DORCHESTER DR-SG

Gas-fired condensing water heater

INSTALLATION, COMMISSIONING AND SERVICING INSTRUCTIONS

Models

20-210, 25-210, 30-210,

35-356, 50-356, 60-356,

70-538, 80-538, 100-538, 120-538

IMPORTANT NOTE

THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT

Hamworthy

Customer After Sales Services

Telephone: 01202 662555 E-mail: service@hamworthy-heating.com Fax: 01202 662522

Technical Enquiries

To supplement the detailed technical brochures, technical advice on the application and use in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly

Hamworthy offer a service of site assembly for many of our products where plant room access is restricted. Using our trained staff we offer a high quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning

Commissioning of equipment by our own engineers, accredited agents or specialist sub-contractors will ensure the equipment is operating safely and efficiently.

Service Contracts

Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Service contracts enable you to plan and budget more efficiently.

Breakdown service, repair, replacement

Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts

We offer a comprehensive range if spare parts, providing replacement parts for both current and discontinued products. Delivery options are available to suit you. Please refer to our website hamworthy-heating.com for more details.

IMPORTANT: NOTE TO THE INSTALLER: LEAVE THESE INSTRUCTIONS ADJACENT TO THE GAS METER.

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Symbols used in this document

	**INFORMATION:**	This symbol draws attention to comments.
	**CAUTION:**	May cause damage to the installation or to other objects.
	**WARNING:**	May cause injury and serious material damage.
	**DANGER:**	May cause electrocution.

The DORCHESTER DR-SG is covered by Section G3 of the Building Regulations (England and Wales) Technical Standard P3 (Scotland) and Building Regulation P5 (Northern Ireland). Compliance can be achieved via a Competent Person Self Certification Scheme or notification of installation to the Local Authority Building Control Department.

It must be installed by a competent person as defined by the relevant regulations. Manufacturers notes must NOT be taken as overriding statutory obligations

1. WARNINGS AND RECOMMENDATIONS

To install, adjust and maintain the water heater, it must be carried out by a qualified and approved professional in accordance with current local and national regulations. These operations may require working on the hot water storage heater with the mains power on and the casing control cover removed, all necessary precautions must be taken. The water heater must always have the external covers fitted when put into operation.

1.1. Transport and storage

The water heater :

- must be stored vertically at a temperature of between -20 °C and +60 °C, with a relative humidity of between 5% and 95%.
- must not be stacked,
- must be protected from humidity.
- must not be exposed to the sun.
- must be transported vertically.
- must not be slung.
- must be removed from its pallet for any tilted or horizontal handling. In this case, the installer will carefully protect the product to avoid any damage during this handling.

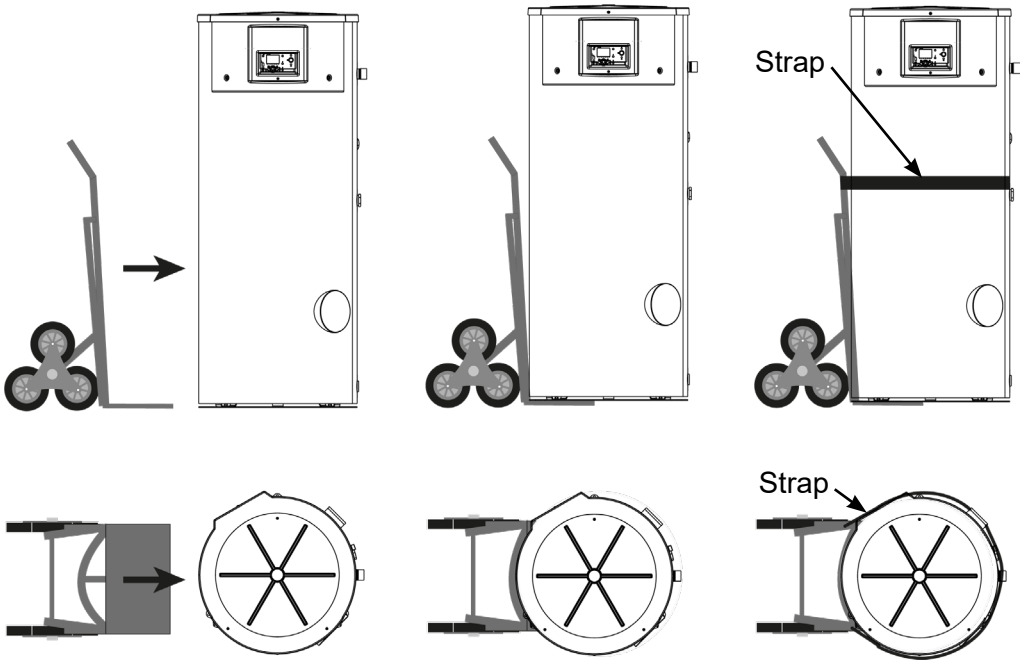
1.2. Qualification of personnel for installation, adjustment, use and maintenance

Boiler installation, adjustment and maintenance must be conducted by a Gas Safe installer (UK) or Registered Gas Installer (IE) . Operations may require work to be carried out with the power turned on and the casing open.
Basic operations must be carried out with the casing closed.

1.3. Handling

The DORCHESTER DR-SG must only be handled/moved using a pallet truck or a hand truck (see §3.4 for water heater weight). If the latter is used, the following handling recommendations MUST BE respected:

• Position the three-wheeled hand truck and the strap:



INFORMATION: **In order to move the DORCHESTER DR-SG XX-538 model through an 800 mm passageway, you will have to dismantle the top, the screen, the cable gland plate and the TDC bracket, the jacket and associated covers, and the display support.**

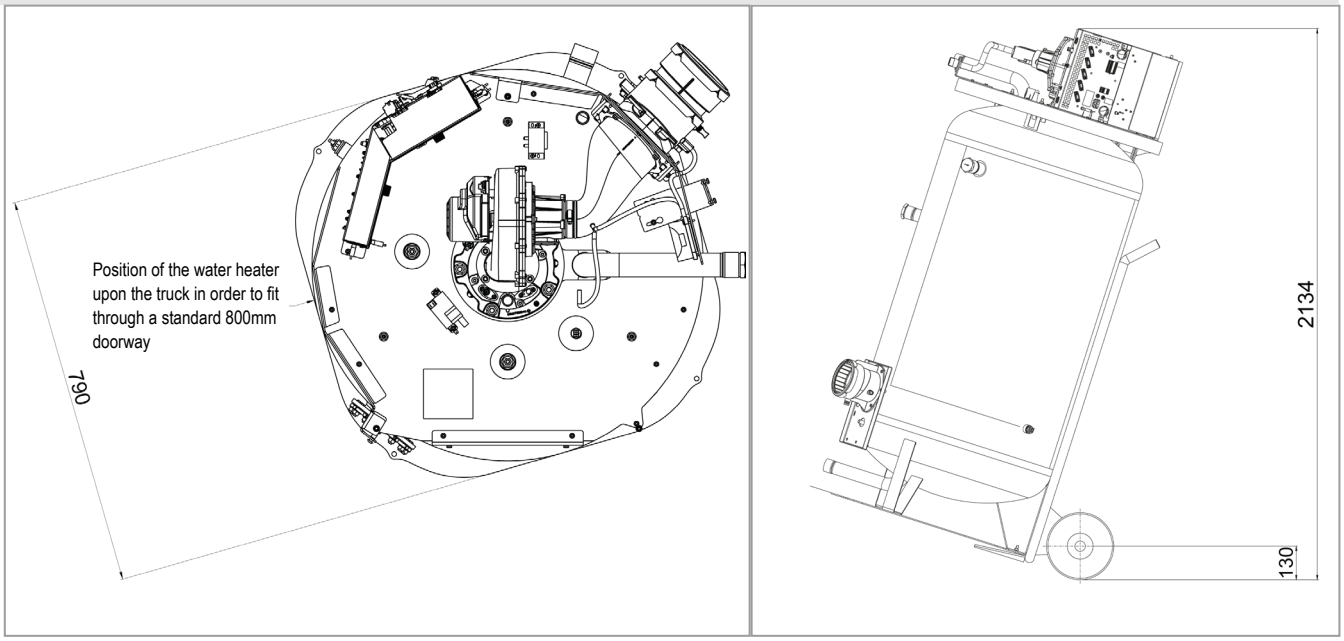


figure 1 - Transporting through a doorway - Dorchester DR-SG XX-538 model

WARNING : **Ensure that the DORCHESTER DR-SG is positioned as shown on the hand-truck in the diagrams above.**

IMPORTANT : **To avoid damaging the DORCHESTER DR-SG, we strongly recommend protecting it where it is in contact with the hand truck and the strap ratchet..**

1.4. Safety instructions

- Always disconnect the Dorchester DR-SG from the power supply and shut off the main gas supply before carrying out any work on it.
- Check that there are no gas leaks on the installation after any work on the Dorchester DR-SG (maintenance or repair).

WARNING:

If you smell gas:
Where safe to do so :

- **Turn off the gas supply at the emergency/meter control valve (ECV/ MCV).**
- **Extinguish and remove all sources of ignition.**
- **Ensure that any electrical switches are not operated either off or on.**
- **Ventilate the building by opening doors and windows to ensure an adequate air flow direct from outside.**
- **Perform an appropriate tightness test on the gas installation**
- **Where the tightness test indicates a gas escape exists, proceed to locate and repair the escape.**
- **If the source of the gas escape cannot be repaired there and then, make the installation safe and apply the procedures contained within IGEM/G/11 'Gas Industry Unsafe Situations Procedure' - formerly Gas Safe Register Technical Bulletin (TB) 001**
- **Where the installation has been proved to be tight and the smell of gas persists contact the National Gas Emergency Call Centre.**
- **Warn occupants and leave the building.**

WARNING:

If any product of combustion are released :

- **Follow a fumes investigation procedure in accordance to BS 7967:2015**

WARNING:

This appliance's earth continuity is provided by link cables (green/ yellow) and specific holding screws. During any disassembly operations, make sure that the cables in question are reconnected; you MUST also reuse the original holding screws.

WARNING:

Risk of burns when emptying or touching the walls of the appliance

1.5. Water composition

For regions with very hard water (TH>24.5 Clark degrees), it is best to use a softener to prevent scaling problems in the heating element. Excessive scaling:

- Reduces device performance
- Can lead to corrosion of the heating element

Monitoring this is therefore important (the inspection hatch is provided for this purpose) and, if necessary, descale the appliance.

- The domestic water must meet the following criteria to guarantee the service life of the appliance:
- Chloride concentration less than 150 mg/L
- pH neutral (6.5 <pH<8)
- Total chlorine concentration less than 1 mg/L

It is possible to disinfect the appliance by occasionally implementing what are called chlorine shocks within the limit of 50 mg/L of chlorine for between 4 to 6 hours. Exposure time should not exceed 24 hours at room temperature.
This disinfection can also be performed using hydrogen peroxide with a maximum concentration of 30% and an exposure time of less than 24 hours at room temperature.

2. APPROVALS

2.1. Compliance with European Directives

- Low Voltage (2014/35/EU):

This product is intended for use only by competent persons.
Children should be supervised to ensure that they do not play with the appliance.

- Electromagnetic compatibility (2014/30/EU)

- Gas appliance (2009/142/CE)

- Efficiency (92/42/CEE)

- Eco-design (2009/125/EC):

In accordance with the Directive and the requirements of Regulation (EU) No 814/2013 of 2 August 2013, the technical parameters of water heaters with an output of 400 kW or less are provided in Appendix A.

- Energy efficiency labels (2010/30/CE) :

In application of the directive and according to the requirements of the EU regulation No. 812/2013 of 18 February 2013, the information on water heaters with a power of less than or equal to 70 kW is provided in appendix A of the installation manual.

- WEEE (2012/19/EU):

Waste Electrical and Electronic Equipment. See section 9.Standards and Regulations

Current Gas Safety (Installation and Use) Regulations or rules in force. The appliance is suitable only for installation in GB and IE and should be installed in accordance with the rules in force.

In GB, the installation must be carried out by a suitably qualified Gas Safe registered engineer or in IE by a competent person. It must be carried out in accordance with the relevant requirements of the: Gas Safety (Installation and Use) Regulations The appropriate Building Regulations either The Building Regulations, The Building Regulations (Scotland), Building Regulations (Northern Ireland). The Water Fittings Regulations or Water byelaws in Scotland. The Current I.E.T. Wiring Regulations.

Where no specific instructions are given, reference should be made to the relevant British Standard Code of Practice.

In IE, the installation must be carried out by a Competent Person and installed in accordance with the current edition of I.S.813 “Domestic Gas Installations” or I.S. 820 “Non-Domestic Gas Installations” as appropriate, the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

- The Building regulations.
Approved document G, Approved document L and Approved document P and Approved document J
Technical standard P3 Scotland
Building regulation P5 Northern Ireland

- British standards.
BS 5440 Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases)
Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys.
Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances.
BS 6644 Specification for the installation and maintenance of gas-fired hot water boilers of rated inputs between 70 kW (net) and1.8 MW (net) (2nd and 3rd family gases)
BS 7671 Requirements of Electrical Installation IET wiring regulations 18th Edition
BS 6891 Specification for the installation and maintenance of low pressure gas installation pipework of up to 35 mm (R1¼) on premises
BS 5546 Specification for installation and maintenance of gas-fired water-heating appliances of rated input not exceeding 70 kW net
7074-2 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. Code of practice for low and medium temperature hot water heating systems
BS 6880 1 Code of practice for low temperature hot water heating systems of output greater than 45 kW. Fundamental and design considerations
BS 6880 2 Code of practice for low temperature hot water heating systems of output greater than 45 kW. Selection of equipment
BS 6880 3 Code of practice for low temperature hot water heating systems of output greater than 45 kW. Installation, commissioning and maintenance
BS 6798 Code of practice for low temperature hot water heating systems of output greater than 45 kW. Installation, commissioning and maintenance
BS 6700 Design, installation, testing and maintenance of services supplying

water for domestic use within buildings and their curtilages.

Any installation must be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Wiring Regulations and the Water Fitting Regulations (England and Wales) or Water Byelaws (Scotland). It should be read in accordance with the relevant recommendations of the following:

BS EN 12828 2012 Heating systems in buildings - Design for water-based heating systems.

BS EN 12831 Heating systems in buildings - Method for calculation of the design heat load

BS EN 14336 Heating systems in buildings - Installation and commissioning of water based heating systems

BS EN 806-1 Installations Inside Buildings Conveying Water for Human Consumption - Part 1: General

BS EN 806-2 Specification for installations inside buildings conveying water for human consumption - Part 2: Design

BS EN 806-3 Specifications for installations inside buildings conveying water for human consumption - Part 3: Pipe sizing

BS EN 806-4 Specifications for installations inside buildings conveying water for human consumption - Part 4: Installation

BS EN 806-5 Specifications for installations inside buildings conveying water for human consumption - Part 5: Operation and maintenance

BS 8558 : 2015 Guide to the deisgn, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages - complementary guidance to BS EN 806

BS 7593 : 2019 Code of practice for the preparation, commissioning and maintenance of domestic central heating and cooling water systems

- IGEM publications.

IGEM/UP/1B Tightness testing and direct purging of small Liquefied Petroleum Gas/Air, Natural Gas and Liquefied Petroleum Gas installations.

IGE/UP/1 Strength testing, tightness testing and direct purging of industrial and commercial gas installations

IGE/UP/1A Strength and tightness testing and direct purging of small low pressure industrial and commercial Natural Gas installations

IGE/UP/10 Installation of flued gas appliances in industrial and commercial premises

- Additional standards

Health and Safety at Work etc Act 1974

Electricity at Work Regulations 1989

The water supply (water fittings) regulations 1999

- Fire Safety Regulations:

a) General requirements:
   - Building regulations 2010 approved document B.

b) Special requirements for each type of establishment receiving the public (hospitals, shops, etc.).

2.2. Gas category

The DR-SG water heater has been factory-set to operate with **group H natural gas (type G20) with a nominal supply pressure of 20 mbar.**
See chapter 4.8 for how to change the gas, and use a qualified professional.

INFORMATION: **Any work on a sealed component will lead to loss of the guarantee.**

	Gas category
Dorchester DR-SG XX-210 (20 to 30kW)	II2H3P
Dorchester DR-SG XX-356 (35 to 60kW)	II2H3P
Dorchester DR-SG XX-538 (70 to 120kW)	II2H3P

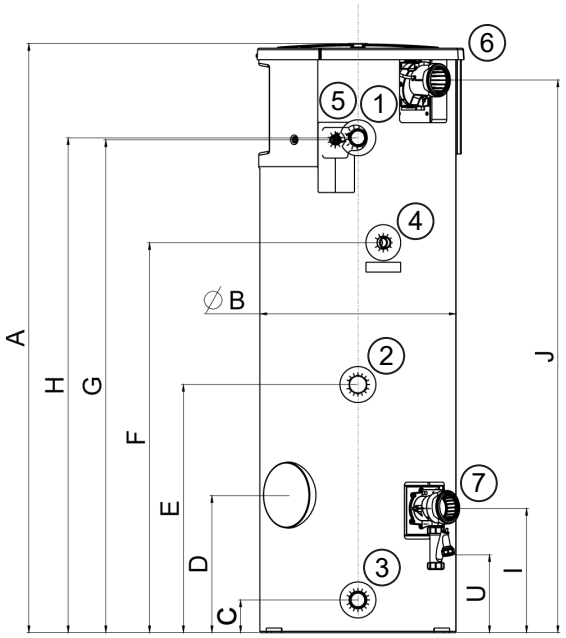
2.3. Gas supply pressures

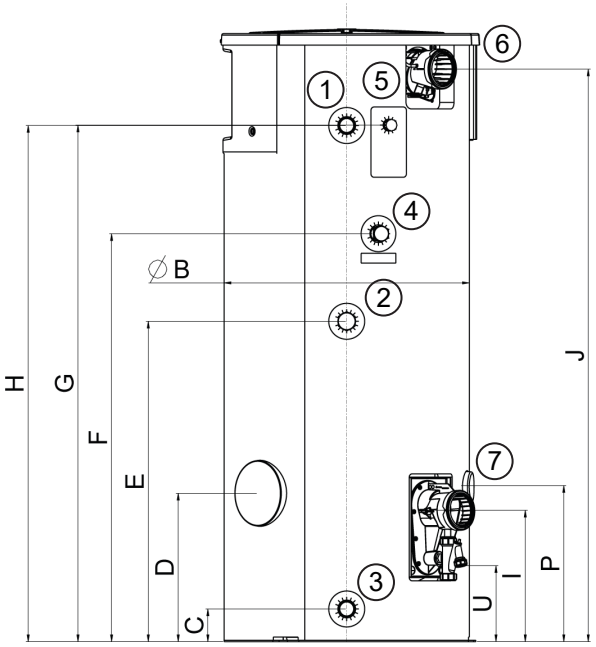
INFORMATION: **The pressures provided below must be taken at the inlet to the gas valve.**

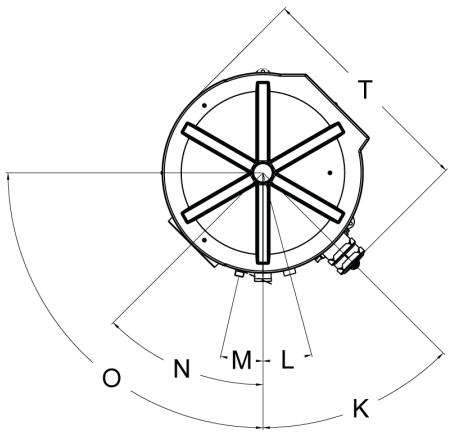
	Natural gas H G20	Propane gas G31
Nominal pressure (mbar)	20	37
Minimum pressure (mbar)	17	25
Maximum pressure (mbar)	25	45

3. TECHNICAL SPECIFICATIONS

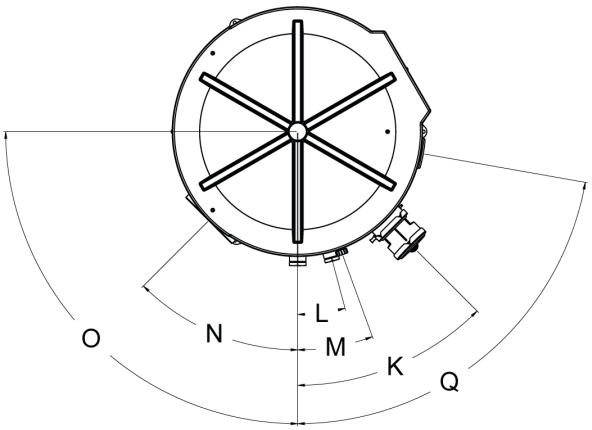
3.1. Dimensions





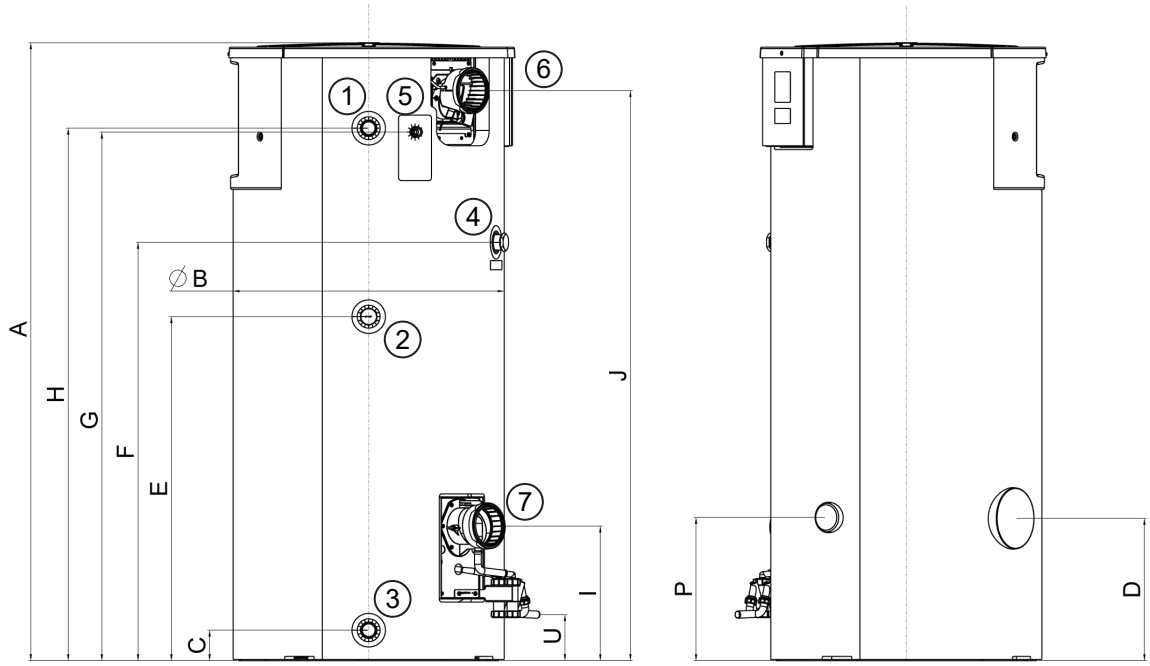


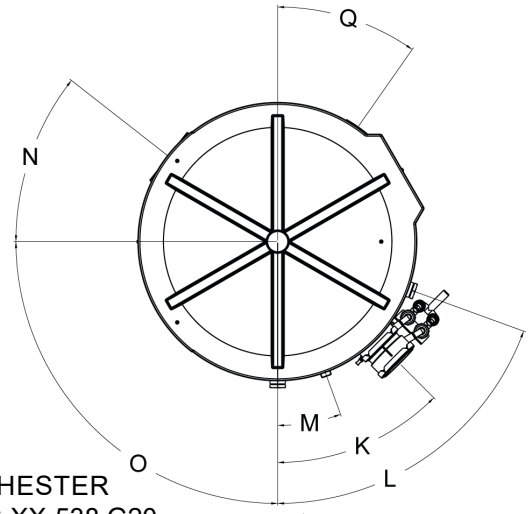
DORCHESTER DR-SG XX-210



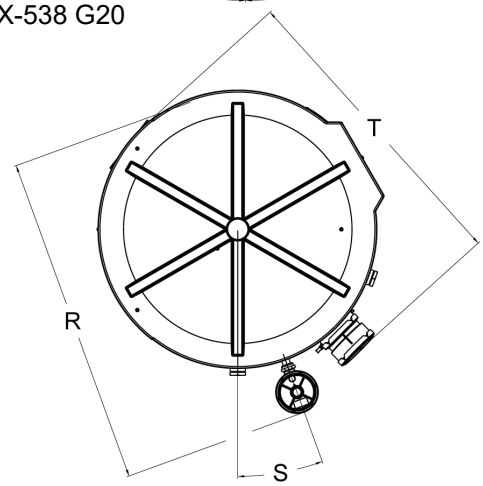
DORCHESTER DR-SG XX-356

		MODELS									
		Dorchester DR-SG XX-210			Dorchester DR-SG XX-356			Dorchester DR-SG XX-538			
		20	25	30	35	50	60	70	80	100	120
1	Hot water outlet	Rp 1"1/2			Rp 1"1/2			Rp 1"1/2			
2	Secondary return	Rp 1"1/2			Rp 1"1/2			Rp 1"1/2			
3	Cold water inlet	Rp 1"1/2			Rp 1"1/2			Rp 1"1/2			
4	T&P valve (UK only)	Rp 1"			Rp 1" 1/4			Rp 1" 1/2			
5	Gas inlet	R 3/4"			R 3/4"			R 1"			
6	Air inlet	Ø 80			Ø 100			Ø 130			
7	Fume outlet	Ø 80			Ø 100			Ø 130			





DORCHESTER
DR-SG XX-538 G20

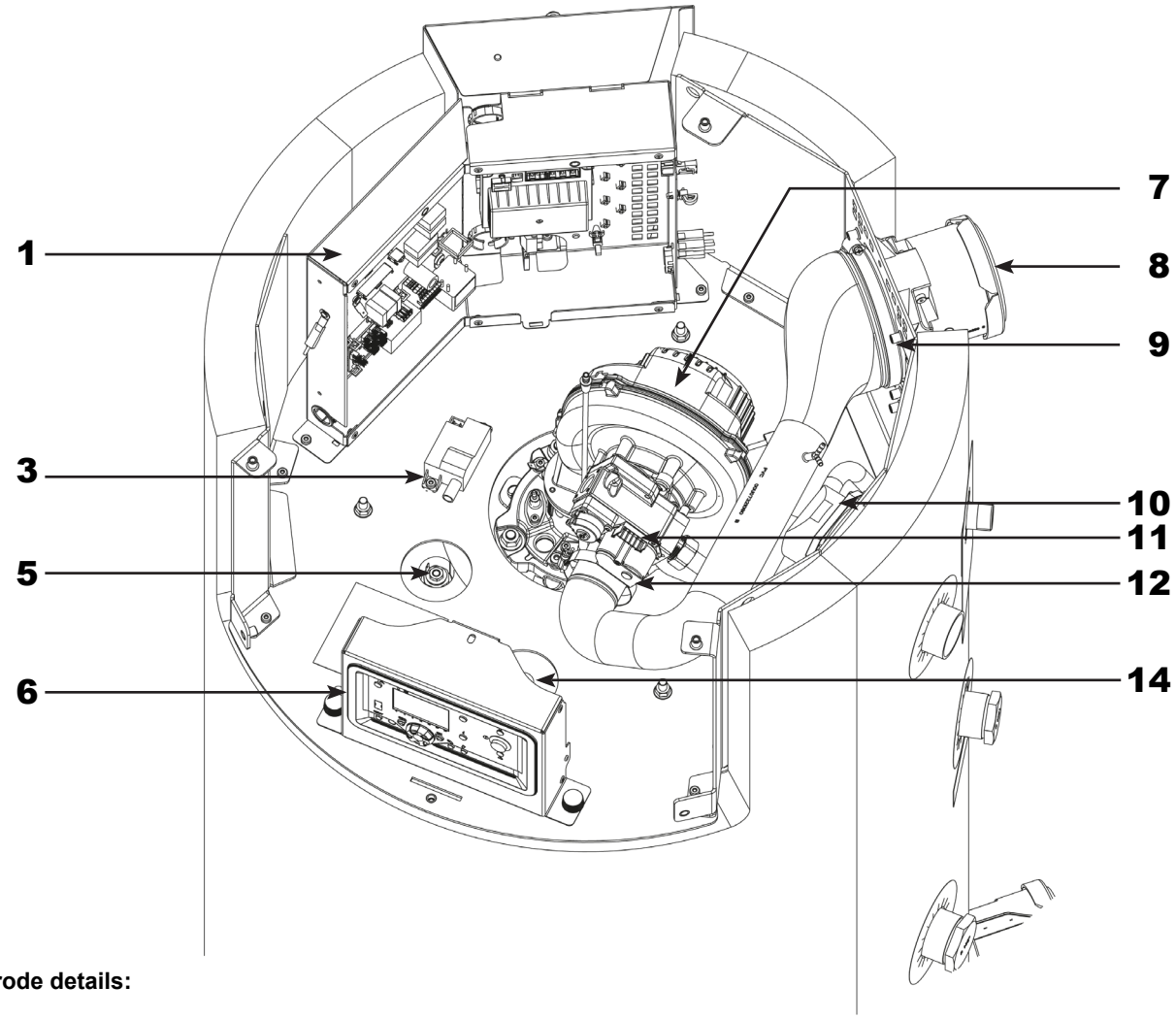


DORCHESTER DR-SG XX-538
with LPG CONVERSION KIT (AA031275)

REF	Description	DR-SG XX-210	DR-SG XX-356	DR-SG XX-538
A	Overall Height	1802	1874	2028
B	Diameter	Ø 600	Ø 750	Ø 890
C	Height to cold water inlet	100	100	100
D	Height to inspection hatch	419	454	467
E	Height to secondary return	759	980	1129
F	Height to T&P valve connection	1193	1248	1373
G	Height to gas connection	1508	1580	1735
H	Height to hot water outlet	1514	1579	1748
I	Height to flue outlet	380	402	442
J	Height to air inlet	1691	1752	1871
K	Angle position of flue outlet	45°	45°	45°
L	Angle position of T&P valve fitting	13°	15°	70°
M	Angle position of gas connection	12.9°	20°	20°
N	Angle position of inspection hatch	45°	45°	38°
O	Angle position of HMI	90°	90°	90°
P	Height to lower anode fitting	NA	478	470
Q	Angle position of lower anode fitting	NA	80°	35°
R	Overall width with LPG conversion kit	NA	NA	639
S	Angle position of gas connection with LPG conversion kit	NA	NA	20°
T	Width	699	884	1020
U	Height to condensate trap outlet	238	235	151

3.2. Boiler components

1 Control unit
2 Ionisation electrode
3 Ignition transformer
4 Sight glass
5 Upper powered anode
6 Complete display (user interface)
7 Fan
8 Air inlet
9 Air valve
10 Air pressure switch
11 Gas valve
12 Gas mixer tap
13 Ignition electrode (spark train)
14 Triplex sensor (behind HMI screen)



Electrode details:

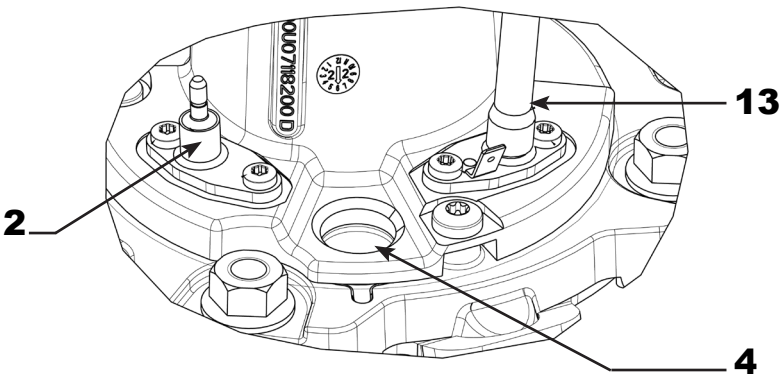
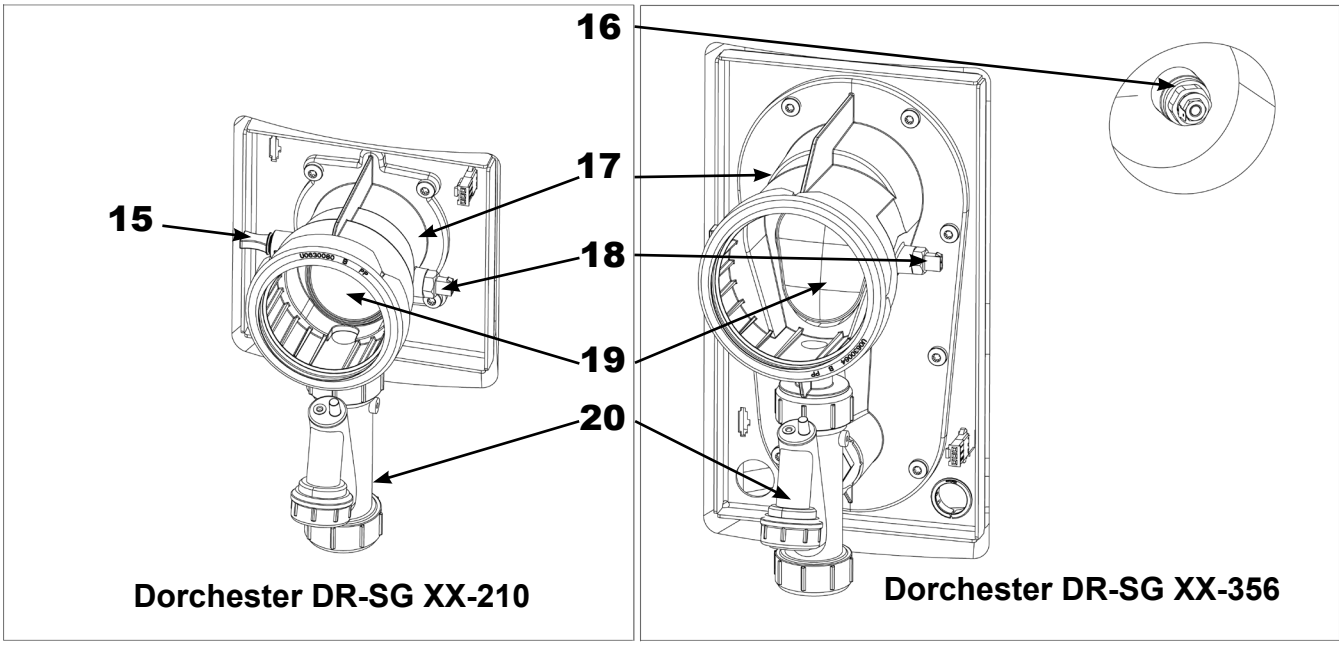


figure 2 - Dorchester DR-SG components

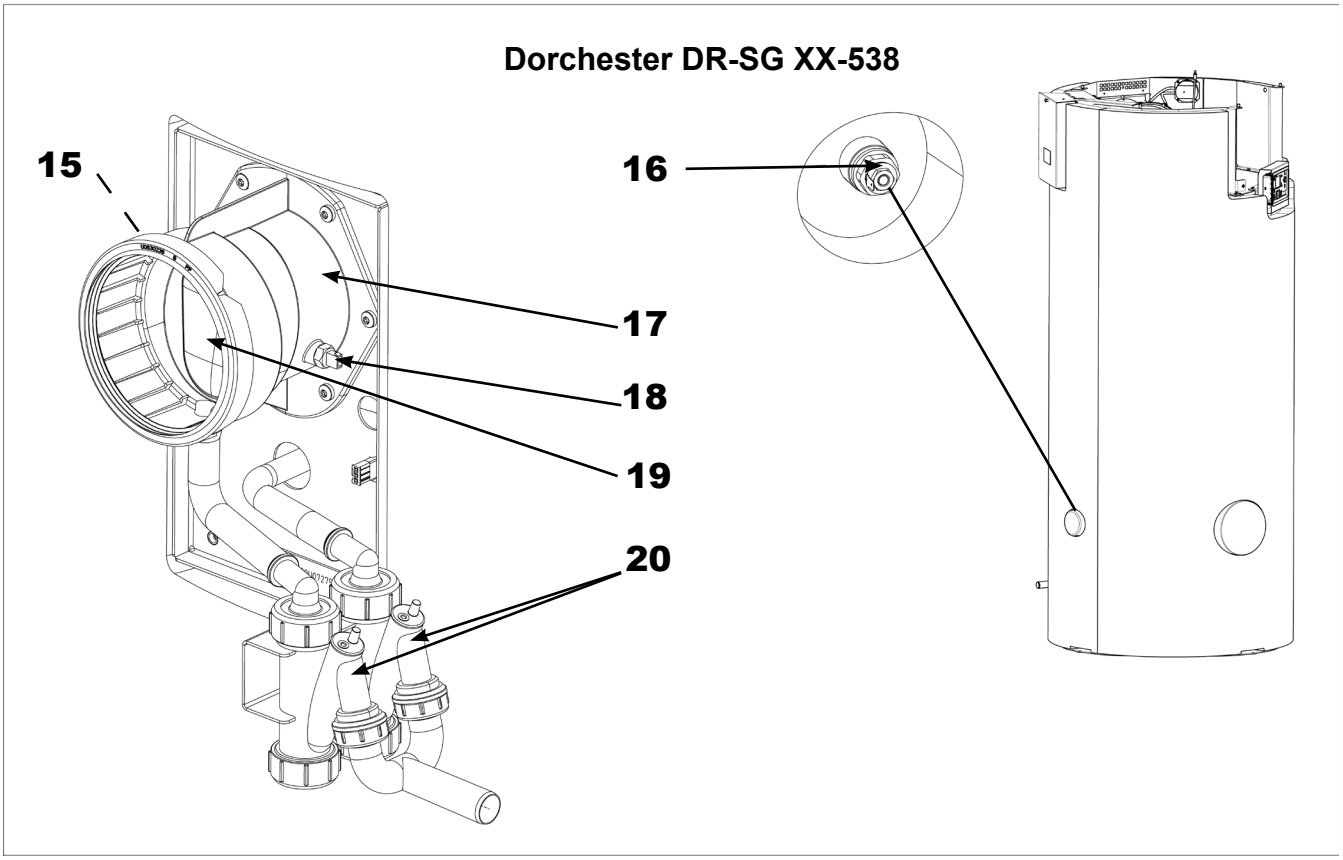
15 Sample point
16 Lower powered anode
17 Smoke nozzle
18 Flue temperature sensor
19 NRV
20 Condensate removal siphon



Dorchester DR-SG XX-210

Dorchester DR-SG XX-356

Dorchester DR-SG XX-538



3.3. Combustion at 15°C and 1013 mbar

3.3.1. Combustion G20

			Dorchester DR-SG XX-210		
			20 kW	**25 kW**	**30 kW**
Nominal power Pn	kW		21	26.3	31.5
Rated heat input Qn	kW		20	25	30
Min heat input Qmin	kW		6	6	6
Gas flow rate at Pn (15 °C)	m^3/h		2.1	2.6	3.2
CO_2 value range	%		at Qmin: 9.4 % < CO_2 < 9.8 % at Qmax: 8.6 % < CO_2 < 9.0 %		
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	33.1 7.9	41.4 7.9	49.7 7.9
Temperature of the combustion products circuit	°C		100	100	100
Nominal operating temperature of the combustion products	°C		57	58	60
Exhaust outlet interior diameter	mm		80	80	80
Maximum allowable nozzle pressure (B23P)	Pa		110	170	200
Combustion air flow rate at Qn (15 °C)	m^3/h		25	31	37
Nitrogen oxide emissions (NOx)	mg/kWh		29	29	29
Smoke removal and air inlet type classifications			B23 / B23p / C13 / C33		

			Dorchester DR-SG XX-356		
			35 kW	**50 kW**	**60 kW**
Nominal power Pn	kW		37	53	60
Rated heat input Qn	kW		35	50	56.6
Min heat input Qmin	kW		11.3	11.3	11.3
Gas flow rate at Pn (15 °C)	m^3/h		3.7	5.3	6
CO_2 value range	%		at Qmin: 9.0 % < CO_2 < 9.4 % at Qmax: 8.2 % < CO_2 < 8.6 %		
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	53.3 16.6	79.9 16.6	95.0 16.6
Temperature of the combustion products circuit	°C		100	100	100
Nominal operating temperature of the combustion products	°C		40.3	50.9	51.6
Exhaust outlet interior diameter	mm		100	100	100
Maximum allowable nozzle pressure (B23P)	Pa		130	200	200
Combustion air flow rate at Qn (15 °C)	m^3/h		44	63	72
Nitrogen oxide emissions (NOx)	mg/kWh		32	32	32
Smoke removal and air inlet type classifications			B23 / B23p / C13 / C33		

			Dorchester DR-SG XX-538			
			70 kW	**80 kW**	**100 kW**	**120 kW**
Nominal power Pn	kW		73.4	84	105	126
Rated heat input Qn	kW		69.9	80	100	120
Min heat input Qmin	kW		24	24	24	24
Gas flow rate at Pn (15 °C)	m^3/h		7.4	8.5	11	12.7
CO_2 value range	%		at Qmin: 9.2 % < CO_2 < 9.6 % at Qmax: 8.4 % < CO_2 < 8.8 %			
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	104.4 32.4	118.8 32.4	158.4 32.4	187.2 32.4
Temperature of the combustion products circuit	°C		100	100	100	100
Nominal operating temperature of the combustion products	°C		56.8	58.8	59.8	59.3
Exhaust outlet interior diameter	mm		130	130	130	130
Maximum allowable nozzle pressure (B23P)	Pa		65	95	155	200
Combustion air flow rate at Qn (15 °C)	m^3/h		88	101	126	152
Nitrogen oxide emissions (NOx)	mg/kWh		39	39	39	39
Smoke removal and air inlet type classifications			B23 / B23p / C13 / C33			

3.3.2. Combustion G31

			Dorchester DR-SG XX-210		
			20 kW	**25 kW**	**30 kW**
Nominal power Pn	kW		21	26.3	31.5
Rated heat input Qn	kW		20	25	30
Min heat input Qmin	kW		6	6	6
Gas flow rate at Pn (15 °C)	m^3/h		0.8	1	1.2
CO_2 value range	%		at Qmin: 10.8 % < CO_2 < 11.2 % at Qmax: 10.4 % < CO_2 < 10.8 %		
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	21.6 7.2	31.7 7.2	38.2 7.2
Temperature of the combustion products circuit	°C		100	100	100
Nominal operating temperature of the combustion products	°C		37	53	59
Exhaust outlet interior diameter	mm		80	80	80
Maximum allowable nozzle pressure (B23P)	Pa		120	200	200
Combustion air flow rate at Qn (15 °C)	m^3/h		24	30	36
Smoke removal and air inlet type classifications			B23 / B23p / C13/ C33		

			Dorchester DR-SG XX-356		
			35 kW	**50 kW**	**60 kW**
Nominal power Pn	kW		37	53	60
Rated heat input Qn	kW		35	50	56.6
Min heat input Qmin	kW		11.3	11.3	11.3
Gas flow rate at Pn (15 °C)	m^3/h		1.4	2	2.4
CO_2 value range	%		at Qmin: 10.8 % < CO_2 < 11.2 % at Qmax: 10.4 % < CO_2 < 10.8 %		
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	42.8 14.4	63.0 14.4	76.7 14.4
Temperature of the combustion products circuit	°C		100	100	100
Nominal operating temperature of the combustion products	°C		37.8	48.7	50.8
Exhaust outlet interior diameter	mm		100	100	100
Maximum allowable nozzle pressure (B23P)	Pa		152	200	200
Combustion air flow rate at Qn (15 °C)	m^3/h		42	60	68
Smoke removal and air inlet type classifications			B23 / B23p / C13 / C33		

			Dorchester DR-SG XX-538			
			70 kW	**80 kW**	**100 kW**	**120 kW**
Nominal power Pn	kW		73.4	84	105	126
Rated heat input Qn	kW		69.9	80	100	120
Min heat input Qmin	kW		24	24	24	24
Gas flow rate at Pn (15 °C)	m^3/h		2.7	3.1	4	4.7
CO_2 value range	%		at Qmin: 10.8 % < CO_2 < 11.2 % at Qmax: 10.4 % < CO_2 < 10.8 %			
Mass flow rate of the flue gas	kg/h	Q_n Q_{min}	93.6 32.4	108.0 32.4	136.8 32.4	187.2 32.4
Temperature of the combustion products circuit	°C		100	100	100	100
Nominal operating temperature of the combustion products	°C		53.1	56.3	57.6	58.5
Exhaust outlet interior diameter	mm		130	130	130	130
Maximum allowable nozzle pressure (B23P)	Pa		52	70	127	200
Combustion air flow rate at Qn (15 °C)	m^3/h		85	97	121	145
Smoke removal and air inlet type classifications			B23 / B23p / C13 / C33			

3.4. Operating conditions

		Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
Max DHW temperature setting	°C	80	80	80
DHW safety temperature	°C	92	92	92
Max service pressure	hPa (bar)	7000 (7)	7000 (7)	7000 (7)
Water content	L	210	356	538
Weight without water	kg	96	142	240
Acoustic power at P_{max} (Lw) *	dB (A)	63.6	75.4	77.9
Acoustic pressure 1 m at P_{max} (Lp)	dB (A)	52	64	66
Installation premises temperature (min / max)	°C	5 / 40	5 / 40	5 / 40
Installation premises relative humidity		between 15% and 95%	between 15% and 95%	between 15% and 95%
Protection level		IP 21	IP 21	IP 21
Maximum installation altitude	m	2000	2000	2000

* The sound power level is a laboratory measurement of the emitted sound power but contrary to the noise level, it doesn't correspond to the perceived measurement.

3.5. Electrical connection

		Dorchester DR-SG XX-210			Dorchester DR-SG XX-356			Dorchester DR-SG XX-538			
		20	**25**	**30**	**35**	**50**	**60**	**70**	**80**	**100**	**120**
Electrical power supply	V	230 V AC (+10% -15%), 50Hz			230 V AC (+10% -15%), 50Hz			230 V AC (+10% -15%), 50Hz			
Electrical power consumed at Qn (excluding accessory)	W	34	50	68	79	197	266	70	90	160	270
Electrical power consumption in standby mode	W	3.6	3.6	3.6	3.7	3.7	3.7	4.5	4.5	4.5	4.5
Maximum length of sensor cables	m	DHW storage tank sensor: 6m			DHW storage tank sensor: 6m			DHW storage tank sensor: 6m			
Terminal output power	V A	230V AC (+10%, -15%) From 5 mA to 1 A			230V AC (+10%, -15%) From 5 mA to 1 A			230V AC (+10%, -15%) From 5 mA to 1 A			
Fuses		T6.3H 250V x 2			T6.3H 250V x 2			T6.3H 250V x 2			

4. INSTALLATION

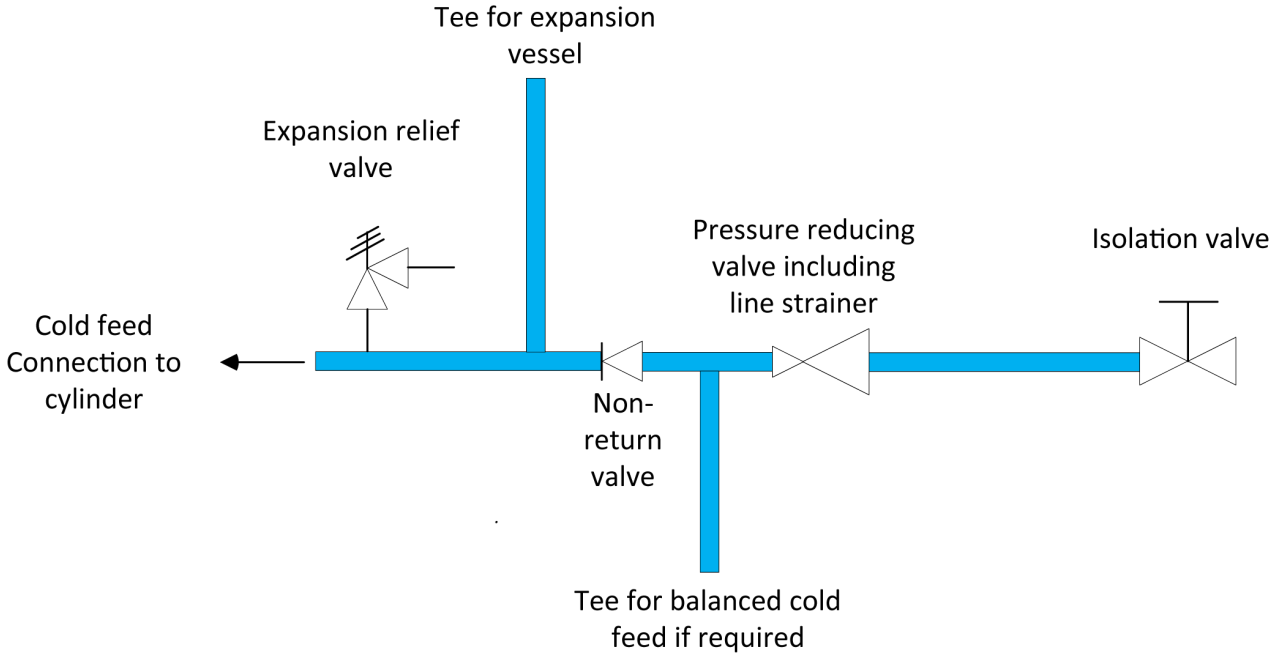
4.1. Ventilation

The appliance may only be installed in a room that complies with the requirements stated in national and local ventilation regulations.
BS5440 Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) –Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances.
BS 6644 Specification for the installation and maintenance of gas-fired hot water boilers of rated inputs between 70 kW (net) and1.8 MW (net) (2nd and 3rd family gases)
IGEM UP/10 Edition 4 with amendments installation of flued gas appliances in industrial and commercial premises.

4.2. Unvented installation

Unvented installations require a number of mandatory safety devices to be installed onto the system to prevent the build up of excessive pressure within the supply system or the storage vessel.

A bespoke unvented kit is offered and will supply the mandatory safety devices required to comply with Part G3 of the Building Regulations as well as the Water Regulations. The components shown in the drawing below must be installed in this order on the cold mains supply :



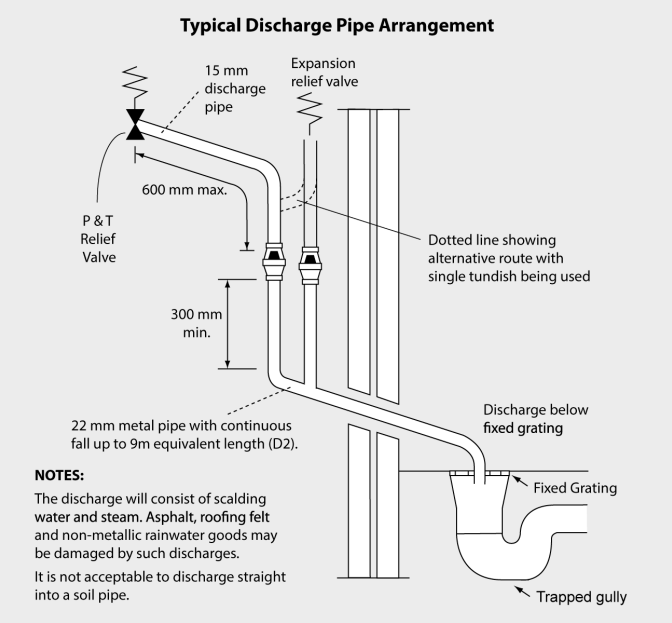
INFORMATION: **The DR-SG water heater does not come with an integrated drain valve. A tee, reducing fitting and drain valve are provided within the unvented kit and must be fitted closest to the cold water inlet connection.**

The following information is taken from Approved Document G3 of the Building Regulations and is provided to assist with the design and installation of the discharge pipework. However, the information is not exhaustive and reference should always be made to Approved Document G3 of the Building Regulations. The final decision regarding any arrangements rests with Building Control and it is recommended that their advice is sought if you have any concerns regarding this aspect of the installation.

The two safety valves will only discharge water under fault conditions. When operating normally water will not be discharged.

The tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible and within 600mm of the safety device e.g. the temperature relief valve.

The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal and:



a) Be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance. Refer to the table and the worked example.
An alternative approach for sizing discharge pipes would be to follow BS EN 806-2:2005 Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

b) Have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipe work.

c) Be installed with a continuous fall.

d) It is preferable for the discharge to be visible at both the tundish and the final point of discharge but where this is not possible or practically difficult there should be clear visibility at one or other of these locations.

Worked Example

The example below is for G1/2 temperature relief valve with a discharge pipe (D2) having 4 elbows and length of 7m from the tundish to the point of discharge.

From the table below:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G1/2 temperature relief valve is: 9m subtract the resistance for 4 x 22mm elbows at 0.8m each = 3.2m.

Therefore the maximum permitted length equates to: 5.8m.

5.8m is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm pipe (D2) from a G1/2 temperature relief valve equates to: 14m.

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

Sizing of copper discharge pipe 'D2' for a temperature relief valve with a G1/2 outlet size (as supplied)

Size of discharge pipework	Maximum length of straight pipe (no bends or elbows)	Deduct the figure below from the maximum length for each bend or elbow in the discharge pipe
22mm	Up to 9m	0.8m
28mm	Up to 18m	1m
35mm	Up to 27m	1.4m

Examples of acceptable discharge arrangements are:

1. Ideally below the fixed grating and above the water seal in a trapped gulley.
2. Downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc are acceptable providing that where children play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact whilst maintaining visibility.
3. Discharges at a high level; e.g. into metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering systems that would collect such discharges.
4. Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.
5. If unvented hot water storage systems are installed where discharges form safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

WARNING: RISK OF INJURY OR DEATH

The Temperature and Pressure Relief Valve must be fitted and should not be disconnected other than for replacement. The Temperature and Pressure Relief valve will open if the pressure or temperature within the tank exceeds the valve limit. The DR-SG water heaters are provided as standard with a 7 bar / 90°C T&P relief valve. If the valve is activated, it will remain open until the water has dropped below the unsafe temperature and pressure limit.

4.3. Vented installation

With a vented installation, excess pressure is taken up by the open cold water head tank. The level of the cold water head tank determinesNthe maximum working pressure in the tank. The water heater must also be fitted with a vent pipe from the hot water pipe, which opens into the cold water head tank. Ideally, the vent pipe should discharge into a separate discharge channel/ drain or otherwise to the open cold water head tank. The water heater should also be fitted with a stop valve on the hot water side. A Temperature and Pressure Relief Valve is only mandatory in unvented installations.

However, Hamworthy also strongly recommends the use of a Temperature and Pressure Relief Valve in vented installations.

4.4. Removing the cover panel

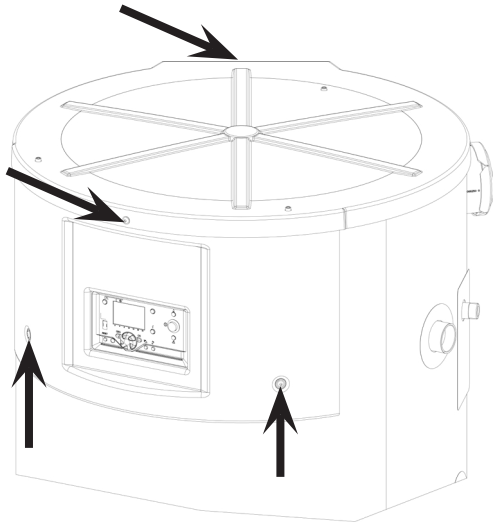


figure 3 - Screw positions for cover dismount

1. Remove the 2 screws securing the cover
2. Remove the top cover
3. Unscrew the 2 retaining screws on each side of the display:
4. Remove the front screen.

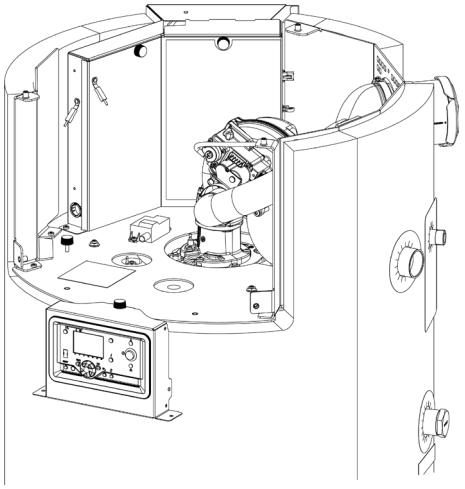


figure 4 - Retracted screen

Dorchester DR-SG XX-210 and XX-356 models have a moveable screen that can be hung from the front part of the Dorchester DR-SG to facilitate access to the burner as well accessing the settings.

4.5. Installing the Dorchester DR-SG

Dorchester DR-SG must not be installed on an inflammable surface (wooden floor, inflammable floor covering, etc.).

Recommended distances relative to walls and ceiling:
Sufficient clearances must be provided to permit easy maintenance operations on the boilers. The minimum clearance required is 500 mm around the boiler and 175 mm above it.

These values cannot be substituted for the specific regulatory requirements.
The product must be levelled if required.

IMPORTANT: The drilled holes on the base of the unit must not be used to mount adjustable feet

4.6. Flue installation connection

You must comply with the regulatory texts and rules of the art that apply in the country where the boiler will be installed, i.e.:
IGEM UP10, BS 6644 (when installed within a domestic environment), BS EN 806 and BS 8558 .

An exhaust temperature sensor guarantees the protection of the type B combustion product evacuation ducts. The temperature cannot be adjusted and is fixed at 100°C.

Any concentric system must be comprised of the manufacturers specified flue parts. Open flue systems (B23) must use the manufacturer specified air inlet basket.
It is not permitted to combine flue systems from different manufacturers.

Dorchester DR-SG appliances are approved according to the gas category to be connected to:

- Open flue systems B23 and B23P
- Horizontal and vertical concentric systems C13 and C33

For room sealed flue systems, concentric flues from Hamworthy must be used.

Further information and installation instructions can be found within the Installation Manual for the Flue Starter Kits.

IMPORTANT: **The exhaust ducts must be correctly supported. Their weight must not rest on the Dorchester DR-SG's smoke outlet or the air inlet**

A range of bespoke flue starter kits are available to purchase from Hamworthy, in open flue (B23) and room sealed (C type) variants. For B23 systems it is strongly recommended to purchase and install these kits as thse components have been designed to support the weight of the flue system without any stress being placed upon the air inlet or flue outlet. For C type flue systems, purchasing and installing these kits is a mandatory requirement to meet system approvals. Requirement to meet system approvals.

4.6.1. Connection to a B23 chimney

B23 type connection:
An appliance intended to be connected to a flue which evacuates the products of combustion to the outside of the room containing the boiler. The combustion air is drawn directly from the room. The fan is up stream of the combustion chamber.

IMPORTANT: **Check that the room where the boiler is to be installed has upper and lower ventilation ducts, that they comply with current regulations and are not obstructed.**

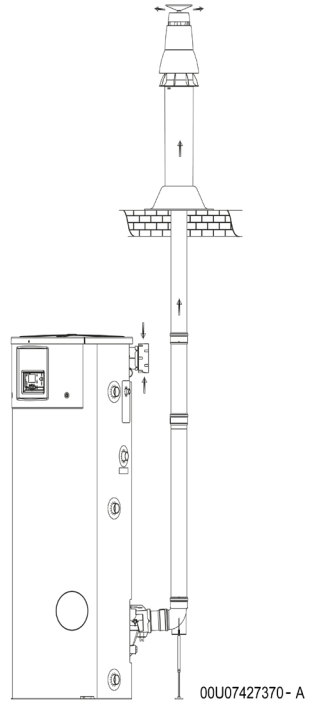


figure 5 - B23 type connection

The size of the chimney pipes must be determined by taking account of combustion gas pressure on the water heater's output equal to 0 Pa (see table § 3.3).

The flue ducts must be made in a material resistant to the condensate that can form when the boiler is operating. These materials must also be capable of supporting flue gas temperatures up to 120°C. Horizontal duct runs must be avoided so as to limit condensate retention.

The heater is designed to be fired into a flue with a balanced draught condition (0PA). If suction conditions exceed this it is permitted to install a suitable druaght stabiliser, specialist advice from a flue specialist should be sought if required.

Check that the combustion gas is evacuated via the suitable and approved pipe flue pipe system.

Dorchester DR-SG appliances are high performance water heaters with very low exhaust temperatures; consequently to retain a favourable draft the ducts must run upwards from the storage tank outlet.

WARNING:	**If several water heaters are connected to one flue, check by calculation that the flue is not pressurised when all the boilers are operating at Qn.**
IMPORTANT:	**The dimensions of the flues must be determined by the flue supplier.**
IMPORTANT:	**The storage unit's connection part must not be made to support the exhaust duct's weight.**
IMPORTANT:	**Installation of an air filter (ref. HAMWORTHY Kit for Dorchester DR-SG XX-210: 031303, Dorchester DR-SG XX-356: 031304, Dorchester DR-SG XX-538: 031305) is strongly recommended to protect the burner tube from clogging. This clogging can cause ignition errors (E133) or flame failure during operation (E128). Cleaning the tube is usually enough to resolve safety shut-downs.**

4.6.2. Connection to a B23P chimney

B23P type connection:
Air from the installation premises, gas evacuation through the roof via a pressurised duct.

IMPORTANT: **Check that the boiler installation premises have high and low ventilation, that it conforms to current regulations and that it is not obstructed.**

WARNING: **The combustion product extraction duct must be dimensioned by using the parameters set out in the table in chapter 3.3.**

Depending on the actual configuration of the duct, a calculation is required to check that the pressures at the boiler outlet do not exceed the maximum allowable values (see table below).

Maximum allowable nozzle pressure (B23P) (Pa)	Dorchester DR-SG XX-210			Dorchester DR-SG XX-356			Dorchester DR-SG XX-538			
	20 kW	25 kW	30 kW	35 kW	50 kW	60 kW	70 kW	80 kW	100 kW	120 kW
G20	110	170	200	130	200	200	65	95	155	200
G31	120	200	200	152	200	200	52	70	127	200

IMPORTANT: **Installation of an air filter (ref. HAMWORTHY Kit for Dorchester DR-SG XX-210: 031303, Dorchester DR-SG XX-356: 031304, Dorchester DR-SG XX-538: 031305) is strongly recommended to protect the burner tube from clogging. This clogging can cause ignition errors (E133) or flame failure during operation (E128). Cleaning the tube is usually enough to resolve safety shut-downs.**

Special case of a cascade installation:
In the case that storage tanks of different powers are connected, the most powerful models must be as close as possible to the chimney.
The Dorchester DR-SG has an internal non-return exhaust valve which negates the fitting of same in shared flue systems.
Please ensure that any other connected appliances are B23P-approved.

4.6.3. Connection to a C13 or C33, suction pipe

C13 type connection:

A room sealed appliance designed for connection via ducts to a horizontal terminal, which admits fresh air to the burner and discharges the products of combustion to the outside through orifices which, in this case, are concentric. The fan is up stream of the combustion chamber.

C33 type connection:

A room sealed appliance designed for connection via ducts to a vertical terminal, which admits fresh air to the burner and discharges the products of combustion to the outside through orifices which, in this case, are concentric. The fan is up stream of the combustion chamber.

INFORMATION: **The length of the concentric ducts between the concentric adaptator and terminal (both not included) must not exceed 20m.**
See table below equivalence

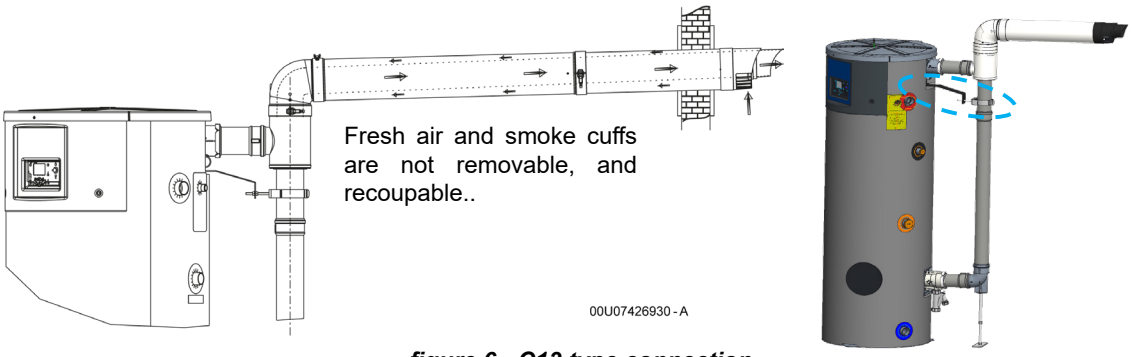


figure 6 - C13 type connection

	Ø 80-125	Ø 100-150	Ø 130-200
45° elbow	0.5m	0.5m	0.5m
90° elbow	1m	1m	1m

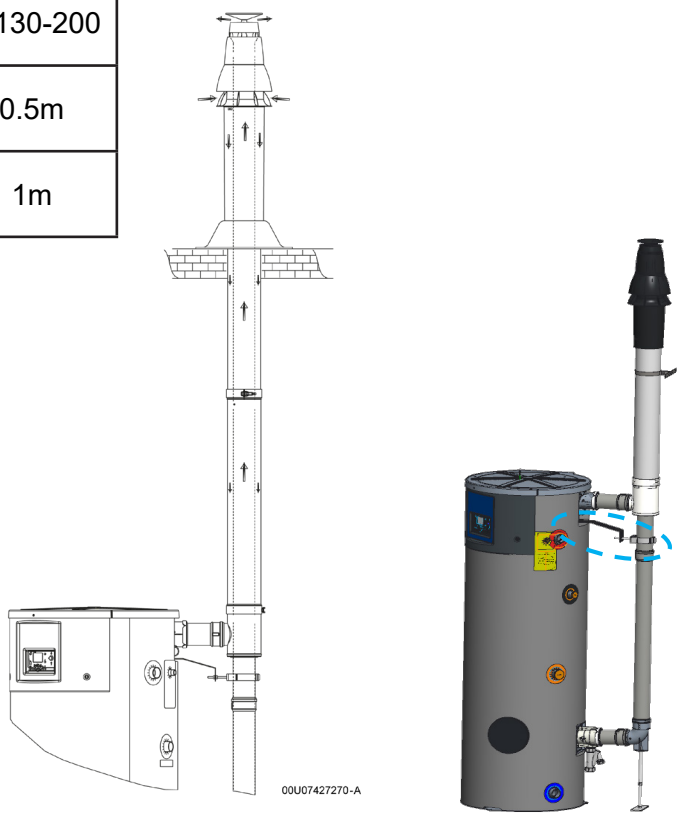
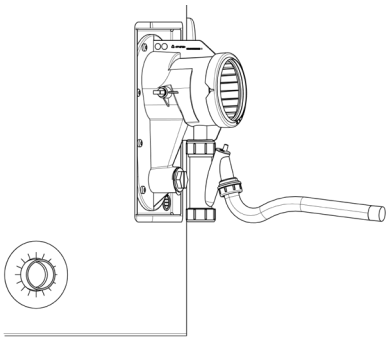


figure 7 - C33 type connection

4.6.4. Connection and draining of condensates

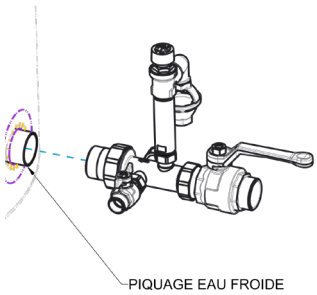


Removal to the drains, via a drain point, using a P.V.C tube (minimum diameter 32 mm) is mandatory because the condensates are acid and thus aggressive (pH between 3 and 5). Use a sufficient slope of minimum 3% to ensure correct flow of the condensates.

All pipework and fittings in the condensate drainage system MUST be compatible with condensate. Refer to either BS 6644:2011 or the Building Regulations for materials that should be used.

IMPORTANT: **Neutralise these condensates before removal according to the current regulations.**

4.7. Hydraulic connection



The following must be fitted to the cold water pipe:

either:

- the HAMWORTHY hydraulic kit (ref 031272),

or:

- an isolation valve,
- a drain valve.
- an anti-return flap
- a safety valve rated at 7 bar in compliance with standard NF P 52.001 and its system for evacuating directly to the sewer.

The following must be fitted to the hot water pipe:

- a pressure gauge (check that the maximum working pressure does not exceed 7 bar).

REMINDER: In accordance with the DTU, the installer must ensure that an automatic drain valve is fitted at the high points of the installation.

WARNING: **The product is not fitted with a drain tap. A drain valve must be installed on the cold water inlet to allow the product to be drained.**

WARNING: **The components used to seal the connections must be WRAS or equivalent certified products.**

IMPORTANT: **In operating conditions where the hot water outlet temperature is over 60°C, the installation must comply with the applicable regulations. A safety mixer tap may be required to obtain an acceptable temperature at the point of use.**

IMPORTANT: **The DHW temperature must always remain below the maximum operating temperature of the domestic water pipes (especially when using PER or PVC pressure pipes) and the components of the hydraulic circuit.**

4.8. Gas change G20-G31

This Dorchester DR-SG has been factory-set to work with group H (type G20) natural gas with a supply pressure of 20 mbar.

IMPORTANT: **Any operations involving changing the type of gas used must be performed by a qualified professional.**

The valve must be adjusted on the water heater while operating at the maximum and minimum power. To do this, use the operation mode "Manual power adjustment" (see the instructions for the NAVISTEM H3100 boiler controller) which enables the user to switch straight to the minimum or maximum setpoint value (i.e. to zero or full power).

IMPORTANT: **The settings have been approved for the gas supply pressures at the valve inlet (measured on the pressure meter before the gas valve and with the burner working) in the tables in the following chapters.**

IMPORTANT: **The setting mechanism must be sealed once the operation is complete. All damaged seals must be replaced.**

4.8.1. Change from G20 to G31

Refer to section 4.8.1.3 for instructions on how to implement the settings changes as the last step of this process

4.8.1.1. Installing the propane injector Dorchester DR-SG XX-210 models

IMPORTANT: **ONLY on 20 to 30kW storage tanks**
AA031256 - DR-SG 20-210, AA031257 - DR-SG 25-210, AA031258 - DR-SG 30-210

IMPORTANT: **Complete the modification before connecting the gas line**

Change the type of gas by installing an injector at the gas valve outlet.
Remove the fixing clip (4) downstream of the valve.
Remove the versilic tubes from the air hose.
Unscrew the air hose collars and remove it.
Unscrew the fan screws (6).
Remove the fan + venturi sub-assembly.
Position the injector (7) in the valve (see figure).
Replace the gas valve O-ring (3) with the additional supplied seal.
Replace the fan seal (5)
Install the assembly.

4.8.1.2. Installing the propane injector Dorchester DR-SG XX-538 models

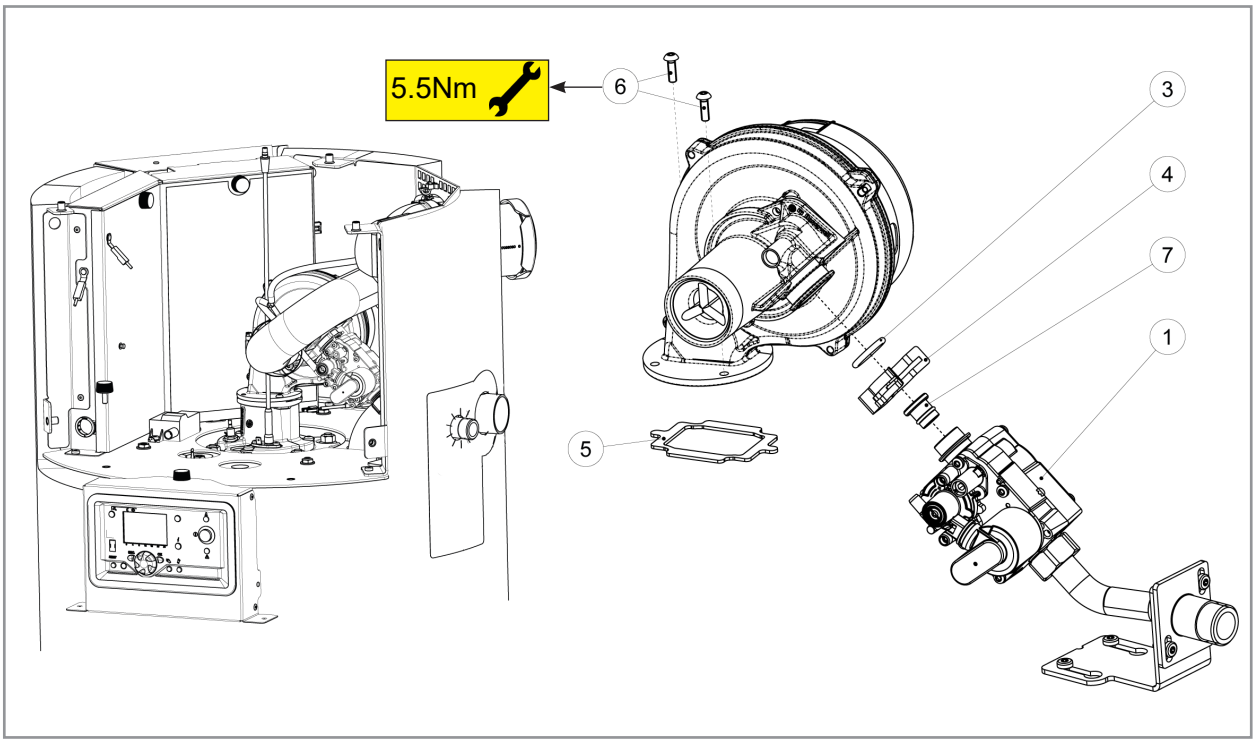


figure 8 - installing the propane injector

IMPORTANT: **Always replace seals after disassembly.**
IMPERATIVELY check the different seals after assembly.

IMPORTANT: **It is essential to use the 235594 SG70-120 LPG Conversion Kit supplied as an option by HAMWORTHY. Refer to the kit instructions for installing specific components and before modifying the LMS settings, adjusting the gas valve, and adjusting the regulator.**

IMPORTANT: **ONLY** on 70 to 120kW storage tanks
AA031262 - DR-SG 70-538, AA031263 - DR-SG 80-538, AA031264 - DR-SG 100-538, AA031265 - DR-SG 120-538

IMPORTANT: **Always replace seals after disassembly.**
IMPERATIVELY check the different seals after assembly.

4.8.1.3. Changing the ignition, pre-ventilation, minimum and maximum speeds

Put the Dorchester DR-SG on standby.

If necessary, press the ESC button to return to the main screen.
Open the Settings / Safety unit menu at specialist level.
Adjust the pre-ventilation speed (9504), ignition speed (9512), minimum speed (9524) and maximum speed (9529) settings:

Models	Gas	9504	9512	9524	9529
20-210	G20	5450	5840	2200	6030
	G31	5450	5700	2100	5700
25-210	G20	5450	5840	2200	7390
	G31	5450	5700	2100	6970
30-210	G20	5450	5840	2200	8500
	G31	5450	5700	2100	7850
35-356	G20	5000	3870	2250	6250
	G31	5000	3800	2200	5630
50-356	G20	5000	3870	2250	8890
	G31	5000	3800	2200	7880
60-356	G20	5000	3870	2250	9800
	G31	5000	3800	2200	8800
70-538	G20	3200	3300	1700	3810
	G31	3200	3470	1620	3470
80-538	G20	3200	3300	1700	4330
	G31	3200	3470	1620	3740
100-538	G20	3200	3300	1700	5270
	G31	3200	3470	1620	4600
120-538	G20	3200	3300	1700	6400
	G31	3200	3470	1620	5700

4.8.1.4. Adjustment of the gas valve

- Before starting the burner, on the gas valve, preset the gas flow rate, using the gas flow rate adjustment screw R1, to the appropriate value given in the following table for settings
- Start the burner at maximum power.
- Using a combustion analyser, measure the CO2 ratio in the exhaust gases: on the exhaust outlet nozzle, remove the plug from the opening and insert the CO2 measurement sensor into the centre of the flow in the exhaust duct.
- Check the CO2 value at maximum power Qmax and, if necessary, adjust the gas flow screw R1 of the valve in order to obtain the CO2 values in the following table for settings
- Change to minimum power Qmin and check that the CO2 value is within the range in the table below. If necessary, use the setting adjustment screw R2
- If the setting is adjusted at minimum power, go back to maximum power Qmax and recheck the CO2 value. Repeat the operation until both values comply with the following table for settings.
- Return to the standard operating mode.

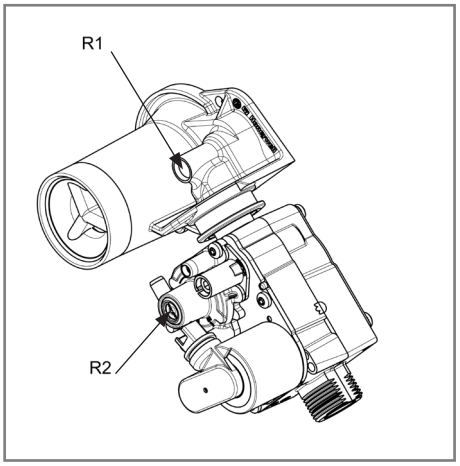


figure 9 - Dorchester DR-SG XX-210 setting

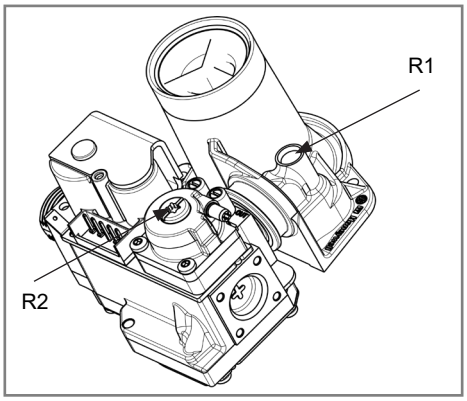


figure 10 - Dorchester DR-SG XX-356 setting

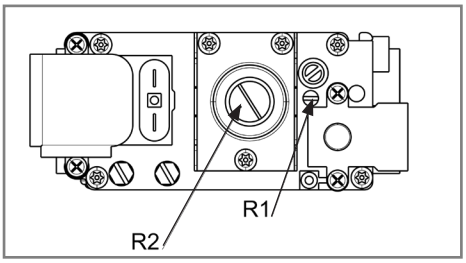


figure 11 - Dorchester DR-SG XX-538 setting

After changing the type of gas:
- Check the sealing of the gas line.
- Stick the G31 data plate label provided in place of the original label (G20)

Model	Gas	Pre-setting the gas flow adjustment screw R1 and the R2 / G20 regulator setpoint adjusting screw	CO_2 Pmax	CO_2 indicative Pmin
20-210	G20	Screw R1 all the way Unscrew R1 de 3,25 turns, ajust R2	**10,4% <CO_2 <10,8%**	**10,8% <CO_2 <11,2%**
	G31	(*Valve set G20*) Screw R1 d'1/2 turn, ajust R2		
25-210	G20	Screw R1 all the way Unscrew R1 de 3,25 turns, ajust R2		
	G31	(*Valve set G20*) Screw R1 d'1/2 turn, ajust R2		
30-210	G20	Screw R1 all the way Unscrew R1 de 3,25 turns, ajust R2		
	G31	(*Valve set G20*) Screw R1 d'1/2 turn, ajust R2		
35-356	G20	Screw R1 all the way Unscrew R1 de 4,5 turns, ajust R2		
	G31	(*Valve set G20*) Screw R1 d'1 turn, ajust R2		
50-356	G20	Screw R1 all the way Unscrew R1 de 4,5 turns, ajust R2		
	G31	(*Valve set G20*) Screw R1 d'1 turn, ajust R2		
60-356	G20	Screw R1 all the way Unscrew R1 de 4,5 turns, ajust R2		
	G31	(*Valve set G20*) Screw R1 d'1 turn, ajust R2		
70-538	G20	Screw R1 all the way Unscrew R1 de 2,5 turns, ajust R2	**10,9% <CO_2 <11,3%**	**11,3% <CO_2 <11,7%**
	G31	(*Valve set G20*) Unscrew R1 d'1 turn, ajust R2		
80-538	G20	Screw R1 all the way Unscrew R1 de 2,5 turns, ajust R2		
	G31	(*Valve set G20*) Unscrew R1 d'1 turn, ajust R2		
100-538	G20	Screw R1 all the way Unscrew R1 de 2,5 turns, ajust R2		
	G31	(*Valve set G20*) Unscrew R1 d'1 turn, ajust R2		
120-538	G20	Screw R1 all the way Unscrew R1 de 2,5 turns, ajust R2		
	G31	(*Valve set G20*) Unscrew R1 d'1 turn, ajust R2		

4.9. Gas connection

Before installing the boiler, clean the interior of the gas line, which must be free of metal particles and welding debris. This will lengthen the lifespan of the product. The gas valve is fitted with an integrated filter (125µm), but this is not able to retain all the impurities contained in the gas and in the mains pipes. To avoid any malfunction of the gas valve, we advise the fitting of a suitable filter to the storage tank gas supply (50µm).
Before starting up for the first time, check that the pressure of the natural gas supply corresponds to the nominal boiler pressure, as marked on the rating plate.
Before feeding gas to the installation, ensure that the different connections are correctly made and gas tight.

A suitable fitting such as a union connector must be installed between the isolating valve and the gas supply connection to provide safe disconnection and allow for removal of the gas valve.
The value upstream of the gas valve must be within the limits shown in the table in chapter § 3.3.

WARNING: **The gas line must not be subject to any mechanical stress (risk of loss of gas tightness of the gas valve).**
Check that the gas supply corresponds to the nominal boiler pressure and gas category, as marked on the rating plate.

WARNING: **You cannot use the appliance if the gas supply pressure is not correct. You must remove the water heater from service, make the installation safe and apply the procedures contained within IGEM/G/11 'Gas Industry Unsafe Situations Procedure' (formerly Gas Safe Register Technical Bulletin (TB) 001.**

4.10. Electrical connection / Wiring diagram

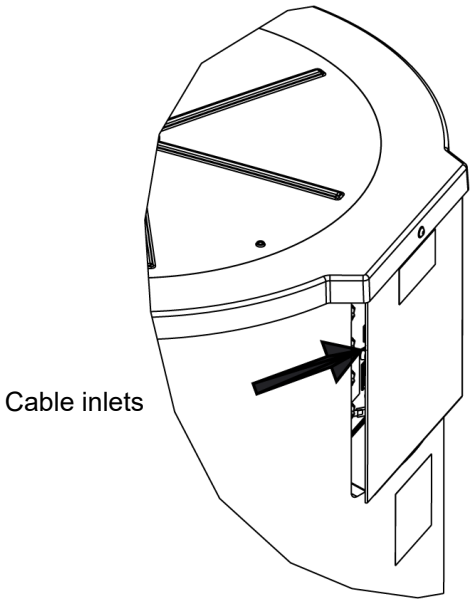
WARNING: **Ensure that the general electrical power supply has been cut off before starting any repair work.**

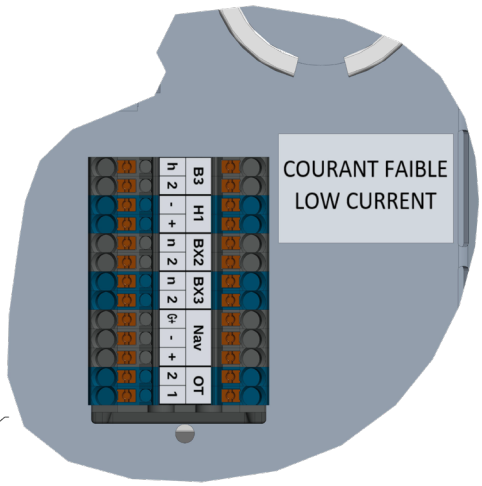
WARNING: **You must respect the live (L) - neutral (N) polarity when making electrical connections.**

CAUTION: **It is mandatory to connect this boiler correctly to earth and to comply with the national standards which apply in the country for low-voltage electrical installations.**
Provide a two-pole circuit breaker upstream of the boiler (distance between contacts: 3.5 mm minimum).
Fitting the electrical installation with a 30 mA differential protective device is strongly advised.

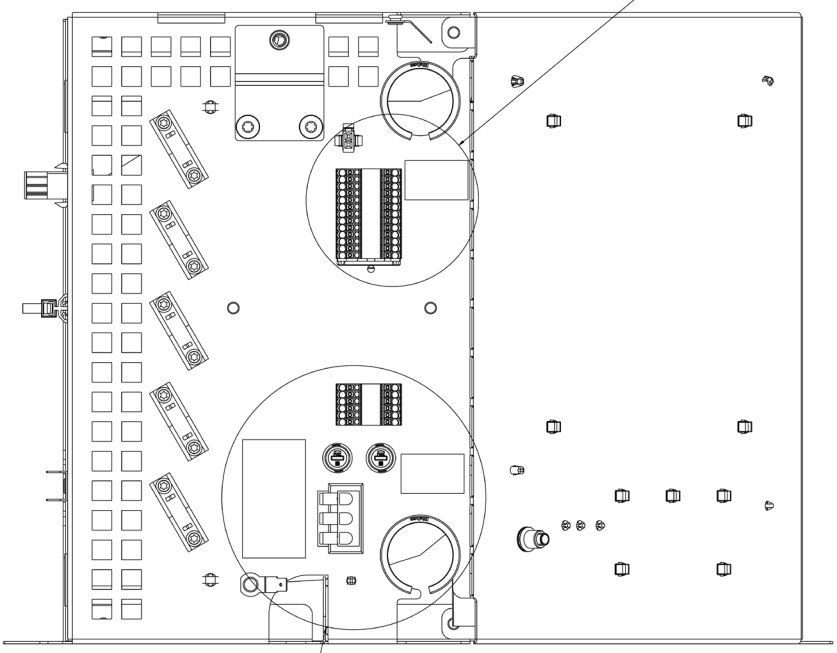
WARNING: **The protective earth conductor must be longer than the phase and neutral conductors.**

4.10.1. Cable ways

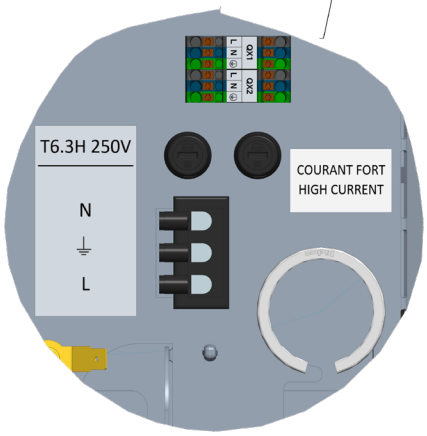




Low voltage cable entry point



High voltage cable entry point



4.10.2. Characteristics of the electrical power supply

The electrical connections will only be made when all of the other assembly operations (attachment, assembly, etc.) have been carried out on the boiler.

The electrical installation must comply with CE/UKCA standards for electrical connection, and in particular, the earth connection.

This appliance is designed to operate under a nominal voltage of 230 V +10% / -15%, 50 Hz.

Ensure that the following rules are observed when connecting to avoid degrading the measurement of the ionisation current:

- In single phase: it is essential to respect the phase – neutral polarity

If you are not equipped to measure the phase shift, wire the control box's power supply in both configurations then in both cases check the ionization current by going to the "generator diagnostics" menu at parameter 8329 .

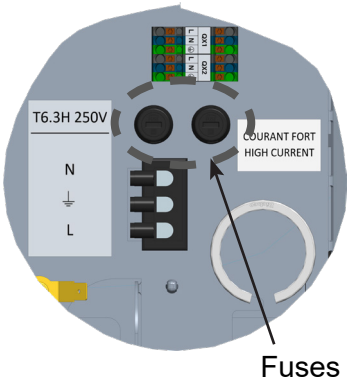
4.10.3. Cable sections

The following cable sections are given for information purposes only and do not exempt the installer from checking that they meet requirements and comply with standards in force.

If a cable is damaged, it must be replaced by the manufacturer, its after-sales service or any suitably qualified person, in order to avoid any danger.

Cable	Terminal blocks	Copper conductor section
Power	Power supply	3 x 1.5 mm²
	QX1 and QX2	3 x 1.5 mm²
Signals	B3, BX2, BX3, H1, OT	2 x 0.5 mm²
	Navipass Modbus bus	3 x 0.5 mm²

4.10.4. Fuses



The Dorchester DR-SG is equipped with 2 identical T6.3H 250V fuses located to the right of the connection terminals. These fuses ensure that all the boards installed in the panel are protected.

4.10.5. Electric connections to terminals

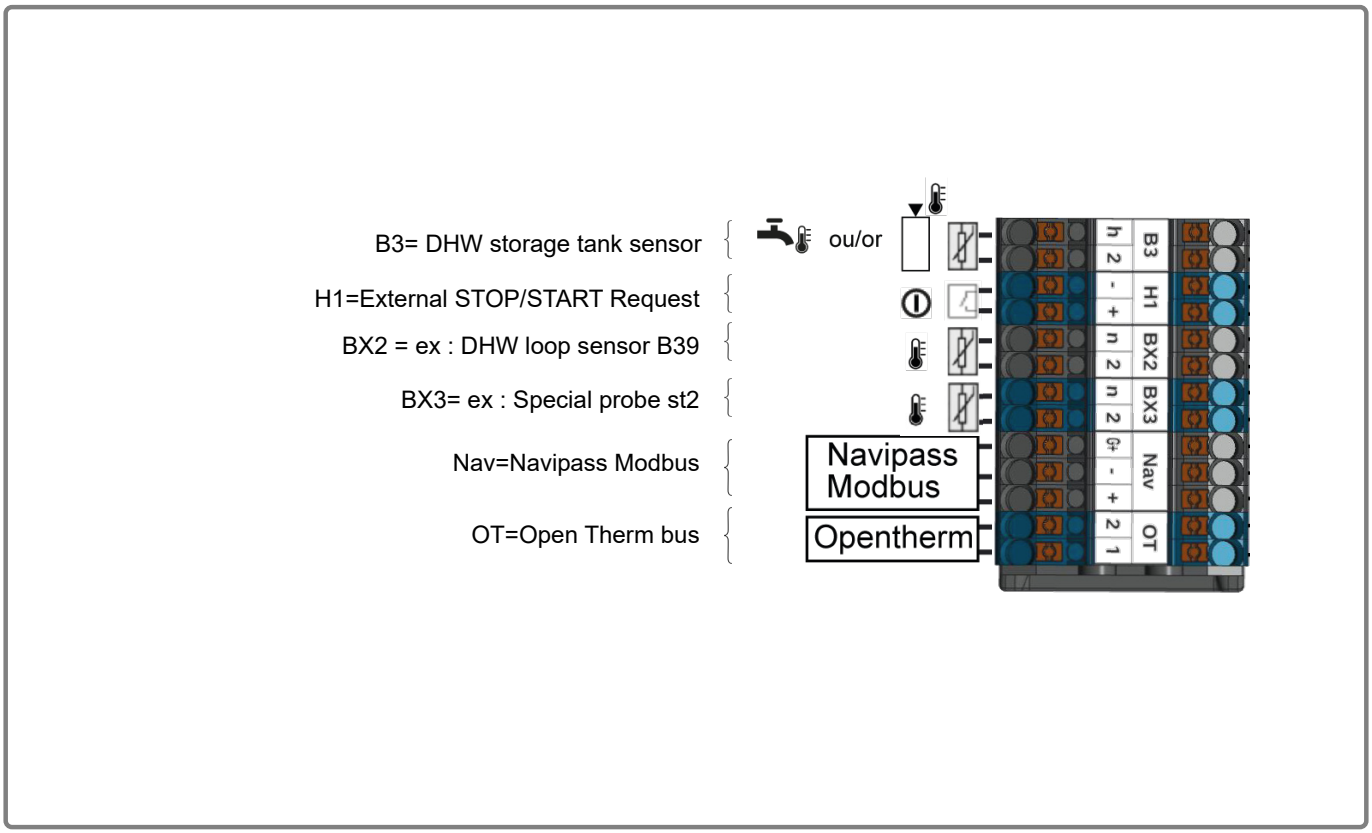


figure 12 - Signal terminals

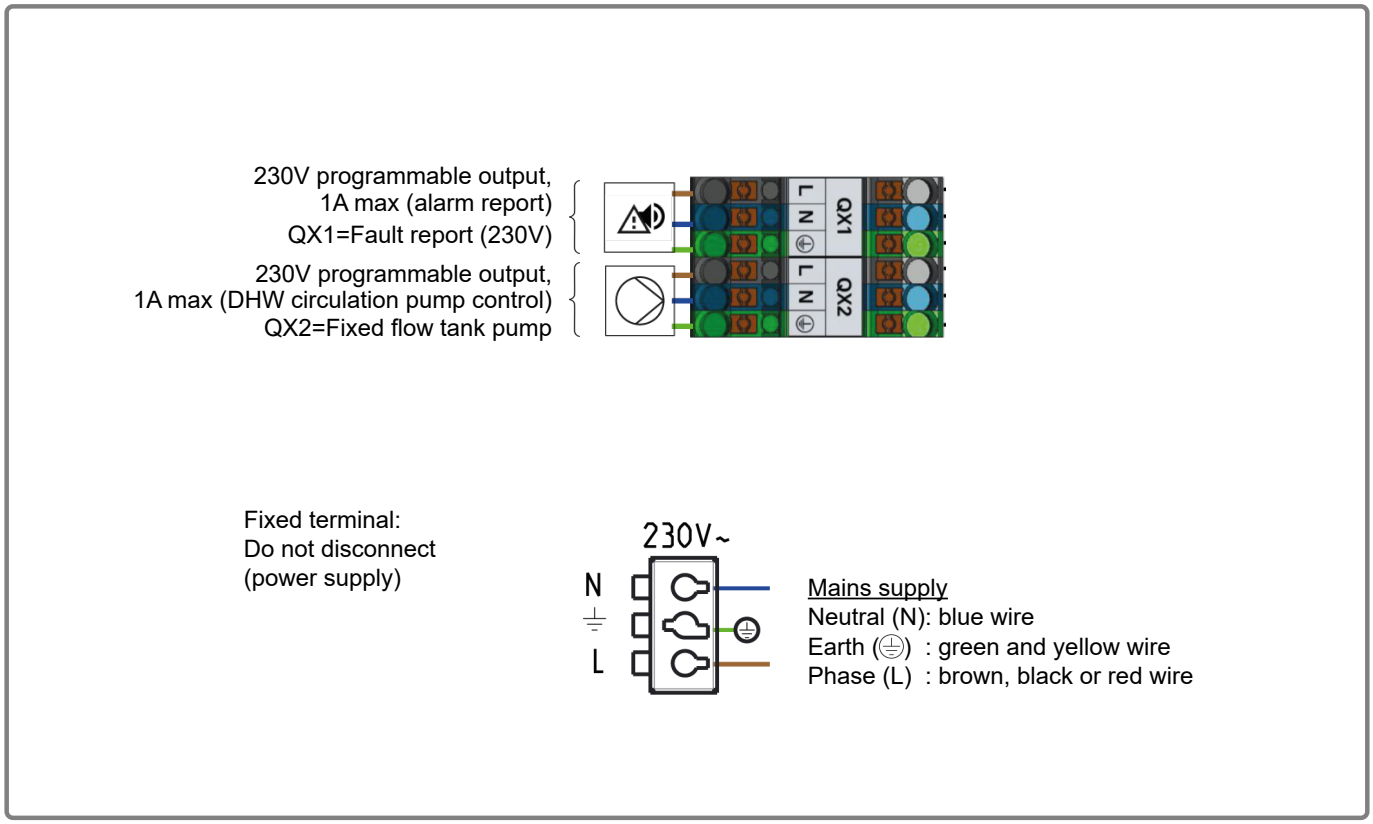


figure 13 - Power and power supply terminals

4.10.6. Wiring diagram

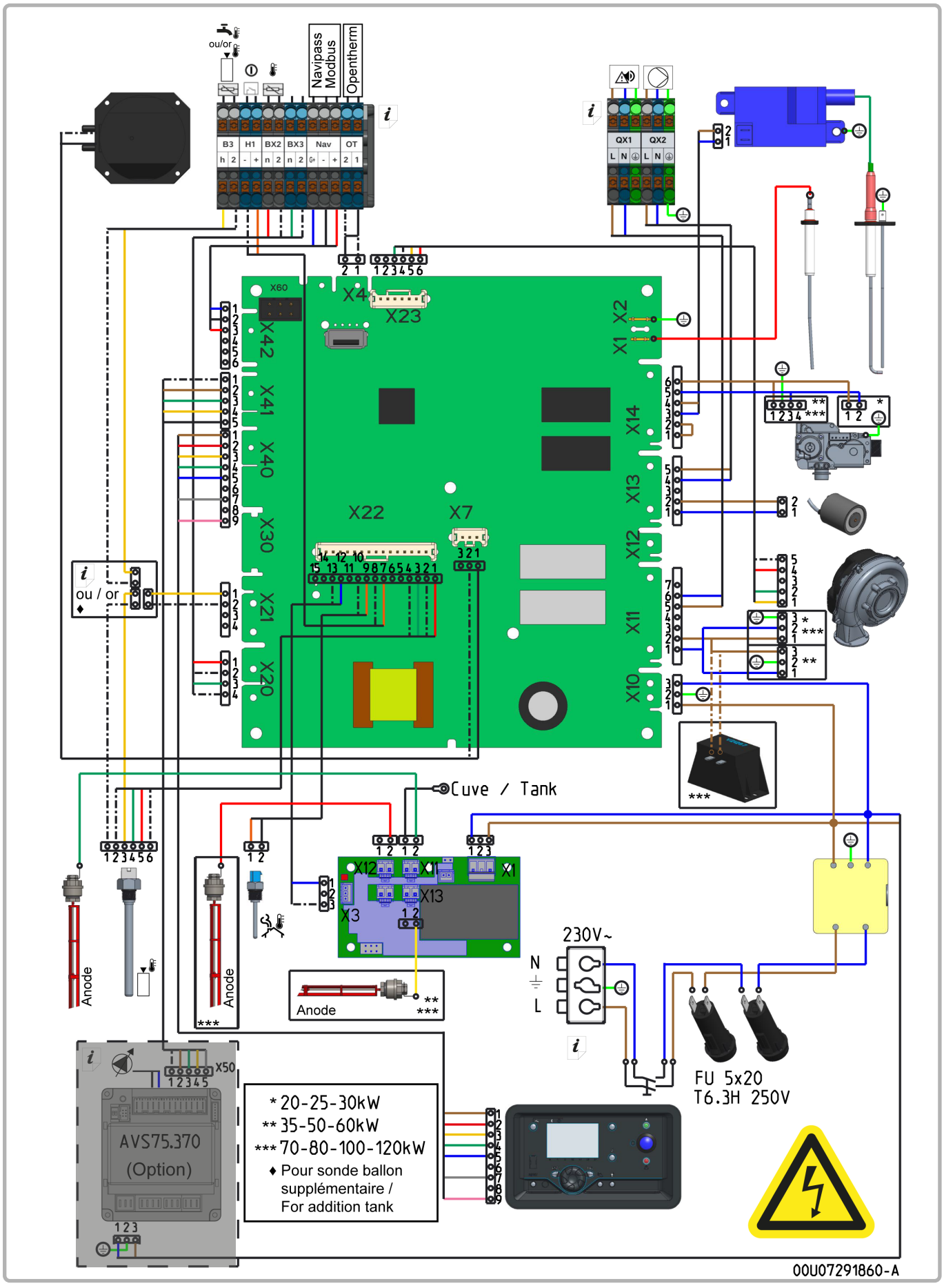


figure 14 - Complete wiring diagram

5. START-UP

5.1. Filling the boiler

- Open a tap (air vent and end-of-fill check).
- Check that the drain valve is closed.
- Open the cold water supply valve.
- Close the tap opened previously once the storage tank has been completely filled and vented.
- Check the water pressure, which must be less than 7 bar, and the safety valve, which must not leak.

5.2. Starting-up

WARNING: **Never operate the water heater if it is not filled with water.**

1. Switch on the main circuit breaker.

2. Create a request for heat via the comfort mode using the customer interface (see the NAVISTEM H3100 manual).

3. After starting the burner, check the gas tightness of the gas line connections using a foaming product. Check the combustion hygiene using a smoke analyser via a sampling plug on the fume nozzle.
   CO_2 value range: refer to chapter 3.3

4. Adjust the DHW setpoint (settings 1610 and 1612 - refer to the table summarising customer parameters at the end of this manual).

6. CHECKS AFTER COMMISSIONING

6.1. Condensate removal

Check that the removal of condensates is not obstructed, on both the boiler side and the pipe side.

6.2. Gas supply

Check that the gas pipe diameter is correctly sized:

It is necessary to stop all the gas appliances from the boiler room together abruptly using the boiler room main circuit breaker to check that the gas pressure regulator safety device is not triggered.

If this is triggered, the gas pipe is undersized. After this operation, reengage the circuit breaker. The storage tanks must start automatically, if not, consult the supplier of the gas pressure regulator.

7. MAINTENANCE OPERATIONS

The common maintenance programme features 2 types of work :
- **Maintenance which is carried out every year**
- **In-depth maintenance which is carried out every 3 years.**

The table below contains the actions to be carried out according to the type of maintenance operation.
These operations must be carried out by a qualified professional in all cases.

A specific check of the safety valve by operating it and checking the water flow should be carried out at least once a month.

WARNING:

This storage tank's earth continuity is provided by link cables (green/yellow) and specific holding screws. During any disassembly operations, make sure that the cables in question are reconnected; you MUST also reuse the original holding screws.

Before performing the following operations:
- **Switch off the main circuit breaker.**
- **Close the gas supply isolation valve.**

N° of paragraph to consult		Servicing	
		every year	every 3 years
7.1	Descaling and cleaning of the storage tank	X	
7.2	Inspection of ignition and ionization electrodes	X	
7.3	Cleaning siphons for condensate evacuation	X	
7.4	Verification of tightness on combustion circuit	X	
7.5	Verification of combustion quality	X	
7.6	Checking the gas valve setting	X	
7.7	Checking the condition of the gas manifold coating Burner cleaning and sealing gaskets exchange Checking the evacuation in the by-pass		X

7.1. Descaling and cleaning of the storage tank

Emptying the water heater
- Close the cold water inlet tap.
- Connect the drain valve (see § 4.4) to the drain with a suitable hose,
- Open a tap.
- Open the drain valve

WARNING: **The water evacuated may be very hot.**

An access panel on the front of the boiler permits access and cleaning of the bottom of the boiler using an industrial vacuum cleaner.

Each time the access panel is opened, the gasket must be changed.

The frequency of the descaling depends in the conditions of use of the storage tank, in particular the consumption, hardness and temperature of the stored water.. Storing the water at a temperature of 60°C or less will reduce the precipitation of limescale.

WARNING: **ONLY use products that are suitable and compatible with stainless steel and which do not present a health risk (WRAS or equivalent compatibility).**

7.2. Checking the ignition and ionisation electrodes

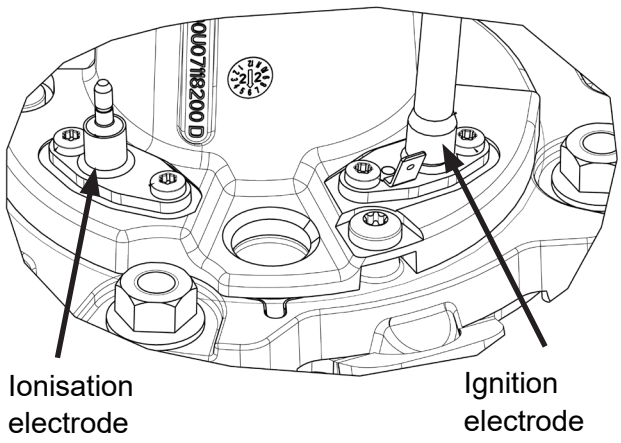


figure 15 - Electrode location

Removing the electrodes

Electrically disconnect the electrodes
- the ionisation electrode at the connection
- the ignition electrode at the ignition transformer and ground connector

Unscrew the 2 M4 Torx screws holding the electrode to be removed.

If necessary and if there is major oxidation, clean the electrodes by rubbing them with an emery cloth.

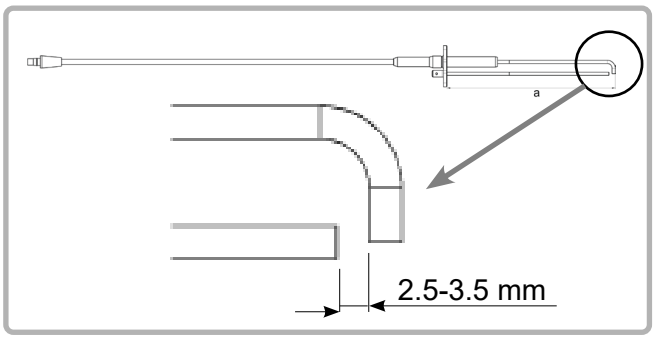
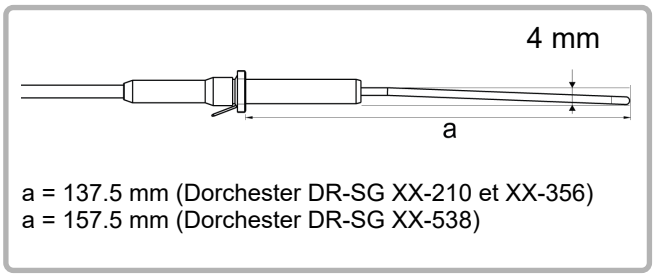


figure 16 - Spacing

Check the spacing between the ignition electrodes (see figure opposite). It must be between 2.5 and 3.5 mm. If this is not the case, the electrode must be replaced.



a = 137.5 mm (Dorchester DR-SG XX-210 et XX-356)
a = 157.5 mm (Dorchester DR-SG XX-538)

figure 17 - Geometry

Check the ignition electrode fold geometry.
If there is over ±0.8 mm deformation, the electrode must be replaced.

Put back the electrode block(s). Block attachment screw tightening torque = 2.5 N.m Electrically reconnect the electrodes and the earth wire

7.3. Cleaning the condensate evacuation pipe

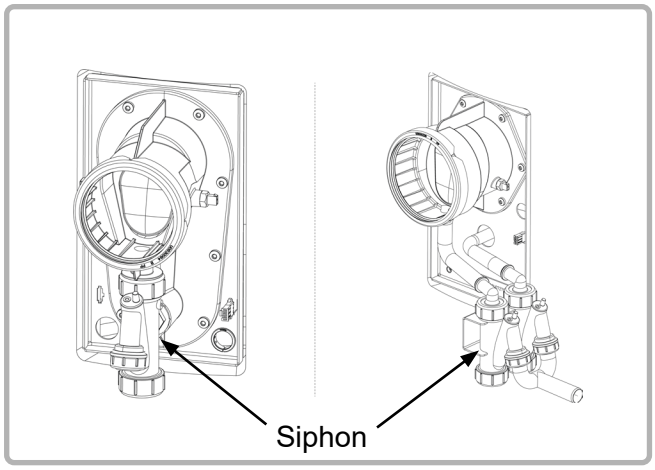


figure 18 - Siphon

Check the siphon and clean it if necessary. The siphon is underneath the fume nozzle.
To do so:

- Free the siphon by pulling it downwards.
- Clean it with water.
- Replace the siphon after checking that the floater (ball) is present and can move freely. Also check that the seal has not been damaged.

7.4. Checking the combustion circuit seal

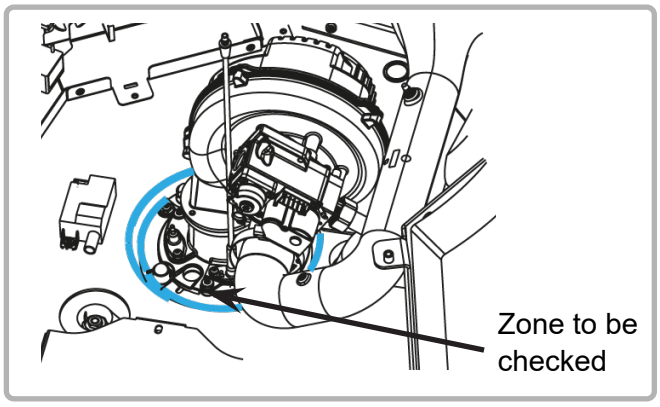


figure 19 - Combustion leaks

Check for leaks with a foaming product. The areas to be checked are shown in the figure opposite.
The check should be carried out when the appliance is cold (water heater turned off) but with the fan at maximum speed (obtained by disconnecting the PWM signal connector - see electrical diagram).

If you detect any leaks, you must replace the seal with the adapted kit.

We recommend replacing the seals each time it is opened.

7.5. Checking the combustion quality

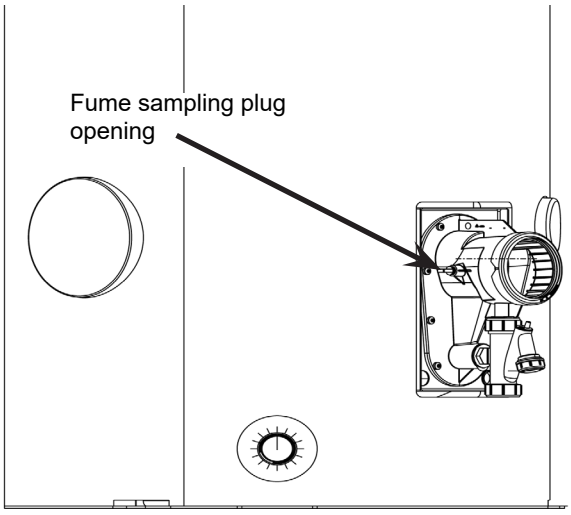


figure 20 - Sampling plug

This check is carried out with a calibrated combustion kit. To do so, insert the measurement rod into the fume nozzle (see figure opposite).

The water heater setpoint must be equal to or greater than 65°C.

IMPORTANT: **Do not forget to put the cap back on the sampling plug opening after the measurement.**

The CO_2 content measured under these conditions must be within <u>the values indicated in the table on the end of section 7.6 (depending on the type of gas and the Dorchester DR-SG model).</u>
If this is not the case, you must readjust the gas valve (see next §).
Following this check, you must take a "gas start" flow rate measurement. This measurement is used to check the dirt build-up on the combustion circuit.

The "gas start" must be made for a period over 3 minutes to obtain a satisfactory level of accuracy.
If the gas flow rate is 20% lower in relation to the value indicated in the table in paragraph § 3.3, you must clean the burner (see § 7.7).

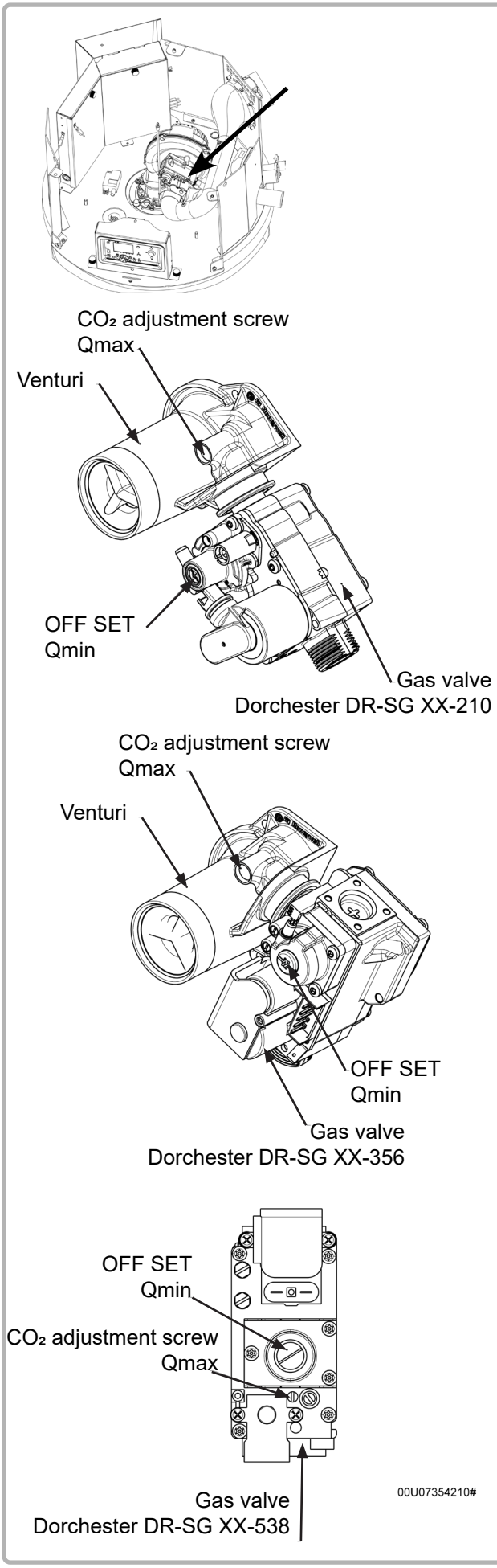


figure 21 - Gas valve

7.6. Checking the gas valve setting

This Dorchester DR-SG storage tank has been adjusted in the factory to work with group H (type G20) natural gas with a supply pressure of 20 mbar.

IMPORTANT: **Any operations involving adjusting the gas valve must be performed by a qualified Gas Safe engineer or in IE by a competent person.**

The valve must be adjusted on the boiler operating at the maximum power and the minimum power levels. Valve adjustment must be done in “Manual power setting mode” (see the instructions for the NAVISTEM H3100 boiler controller) which allows a direct switch to maximum power or minimum power (0% or 100%).

Start the burner at maximum power.

Using a combustion analyser, measure the CO_2 level in the flue gas at the smoke nozzle..

Check the CO_2 value at maximum power and, if necessary, adjust the gas flow screw of the valve in order to obtain the CO_2 values that correspond to the model (see following table).

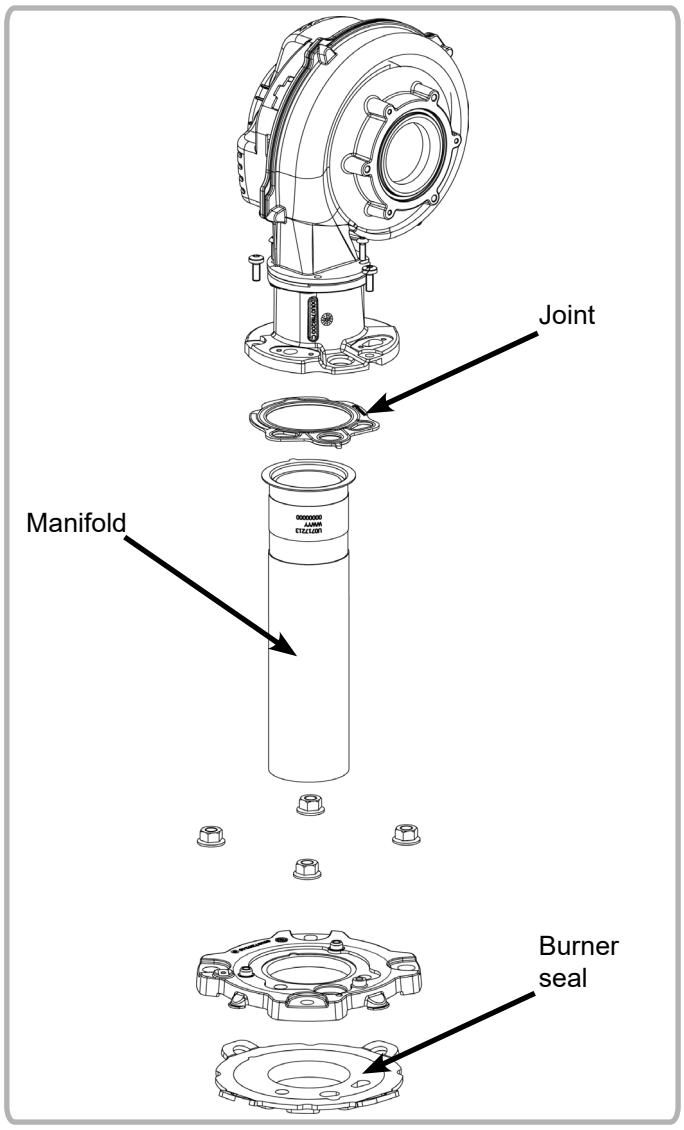
Change to minimum power Qmin and check that the CO_2 value is within the range in the table below. If necessary, adjust the Offset regulator.

If the setting is adjusted to minimum power, go back to maximum power and check the CO_2 value again. Repeat the operation until two compliant values are obtained.

Return to the standard operating mode.

		G20	G31
DORCHESTER DR-SG XX-210	20 kW	AT QMIN: 9.4 % < CO2 < 9.8 %	at Qmin: 0.8 % < CO2 < 11.2 % at Qmax: 10.4 % < CO2 < 10.8 %
	25 kW		
	30 kW	AT QMAX: 8.6 % < CO2 < 9.0 %	
DORCHESTER DR-SG XX-356	35 kW	AT QMIN: 9.0 % < CO2 < 9.4 %	
	50 kW		
	60 kW	AT QMAX: 8.2 % < CO2 < 8.6 %	
DORCHESTER DR-SG XX-538	69.9 kW	AT QMIN: 9.2 % < CO2 < 9.6 %	
	80 kW		
	100 kW	AT QMAX: 8.4 % < CO2 < 8.8 %	
	120 kW		

7.7. Cleaning the burner and the evacuation in the by-pass and changing the seals



7.7.1. Cleaning the burner

Before beginning any type of burner zone dismantling, it is essential that you obtain the after-sales service kit for changing burner seals that is suitable for your appliance. (kit AA555573 or AA555574)

IMPORTANT: Any seal that is dismantled must be replaced.

Refer to the instructions for the burner seal kit(s) / burner pipe / complete burner etc. for disassembling and reassembling the burner elements for maintenance operations.

IMPORTANT: **When extracting the burner tube, avoid rubbing its "metal covering" against the flange.**

Cleaning the burner tube:

- Use a vacuum cleaner to clean the whole "metal covering" surface.
- Check the condition of the gas manifold coating.

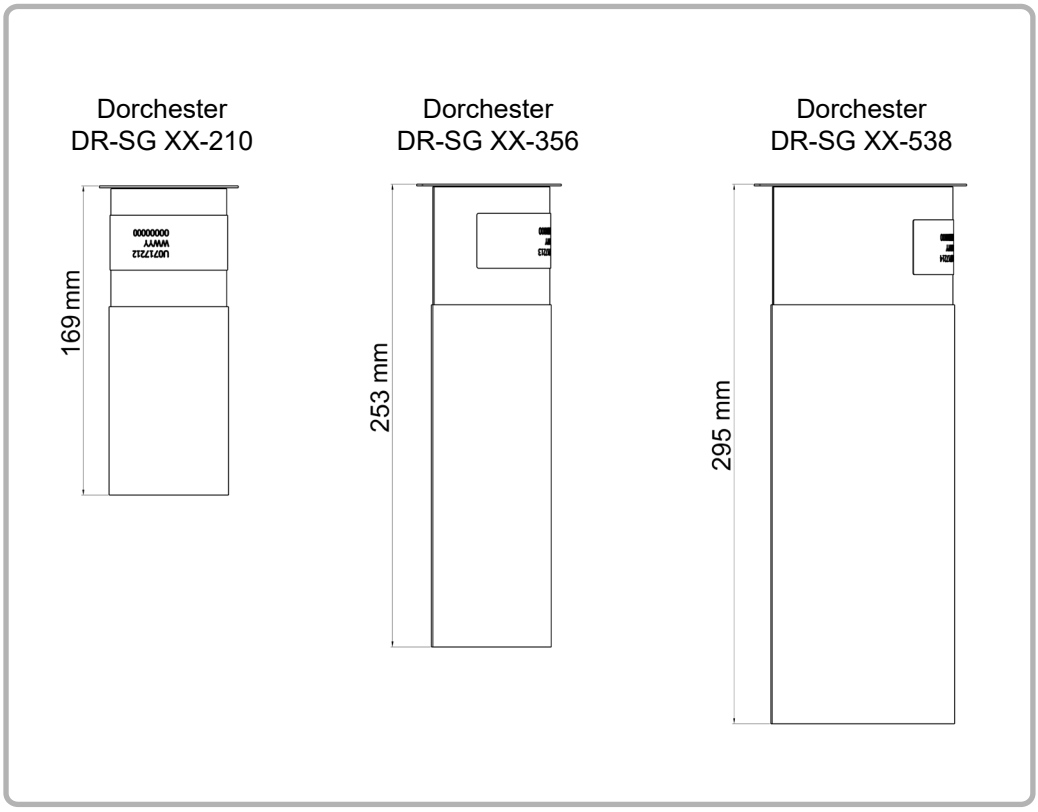
CAUTION:

When refitting:

- **Always replace the gasket under the burner manifold.**
- **do not forget to connect the air transfer pipe to the "-" connection point of the air pressure switch.**

IMPORTANT: **The burner seal must be replaced every 3 years**

Please note that the size of the burner is different depending on the model.



7.7.2. The by-pass

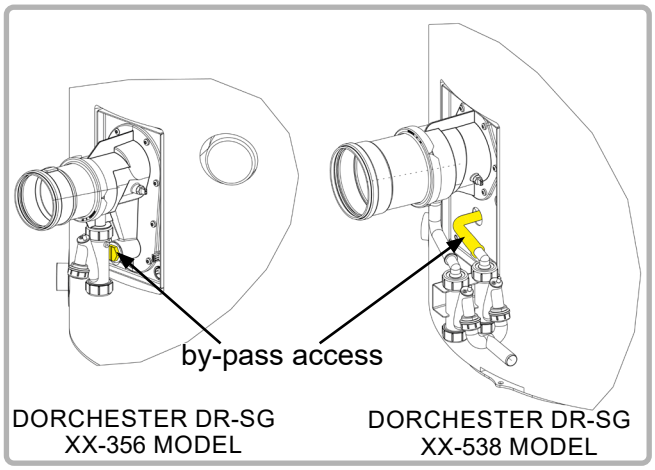


figure 22 - By-pass

On the Dorchester DR-SG XX-356 and Dorchester DR-SG XX-538 models. are equipped with a By Pass tube allowing the evacuation of condensate formed in the fireplace.

Control the non-clogging of it by controlling the evacuation of water from the bottom of the hearth.

For Dorchester DR-SG XX-356 models, this is done by gaining access through the yellow cap after the siphon has been moved.

For Dorchester DR-SG XX-538 models, the by-pass can be accessed by removing the rear siphon hose.

8. END OF PRODUCT LIFE

Regulatory disposal and managed recycling of this product can prevent damage to the environment and health risks.

a) For the disposal of the product and the component parts, the services of an accredited waste disposal company should be used.

b) For more information on waste disposal/management, contact the Local Authority responsible for waste management or the point of sales where the product was purchased

HAMWORTHY has signed up to the Eco-systèmes service which collects, recycles and cleans our used electrical equipment, according to the highest environmental requirements.

Eco-systèmes is an eco-organisation which is approved by the public authorities for the WEEE (Waste Electrical and Electronic Equipment) sector.

The appliances which have the symbol above must not be put with domestic waste and must be collected separately. Contact Eco-systemes (**www.eco-systemes.fr**).

9. HYDRAULIC DIAGRAMS AND CONFIGURATIONS

9.1. Symbols used in the diagrams

Symbol	Function
	Isolation valve open
	Motorised 2-channel valve
	Fixed flow pump
	Temperature sensor
	Variable flow pump
	Y Strainer
	Cut-off valve with bleed tap

Symbol	Function
	Balancing valve
	Bleed valve
	Outdoor sensor
	No return valve
	Security Group
	Safety valve
	Mixer tap

9.2. List of diagrams

DORCHESTER DR-SG ONLY 52
Dorchester DR-SG with or without de-stratification pump for anti-legionella function
DORCHESTER DR-SG + TANK(S) IN SEMI-ACCUMULATED 55
DORCHESTER DR-SG WITH VOLUME MIXING OR TANK LOAD PUMP
DORCHESTER DR-SG + TANK(S) IN SEMI-ACCUMULATED 59
DORCHESTER DR-SG WITH VOLUME MIXING OR TANK LOAD PUMP
DORCHESTER DR-SG + TANK(S) SEMI-INSTANT 65
DORCHESTER DR-SG AND TANK(S) WITH VOLUME MIXING or tank load pump
DORCHESTER DR-SG CASCADE WITHOUT TANK(S) 69
HYDRAULIC CASCADE OF 2 DORCHESTER DR-SGS
DORCHESTER DR-SG CASCADE WITH TANK(S) 73
DORCHESTER DR-SG CASCADE WITH TANK, WITH OR WITHOUT MANUAL BYPASS OF THE SAFETY MIXING TAP FOR THE ANTI-LEGIONELLA CYCLE

DORCHESTER DR-SG ONLY
Dorchester DR-SG with or without de-stratification pump for anti-legionella function

Diagrams
DR-SG100
DR-SG102

A. HYDRAULIC DIAGRAM

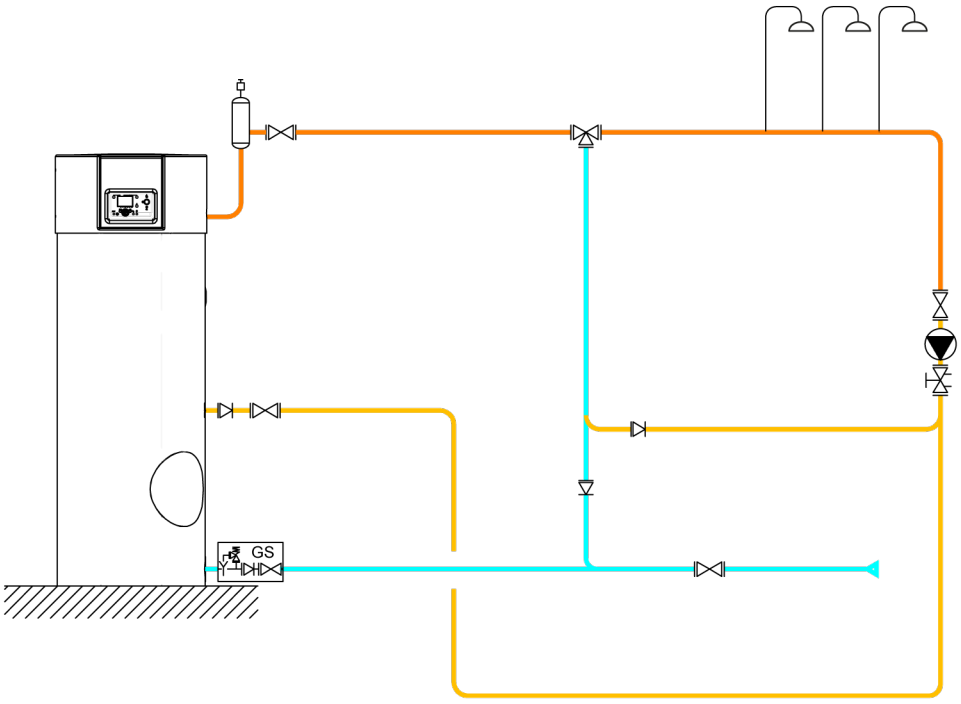


figure 23 - DR-SG100 diagram without de-stratification pump

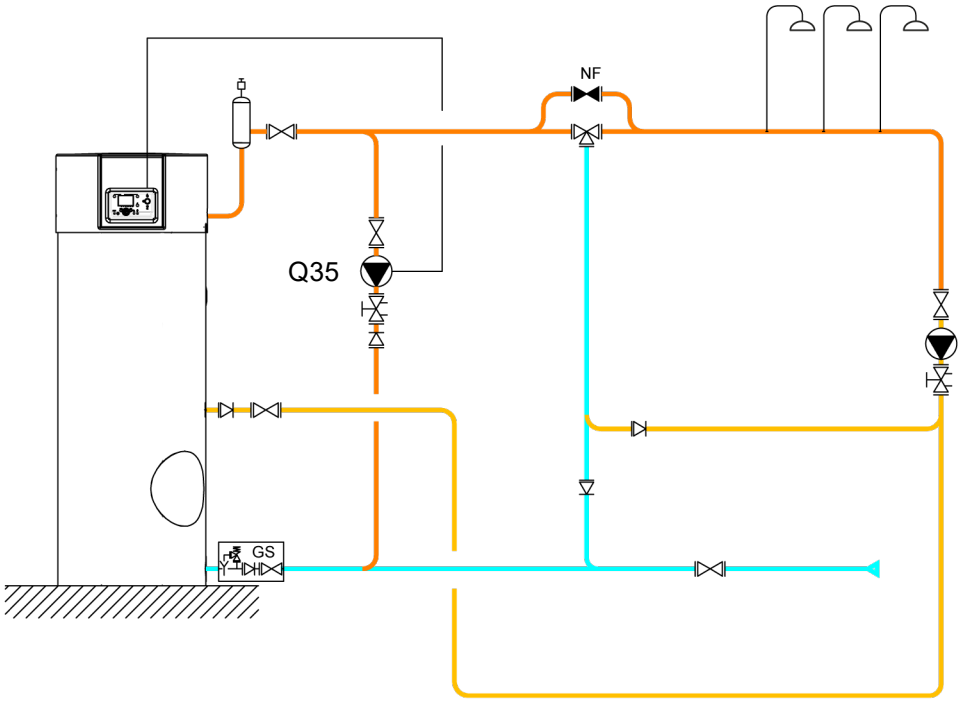


figure 24 - DR-SG102 diagram with de-stratification pump

Diagrams: DR-*SG100, DR-SG102*	page 2 / 3

B. OPTIONAL ACCESSORIES REQUIRED

DR-SG100 diagram: No accessories.

DR-SG102 diagram:

	Quantity	Appliance reference	Order No.
De-stratification pump	1	DR-SG Re-circulation pump	236166

C. OPERATING DESCRIPTION

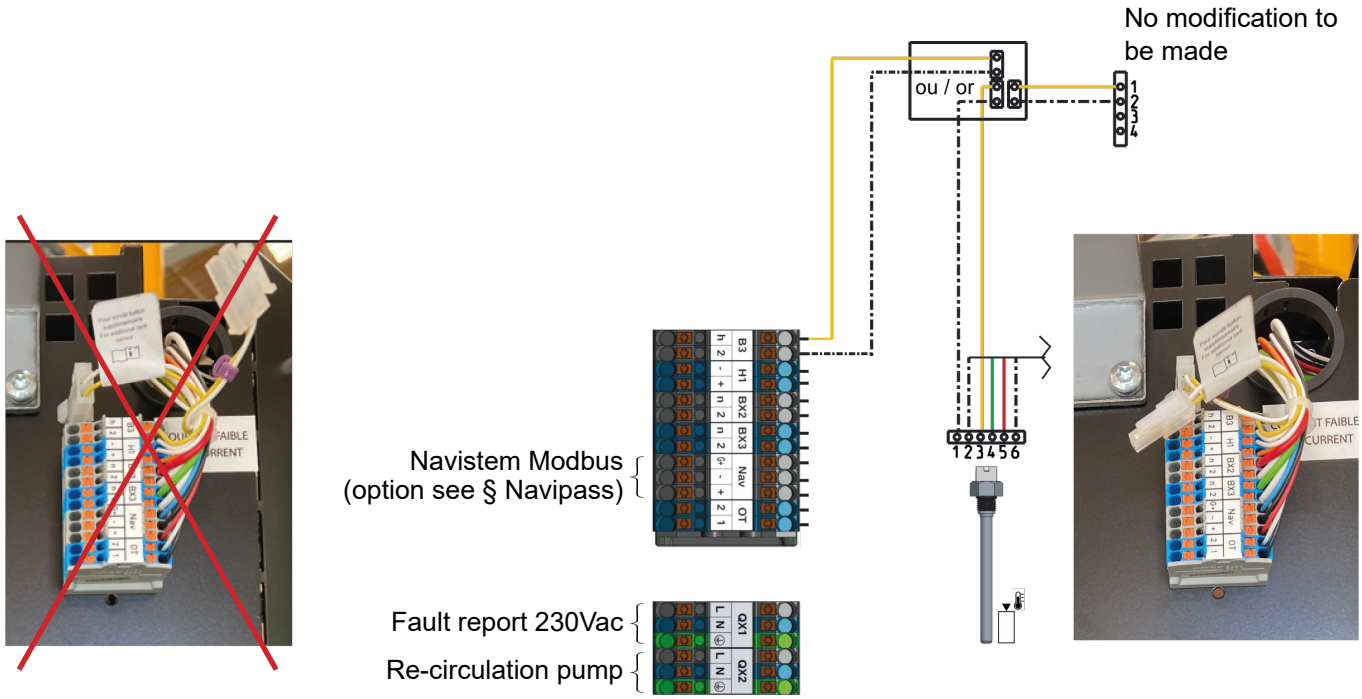
Version DR-SG 100 diagram:
The Dorchester DR-SG is autonomous, the DHW setpoint is adjusted based on the desired flow temperature.

IMPORTANT: **Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.**

Version DR-SG 102 diagram:
The Dorchester DR-SG is autonomous, the DHW setpoint is adjusted based on the desired flow temperature. The optional recirculation pump can homogenise the water contained in the Dorchester DR-SG to give enhanced temperature control and be used in the control of legionellosis.

IMPORTANT: **Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint. You will notice that there is a bypass at the mixing tap terminals that can increase the temperature of the distribution loop during anti-legionella cycles; remember to close this bypass after the anti-legionella cycle.**

D. CUSTOMER'S ELECTRICAL CONNECTION



Diagrams: DR-*SG100, DR-SG102* | page 3 / 3

E. SPECIFIC START-UP PROCEDURE

☞ Correctly install and connect the electrical connections.

☞ Make the settings below in "specialist" mode

OK Short press

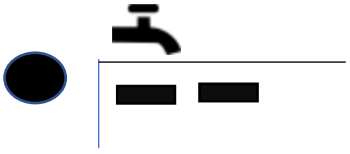
i Press 3 seconds

OK

End user | Commissioning | Specialist | OEM

		Line No.	Value
• Time and date menu			
Set time		Hour / minute (1)	HH.MM
Set the date		Day / month (2)	DD.MM
Set the year		Year (3)	YYYY
• Configuration menu			
Configure just the Dorchester DR-SG (without additional tank)		DHW tank heating gas (5741)	Stop
Configure the alarm output		Relay output QX1 (5890)	Alarm output K10
Configure the de-stratification pump output (DR-SG120 diagram)		Relay output QX2 (5891)	Destratifier pump DHW Q35
• Heating gas menu DHW			
Adjust the comfort setpoint		Comfort setting temperature (1610)	---°C
DHW release request		Release (1620)	24/24
DR-SG102 diagram: Setting the anti-legionella cycle (if desired)			
Activate the anti-legionella function		Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic		Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday		Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time		Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function		Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time		Anti-legionella function duration (1646)	as needed (min)
• DHW tank menu			
Adjust burner request		Outlet setpoint T° over-value (5020)	-3 °C
DHW restart hysteresis		Differential (5024)	5 °C

• Switch the DHW mode to permanent comfort (as per parameter 1620)



Refer to the “§Electrical validation” chapter for the regulator input/output tests

DORCHESTER DR-SG + TANK(S) IN SEMI-ACCUMULATED
Dorchester DR-SG with volume mixing or tank load pump

Diagrams
DR-SG120
DR-SG121

A. HYDRAULIC DIAGRAM

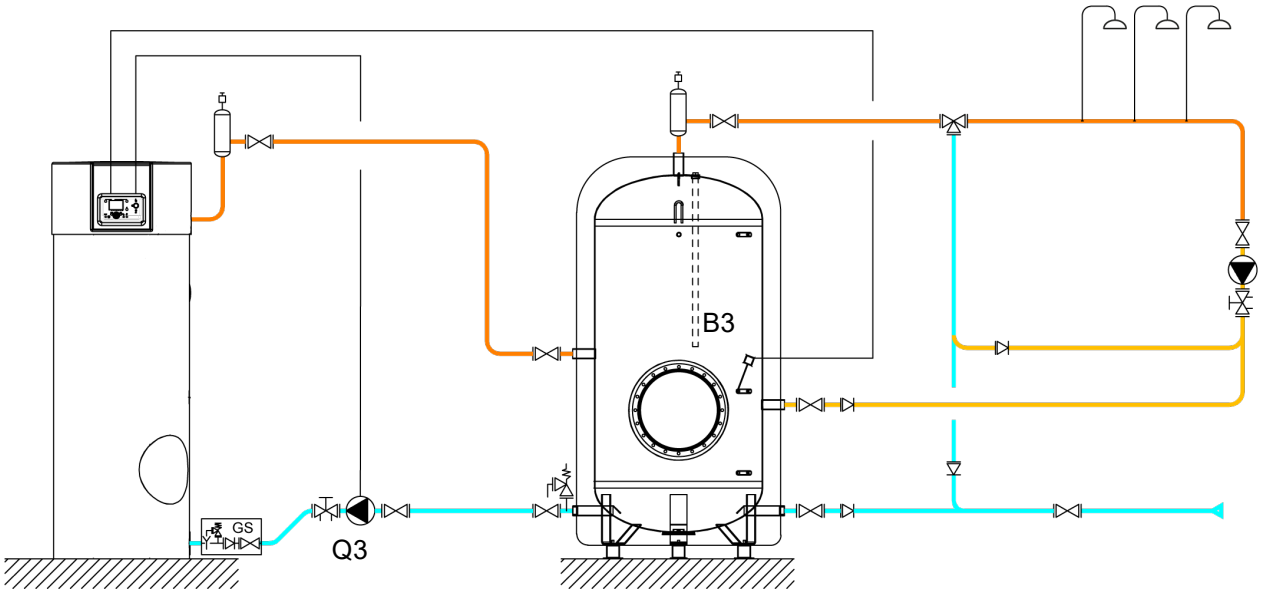


figure 25 - DR-SG120 diagram

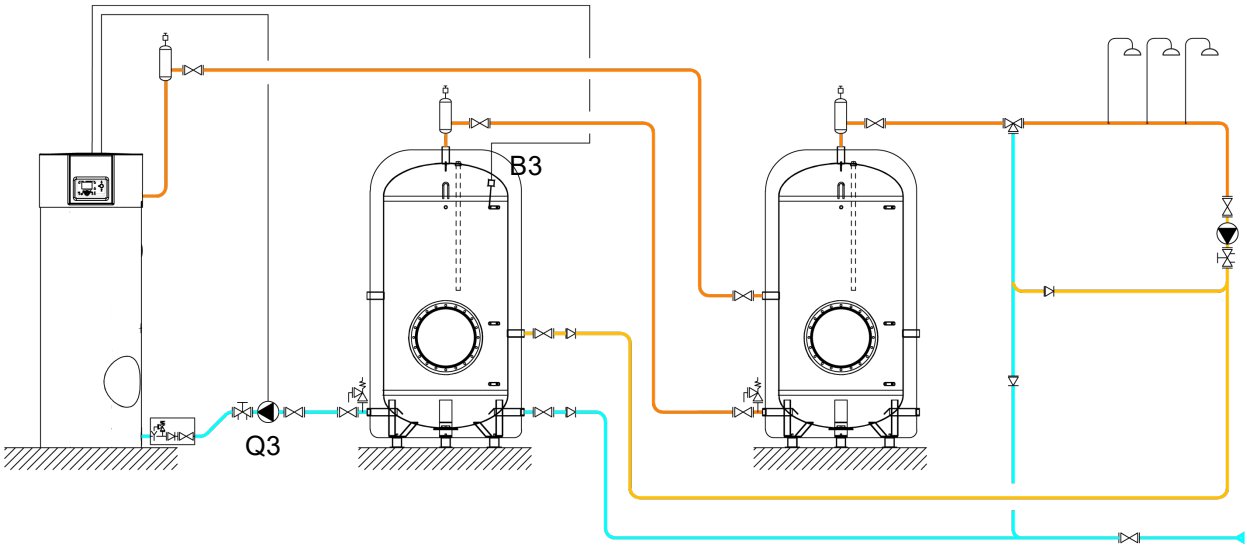


figure 26 - DR-SG121 diagram

Diagrams: DR-*SG120, DR-SG121*	page 2 / 4

B. OPTIONAL ACCESSORIES REQUIRED

	Quantity	Appliance reference	Order No.
Insertion water temp sensor	1	QAZ 36	563605609

C. OPERATING DESCRIPTION

The Dorchester DR-SG is coupled to 1 or 2 DHW tanks, the customer regulates the DHW setpoint he wishes to obtain at the product outlet, which will be the same setpoint for the tank(s).
A pump is installed between the tank and the Dorchester DR-SG that can reactivate the tank(s) loading when the water they contained is lower than the setpoint minus the recovery hysteresis.

IMPORTANT: **When you are in DHW comfort mode (2 cursor on the HMI) the DHW tank loading pump operates permanently, the pump restarts in reduced mode (1 cursor on the HMI) when the temperature in the tank is not satisfactory.**

You can choose to operate in permanent comfort mode (2 cursors on the HMI), permanent reduced mode (1 cursor on the HMI), or a timer program to alternate comfort and reduced modes (2 cursors on the HMI + timer program).
This pump operates during anti-legionella cycles to obtain a uniform water temperature in the storage tank.
A timer program can be used to perform loading at either the comfort DHW setpoint or at the reduced DHW setpoint.

IMPORTANT: **Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.**

In principle, the circulator between the tank and the Dorchester DR-SG is dimensioned to ensure a flow rate equal to P / (1.16 x ∆T)

- with P being the nominal power of the Dorchester DR-SG (in kW) and

- ∆T = setpoint T – cold water T considering the temperature of cold water in summer.

However, it is imperative that this flow rate is higher than the loop return flow rate in the tank, once you are sure of compliance with distribution loop regulations.
It should be remembered that the power of the Dorchester DR-SG must be determined on the basis of DHW consumption but also taking into account the heat losses of the distribution loop.

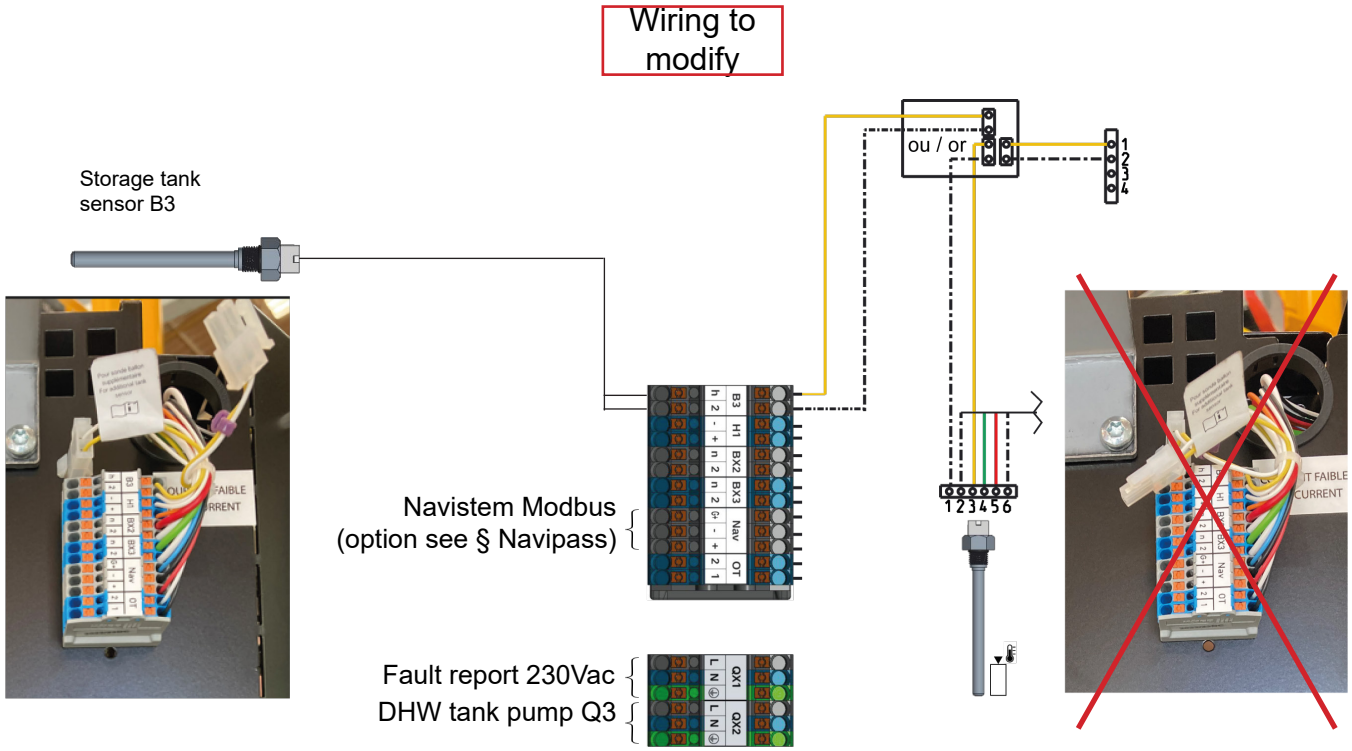
For example, for a cold water temperature of 18°C in summer, a DHW set point at 62°C on a the Dorchester DR-SG 35-356.
Nominal power = 35kW

∆T = 62-18 = 44°C

Circulator flow = 35/(1.16 x 44) = 0.69m3/h.

Diagrams: DR-*SG120, DR-SG121* | page 3 / 4

D. CUSTOMER'S ELECTRICAL CONNECTION



E. SPECIFIC START-UP PROCEDURE

☞ Correctly install and connect the electrical connections.

☞ Make the settings below in "specialist" mode

OK Short press

i Press 3 seconds

End user | Commissioning | Specialist | OEM

	Line No.	Value
• Time and date menu		
Set time	Hour / minute (1)	HH.MM
Set the date	Day / month (2)	DD.MM
Set the year	Year (3)	YYYY
• Configuration menu		
Configure Dorchester DR-SG with an additional tank	DHW tank heating gas (5741)	Start
Configure the alarm output	Relay output QX1 (5890)	Alarm output K10
Configure the DHW tank pump output	Relay output QX2 (5891)	DHW pump Q3
• Heating gas menu DHW		
Adjust the comfort setpoint	Comfort setting temperature (1610)	---°C
Adjust the reduced setting	Reduced setpoint temperature (1612)	---°C

Diagrams: DR-*SG120, DR-SG121*

DHW release request	Release (1620)	24/24

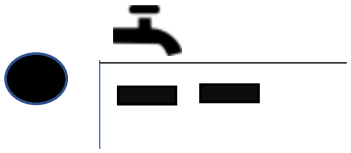
Setting the anti-legionella cycle (if desired)

Activate the anti-legionella function	Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic	Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday	Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time	Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function	Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time	Anti-legionella function duration (1646)	as needed (min)

- DHW tank menu

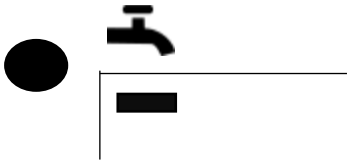
Adjust burner request	Outlet setpoint T° over-value (5020)	+4 °C
DHW restart hysteresis	Differential (5024)	5 °C

- Switch the DHW mode to permanent comfort (as per parameter 1620)



OR

- Switch the DHW regime to permanent reduced



If you want to lower the DHW setpoint (reduced setpoint) for a specific time range, use the following settings

	Line No.	***Value***
• Heating gas menu DHW		
DHW release request	Release (1620)	Timer programme 4/DHW

- Timer program menu 4/DHW

Choose the programming range	Preselection (560)	e.g.: Monday-Sunday
Set the start of the comfort setpoint range	1st phase ON (561)	e.g.: 06:00 h
Set the end of the comfort setpoint range	1st phase Off (562)	e.g.: 22:00 h

- Switch the DHW mode to permanent comfort (as per parameter 1620)

Refer to the “§Electrical validation” chapter for the regulator input/output tests

DORCHESTER DR-SG + TANK(S) IN SEMI-ACCUMULATED *Dorchester DR-SG with volume mixing or tank load pump*	Diagram ***DR-SG120 bis*** page 1 / 7

A. HYDRAULIC DIAGRAM

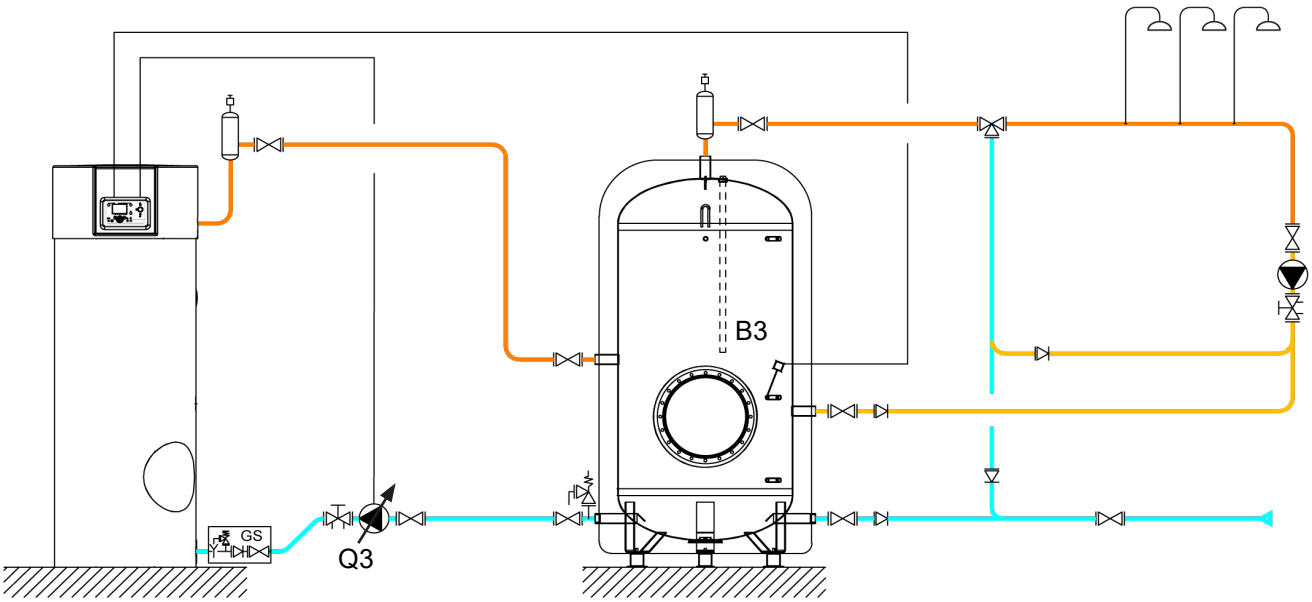


figure 27 - DR-SG120 bis diagram

B. OPTIONAL ACCESSORIES REQUIRED

	Quantity	Appliance reference	Order No.
0*10v variable flow pump control kit	1	AVS 75 Expansion kit	AA031322

C. OPERATING DESCRIPTION

The Dorchester DR-SG is coupled to a DHW tank, the customer regulates the DHW setpoint he wishes to obtain at the product outlet, which will be the same setpoint for the tank and the Dorchester DR-SG.
A pump is installed between the tank and the Dorchester DR-SG that can reactivate the tank loading when the water it contains is lower than the setpoint minus the recovery hysteresis.
The control mechanism of the variable flow pump means that the water leaving the Dorchester DR-SG rises in temperature more quickly (outflow close to the bottom heel of the pump). The flow is then gradually increased to maintain the burner in operation throughout the DHW loading.

IMPORTANT: **When you are in DHW comfort mode (2 cursor on the HMI) the DHW tank loading pump operates permanently, the pump restarts in reduced mode (1 cursor on the HMI) when the temperature in the tank is not satisfactory.**

You can choose to operate in permanent comfort mode (2 cursors on the HMI), permanent reduced mode (1 cursor on the HMI), or a timer program to alternate comfort and reduced modes (2 cursors on the HMI + timer program).
This pump operates during anti-legionella cycles to obtain a uniform water temperature in the storage tank.
A timer program can be used to perform loading at either the comfort DHW setpoint or at the reduced DHW setpoint.

IMPORTANT: **Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.**

In principle, the circulator between the tank and the Dorchester DR-SG is dimensioned to ensure a flow rate equal to P / (1.16 x ΔT)

- with P being the nominal power of the Dorchester DR-SG (in kW) and

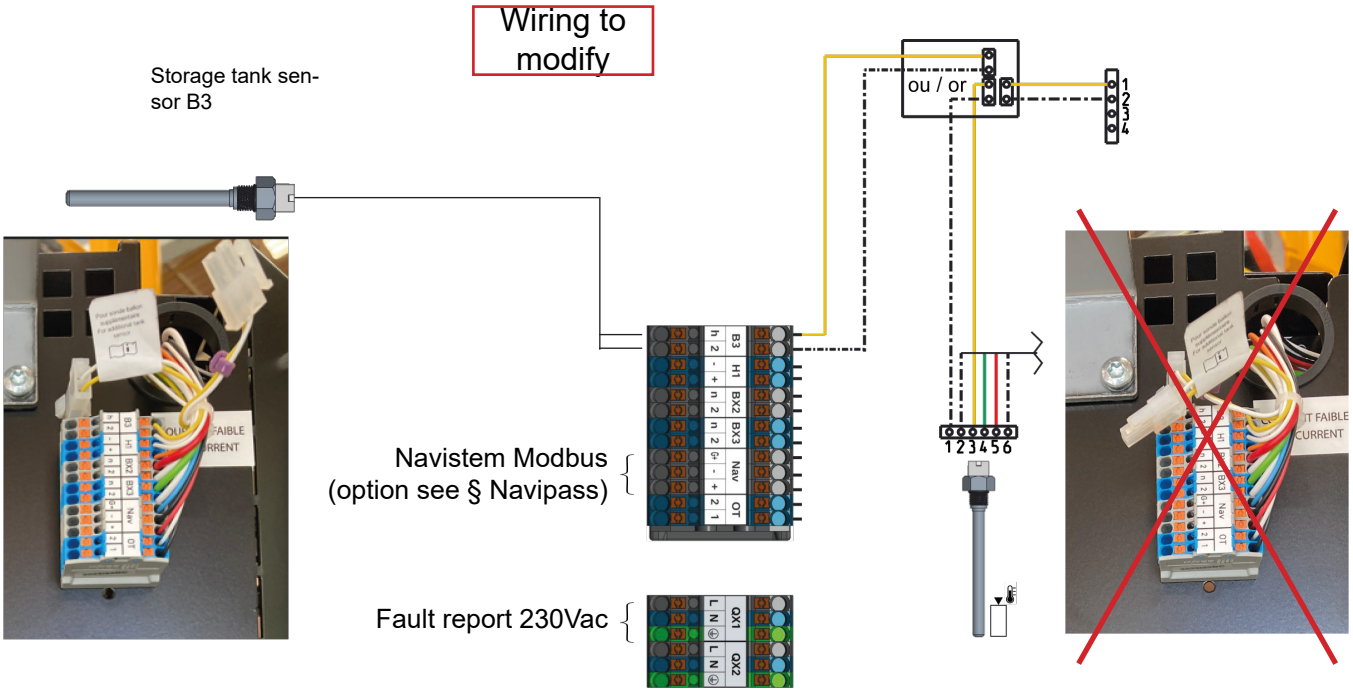
- ΔT = setpoint T – cold water T considering the temperature of cold water in summer.

However, it is imperative that this flow rate is higher than the loop return flow rate in the tank, once you are sure of compliance with distribution loop regulations.
It should be remembered that the power of the Dorchester DR-SG must be determined on the basis of DHW consumption but also taking into account the heat losses of the distribution loop.
The Dorchester DR-SG's regulator will control the speed of the circulator; based particularly on the return temperature and the instantaneous partial power, the circulator's flow rate will be adjusted to maintain a flow temperature equal to the setpoint temperature, meaning that the electrical power absorbed by the circulator will be minimised.

In summary, the circulator's maximum speed must be set to ensure a flow rate that is at least equal to the loop return flow rate in the tank, so that the minimum speed setting can correspond to the low limit speed of the circulator.

Diagrams: DR-*SG120 bis*	page 3 / 7

D. CUSTOMER'S ELECTRICAL CONNECTION



E. ELECTRICAL CONNECTION OF THE KIT

Do not modify the switches

DHW pump Q3 control signal (0-10V)

IMPORTANT: **The AVS 75.370 module must be installed on the plate upside down.**

Diagram: DR-*SG120 bis* | page 4 / 7

F. SPECIFIC START-UP PROCEDURE

☞ Correctly install and connect the electrical connections.

☞ Make the settings below in "specialist" mode

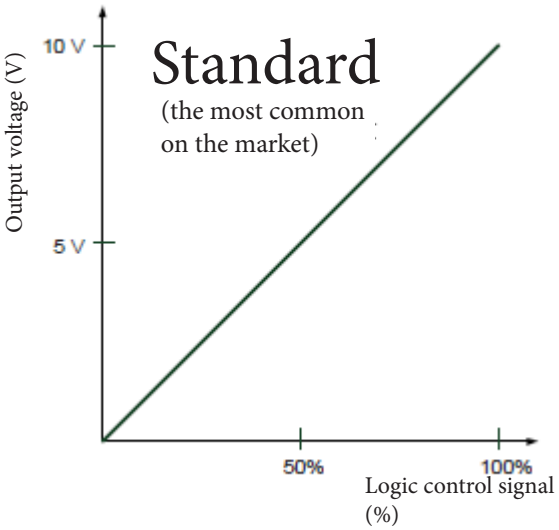
OK Short press

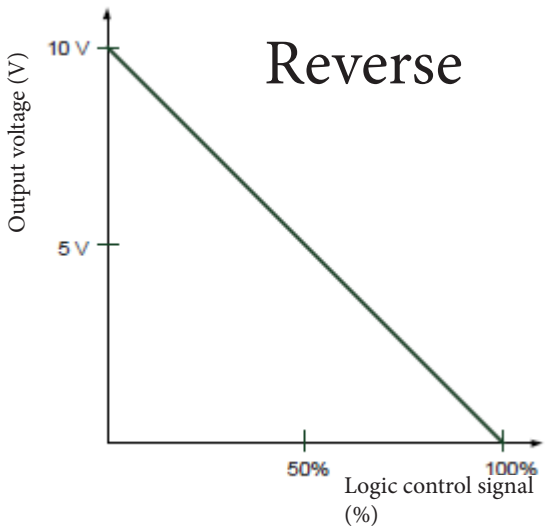
i Press 3 seconds

OK

End user | Commissioning | Specialist | OEM

	Line No.	Value
• Time and date menu		
Set time	Hour / minute (1)	HH.MM
Set the date	Day / month (2)	DD.MM
Set the year	Year (3)	YYYY
• Configuration menu		
Configure Dorchester DR-SG with an additional tank	DHW tank heating gas (5741)	Start
Configure the alarm output	Relay output QX1 (5890)	Alarm output K10
Configure the AVS 75 Kit	Extension module function 1 (6020)	Multifunction
Configure the DHW tank pump output (variable flow)	Func. Output UX21 Module 1 UX21 (6240)	DHW pump Q3
Configure the DHW tank pump control direction (variable flow)	Out. Logic sign Ux21 mod.1 (6241)	Standard (most common) or reversed depending on the pump used





• Heating gas menu DHW		
Adjust the comfort setpoint	Comfort setting temperature (1610)	---°C
Adjust the reduced setting	Reduced setpoint temperature (1612)	---°C
DHW release request	Release (1620)	24/24

Diagram: DR-*SG120 bis*

Setting the anti-legionella cycle (if desired)

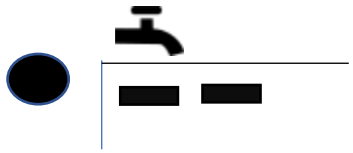
Activate the anti-legionella function	Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic	Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday	Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time	Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function	Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time	Anti-legionella function duration (1646)	as needed (min)

- DHW tank menu

Setting the pimp speed *(See next page to determine the thresholds to be filled in)*

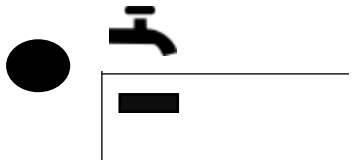
DHW pump Q3 start speed	Circ. pump start rot. speed (5108)	depending on pump specification (%)
DHW pump Q3 minimum speed	Min pump rot. speed (5101)	depending on pump specification (%)
DHW pump Q3 maximum speed	Max pump rot. speed (5102)	depending on pump specification (%)
Adjust burner request	Outlet setpoint T° over-value (5020)	+4 °C
DHW restart hysteresis	Differential (5024)	5 °C

- Switch the DHW mode to permanent comfort (as per parameter 1620)



OR

- Switch the DHW regime to permanent reduced



If you want to lower the DHW setpoint (reduced setpoint) for a specific time range, use the following settings

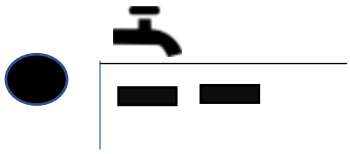
	Line No.	*Value*
• Heating gas menu DHW		
DHW release request	Release (1620)	Timer programme 4/DHW

Diagram: DR-*SG120 bis*

- Timer program menu 4/DHW

Choose the programming range	Preselection (560)	e.g.: Monday-Sunday
Set the start of the comfort setpoint range	1st phase ON (561)	e.g.: 06:00 h
Set the end of the comfort setpoint range	1st phase Off (562)	e.g.: 22:00 h

- Switch the DHW mode to permanent comfort (as per parameter 1620)

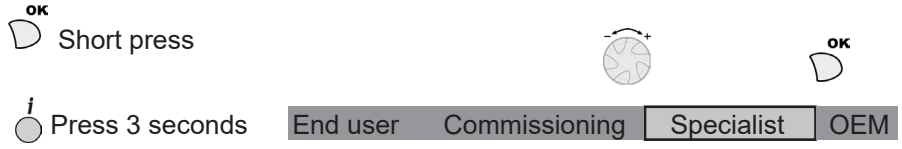


Refer to the “§Electrical validation” chapter for the regulator input/output tests

Procedure for adjusting the speed of the DHW pump via the HMI

In order to determine the correspondence between the electrical control via the 0-10V signal and the pump's flow rate, use the following procedure for the start, minimum, and maximum speeds. First refer to the description shown section C page 60 to know the minimum and maximum flow rates that you have to adjust. The start speed depends on your pump; it must be between the minimum and maximum speeds that you will set.

This procedure can be implemented provided that:
- The Dorchester DR-SG is electrically connected.
- The Dorchester DR-SG and tank have been supplied with water.
- That the pump is correctly powered and that the control signal coming from the AVS75 is connected.
- That you are able to see the water flow between the tank and the Dorchester DR-SG via the adjustment valve and your connected reading case.



	Line No.	*Value*
• Inputs/outputs test menu Manually control the Ux21 output of the AVS75 module	Test output Ux21 module1 (7780)	---% 0% corresponds to 0V and 100% to 10V

IMPORTANT: **Remember to set this parameter to "---" once the evaluation procedure is finished.**

Once you have found the value in % that corresponds to the start, minimum and maximum flow rates, enter these values in parameters 5101, 5102 and 5108.

	Setting 5108 (start speed)	**Setting 5101 (minimum speed)**	**Setting 5102 (maximum speed)**
Setting	100% (recommended)	Circulator pump's low limit	P/10 with P, the power of DR-SG in th/h

DORCHESTER DR-SG + TANK(S) SEMI-INSTANT
Dorchester DR-SG and tank(s) with volume mixing or tank load pump

Diagrams
DR-SG130
DR-SG131

A. HYDRAULIC DIAGRAM

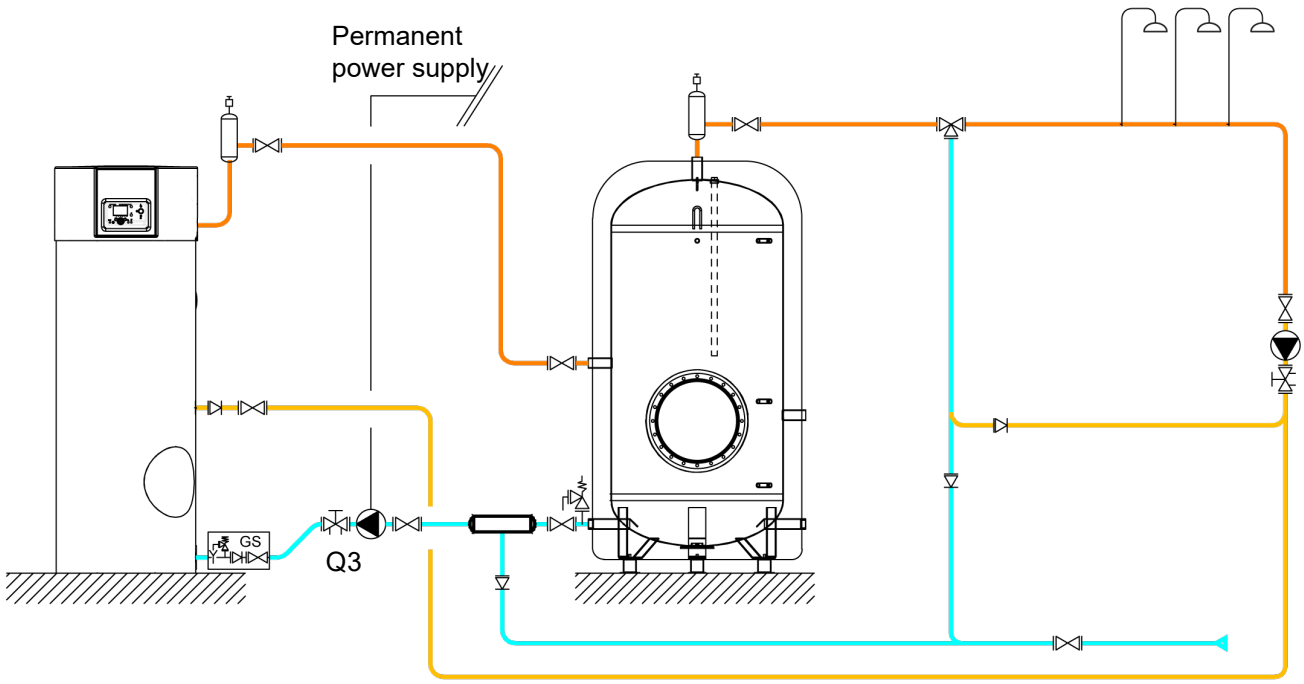


figure 28 - DR-SG130 diagram

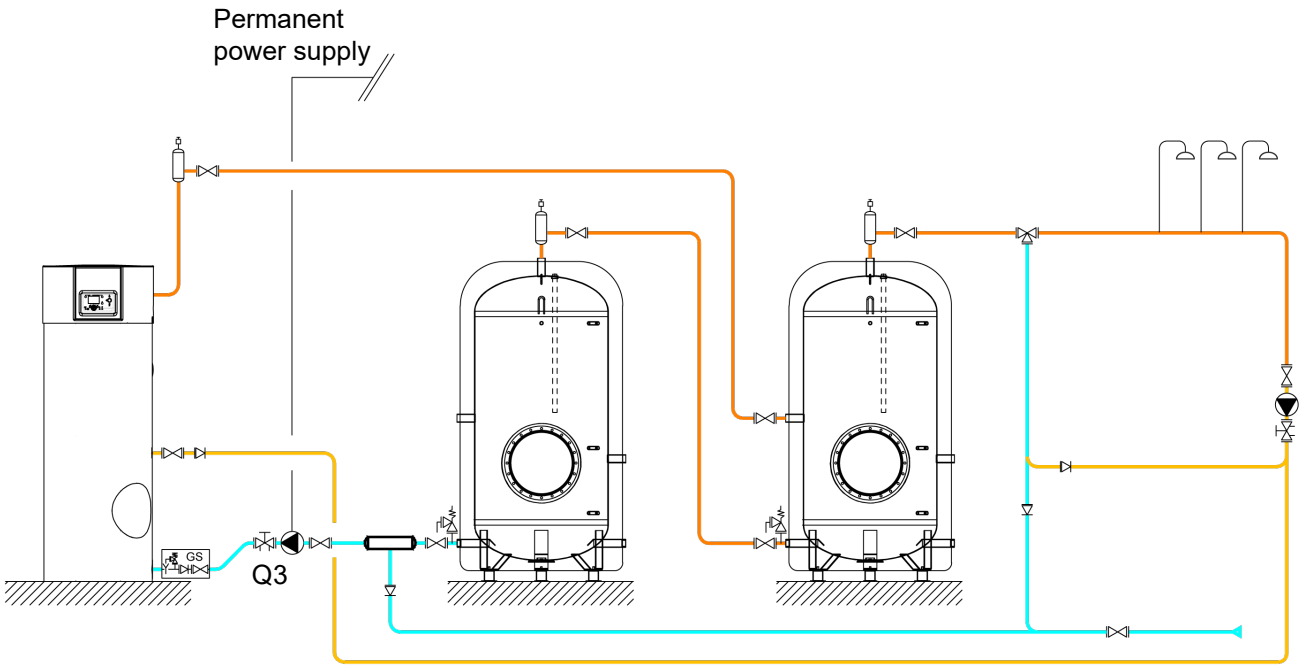


figure 29 - DR-SG131 diagram

Diagrams: DR-*SG130, DR-SG131*	page 2 / 3

B. OPTIONAL ACCESSORIES REQUIRED

No accessories needed.

C. OPERATING DESCRIPTION

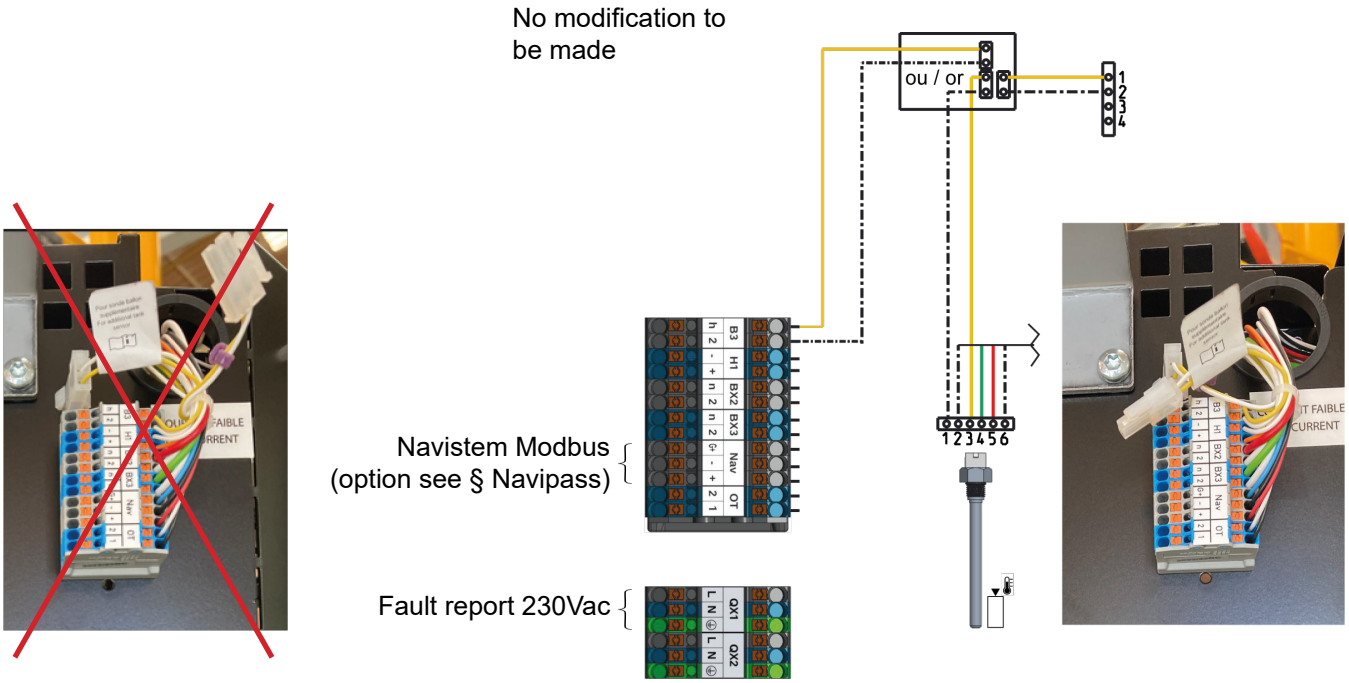
The Dorchester DR-SG is coupled to 1 or 2 DHW tanks, the customer regulates the DHW setpoint he wishes to obtain at the product outlet, which will be the same setpoint for the tank(s).
A pump is added between the tank and the Dorchester DR-SG that allows the entire volume to be permanently stirred. This pump can either be directly connected to the customer's electrical cabinet and operate permanently, or can be connected to the Dorchester DR-SG control panel.
/!\ Ensure you are in DHW comfort mode (2 cursor on the HMI) so that the DHW tank load pump operates permanently. If you are in reduced mode (1 cursor on the HMI) the pump will not operate as effectively as expected and the temperature of the water supplied to the network will not reach the setpoint.
Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.

the circulator between the tank and the Dorchester DR-SG is dimensioned to ensure a flow rate equal to P / (1.16 x ΔT)

- with P being the nominal power of the Dorchester DR-SG (in kW) and

- ΔT = setpoint T – cold water T considering the temperature of cold water in summer.

However, it is imperative that this flow rate is higher than the loop return flow rate in the tank, once you are sure of compliance with distribution loop regulations.
It should be remembered that the power of the Dorchester DR-SG must be determined on the basis of DHW consumption but also taking into account the heat losses of the distribution loop.

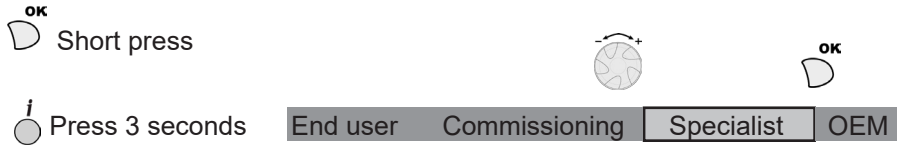


D. CUSTOMER'S ELECTRICAL CONNECTION

E. SPECIFIC START-UP PROCEDURE

☞ Correctly install and connect the electrical connections.

☞ Make the settings below in "specialist" mode

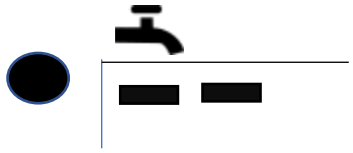


		Line No.	***Value***
• Time and date *menu*			
Set time		Hour / minute (1)	HH.MM
Set the date		Day / month (2)	DD.MM
Set the year		Year (3)	YYYY
• Configuration *menu*			
Configure Dorchester DR-SG with an additional tank		DHW tank heating gas (5741)	Start
Configure the alarm output		*Relay output QX1 (5890)*	*Alarm output K10*
Configure the DHW tank pump output		*Relay output QX1 (5891)*	*DHW pump Q3*
• Heating gas *menu DHW*			
Adjust the comfort setpoint		Comfort setting temperature (1610)	---°C
Adjust the reduced setting		Reduced setpoint temperature (1612)	---°C
DHW release request		*Release (1620)*	*24/24*
Setting the anti-legionella cycle (if desired)			
Activate the anti-legionella function		Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic		Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday		Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time		Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function		Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time		Anti-legionella function duration (1646)	as needed (min)
• DHW tank *menu*			
Adjust burner request		Outlet setpoint T° over-value (5020)	-4 °C

Diagrams: DR-*SG130, DR-SG131*

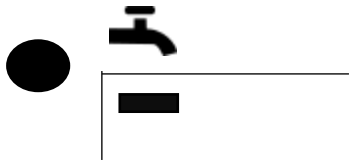
DHW restart hysteresis	Differential (5024)	5 °C

• Switch the DHW mode to permanent comfort (as per parameter 1620)



OR

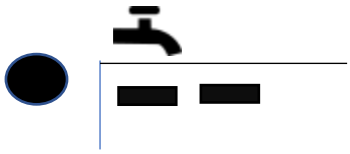
• Switch the DHW regime to permanent reduced



If you want to lower the DHW setpoint (reduced setpoint) for a specific time range, use the following settings

	Line No.	***Value***
• Heating gas *menu DHW*		
DHW release request	*Release (1620)*	*Timer programme 4/DHW*
• Timer program *menu 4/dhw DHW*		
Choose the programming range	Preselection (560)	e.g.: Monday-Sunday
Set the start of the comfort setpoint range	1st phase ON (561)	e.g.: 06:00 h
Set the end of the comfort setpoint range	1st phase Off (562)	e.g.: 22:00 h

• Switch the DHW mode to permanent comfort (as per parameter 1620)



Refer to the “§Electrical validation” chapter for the regulator input/output tests

DORCHESTER DR-SG CASCADE WITHOUT TANK(S)
Hydraulic cascade of 2 Dorchester DR-SGs

Diagrams
DR-SG140
page 1 / 4

A. HYDRAULIC DIAGRAM

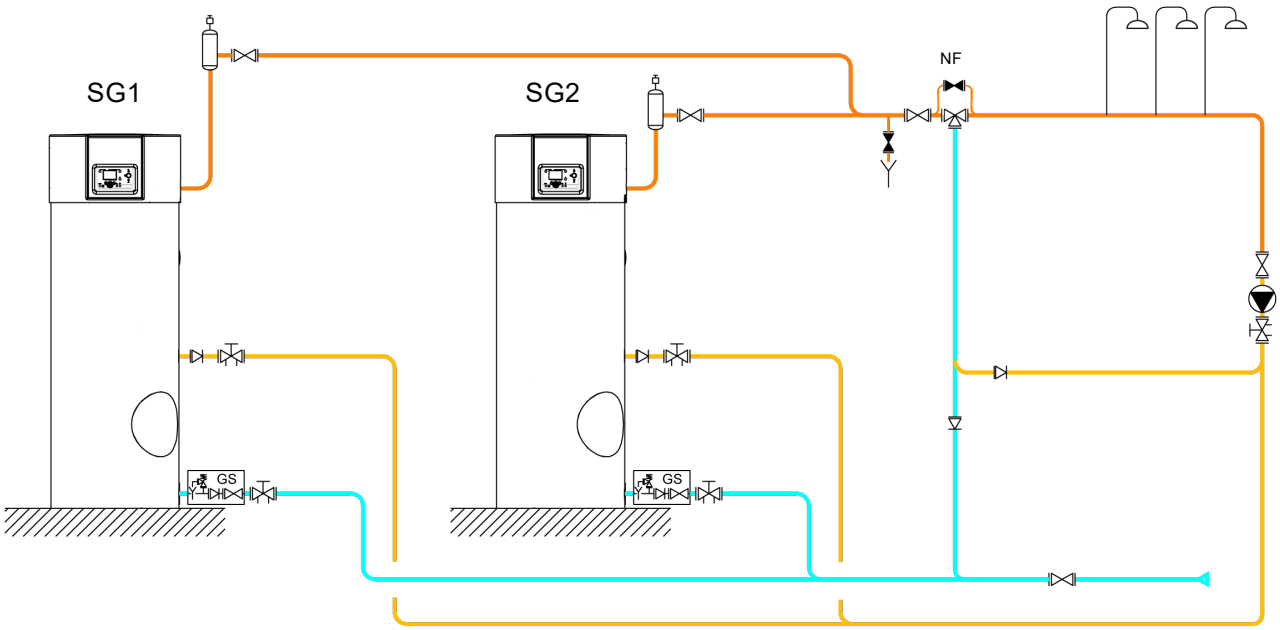


figure 30 - DR-SG140 diagram

B. OPTIONAL ACCESSORIES REQUIRED

No accessories needed

Diagram: DR-*SG140*	page 2 / 4

C. OPERATING DESCRIPTION

Despite the Dorchester DR-SGs being mounted in a hydraulic cascade, there is no communication between the 2 products.

/!\ It is imperative that both the Dorchester DR-SGs have the same settings and the same operating mode. If you use timer programming, you must ensure that the timestamping is correctly set on both products.

Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.

It should be remembered that the power of the Dorchester DR-SGs must be determined on the basis of DHW consumption but also taking into account the heat losses of the distribution loop.

The balancing valves installed on the tank inlet tappings (cold water and loop return) can be used to check that the flow rate ratios are equal to the power ratio.

A drain valve that is installed upstream of the mixing valve helps to balance the cold water, by allowing hot water to be drawn off in the boiler room rather than flowing into the apartments.

D. CUSTOMER'S ELECTRICAL CONNECTION

Same electrical connections for DR-SG1 and DR-SG2

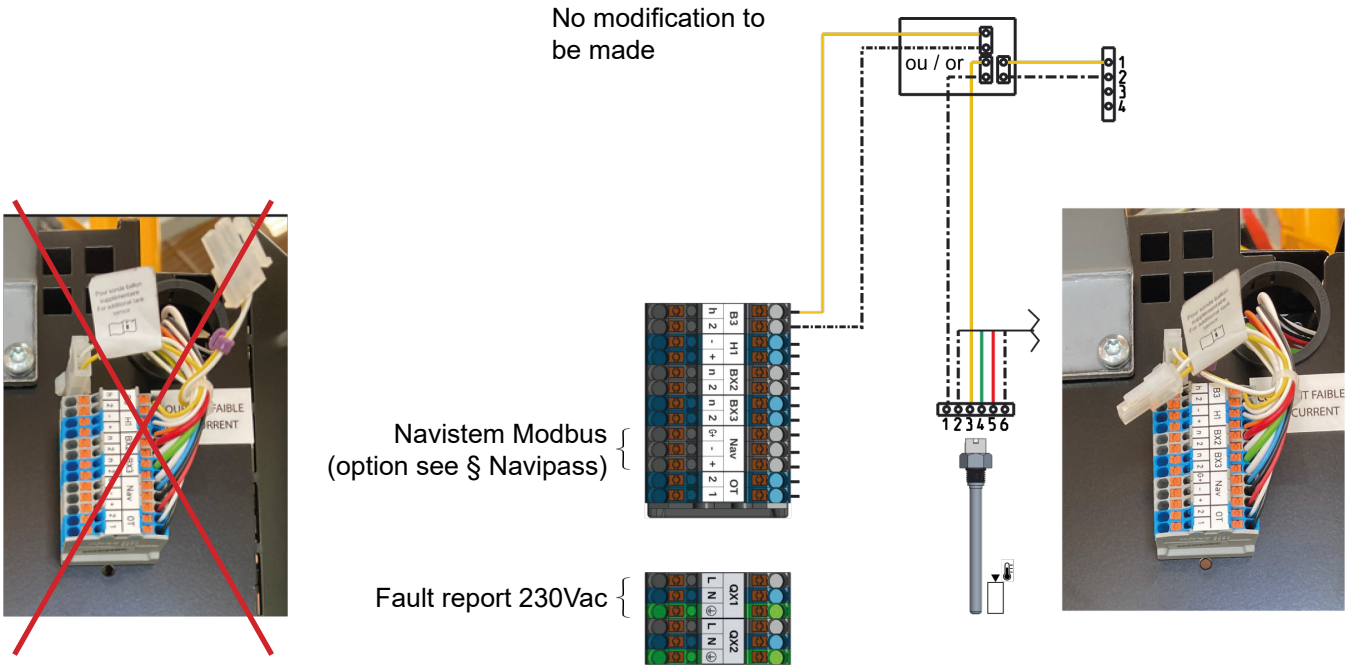


Diagram: DR-*SG140* | page 3 / 4

E. SPECIFIC START-UP PROCEDURE

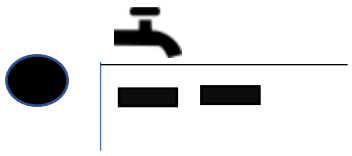
☞ Correctly install and connect the electrical connections.

☞ Make the settings below in "specialist" mode

		Line No.	Value
• Time and date *menu*			
Set time		Hour / minute (1)	HH.MM
Set the date		Day / month (2)	DD.MM
Set the year		Year (3)	YYYY
• Configuration *menu*			
Configure Dorchester DR-SG with an additional tank		DHW tank heating gas (5741)	Stop
Configure the alarm output		*Relay output QX1 (5890)*	*Alarm output K10*
• Heating gas *menu DHW*			
Adjust the comfort setpoint		Comfort setting temperature (1610)	---°C
Adjust the reduced setting		Reduced setpoint temperature (1612)	---°C
DHW release request		*Release (1620)*	*24/24*
Setting the anti-legionella cycle (if desired)			
Activate the anti-legionella function		Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic		Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday		Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time		Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function		Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time		Anti-legionella function duration (1646)	as needed (min)
• DHW tank *menu*			
Adjust burner request		Outlet setpoint T° over-value (5020)	-4 °C
DHW restart hysteresis		Differential (5024)	5 °C

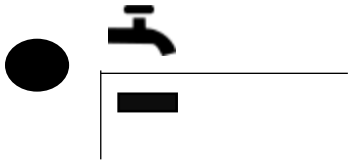
Diagram: DR-*SG140*

- Switch the DHW mode to permanent comfort (as per parameter 1620)



OR

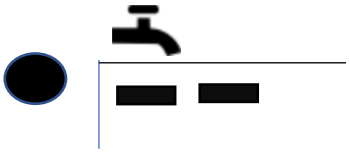
- Switch the DHW regime to permanent reduced



If you want to lower the DHW setpoint (reduced setpoint) for a specific time range, use the following settings

	Line No.	***Value***
• Heating gas *menu DHW*		
DHW release request	*Release (1620)*	*Timer programme 4/DHW*
• Timer program *menu 4/dhw DHW*		
Choose the programming range	Preselection (560)	e.g.: Monday-Sunday
Set the start of the comfort setpoint range	1st phase ON (561)	e.g.: 06:00 h
Set the end of the comfort setpoint range	1st phase Off (562)	e.g.: 22:00 h

- Switch the DHW mode to permanent comfort (as per parameter 1620)



Refer to the “§Electrical validation” chapter for the regulator input/output tests

DORCHESTER DR-SG CASCADE WITH TANK(S)
Dorchester DR-SG cascade with tank, with or without manual bypass of the safety mixing tap for the anti-legionella cycle

Diagrams
DR-SG160
DR-SG161

A. HYDRAULIC DIAGRAM

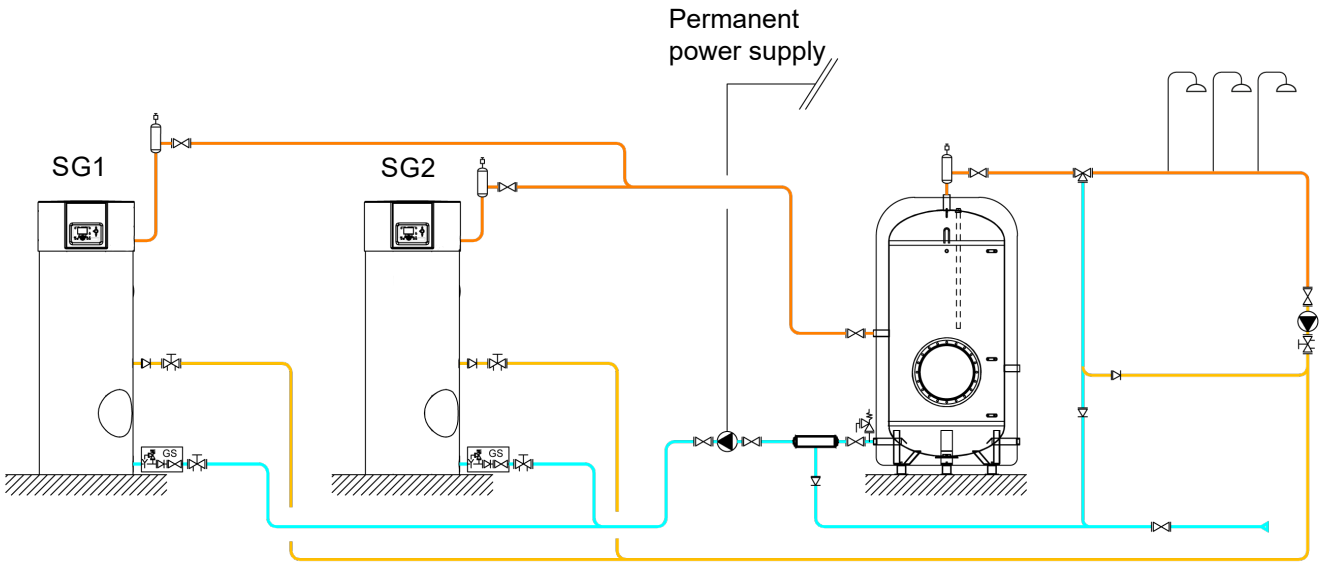


figure 31 - DR-SG160 diagram

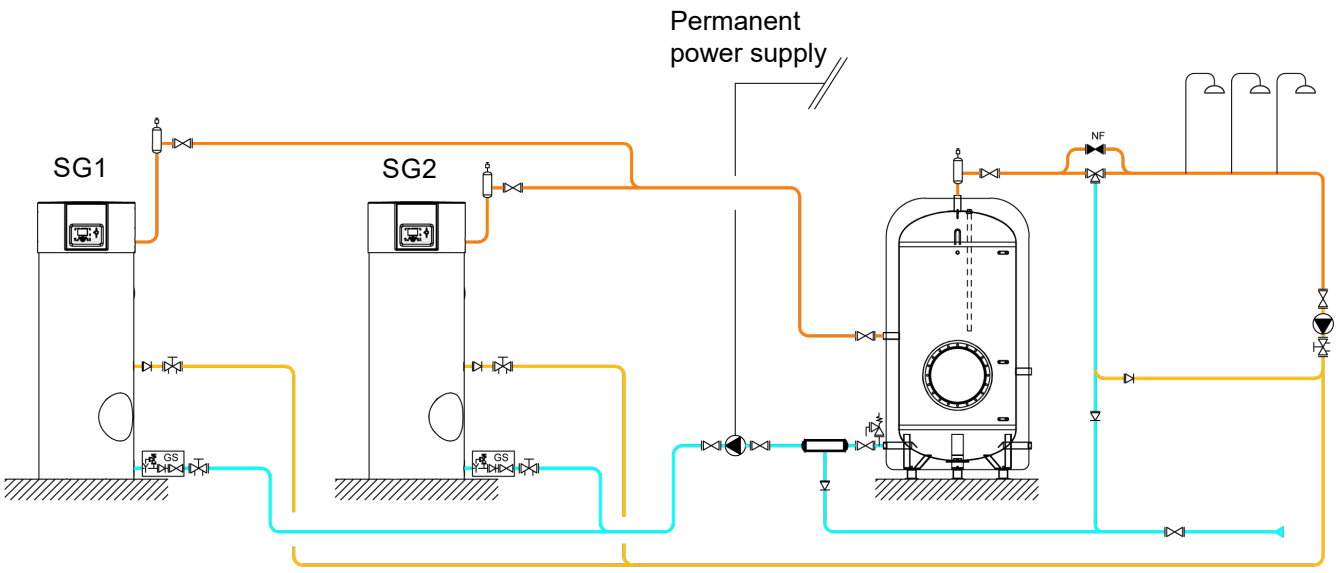


figure 32 - DR-SG161 diagram

Diagrams: DR-*SG160, DR-SG161*	page 2 / 4

B. REGULATION ACCESSORIES REQUIRED

No accessories needed.

C. OPERATING DESCRIPTION

Despite the Dorchester DR-SG being mounted in a hydraulic cascade, there is no communication between the 2 products.

/!\ It is imperative that both the Dorchester DR-SGs have the same settings and the same operating mode. If you use timer programming, you must ensure that the timestamping is correctly set on both products.

Check that the loop flow rate and temperatures comply with the regulations; if necessary, adjust the loop circulator adjustment valve and/or the mixing tap setpoint.
It should be remembered that the power of the Dorchester DR-SGs must be determined on the basis of DHW consumption but also taking into account the heat losses of the distribution loop.
The balancing valves installed on the tank inlet tappings (cold water and loop return) can be used to check that the flow rate ratios are equal to the power ratio.

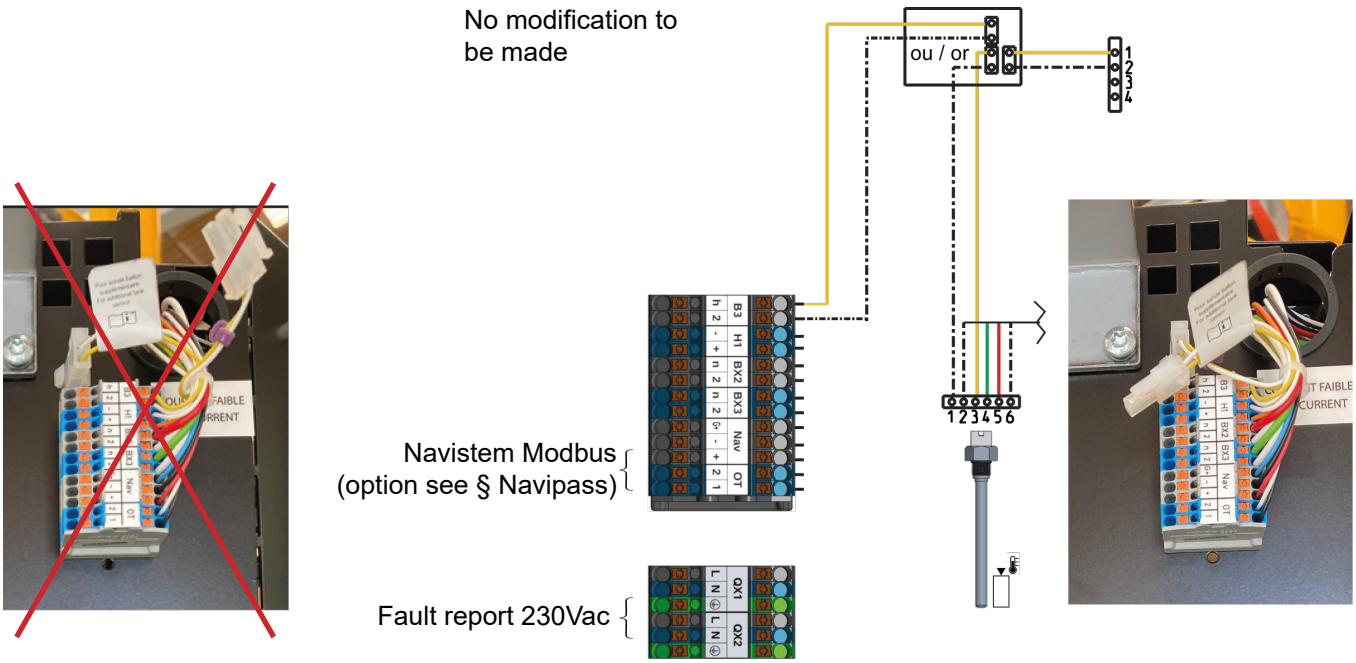
the circulator between the tank and the Dorchester DR-SG is dimensioned to ensure a flow rate equal to P / (1.16 x ΔT)

- with P being the nominal power of the Dorchester DR-SG (in kW) and

- ΔT = setpoint T – cold water T considering the temperature of cold water in summer.

D. CUSTOMER'S ELECTRICAL CONNECTION

DR-SG160 and DR-SG161 diagrams same electrical connections for the DR-SG1 and DR-SG2



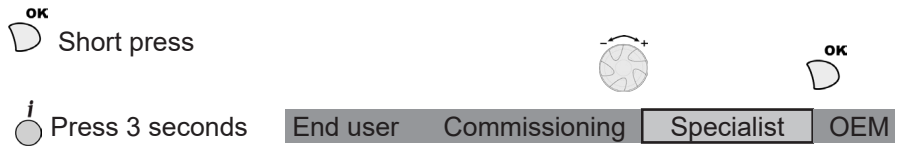
Diagrams: DR-*SG160, DR-SG161* | page 3 / 4

E. SPECIFIC START-UP PROCEDURE

☞ Electrically assemble and connect the 2 Dorchester DR-SGs

☞ Connect the DHW tank loading pump to the boiler room's electrical cabinet and activate it as soon as the product is switched on.

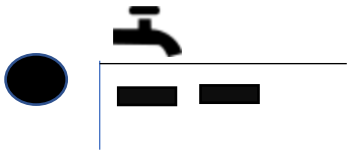
☞ Perform the following settings identically on the 2 Dorchester DR-SGs from the "specialist" level



		Line No.	Value
• Time and date *menu*			
Set time		Hour / minute (1)	HH.MM
Set the date		Day / month (2)	DD.MM
Set the year		Year (3)	YYYY
• Configuration *menu*			
Configure Dorchester DR-SG only (without additional tank)		DHW tank heating gas (5741)	Stop
Configure the alarm output		*Relay output QX1 (5890)*	*Alarm output K10*
• Heating gas *menu DHW*			
Adjust the comfort setpoint		Comfort setting temperature (1610)	---°C
Adjust the reduced setting		Reduced setpoint temperature (1612)	---°C
DHW release request		*Release (1620)*	*24/24*
Setting the anti-legionella cycle (if desired)			
Activate the anti-legionella function		Anti-legionella function (1640)	stop / periodic / fixed day of the week
Choice of repetition. From daily to every 7 days. 1640 = periodic		Function anti-legionella periodical (1641)	1 to 7 days
Choice of the day of the week if 1640=fixed weekday		Function anti-legionella day week (1642)	Monday ... Sunday
Anti-legionella launch time		Anti-legionella function time (1644)	00:00
Heating T° setpoint for anti-legionella function		Anti-legionella setpoint (1645)	as needed (°C)
Anti-legionella T° holding time		Anti-legionella function duration (1646)	as needed (min)
• DHW tank *menu*			
Adjust burner request		Outlet setpoint T° over-value (5020)	-3 °C
DHW restart hysteresis		Differential (5024)	5 °C

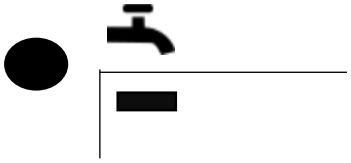
Diagrams: DR-*SG160, DR-SG161*

- Switch the DHW mode to permanent comfort (as per parameter 1620)



OR

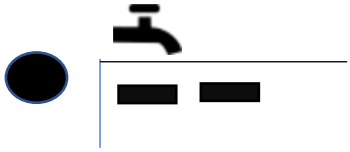
- Switch the DHW regime to permanent reduced



If you want to lower the DHW setpoint (reduced setpoint) for a specific time range, use the following settings

	Line No.	***Value***
• Heating gas *menu DHW*		
DHW release request	*Release (1620)*	*Timer programme 4/DHW*
• Timer program *menu 4/dhw DHW*		
Choose the programming range	Preselection (560)	e.g.: Monday-Sunday
Set the start of the comfort setpoint range	1st phase ON (561)	e.g.: 06:00 h
Set the end of the comfort setpoint range	1st phase Off (562)	e.g.: 22:00 h

- Switch the DHW mode to permanent comfort (as per parameter 1620)



Refer to the “§Electrical validation” chapter for the regulator input/output tests

External commands mode

For a product blocking request made by external information with a VF contact

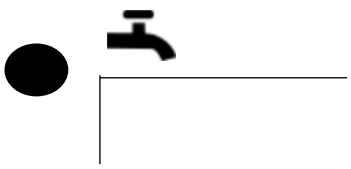
	Line No.	*Value*
• Configuration menu Configure input H1 to make an on/off command by dry contact	H1 input function (5950)	Blocked generator, waiting
If you want the blocking command to be effectuated when you CLOSE your contact	Contact H1 action direction (5951)	Operation contact
If you want the blocking command to be effectuated when you OPEN your contact	Contact H1 action direction (5951)	Normally-closed contact (NC)

INFORMATION: **The frost protection function is still ensured even when the Dorchester DR-SG is blocked.**

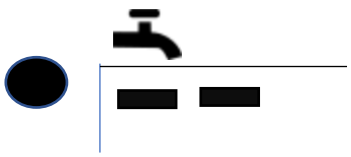
To switch from “no DHW request” to “DHW request comfort mode”

	Line No.	*Value*
• Configuration menu Configure the H1 input	H1 input function (5950)	Switching of heating circuit + DHW operation
If you want "no DHW request" to switch to "DHW request comfort mode" when you CLOSE your contact	Contact H1 action direction (5951)	Operation contact
If you want "no DHW request" to switch to "DHW request comfort mode" when you OPEN your contact	Contact H1 action direction (5951)	Normally-closed contact (NC)

• Switch the DHW mode when stopped



• Activate the DHW request via your dry contact The screen then displays



External commands mode

To modify the DHW temperature setpoints via the Modbus bus

	Line No.	*Value*
There is no need to change settings on the product when using Modbus communication		
• **list of the most used modbus points**		
Configure DHW comfort mode (R/W)	Modbus address	191 (OxBF) Temperature in tenths of a degree e.g.: 500 (0x01F4) for 50°C
Configure DHW reduced mode (Eco) (R/W)	Modbus address	192 (OxC0) Temperature in tenths of a degree e.g.: 500 (0x01F4) for 50°C
DHW T° (Read only)	Modbus address	194 (OxC2) Temperature in tenths of a degree e.g.: 500 (0x01F4) for 50°C
DHW status (Read only)	Modbus address	196 (OxC4)

External commands mode

List of DHW statuses

Register 196 Line No. 8003	Text
3	Safety thermostat
4	Manual mode
17	Under load
23	Antifreeze protection
24	Antifreeze protection
25	Stop
53	Adiabatic cooling
66	Electrical resistance load
67	Overheating other circuit
69	Under load
70	Under load
71	Under load
75	Under load
77	Adiabatic cooling
78	Adiabatic cooling
79	Cooling protection
80	Loading time too long
81	DHW load blocked
82	DHW load blocked
83	Overheating other circuit
84	Overheating other circuit
85	Overheating other circuit
86	Overheating other circuit
87	Electrical resistance load
88	Electrical resistance load
89	Electrical resistance load
90	Electrical resistance load
91	Electrical resistance load
92	Under load
93	Under load
94	Under load
95	Under load
96	Under load
97	Under load
98	Under load
99	Under load
100	Under load
199	Fluid decanting regime
200	Ready
201	Under load
221	Heat maintenance mode
222	Heat maintenance mode
223	Antifreeze protection

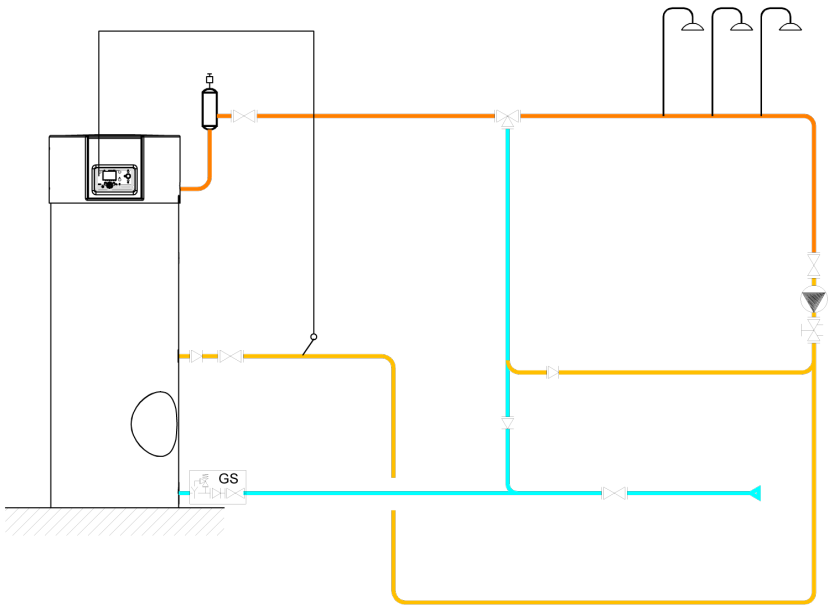
10. ELECTRICAL VALIDATION

Dorchester DR-SG

	Line No.	Value
• Menu *Input / output tests*		
Check the sensor values		
DHW sensor B3	*External T° B9 (7750)*	---°C
Enable outputs		
Alarm output	*Relay test(7700)*	*Output QX1*
Programmable output QX2	*Relay test(7700)*	*Output QX2*
Cancel activation	*Relay test(7700)*	*No test*
Check input H1		
Input used for generator blocking or switching DHW regimes		
	Status of contact H1(7841)	*Closed*

11. OPTIMIZATION

Dorchester DR-SG : Hot water loop monitoring

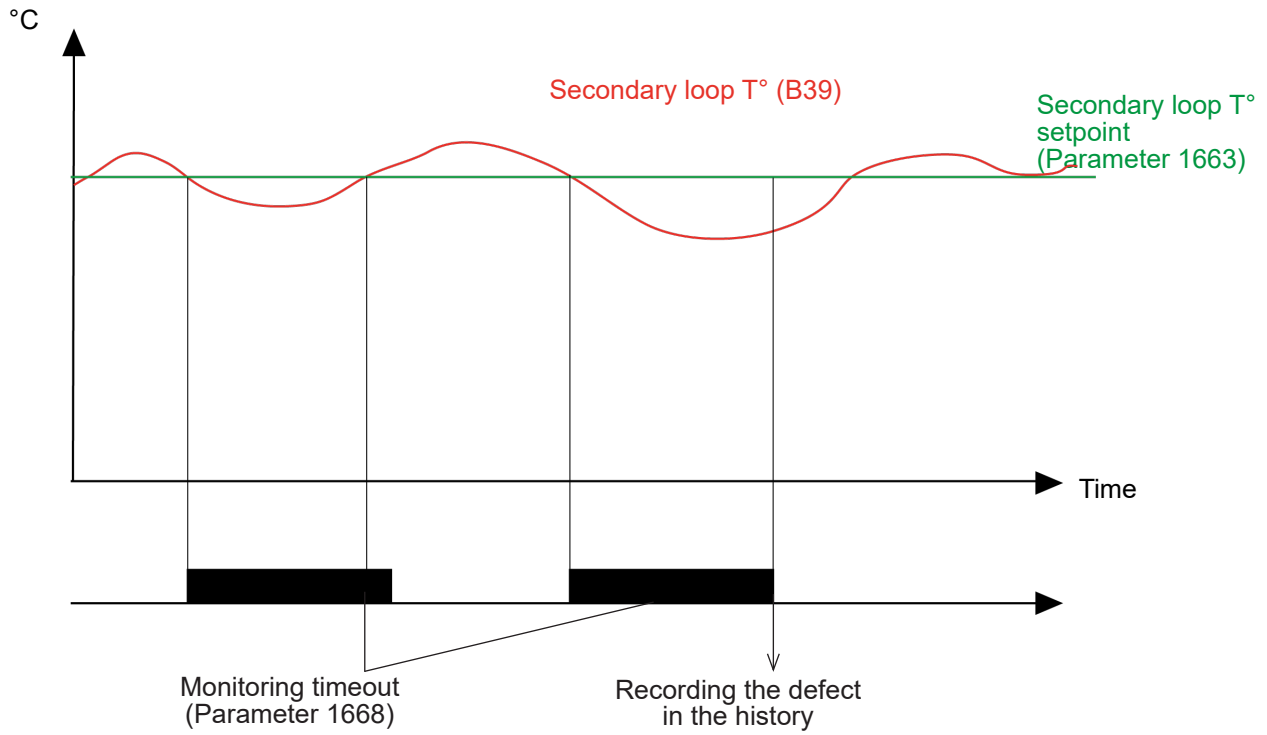


A. CONTROL ACCESSORIES REQUIRED

	Quantity	Appliance reference	Order No.
Loop temperature kit	1	Sensor QAD36	533901594

B. OPERATING DESCRIPTION

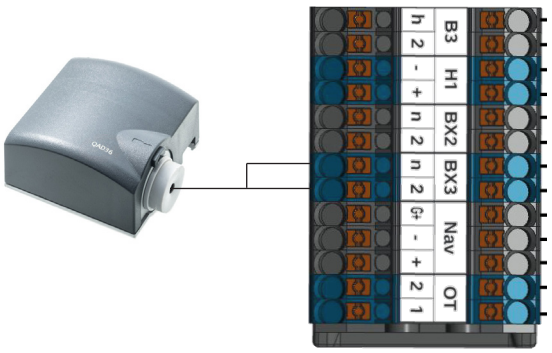
This kit allows you to monitor the temperature of a secondary hot water loop.
You can read the value of this temperature at parameter 8835 and set an alarm that will be stored in the fault history.
The temperature of the secondary loop is considered as correct if the level of deviation from the setpoint is less than 1K. If the loop temperature setpoint is reduced by more than 4K, the supervision function is disabled until the secondary loop temperature is dropped back to the new setpoint.



CAUTION :

The alarm to monitor this temperature does not create a product shutdown.
The alarm setting step is one hour.
Monitoring becomes active only once the loop temperature reaches setpoint at least once.
Only a single loop can be monitored by this function.

C. CUSTOMER'S ELECTRICAL CONNECTION

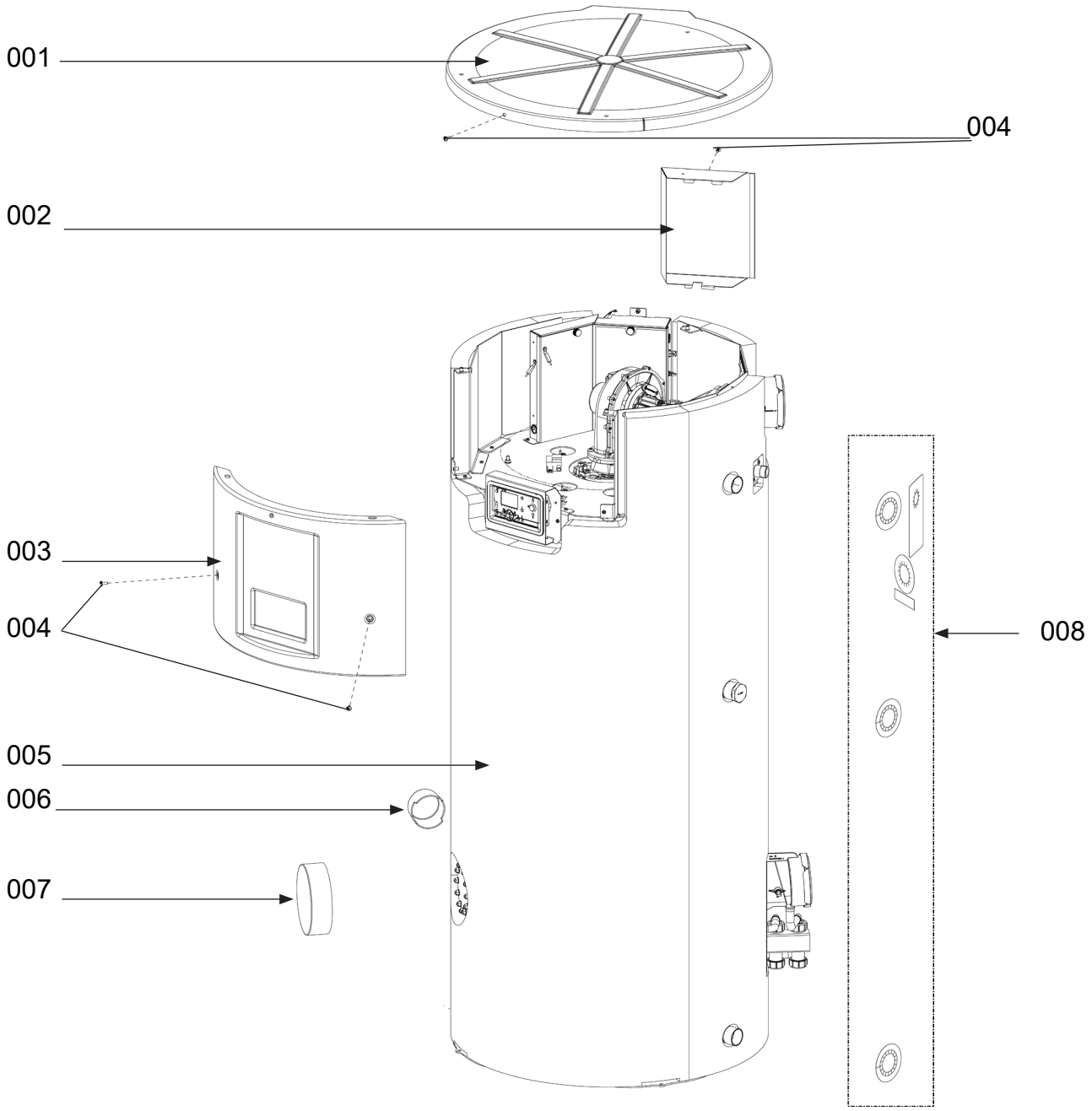


D. SPECIFIC START-UP PROCEDURE

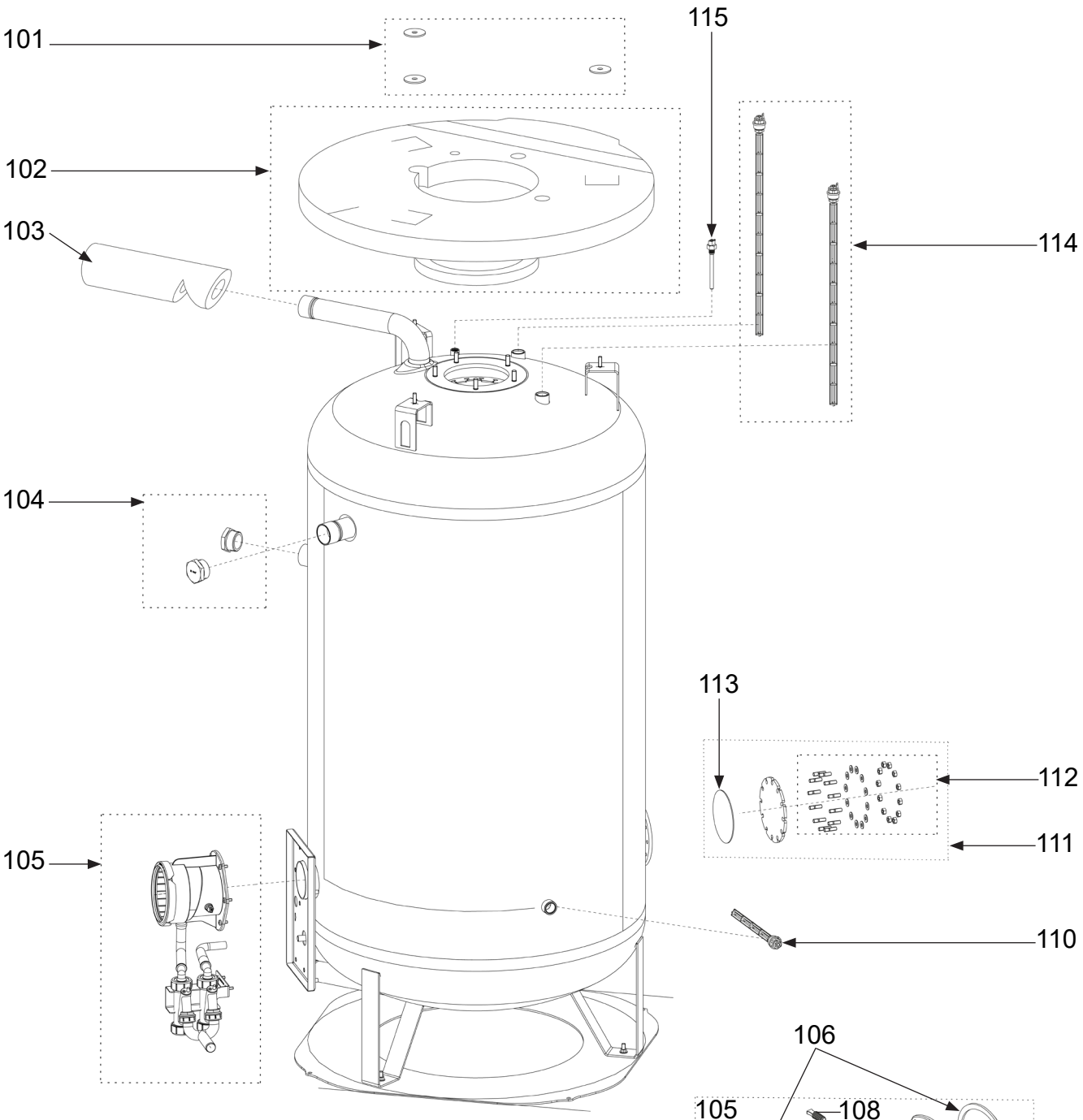
	Line No.	*Value*
• Configuration menu Configure the secondary loop monitoring temperature sensor	Sensor input Bx3 (5932)	DHW flow temperature sensor B39
• Heating gas *menu DHW* Choose setpoint for DHW secondary loop	*Flow temperature setpoint (1663)*	__°C
Choose trigger timeout of the alarm	*Secondary loop alarm timeout (1668)*	*__ hour* *(--- = inactive, if a value is set, the function becomes automatically active)*
• Menu Diagnostic consumer Check reading of the secondary loop flow sensor	DHW flow temperature (8835)	__°C

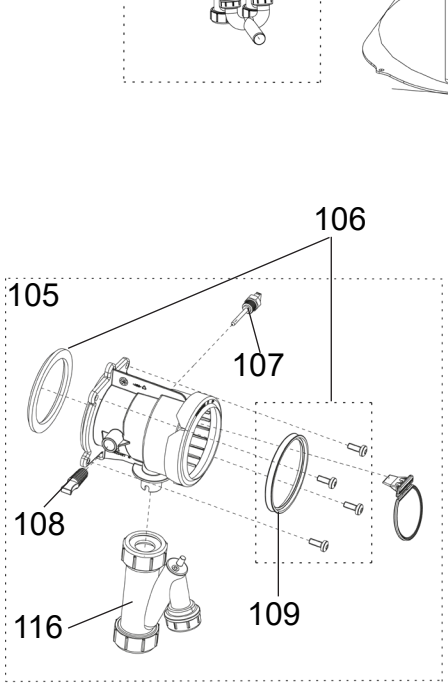
IMPORTANT : This kit does not guarantee that the installation complies with local regulations (risk of burns, legionella prevention, etc ...)

12. SPARE PARTS LIST

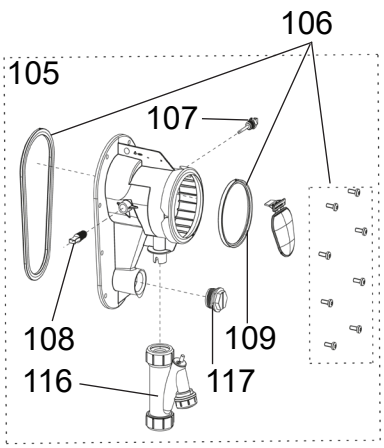


Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	35 to 60 kW	70 to 120 kW
001	Top cover	AA555346	AA555361	AA555362
002	Cable passage plate	AA555369		
003	Cladding screen	AA555366	AA555367	AA555368
004	Cladding screws	AA555370		
005	Cladding jacket	AA555378	AA555379	AA555380
006	Lower anode cover	NA	AA555372	
007	Inspection hatch cover	AA555371		
008	Collar kit + gas plates	AA555381		

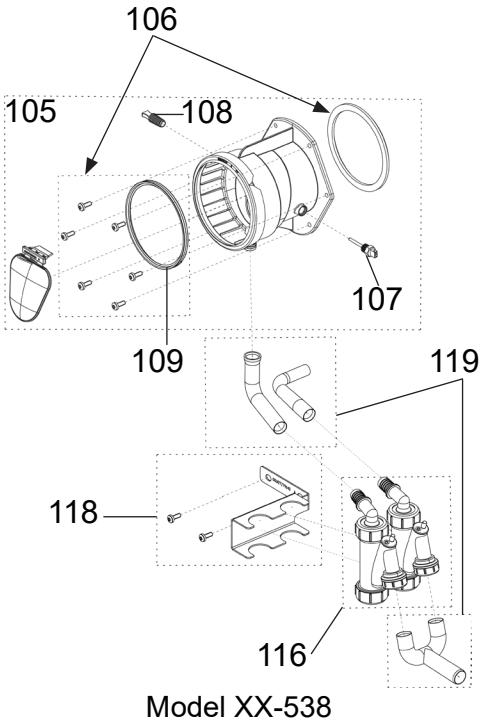




Model XX-210

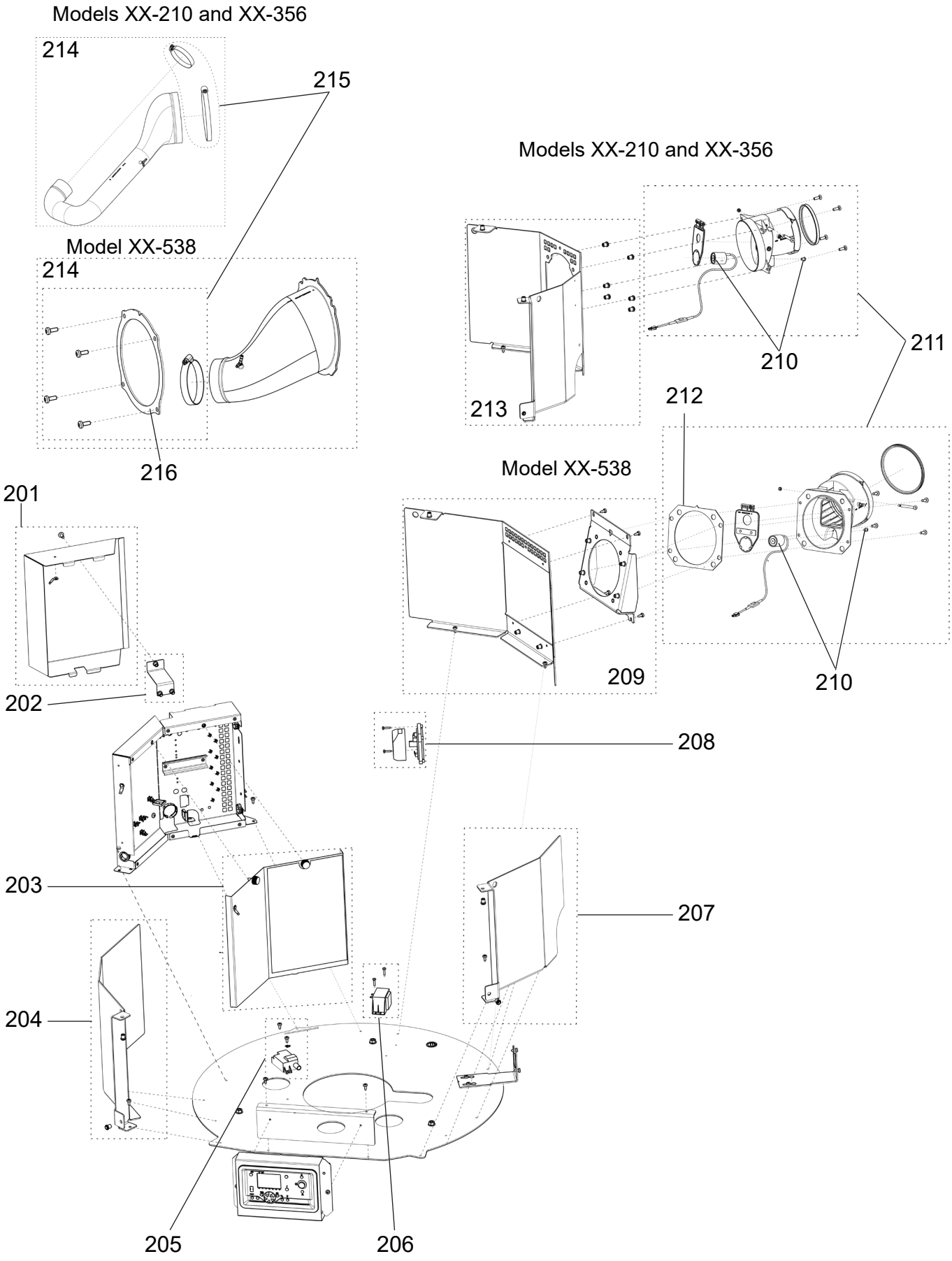


Model XX-356



Model XX-538

Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	35 to 60 kW	70 to 120 kW
101	Tank insulating wedge	AA555432		
102	Upper tank insulation	AA555424	AA555427	AA555431
103	Outlet tapping insulation	AA555434	AA555435	AA555437
104	Tapping plugs	AA555384	AA555385	AA555386
105	Complete exhaust nozzle	AA555396	AA555397	AA555398
106	Exhaust outlet seal + screws	AA555399	AA555400	AA555401
107	Smoke sensor	AA555395		
108	Exhaust sampling plug	AA555391		
109	Air/exhaust connection seal	AA555392	AA555393	AA555394
110	Horizontal anode LG = 247mm	NA	AA555422	
111	Inspection hatch	AA555387		
112	Inspection hatch screws	AA555389		
113	Inspection hatch seal	AA555388		
114	Vertical anode LG = 547 mm	AA555421		
115	Submerged sensor kit	AA555583		
116	Condensate siphon	AA555471		AA555473
117	Bypass plug	NA	AA555405	NA
118	Siphon holder SG XX-538	NA		AA555477
119	Siphon hose SG XX-538	NA		AA555478


Models XX-210 and XX-356
214
215
Model XX-538
214
216
Models XX-210 and XX-356
213
210
211
212
Model XX-538
209
210
201
202
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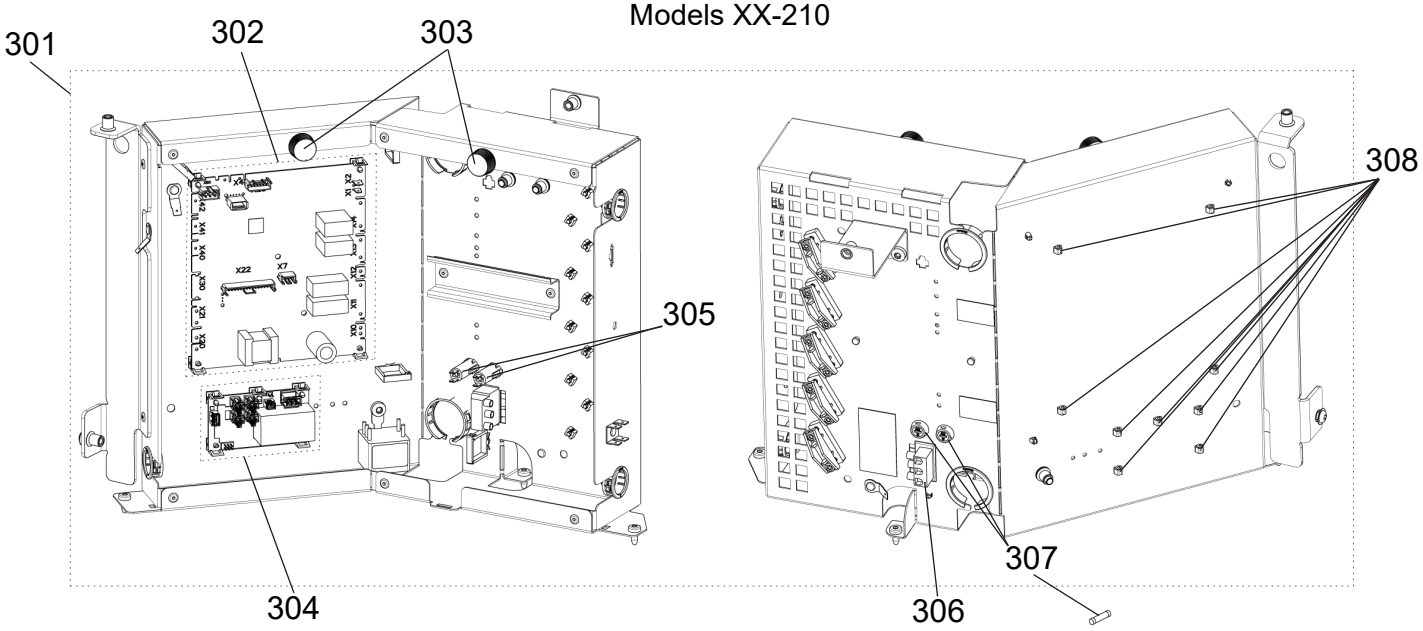
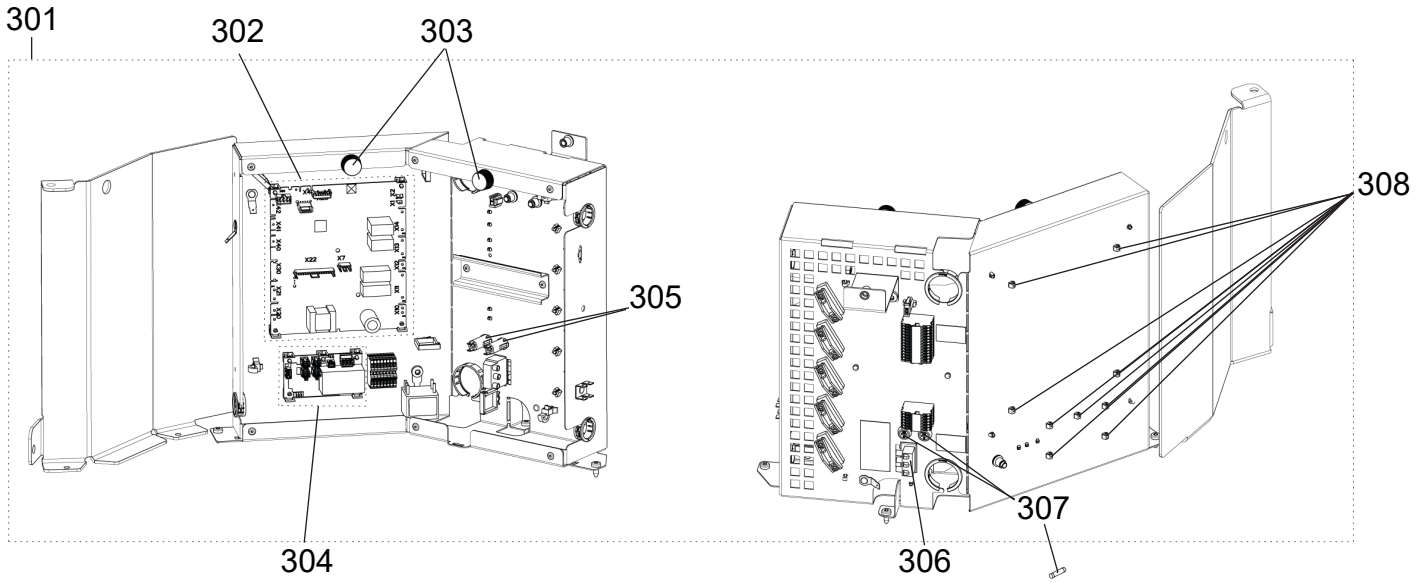
206

Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	35 to 60 kW	70 to 120 kW
201	Cable passage plate	AA555369		
202	Panel rear bracket	AA555476		
203	Panel lock	AA555485		
204	Panel left side jacket	NA	AA555474	AA555475
205	Ignition transformer ZAG1	AA555584		
206	CEM filter	NA		AA555504
207	Right front side jacket	NA		555453
208	Air pressure switch	AA555585		
209	Panel right rear side jacket	NA		555463
210	Electromagnet + screws	AA555418		
211	Complete air inlet	AA555406	AA555407	AA555409
212	Air inlet seal	NA		AA555419
213	Panel right side jacket	AA555451	AA555452	NA
214	Air sleeve	AA555411	AA555412	AA555413
215	Air sleeve fixings	AA555414		AA555417
216	Air hose fixed ring	NA		AA555464
----	Versilic (set)	AA555587	AA555588	AA555589

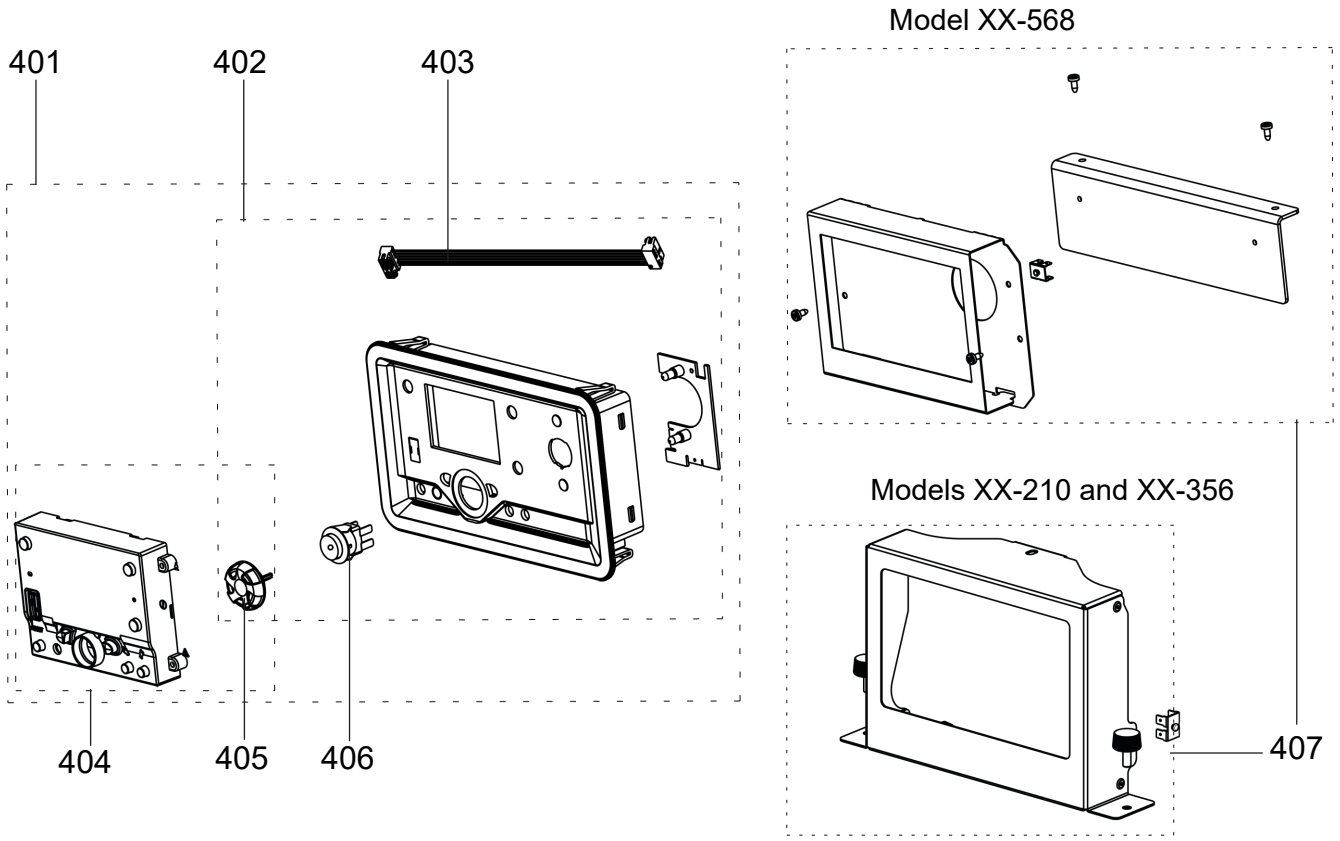
Models XX-210



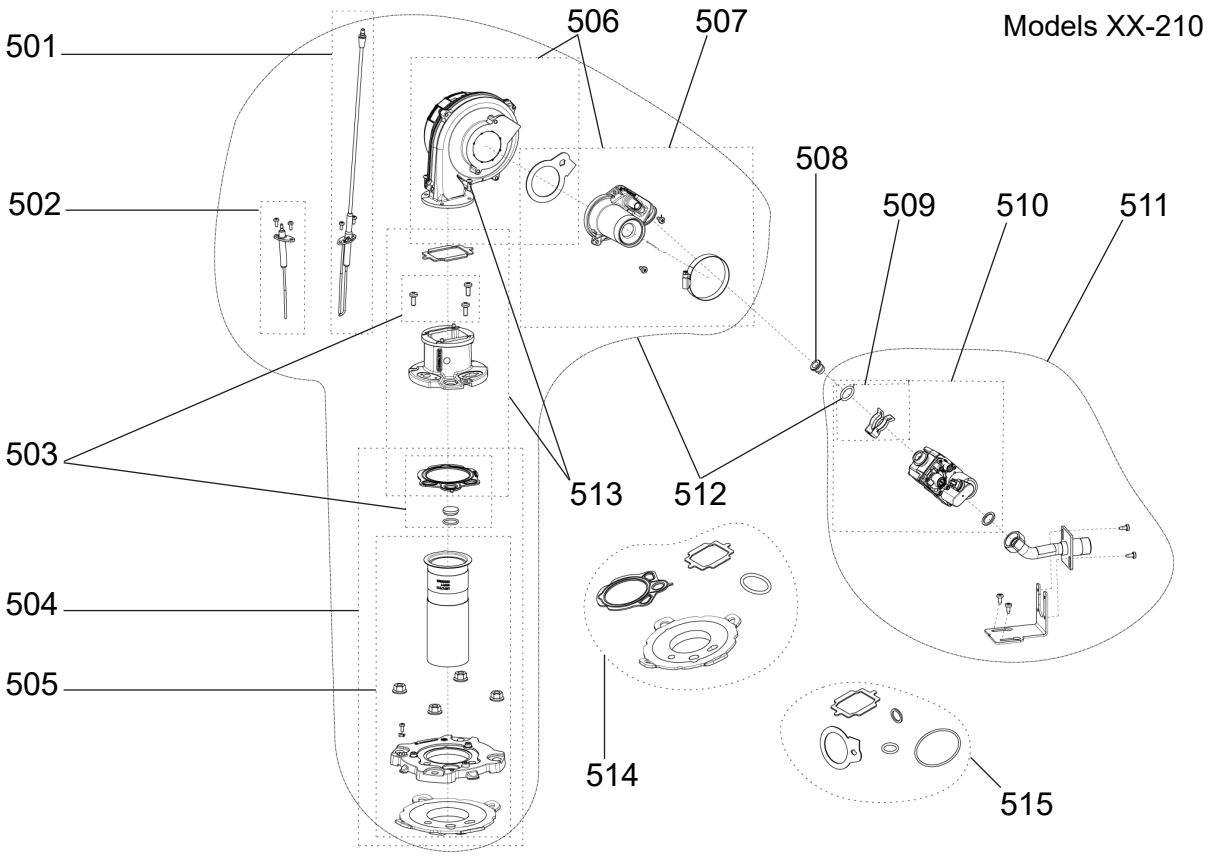
Models XX-356 and XX-538-



Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	**35 to 60 kW**	**70 to 120 kW**
301	Control panel sheet	AA555537	AA555538	
302	Mini LMS board	20kW: AA555486 25kW: AA555487 30kW: AA555488	35kW: AA555489 50kW: AA555491 60kW: AA555492	70kW: AA555493 80kW: AA555494 100kW: AA555495 120kW: AA555496
303	Thumbwheel buttons (x2)	AA555540		
304	ACI board	AA555498	AA555499	AA555500
305	Round fuse holder	AA555505		
306	Power connector	AA555507		
307	Fuses T6.3A 5x20 (box of 10)	AA555506		
308	Board holding clips (x5)	AA555503		

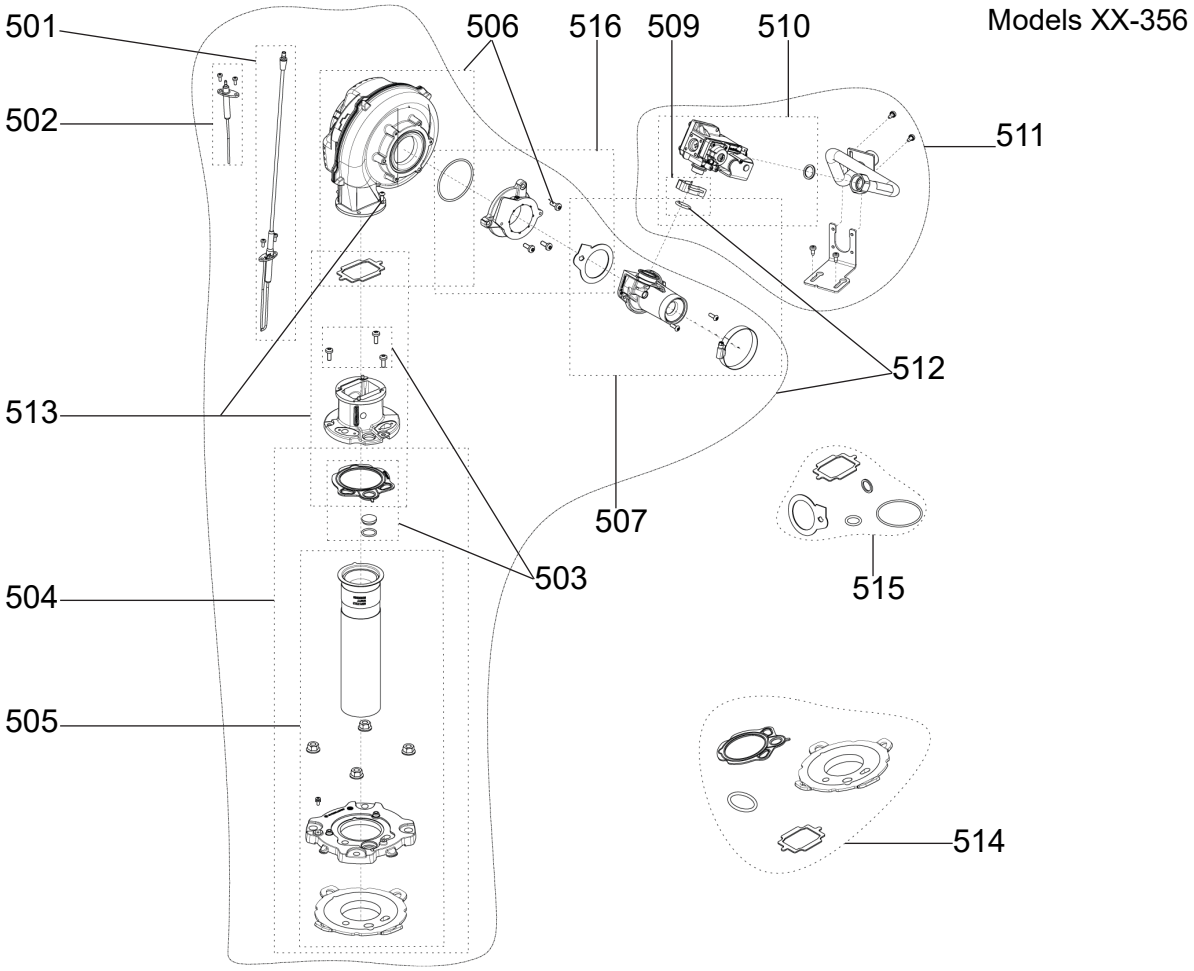


Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	35 to 60 kW	70 to 120 kW
401	Complete Navistem display	AA555438		
402	Mounting + Navistem led board	AA555439		
403	AVS37 ribbon cable	AA555444		
404	AVS37 display + thumbwheel	AA555441		
405	HMI plastic thumbwheel	AA555443		
406	Main switch	AA555442		
407	Support plate AVS37	AA555445		AA555449
---	Power supply cable	AA555508		
---	Power cable	AA555509	AA555510	AA555511
---	Signal cable	AA555513	AA555515	AA555517
---	Intermed cable sensor	AA555520	AA555523	AA555524
---	Flue temp sensor	AA555526	AA555527	AA555529
---	Gas valve cable	NA	AA555530	AA555532
---	Grounding cable	AA555533		
---	Carton accessoires	AA555593		70kW : AA555594 80-120kW : AA555595

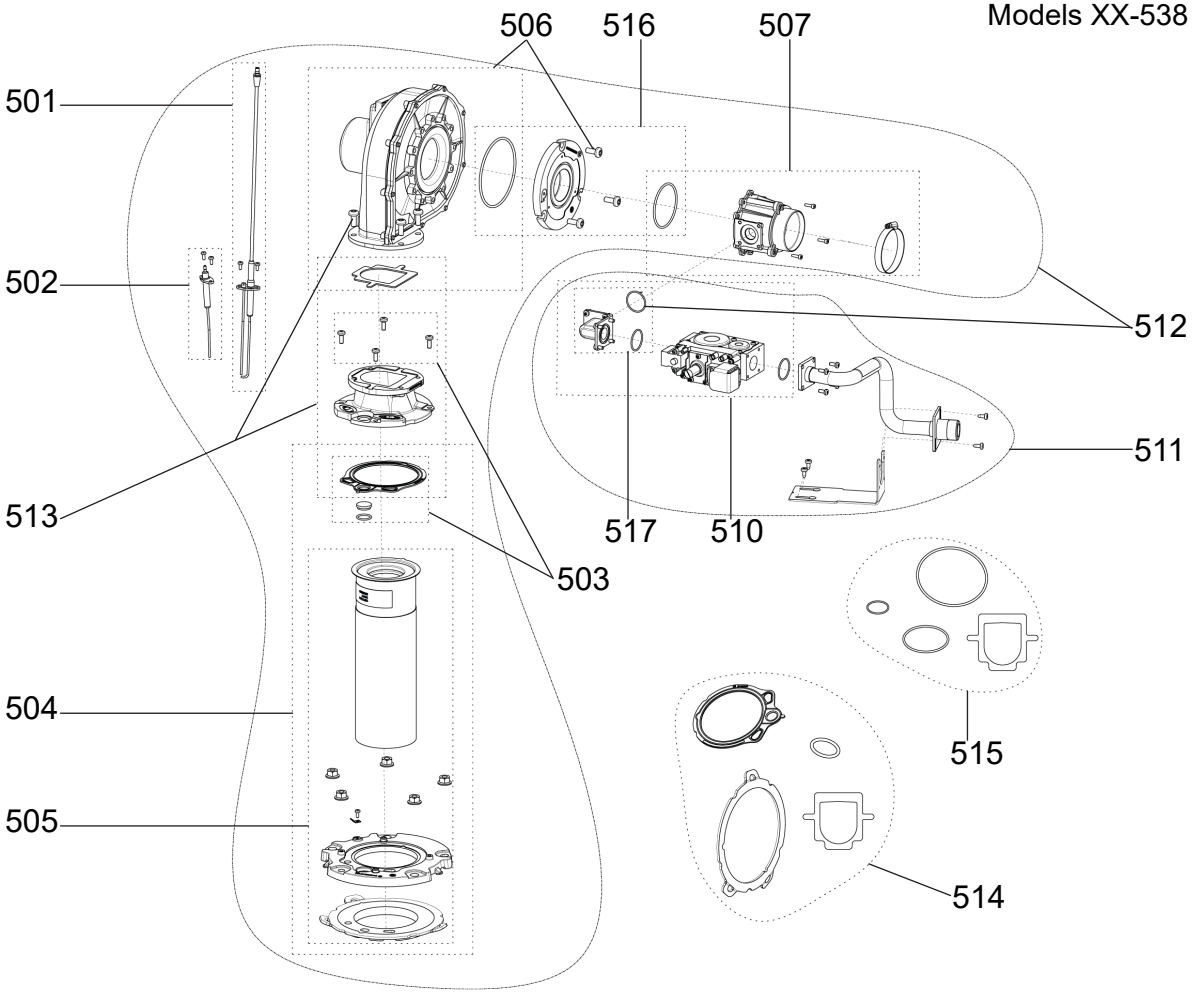


Item	Designation	Dorchester DR-SG XX-210	Dorchester DR-SG XX-356	Dorchester DR-SG XX-538
		20 to 30 kW	35 to 60 kW	70 to 120 kW
501	Ignition electrode	AA555554		AA555556
502	Ionisation electrode	AA555553		
503	Flame viewer	AA555571		AA555572
504	Burner flange	AA555569		AA555570
505	Burner tube	AA555575	AA555576	AA555577
506	Fan	AA555564	AA555565	AA555566
507	Venturi	AA555557	AA555559	AA555560
508	Propane injector	AA555545	NA	AA555546
509	Quick connect clip	AA555561		NA
510	Gas valve	AA555541	AA555543	AA555544
511	Gas line	AA555547	AA555548	AA555549
512	Complete burner	AA555579	AA555581	AA555582
513	Fan support flange	AA555567		AA555568
514	Burner seal set	AA555573		AA555574
515	Fan seal set	AA555550		AA555551
516	Venturi/fan flange	NA	AA555562	AA555563
517	Gas valve elbow flange	NA		AA555552

Models XX-356



Models XX-538



13. CUSTOMER REGULATION PARAMETERS TABLE

Storage tank: ..... site: .....

serial no: ....

Please transfer all parameter modifications into this document!

Note: The "access" column indicates the level of accessibility to information for programming (U for end user, M for commissioning and S for specialist). The *Commissioning* accessibility level integrates the *End User* level. In the same way, the *Specialist* level integrates the *Commissioning* level.

Line No.	Programming	Access	Default value	Customer setting
Time setting				
1	Hours / minutes	U	00:00	
2	Day / month	U	dd.mm	
3	Year	U	yyyy	
5	Start of summer time	U	dd.mm	
6	End of summer time	M	dd.mm	
User interface				
20	Language	U	English	
22	Temporary	M	info	
26	Operation locking	M	stop	
27	Programming locking	M	stop	
28	Direct adjustment	M	with validation	
29	Units	U	°C, bar	
42	Assignment appliance 1	M	---	
44	Heating circuit 2 operation	M	---	
46	Heating circuit 3/P operation	M	---	
70	Software version	M	---	
Time program 4: Domestic hot water (DHW) production				
561	1st period start time	U	06:00	
562	1st period stop time	U	22:00	
563	2nd period start time	U	---	
564	2nd period stop time	U	---	
565	3rd period start time	U	---	
566	3rd period stop time	U	---	
576	Default values	U	---	
Timer programme 5				
601	1st period start time	U	06:00	
602	1st period stop time	U	22:00	
603	2nd period start time	U	---	
604	2nd period stop time	U	---	
605	3rd period start time	U	---	
606	3rd period stop time	U	---	
616	Default values	U	---	

Line No.	Programming	Access	Default value	Customer setting
DHW gas heating				
1610	Comfort setpoint	U	65 °C	
1612	Reduced setpoint	U	65 °C	
1614	Max comfort setpoint	S	80 °C	
1620	Release	M	24/24	
1640	Anti-legionella function	S	stop	
1641	Periodic anti-legionella function	S	1	
1642	Anti-legionella function day week	S	Monday	
1644	Anti-legionella function hour	S	0 min.	
1645	Anti-legionella setpoint	S	80 °C	
1646	Anti-legionella function duration	S	10 min	
1663	Circulation setpoint	S	55 °C	
1668	Loop alarm times	S	01:00	
1680	DHW regime switching	S	stop	
2570	Max. output by lim. output	S	50%	
2571	Output lim. differential	S	2 °C	
5741	DHW tank heating gas	S	stop	
6745	DHW loading alarm time	S	08:00	
Boiler				
2210	Min setpoint	S	8 °C	
2212	Max. setpoint	S	85 °C	
2214	Manual rate setpoint	U	60 °C	
2217	Frost protection setpoint	S	2 °C	
2243	Burner min stop duration	S	5 min	
2250	Pump timed stop	S	1 min	
2253	DHW supply pump timer stop	S	0 min.	
2321	Rot. speed at boiler on start	S	0%	
2322	Pump speed min boiler	S	0%	
2323	Pump speed max boiler	S	0%	
2324	Pump speed P-band XP boiler	S	16 °C	
2325	Boiler speed integration time	S	30 s	
2326	Boiler speed bypass time	S	5 s	
2330	Nom. power	S	20-210: 20 kW 25-210: 25 kW 30-210: 30 kW 35-356: 35 kW 50-356: 50 kW 60-356: 60 kW 70-538: 70 kW 80-538: 80 kW 100-538: 100 kW 120-538: 120 kW	
2331	Power at basic speed	S	XX-210: 8 kW XX-356: 13 kW XX-538: 30 kW	

Line No.	Programming	Access	Default value	Customer setting
2442	Max. charge full fan speed	S	20-210: 6030 rpm 25-210: 7390 rpm 30-210: 8500 rpm 35-356: 6250 rpm 50-356: 8890 rpm 60-356: 9800 rpm 70-538: 3810 rpm 80-538: 4330 rpm 100-538: 5270 rpm 120-538: 6400 rpm	
2444	Max DHW fan speed	S	20-210: 6030 rpm 25-210: 7390 rpm 30-210: 8500 rpm 35-356: 6250 rpm 50-356: 8890 rpm 60-356: 9800 rpm 70-538: 3810 rpm 80-538: 4330 rpm 100-538: 5270 rpm 120-538: 6400 rpm	
2454	Heating circuit activation differential	S	1 °C	
2455	Min. heating circuit disc. different.	S	1 °C	
2460	DHW activation differential	S	2 °C	
2461	Min DHW disconnection differential	S	5 °C	
2550	Gas energy meter	S	on	
2551	Gas meter correction	S	1	
DHW tank				
5020	Outlet setpoint T° raise	S	-3 °C	
5022	Charge type	S	complete charge	
5024	DHW differential	S	5 °C	
5101	Min pump rot. speed	S	50%	
5102	Max pump rot. speed	S	100%	
5103	Band Pump rotation speed DHW	S	32 °C	
5104	DHW rotation speed integration time	S	120 s	
5105	DHW rotation speed Tv	S	0 s	
5108	Load pump start rot. speed	S	100%	
General functions				
5570	dT° regul on dT 1	S	20 °C	
5571	dT°regul off dT 1	S	10 °C	
5572	Regul min act time dT 1	S	0 °C	
5573	Sensor 1 regulator dT 1	S	none	
5574	Sensor 2 regulator dT 1	S	none	
5575	Min regul on time dT1	S	0 s	
5577	Pump/valve kick-start K21	S	on	
5580	dT° regul on dT 2	S	20 °C	

Line No.	Programming	Access	Default value	Customer setting
5581	dT°regul off dT 2	S	10 °C	
5582	Regul min act time dT 2	S	0 °C	
5583	Sensor 1 regulator dT 2	S	none	
5584	Sensor 2 regulator dT 2	S	none	
5585	Min regul on time dT2	S	0 s	
5587	Pump/valve kick-start K21	S	on	
Configuration				
5890	Relay output QX1	M	Alarm output K10	
5891	Relay output QX2	M	Valve/DHW pump Q3	
5931	Sensor input BX2	M	none	
5932	Sensor input BX3	M	none	
5950	H1 input function	M	none	
5951	H1 contact action direction	M	operation	
6020	Extension module 1 funct	M	none	
6021	Extension module 2 funct	M	none	
6022	Extension module 3 funct	M	none	
6030	Relay output QX21 module 1	M	none	
6031	Relay output QX22 module 1	M	none	
6032	Relay output QX23 module 1	M	none	
6033	Relay output QX21 module 2	M	none	
6034	Relay output QX22 module 2	M	none	
6035	Relay output QX23 module 2	M	none	
6036	Relay output QX21 module 3	M	none	
6037	Relay output QX22 module 3	M	none	
6038	Relay output QX23 module 3	M	none	
6040	Module 1 BX21 sensor input	M	none	
6041	Module 1 BX22 sensor input	M	none	
6042	Module 2 BX21 sensor input	M	none	
6043	Module 2 BX22 sensor input	M	none	
6044	Module 3 BX21 sensor input	M	none	
6045	Module 3 BX22 sensor input	M	none	
6046	Module 1 H2 input function	M	none	
6047	Mod.2 H2 contact act. direction	M	operation	
6049	Mod. 2 H2 voltage value (U1)	M	0V	
6050	Module 1 H2 funct. value 1 (F1)	M	0	
6051	Mod. 1 H2 voltage 2 value 1 (U2)	M	0V	
6052	Module 1 H2 funct. value 2 (F2)	M	0	
6054	Module 2 H2 input function	M	none	
6055	Mod.2 H2 contact act. direction	M	operation	
6057	Mod. 1 H2 voltage value 1 (U1)	M	0V	
6058	Module 2 H2 funct. value 1 (F1)	M	0	
6059	Mod. 2 H2 voltage 2 value (U2)	M	0V	
6060	Module 2 H2 funct. value 2 (F2)	M	0	
6062	Module 3 H2 input function	M	none	
6063	Mod.3 H2 contact act. direction	M	operation	
6065	Mod. 3 H2 voltage value (U1)	M	0V	
6066	Module 3 H2 funct. value 1 (F1)	M	0	

Line No.	Programming	Access	Default value	Customer setting
6067	Mod. 3 H2 voltage 2 value 3 (U2)	M	0V	
6068	Module 3 H2 funct. value 2 (F2)	M	0	
6100	Ext. T° sensor correction	S	0 °C	
6120	Installation antifreeze	S	stop	
6127	Valve/pump kick-start duration	S	30 s	
6200	Register sensor	S	---	
6205	Reset parameters	S	---	
6220	Software version	S	---	
6224	Appliance identification.	S	---	
6230	Info 1 OEM	S	16	
6231	Info 2 OEM	S	20-210: 91 25-210: 92 30-210: 93 35-356: 100 50-356: 94 60-356: 95 70-538: 96 80-538: 97 100-538: 98 120-538: 99	
6240	Output function UX21 module 1	S	Q3 gas heating pump	
6241	Logic signal output UX21 module 1	S	standard	
6242	Signal output UX21 module 1	S	0-10V	
6243	Output function UX22 module 1	S	DHW Q4 circulation pump	
6244	Logic signal output UX22 module 1	S	standard	
6245	Signal output UX22 module 1	S	0-10V	
6246	Output function UX21 module 2	S	Q3 gas heating pump	
6247	Logic signal output UX21 module 2	S	standard	
6248	Signal output UX21 module 2	S	0-10V	
6249	Output function UX22 module 2	S	DHW Q4 circulation pump	
6250	Logic signal output UX22 module 2	S	standard	
6251	Signal output UX22 module 2	S	0-10V	
6252	Output function UX21 module 3	S	Q3 gas heating pump	
6253	Logic signal output UX21 module 3	S	standard	
6254	Signal output UX21 module 3	S	0-10V	
6255	Output function UX22 module 3	S	DHW Q4 circulation pump	
6256	Logic signal output UX22 module 3	S	standard	
6257	Signal output UX22 module 3	S	0-10V	
6351	OT function channel 1	S	External room control 1	
6359	DHW external control	S	none	
LPB bus				
6612	Alarm timeout	S	10 min	
Error				
6705	Software diagnostic code	U	0	
6800	History 1	U	00:00	
6805	Software diagnostic code 1	U	0	

Line No.	Programming	Access	Default value	Customer setting
6810	History 2	U	00:00	
6815	Software diagnostic code 2	U	0	
6820	History 3	U	00:00	
6825	Software diagnostic code 3	U	0	
6830	History 4	U	00:00	
6835	Software diagnostic code 4	U	0	
6840	History 5	U	00:00	
6845	Software diagnostic code 5	U	0	
6850	History 6	U	00:00	
6855	Software diagnostic code 6	U	0	
6860	History 7	U	00:00	
6865	Software diagnostic code 7	U	0	
6870	History 8	U	00:00	
6875	Software diagnostic code 8	U	0	
6880	History 9	U	00:00	
6885	Software diagnostic code 9	U	0	
6890	History 10	U	00:00	
6895	Software diagnostic code 10	U	0	
6900	History 11	U	00:00	
6905	Software diagnostic code 11	U	0	
6910	History 12	U	00:00	
6915	Software diagnostic code 12	U	0	
6920	History 13	U	00:00	
6925	Software diagnostic code 13	U	0	
6930	History 14	U	00:00	
6935	Software diagnostic code 14	U	0	
6940	History 15	U	00:00	
6945	Software diagnostic code 15	U	0	
6950	History 16	U	00:00	
6955	Software diagnostic code 16	U	0	
6960	History 17	U	00:00	
6965	Software diagnostic code 17	U	0	
6970	History 18	U	00:00	
6975	Software diagnostic code 18	U	0	
6980	History 19	U	00:00	
6985	Software diagnostic code 19	U	0	
6990	History 20	U	00:00	
6995	Software diagnostic code 20	U	0	
Maintenance / Special operation				
7040	Burner op. hours interval	S	---	
7041	Op. h since maint.	S	0 h	
7042	Burner start interval	S	---	
7043	Burner start since Maint.	S	0	
7044	Maintenance interval	S	---	
7045	Time since maintenance	S	0 months	
7050	Ionis. current fan speed	S	0 rpm	
7051	Ionis. current message	S	no	

Line No.	Programming	Access	Default value	Customer setting
7130	Chimney function	U	stop	
7131	Burner power	U	max. burner load	
7140	Manual mode	U	stop	
7143	Regulator stop function	S	---	
7145	Regulator stop setpoint	S	100%	
7146	Drain function	M	---	
7147	Drain type	M	---	
7170	After Sales Department telephone	M	---	
7250	Pos memory Pstick	S	---	
7252	Pstick control	S	---	
7253	Pstick progress	S	---	
7254	PStick status	S	---	
Inputs/Outputs test				
7700	Relay test	M	---	
7750	DHW temperature B3/B8	U	---	
7760	Boiler T° B2	U	---	
7820	Sensor T° BX1	U	---	
7821	Sensor T° BX2	U	---	
7822	Sensor T° BX3	U	---	
7823	Sensor T° BX4	U	---	
7830	Module 1 BX21 sensor T°	U	---	
7831	Module 1 BX22 sensor T°	U	---	
7832	Module 2 BX21 sensor T°	U	---	
7833	Module 2 BX22 sensor T°	U	---	
7834	Module 3 BX21 sensor T°	U	---	
7835	Module 3 BX22 sensor T°	U	---	
7840	H1 voltage signal	U	---	
7841	H1 contact status	U	---	
7845	Module 1 H2 voltage signal	U	---	
7846	Module 1 H2 contact status	U	---	
7848	Module 2 H2 voltage signal	U	---	
7849	Module 2 H2 contact status	U	---	
7851	Module 3 H2 voltage signal	U	---	
7852	Module 3 H2 contact status	U	---	
7860	H4 contact status	U	---	
7872	H6 contact status	U	---	
7874	H7 contact status	U	---	
Status				
8003	DHW status	U	---	
8005	Boiler status	U	---	
8009	Burner status	U	---	
Generator diagnostic				
8304	Boiler pump status (Q1)	S	---	

Line No.	Programming	Access	Default value	Customer setting
8308	Boiler pump speed	S	---	
8310	Boiler temperature	U	---	
8311	Boiler setpoint	U	---	
8312	Boiler switching point	M	---	
8313	Regulation sensor	M	---	
8314	Boiler return temperature	U	---	
8316	Fume temperature	U	---	
8318	Max burnt gas temperature	U	---	
8323	Fan speed	U	---	
8324	Burner fan setpoint	U	---	
8325	Current fan command	M	---	
8326	Boiler modulation	U	---	
8329	Ionisation current	U	---	
8330	1st speed operating hours	U	---	
8331	1st speed start counter	U	---	
8339	DHW mode operating hours	U	---	
8379	Global DHW energy	S	---	
8380	Global energy	S	---	
8382	DHW gas energy	S	---	
8383	Gas energy	U	---	
8390	Current phase No.	S	---	
Consumer diagnostic				
8820	DHW pump	U	---	
8823	DHW intermediate circuit pump status (Q33)	U	---	
8825	DHW pump speed	U	---	
8826	Interm. circulator pump speed DHW	U	---	
8830	DHW temperature 1 (B3)	U	---	
8831	DHW setpoint	U	---	
8832	DHW temperature 2 (B31)	U	---	
8835	DHW circulation temperature	U	---	
8836	DHW loading temperature	U	---	
9016	Special temperature 1	U	---	
9017	Special temperature 2	U	---	
9031	Relay output QX1	U	---	
9032	Relay output QX2	U	---	
9033	Relay output QX3	U	---	
9050	Relay output QX21 module 1	U	---	
9051	Relay output QX22 module 1	U	---	
9052	Relay output QX23 module 1	U	---	
9053	Relay output QX21 module 2	U	---	

Line No.	Programming	Access	Default value	Customer setting
9054	Relay output QX22 module 2	U	---	
9055	Relay output QX23 module 2	U	---	
9056	Relay output QX21 module 3	U	---	
9057	Relay output QX22 module 3	U	---	
9058	Relay output QX23 module 3	U	---	
Safety unit				
9504	Preventilat. speed setpoint	S	XX-210: 5100 rpm XX-356: 5000 rpm XX-538: 3300 rpm	
9505	Min. pre-ventilation setpoint speed	S	XX-210: 5100 rpm XX-356: 5000 rpm XX-538: 3300 rpm	
9506	Nominal load tolerated speed	S	XX-210: 300 rpm XX-356: 300 rpm XX-538: 500 rpm	
9512	Ignition speed setpoint	S	XX-210: 5840 rpm XX-356: 3870 rpm XX-538: 3300 rpm	
9513	Maximum ignition speed setpoint	S	XX-210: 5920 rpm XX-356: 3870 rpm XX-538: 500 rpm	
9514	Ignition rot. speed tolerance	S	200 rpm	
9524	Part charge rot. speed setpoint	S	XX-210: 2200 rpm XX-356: 2250 rpm XX-538: 1700 rpm	
9525	Part char. speed min setpoint	S	XX-210: 2320 rpm XX-356: 2200 rpm XX-538: 1620 rpm	
9529	Nom char. speed setpoint	S	20-210: 6030 rpm 25-210: 7390 rpm 30-210: 8500 rpm 35-356: 6250 rpm 50-358: 8890 rpm 60-358: 9800 rpm 70-538: 3810 rpm 80-538: 4330 rpm 100-538: 5270 rpm 120-538: 6400 rpm	
9530	Nom charge max speed setpoint	S	20-210: 6030 rpm 25-210: 7390 rpm 30-210: 8500 rpm 35-356: 6250 rpm 50-356: 8890 rpm 30-356: 9800 rpm 70-538: 3810 rpm 80-538: 4330 rpm 100-538: 5270 rpm 120-538: 6400 rpm	

Line No.	Programming	Access	Default value	Customer setting
9626	Power slope/fan speed	S	G20 / G31 20-210: 301.6 / 133.3 25-210: 296.6 / 174.5 30-210: 283.8 / 143.0 35-356: 178.6 / 161.0 50-356: 178.0 / 147.8 60-356: 163.4 / 146.7 70-538: 54.5 / 49.6 80-538: 54.2 / 43.4 100-538: 52.7 / 46.0 120-538: 53.3 / 47.6	
9627	Section Y fan power/speed	S	G20 / G31 20-210: -1.5 / 1033.3 25-210: -24.3 / -12 30-210: -13.5 / -17 35-356: 0 / -6.15 50-356: -10.8 / -8.9 60-356: -5.2 / 0.0 70-538: -6.5 / -1.8 80-538: -8.1 / -4.2 100-538: -3.3 / -5.9 120-538: -1.8 / -6.3	
9650	Chimney drying	S	0	
9651	Chimney drying speed setpoint	S	XX-210: 2100 rpm XX-356: 2250 rpm XX-538: 1600 rpm	
9652	Chimney drying time	S	10 min	

14. APPENDIX A

Product data ≤ 400 kW

Product reference								
Trade mark			HAMWORTHY					
Model			20 KW	25 KW	30 KW	35 KW	50 KW	60 kW
Code			**031245**	**031246**	**031247**	**031248**	**031249**	031250
Declared load profile	**Profile**		*XXL*	*XXL*	*XXL*	*XXL*	*XXL*	XXL
Water heating energy efficiency class	**-**	-	*A*	*A*	*A*	*A*	*A*	A
Energy efficiency	**η_{wh}**	*%*	*96*	*92*	*94*	*90*	*93*	91
Daily electricity consumption	**Q_{elec}**	*kWh*	*0.122*	*0.129*	*0.145*	*0.2*	*0.21*	0.22
Daily fuel consumption	**Q_{gaz} (PCS)**	*kWh*	*25.26*	*26.436*	*25.86*	*26.66*	*25.99*	26.3
Nitrogen oxide emissions	**NOx**	*mg/ kWh*	29	29	29	32	32	32
Volume of mixed water at 40°C	**$V_{40°}$**	*L*	∞	∞	∞	∞	∞	∞
Thermostat temperature setting	**-**	*°C*	65	65	65	65	65	65
Indoor sound power level	**L_{WA}**	*dB(A)*	64	64	64	75	75	75
Work only during off-peak hours	**-**	-	-	-	-	-	-	-
Smart control	**-**	-	-	-	-	-	-	-

Product reference						
Trade mark			HAMWORTHY			
Model			70 KW	80 KW	100 KW	120 KW
Code			**031251**	**031252**	**031253**	**0312484**
Declared load profile	**Profile**		*XXL*	*XXL*	*XXL*	*XXL*
Water heating energy efficiency class	**-**	-	*A*	*A*	*A*	*A*
Energy efficiency	**η_{wh}**	*%*	*91*	*91*	*92*	*92*
Daily electricity consumption	**Q_{elec}**	*kWh*	*0.18*	*0.18*	*0.19*	*0.19*
Daily fuel consumption	**Q_{gaz} (PCS)**	*kWh*	*26.5*	*26.4*	*26.3*	*26.1*
Nitrogen oxide emissions	**NOx**	*mg/ kWh*	39	39	39	39
Volume of mixed water at 40°C	**$V_{40°}$**	*L*	∞	∞	∞	∞
Thermostat temperature setting	**-**	*°C*	65	65	65	65
Indoor sound power level	**L_{WA}**	*dB(A)*	67	69	74	78
Work only during off-peak hours	**-**	-	-	-	-	-
Smart control	**-**	-	-	-	-	-

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