

80 - 100 - 120 - 150 - 180

Wall hung high efficiency water heater

Installation, user and service instructions





E93.1001EN.D

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INTRODUCTION

This manual is written for:

- the installer
- system design engineer
- the service engineer
- the user

abbreviations	EHS NB	Eco Heating Systems Groningen B.V. NOTICE
symbols		Warning: important information related to the safety of persons and/or the appliance
terminology	Flow Return	Water heater hot water out Water heater cold water in

1 SAFETY GUIDELINES

1.1 General

Read all these instructions before commencing installation.

Keep this user manual near the water heater for quick reference.

The appliance should be installed by a skilled installer according to all applicable standards and regulations. Failure to comply with these regulations could deem the warranty invalid.

Without written approval of the manufacturer the internals of the water heater may not be changed. When these changes are executed without approval, the water heater certification is invalid.

Commissioning, maintenance and repair must be done by a skilled installer/engineer, according to all applicable standards and regulations.



- Don't use any electrical equipment.
- Don't press any switches.
- Close the gas supply.
- Ventilate the room (open the windows and/or outdoor water heater room doors).
- Immediately warn the installer.



The manufacturer/supplier is not liable for any damage caused by inaccurately following of these mounting instructions. Only original parts may be used when carrying out any repair or service works.



This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

1.2 Important technical warnings and guidelines

For FAULT CODES in this manual see Ch. 16 on page 101

The EHS Domestic Hot Water systems will, for a long period, comfortably meet your requirement of hot water of the right temperature at the right hour, provided that a few important conditions have been fulfilled regarding the installation.

Please follow all instructions and recommendations presented in this manual by EHS, especially the ones concerning the next important topics:

- Water quality (also see § 8.1 on page 38)

A first necessary condition is the quality of the water to be heated in the DHW water heater. Three values matter: hardness, total amount of dissolved solids and acidity. If water quality does NOT meet the requirements the system may be seriously damaged in time!

- Hardness should not exceed 205 PPM CaCO₃ (11,5°dH)
- TDS (Total Dissolved Solids) should not exceed 450 PPM
- Hardness and TDS together may not exceed 450 PPM
- pH value should be between 6,5 and 7,5, measured cold

The actual values can be retrieved at your local water supplier.

If water quality doesn't meet the abovementioned requirements, a water treatment installation should be installed to improve water quality to the required levels, if possible.

- Water flow velocity and pump selection (see § 9.7 on page 48)

For a given combination of water heaters and tanks, pump selection is very important with respect to the required flow velocity.

EHS has done the calculations and provides a number of tables in which you can find the right pump type suitable for your particular installation.

- Water flow velocity and piping diameters and lengths (see § 9.5 from page 46 on)

The arguments that hold for pump selection, hold for piping design as well: all piping components added up are giving a certain total resistance which should not exceed a critical value at which the pump cannot realize the required flow velocity anymore.

EHS has done the calculations and provides a number of tables in which you can find the piping requirements suitable for your particular installation.

Following the instructions and recommendations given in the referred paragraphs will highly improve the functioning and considerably lengthen the life time of your EHS DHW system.

Furthermore, for all EHS appliances the next instructions and recommendations apply:

- ! Never use aluminium or aluminium containing flue gas outlet
- ! Always fill the siphon before commissioning the water heater
- ! Always set the gas valves during commissioning the water heater, for the first time and after maintenance and/or installation changes
- ! Never change the parameters P2LC, P2LD, P2ML and P5BI
- ! Never place a ball valve between the safety valve and the water heater
- In a log, keep track of all situations regarding the appliance: <u>what</u>, <u>when</u>, <u>by whom</u>, <u>what actions and/or changes</u>, <u>what communication</u> has been performed

Warnings and guidelines (continuation)

EHS is not liable for any damage caused by inaccurately following these mounting instructions. Only EHS parts may be used when carrying out any repair or service works.

Do not use chlorine based products for brazing.

When commissioning the water heater, the running of the water heater pump must be checked before leaving the installation.

By pressing the service button during a couple of seconds the water heater can be fired independently from the thermostat circuit. Firing the water heater without water flow (but filled with water) will cause a boiling noise.

The flow and return temperature are checked continuously. The temperature difference may not exceed the programmed value belonging to the actual power mode. If it does, the water heater will go in a lock-out.



The applied DHW pump <u>must</u> be controlled only by the CD⁺ water heater control. If, for any reason, an external pump control is applied *without written approval of EHS*, the complete warranty on the CD⁺ water heater and all supplied parts will become invalid.

Minimum water pressure 1 bar.

Fuel used should have sulphur rates that comply with the next values: a maximum annual peak over a short period of time of 150 mg/m³ and an annual average of 30 mg/m³ maximum.

Combustion air must be free of contents of chlorine, ammonia, alkali agents. The air near a swimming pool, a washing machine or a laundry is containing these a.m. contents.

The water heater is used in combination with a hot water tank without any other heat exchanger; the water heater should be equipped with a safety relief valve. In some cases also the tank should be equipped with a T&P relief valve. Always apply all applicable installation standards and regulations.

The connection for a remote DHW Stat is based on an OpenTherm bus system or an on/off timer. For correct connections of the thermostat see page 34.

At first installation, the built-in automatic air vent should be open.

LEGIONNAIRES' DISEASE

An anti-Legionella function is present in the software but is default turned OFF. See § 8.3 on page 38 and for the programming options § 11.2.2 on page 83.

BUTANE GAS



If a butane/propane gas mixture has to be used for this water heater the fan speed must be reduced by altering parameter P4BD. See § 11.1.3 on page 80.

1.3 Safety valve

Between the water heater and the safety valve, DO NOT apply a closing valve or any other form of narrowing, because this might disturb the correct functioning of the safety valve.

Water heater	Safety valves	Part number
CD+ 80-150	27112 Prescor B 3/4 - 10 bar - 150 kW	E04.015.090
CD+ 180	29007 Prescor B 1 - 10 bar - 250 kW	E04.015.091

The right safety valve has been supplied with the CD⁺ water heater.

The CD⁺ water heater and tank should be installed by a skilled installer according to all applicable standards and regulations for tap water installations. Use the next scheme as guideline. When multiple water heaters and tanks are applied, every combination has to be equipped with its own safety valve.



- A) Service pipe inlet
- B) Hot water supply circulation
- C) Circulation return
- Pressure relief valve (mandatory in case service water pressure is too high)
- Inlet combination with valve (mandatory)
- 3) Apply filter if necessary (recommended)
- A suitable safety valve must be mounted near the water heater (mandatory)
 This safety valve may never be isolated from the water heater by means of a ball valve
- 5) Remote tank sensor (necessary) → mounting hereof: see § 9.2.1 on page 42
- 6) Drain valve (recommended)
- 7) Hot and cold-water mixers

-		,	
	PUMP	₩-1	FILTER
*	NON- RETURN VALVE		INLET COMBINATION -
Ŕ	VALVE] []	Overflow
	SAFETY VALVE		 Controllable return valve Valve
¢	AUTOMATIC VENT	\bowtie	PRESSURE REGULATING

SAFETY COMPONENTS

NB! The picture shows an example of a functional installation. The safety components as shown in the picture are NOT necessarily conform all applicable standards and regulations.

ALWAYS have the system installed by a skilled installer. Safety must be added according to all applicable standards and regulations.

2 TECHNICAL DATA CD⁺ WATER HEATERS

2.1 Functional introduction

The CD⁺ water heaters are heaters with a maximum high efficiency. Such a performance can be reached by, amongst other things, using a special heat exchanger made of stainless steel. This allows the flue gases to cool down below the condensation point, and so release extra heat. This has an immediate positive impact on the efficiency, exceeding the 100%.

The CD⁺ water heater is standard set for Natural gas G20 / G25.3

Gases used must meet the European standard EN 437.

Fuel used should have sulphur rates according to the European standard, a maximum annual peak over a short period of time of 150 mg/m³ and an annual average of 30 mg/m³.

Water heater control includes the next programmable features:

- Cascade control for up to twelve water heaters
- Remote operation and heat demand indication from each water heater
- Anti-Legionnaires' disease function
- 0-10 VDC remote flow temperature (set point) control
- NB! 0-10 VDC remote *burner input* control is NOT possible for this type of direct fired water heaters.

Cascade control

When using the integrated cascade control, a maximum of twelve heaters can be controlled in a cascade configuration. Using an appropriate external control, this number may be increased at will.

0-10 VDC connection available

The water temperature can be controlled by an external 0-10 VDC signal. When a number of water heaters are cascaded, the signal should be directed to the master only. A signal of 1.48 Volt will switch on the water heater(s), less than 1.4 Volt will switch off the water heater(s).

Time program

Time programs with three programmable periods per day are available. These time programs are activated at the control panel and offer great flexibility in controlling the water heater's day and night temperatures as well as the anti-Legionella settings.

2.2 Technical specifications datasheet

GEN	GENERAL									
Product Identification number					CE 0063 BR3190					
Class	sification				II2EK3B/P (Country depending)					
Gas	Appliance Type				B2	3, B23P, C1	3, C33, C43,	C53, C63, C	83	
Туре	e water heater				CD+80	CD+100	CD+120	CD+150	CD+180	
Dime	ensions (h x w x	d)		mm	84	42 x 476 x 4	86	898 x 47	76 x 677	
Wate	er content est.			Litres	5,0	6,5	8,3	10,4	12,9	
Weig	jht dry			kg	68	73	78	87	96	
In- a	nd outlet water	conn	ection union	inch	1½	2	2	2	2	
Gas	connection			inch	R 3⁄4	R 3⁄4	R 3⁄4	R 1	R 1	
Flue/	air concentric			mm	80/125	100/150	100/150	100/150	100/150	
Flue/	air twin pipe			mm	80-80	100-100	100-100	130-130	130-130	
DON	IESTIC HOT W	ATE	R		Values mi	in-max:				
Nom	inal input (Net)			kW	14,6 - 74,3	17,2 - 92,2	26,0 - 111	34,0 - 138	45,0 - 166	
Nom	inal input (gross	s) (G	20 G25.3)	kW	16,2 - 82,5	19,1 - 102	28,9 - 123	37,8 - 153	50,0 - 184	
Nom	inal input (gross	s) (G	31)	kW	15,9 - 80,8	18,7 - 100	28,3 - 121	37,0 - 150	48,9 - 180	
Nom	inal input (gross	s) (G	30/G31)	kW	15,8 - 80,2	18,6 - 99,7	28,2 - 120	36,8 - 150	48,8 - 180	
Nom	. output 80/60°C)		kW	14,0 - 71,2	16,5 - 88,4	24,7 - 106	32,6 - 132	43,3 - 160	
Nom	. output 50/30°C)		kW	15,2 - 77,5	18,0 - 96,2	27,2 - 116	35,5 - 144	47,3 - 175	
Nom. output 37/30°C			kW	15,7 - 80,1	18,6 - 99,5	28,1 - 120	36,7 - 149	48,5 - 179		
Effici	ency 40/30°C D	N 4	702-8	%	up to 110,6 % within the CD ⁺ range					
GAS	CONSUMPTIC)N ga	ases acc. to E	EN437	Values mi	in-max:				
Natu	ral gas G25.3	3		m³ _{st} /h	1,76 - 8,94	2,07 – 11,1	3,13 - 13,4	4,09 - 16,6	5,41-20,0	
Natu	ral gas G20			m³ _{st} /h	1,54 - 7,86	1,82 - 9,76	2,75 - 11,8	3,60 - 14,6	4,76 - 17,6	
Prop	ane gas G31 ¹			m³ _{st} /h	0,60 - 3,04	0,70 - 3,77	1,06 - 4,54	1,39 - 5,65	1,84 - 6,79	
Buta G30/	ne/Propane gas G31 (B/P) ¹	s mix	ture	m³ _{st} /h	0,45 - 2,29	0,53 - 2,85	0,81 - 3,44	1,05 - 4,28	1,40 - 5,15	
	· · · ·		G25.3		25					
Gas	supply pressure	;	G20	, mb ar	20					
nom.	2		G31 ¹	mbar			30/37			
G30/G31 ¹						50				
NOT	ES									
1 L	Jsing propane G	331 r	naximum fan	speed ne	eds to be rec	duced (paran	neter P4BD)			
² Below, a table is given in which the min. and max. gas supply pressures are mentioned acc. to EN437)				
p nominal [mbar]	р	min [mbar]		p max [mba	ar]		
	G25.3		25			20		30		
-	G20 G31		30			25		25		
	001		37			25		45		
	G30/G31		50			43		57		

Gas type I2EK / G25.3 Only applicable to the Dutch manual

Type water hear	ter		CD+80	CD+100	CD+120	CD+150	CD+180
EMISSION [EN4	37]		Nominal values at min-max load:				
	G25.3/G20	%	8,7 - 9,0	8,7 - 9,0	8,7 - 9,0	8,7 - 9,0	8,7 - 9,0
CO ₂ flue gas	G31	%	9,3 - 10,3	9,3 - 10,3	9,3 - 10,3	9,3 - 10,4	9,3 - 10,5
minimux	G30/G31 B/P	%	9,3 - 10,4	9,3 - 10,4	9,3 - 10,4	9,3 - 10,5	9,3 - 10,6
NOx class [EN1	5502-1]	-			6		
Temperature flue combustion air te	e gas at emp = 20°C	°C			~ 85-95		
Mass flow flue ga	as [min-max] Q _{fluegas} condensing	g/s	6,52-38,6	7,69-47,9	11,6-57,7	15,2-71,7	20,1-86,2
Available pressu tem ⁴	Ра			200			
INSTALLATION							
Max. water temp	°C	75					
Pressure WW-sy	vstem min-max	bar	1,0-8,0				
Relief valve pres	sure max		10				
Hydraulic resistant heater at ΔT (in-	nce of the water and outlet) = 17 K	mWC	5,8	4,7	4,1	6,0	5,5
ELECTRIC							
Power consumption	tion	W	136	142	151	214	229
Power supply		V / Hz	230 / 50				
Protection class			IPX4D				
NOTES							
³ CO ₂ of the unit measured/set without the water heater front door in place ⁴ Maximum allowed combined resistance of flue gas and air supply piping at high fire							

2.3 Table technical specifications ERP

Type water heater:		CD+80	CD+100	CD+120	CD+150	CD+180
Load profile		XXL	XXL	XXL	3XL	3XL
	Unit					
Water heating energy efficiency (η_{wh})	%	86,0	86,3	85,9	89,0	88,6
Daily fuel consumption (Q _{fuel})	kWh	27,900	27,820	27,970	51,920	52,160
Daily electricity consumption (Qelec)	kWh	0,245	0,242	0,240	0,240	0,235
Emissions of nitrogen oxides (EN15502- 1:2012+A1:2015)	mg/kWh	46	40	45	41	44
Sound power level, indoors (L _{WA} ; EN 15036-1:2006)	dB(A)	67	65	62	66	69

A CD water heater appliance has to be installed with a water tank.

The efficiency of the complete installation depends on:

- type of water tank.
- volume of the water tank.
- number of tanks
- type of circulation pump.
- length of the connecting pipes.
- insulation of the connecting pipes.

Dependent on the applied tank volume, the load profile might be higher.

3 DIMENSIONS

3.1 Water heaters CD+80 – CD+120

TWIN PIPE

CONCENTRIC









Connections (mm/ ")		twin pipe			concentric		
		CD+80	CD⁺100	CD+120	CD⁺80	CD+100	CD+120
FG	G flue gas Ø80 Ø100		Ø 80	Ø100			
AI	air inlet	Ø80	Ø100		Ø125	Ø150	
I	cold wa- ter inlet	R 1½" (swivel)	R 2" (swivel)		R 1½" (swivel)	R 2"	(swivel)
o hot wa- R 1 ter outlet (swi		R 1½" (swivel)	R 2" (swivel)		R 1½" (swivel)	R 2"	(swivel)
G gas		R ¾" (male)					
c conden- sate		flexible hose Ø25/21 x 750 mm.					
Va	alue "D"	175	16	60	175	160	



<u>TWIN PIPE</u> FG . 1/0 C

CONCENTRIC





C	Connections	twin pipe	concentric	
	(mm/ ")	CD⁺ 150-180	CD ⁺ 150-180	
FG flue gas		Ø130	Ø100	
AI air inlet		Ø130	Ø150	
I	cold water inlet	Rp 2" (swivel)	Rp 2" (swivel)	
O hot water outlet		Rp 2" (swivel)	Rp 2" (swivel)	
G	gas (male)	R 1"	R 1"	
С	condensate	flexible hose Ø25/21 x 750 mm.		

E93.1001EN.D Manual CD+

3.3 CD⁺ tanks EWD300 - EWD500 - EWD750

For the connections marked **A-H** see § 9.3.2 on page 43-45.



EWD750



3.4 ERP specifications Ecohs tanks.

Туре		EWD300	EWD500	EWD750
Energy efficiency class		В	В	С
Standing loss (S)	Watt	62	75	98
Volume (V)	litre	304	491	764

3.5 Cascade frames CD+80 – CD+180

Frames for two, three and four water heaters CD+80 up to CD+180



			CD+	80			CD+ 10	0 - 120			CD+ 15	0 - 180	
Number of water heaters cascaded	Ť	1	2	3	4	1	2	3	4	1	2	3	4
L (frame)	mm	510	1015	1520	1980	510	1015	1520	1980	510	1015	1520	1980
B1 (return)	mm	133	133	133	133	133	133	133	133	133	133	133	133
B2 (return/flow)	mm	175	175	175	175	160	160	160	160	160	160	160	160
B3 (gas)	mm	177	177	177	177	177	177	177	177	235	235	235	235
C (water/gas)	mm	310	310	310	310	314	314	314	314	317	317	317	317
D1 (flow)		Rp 1½	Rp 1½	Rp 1½	Rp 1½	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2
D2 (return)		Rp 1½	Rp 1½	Rp 1½	Rp 1½	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2
D3 (gas)	-	R ¾"	R ¾"	R ¾"	R ¾"	R ¾"	R ¾"	R ¾"	R ¾"	R 1"	R 1"	R 1"	R 1"
E1 (gas 2nd water heater)	mm	n.v.t.	605	605	590	n.v.t.	605	605	590	n.v.t.	605	605	590
E2 (gas 3rd water heater)	mm	n.v.t.	n.v.t.	1110	1080	n.v.t.	n.v.t.	1110	1080	n.v.t.	n.v.t.	1110	1080
E3 (gas 4th water heater)	mm	n.v.t.	n.v.t.	n.v.t.	1570	n.v.t.	n.v.t.	n.v.t.	1570	n.v.t.	n.v.t.	n.v.t.	1570
H1 (flow/return)	mm	066	066	066	066	066	066	066	066	935	935	935	935
H2 (gas)	mm	066	066	066	066	066	066	066	066	935	935	935	935

4 ACCESSORIES AND UNPACKING

4.1 Accessories

Depending on the selected way of controlling the system, the following items can be supplied with the water heater. Ask your supplier for the specifications.

Item	Part Nº.				
External DHW-Tank threaded temperature sensor 10kOhm@25°C (supplied with the water heater), to be mounted in the screw hole on the tank outlet to the water heater	E04.016.677				
External DHW-Tank pipe temperature sensor 10kOhm@25°C for tank types without screw hole in the outlet to the water heater	E04.016.304				
DHW thermostat RCH	S04.016.658				
Hot water tank, stainless steel, EWD300	E66.000.206				
Hot water tank, stainless steel, EWD500	E66.000.207				
Hot water tank, stainless steel, EWD750	E66.000.208				
Base plate EWD150 to EWD500					
Base plate EWD750	E01.000.411				
Pump, Grundfos UPMXL GEO 25-125N-180, check §9.7 to select.	S04.000.429				
2 x Brass fittings for solder G2 x Ø42 including 2 x Brass threaded reducing adapter G1 ¹ / ₂ x G2	S04.000.430				
Pump, Grundfos UPS 32-100N, check §9.7 to select.	E09.000.112				
Pump, Grundfos UPS 40-120 FB, check §9.7 to select.	E09.000.115				
Software and interface cable to programme the water heater with a computer/laptop	S04.016.586				

4.2 Flue gas and air supply parts - <u>TWIN PIPE</u>:

Water heater type:	CD80	CD100 + CD120	CD150 + CD180
Twin pipe air and flue diameters:	Ø80	Ø100	Ø130
Conversion kit concentric to twin pipe	E61.001.163	E61.001.164	E61.001.165
Flue gas pipe stainless steel L=1000mm	E04.018.055	E04.018.061	E04.018.036
Flue gas pipe stainless steel L=500mm	E04.018.054	E04.018.060	E04.018.037
Flue gas pipe stainless steel L=250mm	E04.018.053	E04.018.059	E04.018.038
Flue gas pipe PP L=1000mm	410085502	410085482	410070242
Flue gas pipe PP L=500mm	410085501	410085481	410070241
Flue gas pipe PP L=250mm	410085500	410085480	410070240
Adjustable pipe PP	410085027	410085127	410070250
All-purpose lead tile roof terminal	E04.018.031	E04.018.013	E04.018.092
Concentric roof terminal SS.	E04.018.015	E04.018.001	E04.018.074
Single pipe roof terminal PP	410086883	410084853	410070279
Tile roof terminal	E04.018.032	E04.018.014	E04.018.079
Condensate drain stainless steel	E04.018.058	E04.018.064	E04.018.065
Condensate drain PP	410085048	410085130	410070247
Wall pipe clamps	E04.018.083	E04.018.084	E04.018.086
Roof deck pipe clamps (included in roof term.)	Inc	luded in roof termin	al
Seal ring rubber	S07.004.023	S07.004.024	S07.004.025
Bend stainless steel 43-45°	E04.018.057	E04.018.063	E04.018.041
Bend stainless steel 87-90°	E04.018.056	E04.018.062	E04.018.042
Bend PP 43-45°	410085042	410085142	410070252
Bend PP 87-90°	410085041	410085141	410070251
Concentric wall terminal	E04.018.019	E04.018.002	410072131
Air supply wall terminal	410082856	410087931	410087550
Manifold Air-Flue gas	E04.010.161	E04.018.033	Incl. in roof terminal

4.3 Flue gas and air supply parts - <u>CONCENTRIC</u>:

Water heater type:		CD80	CD100 + CD120	CD150 + CD180
Concentric pipe dian	neters air and flue:	Ø80/125	Ø100/150	Ø100/150
Conversion kit twin p	pipe to concentric	E61.001.170	E61.001.171	E61.001.172
Flue gas pipe SS L=	1000mm	E04.018.016	E04.018.005	E04.018.005
Flue gas pipe SS L=	500mm	E04.018.067	E04.018.004	E04.018.004
Flue gas pipe SS L=	250mm	E04.018.066	E04.018.003	E04.018.003
Adjustable pipe SS		at request	410031724	410031724
Flue gas pipe PP L=	1000mm	E04.018.020	410084302	410084302
Flue gas pipe PP L=	500mm	E04.018.025	410084301	410084301
Flue gas pipe PP L=	250mm	E04.018.024	410084300	410084300
Adjustable pipe PP		410084457	410084307	410084307
All-purpose lead tile	roof terminal	E04.018.031	E04.018.013	E04.018.013
Concentric roof term	inal SS	E04.018.015	E04.018.001	E04.018.001
Roof pipe flashing		E04.018.032	E04.018.014	E04.018.014
Concentric roof term	inal PP	E04.018.018	410084863	410084863
Air seal ring concent	ric roof terminal	08 1078 00	08 1078 00	410075439
Concentric condensa	ate drain SS	E04.018.069	E04.018.009	E04.018.009
Concentric condensa	ate drain PP	E04.018.028	410084318	410084318
Wall pipe clamps		E04.018.085	E04.018.087	E04.018.087
Roof deck pipe clam	ps	E04.018.030	E04.018.012	E04.018.012
Sool ring gummi	Inner flue gas pipe	E07.004.023	E07.004.024	E07.004.024
Searning gummi	Outer air pipe	E07.004.026	E07.004.027	E07.004.027
Conc. bend SS 43-4	5°	E04.018.068	E04.018.007	E04.018.007
Conc. bend SS 87-9	0°	E04.018.017	E04.018.006	E04.018.006
Conc. bend PP 43-4	5°	E04.018.027	410084313	410084313
Conc. bend PP 87-9	0°	E04.018.021	410084312	410084312
Concentric wall term	inal stainless steel	E04.018.019	E04.018.002	E04.018.002

4.4 Unpacking

The CD⁺ water heater will be supplied with the following documents and accessories:

- One "Installation, user and service instructions manual"
- One suspension bracket with locking plate and bolts
- Attached to a connection tube:
- One safety relief valve, to be mounted conform all applicable standards and regulationsAttached to the front of the gas valve:
 - three spare nuts for mounting the burner plate
 - two spare fuses for the water heater control
 - one sticker for propane or butane/propane operation
- Bottom part of the siphon, tank sensor and connector
- Two nipples with gaskets for inlet/outlet connections of the water heater

NB! A pump is separately supplied, it is not included in the water heater supply. For pump selection, see § 9.7.

After delivery, immediately check the water heater package to see if it is complete and without any defects. Report any imperfections immediately to your supplier.

5 INSTALLATION OF THE CD⁺

5.1 General notes

At every side of the water heater at least 50 mm of clearance should be applied to walls or wall units, 350 mm above the top side of the water heater and 250 mm from the bottom of the water heater.

The installation area/room must have the following provisions:

- 230 V 50 Hz power source socket with earth connection.
- <u>Open</u> connection to the sewer system for draining condensing water.
- A sound-deadening wall.



Note:

The wall used for mounting the water heater must be able to hold the weight of the water heater. If this is not the case it is recommended to mount the water heater on a (cascade) frame.

Other considerations related to the water heater location:

- The ventilation of the plant room must meet all applicable standards and regulations, regardless of the selected supply of fresh air to the water heater location.
- Both the air supply and the flue gas tubes must be connected to the outside wall and/or the outside roof.
- The installation area must be dry and frost-free.
- The water heater has a built-in fan that will generate noise, depending on the total heat demand. The water heater location should minimise any disturbance this might cause. Preferably it is suggested to mount the water heater on a brick wall.
- There must be sufficient lighting available in the plant room to work safely on the water heater.
- Remind the positioning of electrical components in relation to the temperature sensitivity.
- Make sure there is an open connection with the sewer to drain the condensate. This connection should be lower than the condensate drains level of the water heater.

The water heater must be positioned and installed by a certified installer in accordance with all applicable standards and regulations. Commissioning of the water heater must be done by a skilled service/commissioning engineer, who is trained for this type of water heater.

5.2 Mounting the water heater and tank

5.2.1 WATER HEATER MOUNTING

Before mounting and installing the water heater the following connections should be considered:

- Flue gas system and the flue gas pipe connections
- Air supply system and connections
- 'Cold in' and 'hot out' pipe connection
- Condensate and pressure relief valve drainage
- Power supply (preferably the power connection is positioned above the water heater)
- Gas pipe.



All lines/piping must be mounted free of tension. The weight of all the installation components should be supported separately from the water heater so there will be no standing force on the connections. This might influence the mounting position of the water heater.

Determine the position of the flow and return pipes by using the included suspension bracket or a suspension frame (when supplied).

While marking the holes, ensure that the suspension bracket or frame is <u>perpendicular and the water heater</u> <u>does not lean forward</u>. If necessary adjust the position with the adjusting bolts at the lower rear side of the back panel (see drawing). When the adjusting bolts aren't sufficient, fill the gap behind the bolts to get the water heater in position. The exact water heater position lies between the water heater hanging level and hanging slightly backwards.

The water heater should not lean forward in the mounted position.

Lock the suspension bracket with the security cover before making any other connections to the water heater. This security cover will prevent the water heater from falling off the bracket. Don't use excessive force during the mounting of the water heater connections.



5.2.2 TANK POSITIONING

The tank can be placed at will* on a stable floor, but not too far from the water heater(s). See § 9.6, 'Interconnecting pipes – equivalent length', on page 47.

* NB! This floor must be able to hold the weight of the water filled tank(s).

6 FLUE GAS AND AIR SUPPLY SYSTEM

6.1 General

The water heater has a positive pressure flue system. The available combined pressure drop for the inlet and outlet system, for a single water heater, **is 200 Pa for the complete water heater range.** For a multiple water heater installation, always contact the manufacturer for advice.

Notice:

- Install the horizontal flue components with an angle of 3° downwards in the direction of the water heater (roughly equal to five centimetres for every linear meter). When not installed accordingly, it may result in condensate building-up in the flue gas tube, eventually causing component failure.
- Wall flue terminals are generally used up to 80 kW. Using these terminals with larger capacities will give unpleasant large condensate clouds.
- When using a wall terminal, there is the possible risk of ice building-up on surrounding parts/structures, because the condensate will freeze. This risk should be taken into account during the design phase of the DHW installation.

Note:

Because the flue gases can have a relatively low temperature, the water heater needs to have a high efficiency approved stainless steel or plastic flue system. These materials should be usable for the applied pressure in the flue gas system, be condensate proof and have a temperature class of **T120**.



Before installing, read the installation manual(s) of the supplier of the flue gas and air supply parts included with the parts. Manuals for parts supplied by ECO can be found at: http://burgerhout.nl/documenten/handleidingen/ (Only Dutch language available).

Undermentioned manuals for parts supplied by ECO HS are applicable:

- Regulations regarding flue gas systems PP(s)
- Installation instructions clamps: Checklist
- Installation instructions Skyline 3000

6.2 Heights on roof



Height A

This is the height of the air inlet. A rain hood should prevent rainwater entering the air supply system.

When the inlet and outlet are mounted on a flat roof, the inlet should be at least 60 cm above the roof surface and at least 30 cm above the maximum snow level.

Example 1:

When the maximum snow level on the roof surface is 45 cm then the air inlet should be at 45+30=75 cm. 75 cm is more than the minimum 60 so the height will be 75 cm.

Example 2:

When the maximum snow level on the roof surface is 15 cm then the air inlet should be at 15+30=45 cm. 45 cm is less than the minimum 60 cm so the height will be 60 cm.

Height difference B

This is the height difference between the flue outlet and the air inlet.

The flue gas outlet should be at least 70 cm above the air inlet. It is advised to be equipped with a conical outlet.

A single flue outlet should be situated at least 100 cm above the roof surface.

Distance C

The horizontal distance between the flue gas pipe and air inlet pipe at roof level.

This distance should be at least 70 cm.

6.3 Water heater categories - types of flue gas systems.

For C43 and C83 see cascade manual: http://www.ecohs.nl/products/ambassador-/documentation/





6.4 C63 certified

In general, water heaters are certified with their own flue gas material. For type B23, C13, C33, C43, C53, C83 systems, only use flue gas and air supply parts approved according §4.2 and §4.3.

If a heater is C63 certified, no specific type flue gas material has been certified in combination with the boiler. In this case the flue gas and air supply parts should comply with the applicable European standards (EN14989). So, for type C63 systems flue gas and air supply parts from other suppliers can be used. It must be able to handle the condensate forming (W) and transport, overpressure (P1) and must have a minimum temperature class of **T120**. Also it has to meet the requirements in the following chapters "air supply" and "flue terminal".

CE string flue gas material	European standard	Temperature class	Pressure class	Resistance to condensate	Corrosion re- sistance class	Metal: liner specifications	Soot fire re- sistance class	Distance to combustible ma- terial	Plastics: location	Plastics: fire be- haviour	Plastics: enclosure
min. req. PP	EN 14471	T120	P1	W	1		0	30	I of E	C/E	L
min. req. SS	EN 1856-1	T120	P1	W	1	L20040	0	40			

A few examples of flue gas material suitable for ECO water heaters:

CE String for Plastic PPs: EN14471 T120 P1 W 2 O(30) I C/E L

CE String for Stainless Steel: EN1856-1 T250 P1 W V2-L50040 O (50)

When selecting flue gas systems, be aware that the minimum requirements are met. So only select flue gas materials having the same or better properties than this table.



Never use aluminium containing flue gas pipes in these water heaters.

···.	looung c		Jiunoo	0.		
	mat	water heater	d_{nom}	Doutside	d _{inside}	Linsert
			[mm]	[mm]	[mm]	[mm]
	SS	CD80	80	80 +0,3/ -0,7	81 +0,3/ -0,3	50 +2/ -
	SS	CD100, CD120	100	100 +0,3/ -0,7	101 +0,3/ -0,3	50 +2/ -
	SS	CD150, CD180	130	130 +0,3/ -0,7	131 +0,5/ -0,5	50 +2/ -
	PP	CD80	80	80 +0,6/ -0,6		50 +20/
	PP	CD100, CD120	100	100 +0,6/ -0,6		50 +20/
	PP	CD150, CD180	130	130 +0,9/ -0,9		50 +20/

Connecting diameters and tolerances:

Multiple water heaters can be connected to a common duct. These flue gas systems for multiple water heater installations must always be engineered as zero or negative pressure systems; this to prevent the risk of recirculation of the flue gases. Consult the flue gas supplier for detailed information and engineering. See also the cascade manual for these multiple water heater installations.

More information about these common flue gas systems can be found at the cascade-installation manual. You can find the cascade manual at the website: http://www.ecohs.nl/products/ambassador-/documentation/

6.5 Air supply

When an air supply duct is connected from the outside of the building to the water heater, the water heater will operate as a room-independent water heater (closed water heater).

The air supply duct can be made of:

- PVC / PP
- Thin-walled aluminium
- Stainless steel

6.5.1 COMBUSTION AIR QUALITY

Combustion air must be free of contaminants. For example: chlorine, ammonia and/or alkali agents, dust, sand and pollen. Remind that installing a water heater near a swimming pool, a washing machine, laundry or chemical plants does expose combustion air to these contaminants.

6.5.2 AIR SUPPLY THROUGH HUMID AREAS

When the supply duct will be placed in a water heater room with moist air (for example: greenhouses), a double walled supply duct or an insulated duct must be used to prevent the possible condensation at the outside of the duct. It is not possible to insulate the internal air pipes of the water heater and therefore condensation at the internal air canals must be prevented.

When roof mounted, the air supply duct needs to be protected against rain, so no water will be entering the water heater.

6.6 Flue gas and air supply resistance table

In the next sections, six calculation examples will be given to determine maximum lengths of the flue gas and air supply pipes. First, the component resistance data are given in the next table:

FLUE GAS PIPII	NG		RES	ISTANCE	[Pa]	
	Ø [mm] *	CD+80	CD+100	CD+120	CD+150	CD+180
straight tube/m	80	8,0	-	-	-	-
_	100	3,5	4,0	6,5	-	-
	130	0,8	1,2	1,8	3,8	6,0
	150	-	0,5	0,8	1,7	3,0
45° bend	80	4,0	-	-	-	-
	100	1,7	2,0	3,2	-	-
	130	0,4	0,6	0,8	1,9	3,0
	150	-	0,2	0,4	0,8	1,5
90° bend	80	8,0	-	-	-	-
	100	3,5	4,0	6,5	-	-
	130	0,8	1,2	1,8	3,8	6,0
	150	-	0,5	0,7	1,7	3
Flue outlet zeta=0,05	80	1,2	-	-	-	-
	100	0,5	0,8	1,1	-	-
	130	0,18	0,3	0,4	0,6	0,9
	150	-	0,15	0,2	0,35	0,5
Flue outlet zeta=1,0	80	24	-	-	-	-
	100	9,8	15,2	22,1	-	-
	130	3,5	5,3	7,8	12	17,3
	150	-	3,0	4,4	6,8	9,8
Flue outlet zeta=1,5	80	36	-	-	-	-
	100	14,8	22,8	33,2	-	-
	130	5,2	8,0	11,6	18	26
	150	-	4,5	6,6	10,2	14,7



AIR SUPPLY	PIPING		RES	ISTANCE	[Pa]	
	Ø [mm] *	CD+80	CD+100	CD+120	CD+150	CD+180
straight tube/m	80	7,5	-	-	-	-
-	100	3,0	3,5	4,0	-	-
	130	0,75	0,8	1,1	1,2	2,0
	150	-	0,3	0,4	0,6	1,2
45° bend	80	3,5	-	-	-	-
	100	1,5	1,7	2	-	-
	130	0,4	0,4	0,5	0,6	1,0
	150	-	0,15	0,2	0,3	0,6
90° bend	80	7,0	-	-	-	-
	100	3,0	3,5	4,0	-	-
	130	0,7	0,8	1,1	1,2	2,0
	150	-	0,3	0,4	0,6	1,2
Air inlet zeta=1.0	80	18,1	-	-	-	-
	100	7,4	11,4	16,7	-	-
	130	2,6	4,0	5,8	9,1	13,1
	150		23	33	51	71



CON FLUE (Al	NCENTRIC GAS OUTLET IR INLET
ROOF	
WALL	

CONCENTRIC PAR	RTS		RES	ISTANCE	[Pa]	
	Ø [mm] *	CD+80	CD+100	CD+120	CD+150	CD+180
roof terminal	80/125	61	-	-	-	-
	100/150	-	39	45	69	86
	130/200	-	-	-	15	23
outside wall terminal	80/125	22	-	-	-	-
	100/150	-	19	24	40	48
straight tube/m	80/125	12	-	-	-	-
	100/150	-	8,0	10	14	16
45° bend conc.	80/125	7	-	-	-	-
	100/150	-	8,0	9,0	14	16
90° bend conc.	80/125	13	-	-	-	-
	100/150	-	11	13	22	28
conc./par. adaptor	80/125	14	-	-	-	-
	100/150	-	16	22	40	56
* Do not reduce p	ipe diameters	relative to	o water he	ater conn	ections	

NOTICE: This table can only be used for a single flue/air system for one water heater. Do NOT use this table for common flue/air systems with cascaded water heaters.

6.7 Six typical examples

- Twin pipe system with separate pipes for flue gas and air supply C63 **A**:
- Twin pipe system with separate pipes and concentric roof terminal B: C33
- Single pipe for flue gas outlet only (air supply from water heater room) C: B23 C33
- D: Concentric pipe for flue gas/air supply (roof-mounted)
- E: Concentric pipe for flue gas/air supply (wall-mounted)
- Separate air supply duct & flue duct in different pressure zone F: C53

6.7.1 EXAMPLE A: TWIN PIPE SYSTEM (C63)



Wa	iter heater type:		CD⁺	180	
	Diameter: 1	30 mm	Number	Ра	Pa total
gas	Straight tube m ¹	total	9	6	54
le (Bend	90°	2	6	12
FIL	Flue outlet	conical	1	0,9	0,9
	Total res	istance flue	gas outlet:		66.9
y	Diameter: 1	30 mm	Number	Ра	Pa total
jdc	Straight tube m ¹	total	8	2	16
sup	Bend	90°	2	2	4
vir :	Air inlet	H/D = 1,0	1	13,1	13,1
4	Total re	esistance ai	r supply:		33,1
•	Total resistance flu	e gas outlet	and air su	oply:	100 Pa

Calculation example with given lengths: checking resistance

C13

The total resistance is less than 200 Pa. This flue gas / air supply system is functional.

Be aware: Eco specific resistance values are used in this example. Flue and air pipes of other supplier can have other values

6.7.2 EXAMPLE B: TWIN PIPE SYSTEM WITH CONCENTRIC ROOF TERMINAL (C33)



Calculation example with given lengths: checking resistance

Wa	ater heater type:		CD⁺	120	
	Diameter: 10)0 mm	Number	Ра	Pa total
6	Straight tube m ¹	total	6	6,5	39
gas	Bend	90°	2	6,5	13
=lue	Roof terminal	concentric 150/100	1	45	45
	Adaptor conc./par.	150/100	1	22	22
	Total resi	stance flue	gas outlet:		119
V	Diameter: 10	00 mm	Number	Ра	Pa total
ddn	Straight tube m ¹	total	6	4	24
Air s	Bend	90°	2	4	8
1	Total re	esistance air	supply:		32
	Total resistance flue	e gas outlet	and air sup	oply:	151 Pa

The total resistance is less than 200 Pa. This flue gas / air supply system is functional.

Part number. roof terminal: E04.018.001 - Inox

Part number. adaptor conc/twin: E04.018.033 - Inox/PP



Example A max. pipe length									
water heater type \rightarrow		CD⁺80	CD+100	CD+120	CD+150	CD+180			
Diameter air inlet	[mm]	80	100	100	130	130			
Diameter flue outlet	[mm]	80	100	100	130	130			
Diam. roof terminals	[mm]	80	100	100	130	130			
Maximum pipe length (inlet + outlet together)	[m]	18,0	31,5	24,0	44,5	30,0			

Example B max. pipe length								
water heater	type \rightarrow	CD+80 CD+100		CD+120	CD⁺150	CD+180		
Diameter air inlet	[mm]	80	100	100	130	130		
Diameter flue outlet	[mm]	80	100	100	130	130		
Concentric roof terminal	Concentric roof terminal [mm]		100/150	100/150	130/200	130/200		
Maximum pipe length[m](inlet + outlet together)		12,0	23,0	16,5	40,5	25,5		
Part no. concentric roof te	E04.018.015	E04.01	8.001	E04.018.074				
Part no. adaptor conc/twi	n:	E04.010.161	E04.01	8.033	Roof terminal Included			

6.7.3 EXAMPLE C: SINGLE FLUE GAS OUTLET. AIR SUPPLY FROM WATER HEATER ROOM (B23, B23P)



Wa	ter heater type:	00					
	Diameter: 1	00 mm	Number	Ра	Pa total		
	Straight tube m ¹	ube m ¹ total 13		4	52		
gas	Bend	90° 2		4	8		
lue	Bend	45° 2		2	4		
ш	Flue outlet	H/D = 1,0	1	15,2	15,2		
	Total resistance flue gas outlet:						

Calculation example with given lengths: checking resistance

The total resistance is less than 200 Pa. This flue gas / air supply system is functional.

Part number. roof terminal: E04.018.001 - Inox, concentric Part number. roof terminal: 410084853 - PP, concentric



Example C (B23) max. pipe length								
water hea	CD⁺80	CD+100	CD+120	CD+150	CD⁺180			
Diameter air inlet	[mm]	80	100	100	130	130		
Diameter flue outlet	[mm]	80	100	100	130	130		
Diam. roof terminal [mm]		80	100	100	130	130		
Maximum pipe length (total outlet length)	[m]	21,5	46,5	27,5	49,5	30,0		
Part no. roof terminal: Inox, (same as concentric)	E04.018.015	E04.018.001		E04.018.074				
Part no. roof terminal: PP, c	410086883	410084853		410070279				

6.7.4 EXAMPLE D: CONCENTRIC C33 (ROOF-MOUNTED)



Calculation example with given lengths: checking resistance

W	ater heater type:	CD ⁺ 80						
	Diameter: 80/12	Diameter: 80/125 mm. Number Pa						
<u>c</u>	Straight tube m	total	11	12	132			
ntri	Bend	90°	3	13	39			
nce	Bend	45°	2	7	14			
ပိ	Concentric terminal	roof	1	61	61			
	Total resistance flu (c	ue gas out oncentric	tlet and air):	supply	246			

The total resistance is less than 200 Pa. This flue gas / air supply system is functional.

Part number concentric roof terminal: E04.018.015 – Inox E04.018.018 - PP

6.7.5 EXAMPLE E: CONCENTRIC SYSTEM WALL OUTLET C13 (WALL-MOUNTED)



Calculation example with given lengths: checking resistance

W	ater heater type:	CD* 80						
	Diameter: 80/12	neter: 80/125 mm Number Pa						
tric	Straight tube m	total	9	12	108			
cen	Bend	90°	1	13	13			
Con	Concentric terminal	wall	1	22	22			
•	Total resistance flue gas outlet and air supply (concentric):							

The total resistance is less than 200 Pa. This flue gas / air supply system is functional.

Part number concentric wall terminal: E04.018.019 - Inox



water heater ty	CD⁺80	CD⁺100	CD ⁺ 120	CD⁺ 150	CD⁺ 180		
Diameter concentric pipe [mm]		80/125	100/150	100/150			
Concentric roof terminal [mm]		80/125	100/150	100/150	NOT PO	SSIBLE	
Maximum pipe length [m]		6,0	12,0 7,5		(cnoose B, C or E)		
Part no. conc. roof terminal Ind	E04.018.015	E04.01	8.001				
Part no. conc. roof terminal PF	E04.018.018	41008	4863				

		Example	e E (C13)			
water heater type \rightarrow		CD⁺80	CD ⁺ 100	CD ⁺ 120	CD⁺150	CD ⁺ 180
Diameter concentric pipe	[mm]	80/125	100/150	100/150	100/150	100/150
Concentric wall terminal [mm]		80/125	100/150	100/150	100/150	100/150
Maximum pipe length	[m]	12,5	19,0	14,0	7,0	4,0
Part no. conc. wall terminal	E04.018.019	E04.018.002				



Example F (C53)								
water he	CD+ 80	CD+ 100	CD+ 120	CD⁺ 150	CD+ 180			
Diameter wall terminal	[mm]	80	80	100	100	130		
Diameter air inlet	[mm]	80	80	100	100	130		
Diameter air inlet/ flue outlet [mm]		80	80	100	100	130		
Diameter roof terminal [mm]		80	80	100	100	130		
Maximum pipe length (inlet + outlet together)	[m]	14	38	19	42	23		
Dart no roof terminal:	Inox, conc:	E04.018.015	E04.018.001		E04.018.074			
	PP, conc:	410086883	41008	84853	410070279			
Part no wall terminal:	Inox, conc:	E04.018.019	E04.018.002		410072131			
	PP:	410082856	41008	37931	41008	87550		

7 ELECTRICAL INSTALLATION

7.1 General

All the wiring is connected to a separate connector that is fitted in a socket. The connector can be taken from the sockets without loosening the wiring. The connections are placed on top of the display panel and can be accessed by removing the water heater front door and the connector protection cover.

- For operation the water heater needs a power supply of 230 Vac 50 Hz.
- The water heater connections are not life/neutral sensitive (the water heater is not phase-sensitive).
- The wiring for the connections can be entered at the bottom of the water heater through the cable glands.
- NOTICE: Before starting to work on the water heater, it must be switched off and the power supply to the water heater must be disconnected.
- Electrical wiring should be installed according to all applicable standards and regulations.
- Working on the water heater should only be done by a skilled service engineer/installer and according to all applicable standards and regulations.

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1		2	3	4	5	6	7	8	9	10	11	12]	13	14	15	16		17	18
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	D	I O US	NOT SE	TA SEN	NK ISOR	DO U:	NOT SE	GEN BLOO	IERAL CKING	EM	РТΥ	EXTE W	RNAL PS		ON/ STA OP THE	OFF T OR PEN ERM	+ 0 V	- -10 DC		A CAS CON TI	B CADE INEC- ON
	19 L	9 O	20 Ск- Л	21 OPER	22	23 HE DEM	24 AT IAND	2	52	6 2 	7		28 2 L1	N N DO I US		31 L2		32 L	33 <u>–</u> MAINS 230 VAC	34 N	

7.2 Electrical connections

7.3 Function of the electrical connections of the water heater

1-2	DO NOT USE						
Do not connect any cable	to these connections						
3-4	TANK SENSOR						
This external tank senso	r measures the water temperature at the system side. The sensor must be mounted						
on the return pipe at the s	system side, close to the tank. See also the drawings in § 9.1, pages 40 and 41.						
PARAMETER: No param	eter settings needed.						
5-6	DO NOT USE						
Do not connect any cable	Do not connect any cable to these connections						
7-8	GENERAL BLOCKING						
7-8 A heat demand that will st	GENERAL BLOCKING art the burner will be blocked when terminals 7 and 8 are not bridged. This connection						
7-8 A heat demand that will st is for the use of external st	GENERAL BLOCKING art the burner will be blocked when terminals 7 and 8 are not bridged. This connection safety devices (terminals must be bridged for allowing burner to fire).						
7-8 A heat demand that will st is for the use of external s 9-10	GENERAL BLOCKING cart the burner will be blocked when terminals 7 and 8 are not bridged. This connection safety devices (terminals must be bridged for allowing burner to fire). EMPTY						
7-8 A heat demand that will st is for the use of external s 9-10	GENERAL BLOCKING art the burner will be blocked when terminals 7 and 8 are not bridged. This connection safety devices (terminals must be bridged for allowing burner to fire). EMPTY						
7-8 A heat demand that will st is for the use of external s 9-10 11-12	GENERAL BLOCKING art the burner will be blocked when terminals 7 and 8 are not bridged. This connection safety devices (terminals must be bridged for allowing burner to fire). EMPTY EXTERNAL WATER PRESSURE SWITCH						

13-14 ON/O	OFF STAT OR OPENTHERM WATER TANK
OPTION 1: an ON/OFF thermos	tat can be connected. The water heater will use the set/programmed tank tem-
perature when these terminals 1	3 and 14 are bridged.
OPTION 2: an OpenTherm (OT	Γ) controller can be connected to the terminals 13 and 14. The water heater
software will detect and use this	OpenTherm signal automatically.
15-16 0-10	VDC CONTROL SIGNAL
These terminals are used for a	an external 0-10 VDC control signal. PARAMETER: A parameter change is
needed. NOTICE: Terminal 15 [·	+] (positive) and terminal 16 [-] (negative).
17-18 CASC	CADE CONNECTION
These connections are used whe	en water heaters are cascaded with the internal cascade manager for controlling
the total cascade. NOTICE: Con	nect all terminals 17 and all terminals 18 together, do not switch between these
terminals.	
19-20 LOCK	K-OUT OR PUMP ON/OFF
This contact is N.O. (normally or	pen). When the unit is in lock-out this contact will close.
This contact can also be used for	or the switching of a pump with a separate control input connection.
(PARAMETER: A parameter cha	ange is needed).
21-22 BURN	NER ACTIVE OR EXTRA WATER HEATER OR PUMP ON/OFF
This contact is N.O. (normally op	pen). When the unit starts the burner and detects the flame, this contact will be
closed. This contact can also be	used to control an external (extra) water heater. This contact can also be used
for the switching of a pump with	a separate control input connection.
(PARAMETER: A parameter cha	ange is needed).
23-24 BURN	NER DEMAND OR PUMP ON/OFF
This contact is N.O. (normally or	pen). When the unit receives any heat demand this contact will close.
This contact can also be used for	or the switching of a pump with a separate control input connection.
(PARAMETER: A parameter cha	ange is needed).
25-26-27 CIRC	ULATION PUMP P3
Each water heater should be ins	stalled with an external pump.
Make use of a relay between t	his pump and terminal 25-27, when the pump consumes more than 450
Watt.	
Pump is switched off, when there	e is no heat demand, after post running time.
28-29-30-31 DO N	OT USE
Do not connect any cable to the	se connections.
TAKE CARE! 230 V electric vo	of the seconnections
	v
32-33-34 POW	ER SUPPLY

7.4 Sensor values

SENSOR	SENSOR TYPE	SENSOR VALUE		
S1	Internal flow sensor	NTC-10K		
S2	Internal return sensor	NTC-10K		
S3	Tank sensor	NTC-10K		
S6	Flue gas sensor	NTC-10K		

Conversion table: temperature vs. resistance for all sensors NTC-10k

Temperature	Resistance	Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
(0)	(12)	(0)	40400	(0)	(12)	(0)	(12)
-30	175203	20	12488	70	1753	120	387
-25	129289	25	10000	75	1481	125	339
-20	96360	30	8059	80	1256	130	298
-15	72502	35	6535	85	1070	135	262
-10	55047	40	5330	90	915	140	232
-5	42158	45	4372	95	786	145	206
0	32555	50	3605	100	677	150	183
5	25339	55	2989	105	586	155	163
10	19873	60	2490	110	508	160	145
15	15699	65	2084	115	443	165	130




8 DE CD⁺ WATER HEATER

8.1 Water quality

In direct water heating appliances the water flows directly through the heat exchanger of the water heater. Because all the time fresh water, containing dissolved minerals, is heated, scaling may occur. To prevent this, water quality must meet a number of standards. The values are the following:

Water temperature max. = 75° C Maximum allowed water hardness is 205 PPM or 205 mg/L CaCO₃ (= 11,5°dH) TDS (total dissolved solids) may not exceed 450 PPM Water hardness and TDS together may not exceed 450 PPM The pH value of the water may not be under 6,5 and not above 7,5 (measured cold) If water hardness is too high a water softening system is necessary. If TDS alone or the combined value is higher than the abovementioned, the water should be heated by means of an indirect water heating appliance. Minimum water hardness = 80 PPM or 80 mg/L CaCO₃ (= 4.5°dH) Minimum TDS = 100 PPM Water that's under these minimum values normally has a pH value which is aggressive and corrosive.

NEVER install a direct heated water system in an area where water quality does not comply with above mentioned values.

If the water hardness is too high, a water treatment installation should be installed reducing the water hardness within acceptable level.

8.2 Frost protection

The water heater has a built-in frost protection that is automatically activating the pump when the water heater return (water) temperature drops below 5°C (programmable). When the water heater return temperature drops below 3°C (programmable), the burner is also ignited. The pump and/or burner will shut down as soon as the return temperature has reached 10°C (programmable). The abovementioned temperatures are related to the temperatures measured by the tank sensor of the water heater. This frost protection function will not fire up the water heater in case of a "general blocking" of the burner demand.

NOTICE: - This frost protection function is only protecting the water heater and not the whole sanitary system.

- This frost protection function is only useable provided that water circulation through the system is possible if not, the water heater goes in a lock-out.
- Because it concerns a programmable setting, a water heater damaged by frost is <u>not</u> covered under warranty.

8.3 Legionella program

To avoid contamination of the water with Legionnaires' disease, a special anti-Legionella program is present in the software of the water heater control, the settings of which are freely programmable.

NB! This option is default turned 'OFF', the responsibility for a Legionella-free installation lies with the end-user. See § 11.2.2 on page 83 for an extensive explanation of how to use this option.

8.5 Flow monitoring

Flow

In the control of the water heater an extensive flow monitoring function has been implemented. If the temperature difference between incoming cold water and outgoing hot water gets too high, this indicates a too small water flow through the appliance.

Safety actions

- If the temperature difference exceeds the maximum at a certain load, for a longer time than specified in the software, the display will show 'Delta direct block' and the appliance will block: it switches immediately to reduced power. Power is then slowly increased to the required level again. The fourth time, so after three of these blockings, the water heater will go in *lock-out* (F16) and the display shows 'FlowReturn dt fault'.
- At very bad flow rates (*temperature difference for 10 seconds exceeding a certain entered safety value*), the appliance will skip the blockings and immediately go in lock-out: F16, display 'FlowReturn dt fault'.
- In *Service mode* the appliance will immediately go in lock-out when the maximum value corresponding to the applied power is exceeded, skipping the blocking procedures that apply at normal operation. Again F16, display 'FlowReturn dt fault'.
- **NB!** All values of this flow monitoring have been programmed by EHS to get the best performance combined with a long-life time.

8.6 Water pressure switch

Water pressure getting too low indicates a blocking of the water flow. If that is the case, heat from the flue gases cannot be transferred and will flow away through the flue gas channels. Also overheating of the heat exchanger and/or other parts of the system could occur, if no measures would have been taken. For this reason a water pressure switch, *WPS*, has been integrated in all CD⁺ system models.

Operating values

The water pressure switch has one Normally Open (NO) contact, meaning the contact is open in rest position when no pressure is applied. As soon as the system has been filled and the pressure exceeds 0.85 bar, the switch closes, enabling operation. If, by any cause, the pressure drops below 0.75 bar, the system will be blocked.

In this case the display will show:

Display message	W	а	t	е	r	р	r	е	S	S	u	r	е		f	а	u	-	t	
												9	9	9	,	5		h	r	s
Reason	Wa	Nater pressure is too low or high.																		

Check if there is any leakage or maybe the pressure in the service pipe has dropped down. See also § 16.2 'Blocking codes', from page 107 on.

9 THE CD⁺ SANITAIRY SYSTEM: INSTALLATION INSTRUCTIONS

9.1 The CD⁺ system

The system is set up as shown in the next two examples, the first showing a combination of one water heater and one tank, the second showing a combination of two water heaters and two tanks. Other combinations are possible as well, contact your supplier.

SAFETY COMPONENTS

NB! The pictures in §§ 9.1.1 and 9.1.2 show examples of functional installations. The safety components as shown in these pictures are NOT necessarily conform all applicable standards and regulations.

ALWAYS have the installation installed by a skilled installer. Safety must be added according to all applicable standards and regulations.

9.1.1 STAND-ALONE SET-UP

The basic form of a CD⁺ installation is one water heater with one tank. Shown in the picture are the principle components and connections.



	PUMP
A	NON- RETURN VALVE
Æ	VALVE
	SAFETY VALVE
¢	AUTOMATIC AIR VENT
l ∕ r −1	FILTER
	INLET COMBINATION - Overflow - Controllable return valve - Valve
\mathbb{X}	PRESSURE REGULATING VALVE

Example of a combination of one water heater and one tank



Position tank sensor on ECO tanks Tank sensor: see § 9.2.1 on page 42.

Extra explanation:

- 1) Pressure relief valve (mandatory in case service pipe pressure is too high)
- 2) Inlet combination with valve (mandatory)
- 3) Apply filter if necessary (recommended)
- A suitable safety valve must be mounted near the water heater (mandatory) This safety valve may never be isolated from the water heater by means of a ball valve
- 5) Mount remote tank sensor in the screw hole on the return pipe (see picture) (necessary) When screwing is not possible, mount the tank sensor on the return pipe as close as possible to the tank
- 6) Drain valve (recommended)
- 7) Hot and cold-water mixers
- A) Cold water inlet (service pipe)
- B) Hot water supply circulation
- C) Circulation return

9.1.2 CASCADE SET-UP

CD⁺ water heaters and tanks can be installed cascaded in a number of possible combinations according to the instructions in the next paragraphs. Set-ups mostly used are 1 or 2 water heaters with 1 or 2 tanks, see the tables at the next pages. Contact your supplier if more water heaters or tanks have to be cascaded.



Example of a combination of three water heaters and two tanks

/		< l>
L	!	7

For the installation of cascaded water heaters and tanks, always consult the tables in § 9.5. All requirements concerning pipe diameters and lengths as well as pump selection are presented here. By applying these you'll improve both the well-functioning and the life time of your CD⁺ installation.

	PUMP
*	NON- RETURN VALVE
R	VALVE
	SAFETY VALVE
¢	AUTOMATIC AIR VENT
l <mark>∕~</mark> −l	FILTER
	INLET COMBINATION - Overflow - Controllable return valve - Valve
\mathbb{X}	PRESSURE REGULATING VALVE

Extra explanation:

- 1) Pressure relief valve (mandatory in case water pressure is too high)
- 2) Inlet combination with valve (mandatory)
- 3) Apply filter if necessary (recommended)
- 4) A suitable safety valve must be mounted near the water heater (mandatory) ¹ This safety valve may never be isolated from the water heater by means of a ball valve
 5) Mount remote tank sensor in the screw hole on the return pipe of and tank (see picture) (necessary)
- return pipe of one tank (see picture) (necessary) When screwing is not possible, mount the tank sensor on the return pipe as close as possible to one of the tanks ^{2, 3}
- 6) Drain valve (recommended)
- 7) Hot and cold-water mixers
- A) Cold water inlet (service pipe)
- B) Hot water supply circulation
- C) Circulation return

Notes:

- Connections on the water heater side should **always** be executed as drawn in the picture above.
- ¹ Always apply safety components according to all applicable regulations.
- ² Sensor mounting: p.t.o.
- ³ In case of more than one tank, mount the tank sensor on one of the tank outlets. The temperature of this tank will be assumed to be representative for all, provided that the installation design is correct.
- In the inlet (return) connection of the water heater no check valve is recommended.
- All designs and tables in the next paragraphs go up to two water heaters max. If needed, the water heater control can handle up to twelve water heaters.
- For large capacity installations (more than two water heaters) consult your supplier.

9.2 Control

9.2.1 TANK SENSOR

With the CD⁺ water heater, a <u>threaded sensor</u> is supplied as tank sensor. On a <u>new</u> ECO tank, this sensor can be mounted on the return pipe right away.



The use of this threaded sensor is also recommended for existing tank set-ups, because its controlling behaviour is more stable than that of the strap-on pipe sensor.

When this threaded sensor is used on an existing ECO tank set-up, a <u>reducing nipple</u> may be needed, to be able to mount the sensor on the return of the tank, provided that this return has a threaded socket, i.e. this ECO tank is not older than from 2008.

On other tanks, generally the supplied threaded sensor <u>cannot</u> be applied; the existing pipe sensor must be kept in use and be connected to the water heater control. Check that this sensor has been placed on one tank return, as close as possible to this tank.



E04.016.677 Threaded sensor (M5x5) with Molex connection.

• Supplied with the water heater, cable with Molex connector included.



E04.016.304 Strap-on pipe sensor.

9.2.2 GENERAL CONTROL

- There is no need for a sensor <u>in</u> the tank, because when the pump starts to run, the tank sensor of the water heater is measuring the water temperature of the tank.
- When no water is drawn from the tank, the tank sensor is measuring the water temperature in the tank.
- After ending a heat demand, the pump has a post turning time.
- On the control panel, the tank or hot water temperature can be set.
- When an RCW remote wall controller is connected to the wire terminal (13) and (14), the setting of the tank temperature can be done with this controller (Open-Therm bus), also the night or weekend reduction of tank temperature.
- During a period of no tapping, the temperature inside the tank is maintained at the Setting temperature automatically.
- A safety control stops the water heater from firing, when the temperature difference between flow and return gets higher than allowed at the actual load (flow monitoring/ΔT function).
- Parameters: the default of the parameters of the water heater control have been set for this type of tanks.

9.2.3 CASCADE CONTROL

- Up to twelve water heaters can be cascaded.
- One water heater has to be appointed master, the other water heaters are appointed slaves, each with his own address in the software.
- The slaves are connected with two wires to the master.
- Every individual water heater has a connection for a pump.
- An external tank sensor (S3) is placed at the inlet tube to the water heater(s) (see description on top of this page) measuring the tank water temperature.
- At a heat demand, the master water heater controls the heat output of the slaves, on base of the measured temperature of the tank sensor.
- When a slave stops burning, the pump connected to this slave has a post turning time.
- When one water heater in the cascade installation is burning, the fans of the other water heaters are turning at a low speed, preventing recirculation of the flue gases.
- Flow monitoring cf. § 8.4 (page 39) remains active in every separate water heater of the cascade.
- Parameters: for cascade parameters see § 10.17 pages 70 ff. (parameter menu C).

9.3 Water heater and tank: connections and connection sizes

9.3.1 CONNECTING THE TANK TO THE WATER HEATER

- Connect the **pump** by means of couplings and a piece of copper pipe to connection A of the water heater (note the flow direction of the pump).
- Connect the inlet of the pump to the **upper** of the two close above each other located connections of the tank, labelled 'return to water heater'.
- Connect connection B of the water heater to the lower of the two close above each other located connections
 of the tank, labelled 'flow from water heater'. Also make a tap point in this line at the lowest point.



9.3.2 TO CONNECT THE TANK TO YOUR DHW INSTALLATION

(see picture on next page \rightarrow)

- Connect the fresh water supply to the single connection C, labelled 'cold in', opposite to A and B which were
 used for connecting the water heater. For the application of inlet combination, (control) valves, etc. all applicable regulations should be met.
- Connect the DHW connection on top of the tank, labelled 'hot out', to your DHW installation.
- Connect the recirculation line to connection F, labelled 'circulation return', on the side of the tank, at the same height as inlet C.

The EHS tanks have the following DHW connections:

- COLD IN for inlet of fresh water
- HOT OUT for outlet of DHW
- water heater Return for connection to inlet of water heater
- water heater flow for connection to outlet of water heater
- CIRCULATION RETURN for recirculation of DHW from installation to tank

Besides there are connections for:

- Thermometer (on side on $\pm \frac{3}{4}$ of height of the tank)
- Connection for T&P valve (mounted on top) according to the applicable standards and regulations. Even
 if a T&P valve has to be applied, the safety at the water heater's side, on position C (← see previous
 page), should be maintained at all times.

Tank connection sizes:

Code	Connection	M / F ^{*1}	Remarks	EWD300	EWD500	EWD750	
•	roturn to water bester	NA	incl. reducing ring	R 2"	R 2"	R 2"	
A	return to water heater	IVI	excl. reducing ring	R 1½"	R 1½"	R 1½"	
В	flow from water beater	M	incl. reducing ring	R 2"	R 2"	R 2"	
В	now norm water neater	IVI	excl. reducing ring	R 1½"	R 1½"	R 1½"	
C	cold water inlet	M	incl. reducing ring	R 2"	R 2"	R 2"	
C	cold water inlet	IVI	excl. reducing ring	R 1½"	R 1½"	R 1½"	
D*2		М	incl. reducing ring	R 2"	R 2"	R 2"	
D-	DHVV outlet		excl. reducing ring	R 1½"	R 1½"	R 1½"	
E	free connection (T&P valve)	F	incl. plug	Rp 1½"	Rp 1½"	Rp 1½"	
F	circulation return	М	incl. cap	R1½"	R1½"	R1½"	
G	bleed valve	-	-	-	-	-	
н	thermometer connection	F	incl. plug	Rp ½"	Rp ½"	Rp ½"	
*1 M = M	^{*1} M = Male / Outer ; F = Female / Inner.						
*2 Reduc	ring ring is factory fitted.						



9.3.3 CONDENSATE DRAIN CONNECTION

The condensate drain is placed at the centre at the bottom of the water heater and has a ³/₄ inch hose discharge. Connect this flexible hose to the sewer system.

Use only plastic parts with the condensate drain. Metal lines are not allowed.

Blockage of this drain might damage the water heater. The drain connection is correct when the condensate can be seen flowing away, e.g. using a funnel. Any damage that might occur, when the drain is not installed correctly, is not covered by the warranty of the water heater.

There should be an <u>open</u> connection between the condensate hose and the sewage system, to make sure that any pressure difference between the two can never affect the condense water level and hence the functioning of the water heater:



When mounting the bottom part of the siphon, before commissioning the water heater and/or after maintenance, it must **ALWAYS** be <u>completely</u> filled with water.



This is a safety measure: the water in the siphon keeps the flue gases from entering the water heater room via the condensate drain.

9.4 Cascade systems: pipe codes

9.4.1 PIPE CODES WATER HEATER SIDE

Pipe codes for an installation of only one water heater:

 There's only one hot- and one cold-water pipe, both encoded D1, and also the main connection diameter D = D1.

So water heater sided only one pipe diameter is needed. Values in table A, § 9.5.1

9.4.2 EQUIVALENT LENGTH

Equivalent length:

 Length of the connecting pipes from the water heaters' cascade to the tank(s) may not exceed a certain measure. Components, such as bends and the like, contribute to the total length by their so-called 'equivalent lengths'.

See table E: 'Equivalent lengths' in § 9.6 on page 47.

- To achieve the new maximum length, the equivalent lengths of the applied components must be deducted from the allowed length without components (first column of the table).

ELABORATED EXAMPLES

At the end of this chapter, in § 9.8, three elaborated examples will be given, demonstrating how to apply the tables and values given in § 9.5 up to § 9.7 (pump selection).

9.5 Diameters – tables

General remark: diameters may never be chosen smaller than specified in the tables; flow must remain guaranteed.

9.5.1 WATER MANIFOLDS

The figures in the tables refer to **diameter**×**wall thickness (mm**×**mm)** of the corresponding pipe.

Diameter D1	(= OUTLET and INLET of each water heater)					
CD+ 80	35×1,3					
CD+100						
CD+120	42×1,4					
CD⁺150						
CD+180	54×1,5					

Table A: Connections directly on the water heater(s)

Diameters D (= MAIN CONNECTING PIPES to the tank(s))					
	2* cascaded water heaters				
CD+ 80	54×1 5				
CD+100	54 ~ 1,5				
CD+120	67×1.0				
CD+150	07 ~ 1,9				
CD+180	80×2,1				
* D = D1 using a syst	em having 1 water heater (see table A).				

Table **C**: *Main connecting pipes to the tank(s)*

9.5.2 TANK HEADERS

The numbers in the tank table are **diameter** \times **wall thickness (mm** \times **mm)** of the connecting pipe to each tank D_T

Diameters D _T	(= TANK in- and	d outlet)					
	number of case	number of cascaded water heaters					
	1	2					
1 tank	35×1,3	54×1,5					
2 tanks	28×1,2	35×1,3					
CD+ 100	number of case	aded water heaters					
	1	2					
1 tank	42×1,4	54×1,5					
2 tanks	28×1,2	42×1,4					
CD+ 120	number of cascaded water heaters						
	1	2					
1 tank	42×1,4	67×1,9					
2 tanks	35×1,3	42×1,4					
CD+ 150	number of cascaded water heaters						
CD 130	1	2					
1 tank	54×1,5	67×1,9					
2 tanks	35×1,3	54×1,5					
CD+ 190	number of case	caded water heaters					
CD 160	1	2					
1 tank	42×1,4	80×2,1					
2 tanks	54×1,5	54×1,5					

Table **D**: Tank connections D_T

9.6 Equivalent lengths – table

When the water heaters and tanks are separated over some distance, the interconnecting pipes may only have a certain maximum length, dependent of the number of bends and the like components. For every applied component a so-called 'equivalent length' is deducted from the total allowed.

The meaning of the connection 'VL' can be seen in the drawing below.

The diameter of this connection VL should meet at least the specified pipe diameter D. For this pipe connection the maximum straight length of flow and return part added * has been specified in the table below.



^t The real available <u>maximum</u> distance VL between water heaters and tanks is therefore <u>half</u> of the length specified in the table!



Figure 9.3 Drawing in which pipe connection 'VL' is displayed

Each component that's added to the straight pipes is contributing to the total resistance, and will therefore cause a necessary reduction of straight length. The table contains a number of commonly used components and their equivalent length:

Copper	Maximum	equiv. length	equiv. length	equiv. length	e.l. of fully
pipe	straight length	90° elbow	90° elbow	45° bend	ported
diameter D	flow + return	R=0.5×D	R=1.0×D	R=1.0×D	ball valve
mm× mm	т	т	т	т	т
35×1,3	14,9	0,7	0,2	0,1	0,1
42×1,4	15,8	0,9	0,3	0,2	0,1
54×1,5	17,3	1,2	0,4	0,2	0,2
67×1,9	17,9	1,4	0,5	0,3	0,2
80×2,1	19,5	1,7	0,6	0,3	0,3

Table E: Equivalent lengths

Example:

Suppose, for a project the diameter D has been specified the value 67×1.9 , so the maximum allowed straight length is 17.9 m (see table).

In the connection is added

• 4 × bend 90°, R=0,5×D

• $2 \times$ fully ported ball valve

This gives a reduced allowed straight length of:

 $17,9 - (4 \times 1,4) - (2 \times 0,2) = 11,9 \text{ m}$

With this component configuration one may only use 11,9 m straight length.

→ The distance between water heater main connections and tank main connections in this example is therefore ~6 m at max.

9.7 Pump selection – tables

Pump selection is important, because, in combination with the system's total resistance, it sets the water velocity in water heater and pipes. The right water velocity is essential for correct functioning and life time of the system.

9.7.1 PUMP SELECTION

Select the pump for your CD⁺-installation using the following tables, by looking up, in the table that relates to the CD⁺ water heater type you installed, the applied combination of numbers of cascaded water heaters and tanks ¹.

	P2 = Grundfos UPS 32-100N						
	P3 = UPS 40-120 FB						
CD+ 80	number of cascaded water heaters						
	1	2					
1 tank	P1	P1					
2 tanks	P1	P1					
CD+100	number of casca	ded water heaters					
	1	2					
1 tank	P2	P2					
2 tanks	P2	P2					
CD+120	number of cascaded water heaters						
CD-120	1	2					
1 tank	P2	Х					
2 tanks	P2	P2					
CD+150	number of cascaded water heaters						
CD-150	1	2					
1 tank	P2	х					
2 tanks	P2	Х					
00+400	number of casca	ded water heaters					
CD-100	1	2					
1 tank	P3	Х					
2 tanks	P3	P3					

Three pump types: P1 = Grundfos UPMXL GEO 25-125N-180

Table F: Pump table

¹ **NB!** An X in the pump table doesn't necessarily mean that the corresponding installation cannot be built. If it can, it will need specific design effort and pump selection. Please consult EHS for advice.

Pump part numbers

Water heater		Pump	EHS Part no.
CD+ 80	(P1)	Pump UPMXL GEO 25-125N-180	S04.000.429
CD+ 80-150	(P2)	DHW pump UPS 32-100N	E09.000.112
CD+ 180	(P3)	DHW pump UPS 40-120 FB	E09.000.115

9.7.2 NOMINAL FLOW PER WATER HEATER TYPE

Water heater	Flow [m ³ /h]	
CD+ 80	3,97	
CD+ 100	4,77	
CD+ 120	6,36	
CD+ 150	7,15	
CD+ 180	9,54	

9.7.3 PUMP CONTROL



The applied pump <u>must</u> be controlled only by the CD⁺ water heater control. If, for any reason, an external pump control is applied *without written approval of EHS*, then the complete warranty on the CD⁺ water heater and all delivered parts will become invalid.

9.7.4 PUMP: MAXIMUM ELECTRICAL POWER

General

- The inrush current of a conventional pump is approximately 21/2 x its nominal current.

- The maximum switch current of the relay on the PCB is 5 A.

The conclusion from this is that nominal currents of pumps, controlled by the PCB, may not exceed 2 A.

CD⁺ pump.

The nominal current of the pump must be equal to or lower than 2 A. All pumps of \S 9.7.1 fulfil this condition.

Warning (EC pumps):

In case of using an electronic commutating pump, the relays 1, 2 or 3 <u>may not be used</u> for the power connection, because of the inrush current of the electronics of the pump.

Directly connect the pump to an external power supply.

Control connections of an EC pump can be established in several ways, set by parameter P5BN. See § 11.1.5 on page 81.

9.8 Elaborated examples

To work out the examples in this section, the rules are given again:

1. Codes to a one water heater installation:

- There's only one flow pipe and one return pipe, both encoded D1.
- For the right diameter value see table **A** in § 9.5.1. The main pipe diameter D equals this value.

2. Codes for cascades: two water heaters connected:

- First number the water heaters: water heater-1 is the one whose hot water connection is situated the furthest away from the tank(s).
- Connections directly to the water heaters: $D1 = 54 \times 1,5$ (mm \times mm).
- Number the horizontal hot water pipes between water heaters: from D1 at water heater-1 to D at water heater-number-last (values: table **B** in § 9.5.1).
- Number the horizontal cold-water return pipes between water heaters 'reversely': from D1 at water heater-number-last to D at water heater-1.

3. Codes for tank connections:

- Pipes between the connections: D. Values from the water heater table C (§ 9.5.1).
- Tank connections: D_T (entrance and exit). The values are found in the tank table **D** (§ 9.5.2)

9.8.1 ONE CD+120 WATER HEATER WITH ONE EWD500 TANK



Water heater and tank connections:

For this system rule 1 must be applied, so only one pipe size is needed. No numbering of water heaters, tanks and connections is required. From table **A**: for 1 water heater is D1=D = $42 \times 1,4$ [mm×mm] From table **D**: for 1 tank is D_T = $42 \times 1,4$ [mm×mm]

For this system, pipes sized at least 42×1,4 [mm×mm] are required for all connections.

Length of the connecting pipes water heaters \leftrightarrow tanks

From table E:

The maximum total length of flow and return pipes 42×1.4 [mm×mm] is 24.2 m.

So when $42 \times 1,4$ [mm×mm] is applied, the physical distance between water heaters and tanks may be half of this, so ~ 6 m, at max. In case bends and/or valves are used, this distance becomes less than 6 m. Table **E**. **Pump**

From table F: Use pump P2.

982 Two CD+100 water heaters with two EWD500 tanks



Water heater connections, encoding:

Number the water heaters: water heater-1 is the water heater furthest from the tank(s), see picture. Encode the connection pipes directly connected to the water heaters: D1, see picture. Encode the horizontal connexion pipes:

- hot water pipes starting at water heater-1: D1 up to D (= in this example only D1 and D), see picture.
- return pipes starting at water heater-last (= water heater-2): D1 up to D (same remark), see picture.

Pipe sizes, water heater side:

From tables A, B and C, CD+100:

All pipes D1 in the picture must measure at least 42×1.4 [mm×mm] (tables A and B) The pipes D must measure 54 x 1,5 [mm \times mm] (table C)

Tank connections:

From table D, 2^{nd} block (CD+100): for 2 tanks D_T = 42×1,4 [mm×mm].

So for this system, pipes sized at least 54×1,5 [mm×mm] are to be applied for all connections directly on water heaters and tanks, and pipes sized at least 67×1.9 [mm×mm] for the connections between them. $= 42 \times 1.4$ 2 □ = '54 x 1.5

Length of the connecting pipes water heaters ↔ tanks From table E:

The maximum total length of flow and return pipes 54×1.5 [mm×mm] is 17.3 m. So when 54 x 1.5 [mm \times mm] is applied, the physical distance between water heaters and tanks may be half of this, so ~ 8 m, at max. Using bends and/or valves, this distance becomes less than 8 m. Use table E.

Pump

From table F: Use two pumps P2.

10 USER INTERFACE

10.1 Control panel menu structure







10.3 Display during operation

During normal operation the text in the display shows the status of the water heater. In the following graphs the several displays during normal operation are explained.

	ema	nd ty	pe:			Ac	tua	l sta	atus	:								
WA	TF	R H	Т	R	:	S	Т	Α	Ν	D	-	В	Υ					
> >	>	: 1	2	3	•	4	٥	С	(1	2	3		4	0	С)	
cascad	ما	se	t po	int v	wate	er te	emp).	tor	nn	mo	2011	rod	by	tan	k		
commi	inica	-							se	nso	r.	asu	icu	Бу	tan	N		
tion inc	licate	or							Ca	n b	e tu	rne	d o	ff by	/ P	5 B.	J	
																	_	
Explar	natio	n "A	ctu	al s	tatu	ıs"	scr	eer	1	ì								
Actual	stat	us:			_			1										
BO	1	I e	r		0	T	T											
vvnen	wate		ter	IS SI	witc	neo	i Of	1 (01	niy t	ext	in t	ne	uisp	nay	au	ring	thi	s status)
	t da	ı e moni	m h cic	a		a	a fr		tha	 roc	m +	hor		tot	<u></u>	1 +~	n k -	oncor
no nea (onen)	a ue	mane	i sig	Jinal	COL	1111)	y in		me	100	III U	nen	1105	າສເ	and	มเส	IIK S	Sensor
S t	alı	n d	-	b	v													
Room	therr	nosta	at &	tan	k se	enso	or/th	herr	nos	tat (dete	ect l	hea	t de	ema	nd	but	set poin
is reac	hed.							-								-		
P r	е	- p	u	r	g	е												
The far	n is p	burgii	ng b	efoi	re a	bu	rne	r sta	art a	atter	npt							
P r	е	- i	g	n	i	t	i	ο	n									
Ignitior	n sta	rts be	efore	e op	eni	ng d	of th	ne g	as	valv	e.							
Ιg	n	i t	i	0	n													
The igr	niter	is igr	hiting	<u>g</u> .						1								
Po	S	t -	р	u	r	g	е											
The fai	n is p	burgii	ng a	fter	bur	ner	is :	swit	che	ed o	ff.							
	rI	ו∣ ו	n	g		1	0	0	%									
Bu							-											

10.4 Monitor screens

During normal operation and standby, the $[\blacktriangleleft]$ and $[\blacktriangleright]$ buttons can be used to show some water heater information, including measured temperatures, settings and data. In the following graphs is explained which values can be shown in the display. When no button is activated for three minutes, the display will return to its status display.

Pr w	essi	ng	[◄]	or	[►]	wh	ile b	ein	g a' s⊨⊤	t the	е "о Лте	pera	ating	g so ⊿⊏N	cree	en" t	ogg	les	thr	ough the screens below.
VV	len	hie	5511	IY L		Or	Г, і			, Er		κjι	יון וכ		١UJ	ala	arry	um	eu	le display returns to the base menu.
SC	REE	N:		1																
т	1		F	Ι	ο	w							1	2	3	,	9	0	С	Measured value by the internal flow sensor.
Т	2		R	е	t	u	r	n					1	2	3	,	9	0	С	Measured value by the internal return sensor.
													0	р	е	n				Shown when controller doesn't detect this sensor.
													S	h	0	r	t	е	d	Shown when sensor wires or sensor itself is shorted.
sc	REE	N:		2									-	-	-	-	_	-	-	-
Т	3		Е	x	t	е	r	n	а	I			1	2	3	,	9	0	С	Measured value by the external sensor.
Т	4		С	а		0	r	i	f	i			1	2	3	,	9	0	С	Measured value by the tank sensor.
													0	р	е	n				Shown when controller doesn't detect this sensor.
r													S	h	0	r	t	е	d	Shown when sensor wires or sensor itself is shorted.
SC	REE	N:		3																
Т	5		0	u	t	d	ο	ο	r				1	2	3	,	9	٥	С	Measured value by the outdoor sensor.
Т	6		F	Ι	u	е							1	2	3	,	9	0	С	Measured value by the flue gas sensor.
													0	р	е	n				Shown when controller doesn't detect this sensor.
					_								S	h	0	r	t	e	d	Shown when sensor wires or sensor itself is shorted.
sc	REE	N:		4																-
d	Т	F	Ι	ο	w	R	е	t	u	r	n		1	2	3		9	•	С	Temp. difference between internal flow & return.
d	Τ	F	I	u	е	R	e	t	u	r	n		1	2	3	,	9	•	C	Temp. difference between flue gas & internal return.
					1															
SC	REE	N:		5						1		1							1	Temp. difference between external & internal return
d	Т	Ε	X	t	R	е	t	u	r	n			1	2	3	,	9	•	С	(ΔT LLH).
S	i	g	n	а											Ρ	0	w	е	r	External supplied 0-10 Volt dc signal.
														S	е	t	р	0	i	"Power" = power input control or "Setpoi" = set point
sc	RFF	N٠		6	1															control.
E	2	n		•	n	•	•	Ч					٥	٥	٥	٩	r	n	m	Actual fan speed in rom
F	a 2	n		о 6	р n	0	0	d					3	1	0	0	۱ %	μ		Actual fan speed % of maximum allowable fan speed
	a			Э	μ	C	C	u							U	U	70			Actual fait speed 76 of maximum allowable fait speed.
Fa be	n m abl	n <mark>axi</mark> e to	mu rea	m F ach	RPN the	/: T e ma	⁻ he axin	ma: num	xim n rp	um m s	acti	ual i boin	rpm t. be	ma eca	ay b use	e lo of	wer the	tha uni	ant t's i	he maximum rpm set point. The fan may not resistance, which is still correct according to
the	e de	sigr	n of	tha	t sp	eci	fic u	unit.	•				,							,
				-	1															
50	REE	N:		'			<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	1	1					_	I
F	I	a	m	е	S	İ	g	n	а						1	0	0	μ	Α	Flame signal given in μΑ.
W	а	t	е	r	Ρ	r	е	S	S	u	r			1	,	0	b	а	r	Shows water pressure when sensor is connected.
SC	REE	N:		8																
Ρ	u	m	р	1		Н	е	а	t	е	r				0	f	f			Pump 1 (HEATER PUMP) On or Off.
Ρ	u	m	р	1		S	i	g	n	а	Ι			1	0	0	%			Modulating signal Pump 1 in (%).
			•		1			. •				I			-					· · · · · · · · · · · · · · · · · · ·
SC	REE	N:		9		L		L	L	1	L	L	L		-	-	-	ı	1	
Ρ	u	m	р	2		С	а	Ι	0	r	i				0	f	f			Shows when the calorifier pump is "ON" or "OF".
3	-	w	а	у	V	а	I	v	е	Η	е	а	t	i	n	g				Signal to the 3-way valve: "HEATING" or "HOTWA- TER".
SC	REE	N:		10]														
Р	U	m	n	3		S	v	S	t	e	m			0	f	f				Shows when the system pump is "ON" or "OF"
h	h		۳ m	m	Р		y 1	м	M	Ĭ	V	v	Y	V	י ח	2	v			hh=hour: mm=minutes: DD=day: MM=month
		-			0		,	141	141	· /			•	1		a	y		I	YYYY=vr: Day of the week

SC	RFF	·N·	11			ן														
C	а	s	С		D	е	s	i	g	n				0	1					0 = MASTER, 1 11 = SLAVES
С	а	s	I	n	f			0	1	2	3 4	4 5	6	67	8	9)	Α	В	Displays number, priority and state of cascade water heaters.
												-		-			-		_	
DE	sc	RI	ΡΤΙ	ON	"C	:AS	SCII	NFC)" (Scr	een	11								
Sh as nu Wi he in Ex Th Ex Th	ow 0. mb nen ate the am ere am	s th Sla er, an the r is rov ple are	ne r ve/ the "x' ch: ch: ch: ch: ch: ch: ch: ch: ch: ch:	num lag n th is uml ang f nu "3 x w "3 x w	nbe wa nat use ber jed imb 4 5 vate 4 x	r of ater wa ed i accers accers ar h	f wa he ter nste flas corc s. eate	ater ater hea ead hing ding ers (ers	he rs v ter of g, tl to) 1 pre	ate vill is o a n her the 2 " ser 2 "	nt ar	onn lesi er no er, t wa prid nd n	ect gna ot c the ate orit	ed v ated conn en th r hea y ch 3 has 3 has	vith 1, ect at v ate anç s pr	n th 2, ted wa r is ge	ne 3, I, c Iter tir tir	ca , 4 , 7 , 1 , 7 , 7 , 7 , 7	asca , 5, in a eate vidi , the Wat	ade. The master/lead water heater is designated 6, 7, 8, 9, A, B. When a "-" is used instead of a lockout mode and not available for the cascade. er is connected, but in lockout mode. ing heat to the cascade. When the leading water en that water heater's address will be shown first the the test of the cascade be address will be shown for the test of test o
SC	REE	N:	12																	
С	а	s	С		Ρ	ο	w	е	r		9 9	9 9	%	6	9	9)	9	%	% heat demand of total (cascade) power available (%).
D	u	а	I		В	u	r	n	е	r	:			N	0					One heat exchanger equipped with two burners: "Yes" or
80	DEE	INI-	12)														"No".
M	2	v	13	т	h	•	r	m						n		Ir	.			Status of the maximum thermostat: "Open" or "Closed"
G	۵	^ n		B		0	г С	k				-	C	<u>, b</u>	0		:	6	Ь	Status of the general blocking contact: "Open" or "Closed"
	U						Ŭ	IX.				_			0	-	-	0	5	claud of the general blocking contact. Open of Closed .
SC	REE	N:	14										-							
S	i	р	h	0	n		р	r	е	s	s		C		0	S	5	е	d	Status of the siphon pressure switch: "Open" or "Closed".
Ν	R	۷		С	0	n	t	а	С	t			C) p	е	r	า			Status of the non-return valve contact: "Open" or "Closed".
	* R	EM	AR	Ka	at s	cre	en	14:	No	NF	۲V u	sed	in	this	typ	be (of	wa	ater	heater.

10.5 Service function

The following graphs describe how to use the service function.

N	Α	Т	R	Н	Т	R	:	S	Т	Α	Ν	D	-	В	Υ							
>	>	>	:	1	2	3		4	0	С	(1	2	3		4	۰	С)			
																				-		
Pre	ess	[SE	ER۱	/ICI	E] a	and	ho	ld f	for :	3 se	eco	nds										
The	e bi	urn	er v	vill :	sta	rt a	nd	shc	ow 1	the	dis	play	y be	elov	N.							
																				-		
Ͻр	era	tinę	g so	ree	en:																	
N	Α	Т	R	Η	Т	R	:	S	е	r	V	i	С	е			2	6	%			
>	>	>		7	5	-	0	0	С		(6	0	-	0	0	С)			
W	AT	RH	TR'	': It	is a	an a	app	liar	nce	for	DH	IW.					_					
Se	ervi	ce"	: It i	is o	pei	ratir	ng i	n s	erv	vice	mc	de.										
26	%"	: TI	he b	burr	ner	is f	irin	g a	t 26	5%.												
75	,0°	C":	Ma	ax. a	allo	wa	hle	wa	tor													
		-			20	ww		110	uer	ten	np.	dur	ring	se	rvio	ce.						
60	,0°	C":	Ac	tua	l m	eas	sure	ed v	vat	ten er te	np. emj	dur ɔ. (\	ing whe	se en F	ervio P5E	ce. 3J a	acti	ve)				
60	,0°	C":	Ac	tua	l m	eas	sure	ed v	vat	ten er te	np. em	dur ɔ. (\	ring whe) se en l	P5E	ce. 3J a	acti	ve)	•			
60	,0°	Ċ":	Ac Pre	tua ess	l m [SI	eas	ure /IC	ed v	to e	er ten er ten	np. em Th	dur o. (\ e u	ring whe	se en f will	P5E go	ce. 3J a	acti the	ve) e op	era	ating	SCI	eei
60	0,0°	C":	Ac Pre Pre	tua ess ess	l m [SI 3 s	eas ER\ 6. [C	sure /IC /N/	ed v E] OF	to e	ten er te exit. to e	np. em Th xit.	dur o. (\ e u Th	ring whe nit e u	i se en F will nit	ervia P5E go will	ce. 3J a to be	acti the sw	ve) e op /itcł	oera	ating off.	SCI	eei
60	,0°	Ċ": →	Ac Pre Pre	tua ess ess	I m [SI 3 s	eas ER\ 6. [C	JIC Sure /IC DN/	E]	to e F] t	ten er te exit. to e	np. em Th xit.	dur o. (v e u Th	ring whe nit e u	se en f will nit	ervia P5E go will	ce. 3J a to be	acti the sw	ve) e op /itch	bera ned	ating off.	sci	.661
60	0,0°	C": →	Ac Pre Pre By	ess ess usi	I m [SI 3 s ng ed	eas ER\ 5. [C the	JIC JIC JN/	E] OF	to e F] t	ten er te exit. to e	np. em Th xit. utto	dur o. (v e u The ons	ring whe nit e u the	vill nit	ervia P5E go will	ce. 3Ja to be	the sw	ve) e op /itch g ra	ned ite%	ating off. 6 ca	sci n b	eei
60	0,0°	<u>C":</u> →	Ac Pre Pre By cha	tual ess ess usi ang	I m [SI 3 s ng ed.	eas ER\ 5. [C the	JIC JIC JN/	E] OF	to e F] t	ten er te exit. to e	np. em Th xit. utto	dur o. (v e u Th	nit the	vill	ervia P5E go will	ce. 3J a to be er fi	the sw	ve) e op /itch g ra	ned ite%	ating off. 6 ca	sci n b	eei e
60	0,0°	C": →	Ac Pre Pre By cha	tual ess ess usi ang	I m [SI 3 s ng ed.	eas ER\ 5. [C the EN	U] 1	E] OF	to e F] t	er ten exit. to e 7] b	np. em Th xit. utto	dur o. (v e u The ons	nit e u the	will nit bu	ervic P5E go will urne	ce. 3J a to be	the sw	ve) e op /itch g ra	ned ite%	ating off. ca	sci n b	eei
60	0,0°	<u>⊂</u> ": →	Ac Pre Pre By cha	ess ess usi ang ess ess	I m [SI 3 s ed. [M	ERV ERV 5. [C the EN		E] OF	to e F] t acce	er ten exit. to e 7] b ess rn t	np. em Th xit. utto	dur o. (v e u The ons	ing whe nit e u the ain erv	will nit bu	ervic P5E go will urne	to be be be	the sw	ve) e op /itch g ra	ned ite%	ating off.	n b	-eei e
60	,0°	→ 	Ac Pre Pre By cha Pre Pre	tua ess usi ang ess ess	I m [SI 3 s ed. [M	ER ER 5. [C the EN EN	UIC Sure /IC DN/ := [▲ U] 1	E] OF () 8	to e F] t acce	rn ten er ten exit. to e	np. em Th xit. uttc the o th	dur p. (v e u The ons	ing whe nit e u the ain erv	i se en f will nit e bu me vice	ervid P5E go will urne enu	ce. 3J a to be be r fi	the sw	ve) e op vitch g ra	ned te%	ating off.	n b	-eei
60	,0°	<u> </u>	Ac Pre Pre By cha Pre Pre	tua ess ess usi ang ess ess ess	Im [SI 3 s ed. [M [M	ERV S. [C the EN EN	U] 1 U] 1	E] OF () 8 () 8 () 8	wat to € F] t acce etu	ten er ten exit. to e '] b esss rn te	np. emp Th xit. utto the o th	dur o. (v e u The ons ma ae s	ing whe nit e u the ain erv	i se en f will nit e bu me rice	ervic P5E go will urne enu.	se. 3J a to be be er fi	the sw rine	ve) e op vitch g ra	ned te%	ating off. 6 ca	n b	eel
<u>60</u>	,0°	<u>C":</u> → →	Ac Pre Pre By cha Pre Pre Us Pre	tual ess ess usi ang ess ess ess e [•	I m [SI 3 s ed. [M [M	eas ER\ 3. [C the EN EN & [I EN	UI 1 UI 1 UI 1 UI 1 UI 1	E] OF () () () () () () () () () () () () ()	to etu F] t	rn to s to s to o th	Th xit. utto the o th	dur o. (v e u The ons ma e s pons pons pons	ing whe nit e u the ain erv se t	y se en f will nit bu me vice	ervic P5E go will urne enu. me ugł	ce. 3J a to be be r fi enu	the sw ring	ve) op vitch g ra	ned te%	ating off. % ca	n b	eei
60	,0°	<u>C":</u> →	Ac Pre Pre By cha Pre Pre Us Pre	usi ang ess ess ess ess ess	I m [SI 3 s ed. [M [M [M	ER\ ER\ the EN EN EN	Ul 1 Ul 1 Ul 1 Ul 1 Ul 1	E] OF 0F	to e F] t acce etu	rn to s to s to o th	np. emi Th exit. utto the o th o bro	dur b. (v e u The ons ma e s per	ing whe nit e u the ain erv se t	i se en f will nit bu me vice hro on r	ervid P5E go will urne enu. enu. me me	ce. 3J a to be be r fi	the sw ring	ve) e op vitch g ra	ned ite%	l off.	n bo	eer
60	,0°	<u>C":</u> → → →	Ac Pre Pre By cha Pre Pre Us Pre	e [1	[SI 3 s ng ed. [M [M	eas ER\ 5. [C the EN EN EN EN	UI 1 UI 1 UI 1 UI 1 UI 1 UI 1 UI 1 UI 1	E] OF .] 8 .] 8 	to e F] t F] t acce etu	rn ten er ten exit. to e sto o th exit	np. mp. Th xit. utto the o th o bro e o	dur b. (v e u The ons e ma be so per se	nit e u the ain erv	y se en F will nit v e bu me rice hro on r	ervic P5E go will urne enu. enu. enu. enu. enu. enu. enu. en	ce. 3J a to be be r fi enu n th nu le	acti the sw ring	ve) e op vitch g ra	ned ite%	dating off. % ca	n b	e e s.

10.6 Schornsteinfeger function

The following graphs describe how to use the Schornsteinfeger function. NOTICE: This function is required for Germany and can be activated by parameter (P5 BK). The standard factory setting for this function is "OFF".

> The purpose of this function is to have an easy interface for the "Schornsteinfegers" in Germany, to be able to do their required testing on the water heater. This is a simplified function similar to the normal service function of the water heater.



P o When he he n this F I P o	w the ate sta u	e bu r wi ite t	r ttor ill fi	n is	:		Μ	i	n	i	m		m					
When he he n this F I P o	the ate sta u	bu rwi tet	ttor II fi	n is						-		u						
he he n this F I P o	ate sta	r wi ite t	ill fi	115	nra	~~~		orio	flyy	0.00	in:							
n this F I P 0	sta u	te t	ho	re a	pre t 5(55E)%	firii	na i	rate	aya								
F I P o	u	e		disp	olay	/ sh	ows	S:										
Po		•		s	е	r	v	i	С	е		m	ο	d	е			
	W	е	r		:		5	0	%									
0	W	е	r		:		M	а	X	I	m	u	m					
Nhen	the	bu	ttor	n is	pre	sse	ed b	rief	ly a	gair	า:							
he he	ate	r wi	ill re	etur	n to	the fir	e no noti	orm	al o	pera	atio	n m	ode	•				
		UIII	SIEI	me	yei	Tu	ncu	UII	5 51	VIIC	neu	011.						
NOTE	:5:																	
When	the	he	ate	r is	bur	nin	g di	urin "⊏"	g S	cho	rnst	teint	fege	er fu	inct	ion	itta	~
when s pros	ssec	d fo	r 12	iy II 2 m	ne : inut	es.	the	FIU Wa	ie s ater	hea	ater	will	reti	and Jrn	a no aut	oma	ati-	1
3 0153					200	rati	on	mod	de.	The	"So	hor	nst	ainf	ene	er" f	una	
cally to	o th	e n	orm	nar	she		• · · ·						1100	0.111	- gu			;-

10.7 Programming in standby mode

Standby

Use the standby mode for modifying water heater settings without interaction with the water heater control. Changes are effectuated by leaving standby mode.

Properties of standby mode:

- Keys are active and the menu is accessible.
- Burner does NOT respond to an external heat demand.
- All control functions are ON: pumps, fans and cascade are operational, recirculation and frost protection are active.

How to programme the water heater:

- Disconnect or shut down the DHW thermostat and/or other external controllers from the water heater. The pump and fan will stop after a short time.
- Switch the water heater in standby mode by pressing [ON/OFF] for three seconds.
- The next display screen should appear:

Display message	W	Α	Т	R	Н	Т	R	:	b	0	i	Ι	е	r		0	f	f		
	۷	>	>	:	1	2	3		4	0	С	(1	2	3	•	4	0	С)

- Programme the water heater at the control panel (see the following sections).
- Reactivate the water heater by pressing [ON/OFF] for three seconds again.

10.8 Setting the time & date

The following graphs describe how to programme the time and date of the unit.

VV	Α	Т	R	Η	Н	R	:	b	ο	i	—	е	r		0	f	f		
>	>	٨		1	2	3	-	4	0	С	(1	2	3		4	0	С)
Pre	ess	[M	EN	J]															
Ма	in r	ner	าน ร	scre	en:														
Μ	а	i	n		Μ	е	n	u											
С	Т	0	С	k															
Th	e di	spl	av	sho	ws	"CI	00	:K"	pre	SS	IEN	JTF	R1						
-		-				02	.00		pre	.00									
Se	tting	g T	ime	an	d D	ate:		,			4			•	•	_	•	•	
S	e	t	•	t		m 2	e	1	a	а	t T	е		0	8	:	3	3	
2																			
3	U	1	U	3	1	Z	U		U			u	e						
3 Th Us Us	e da e [⊿ e [∙	ay i ▲] (▲] (s n & [& [ow ▼]t ▶]t	blin o cł o se	∠ king nang elec	g/se ge t t ar	elec the noth	tec val	l an ue. val	nd c ue.	an	be	cha	ango	ed.			
3 The Us Us Pre are	e da e [4 e [4 ess e do	ay i ▲] (▲] (■] (Ellone	is n & [& []	ow ▼]t ▶]t	blin o cł o se for	∠ king elec the	g/se ge t t ar cor	elec the noth	tec val	l an ue. val ion	ue.	an reei	be n af	cha iter	ango all	ed. cha	nge	es	
3 Th Us Us Pre are	e da e [4 e [4 ess e do	ay i ▲] à ◀] à [El one ma	s n & [& [NTE	ow ♥] t ▶] t ₽R]	blin o ch o se for ree	king hang elec the	g/se ge t t ar cor	elec the noth	tec val	l an ue. val ion	ue.	an reei	be n af	cha iter	ange	ed. cha	nge	es	
3 Th Us Us Pre are Co	e da e [4 e [4 ess e do nfir r	ay i ▲] a 【EI ma e	s n & [& [NTE	ow ▼]t ▶]t R]	blin o ch o se for ree	∠ king elec the n: u	g/se ge t t ar	elec the noth	tec val ner mat	l an ue. val ion	ue.	an	be n af	cha	ango all	ed. cha	nge	es	
3 The Us Us Pre are Co A <	e da e [⊿ e [⁴ e [⁴ e sss e do nfir r C	ay i ▲] ▲] [El ma e a	0 s n & [↓ & [↓ NTE	3 ow ▼]t >]t R] SC y C	blin o ch o se for ree o e	king hang elec the n: u I	g/se ge t t ar cor	elect the noth	val val ner mat	l an ue. val ion r	ue. sci	an reei n	be n at	cha iter	ango all	ed. cha m	nge	es	
3 Thi Us Us Pre are Co A < Pre opt	e da e [1 e [1 e [1 e c] e do nfir r C ess erat	ay i ay i ay i [El ma e a [◀ [◀	0 is n & [\ & [\ NTE tior n] to I sc	ow [] t] t] t] t [] t] t [] t] t [] t [blin o ch o se for ree o e nce n).	king hang elec the n: u I the	g/se ge t t ar cor ;	electric the noth	u val ner mat	l an ue. val ion r C	e o ade	an reei n (di	be n at f	cha iter	all r goe	ed. cha m s ba	nge	es	

10.9 Set points

The following graphs describe how to program the hot water set points.



NOTICE:

The max. actual DHW temperature will never exceed the value set at Heating Setpoint Regardless the set DHW setpoint If higher DHW setpoints are needed the Heating Setpoint has to be set higher also.

10.10 Setting the timer programs

Two different programs can be set with the water heater, these are:

- DHW program
 - Anti-Legionnaires' disease (pasteurisation) program

START PROGRAMMING

Three programmed periods each day can be set (period 1, 2 and 3). During this period the unit will use the normal DHW set point. Outside the programmed period(s) the unit will use the reduced temperature as set point. When no time is programmed for a period, it will not be used.

(Example no time programmed in period 3 on Monday > "Mon 3 --:-- ---:--").



10.11 HOT WATER PROGRAM



10.12 ANTI LEGIONNAIRES' DISEASE PROGRAM

See the following description. The standard factory setting for this function is "OFF".



10.13 Checking the operating history

The following graphs describe how to check the operating history of the water heater.

	Α	Т	R	Η	Τ	R	:	b	0	i	1	е	r		0	f	f	_	
>	>	>		1	2	3	-	4	0	С	(1	2	3	-	4	0	С)
Pre	ss	[ME	ΞΝΙ	J]															
Sel	ect	"0	per	ate	" us	ing	[◄	1] &	. [►] ar	nd p	res	s [l	ΞN	TEF	र।			
Ma	in r	nor		oro	on.		-			-			-						
M	a	i	n		M	е	n	u											
0	р	e	r	а	t	e		-											
Pre	224	[]	1 &	[▶]	to	hro	ws	e th	noi	Iah	the	5 5	cre	eng					
Pre	ess	[ME		J] 0	r [E	NT	ER	1 to	ex	it. T	he	unit	t wi	ll re	y. etur	n to	o th	еo	p-
era	ting	j sc	ree	en.	•			-											
SC	RE	EN	: 1																
0	р	е	r	а	t	i	n	g		h	i	S	t	0	r	у			
Ρ	0	W	е	r	0	n			h	r	S			1	3	1	4	0	0
Top	o lir	ie:	Sho)WS	the	e op	era	atin	g h	isto	ry m	nen	u is	ac	tiva	ateo	<u>.</u>		
Bot	ton	n lir) אר ה	l ot	al h	our d a	s th	ne ۱	wat	er h	eat	er is	s co	onn	ect	ed	to p	DOM	/er
sup	ріу	an	uS	witt	une(u 01	1.												
SC	RE	EN	: 2						-		_					1			
h	r	S	C	h		-	T	0	t				1	0	0	0	0	0	0
h	r	S	D	h	W		<u> </u>	0	t				1	0	0	0	0	0	0
I OP	o IIr		lot	ai b	ol h	ing	no	urs	TOI	for	ating	g. nor	tio	hot		ator			
DU	lon	1 111	ie.	100		um	ing	no	uis	101	uui	nes	SUC	1101	. wa	alei	•		
<u>SC</u>	RE	EN	: 3						_		0(•	•		•	•	•
n հ	r	S		n հ				<	5	0	%		1	0	0	0	0	0	0
	r Dir	S		n nin	a ha			> r.b.	D	U	70 whil	o th		U	U		U	U ripc	U
les	s th	an	50°	7. %.	y n	Jui	5 10	// 11	cai	ing	vviili	εu		Jun		wa	5 11	mię	1
Bot	ton	n lir	ne:	Bur	ning	g ho	our	s fo	or h	eati	ng ۱	whil	e t	ne l	our	ner	wa	ıs fi	r-
ing	eq	ual	or	higł	her	tha	n 5	0%											
SC	RE	EN	: 4																
	r	S	D	h	w		<	5	0	%		:	1	0	0	0	0	0	0
n	r	S	D	h	14/	=	>	5	0	0/			1	0	0	0	0	0	0
n h	•	_			vv	_		5	•	/0				•	_			_	_
h h Top	o lir	ie:	Bur	nin	g ho	ours	s fo	or h	ot v	vate	er wl	hile	the	e bi	urne	er v	vas	firi	ng
h Top les:	o lir s th	ie: an	Bur 509	nin %.	g ho	our:	s fo	or h	ot v	vate	er wl	hile	the	e bi	urne	ər v	vas	firi	ng
h Top less Bot	o lir s th	ne: an n lir	Bur 509 ne:	nin %. Bur	g ho ning	g he	s fo	s fc	ot v	vate ot w	er wl	hile r w	the hile	e bu	urne e bi	er v urn	vas er v	firi vas	ng
n Top less Bot firir	o lir s th tton	ne: an n lir equa	Bur 50° ne: al o	nin %. Bur r hi	g ho ning ghe	g ho er th	s fo	or hor s fc	ot v or h %.	vate	er wl	hile r w	the	e bu	urne e bi	er v urn	vas er v	firi vas	ng
n h Top less Bot firir	o lir s th tton ng e RE	ne: an n lir equa	Bur 50% ne: al o : 5	nin %. Bur r hi	g ho ning ghe	ours g ho er th	s fo	or hor hor s fc	ot v or h %.	vate ot w	er wi	nile	the	e bu	urne e bi	er v urn	vas er v	firi vas	ng
n Top less Bot firir SC T	o lir s th tton ng e RE	ne: an n lir equa EN a	Bur 50° ne: al c : 5	nin %. Bur r hi 0	g ho ning ghe 0	g ho er th	s fo	or h s fc 50	ot v or h %.	vate ot w	er wl vate a	r w	the	e the	arne e bi	er v urn 0	vas er v	firi vas 0	ng 0
n Top less Bot firir SC T S	b lin s th tton ng e RE i s	ne: an n lir equa EN a I	Bur 50° ne: al c 5 1	nin %. Bur or hi 0 0	g ho ning ghe 0 0	ours g ho er th 0 0	s fo our nan 0 0	or h s fc 50	ot v or h %.	ot w	er wl vate a t	r w	the	= bi the 1	urne e bu 0 0	er v urn 0 0	vas er v	firi vas 0 0	ng 0 6
n h Top less Bot firir SC T S Top Att	b lir s th tton ng e RE i s	ne: an lir equa EN a le:	Bur 50% ne: al c : 5 1 Sho	nin %. Bur r hi 0 0 0 0 0 0	g ho ning ghe 0 To	g ho er th 0 0 tal	s fc our nan 0 Ign	or hor hor hor hor hor hor hor hor hor h	ot v or h %. F S	ot w	er wi vate a t	r w	the hile	2 bi the 1 8 F	e bu o aile	er v urn 0 ed l	vas er v gni	firi vas 0 0 tior	ng 0 6

10.14 Checking the fault history

The following graphs describe how to check the fault history of the water heater.



10.15 Setting the maintenance specifications

MAINTENANCE SETTINGS

The unit can be programmed in such a way that an automatic maintenance message is displayed. There are three options that can be selected. A maintenance message appears after:

* A programmed date is reached.

* An amount of burning hours is reached.

* An amount of ignition cycles is reached.

A single option can be activated or all three options.







BE AWARE: This function is standard turned OFF. We offer this programmable function to the installer to use as a reminder. Because it concerns a free programmable function the use of it cannot be used as an argument in warranty cases.

Our units must be maintained every twelve months whatever the settings/working of this function.

It is and remains the responsibly of the end user to have the unit maintained every twelve months.

10.16 Setting the user lock

The following graphs describe how to activate the user lock of the display. The standard factory setting for this function is "OFF".

0 = UI 1 = LC			(E[)	5	ater	ne	alt		an	De	IUCr	veu	101	(61	iu-,	Jusi	c13.	
When MENU will sh	the J by Iow	e wa / pr up.	atei ess	r he sing	eate g the	er is e m	un eni	lloc u bi	kec utto	d, th on a	ne u Ind	iser all :	r ca scre	n e een	nte Is	er th	ne	
When [MEN] to acc	the U] b ess	e wa outte s all	atei on me	r he tog enu	eate eth i sc	er is er v ree	loc with ns.	cke h the	d, t e ['	he ▼]k	use outt	r ha on '	as t for	op 5s	usł	ר th	e:	
This fu	unc CE:	tion Th	n is e F	to PAR	prev RAN	ven 1ET	t ao ER	ccio l sc	len ree	tal (en a	cha Iwa	nge lys	es! acc	es	sibl	e.		
Opera H E > >	ating A >	g so T :	ree I 1	en: N 2	G 3	:	b 4	0 °	i C	 (е 1	r 2	3	0	f 4	f °	C)
Press	[M	EN	U]															
Select	t "U	ser	loc	ck"	usiı	ng	[◀]	&	[▶]	an	d p	res	s [E	NT	ΈF	R]		
User I	ock	sc	ree	n:	-			-		r	r						,	
S e	t	0	U	S	е	r		0	C	k	=	0						
						n/se		rter	1 21	nd c	can	be	cha	ang	ed.			
The "(Use [2 0 = Us 1 = Us Press has be)" is ser ser [El een	s no & [loci loci loci NTE ma	wl V]1 kfu kfu R] ade	olin to c inct inct for	king tion tion	of OF OP OP	the FF N	e va	alue	n so	cree	en a	afte	r th	e s	ele	ctio	n
The "(Use [0 = Us 1 = Us Press has be Confir)" is ser ser [El een	s no & [loci loci NTE ma	w I k fu k fu R] ade	olin to c inct inct for to te	king tion tion tion		the FF N	rma		n so	cree	en a	afte	r th	e s	ele	ctio	n
The "(Use [<i>I</i> 0 = Us 1 = Us Press has be Confir)" is ser ser [E1 een ma	s no & [loci loci NTE ma	w I V] 1 k fu k fu R] ade so V	olin to c inct inct for to ree	tion tion tion tion		the FF onfin	rma	atio	n so	cree	en a	afte	r th	e s	ele	ctio	n
The "(Use [, 0 = Us 1 = Us Press has be Confir A r < Press displa Press blinkir operation)" is ser ser [Ef een c [◀ c [◀ c [◀ c	s no & [\ locl locl locl NTE ma tion a] to eturn] to eturn] to or a y sc	w I [] 1 k fu k fu k fu c R] ade n s c n c a fe ree	olin to c incl incl for for c c c c c c c c c c c c c c c c c c c	king tion tion tion tion the en: u e el th he secc	OF OF OF OF COF OF OF OF OF OF OF OF OF OF OF OF OF O	sector the F S nfin s that char s. f	rma nge ing Afte	r s (i es. (i es. r th	e the reei Tho iis, 1	cree C uni n). e ch the	en a o t wi dis	n n geo	r th f d va	e s i t ar	ele r nd t ms	ctio m he ill be to tl	n e ne

10.17 Setting the parameters at the control panel

The functions of the controller are embedded in de electronics by means of parameters. The values and settings hereof can be programmed by a skilled and trained service engineer with the help of a computer (laptop), the correct software and an interface cable. A selection of these parameters can be programmed at the control panel of the unit itself, without the use of a computer.

The following table gives a list of these last-mentioned parameters. NOTICE: Only the password for level 1 is issued in this manual. "More advanced" parameters need to be programmed by a skilled and trained service engineer with access to level 2.

				When 'Modify = no', the parameter can only be pro-	gramme	d at	t le	vel	2							PASSWORD:
					-											1342
ME	NU		METER	DESCRIPTION	UNITS			Т	EX.	T D	ISP	۲LA	Y			Modify
		1	P5BE	Step modulation (1=on 0=off)	-	S	t	е	р		m	0	d	u	T	no
1		2	P5AO	Blocking offset flow temperature control	°C	Н	Ε		s		0	f	f	1	3	yes
(1)		3	P5AP	Proportional range temperature control	°C	Н	Ε		s		Ρ	r	b	1	3	no
Ž		4	P5AL	Hysteresis CH Flow temperature control	°C	Н	Ε		s	С	D	i	f	1	3	yes
E	Α	5	P2IC	Integration time temperature control	S	Н	Ε		s		I	n	t	1	3	no
Ē		6	P2MI	Blocking offset System CH temperature control	°C	Н	Ε			С	0	f	f		3	yes
1		7	P2MJ	Proportional range System CH temperature control	°C	Η	Ε			С	Ρ	r	b		3	no
		8	P2MK	Integration time CH temperature control	S	Η	Ε			С	I	n	t		3	no
		9	P5AB	Timer Contact (1=on)	-	Т	i	m	е	r	С	0	n	t		yes
		1	P4AB	DHW Pump Config 0=Pump 1=TWV	-	D	Η	i	р	m	р	1	t	w	v	yes
		2	P5CB	Flow temperature DHW tank low	°C	D	Η	i	f		0	w		L	0	yes
		3	P5CK	Flow temperature DHW tank hi	°C	D	Η	i	f		0	w		Н	I	yes
		4	P5CL	Low Flow temperature time DHW	min	D	Η	i		L	0	t	i	m	е	yes
		5	P5CD	Legionella temperature	°C	L	е	g	i	0		t	е	m	р	no
		6	P5CI	Legionella hyst DHW tank temperature	°C	L	е	g	i	0		h	у	s	t	no
		7	P5CJ	Legionella hold time (0=off)	min	L	е	g	i	0		h	0	I	d	no
≩	P	8	P2KI	CH interrupt by Legionella (0=yes)(1=no)	-	L	е	g	i	0		i	n	t	r	no
占	Б	9	P2LC	Regulation temperature offset DHWd	°C	D	Η	d	s	С	0	f	f	2		yes
		Α	P2MN	Proportional range DHWd modulation	°C	D	Η	d	S	С	Ρ	r	b	2	3	no
		В	P2LD	Regulation temperature hysteresis DHWd	°C	D	Η	d	s	С	D	i	f	2		yes
		С	P2MO	integration time DHWd modulation	S	D	Н	d	s	С	I	n	t	2	3	no
		D	P2ML	Sys temp blocking offset DHW tank	°C	D	Η	d	s	С	0	f	f	3		yes
		Ε	P2MM	Sys temp blocking hysteresis DHW tank	°C	D	Н	d	s	С	D	i	f	3		yes
		F	P5CA	Hysteresis DHW tank temperature	°C	D	Η	i	s	С	D	i	f	4		yes
		G	P2KH	Gradient heat demand detect DHW tank temperature	°C	D	Η	i	d	е	t	g	r	а	d	yes
		1	P2MA	Max number extra water heaters	-	М	а	X	С	а	S	С	U	n	t	no
щ		2	P5DA	Bus address water heater	-	В	u	s		а	d	r	е	S	S	no
AD		3	P5DC	Dhw on entire cascade(0) only master(1)	-	D	Η	i	С	а	S	1	m	а	s	no
l õ	С	4	P5DE	Extra Water heater output enable(1)	-	Ε	x	t	r	а		u	n	i	t	yes
Ne la		5	P5DF	Cascade detection (0=standalone 1=Leader)	-	С	а	s		S	i	1	Μ	а		no
0		6	P5BL	Power off total cascade (1)	-	Ρ	w	r	0	f	f	Т	0	С	а	no
		7	P5DB	Number of water heaters with common flue 0=None	-	С	0	m	F		u	Ν	u	m		no
		1	P5BB	Analogue input Config (0=off 1=temp)	-	Α	n		I	n	р		С	0	n	yes
		2	P5AI	Minimum Temperature 0-10V input	°C	0	-	1	0	Μ	i	n	Τ	m	р	yes
.		3	P5BI	Altitude (in amounts of 100 ft.)	ft*100	Α	I	t		*	1	0	0	f	t	yes
AL		4	P2LK	Max cooling time	min	Μ	а	X	С	0	0	Ι	Τ	i	m	yes
l R	П	5	P5BJ	Temperature display 1=on	-	Τ	е	m	р	0	n	D	i	s	р	yes
I Z		6	P4AA	DHW 0=off 1=Indirect 2=Direct	-	D	Η	W		1	=	i	2	=	d	no
B		7	P4AD	pressure 0=off 1=sensor and 2=switch	-	С	0	n	f	i	g					no
-		8	P4BD	Gas type values 0-2	-	g	а	s	t	у	р	е				no
		9	P4BE	Soft start type values 0-2	-	С	0	n	f	i	g					no
		Α	P5BN	Pump modes 0-4	-	С	0	n	f	i	g					no

For extensive explanation see Ch. 11: 'Controlling options and settings', page 80 ff.

IMPORTANT: Do not change the parameters P2LC, P2LD, P2ML, P2MM and P5BI; they are present in the controller for different purposes than DHW control. Changing these parameters may affect water heater operation negatively.

Parameter screens + concise explanation see next pages \rightarrow

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The screen texts on these pages are standard part of the software and apply to CH systems (boilers) and/or DHW devices (water heaters).

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The screen texts on these pages are standard part of the software and apply to CH systems (boilers) and/or DHW devices (water heaters).
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10.18 Fault codes display

The following graphs describe the lock out codes of the boiler. A lock out code can only be removed by a manual resetting of the boiler.

NOTICE: Before resetting the water heater always check water heater, central heating system and all components corresponding to the related lock out description. Never just reset the water heater, before analysing the possible cause of failure.

10.18.1 LOCK-OUT CODES

Having a lockout means that the water heater needs a manual reset to start operating again. When the water heater is in lockout the backlight of the display is blinking on and off.

Explanation > 9 9	9	,	5	:	h	r	s	=	time	e ela	aps	ed a	afte	r fau	ult &	, me	essa	age.		
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Display message	F	а	i	Τ	е	d		b	u	r	n	е	r		S	t	а	r	t	
F8	р	u	m	р		0	n					9	9	9	,	5		h	r	S
Reason Water heater	is r	not s	start	ting	afte	er th	e p	rog	ram	me	d st	artir	ng a	itter	npts	S.				
Display message	F	а	Ι	S	е		f	Ι	а	m	е		S	i	g	n	а	I		
F10	р	u	m	р		0	n					9	9	9	,	5		h	r	S
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F11	р	u	m	р		ο	n					9	9	9	,	5		h	r	S
Reason The controlle	r dc	es	not	dete	ect	a co	rre	ct fa	ın s	pee	d.									
Display message	F	Ι	а	m	е		I	0	S	t										
F9	р	u	m	р		0	n					9	9	9	,	5		h	r	s
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ReasonFlame detectDisplay messageF1ReasonDisplay messageF16	ed (F ature F	duri I u e ex	ng r o m ccee o m	w p eds w	nal the R	ope h limi e o	i n t wh t	on, g nich u	but h has	was s be	T en	e 9 set d 9	hile m 9 in th t 9	run 9 ne p 9	ninų , para f	g. 5 met a 5	ers u	h I h	r t r	S S
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ReasonFlame detectDisplay messageF1ReasonFlow temperationDisplay messageF16ReasonTemperatur or 'dT blockDisplay message	F P ature F e di	duri u e ex l u ffer delt	ng r o m ccee o m ence a di	w p eds p e be rect	the R blo	h o limi e o een ck'	i n t wh t flow has	nich	has has d re curr	was s be n eturr ed t	s los T en n ex hre	e 9 set d 9 ccee e tir	hile m 9 in th 9 eds nes e	run 9 9 1 9 1 1 1 1 1 1	ning , para f , tatic	g. 5 met 5 0n v	ers u alue	h 	r t r	s s
ReasonFlame detectDisplay messageF1ReasonFlow temperationDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0	F P ature F e di or F	duri u e ex l u ffer delt	ng r m m ccee o m encu a di o m	w p eds w p e be rect w	the R blc	ope h o limi e o een ck' s o	i n t wh t flow has e n	nich u v an occ n	h has r d re curr	was s be n eturn ed t	s los T en n ex hre r	e 9 set d 9 ccee e tir	hile m 9 in th 9 eds mes e 9	run 9 9 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ninq , ara f , tatic r	g. 5 met 5 0n v	ers u alue	h l h e,	r t r	s s
ReasonFlame detectDisplay messageF1ReasonFlow temperaDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0ReasonFlow sensor	F P ature F P e di or F P not	l u e ex l u delt u dete	ng r m ccee o m ence a di o m ecte	w p eds w p e be rect w p ed by	the R blo	h o limi e o e en ck' s o e w	i n t wh flow has e n ater	y an	has has d re curr s ater	was s be n ed t o	s los T en n ex hre r	e 9 set 9 ccee e tir 9 d by	hile m 9 in th 9 eds mes eds mes 9 / fau	run 9 9 9 limi 9 ulty	ninq , para f , tatic r , con	g. 5 met 5 on v 0 5 nec	ers u alue	h - - - - - - - - - - - - - - - - - - -	r t r nso	s s s
ReasonFlame detectDisplay messageF1ReasonFlow temperationDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0ReasonFlow sensorDisplay messageF0ReasonFlow sensorDisplay message	F P ature F P e di F P not	duri u e e> 1 u delt dett	ng r m ccee o m ence a di o m ecte	w p eds w p e be rect w p e d by e	the R blo	h o limi e o een ck' s o e w	i n t wh t flow has e n ater e	g nich v an occ n • he	but h has r d re curr s ater	was s be n ed t o cat	s los T en en hre r	e 9 set d 9 ccee e tir 9 d by	hile m 9 in th 9 eds mes eds 9 7 fau	run 9 9 Iimir r 9 ulty r	ninų , para f , tatic r , con	g. 5 met 5 5 0 n v 5 nec 0	ers u alue r	h I h 9,	r t r	s s r.
ReasonFlame detectDisplay messageF1ReasonFlow temperaDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0ReasonFlow sensorDisplay messageF0ReasonFlow sensorDisplay messageF6	ed o F p aturo F e di or F F p not F	duri I U e e> I U deft deft I U dett	ng r o m ccee o m encc a di o m ecte u m	w p eds w p e be rect w p ed by e p	the R blc	h o limi e o e e w s o e w	i n t wh t flow has e n ater e n	g hich u v an occ n he n	but h has r d recurr s ater s	was s be n ed t o cat	s los T en en hre r use	e 9 set d 9 ccee e tir 9 d by 9	hile m 9 in th 9 eds mes eds 9 y fau e 9	run 9 9 limir r 9 ulty r 9	r , con r ,	5 met a 5 on v o 5 nec 5	ers u alue tior	h I h e,	r t r nso	S S S r.
ReasonFlame detectDisplay messageF1ReasonFlow temperationDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0ReasonFlow sensorDisplay messageF0ReasonFlow sensorDisplay messageF6ReasonFlue gas senation	ed of F pature e di or F P not F P sor	duri u u e ex l u delt l u dete l u not	ng r o m cceee o m encc a di o m ecte u m deto	w p eds w p e be rect w p e d by e e p ecte	the R blo	h o limi e o een ck' s o e w s o aus	ration i n t wh flow has e n ater e n ed l	nich u v an occ n he n by f	but has d recurr s ater s	was s be n ed t o cat	r in example in	e 9 set 9 set 9 ccee e tir 9 d by 9 9 ectio	hile m 9 in th 9 eds eds 9 eds 9 fau 9 fau 9 son/s	run p 9 1 1 1 1 1 1 1 1 1 1 1 1 1	f , tatic r , con r , sor.	g. 5 met 5 on v 5 nec 5	ers u alue r	h I h e,	r t r nso	S S S r.
ReasonFlame detectDisplay messageF1ReasonFlow temperaDisplay messageF16ReasonTemperatur or 'dT blockDisplay messageF0ReasonFlow sensorDisplay messageF0ReasonFlow sensorDisplay messageF6ReasonFlue gas senseDisplay messageF10ReasonFlue gas sense	ed o F P aturo F P e di or F P not F P sor F	duri u u e e> l u delt l u dete l u dete	ng r o m cceee o m encc a di o m eccee u m detc	w p eds w p e be rect w p ed by e e cte	nal the blo	h o limi e o e e n c k' s o e w s o aus	i n t wh t n flow has e n e d l e d	n n n n n n n n n n n n n n n n n	but has has r d re curr s ater s ault	was s be n ed t o cau	s los T en en hre r use r use	e 9 set 9 set 9 ccee e tir 9 d by 9 9 9 9 9	hile m 9 in th 9 eds mes e 9 y fau e 9 y 7 fau e 9 o n/s	run p 9 ne p 9 limiri r 9 ulty r 9 sens	r , con r , con r , con	g. 5 met 5 5 0n v 6 5 5	ers u alue r	h - - - - - - - - - - - - - - - - - - -	r t r nso	s s s r.

Reason Flue gas temperature exceeds the limit more than 3 times within a time frame.

Display message	Р	а	r	а	m	1	н	а	r	d	W		t	а	u	I	t			
F13	р	u	m	р		0	n					9	9	9	,	5		h	r	S
Reason Fault during	orog	gran	nmii	ng c	of th	e w	ater	he	ater	sof	twa	re p	bara	me	ters	•				
Display message	р	r	0	g	r	а	m	m	i	n	g		е	n	d					
F12	р	u	m	р		0	n					9	9	9	,	5		h	r	s
Reason Software par	ame	eter	s ha	ve	bee	n pr	ogr	amı	nec	I .										
Display message	R	е	t	u	r	n		h	-	g	h		Т	е	m	р				
F1	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Reason The maximum	n re	eturr	n tei	mpe	erati	ure	as s	set i	n th	e pa	arar	nete	ers	is e	xce	ede	d.	-		-
Display message	R	е	t	u	r	n		S	е	n	S	0	r		е	r	r	0	r	
F3	-					-						•	~	•		-		_		
	р	u	m	р		0	n					9	9	9	,	5		h	r	S
Reason Return senso	p br no	u ot de	etec	p ted	cau	o Jsec	n d by	fau	ilty o	con	nec	9 tion	9 /ser	9 nsor	,	5		h	r	S
Reason Return senso	p or no S	u ot de i	etec p	p ted h	са. о	o Jsec n	n d by	fau s	ilty o	coni i	nec t	9 tion C	9 /ser h	9 1501	,	5		h	r	S
Reason Return sense Display message F19	p or no S P	u ot de i u	etec p m	p ted h p	са. о	o Jsec n o	n d by n	fau s	ilty o	coni i	nec t	9 tion C 9	9 /ser h 9	9 1501 9	,	5 5		h h	r r	S S
ReasonReturn senseDisplay messageF19ReasonThe pressure	p or no S p • sw	u ot de i u itch	etec p m det	p ted h p	ca. o s a	o usec n o high	n d by n pre	fau s	ulty o w ure i	in th	nec t ne fl	y tion c 9 ue/s	9 /ser h 9 siph	9 nsor 9 on s	, , syst	5 5 em		h h	r r	S S

Display mes	ssage	W	а	t	¢	r		h	·	g	h		-	i	m	i	t			
F17		р	u	m	р		0	n					9	9	9	,	5	h	r	S
Paasan	Movimum the	rm	ooto	t (c	livo	n n	000	Sure		too	hio	uh fl	0.00	hom	nor	otur	~			

Reason Maximum thermostat (clixon) measured a too high flow temperature.

10.18.2 BLOCKING CODES

The following graphs describe the blocking codes of the water heater. A blocking code is a temporary blocking of the water heater, because of an extraordinary situation. The water heater will continue to operate after stabilisation of this situation.

The display is not blinking, but is lightened up during the blocking period.

The water heater is blocking an action because of an extraordinary situation. This action will be continued after elimination of the extraordinary situation.

Display message	Α	n	t	i	С	у	υ	-	е	t	i	m	e					
											9	9	9	,	5	h	r	s

Reason The controller received a new heat demand too quick after the last demand.

Display messa	ge	С	а	s	С	а	d	е		В	I	ο	С	k							
													9	9	9	,	5		h	r	s
Reason	One of the	e ca	isca	Idec	l wa	ater	hea	ters	s ca	use	s ar	n er	ror,	bed	aus	se o	fal	ock	out		

Display message	D	е	а	i	r	а	t	i	0	n									
											9	9	9	,	5		h	r	s
											 -	-	_	-		-			

Reason The heater starts its deairation function and will return to normal operation.

Display message	D	е	I	t	а	D	i	r	е	С	t		b	Ι	ο	С	k		
											9	9	9	,	5		h	r	s

Reason Temperature difference T2-T1 has exceeded the blocking value.

Reason Setp.return (tank) temp. DHW (S3) is higher than Setp. heating = flow temp.

Display mess	age	F	I	0	w		t	е	m	р		h	i	g	h						
													9	9	9	,	5		h	r	s
Reason	The flow t	tem	pera	atur	e ha	as e	xce	ede	d th	e b	locł	king	ten	npe	ratu	re.	-	-	-		

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Display message	F	Т	u	е		t	е	m	р		h	i	g	h						
												9	9	9	,	5		h	r	s
Reason Flue gas t	emp	bera	ture	ha	s ex	cee	ede	d th	e lin	nit.	<u></u>	P		<u>.</u>		<u>.</u>	±	<u>.</u>		
Display message	G	е	n		В	Ι	0	С	k											
												9	9	9	,	5		h	r	s
Reason The gener	al b	lock	king	circ	cuit	is a	ctiva	atec	l du	ring	ор	erat	ion	= C(onta	act 7	7-8			
Display message	L	i	n	е		f	а	u	Ι	t										
												9	9	9	,	5		h	r	s
Reason Wrong ele	age L i n e f a u l t g <thg< th=""> <thg< th=""> <thg< th=""></thg<></thg<></thg<>																			
Display message	R	е	t	u	r	n		t	е	m	р		h	i	g	h				
												9	9	9	,	5		h	r	s
Reason Return ter temperat	ion Wrong electrical power supply is connected (not 50 or 60 Hz, 220-240 Volt). Iay message R e t u r n t e m p h i g h i g h i g h i g h i g h i g h i g h r s son Return temperature has exceeded the blocking temperature, but the return temperature has not exceeded the lock-out value. son a a a b a a b a a b a a b a <td< th=""><th></th></td<>																			
Display message	Т	2	-	Т	1		h	i	g	h										
												9	9	9	,	5		h	r	S
Reason Temperate	ure	diffe	eren	ce -	T2-7	Г1 h	as	exc	eed	ed t	he	bloc	kin	g va	lue	-				
Display message	W	а	t	e	r	р	r	е	S	S	u	r	e		f	а	u	I	t	
												9	9	9	,	5		h	r	S
Reason Water pre	ssui	re is	toc	o lov	v or	too	hig	h.	-											
Display message	W	Α	Т	R	Н	Т	R	:	Т	3		Ε	x	t	е	r	n	а	I	
	>	>	>	:		6	0	-	0	0	С	(-	3	0		7	٥	С)
Reason T3 externa	al ta	ink s	sen	sor	is n	ot c	onn	ecte	ed to	o th	e te	rmi	nals	;	-	-	-			

10.18.3 MAINTENANCE ATTENTION MESSAGES

The following graphs describe the messages at the water heater display. Depending on the selected and activated options for the water heater, it is possible that some messages will show up at the display. For example, a maintenance message after a certain programmed date has been reached. The water heater will operate independently of these messages.

The display shows alternating the base screen and this message, while the backlight is blinking.

The water heater is operating, but will count the exceeding hours.

A parameter must be changed, after service, to remove this message.

Display message	Ν	е	е	d	S		Μ	а	i	n	t	е	n	а	n			0	•	0
	-	g	n	i	t	i	0	n		С	У	С	Ι	е	s		h	r	s	
Reason Maintena	anc	e op	otior	n of	tota	l an	our	nt of	ign	itior	ı су	cles	has	s be	en i	reac	hed	l.		
Display message	Ν	е	е	d	S		Μ	а	i	n	t	е	n	а	n			0	-	0
	D	а	t	е													h	r	S	
Display message N e e d s M a i n t e n a n 0 . 0																				
Display message	Ν	е	е	d	s		Μ	а	i	n	t	е	n	а	n			0		0
	В	u	r	n	i	n	g		h	0	u	r	s				h	r	S	
Reason Maintena	anc	e op	otior	n of	tota	l an	nour	nt of	bu	rning	g ho	ours	has	s be	en r	eac	hed			
Display message	Ν	е	е	d	S		Ν	а	i	n	t	e	n	а	n			0		0
	Α	I	I														h	r	S	

Reason One of the abovementioned maintenance options has been reached.

11 CONTROLLING OPTIONS AND SETTINGS

11.1 General

The following sections describe some general functions of the water heater and their possible use.

11.1.1 MAX COOLING TIME

The fan will cool down the heat exchanger according to the temperature settings (parameters) of the software. With this cooling parameter the maximum run time of the fan can be programmed.

P2LK Max cooling time (display D4)

[min.]

The fan will cool the heat exchanger according to parameter P2 LJ, but the fan will never run for cooling longer than the period programmed with this parameter P2LK. "0" = cooling function off.

For S1 > local set point P6BA – P2LJ \rightarrow fan starts after 1 minute and stops after 3 minutes During post pump circulation, no post ventilation takes place.

11.1.2 **TEMPERATURE DISPLAY ON/OFF**

Selection for showing the measured temperatures in the operation display of the water heater.

P5BJ Temperature display 1=on (display D5)

The measured temperature in the operation display.

- 0 = not visible
- 1 = visible

11.1.3 GAS TYPE SELECTION

Settings for gas types: natural gas, propane or butane/propane mixture (B/P).

P4BD Gas type (0=standard, 1=propane, 2=butane/propane (B/P)) (display D8).

This parameter is set 0 for the common used gas types such as natural gas G20 or G25.3. By setting this parameter 1 for propane, fan speed is reduced. Set this parameter 2 for B/P.

- 0 =standard gas (e.g.: natural gas)
- 1 = propane
- B/P 2 =

By each setting, the relevant Soft start settings are automatically adjusted, depending on its main setting P4BE, see next section § 11.1.4.



In case of gas conversion, paste the corresponding sticker at the appropriate position in the water heater and mark the square for the used gas type. Also mark the square, indicating that the correct value has been set for parameter P4BD.

G31 P	PROPANE PROPAN PROPANO PROPAAN	P4BD = 1
G30/G31 B/P	BUTANE/PROPANE BUTAN/PROPAN BUTANO/PROPANO BUTAAN/PROPAAN	P4BD = 2

(In the example on the right, 'propane' and 'P4BD = 1' have been marked).





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11.1.4 SOFT START OPTION

Start parameters can be modified to achieve better start behaviour, in case of noise or other difficulties. This is done by reducing the fan ramp-up speed. Two reduced settings are available (I and II).

P4BE Soft start (0=normal, 1=reduced fan ramp-up speed (I), 2= reduced fan speed ramp-up (II)) (display D9).

0 = normal start-up

- 1 = reduced fan ramp-up speed (I)
- 2 = reduced fan ramp-up speed (II)

11.1.5 PUMP MODE (EC TECHNOLOGY)

When using a pump with Electronic Commutation technology and start-stop function, with a separate control connection, this parameter determines the relay for switching the pump on and off.

P5BN Pump mode (0=modulating, 1=relay1, 2= relay2, 3= relay3) (display DA).



Do not use the 230 Vac relay for the main power supply of the pump, but directly connect the pump to an external power supply.

A modulating pump with PWM control: the power supply is directly connected to the mains, the PWM connection is connected to CN10, contacts 9 and 18.

Pumps with an on/off control can be switched by one of the relay connections "lock-out", "burner burning" or "heat demand". Choose a connection which is not yet used.

- 0 = PWM 0-100% modulating pump, connection **CN10**, connector 9 and 18
- 1 = Start-stop through relay **1**, connector 19 and 20 (lock-out)
- 2 = Start-stop through relay **2**, connector 21 and 22 (burner burning)
- 3 = Start-stop through relay **3**, connector 23 and 24 (heat demand)
- 4 = Do not use (reserved for future applications).

11.1.6 TANK SENSOR SENSITIVITY

P2KH Gradient heat demand detection DHW tank temperature (display BG) [0.1°C]

With S3 in use as tank sensor, it is possible to detect a fast cooling down of the tank through a large DHW flow. The sensitivity of this sensor can be set in parameter P2KH in tenths of degrees.

11.2 Water heater options

11.2.1 0-10 VDC REMOTE FLOW TEMPERATURE SET POINT

The hot water temperature is controlled by connecting an external 0-10 VDC signal to the water heater (connections 15-16).

P5BB Analogue input Config (0=off 1=temp) (display D1).

This parameter must be set at "1" so the supplied 0-10 V dc signal will control the temperature set point. Possible settings are:

- 0 = 0-10V control off
- 1 = 0-10V temperature set point control active

See also the following graph for the relation between the temperature and the control signal.



The graph is only for illustration purposes, parameter values in the water heater can deviate.

11.2.2 ANTI-LEGIONNAIRES' DISEASE (PASTEURISATION) FUNCTION

To prevent Legionnaires' disease, the water heater (software) provides a function for heating up the hot water storage tank (once a week or every day) to a higher water temperature than the normal active hot water set point. Also the period, that this "higher" water temperature function must be active, can be programmed in P7BV start time (0:00) and P7BW (8) and is standard switched off.

Also an external 0-10 Vdc signal can be used to activate the pasteurisation function, by making the 0-10 V signal higher than 10,2 V.

NOTICE: The standard factory setting for this Legionnaires' disease (pasteurisation) function is "OFF". To activate this Legionnaires' disease function some parameters must be programmed by the manufacturer/supplier. The starting day and starting time of this Legionnaires' disease function can be programmed at the control panel of the water heater.

Several parameters are used for this function. Three of these parameters are shown in the following graph.



The graph is only for illustration purposes, parameter values in the water heater can deviate.

The settings of these parameters P5CI, P5CJ and P5CD must be programmed according to all applicable anti Legionnaires' disease preventing regulations.

The setting of these parameters can only be done by the manufacturer/supplier of the water heater or by a technician with access to programming level 2, at the control panel of the unit without the use of a computer.

NOTICE: The use and activation of this function won't guarantee a Legionnaires' disease-free installation. The responsibility for a Legionnaires' disease-free installation remains at the end-user/owner.

11.3 Cascade control

Before commissioning a cascade installation, a number of parameters has to be adjusted. These parameters can be programmed on the unit itself, without the use of a computer.



Changes in parameter may only be carried out by a skilled commissioning/service engineer, who has had specific training for setting up the CD⁺ range water heaters. He will be able to check whether the installation operates correctly after the parameter change has been done.

For programming **all parameters** of the water heaters, one needs to have an interface cable for connecting the laptop to the water heater control and a laptop with the appropriate EHS software. Both are available as one service set, part.no. E04.016.586. This software is used for programming but also shows all measured temperatures and cascade behaviour during operation and service/fault history.

11.3.1 PARAMETER SETTINGS FOR CASCADE SET-UPS

Before programming the cascaded water heaters, make sure that all water heaters are connected (wire) with each other. Use connection 17 and 18 of each water heater.

Remind: do not alternate these connections, so always connect 17 to 17 and 18 to 18.

After connection every water heater must be programmed. This can be done at the control panel. Press the [MENU] button and select the [PARAMETER] menu. See graphics below.

Ор	era	ting	g sc	ree	en:														
W	Α	Т	R	Н	Т	R	:	b	ο	i	I	е	r		0	f	f		
۷	٨	٨	•••	1	2	3	•	4	0	С	(1	2	3	•	4	0	С)
•																			
Pre	ess	[MI	ΕNI	J]															
¥																			
Ма	in r	ner	าน ร	scre	en:														
Μ	а	i	n		Μ	е	n	u											
S	е	t	р	0	i	n	t	s											
V	-			-			-								-			-	
Se	lect	: "P	ara	me	ter"	usi	ng	[◀]] &	[▶]	an	d p	res	s [E	ΕΝΤ	Ē	?]		

After this, use the password for installer's level 2.

Pa	aran	net	er n	ner	iu:											
I	n	s	t	а	-	-	е	r		С	0	d	e			
								0	0	0	0					
		•						•	•	•	•					

Enter the 4-digit code with the [◀] & [▶] and the [▲] & [▼] buttons and select [ENTER] The code will blink a few seconds and when entered correctly, the following parameters will be displayed.



Now for every single water heater of the cascade the following two parameters must be selected and programmed according to the above drawing.



When the correct parameter is set, this must be confirmed at the confirmation screen. After activation, the value will blink for a few seconds while the parameter is programmed into the water heater.

is continued p.t.o. \rightarrow

When cascade connection is programmed correctly the water heater display will show the following.

Explanation "Cascade communication indicator" NO CASCADE COMMUNICATION



Always showing the fixed ">>>"

CORRECT CASCADE COMMUNICATION



Showing alternating no.1 & no.2 with 1 second interval.

11.3.2 MONITOR SCREENS

To obtain cascade information, see § 10.4 on page 56.

11.3.3 OUTPUT CONTROL AND WATER HEATER SEQUENCE

The total cascade set-up will act as one single big water heater, switching on- and off water heaters, depending on the total load necessary to adjust and keep the flow temperature at the calculated value. When the heat demand rises, more water heaters are switched on, and when heat demand falls, one or more water heaters will be switched off. The water heater that was switched on last, will be switched off first, see table below.

To distribute operating hours equally over all water heaters, the working sequence of the water heaters will change every two hours.

Hour	Switching ON sequence	Switching OFF sequence
х	Master – Slave 1 – Slave 2 – Slave 3 – Slave 4 – Slave 5 – Slave 6 – Slave 7	Slave 7 – Slave 6 – Slave 5 – Slave 4 – Slave 3 – Slave 2 – Slave 1 – Master
X+2	Slave 7 – Master – Slave 1 – Slave 2 – Slave 3 – Slave 4 – Slave 5 – Slave 6	Slave 6 – Slave 5 – Slave 4 – Slave 3 – Slave 2 – Slave 1 – Master – Slave 7
X+4	Slave 6 – Slave 7 – Master – Slave 1 – Slave 2 – Slave 3 – Slave 4 – Slave 5	Slave 5 – Slave 4 – Slave 3 – Slave 2 – Slave 1 – Master – Slave 7 – Slave 6
X+6	Slave 5 – Slave 6 – Slave 7 – Master – Slave 1 – Slave 2 – Slave 3 – Slave 4	Slave 4 – Slave 3 – Slave 2 – Slave 1 – Master – Slave 7 – Slave 6 – Slave 5

Table: water heater sequence example of an eight water heater cascade.

In this table a total of eight water heaters (one master, seven slaves) is mentioned as an example, in practice the maximum number in a cascade, without extra (external) control, is twelve water heaters.

12 COMMISSIONING THE WATER HEATER

12.1 First: flushing the water heater with water

After installation of the water heater the first step, before commissioning, is to flush the water heater and the whole DHW installation with fresh water to remove pollution, debris and other materials that might cause a blocking. This must also be done with installations, where only the water heater is replaced.

12.2 Second: filling & venting the water heater and the system

After flushing the water heater and the installation the system can be filled with fresh water by opening the water supply valve of the system and opening all the taps that are on the system. The water pressure of the system should be between a minimum of 1 bar and a maximum of 8 bar, also depending on the applied pressure safety valve.

The water heater has an automatic air vent situated at the top panel of the water heater. This vent must be opened during the filling of the water heater and the DHW system to make sure that no air/oxygen is trapped in the heat exchanger of the water heater. NOTICE: Check that the screw cap has been loosened at least one twist.

Make sure that, during flushing and filling, no water can reach any electrical parts of the water heater.

12.3 Third: check the water flow

Before the water heater will be started, be sure that the pump is functioning and that there is a water flow through the heat exchanger. Check the electrical power supply of the water heater. When this is connected correctly, the display will show:

Display mess	age	В	0	i	I	е	r		0	f	f										
Reason	Water button	hea for	ater <u>six</u>	is i se	not con	acti ds.	ve.	То	act	ivat	e th	ne w	vate	r he	eate	er p	ress	s [O	N/C	OFF]

Display messag	е	W	Α	Т	R	Η	Т	R	:	b	0	i	Ι	е	r		0	f	f		
		>	٧	>	:	1	2	3	•	4	0	С	(1	2	3	•	4	0	С)
-							-					-				-		· ·	10		

Reason Water heater is standby. To activate the water heater press [ON/OFF] button for <u>three</u> seconds.

Activate the water heater by pressing the ON/OFF button for six resp. three seconds. After this the following display will appear:

Display message	W	Α	Τ	R	Η	Т	R	:	Ν	0		d	е	m	а	n	d			
	۸	٨	٨	••	1	2	3	-	4	0	С	(1	2	3	•	4	0	С)

Reason Water heater is active, but there is no heat demand.

When there is no water present in the water heater or the water pressure is too low, the water heater will go into lock-out and will show a corresponding message in the display.

Display message	W	а	t	е	r	р	r	е	S	s	u	r	е		f	а	u	Ι	t	
												9	9	9	,	5		h	r	s
Deces Weter				10 10			~ * +	k	i a la											

Reason

Water pressure is too low or too high.

By pressing the [SERVICE] button of the water heater, the water heater can be started without a heating demand. The water heater will start to fire and the pump will start to run. Firing of the water heater without a water flow (but filled with water) will cause the so called "boiling noises". Check during this "service function" operation also the flow and return temperatures of the water heater by pressing the [◀] button once. The temperature difference of the flow and return must be at least 13°C and maximum 25°C. This temperature difference indicates that there is (enough) water flow over the water heater; this water flow prevents the heat exchanger of possible damage caused by a thermal overload.

Flow monitoring

Another safety feature of the water heater, to make sure that there is enough water flow over the water heater, is the monitoring of the flow and return temperatures (T2 and T1). When the temperature difference (delta T) between flow and return exceeds a certain (set) value (load dependent), the following warning messages will be shown in the display.

Display me	essage	Т	2	-	Т	1		h	i	g	h										
													9	9	9	,	5		h	r	s
Reason	Temperatirameters.	ure	diffe	eren	ce T	Г2-Т	1 h	as e	exce	ede	ed th	ne bl	lock	ing	valu	Je, a	as s	et in	the	pa-	•
Display me	essage	d	Т		D	i	r	е	С	t		b	Т	0	С	k					
													9	9	9	,	5		h	r	s

Reason	The temperature difference between flow and return has exceeded the blocking
	value

When this temperature difference exceeds the lock-out setting, the water heater will switch off and the following lock out code will be shown at the display.

Display message	F	I	ο	w	R	е	t	u	r	n	d	Т		f	а	u	Ι	t	
F16	р	u	m	р		0	n				9	9	9	,	5		h	r	s

Reason Temperature difference between flow and return exceeds limitation value, or 'dT Direct block' has occurred three times.

When these messages appear and/or the water heater will lock out, it means that there is not enough flow over the water heater. In this case check the functioning of the pump.

The water heater has a built-in water pressure switch. If water pressure of the system drops under a certain limit, the water heater will go in a lock-out.

During and after the commissioning of the water heater, the operation of the water heater pump must be checked, before leaving the installation room.

NOTICE: Always check the running of the pump before firing the water heater.

13 STARTING THE WATER HEATER

13.1 General

Check the gas pressure available at the gas connection pipe of the water heater. Use the pressure nipple (3) of the gas safety valve for this measurement. The gas pressure for the water heater, to operate properly under the correct load, must be at least 20 mbar.

The graphs below show the position of the pressure nipple (3) for the complete water heater range.



13.2 Firing for the first time

After the commissioning of the water heater and the described previous actions, the water heater display will show the following graph.

Display message	W	Α	Т	R	Н	Т	R	:	Ν	0		d	е	m	а	n	d			
	٨	٧	^		1	2	3		4	0	С	(1	2	3	•	4	0	С)
Reason	W	ate	r he	eate	r is	act	ive	, bı	ut th	nere	e is	no	hea	at de	ema	and				

The display describes:

- The actual operation •
- If a heat demand is activated •
- The temperature setting
- The temperature measured



When mounting the bottom part of the siphon, before commissioning the water heater and/or after maintenance, the siphon must ALWAYS be completely filled with water.

This is a safety measure: the water in the siphon keeps the flue gases from leaking out of the heat exchanger via the condensate drain.



When the water heater receives a heat demand the electronics will start the operation of the water heater. Before the water heater is used, the burner must be adjusted and set at the minimum and maximum load.

14 ADJUSTING AND SETTING THE BURNER



Before carrying out any adjusting of the burner, carefully read this complete chapter.

14.1 Introduction

The burner must <u>always</u> be adjusted in the next situations:

- A. A new water heater is installed
 - As part of a service/maintenance check, in case the CO₂ values turn out to be incorrect.
- B. The gas control safety valve has been (re)placed
 - Another type of gas is applied: gas conversion

Adjustment procedures for situation A are described in § 14.2 And for situation B § 14.3.

In either of the four cases described in **A** and **B**, <u>always</u> check the gas/air ratio of the combustion figure (CO₂) at maximum and minimum input. First set the water heater at max. load and subsequently at min. load, and repeat if necessary.

Set-up of this chapter:

First, all necessary values are given in three tables in § 14.1.1. A drawing of the gas valve(s) and setting screws is given in § 14.1.3. In § 14.1.4. a general scheme, conform which the adjustments must be carried out, is presented in table form. In §§ 14.2 and 14.3, a description is given of how to proceed in cases **A** and **B** respectively. In §14.4, finally, two main procedures used in the previous sections are described in detail.

14.1.1 ADJUSTMENT TABLES

Table 1: CO ₂ values for maximum and minimun	1 load. ²⁾	
---	-----------------------	--

gas type 1)		CO	2 [%]	O ₂ [%]
	water heater type	max load	min load	max load	min load
620, 625.5	CD ⁺ 80-180	9,0 - 9,2	8,5 - 8,7	4,5 - 4,8	5,4 - 5,7

		CO	2 [%]	O ₂ [%]				
	water heater type	max load	min load	max load	min load			
propane G31 ³⁾	CD⁺ 80-120	10,3 - 10,5		4,9 - 5,2				
	CD⁺ 150	10,4 - 10,6	9,1 - 9,3	4,7 - 5,0	6,7 – 7,0			
	CD ⁺ 180	10,5 - 10,7		4,6 - 4,9				

		CO	2 [%]	O ₂ [9	%]		
	water heater type	max load	min load	max load	min load		
B/P ^{3) 4)} G30/G31	CD ⁺ 80-120	10,4 - 10,6		5,1 - 5,4			
	CD ⁺ 150	10,5 - 10,7	9,1 - 9,3	4,9 - 5,2	7,0 – 7,3		
	CD ⁺ 180	10,6 - 10,8		4,8 - 5,1			

1 Cf. EN437.

- 2 All values measured without front door. The CO₂ / O₂ values should always be between the values set in this table. Nominal values can be found in Technical specifications datasheet page.
- 3 Fan settings must be changed by altering parameter P4BD (display D8). (only by a skilled engineer).
- 4 B/P: Propane/butane mixture.



Using propane or butane/propane mixtures (B/P), maximum fan speed needs to be reduced by changing parameter P4BD.

14.1.2 ADJUSTMENT VALUES

To make adjustments easier, values of table 1 are presented in the following figures.

The CO_2 / O_2 values should always be between the values set in this figure. Nominal values can be found in the Technical specifications datasheet at the beginning of this manual. All values are measured without front door.

Gas type G20, G25.3

The CO₂ level may never be in the hatched area.



Propane G31:

Fan settings must be changed by altering parameter P4BD (display D8). (only by a skilled engineer). The CO_2 level may never be in the hatched area.



CD80 - CD120

>>> cont. Propane G31:

The CO₂ level may never be in the hatched area.





CD180

B/P: propane/ butane mixture G30/ G31:

Fan settings must be changed by altering parameter P4BD (display D8). (only by a skilled engineer). The CO_2 level may never be in the hatched area.



Table 2 pre- adjustment settings gas valves

water heater	number o	number of turns open (counter clockwise)											
type	nat. gas G20 / G25.3	propane G31	Butane/Propane B/P G30/G31										
CD+ 80	1,5	0,75	0,5										
CD+ 100	3,5	1,5	1,25										
CD+ 120	2,25 *	1 *	0,75 *										
CD+ 150	2,25 *	1 *	0,75 *										
CD+ 180	4,25 *	2,25 *	2 *										

* Both gas valves must be opened this number of turns.

Table 3

Contact your water heater supplier for the right settings when converting to a not mentioned type of gas

Pressure adjustment settings LEFT valve

water heater	"p-out" pressure at gas valve										
type	nat. gas G20 / G25.3	propane G31	Butane/Propane B/P G30/G31								
CD⁺ 120	-2 to 0 Pa	-4 to -2 Pa	-5 to -3 Pa								
CD⁺ 150	-2 to 0 Pa	-7 to -5 Pa	-8 to -6 Pa								
CD⁺ 180	-2 to 0 Pa	-7 to -5 Pa	-8 to -6 Pa								



Maximum fan speed has to be reduced to convert the water heater into a propane or B/P appliance. Setting of parameter P4BD.

A sticker has to be pasted after converting the water heater into a propane or B/P appliance. Mark the used gas and the parameter setting on this sticker.

G31 P	PROPANE	P480 = 1
0.51T	PROPANO	1400 - 1
	PROPAAN	
	BUTANE/PROPANE	
G30/G31 B/P	BUTAN/PROPAN	P4BD = 2
	BUTANO/PROPANO	
	BUTAAN/PROPAAN	

See § 14.3.

14.1.3 SETTING SCREWS GAS VALVE(S): DRAWINGS



NOTICE: Do NOT mistake the screw marked 'PILOT' for screw 2. \rightarrow Screw 2 is the SMALL screw <u>immediately next to</u> the pilot screw.





14.1.4 ADJUSTMENT ACTIONS: GENERAL SCHEME

General scheme for adjustment of the gas valve(s). Check this scheme for an overview.

To complete all necessary adjustments in right order, follow case **A** <u>or</u> **B** top-down through the scheme (**B** involves a few extra steps (grey text blocks)):



in case of a double valve (CD+120, CD+150 and CD+180)

For an extensive description consult the next two sections (choose which is applicable, A or B):

14.2 Adjusting in case of a new water heater, or after maintenance (case A)

14.2.1 GENERAL REMARK

For all adjusting steps under A the measured CO2 values shall be according table 1 or figures

14.2.2 CHECKING AND ADJUSTING AT MAXIMUM LOAD

Adjust at maximum load by carrying out procedure 1 on p.96

14.2.3 CHECKING AND ADJUSTING AT MINIMUM LOAD

Adjust at minimum load by carrying out procedure 2 on p.96

14.3 Adjusting in case of valve replacement or gas conversion (case B)



Maximum fan speed has to be reduced to convert the water heater into a propane or B/P appliance. Setting parameter P4BD.

14.3.1 GENERAL REMARKS

In case **B**, a distinction is made between the setting of water heaters containing a single valve (CD+80-CD+100) and water heaters with a double valve (CD+120-CD+180). All adjustments must result in CO₂ according table 1 or figures.

Checking and adjusting at maximum load CD+80 / CD+100 The water heaters CD80 and CD100 all have single gas valves, see the drawings on page 95.

- First, turn setting screw [2] of the gas valve clockwise until you feel resistance. This means that the valve is closed, *do not try to tighten the screw any further*.
- Now turn screw [2] counter clockwise (open), according to the number of turns in table 2 or 3 for the used water heater and gas type.

After this, adjust at maximum load by carrying out procedure 1 on page 96. If the burner doesn't start up in service mode, turn screw [2] a quarter turn counter clockwise open, and try again.

14.3.2 CHECKING AND ADJUSTING AT MINIMUM LOAD CD+80 / CD+100

Adjust at minimum load by carrying out procedure 2 on page 96.

IMPORTANT: Toggle between high fire and low fire to make fine-tuning adjustments (adjusting the minimum setting affects the maximum setting and contrariwise).



In case of gas conversion, paste the corresponding sticker at the appropriate position in the water heater and mark the square for the used gas type. Also mark the square, indicating that the correct value has been set for parameter P4BD.

(In the example on the right, 'propane' and 'P4BD = 1' have been marked).



For adjusting double gas valves CD+120 / CD+150 / CD+180 see next page \rightarrow

14.3.3 CHECKING AND ADJUSTING AT MAXIMUM LOAD CD+120 / CD+150 / CD+180

The water heaters CD+120, CD+150 and CD+180 all have double gas valves, see the drawings on page 95

First connect a manometer to "p-out" = measuring point [4] of the **left** gas valve (see drawing).

- Now, turn setting screws [2] of <u>both gas valves</u> clockwise until you feel resistance. This means that the valves are closed, do not try to tighten the screws any further in the closed position.
- After this, turn screws [2] of <u>both left and right-hand gas valve</u> counter clockwise (open), according to the number of turns in table 2 or 3 for the used water heater and gas type.

From now on only use the right-hand gas valve for adjustments on high fire.

Adjust the right value at maximum load by carrying out procedure 1 on page 96. If the burner doesn't start up in service mode, turn screw [2] a quarter turn counter clockwise further open, and try again.

14.3.4 CHECKING AND ADJUSTING AT MINIMUM LOAD CD+120 / CD+150 / CD+180

Adjusting these water heaters at minimum load in case B involves extra measurements, to get both valves balanced:

Use the [▼] button to decrease the actual load of the service (percentage) to the minimum. The following screen will appear:

Display message	н	Ε	Α	Т	I	Ν	G	:	S	е	r	v	i	С	е			2	6	%
	>	٨	٨		1	2	3	•	4	0	С	(1	2	3	•	4	0	С)

Water heater is activated and operates at service mode at 26% (minimum).

See table 3 for pressure settings "p-out" gas valve for the used water heater and gas type. Use screw [1] on the **left-hand** gas valve to adjust the measured pressure at "p-out" to the right value according to table 3. Be sure the manometer has been zeroed out prior to making this setting. Below, the influence of turning screw [1] is described.

Turning counter clockwise	\rightarrow	less gas	\rightarrow	a drop in CO ₂	\rightarrow	a drop in measured pressure at "p-out"
Turning clockwise	\rightarrow	more gas	\rightarrow	a rise in CO2	\rightarrow	a rise in measured pressure at "p-out"

After "p-out" has been set according table 3, the CO₂ level at low fire has to be set again. Use values of table 1 and/or figures.

Adjust screw [1] of the **RIGHT hand** valve to set the CO₂ at minimum load by carrying out procedure 2 on page 96.

Again, toggle between high fire and low fire to make fine-tuning adjustments (adjusting the minimum setting affects the maximum setting and contrariwise).

If the valves have been set correctly, "p-out" left should equal "p-out" right. As an additional test, one could check this by measuring "p-out" at the RIGHT valve, i.e. at measuring point 4 on the right valve (not denoted in the drawings on page 95).

This pressure should be in the same range of pressure as the left valve, so in accordance with table 3 again.

If, after all setting steps have been carried out properly, the values of left and right "p-out" are still very different, contact your supplier.

14.4 Adjusting procedures

Procedures 1 and 2, referred to in the previous sections 14.2 and 14.3 are described here:

Procedure 1: adjust at maximum load

In case **B** (replacement of gas valve or gas conversion): consult §14.3. before starting procedure 1 below.

Carry out the next 4 steps:

1. Press [SERVICE] button for about 3 seconds.

Display message	н	Ε	Α	Т	Ι	Ν	G	:	S	е	r	V	i	С	е			2	6	%
	٨	٨	٨		1	2	3	•	4	0	С	(1	2	3	-	4	0	С)
																× /				

Water heater is activated and operates at service mode at 26% (minimum). (example)

2. Press [▲] button until maximum load is reached:

Display message	Н	Ε	Α	Т	Ι	Ν	G	:	S	е	r	v	i	С	е		1	0	0	%
	۸	٨	٨		1	2	3	•	4	0	С	(1	2	3	-	4	0	С)

Water heater is activated and operates at service mode at 100% (maximum). (example)

- 3. Measure the CO₂ percentage at the flue gas outlet.
- By setting screw [2], adjust the gas valve to obtain the CO₂ value of table 1 or the figures. NOTICE: For the CD+120, 150 and 180 water heaters use only the RIGHT side gas valve for adjusting.



Turn screw [2] right (clockwise)

Turn screw [2] left (counter clockwise)

Increase CO₂ percentage

Decrease CO₂ percentage

The service operation of the water heater will be active for 40 minutes. After this period the water heater will return to normal operation.

Procedure 2: adjust at minimum load

In case B (gas conversion or replacement of gas valve): consult § 14.3 before starting procedure 2 below.

Carry out the next three steps:

1. Press [▼] button until minimum load is reached.

Display message	Η	Ε	Α	Т	I	Ν	G	:	S	е	r	V	i	С	е			2	6	%
	۷	>	>		1	2	3	•	4	0	С	(1	2	3	•	4	0	С)

Water heater is activated and operates at service mode at 26% (minimum).

- 2. Measure the CO₂ percentage at the flue gas outlet.
- 3. By setting screw [1], adjust the gas valve to obtain the CO₂ value of table 1.
 - NOTICE: For the CD+120, 150 and 180 water heaters use only the RIGHT side gas valve for adjusting.

Decrease	\mathbf{CO}_2	percentage
----------	-----------------	------------





Turn screw [1] right (clockwise)

Increase CO₂ percentage

The service operation of the water heater will be active for 40 minutes. After this period the water heater will return to normal operation.

15 PUTTING THE WATER HEATER OUT OF OPERATION

It is recommended to have the water heater operational all year round to prevent any frost damage during the winter and/or rotating parts getting jammed during other times of the year (built in water heater safety features).

15.1 Out of operation: on/off function

To be used when the appliance must be put out of operation for a long period because of a defect or another safety risk.

Act as follows:

- Disconnect or switch off the tank thermostat and/or other external controllers from the water heater. The pump and fan will stop after a short time.
- Switch off the water heater by pressing the [ON/OFF] button for six seconds.
- Make sure the following display screen is visible.

Display message	В	0	i	Ι	е	r	ο	f	f					

Properties of the 'off' function:

- The keys do NOT respond and the menu is NOT accessible.
- The burner does NOT respond to an external heat demand.
- The water heater CAN, however, be switched on again by pressing the [ON/OFF] button.
- Pump(s), fan(s) and cascade (if applicable) are operational, and so are both recirculation protection (if applicable) and frost protection.
- To reactivate the water heater, switch on the burner by pressing [ON/OFF] for six seconds again.



The frost protection module can still activate the burner(s). To prevent this, switch off this protection or put the water heater in 'power off' mode (next paragraph).

15.2 Out of operation: power off

To assure that the water heater cannot become active at all anymore, power should be cut off completely.

Act as follows:

- Disconnect or switch off the tank thermostat and/or other external controllers from the water heater. The pump and fan will stop after a short time.
- Switch off the water heater by pressing the [ON/OFF] button for six seconds.
- Make sure the following display screen is visible.

Display message	В	0	i	I	е	r	0	f	f					

- Switch off the electrical power supply of the water heater (remove connection from the wall socket, or switch off the main power).
- Close the gas valve / gas supply.
- In case of possible frost damage: drain both the water heater and the DHW system.
- NOTICE: Before starting to drain the water heater, first start draining the DHW system and subsequently open also the two drains of the water heater.

16 FAULT CODES, BLOCKING CODES

IMPORTANT:

To avoid electric shocks, disconnect electrical supply before performing troubleshooting. To avoid burns, allow the unit to cool before performing troubleshooting.

Be aware that a fault code is an indication that the unit or the system needs attention. When repeatedly having faults these should not be neglected.

The first step is to check if the unit is installed according to the instructions. If not, first make sure the installation complies with the installation manual.

Always check the fuses on the control board before replacing any major components. A blown fuse can prevent the controller or other components from operating.

Most faults can also be caused by bad wiring and/or connections, even if it is not specifically mentioned. With every fault it is wise to check wiring and connections (at both ends) that connect to the safety device/component that generates the fault.

16.1 Lock-out codes

Having a lockout means that the water heater needs a manual reset to start operating again.

When the water heater is in lockout the backlight of the display is blinking on and off.



Display massage	2	I	:	v		5		E	•			4								
Display message	с U	1	I	X	0	n	_	Г	a	u	I	τ								
F15	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Passan	He	at	excl	han	ger	fus	e o	r bu	irne	r do	oor	clix	on e	exce	eed	ed i	max	kimι	ım	al-
Reason	lov	ved	val	ue.																
Cause:		heat exchanger has opened permanently.																		
The thermal fuse of the	e he	heat exchanger has opened permanently.																		
Corrective action:		heat exchanger has opened permanently.																		
Switch off the electrica	l po	heat exchanger has opened permanently. power and gas supply and contact supplier.																		
Cause:																				
The burner door clixon	ha	s oj	ben	ed.																
Corrective action:																				
Remove the burner do	or c	of th	e h	eat	exc	chai	nge	r ar	nd c	hec	k th	ne b	urn	er c	loo	r ga	ske	t fo	r	
leakage.																				
Check the burner door	for	de	form	natio	on;	whe	en i	t de	forr	ns i	t m	ust	be	repl	ace	ed.				
Check the heat exchar	ngei	fo	r dir	t ar	nd c	hec	:k tł	nat f	the	flue	is I	not	blo	cke	d.					
If heat exchanger is cle	ean	, re	set	mai	nua	lly t	he	clix	on it	tsel	f ar	nd re	ese	t the	e wa	ater	he	ater		

F8 p u n p o n p o n r s Reason Water heater not operational after four starting attempts. Cause: No spark. Corrective action: Corrective action: Check the ignitor/ignition electrode and replace/clean if necessary. Check the state of the ceramic insulator. A small crack can prevent the spark to form at the end of the electrode. Check the state of the earth wire/connection of the ignitor and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check for proper electrical grounding of unit. Bad ignition transformer. Replace the burner control of the unit. Cause: Ignition spark is present, but no flame results. Corrective action: Check if the gas valve opens. When there is no power supply to the gas valve, but the valve does not open, the gas valve opens. When there is no power supply to the gas valve check the gas valve avalve settings are correct and adjust if necessary. Check if the gas valve settings are correct and adjust if necessary. Check if the gas valve avalve settings are correct and adjust if necessary. Check if the gas valve settings are correct	Display message	F	а	i	I	е	d		b	u	r	n	е	r		s	t	а	r	t		
Reason Water heater not operational after four starting attempts. Cause: No spark. Corrective action: Corrective action: Check the ignitor/ignition electrode and replace/clean if necessary. Check the state of the ceramic insulator. A small crack can prevent the spark to form at the end of the electrode. Check the state of the ceramic insulator. A small crack can prevent the spark to form at the end of the electrode. Check the state of the searth wire/connection of the ignitor and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check the state of the sparkplug cap and replace if necessary. Check if the opper electrical grounding of unit. Bad ignition transformer. Replace the burner control of the unit. Cause: Ignition spark is present, but no flame results. Corrective action: Check if all gas valves in the supply line are completely open. Check if the gas valve opens. When there is no power supply to the gas valve, but the valve does not open, the gas valve opens. When there is no power supply to the gas valve check the gas valve winn/connections. Check if the gas valve settings are correct and adjust if necessary. Check if the gas valve supply is open/not blocked. Cause:	F8	р	u	m	р		ο	n	1				9	9	9	,	5		h	r	s	
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F10pumpon9999,5hrsReasonFlame signal detected, while water heater should not fire for operation.	Display message	F	а	I	s	е		f	I	а	m	е		S	i	g	n	а	I			
Reason Flame signal detected, while water heater should not fire for operation.	F10	р	u	m	р		0	n	1				9	9	9		5		h	r	s	
	Reason	Fla for	ame Op	e siç era	gnal tion	de	tect	ed,	wh	ile	wate	er h	eat	er s	hou	, Id I	not	fire				

The flame detection circuit detects a flame which is not supposed to be present.

Corrective action:

Check the ignition/ionisation electrode and make sure it is clean (or replace it).

Check the power supply voltage for a correct polarity.

Check the power supply for bad frequency or voltage peaks.

Check external wiring for voltage feedback. Check the internal wiring for bad connections.

Check if the gas valve is closing correctly.

Replace the burner control.

Display message	F	а	n		s	р	е	е	d		i	n	С	0	r	r	е	С	t	
F11	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Reason	Ac	tua	far	n sp	eed	d dit	ffers	s fro	om 1	the	unit	t rpr	n s	et p	oint	t.				-
Cause:		detected.																		
An incorrect fan speed	is d	detected.																		
Corrective action:																				
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Display message	F	I	а	m	е		I	0	s	t										
F9	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Reason	Fla	ame	się	gnal	los	t du	ırin	g ol	bera	atior	۱.									
Cause:																				
Bad gas supply pressu	ire.																			
Corrective action:																				
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Cause:																				
Bad gas valve or gas v	alv	e se	ettin	igs.																
Corrective action:																				
Check and set gas val	ve s	setti	ngs	5.																
Cause:																				
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Cause:																				
Bad flue gas and/or air	su	oply	/ sy	ste	m.															
Corrective action:																				
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Cause:																				
External factors.																				
Corrective action:																				
Check if there were ex Check if the water hea gas outlet (when comb	tren ter i usti	ne v rooi ion	wea n p air	ithe res is d	r/wi sure raw	ind e is <u>m f</u> r	cor eqi om	uditi ual t the	ons to th wa	wh ne p ter	en t res <u>he</u> a	the sur ater	fau e at <u>roo</u>	lt oo : the o <u>m)</u> .	ecui pc	rred ositio	l. on c	of th	ne fl	ue

Display message	F	I	ο	w		h	i	g	h		Τ	е	m	р						
F1	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Reason:	Ma	ax. f	low	ter	npe	erati	ure	exc	eec	ds li	mita	atio	n (lo	ock ·	out) va	alue			
Cause:			k. now temperature exceeds limitation (lock-out) value.																	
The water flow is restri	cte	d.																		
Corrective action:																				
Check functioning of th Check/open all valves Check for an external s Check if the system res	ne p tha syst sist	um t mi em anc	p. ght pui e e	res np xce	tric that eds	t the t inf s the	e wa iluei e sp	ater nce	flov s flo car	w th ow t	nrou hro ity c	igh ugh of th	the i the	uni e ur nit j	t. nit. oum	מו.				

Display message	F	I	ο	w	R	е	t	u	r	n		d	t		f	а	u	I	t	
F16	р	u	m	р		ο	n					9	9	9],	5		h	r	s
Reason:	Ter tior tim	npe i va es.	erati lue,	ure or	diffe 'dT	erer blo	nce ck c	be or c	two delt	een ta d	lirec	w ai t ble	nd r ock'	etu ' ha	rn e s oo	xce ccui	reds	thre	ita- ee	
Cause:																				

The water flow through the unit is too low.

Corrective Action:

Check functioning of the pump.

Check/open all valves that might restrict the water flow through the unit.

Check for an external system pump that influences the flow through the unit. Check if the system resistance exceeds the spare capacity of the unit pump.

Make sure the heat exchanger is clean. Heat exchanger fouling (partly blockage) will increase the resistance causing the water flow to drop.

Display message	F	I	0	w		s	е	n	s	0	r		е	r	r	ο	r			
FO	р	u	m	р		0	n					9	9	9	,	5		h	r	s
Reason:	Flo	ow s	sens	sor	is n	ot o	dete	cte	d.											
Cause:																				
Bad wiring/connection	in t	he f	flow	se	nso	r ci	rcui	t.												
Corrective action:																				
Check for loose wiring	/cor	ne	ctio	ns i	n th	e fl	ow	sen	sor	circ	cuit									
Cause:																				
Bad temperature sense	or c	aus	sing	a fa	ault	sig	nal.													
Corrective action:																				
Replace flow sensor.																				

Display message	F	I	u	е		s	е	n	s	ο	r		е	r	r	0	r			
F6	р	u	m	р		0	n					9	9	9	,	5		h	r	s
Reason	FΙι	le s	ens	sori	is n	ot d	ete	cte	d by	/ the	e wa	ater	' he	ate	r PC	CB.				
Cause:																				
Bad wiring/connection	in t	he f	lue	gas	s se	enso	or ci	ircu	it.											
Corrective action:																				
Check for loose wiring/	'cor	nne	ctio	ns i	n th	e fl	ue g	gas	ser	ารอเ	r cir	cuit								
Cause:								-												
Bad temperature sense	or c	aus	sing	a fa	ault	sig	nal.													
Corrective action:																				
Replace flue gas sense	or.																			

Display message	F	Ι	u	е	-	t	е	m	р		t	0	0		h	i	g	h		
F7	р	u	m	р		ο	n					9	9	9	,	5		h	r	S
Reason	Flu	le c	jas	terr	per	atu	re e	exce	ede	ed 3	3 tin	nes	lim	itati	on	valu	ie v	vithi	n	
	аc	cert	ain	per	iod.															
Cause: Heat exchange	er p	ollu	ted	an	d no	ot al	ble	to ti	rans	sfer	en	oug	h h	eat	to s	syst	em	wat	er.	
Corrective action:																				
Check and clean heat	exc	har	nger																	
Cause: Bad flue gas s	ens	oro	or se	ens	or c	conr	nec	tion	(pa	rtly	sh	orte	ed).							
Corrective action:																				
The sensor is of the type	pe N	NTC	С. Т	his	me	ans	if tl	he t	emj	pera	atur	e ri	ses	, the	e re	sist	anc	e lo	w-	
ers. A partly shorted se	enso	or v	vill c	Irop) its	res	ista	ince	e an	d th	nere	efor	e 'n	nea	sure	e' a	rais	se ir	ı ter	m-
perature when actually	' the	ere	is n	one																
Check for moist in the	sen	sor	cor	nne	ctio	ns (or re	epla	ice	ser	ISO	•								
Cause: There is no wa	ater	in t	he ı	unit	wh	ile f	irin	g.												
Corrective action:																				
This is an unlikely situa	atior	n w	hile	all	the	saf	etie	s fo	or ch	nec	king	g the	e w	ater	. ble	ese	nce	did	n't	
detect anything. Only a	a lot	of	air i	n th	ne s	yste	em/	unit	: (ur	nde	r pr	ess	ure) ca	n c	aus	e th	e w	ate	r
pressure switch to swit	ch v	whi	le n	o w	ate	r is	pre	sen	t. A	lso	the	wa	ter	leal	k de	etec	tior	1		
did not react. Bleed all	air	fror	n th	le u	nit	so t	he	hea	t fro	om (con	bu	stio	n ca	an b	be tr	ans	sferi	ed	to
the water and won't dis	sapp	bea	r th	rou	gh t	he	flue	sys	sten	٥.										
Cause: Heat exchange	er fa	ailui	e.																	
Corrective action:																				
This is an unlikely situa	atior	n bi	ut w	her	n the	ere	is s	eve	ere o	dam	nag	e to	the	e he	at e	excl	nan	ger,	the	;
combustion product wi	ll no	ot b	e at	ble	to tr	rans	sfer	all	hea	t to	the	sy	ster	n w	ate	r. T	he l	nea	t tha	at
is not transferred will c	onv	ert	to a	ın ir	ncre	ease	ed f	ue	gas	ter	npe	erati	ure.							
															-					
Display message	р	r	0	g	r	а	m	m	Ι	n	g		е	n	d					
F12	р	u	m	р		0	n			-		9	9	9	,	5		h	r	S
Reason	Pro	ogra	amr	ning	g of	the	e pa	ram	nete	rs o	com	ple	ted	suc	ces	ssfu	lly.			
Cause: Programming	of th	ne p	bara	me	ters	s co	mp	lete	d si	ucc	ess	fully	/.							
Corrective action:																				
This message occurs t	0 00	onfi	rm 1	the	enc	d of	pro	gra	mm	ing	. Pr	ess	ing	RE	SE	Τw	ill re	etur	n th	e
unit in normal operating	g st	atu	s.																	
	_																			
Display message	Ρ	а	r	а	m	1	н	а	r	d	W		f	а	u	I	t			
F13	р	u	m	р		0	n					9	9	9	,	5		h	r	S
Reason	Fa	ilur	e dı	urin	g pi	rogr	am	min	g o	f the	e pa	arar	net	ers.						
Cause: Programming	of th	ne p	bara	me	ters	s N() TC	suc	ces	sful	ly c	om	plet	ed						
Corrective action:																				

Unit is not in standby mode (fan must not run during programming). Check programming wire and connections and try again. Check if the software complies with the PCB. Replace the programming wire. Replace the display PCB.

Display message	R	e	t	u	r	n		h	i	g	h		Т	е	m	р				
F1	р	u	m	р		0	n					9	9	9	,	5		h	r	s
Reason:	Ма	xim	um	retu	Irn	tem	per	atu	re e	эхс	eed	s lir	nit v	valu	ie.					
Cause: Systems that	pre-	hea	its th	ne v	/ate	ər h	eate	er re	etu	rn t	emp	bera	atur	e to	o m	uch	/hig	gh.		
Corrective Action:																				
Reduce pre- heat tem	pera	atur	e of	exte	ern	al h	eat	sou	irce	ə.										
Cause:																				
The need for heat in the	ne s	yste	em s	udo	len	ly d	rop	s ca	aus	ing	hot	ret	urn	wa	ter to	o th	e h	eat	er.	
Corrective Action:																				
Dampen external heat	ting	sys	tem	cor	ntro	l to	pre	ven	t s	udc	len	hea	ter	tem	npera	atur	e r	ise.		

Display message	R	e t	u	r	n		S	е	n s	0	r		е	r	r	o r		
F3	р	u m	р		0	n				9	9	9	,	5		h r		s
Reason	Ret	urn s	enso	or is	s no	t de	etec	ted	by the	wa	ter	hea	ter	PC	В.			
Cause: Bad wiring/cor	nect	ion ir	the	e ret	turn	se	nso	r cir	cuit.									
Corrective action: Ch	eck f	or lo	ose	wiri	ng/	con	nec	tion	is in th	e re	eturi	n se	enso	or c	ircu	it.		
Cause: Bad temperatu	ire se	ensor	cau	usin	g a	fau	ılt si	igna	d.									
Corrective action: Re	place	e retu	irn s	ens	sor.													
Display message	S	i p	h	ο	n		s	w	i t	С	h							
F19	p I	u m	q		ο	n	Ì			9	9	9	Ι.	5	<u> </u>	h r		s
Reason	Sipł	non p	ress	sure	sv	/itch	n de	tect	ts hiah	pre	รรเ	ire	,					_
	in th	e flu	e/sip	oho	n sy	/ste	m.			1								
Cause:																		
There is too much resi	stand	e in t	the	flue	ga	s ci	rcui	t ca	using	high	n pre	ess	ure	in t	he ł	neat e	x-	
changer at the flue gas	s side).																
Corrective action:																		
Check if the flue gas s	ysten	n is b	lock	ed.										~.				
Extreme failing of the h	neat e	excha	ange	er a	ISO	cau	ises	the	e resis	anc	e to	o ris	e. (Che	ck t	he sta	ate	ŧ
Check the flue das sys	anu (diam	n n eter	ece ۸ ۱	ena	uy. th (mo	st lik	elv in	a n	ew	svs	tem)				
Cause:		system is blocked. The condensate will build up above the meas e switch and creates a static pressure larger than the measuring																
The condensate drain	svste	em diameter & length (most likely in a new system). ystem is blocked. The condensate will build up above the meas switch and creates a static pressure larger than the measuring														su	r-	
ing point of the pressu	re sw	nd clean if necessary. em diameter & length (most likely in a new system). ystem is blocked. The condensate will build up above the mean e switch and creates a static pressure larger than the measurin e drain hose between the heat exchanger and the siphon is ope														g		
point.		em diameter & length (most likely in a new system). system is blocked. The condensate will build up above the mea e switch and creates a static pressure larger than the measuring e drain hose between the heat exchanger and the siphon is op flow freely to the siphon.																
Corrective action:		em diameter & length (most likely in a new system). system is blocked. The condensate will build up above the mea e switch and creates a static pressure larger than the measuring e drain hose between the heat exchanger and the siphon is op flow freely to the siphon. ree of debris that might block the condensate flow and clean the																
Check if the condensa	te dra	eat exchanger also causes the resistance to rise. Check the stand clean if necessary. em diameter & length (most likely in a new system). ystem is blocked. The condensate will build up above the mea e switch and creates a static pressure larger than the measurin e drain hose between the heat exchanger and the siphon is ope flow freely to the siphon. ee of debris that might block the condensate flow and clean the drain hose between the siphon and the condensate drain point														en,	,	
so the condensate can	I TIOW	eat exchanger also causes the resistance to rise. Check the stand clean if necessary. em diameter & length (most likely in a new system). ystem is blocked. The condensate will build up above the mease e switch and creates a static pressure larger than the measuring drain hose between the heat exchanger and the siphon is ope flow freely to the siphon. ee of debris that might block the condensate flow and clean the drain hose between the siphon and the condensate drain point . Condensate must be able to flow freely.																
siphon if necessary.		em diameter & length (most likely in a new system). ystem is blocked. The condensate will build up above the mean a switch and creates a static pressure larger than the measurin e drain hose between the heat exchanger and the siphon is oper flow freely to the siphon. ree of debris that might block the condensate flow and clean the drain hose between the siphon and the condensate drain point														5		
Check the condensate	draiı	system is blocked. The condensate will build up above the mea e switch and creates a static pressure larger than the measurin e drain hose between the heat exchanger and the siphon is op flow freely to the siphon. ree of debris that might block the condensate flow and clean the drain hose between the siphon and the condensate drain point														in		
the external installation	<u>ι. Со</u>	nden	sate	e mi	ust	be a	able	e to	flow fr	eely	<i>'</i> .					-		
Cause:																		
The condensate drain	hose	mus	t ha	vea	an o	ppe	n co	onne	ection	to th	ne e	exte	rna	sy	ster	n. lf n	ot,	
the heat exchanger of	1 the	DUIIO	ing boa	ara tor	inag	je s	syst	em	can na	ave	ene	CT C	n ti	ne p	bres	sure	In	
Corrective action:		alei	nea	lei.														
Make sure that there is	s an o	neg	con	nec	tior	n be	etwe	en	the sir	hor	h ho	se	and	the	e dra	ainad	e.	
system of the building	insta	llatio	п. Т	he o	con	den	sat	e sh	ould f	ow	in tl	ne d	drai	nag	e sy	/stem		
through a freely "breat	hing"	conr	nect	ion,	so	pre	ssu	ire f	luctua	tion	s of	the	e ex	terr	nal c	Iraina	ge	;
system cannot affect th	ne pr	essu	re in	the	<u>e he</u>	eat e	<u>excl</u>	nang	ger of	the	wat	er h	<u>nea</u>	ter.				
Cause: Blockage of th	e pre	ssur	e się	gna	l ho	<u>se (</u>	goir	ng to	the p	ress	sure	sw	/itch	<u>ו.</u>				
Corrective action: Ch	ECK 1	ne pi	ess	ure	sig	nai	nos	<u>se a</u>	nd cle	an c	or re	epia	ce	it ne	eces	ssary.		
Cause: Bad pressure s	SWITC	n cau	ISIN	уa	iau	It SI	gna	l.										
Replace the pressure of	swite	h																
Cause: Bad wiring/cor	nect	ion ir	the	nr	200	IIFA	swi	tch	circuit									
Corrective action:	meet		i uic	; pr	533	uie	3 101	ton	circuit									
Check for loose wiring	/conr	ectio	ns i	n th	ne p	res	sure	e sv	vitch c	rcui	t.							
g,					p-													
Display message	W	a t	е	r		h	i	g	h		i	m	i	t				
F17	р	u m	р		0	n				9	9	9	,	5		h r		S
Reason	Мах	imun	n th	erm	ost	at e	xce	eds	i limita	tion	val	ue.						
Cause: The water flow	/ is re	strict	ed.															
Corrective action:																		
Check functioning of th	of the pump.																	
Check for an external	I valves that might restrict the water flow through the unit.																	
Check if the system re	sista	nce e	хсе	eds	the	e sn	are	car	acitv	of th	ne u	nit	o un	חת. מר				
	u			- 40		- 74	2.0	201	- Sony				r 911					

16.2 Blocking codes

The display is not blinking, but is lightened up during the blocking period.

The water heater is blocking an action, because of an extraordinary situation. This action will be continued after eliminating the extraordinary situation.

Display message	Α	n	t	i	С	У	С	Ι	е		t	i	m	е						
												9	9	9	,	5		h	r	S
Reason	Th	e h	eate	er re	ece	iveo	dal	hea	t de	ema	nd	too	fas	t af	ter t	he	last	de	mai	nd.
Cause: Opening and in	mm	edia	atel	y th	ere	afte	er cl	osir	ng c	of th	e e	xte	rnal	the	ermo	osta	at.			
Corrective action:																				
Controlled water flow of Controlled water flow h Immediately opening a of the ON/OFF thermo Controller settings nee all common systems. W ing of the controlled wa	cool neat ind stat d to Vhe ater	s do ts u clos t. o be en a flov	p to sing chanti- w/te	o too o q o f ang cyc	o qu uicł the led. ling era	uick <ly a<br="">ext Be ∣is a ture</ly>	ly a after erna aw activ e, it	fter r sta al th are ve, con	los art o nerr tha bec ncer	s of of he nos at th aus ns a	he eat tat. e st se o an ι	at c der Ch tanc f in	lem nar eck darc ime	and d. sw d se dia enti	I. tting te h	ing gs v eati al sy	diff vorl ing /ste	ere c fir or c m.	ntia le fo cool	ll Dr -
D:		1							_											
Display message	C	а	S	С	а	d	е		В		0	С	ĸ							
												9	9	9	,	5		h	r	S

Display message	С	а	S	С	а	d	е		В		0	С	k							
												9	9	9	,	5		h	r	s
Reason	Or	ne c	f th	e w	ate	r he	ate	ers o	of th	e c	asc	ade	is is	in a	loc	k-o	ut.			
Cause:																				
The unit is programme	d ir	ı su	ch a	a wa	ay t	hat	nor	ne c	of th	e h	eat	ers	in a	i ca	sca	de	will	fire	, if	
one has a lockout. One	e ur	nit h	as a	a lo	cko	ut a	and	the	refc	ore t	the	wh	ole	cas	cad	e is	blo	ocke	ed.	
Corrective action:																				
Troubleshoot the fault	of t	he ı	Jnit	in l	ock	-ou	t.													

Display message	D	е	I	t	а		D	i	r	е	С	t		b		0	С	k		
												9	9	9	,	5		h	r	s
Reason	Te the	mp e ble	era ock	ture ing	e dif valu	fere Je	ence	e be	etwe	en	flov	v ar	nd re	etur	n h	as e	exc	eed	ed	
Cause: The water flow	/ thr	ou	gh t	he ı	unit	is t	00 l	ow.												

Corrective action:

Check functioning of the pump.

Check/open all valves that might restrict the water flow through the unit.

Check for an external system pump that influences the flow through the unit.

Check if the system resistance exceeds the spare capacity of the unit pump.

Make sure the heat exchanger is clean. Heat exchanger fouling (partly blockage) will increase the resistance causing the water flow to drop.

Display message	F	_	0	w		h	i	g	h		D	Η	W							
												9	9	9	,	5		h	r	s
Reason:	Se	tpo	int ı	retu	ırn (tan	k)te	emp	era	ture	b DF	IW	(S3	s) is	hig	her	tha	n s	et-	
	ро	int l	nea	ting) = f	low	ter	npe	ratu	ire	(S1)								
Cause: Wrong setting	of p	bara	ame	eter:	P6	ΒA	He	atin	g se	etpo	oint	bel	ow	P60	CA	DH	N s	etpo	oint	
Corrective action:																				
Adjust the heating setp	ooin	t th	rou	gh t	he	disp	olay	': m	enu	l, se	ettin	gs,	hea	ating	g se	etpo	int			

Display message	F	I.	ο	w		t	е	m	р		h	i	g	h						
												9	9	9	,	5		h	r	s
Reason:	Flc ha	ow t s ne	em ot e	per xce	atur ede	re h ed tl	as (he l	exc ock	eed -ou	ed 1 t va	the lue.	blo	ckir	ng te	emp	bera	iture	ə, b	ut il	t
Cause: The water flow	is i	rest	rict	ed.																
Corrective action:																				
Check functioning of th	ie p	um	p.																	
Check/open all valves	that	t mi	ght	res	tric	t the	e wa	ater	flo	w th	nrou	ıgh	the	uni	it.					
Check for an external s	syst	em	pu	mp	that	t inf	lue	nce	s th	e flo	ow [·]	thrc	bugł	n th	e u	∩it.				
Check if the system res	sist	anc	ее	xce	eds	s the	e sp	are	cap	oaci	ity c	of th	ne u	nit	pun	np.				

Display message	F	I	u	е		t	е	m	р		h	i	g	h						
												9	9	9	,	5		h	r	s
Reason	Flu	le g	jas	tem	per	atu	re h	nas	exc	eed	led	the	lim	it.						
Cause: Heat exchange	er p	ollu	ted	and	d no	ot al	ble	to t	rans	sfer	en	oug	h h	eat	to t	he :	sys	em	•	
Corrective action: Ch	eck	an	d c	ear	he	eat e	excl	nan	ger.											
Cause: Bad flue gas s	ens	or o	or s	ens	or c	conr	nec	tion	(pa	artly	sh	orte	ed.)							
Corrective action:																				
The sensor is of the ty	pe N	NTC	С. Т	his	me	ans	wh	en	the	tem	pe	ratu	ire i	ise	s, it	s re	sist	and	e d	e-
creases. A partly short	eds	sen	sor	will	dro	pp it	s re	esis	tand	ce a	nd	the	refo	ore	me	asu	ire'	a ra	lise	in
temperature when actu	ally	/ the	ere	is n	one	Э. 	or r	onla	000	tha	201	000	r							
Check for moist in the	otor	501 in t	ho	Init	wb	ilo f	irin	a		uie	301	150								
Corrective action:				unn	VVII	lie i		y.												
This is an unlikely situa	ation	n w	hile	all	the	saf	etie	s fo	or cl	hecl	kind	n th	e w	atei	. Dre	ese	nce	did	n't	
detect anything. Only a	a lot	of	air i	n th	ie s	vste	em/	'unit	t (ur	ndei	r pr	ess	ure) ca	in c	aus	e th	ne v	/ate	er
pressure switch to swit	ch	whi	le n	o w	ate	r is	pre	sen	t. A	lso	the	wa	ter	lea	k de	etec	tior	۱. ١		
did not react. Bleed all	air	fror	n th	ne u	nit :	so t	he	hea	t fro	om d	con	nbu	stio	n ca	an b	be ti	rans	sfer	red	to
the water and won't lea	ave	thro	bug	h th	e fl	ues	syst	tem	•											
Cause: Heat exchange	er fa	ailur	e.																	
Corrective action:																				
This is an unlikely situa		ח bu	ut w	hen	the	ere	IS S	eve	ere (dam	ag	e to	the	he he	at e	excl	nan	ger	the	e et
is not transferred will c	n nc onv	ert	e ai to a	n ir	o u nore	ans	ad f	aii lue	nea nas	ten	nne nne	e sy erati	ure	II W	ale	1. 1	ne	iea	t tri	ลเ
	G e n B I o c k 9 9 9 9 , 5 h r s eason General blocking circuit is activated during operation (general blocking contacts 7-8).																			
Display message	isplay message G e n B l o c k g																			
	Splay message G e n B I o c k g <																			
Reason	Ge	ener	ral k	oloc	king	g ci	rcui	t is	acti	ivate	ed (duri	ng	ope	rati	on (ger	hera	al	•
	Inot transferred will convert to an increased flue gas temperature.Isplay messageGenBIockIsplay messageGGenggggggnIsplay messageGGcckgggggggggggggggggggggggggggg																			
ause: Heat exchanger failure. corrective action: his is an unlikely situation but when there is severe damage to the heat exchanger, the ombustion product will not be able to transfer all heat to the system water. The heat that an ot transferred will convert to an increased flue gas temperature. Display message G e n B I o c k Image: the system water. The heat that the system water. The heat that the system water. The heat that the system water. The heat that the system water. Display message G e n B I o c k Image: the system water. The heat that the system water. The heat that the system water. The heat that the system water. Display message G e n B I o c k Image: the system water. The heat that the system water. The heat that the system water. The heat that the system water. Display message G e n B Image: the system water. The system water. The heat that the system water. The system w																				
Ind not react. Dieed an air from the unit so the heat from combustion can be transferred to he water and won't leave through the flue system. Sause: Heat exchanger failure. Corrective action: This is an unlikely situation but when there is severe damage to the heat exchanger, the combustion product will not be able to transfer all heat to the system water. The heat that is not transferred will convert to an increased flue gas temperature. Display message G e n B l o c k g																				
ressure switch to switch while no water is present. Also the water leak detection id not react. Bleed all air from the unit so the heat from combustion can be transferred to ne water and won't leave through the flue system. Tause: Heat exchanger failure. Corrective action: This is an unlikely situation but when there is severe damage to the heat exchanger, the ombustion product will not be able to transfer all heat to the system water. The heat that a not transferred will convert to an increased flue gas temperature. Display message G e n B I o c k 9 9 9 9 , 5 h r s Reason General blocking circuit is activated during operation (general blocking contacts 7-8). Cause: The circuit connected to the general blocking terminals is not closed. Corrective action: Check all external components that are connected to the general blocking terminals and heck why the contact is not closing during heat demand. Cause if used with flow switch: The water flow through the unit is too low. Corrective action: Check functioning of the pump and the flow switch. Check for an external system pump that influences flow through the unit.																				
his is an unlikely situation but when there is severe damage to the heat exchanger, the ombustion product will not be able to transfer all heat to the system water. The heat that not transferred will convert to an increased flue gas temperature.																				
Cause if used with flo	ow s	SWI	tch	:Ir	ie v	vate	er flo	SW 1	hro	ugh	th	e ur	nit is	s to	o lo	W.				
Corrective action:				•																
Check functioning of th	ne p	um	p a	nd t	he	flow	/ SW	/itch). 				41							
Check/open all valves	that	t mi	gnt	res	tric	t the	e Wa	ater	TIO offic	w th	rou bro	ign	the	uni	t.					
Check for an external s	sysi cict	em	pu o o	np	una ode	the		are	S IIC	JW L Daci	nro itv d	ngr of th		e ur nit	III. OUM	nn				
Make sure the heat ex	cha	nae	eris	cle	an.	He	at e	exch	nand	aer	fou	lina	(pa	artlv	blc	ocka	aae	wil	l in·	-
crease the resistance of	caus	sing	g th	e wa	ater	flo	w to	o dr	op.	9-1			\ <u>1</u>	,			.g-,			
Display message	L	i	n	е		f	а	u	Ι	t										
	р	u	m	р		ο	n					9	9	9	,	5		h	r	s
Reason	Ba	d p	owe	er si	upp	ly														
Cause: The supplied p	ow	er c	loes	s no	t co	omp	bly v	vith	the	spe	ecif	icat	ion	s.						
Corrective action:																				
Check if the power sup	ply	is c	con	nect	ted	cor	rec	tly t	o th	e u	nit.									
Check the voltage and	free	que	ncy	′ (sh	nou	ld b	еL	ife I	Veu	tral,	G	nd >	> 23	0 V	ac	/ 50) Hz	:).		
Make sure there is no	sigr	nal f	ailir	ng c	or vo	olta	ge	pea	ks i	n th	e p	owo	er s	upp	oly.					
Display message	R	•	t		r	n		ŧ	•	m	n		h	i	a	h				
Diopidy mocouge		v	•	u	•	••		•	v	••••	<u> </u>	٩	<u>a</u>	• •	9	5		h	r	e
Passon	Po	tur		mn	arat		ha				d th			(inc	, tor	1 mpc	rat	Iro	hu	s tit
Reason	ha	s no	nt e	про хсе	ede	ad th	he l	ock	-011	t val	u u lue		1001	\iiig		npe	au	лe,	bu	ιıι
Cause: Systems that r	ore-	hea	its t	he \	vat	er h	eat	err	etu	rn te	emp	Dera	atur	e to	o m	nucl	٦/hi	ah.		
Corrective action: Re	duc	e p	re-	hea	t te	mp	era	ture	e of	exte	erna	al h	eat	SOL	irce).				
Cause: The need for h	eat	su	dde	nlv	dro	ps (cau	sind	g ho	ot re	turi	n wa	ater	to	the	wa	ter l	nea	ter.	
Corrective action:				,						2				-	-					
Dampen external heat	ina	sys	tem	co	ntro	ol to	pre	ever	nt s	udd	en	hea	ter	tem	npe	ratu	re r	ise.		
	3	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,																		
Display message	т	2	_	т	1		h	i	a	h										
--	---	-------	--------	----------	------	-------	------	---------	-------------------	-----------	----------	--------	-------	------	---------	------	--------	-------	------	------------
Diopia) moodage	•	2	-	<u> </u>	-			-	y	••		0	0	٥		5		h	r	6
Passon	Dif	ffor		b			Т2	l an	<u>і</u> ч т ⁄	1 b	26				, bo		kin			3
Neason	which has been set in the parameters.(return temp higher than																			
	flo	w)							P 0						•,		9			
Cause:																				
The water flow through the unit is too low.																				
Corrective action:																				
Check functioning of the pump.																				
Check/open all valves that might restrict the water flow through the unit.																				
Check for an external system pump that influences flow through the unit.																				
Check if the system resistance exceeds the spare capacity of the unit pump.																				
Make sure the heat exchanger is clean. Heat exchanger fouling (partly blockage) will in-													-							
crease the resistance of	cau	sing	g the	w	ate	r flo	w t	o dr	op.				•							
Display message	W	а	t	е	r	р	r	е	s	s		u r	е		f	а	u	I	t	
						•					T	9	9	9	1.	5	1	h	r	s
Reason	W	ater	nre	551	ire	is to	no I	0W	or h	niah	<u>ا</u>	Ľ			,	Ĭ			-	
Cause:																				
The water pressure in	the	svs	tem	is	too	hia	h.													
Corrective action:		0,0		10		mg														
Check if the system pr	222	ure	is to	0	hiał	n af	er	(re)	fillin	n										
Make sure that there is	s a i	ores	sur	e re	elie	fva	lve	and	d ex	g. par	าร	sion v	/ess	el i	nsta	lled	l in t	the	svs	-
tem, according to the applicable standards.																				
Check if there is an open connection between the unit and the relief valve plus expansion													on							
vessel.															-	_		_		
Be aware that if the unit is installed in the basement of a tall building, only the static pres-														s-						
sure of the water colun	nn a	abov	ve tr	ne	unit	S Ca	an i	rais	e at	oov	е	the r	max	ımu	m a	llow	abl	e lir	nits	; .
Make sure that this is r	101	tne	case	e.																
Cause:	the	0.10	tom	ia	to 0	lou														
Corrective action:	ine	sys	lem	15	100	100	v.													
Corrective action:			o +h /		vote		ho			0.46		nro		0 10	dra					k
and fill the system	ika	je i	i trie	9 5	ysie		nai	. ca	use	su	ie	pres	ssur	eio	arc	р. г		any	iea	K-
Check if there is an ext	Ierr	nal s	svete	m	nur	mn	tha	t su	rks	wa	te	≤r thr	nua	h th		ate	r he	ate		
causing an under press	sure	e (b	ad i	nst	alla	tion	i de	sia	n).	wu			oug			alo		ato	,	
<u> </u>		- (-						- 3	/											
Display message	W	Α	T	R	Η	T	R	:	Τ	3		E	X	t	е	r	n	а	Ι	
., .	>	>	>	:		6	0		0	۰		C (-	3	0		7	0	С)
Reason:	T3	3 ex	tern	al t	tank	k se	nso	or is	not	со	n	nect	ed to	o th	e te	rmiı	nals	i.		
Cause:																				
The sensor is not conn	ect	ed t	o th	e t	erm	nina	l, o	r th	e wi	re i	s	brok	en.	The	e se	nso	r is	mal	fun	C-
tioning.																				
Corrective Action:					_															
Connect the sensor to	the	teri	mina	als	3 a	nd 4	4.	- 1 -												
Check the wires from the sensor to the terminals.																				
	515	idli	ue I	υň	ิสเ	20	U.													

16.3 Maintenance attention function

The display shows alternately the base screen and this message, while backlight is blinking. The water heater is operating, but will count the exceeding hours.

A parameter must be changed, after service, to remove this message.

Display message	Ν	е	е	d	s		Μ	а	i	n	t	е	n	а	n		0		0
	Ι	g	n	i	t	i	0	n		С	у	С	I	e	s	h	r	S	
Reason	Maintenance option of total amount of ignition cycles has been reached.																		
Display message	Ν	е	е	d	s		М	а	i	n	t	е	n	а	n		0		0
	D	а	t	e												h	r	S	
Reason	Maintenance option of the date has been reached.																		
Display message	Ν	е	е	d	s		М	а	i	n	t	е	n	а	n		0		0
	В	u	r	n	ï	n	g		h	0	u	r	s			h	r	S	
Reason	Maintenance option of total amount of burning hours has been reached.																		
Display message	Ν	е	е	d	s		М	а	i	n	t	е	n	а	n		0		0
, , , , , , , , , , , , , , , , , , ,	Α	I	I		-							-				h	r	s	-
Reason	One of the abovementioned maintenance options has been reached.																		



This function/message is standard not activated, but can be activated/set by a trained engineer. This function does not overrule the need for annual maintenance. The end user is always responsible for arranging annual maintenance.

17 MAINTENANCE

17.1 General

For a good, safe and long-time operation of the water heater, it is advised to carry out maintenance and service at least every twelve months. Both safety and life time will thus be improved. Omission of preventive and corrective maintenance can have warranty consequences.

Maintenance and inspection of the water heater should be carried out at the following occasions: • When a number of similar error codes and/or lock-outs appear.

At least every twelve months maintenance must be done to ensure safe and efficient operation.

Damage caused by lack of maintenance will not be covered under warranty.

MAINTENANCE REMINDER FUNCTION.

See last page.

BE AWARE: This function is standard turned OFF. We offer this programmable function to the installer to use as a reminder. Because it concerns a free programmable function the use of it cannot be used as an argument in warranty cases. Our units must be maintained every twelve months whatever the settings/working of this function. It is and remains the responsibly of the end user to have the unit maintained every twelve months.

For more information about this maintenance mode see section 10.15 'Setting the maintenance specifications' on page 66.

Service intervals

The normal service interval for the water heater is once a year. Every year the water heater should be cleaned and checked, according to the maintenance procedures. If there is doubt whether the water heater is operating with the correct water and/or combustion air quality, it is advised that a first check is executed after already half a year. This to determine the frequency of the future service intervals. The maximum interval between two services can be a year.



INSPECTION AND MAINTENANCE MUST BE EXECUTED FOR A SAFE AND EFFICIENT OPERA-TION OF THE WATER HEATER.

17.2 Inspection & maintenance

Inspection, maintenance and the replacement of water heater parts should only be done by a skilled service engineer. Apart from the maintenance proceedings it is advised to have a log chart for every water heater that describes the following aspects:

- Serial number
- Date and time of maintenance
- Name of maintenance engineer
- Which parts were exchanged during maintenance
- Which settings (software) were changed during maintenance
- Special remarks / findings
- Future aspects that need extra attention
- Additional aspects: measurement reports, complaints by the (end)-user, lock-out codes, etc.

During maintenance the following parts and aspects of the water heater should be checked and inspected. NOTICE: Before starting to work on the water heater:

- Switch off the electrical power to the water heater (service switch and/or unplug water heater)
- Close the gas valve to block gas supply to the water heater

Customer comments

Comments and remarks from the customer should be analysed and used to find possible causes for any occurring problems and complaints.

Service history

The operational and fault history (total amount and since the last service) of the water heater can be retrieved with the help of a computer, correct software and an interface cable. This information can be used to specify the maintenance and service proceedings in relation to the water heater (parts).

Flue gas & air supply

The flue gas pipes and the air supply pipes must be checked for gas tightness. Also check if the mounting of these pipes is correct, safe and not damaged. Check the rooftop of the water heater housing for signs of water leakage and traces of water coming from the air supply pipe, the air vent or any condensate coming from the flue gas pipes.

Gas supply & safeties

The gas pipes must be checked for gas tightness. Also check if the mounting of these pipes is correct, safe and not damaged. Any built-in safeties should be checked for a correct functioning.

Remove complete burner unit

The complete burner unit consists of the fan, the burner plate and the internal burner. To remove this part for an internal heat exchanger check: remove the 6 x M6 nuts and the ignition cable. After this take out the complete burner unit by moving it forward out of the water heater housing. NOTICE: watch out for the burner plate insulation that it won't be damaged during this operation. While removing the complete burner unplug both electrical and controlling cables of the fan. After all this, disassemble the air/gas mixing box on the suction side of the fan and check the blade wheel of the fan.

Burner

Check the burner surface to see if it has damages, signs of oxidation and/or is cracked. When the burner surface is damaged the burner must be replaced. The burner can be cleaned by using a soft **non-metallic** brush. The dust can be removed with a vacuum cleaner or pressurized air.

Ignition / ionisation electrode

When the complete burner is removed, it is also very easy to check the ignition electrode. First check if the distances between the electrodes and between the electrode and the burner are according to the graph below. When these are not correct, try to bend the electrodes in the right position. Notice: the electrodes undergo high temperatures, therefore the electrodes become hard and are difficult to bend. While being bent, used electrodes might break or burst. Check the electrode, after bending, for any tear/crack and signs of oxide. When they are burst/cracked or oxidised, replace the electrode. Also replace the electrode when there is a crack in the ceramic insulation of the electrode. When the electrode is to be replaced, also the gasket should be renewed.



Burner door gaskets

When these gaskets have changed colours at some parts, the rubber has cured and/or has damages, these gaskets must be replaced. Notice: only use the gaskets that are supplied by the water heater manufacturer.

Fan

When the fan blades are polluted and dirty, carefully clean the blades with a soft brush. Notice: Do not use too much force on the blades or else the fan might be out of balance and run irregularly, causing noises and fan failures. Check the fan also for any water damages. In doubt always replace the fan of the water heater.

Insulation

The insulation of the heat exchanger (located on the rear wall inside the heat exchanger and burner door) must be inspected. If this insulation disk shows any signs of (water) damage or degradation it should be exchanged. Also check if there are any indications of a high condensate level in the burner room (caused by a blocked siphon) that might have wetted the rear wall insulation. When this has happened the rear wall insulation should also be replaced.

Only use the insulation disk that is supplied by the water heater manufacturer.

The same procedure must be applied on the insulation and gaskets fitted on the burner door.

Siphon

Disassemble the siphon and clean every part of it. Check the siphon connection of the heat exchanger for any blocking or pollution and clean it (if necessary). Check the functioning of the siphon by pouring clean tap water in the burner room (when burner door is removed). This water will exit the heat exchanger by the siphon. Notice: Don't wet the rear wall insulation.



Heat exchanger and burner room

After the removal of the complete burner unit, check if there is any debris and dirt in the heat exchanger. The coils of the heat exchanger can be cleaned by using a non-metallic brush. After this the dirt and dust can be removed with a vacuum cleaner and by flushing the burner room with water. Don't forget afterwards to clean the siphon once again.



Cleaning the burner room with acid or alkali products is prohibited.

Gas/air ratio

With every service check and/or maintenance of the water heater always check the gas/air ratio by measuring the CO₂ percentage (flue gas) at the maximum and minimum load of the water heater. If necessary adjust these values, see for information chapter 14 "Adjusting and setting the burner".

Pump

Check the electrical parts and the motor of the pump for a correct functioning. The pump must generate a sufficient water flow over the (heat exchanger of the) water heater. When the pump produces noise, is operational for more than five years or has signs of water leakage it is recommended to replace the pump as a precaution.



When defects and abnormalities are found by the service engineer during service and maintenance and these are not repairable, this information should be reported to the owner/end-user of the installation. Also the owner/end-user should be advised how to fix these defects and these defects should be reported in the service report / log file of the water heater.



During service and maintenance the gas, supply air, flue gas and condensate connections are disconnected, checked and replaced. Make sure that all these components are mounted correctly before commissioning the water heater again.

Mounting the burner door correctly back onto the heat exchanger:

IMPORTANT:

Before mounting the burner door, make sure that its gaskets and insulation are in excellent shape.

If any signs of damage or ageing are present, these parts must be replaced.

The burner door must be mounted back on the heat exchanger as follows:

- Place the burner door with its holes over the six threaded studs.

Careful! When handling too rough or misplacing the holes over the threaded studs, the burner door insulation and/or gaskets can be damaged.

Assure yourself that the door is well positioned with respect to the threaded studs, before pushing it onto the exchanger.

- Now keep the burner door firmly in place by pushing the gas/air nose with one hand at the middle at point **A**.
- Then turn-tighten the flange nuts with the other hand as far as possible onto the threaded studs.

Now the burner door is in place and the nuts can be tightened with a torque key.

- Tighten the nuts in the order given in the picture below.
- The specified torque value for tightening the burner door flange nuts is **8 Nm.**

18 USER INSTRUCTIONS

After installing and commissioning of the water heater demonstrate the operation of the entire DHW system to the end-user. The user should be made familiar with all safety precautions of the water heater and the installation. The user should be instructed that service and maintenance of the water heater is required every twelve months. Regular service and maintenance is essential for a safe and proper operation of the water heater. Hand over the documents that are supplied with the water heater.

tighten in given order

torque value = 8 Nm



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