ignitions, better efficiency and lower emissions.
  (Only possible with storage tank management option)
- When the boiler temperature set point is reached, the facility switches to “Run Auger Empty”. When the in-feed auger has been run empty, and the flue gas temperature is less than 194°F (90°C), the flue gas exhaust blower switches off and the air vents close.
- When the “System Temperature Setting” is fallen below the set point, the boiler will automatically start back up.

Switching off

- Press the F1 “Vitoflex 300-RF Wood”. As feedback to this, “Run Auger Empty” will appear on the control panel.

CAUTION

DO NOT use the main switch to switch off (DANGER OF BACK BURN)!

ECOTRONIC Control System

General information

The ECOTRONIC facility control system is a decentralized microprocessor system (CAN-BUS) developed by Viessmann with various modules that are connected by a data transmission line.

Its function: the ECOTRONIC records all the data relevant to operation and controls the supply of and demand for heat.

Thus the boiler plant is continuously monitored during all the operating phases and kept within an optimum range in terms of emissions.

Factory settings (pre-settings): all the parameters in the ECOTRONIC, such as set point values and switching times, are pre-set and can be called back up at any time. The figures for the factory settings are given in brackets for the various parameters.

Export of operational data via mod-bus Ecotronic

The boiler control Ecotronic can be expanded with the ECO-SED module. This module enables and operating data transfer between a building management system (Mod-Bus Master) and the boiler control (Mod-Bus-Slave) per serial interface (RS232).

Please refer to the Export of operational data via Mod-Bus Ecotronic for details.

Note: This module is optional and must be ordered separately.

Function keys

F1 (Vitoflex 300-RF Wood)
Switch WOOD operation on and off

F2 (Vitoflex 300-RF Oil)
Switch OIL operation on and off (not applicable to North America)

F3 (Vitoflex 300-RF Parameters)
Setting parameters, set point values, the date and time

F4 (Vitoflex 300-RF Loader System)
Setting of cycle switchover, advance-flow and post-flow times

Note: Depending on the design and setting, some menus and texts do not appear.

F5 (Group 1)
Setting parameters and set point values (heat distribution, Group 1)

F6 (Group 2)
Setting parameters and set point values (heat distribution, Group 2)

F7 (Group 3)
Setting parameters and set point values (heat distribution, Group 3)

F8 (Group 4)
Setting parameters and set point values (heat distribution, Group 4)

Note: Depending on the design and setting, some menus and texts do not appear.

ECOTRONIC Control System *(continued)*

MMC software update

The MMC software update is required if there is a change in the software, e.g. adding a control feature.
To perform the update, go by the following steps:

- Disconnect the power supply to the operating module.
- Remove the housing cover from the bottom of the Ecotronic module.
- Connect the MMC dongle to the port for the MMC-dongle.
- Keep the ∧ key pressed, connect the power supply to the Ecotronic module.
- After approx. 5 seconds the following text will be displayed: ⇨

Test clearance Press clearance

- Release the ∧ key.
- Briefly press the data transfer key to transfer the software.
- After the software update is done, the following message will be displayed: ⇨

Load program Ser: 000000000 MMC read ##### MMC evaluate: -M- Prg test: 100% OK Prg load: !00% OK

Finished, restart

- Disconnect the power supply.
- Keep the **OK** key pressed, connect the power supply to the Ecotronic module.
- After approx. 5 seconds the following text will be displayed: ⇨

New boot block FlashMonII V2.0da F1..load basic setting F3//Valves runtime OFF Measuring transducer normal

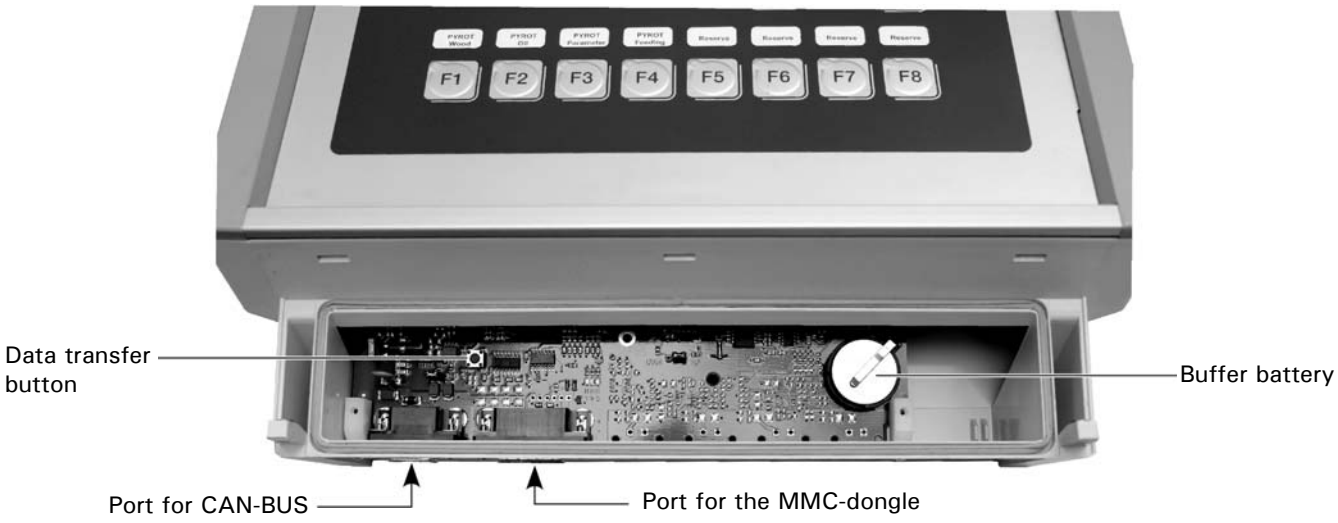
- Release the **OK** key, press the **F1** key to load the basic settings.
- Disconnect the power supply, wait for approx. 5 seconds.
- Connect the power supply.
- Disconnect the MMC-dongle approximately 5 seconds after the control has booted up. (Please return the MMC dongle as quickly as possible to Viessmann).

Replacing the battery

There is a battery built in beneath the removable lid on the control module (type: Panasonic Lithium BR2330).
It is for buffering the time, date and settings.

- The battery needs replacing every five years!
- Do not dissconnect the main power voltage while changing the battery (do not trun off main switch)!

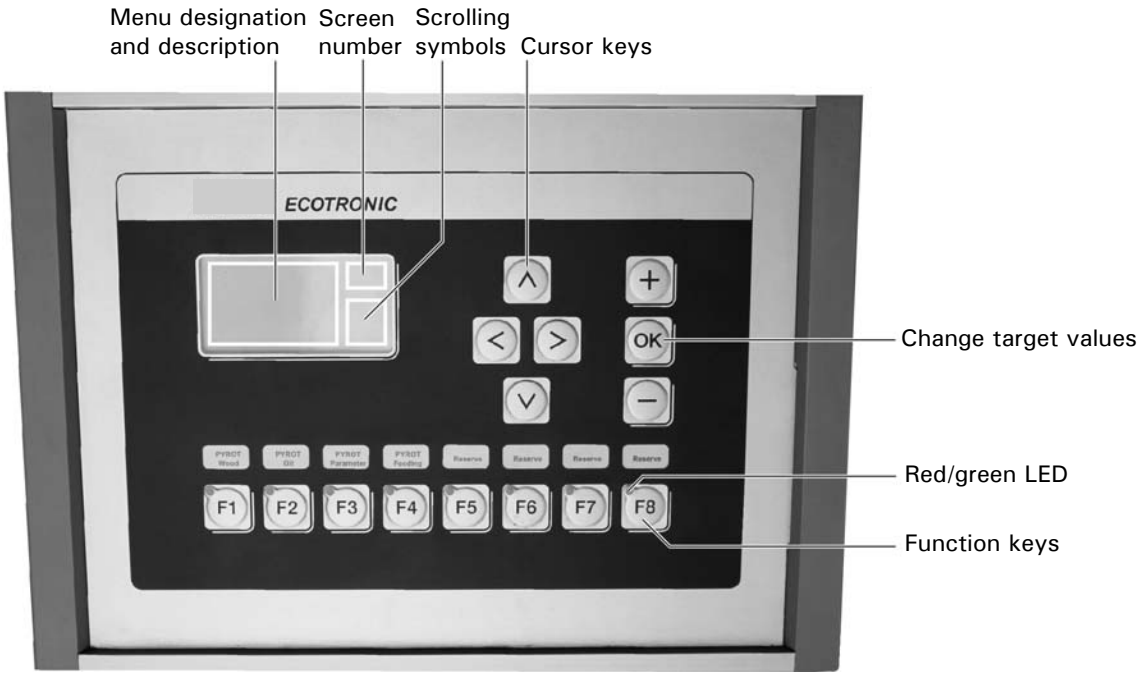
See the location of the battery on page 55.



Note: Once the update has been successfully loaded, the MMC-dongle will no longer be required by the Econtronic module.

ECOTRONIC Control System *(continued)*

1.0 Operating the ECOTRONIC



Menu designation: Display of the activated menu (e.g.: Vitoflex 300-RF parameter)
In addition, an activated menu is also indicated by the flashing green LED of the respective function key.

Screen number: Number of the control text displayed [e.g.: (1)]

Scrolling symbols: When the scrolling symbols are displayed it is possible to use the cursor keys ∧ and V to scroll up and down the text.

Cursor keys: Using the cursor keys < and > it is possible to flick through the individual menu screens. Using the cursor keys ∧ and V when the scrolling symbols are displayed, it is possible to move up and down each line of the menu screen.

Change target values: Using the target value keys + and - it is possible to amend the selected target values. Always confirm each change to the target values with the OK key.

Red/green LED: Green LED on permanently: Group is in operation
Flashing green LED: Parameters menu or service menu active
Red LED on permanently: Fault of the corresponding extended control system

Function keys: Select the respective parameters menu or service menu

2.0 Vitoflex 300-RF ECO wood-fired operation

Green LED	illuminates during wood-fired operation
Red LED	illuminates with excess temperature fault
Start wood-fired operation	**F1** (Vitoflex 300-RF wood) press briefly
Stop wood-fired operation	**F1** press briefly [only possible if the flue gas temperature is below 212°F (100°C)]

3.0 Vitoflex 300-RF ECO oil/gas burner operation (not applicable to North America)

Green LED	illuminates if oil/gas burner operation is preselected
Red LED	illuminates with excess temperature fault
Start oil/gas burner operation	**F2** (Vitoflex 300-RF oil) press briefly
Stop oil/gas burner operation	**F2** press briefly

ECOTRONIC Control System *(continued)*

4.0 Vitoflex 300-RF ECO parameters

Green LED - flashes with an active menu
Red LED - illuminates with excess temperature fault or Vitoflex 300-RF fault

4.1 Parameters menu

Menu designation - Vitoflex 300-RF parameter
Access menu - Press F3 briefly
Exit menu: - Press F3 briefly or automatically after 60 seconds

Screen number	Screen text	Parameter description	Factory setting
(1)	Accumulator temperature	Display all temperatures Only display if: - Thermal storage tank is available	-
(2)	Boiler return temperature	Set point for boiler return temperature	158°F (70°C)
(3)	Boiler inlet	Set point for boiler supply temperature	176°F (80°C)
(4)	Boiler flue gas	Maximum flue gas temperature limit value: If the limit value is exceeded, the air volume will be reduced (by the speed of the flue gas exhaust blower)	392°F (200°C)
(5)	Flue gas residual O_2	Residual oxygen (flue gas residual O_2) target value for lambda control: Primary and secondary air volume is regulated on the basis of the residual oxygen (by air vents).	7%
(6)	O_2 regulation	Switch oxygen regulation on or off for emergency operation. This system will switch to emergency operation if the O_2 sensor is not functioning properly.	On
(7)	Air vents without O_2 regulation	Position of the air vents with O_2 regulation switched off	100%
(8)	Dissipate excess heat	If the boiler temperature exceeds this limit value it is possible to dissipate the excess heat using the individual heating controllers	95%
(10)	Accumulator load at Oil/ gas operation until (Not applicable to North America)	Up to which temperature sensor should the hot water storage tank be loaded in oil/gas operation? Only display if: Thermal storage tank is available, Oil/gas burner available on Vitoflex 300-RF ECO (Vitoflex 300-RF service)	Lower temperature sensor
(11)	Accumulator load at Oil/ gas operation until (Not applicable to North America)	Up to which temperature should the hot water storage tank be loaded in oil/gas operation? Only display if: Hot water storage tank is available Oil/gas burner available on Vitoflex 300-RF ECO (Vitoflex 300-RF service) and hot water storage tank load in oil/gas operation - Yes (Vitoflex 300-RF parameter)	158°F (70°C)
(12)	System target temperature minimum	Minimum supply temperature with customer-provided heat distribution Only display if: Minimum system target temperature - YES (Vitoflex 300-RF Service)	122°F (50°C)

ECOTRONIC Control System *(continued)*

4.1 Parameters menu (continued)

Screen number	Screen text	Parameter description	Factory setting
(14)	Automatic operation Accumulator load to	Up to which temperature sensor should the thermal storage tank be loaded in wood operations Only display if: thermal storage tank available (thermal storage tank management option)	Lower temperature sensor
(15)	Automatic operation Accumulator load to	Up to which temperature should the thermal storage tank be loaded in wood operation? Only display if: thermal storage tank available (thermal storage tank management option)	176°F (80°C)
(16)	Storage management accumulator temperature middle	thermal storage tank average target temperature value (→ boiler output is reduced according to thermal storage tank load). Only display if: thermal storage tank available (thermal storage tank management option)	176°F (80°C)
(17)	Start boiler when dropping below the system target temp.	If the temperature of the selected thermal storage tank temperature sensor drops below the system target temperature, the Vitoflex 300-RF ECO wood operation starts (when preselected)	Upper temperature sensor
(20)	External boiler release	Should the boiler be switched on or off via an external potential-free contact? Only display if: Automatic start on external request option	No
(21)	Material retraction on increase air vent opening	Fuel controller target value (→ target air vents opening) Setting value > → more fuel in the combustion chamber Setting value < → less fuel in the combustion chamber	50%
(23)	In-feed auger Heat up cycle Target	After completing filling process and ignition process, the in-feed auger starts with this duty cycle	5%
(24)	In-feed auger Maximum	Maximum duty cycle of the in-feed auger	60%
(25)	Pneumatic boiler tube cleaning system	Pneumatic boiler tube cleaning interval (based on the in-feed auger operating time) Only display if: Pneumatic boiler tube cleaning option	500 sec
(28)	Wood-fire operation load	Operating hours / minutes for load operation Vitoflex 300-RF ECO	-
(30)	Oil/gas-fired operation (Not applicable to North America)	Operating hours / minutes for oil/gas-fired operation Vitoflex 300-RF ECO	
(31)	Date - Year	Set Year	-
(32)	Date - Month	Set Month	-
(33)	Date - Day	Set Day	-
(34)	Date - Weekday	Set Day of the week	-
(35)	Time - Hour	Set Hours (24 hr timer)	-
(36)	Time - Minutes	Set Minutes	-
(40)	Enter duration code		-
(41)	Measurement mode	Activation of measurement mode (only possible if Vitoflex 300-RF ECO with load). **IMPORTANT:** with measurement mode activated, the power regulation is inactive → ensure sufficient heat consumption!	No

ECOTRONIC Control System *(continued)*

4.2 Service Menu

Menu designation: - Vitoflex 300-RF service
Access menu: - Hold down OK, press F3 briefly
Exit menu: - Press F3 briefly or automatically after 60 seconds
Note: Depending on the design and setting, some menus and text do not appear.

Screen number	Screen text	Parameter description	Factory setting
(1)	Customer details	Display customer details and software version	-
(2)	Boiler data	Display all boiler target values	-
(3)	Boiler valve actuating drive Operating time	Operating time of the boiler control valve actuating drive SQS35.00 and SQY31 → operating time 120 seconds	140 sec
(7)	Flue gas blower with oil/gas-fired operation Nominal RPM (Not applicable to North America)	Speed of flue gas blower on the Vitoflex 300-RF ECO. The speed of the flue gas exhaust blower can be adjusted between 0 and 60 Hz in 14 levels. Only display if: oil/bas burner available (Service Vitoflex 300-RF)	4
(11)	System target temperature minimum	Is a minimum threshold of the system target temperature necessary (e.g. with customer-side heat distribution this parameter must be set to Yes)? It is possible to adjust the minimum target system temperature in the parameters menu	No
(18)	Oil/gas burner on the Vitoflex 300-RF ECO	Is an oil/gas burner fitted to the Vitoflex 300-RF ECO	No
(20)	Flue gas recirculation system	Is a flue gas recirculation system installed? (Flue gas recirculation system YES: the primary air vent is closed below 30 Hz depending on the current speed of the flue gas blower in order to feed more recirculated flue gas to the combustion in lower partial load operation)	No
(30)	Output controller factor	Speed of the output controller: → Rotational speed increase or decrease	10
(31)	Material volume controller factor	Speed of the material volume controller → In-feed auger duty cycle	25
(33)	Boiler inlet Maximum	Vitoflex 300-RF maximum supply temperature: when this temperature is exceeded the system switches from load operation to auger idle run.	194°F (90°C)
(34)	Boiler inlet Maximum delay	Time delay on exceeding the maximum supply temperature → empty auger.	60 sec
(37)	In-feed auger Terminate idle time at	On loader idle run, the in-feed auger is halted if the residual oxygen content exceeds this limit value → **IMPORTANT:** Noise development from the empty in-feed auger!	16.0%
(38)	In-feed auger tube temperature limit value	When this limit value is exceeded the in-feed auger is run idle in automatic mode (→ In-feed auger warm)	158°F (70°C)
(40)	Ember monitoring system level	At which light barrier should the ember monitoring system initiate control: Large ember bed: both light barriers must be broken. Small ember bed: only light barrier 1 (closer to the in-feed and /or lower) must be broken	Large ember bed

ECOTRONIC Control System *(continued)*

4.2 Service Menu (continued)

Screen number	Screen text	Parameter description	Factory setting
(41)	Ember monitoring system Switch-off delay Target	Delay ember bed light barriers until in-feed auger stops (in-feed auger operating time is monitored)	30 sec
(42)	In-feed auger Ember monitoring system Cycle ramp	With a broken ember bed light barrier, the duty cycle of the in-feed auger is reduced in accordance with this timing generator	20 sec
(50)	Flue gas blower Maximum rotational speed	Maximum speed of the flue gas exhaust blower	70%
(51)	Flue gas blower Minimum rotational speed	Minimum speed of the flue gas exhaust blower	30%
(52)	Flue gas blower initial rotational speed	At the start of automatic mode (heat up) the flue gas blower is regulated at this speed.	50%
(60)	Frequency converter 1	Status display of the frequency converter flue gas blower	
(61)	Timer number	Time module display	-
(62)	Controller number	Controller module display	-
(63)	Error number	Error memory: Display of the last 30 error messages with date and time	
(64)	Log for the RS 232	Select the log for the serial interface on the control module KOB → for trend display/archiving KOB (AnzWIN) Visualization → for visualization / data archiving ModBus → in operation Only display if: Export operating data via interface option	KOB
(65)	Visualization address	Controller address system visualization Only display if: Export operating data via interface option and log for the RS 232 = Visualization	110
(68)	Oxygen sensor	Oxygen sensor calibration function: If Vitoflex 300-RF ECO is not in operation, the oxygen sensor can be recalibrated with this function.	No
(69)	Load basic setting	Reset all Vitoflex 300-RF ECO parameters (Parameters - Menu and Service - Menu) to factory settings	No
(70)	Language	Selection of the user language	
(73)	MMC	Status display for the data logger (for archiving data on the MMC dongle)	

ECOTRONIC Control System *(continued)*

5.0 Vitoflex 300-RF ECO loading

Green LED - flashes with an active menu
Red LED - illuminates with loading fault

5.1 Loading menu

Menu designation: - Loading
Access menu: - Press F4 briefly
Exit menu: - Press F4 briefly or automatically after 60 seconds
Note: Depending on the design and setting, some menus and text do not appear.

Screen number	Screen text	Parameter description	Factory setting
(1)	Cleaning	Activation of cleaning function (only possible if Vitoflex 300-RF ECO → Off). During the cleaning function the grate motor is operated in long-term operation and the flue gas blower is operated with the automatic starting speed	No
(5)	Grate drive Pause	In load operation (manual and automatic mode) the grate drive is controlled with an adjustable idle time. (Pulse: 2 seconds, pause adjustable)	60 sec
(6)	Dosing container Idle run time	Operating time of the in-feed auger with free in-feed auger light barrier → Start conveying equipment	5 sec
(7)	Feed system 1 ..... delay	Switch-on delay of the feed system 1 (e.g. rotary valve, in-feed auger 1,..) Only display if: Feed system 1 available	3 sec
(8)	Feed system 1 ..... Post flow	Post flow of the feed system 1 (e.g. conveyor auger) Only display if: Feed system 1 available with post flow function (e.g. conveyor auger)	0 sec
(9) to (37)	Feed system 2 - 15	Switch-on delay or post flow of the conveying equipment 2 to 15 Only display if: Feed system 2 - 15 available or Feed system with post flow function available	
(38)	Extraction system 1 ..... delay	Switch -on delay of the extraction system 1 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 1 available	3 sec
(39)	Extraction system 1 ..... pulse	Pulse of the cycle extraction system 1 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 1 available or extraction system 1 available with clock circuit	5 sec
(40)	Extraction system 1 ..... Pause	Pause of the cycle extraction system 1 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 1 available or extraction system 1 available with clock circuit	0 sec

ECOTRONIC Control System *(continued)*

5.1 Loading menu *(continued)*

Screen number	Screen text	Parameter description	Factory setting
(41)	Extraction system 2 ..... delay	Switch-on delay of the extraction system 2 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 2 available	3 sec
(42)	Extraction system 2 ..... pulse	Pulse of the cycle extraction system 2 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 2 available or extraction system 1 available with clock circuit	5 sec
(43)	Extraction system 2 ..... Pause	Pause of the cycle extraction system 2 (e.g. spring extraction system, pellet extraction auger) Only display if: Extraction system 2 available or extraction system 1 available with clock circuit	0 sec
(44)	Extraction system 1 Hydraulics delay	Switch-on delay of the hydraulic unit extraction system 1 Only display if: Extraction system 1 with hydraulic unit available	5 sec
(45)	Extraction system 2 Hydraulics delay	Switch-on delay of the hydraulic unit extraction system 2 Only display if: Extraction system 2 with hydraulic unit available	5 sec
(46)	Extraction system 1 Horizontal extraction system agitator delay	Switch-on delay of the agitator of the horizontal extraction system 1 Only display if: Extraction system 1 available as horizontal extraction system	5 sec
(47)	Extraction system 2 Horizontal extraction system agitator delay	Switch-on delay of the agitator of the horizontal extraction system 2 Only display if: Extraction system 2 available as horizontal extraction system	5 sec
(50)	Silo filling	If the silo filling function should be started (only possible if the boiler has been out of operation for at least 1 hour).	No

5.2 Loading Service Menu

Menu designation: - Loading Service
Access menu: - Hold down **OK**, press **F4** briefly
Exit menu: - Press **F4** briefly or automatically after 60 seconds
Note: Depending on the design and setting, some menus and text do not appear.

Screen number	Screen text	Parameter description	Factory setting
(1)	In-feed auger Combustion chamber fill time	Fill time of the combustion chamber: With a cold boiler the in-feed auger is filled for this respective duration whilst the combustion chamber is heated	130 sec
(2)	In-feed auger Auger fill time	In-feed auger fill time: With a warm boiler the in-feed auger is filled for this respective duration while the combustion chamber is heated	120 sec
(5)	In-feed auger light barrier delay	Delay of the in-feed auger light barrier	500 ms

ECOTRONIC Control System *(continued)*

5.2 Loading Service Menu *(continued)*

Screen number	Screen text	Parameter description	Factory setting
(6)	Feed system 1 ..... light barrier delay	Delay of the conveying equipment 1 light barrier (e.g. in-feed auger 1) Only display if: Conveying equipment 1 available with light barrier	500 ms
(7) to (22)	Feed system 2 to conveying equipment 15 light barrier delay	Delay of the conveying equipment 2 to 15 light barriers Only display if: Conveying equipment available with light barriers	500 ms
(30)	Extraction system 1 .... preferred direction	Extraction system 1 with preferred rotating direction available? Only display if: Extraction system with reversing (funnel extraction system)	No
(31)	Extraction system 1 ..... reversing interval	Reversing interval extraction system 1 Preferred direction YES: The extraction is reversed in the event of an overload (current measurement) for the duration of the reversing interval. Subsequently preferred direction of rotation. Preferred direction NO: Extraction is reversed in the event of an overload (current measurement) and after the duration of the reversing interval. Only display if: Extraction system with reversing (funnel extraction system)	240 sec
(33)	Extraction system 1 cross load module light barrier delay	Delay of the light barrier walking floor auger extraction system 1 Only display if: Extraction system 1 hydraulic extraction system available	2500 ms
(34)	Extraction system 1 cross load module maximum operating time	Maximum operating time of the walking floor auger extraction system 1 with walking floor auger light barrier broken → forced control hydraulic drive Only display if: Extraction system 1 hydraulic extraction system available	80 sec
(35)	Extraction system 1 Hydraulics pulse	Following expiration of the maximum operating time of the walking floor auger extraction system 1 with broken light barrier of the walking floor auger, the hydraulic unit is force-controlled for this pulse time. Only display if: Extraction system 1 hydraulic extraction system available	20 sec
(40)	Extraction system 2 ..... Preferred direction	Extraction system 2 with preferred rotating direction available? Only display if: Extraction system with reversing (funnel extraction system)	No

ECOTRONIC Control System *(continued)*

5.2 Loading Service Menu *(continued)*

Screen number	Screen text	Parameter description	Factory setting
(41)	Extraction system 2 ..... reversing interval	Reversing interval extraction system 2 Preferred direction YES: The extraction is reversed in the event of an overload (current measurement) for the duration of the reversing interval. Subsequently preferred direction of rotation. Preferred direction NO: Extraction is reversed in the event of an overload (current measurement) and after the duration of the reversing interval. Only display if: Extraction system with reversing (funnel extraction system)	240 sec
(43)	Extraction system 2 cross load module light barrier delay	Delay of the light barrier walking floor auger extraction system 2 Only display if: Extraction system 2 hydraulic extraction system available	2500 ms
(44)	Extraction system 2 cross load module maximum operating time	Maximum operating time of the walking floor auger extraction system 2 with walking floor auger light barrier broken → forced control hydraulic unit Only display if: Extraction system 2 hydraulic extraction system available	80 sec
(45)	Extraction system 2 Hydraulics pulse	Following expiration of the maximum operating time of the walking floor auger extraction system 1 with broken light barrier walking floor auger, the hydraulic unit is force-controlled for this pulse time. Only display if: Extraction system 2 hydraulic extraction system available	20 sec
(46)	Extraction system 1 horizontal extraction system light barrier delay	Delay of the light barrier horizontal extraction system 1 Only display if: Extraction system 1 available as horizontal extraction system	2500 ms
(47)	Extraction system 2 horizontal extraction system light barrier delay	Delay of the light barrier horizontal extraction system 2 Only display if: Extraction system 2 available as horizontal extraction system	2500 ms
(50)	Grate drive factor	Factor for the calculation of the pause of the grate drive depending on the speed of the in-feed auger. The factor can be adjusted in the range of +1.0 to -1.0. The factory setting 0 means there is not in-feed auger dependent calculation of the grate pause.	0
(60)	Transport device	Status display for the STARTTEC in-feed auger, conveying equipment and extraction system. - It is possible to scroll between the individual Starttec using + and -. - F1: all OFF - F2: CLOCKWISE / SLOW - F3: COUNTER CLOCKWISE / FAST - F4: Output 1 (isolating valve OPEN) - F5: Output 2	

Quick Reference

°C	°F
-40	-40
-35	-31
-25	-13
-20	-4
-18	0
-16	+3
-14	+7
-12	+10
-10	+14
-9	+16
-8	+18
-7	+19
-6	+21
-5	+23
-4	+25
-3	+27
-2	+28
-1	+30
0	+32
+1	+34
+2	+36
+3	+37
+4	+39
+5	+41
+6	+43
+7	+45
+8	+46
+9	+48
+10	+50
+12	+54
+14	+57
+16	+61
+18	+64
+20	+68
+25	+77
+30	+86
+35	+95
+40	+104
+50	+122
+60	+140
+70	+158
+80	+176
+90	+194
+100	+212
+110	+230

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