



Force W Range

Condensing thermal power modules for cascade installation



01

Introduction and general features



FORCE W is a family of high-power modular condensing generators, designed to fully meet design requirements in the field of new construction and redevelopment of central heating plants.

FORCE W generators and their accessories have been designed as a modular system, to be composed according to plant and design requirements.

The high degree of flexibility achieved allows FORCE W to be installed individually or to choose between several options for the cascade (INAIL certified) with up to four modules for a maximum total power of 600 kW.

The choice of materials and components, combined with the very high quality standards applied to the production processes, make the FORCE W range an excellence in accordance with the current Standards required by the best professionals in the industry.

The range consists of five product lines:

mod. W 60

Thermal output 58.0 kW - Useful heat output (50°C-30°C)
60.8 kW - Class ErP A - Efficiency >93 + 2log (Pn)

mod. W 80

Thermal output 74.4 kW - Useful heat output (50°C-30°C)
77.0 kW - Efficiency >93 + 2log (Pn)

mod. W 99

Thermal output 96.6 kW - Useful heat output (50°C-30°C)
100 kW - Efficiency >93 + 2log (Pn)

mod. W 120

Thermal output 113.0 kW - Useful heat output (50°C-30°C)
117 kW - Efficiency >93 + 2log (Pn)

mod. W 150

Thermal output 143 kW - Useful heat output (50°C-30°C)
148 kW - Efficiency >93 + 2log (Pn)

FORCE W generators reach performance levels such that the user can have access to all current incentives (according to the legislative framework) for the redevelopment of winter air-conditioning systems.

Code	Product
OMDLAAWA	FORCE W 60 (WF)
OMDLCAWA	FORCE W 80 (WF)
OMDLDAWA	FORCE W 99 (WF)
OMDLEAWA	FORCE W 120 (WF)
OMDLFAWA	FORCE W 150 (WF)

01. GENERAL FEATURES

Performance and efficiency		FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
Class ErP		A	-	-	-	-
Max thermal output	kW	58	74.4	96.6	113	143
Min thermal output	kW	15	15	19	19	24
Max heat output (80/60°C)	kW	57	72.9	94.7	110.6	139.8
Min heat output (80/60°C)	kW	14.7	14.7	18.7	18.7	23.6
Max heat output (50/30°C)	kW	60.8	77	100	117	148
Min heat output (50/30°C)	kW	16.3	16.3	20.5	20.5	25.9
Pmax efficiency (80/60°C)	%	98.3	98	98	97.9	97.8
Pmin efficiency (80/60°C)	%	98.3	98.3	98.3	98.3	98.3
Pmax efficiency (50/30°C)	%	104.8	103.5	103.5	103.5	103.5
Pmin efficiency (50/30°C)	%	108.5	108.5	108	108	108
Efficiency 30%	%	108.6	108.6	108.1	108.1	108.1

Combustion		FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
Gas categories		II2HM3B/P (IT) II2H3P (ES) II2ELS3P (PL) II2E3BP (RO) II2H3B/P (TR -RU)				
NOx emission class		6				
Flue gas temperature Pmax (80/60°C)	°C	64	70	71	72	73
Flue gas temperature Pmin (80/60°C)	°C	60	60	60	60	60
Flue gas temperature Pmax (50/30°C)	°C	44	48	53	54	54
Flue gas temperature Pmin (50/30°C)	°C	30	30	30	30	30
Flue gas flow rate Pmax	g/s	26.3	33.8	43.9	51.3	64.9
Flue gas flow rate Pmin	g/s	7.1	7.1	9	9	11.3
Max head at flue gas outlet	Pa	77	166	147	199	235
CO (O2= 0%) Pmax/Pmin	mg/kWh	110/50	130/50	105/6	110/6	135/28
Weighted CO (O2= 0%)	mg/kWh	75	85	49	50	50
NOx (O2= 0%) Pmax/Pmin	mg/kWh	65/26	70/26	53/20	54/20	65/22
Weighted NOx (O2= 0%)	mg/kWh	50	54	39	38	40
Combustion efficiency (80/60°C) Pmax	%	98.3	98.3	98.1	98.1	98
Combustion efficiency (80/60°C) Pmin	%	98.5	98.5	98.5	98.5	98.5
Flue leakage at Pmax (80/60°C)	%	1.7	1.7	1.9	1.9	2
Shell leakage at Pmax (80/60°C)	%	0.2	0.1	0.1	0.1	0.1
Combustion efficiency (50/30°C) Pmax	%	99.2	99	98.6	98.6	98.6
Combustion efficiency (50/30°C) Pmin	%	99.8	99.8	99.8	99.8	99.7
Flue leakage at Pmax (50/30°C)	%	0.8	1	1.4	1.4	1.4
Shell leakage at Pmax (50/30°C)	%	0.1	0.1	0.1	0.1	0.1
Condensate production (Pmax/Pmin)	kg/h	5.20/2.17	4.68/2.17	7.41/2.50	6.52/2.50	9.05/3.38

Specifications		FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
Max operating pressure	bar	6	6	6	6	6
Min operating pressure	bar	0.8	0.8	0.8	0.8	0.8
Max temperature	°C	85	85	85	85	85
Heating water content	litres	4.2	4.2	5.6	5.6	6.7
Protection rating	IP	X4D	X4D	X4D	X4D	X4D
Supply voltage	V/Hz	230/50	230/50	230/50	230/50	230/50
Electric power absorbed	W	60	93	164	230	250
Type of appliance		B23 / C13 / C33				

Dimensions and connections		FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
Height	mm	900	900	900	900	900
Width	mm	610	610	610	610	610
Depth	mm	460	460	460	460	460
Empty weight	kg	67	67	76	76	86
System delivery Ø	In.	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
System return Ø	In.	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Gas inlet Ø	In.	3/4	3/4	3/4	3/4	3/4
Flue gas outlet/Air inlet Ø	mm	100/150	100/150	100/150	100/150	100/150

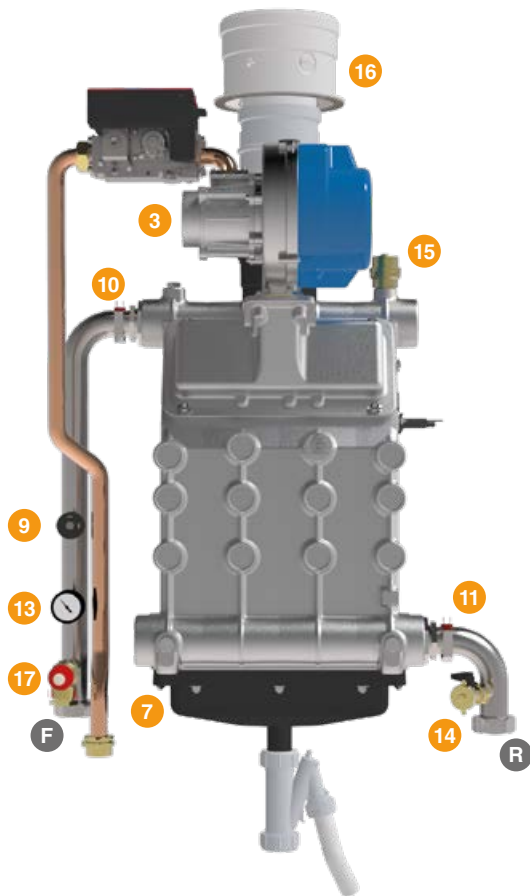
01. ACCESSORIES ON REQUEST FOR SINGLE INSTALLATION

> HYDRAULIC AND CONTROL ACCESSORIES -FLUE GAS ACCESSORIES

	DESCRIPTION	CODE
	low consumption modulating circulator. 8 m head	042070X0
	low consumption modulating circulator. 10 m head	042071X0
	Starting hydraulic unit: 1 x 3-way valve - 1 x 2-way valve - 1 x non-return valve - gaskets	042072X0
	kit for the management of a DHW cylinder with a thermostat (not supplied) (for heating only boilers)	013017X0
	additional sensor for cylinder and/or system delivery for cascade configurations with and without hydraulic separator	cable 2 m
		cable 5 m
	external probe	013018X0
	Flue gas terminal ø 100	1KWMA29K
	Temperature control - Water treatment - Plates see dedicated pages	
	neutralisers (see the chapter on condensation neutralisers for condensing boilers)	

	DESCRIPTION	CODE
	90° coaxial elbow ø 100/150 mm, 360° swivelling	041107X0
	Coaxial flue extension 1 m, ø 100/150 mm M/F	041108X0
	Coaxial flue extension 0.5 m, ø 100/150 mm M/F	041109X0
	Horizontal flue terminal 1 m, coaxial ø 100/150 mm. Supplied complete with wall gasket ø 150 mm	041110X0
	Vertical flue terminal 1 m coaxial ø 100/150 mm	041111X0
	Wall gasket ø 150 mm	041112X0
	PPS 90° elbow kit ø 100 mm	041077X0
	PPS smoke duct kit 1 m ø 100 mm MF	041073X0

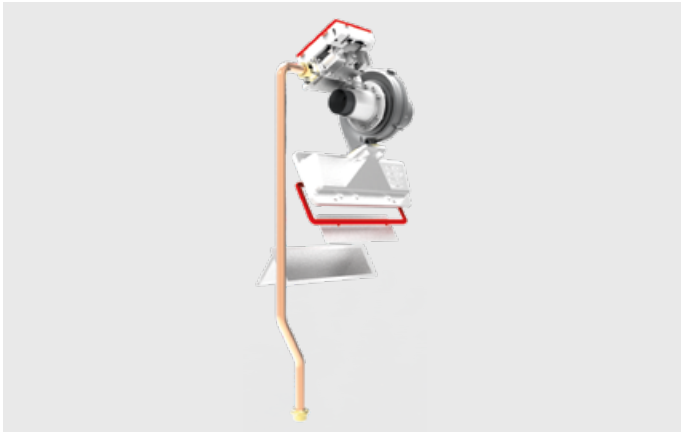
01. MAIN COMPONENTS



- 1 Premixing unit
- 2 Burner. The combustion unit can run on Natural Gas, LPG and Propane Air with conversion kits that can be installed by authorised service technicians. The pre-mixing unit, combined with the low NOx micro-flame burner, has allowed the generator to be certified in class 6 according to UNI 15502-1
- 3 Silencer
- 4 AL/Si alloy aluminium heat exchanger in a single block obtained by die-casting. The water passages inside the heat exchanger are particularly wide to ensure low pressure drops. Fully wetted combustion chamber integrated in the casting
- 5 Condensate collection manifold
- 6 Condensate drain
- 7 Flue gas safety sensor 110°C
- 8 Clapet valve. The flue gas manifold features a thermostat set at 110°C to guarantee the perfect operation of the flue gas expulsion system and a clapet valve with gravity damper which prevents the fumes from returning to the boiler. Appliances equipped with this device allow the designer to size the pressurised smoke duct
- 9 Water pressure switch min. 0.8 bar
- 10 System delivery temperature sensor
- 11 System return temperature sensor
- 12 Heat exchanger overtemperature safety sensor. The heat exchanger operating temperature is controlled by three independent sensors located and three different detection points. This ensures maximum safety during operation and protects the heat exchanger, increasing its service life.
- 13 Pressure gauge (the pressure can also be read on the display)
- 14 Boiler drain valve
- 15 Air bleed valve
- 16 Combustion analysis socket
- 17 6 bar safety valve
- F System delivery $\varnothing$ 1" 1/2
- R System return $\varnothing$ 1" 1/2
- G Gas inlet $\varnothing$ 1"
- F Coaxial flue gas outlet $\varnothing$ 100/150

FORCE W is supplied without the circulator, the hydraulic kit with the shut-off valves and the INAIL safety devices.
For correct installation, the boiler must always be sold with the following kits:

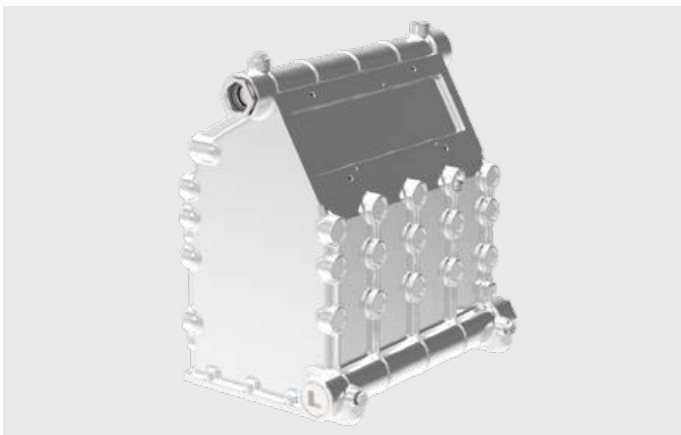
- Modulating circulator
- System hydraulic kit
- INAIL connection



• COMBUSTION UNIT

The combustion unit can run on Natural Gas and LPG with conversion kits that can be installed by authorised service technicians.

The premixing unit, combined with the low NOx micro-flame burner has allowed the generator to be certified in class 6 according to UNI 15502-1.



• HEAT EXCHANGER

Obtained by die-casting AL/Si alloy aluminium. It consists of a single block characterised by high mechanical strength to guarantee operation over time.

The water passages inside the heat exchanger are particularly wide to ensure low pressure drops. Fully wetted combustion chamber integrated in the casting.



• CLAPET VALVE

The flue gas manifold features a thermostat set at 110°C to guarantee the perfect operation of the flue gas expulsion system and a clapet valve with gravity damper which prevents the fumes from returning to the boiler. Appliances equipped with this device allow the designer to size the pressurised smoke duct.



• HEAT EXCHANGER PROTECTION SENSOR

The heat exchanger operating temperature is controlled by three independent sensors located at three different detection points (near the system delivery and return, and on the heat exchanger near the burner). This ensures maximum safety during operation and protects the heat exchanger, increasing its service life.

The sensor on the boiler body controls the Δt with the delivery system and, above a certain threshold, it generates a temporary or permanent lockout.

01. MAIN COMPONENTS

FORCE W is supplied without the circulator and the hydraulic kit on the generator delivery. For operation and correct installation, the boiler must always be sold with the circulator kit and the hydraulic kit.

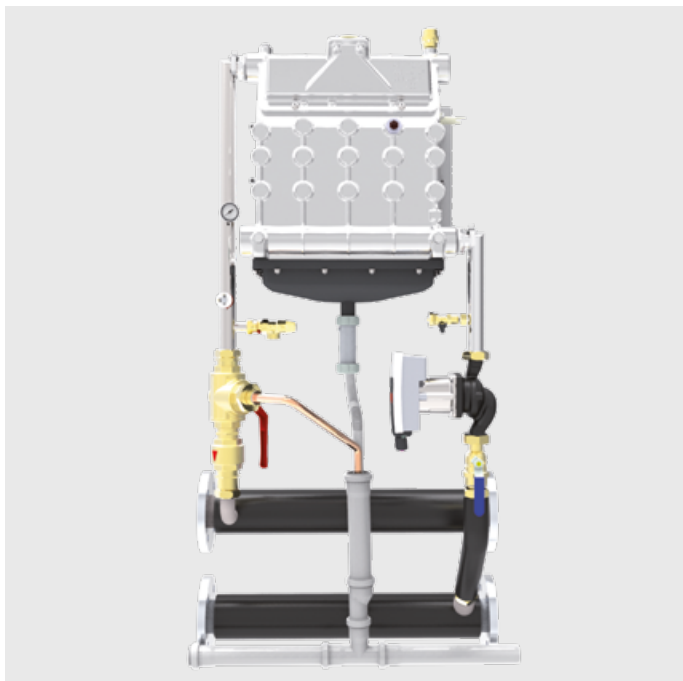


• CIRCULATOR

Two different types of circulator are available in the catalogue with 8 and 10 metres of head, respectively.

They are low consumption modulating devices with three different operating modes:

- At constant differential pressure.
- At variable differential pressure.
- At constant speed (3 control curves).



• HYDRAULIC UNIT

The generator's hydraulic unit consists of a two-way valve to be mounted on the system return, a three-way valve with discharge to the atmosphere to put the generator in a safe condition should it be necessary to disconnect it from the system, and a non-return valve.

FORCE W 60

Condensing heat generator in accordance with ErP directives, Range Rated certified for power adjustment to system demand and INAIL certified for cascade operation.

Premixed forced-draught sealed chamber appliance (type B23 - C13 - C33) with structure for wall-mounted installation, consisting of a single firebox with a thermal output of 58 kW and continuous modulation of heat output (at temperatures of 50/30°C) from 16.3 kW to 60.8 kW.

Maximum operating pressure 6 bar.

Delivery temperature adjustment range Tmax 80°C-Tmin 20°C

Protection rating IP X4D

Efficiency at Pmax (80/60° C) $> 93 + 2\log(P_n)$

Aluminium alloy (Al/Si) die-cast single block heat exchanger with low hydraulic pressure drops and a high exchange surface area capable of working at high ΔT_s .

Air-gas total premixing combustion unit with variable-speed fan supplied complete with silencer.

Runs on Natural Gas or LPG.

Low NOx metal fibre burner capable of ensuring class 6 emissions according to EN 15502-1 (weighted NOx emission 50 mg/kWh).

Gravitational shut-off smoke anti-return valve on the flue gas outlet path.

Three-point operating temperature control system consisting of the probe on the generator system delivery and return and a third safety and protection probe on the boiler body to control the Δt between the heat exchanger and system delivery temperatures.

The electronics supplied as standard with the generator (without the use of additional modules) are able to:

- Manage a two-user, high-temperature system
- Manage a DHW cylinder probe
- Manage a delivery probe for the secondary heating circuit
- Manage variable temperature operation in combination with an external probe
- Manage the Master/Slave type cascade system
- Set the type of cascade operation (sequential or parallel)
- Set the generators in such a way that they switch on in turn according to the hours of operation
- Manage generator operation remotely with 0/10 V, Opentherm and Modbus protocols.

FORCE W 80

Condensing heat generator in accordance with ErP directives, Range Rated certified for power adjustment to system demand and INAIL certified for cascade operation.

Premixed forced-draught sealed chamber appliance (type B23 - C13 - C33) with structure for wall-mounted installation, consisting of a single firebox with a thermal output of 74.4 kW and continuous modulation of heat output (at temperatures of 50/30°C) from 16.3 kW to 77.0 kW.

Maximum operating pressure 6 bar.

Delivery temperature adjustment range Tmax 80°C-Tmin 20°C

Protection rating IP X4D

Efficiency at Pmax (80/60° C) $> 93 + 2\log(P_n)$

Aluminium alloy (Al/Si) die-cast single block heat exchanger with low hydraulic pressure drops and a high exchange surface area capable of working at high ΔT_s .

Air-gas total premixing combustion unit with variable-speed fan supplied complete with silencer.

Runs on Natural Gas or LPG.

Low NOx metal fibre burner capable of ensuring class 6 emissions according to EN 15502-1 (weighted NOx emission 50 mg/kWh).

Gravitational shut-off smoke anti-return valve on the flue gas outlet path.

Three-point operating temperature control system consisting of the probe on the generator system delivery and return and a third safety and protection probe on the boiler body to control the Δt between the heat exchanger and system delivery temperatures.

The electronics supplied as standard with the generator (without the use of additional modules) are able to:

- Manage a two-user, high-temperature system
- Manage a DHW cylinder probe
- Manage a delivery probe for the secondary heating circuit
- Manage variable temperature operation in combination with an external probe
- Manage the Master/Slave type cascade system
- Set the type of cascade operation (sequential or parallel)
- Set the generators in such a way that they switch on in turn according to the hours of operation
- Manage generator operation remotely with 0/10 V, Opentherm and Modbus protocols.

FORCE W 99

Condensing heat generator in accordance with ErP directives, Range Rated certified for power adjustment to system demand and INAIL certified for cascade operation.

Premixed forced-draught sealed chamber appliance (type B23 - C13 - C33) with structure for wall-mounted installation, consisting of a single firebox with a thermal output of 96.6 kW and continuous modulation of heat output (at temperatures of 50/30°C) from 20.5 kW to 100.0 kW.

Maximum operating pressure 6 bar.

Delivery temperature adjustment range Tmax 80°C-Tmin 20°C

Protection rating IP X4D

Efficiency at Pmax (80/60° C) $> 93 + 2\log(P_n)$

Aluminium alloy (Al/Si) die-cast single block heat exchanger with low hydraulic pressure drops and a high exchange surface area capable of working at high ΔT_s .

Air-gas total premixing combustion unit with variable-speed fan supplied complete with silencer.

Runs on Natural Gas or LPG.

Low NOx metal fibre burner capable of ensuring class 6 emissions according to EN 15502-1 (weighted NOx emission 50 mg/kWh).

Gravitational shut-off smoke anti-return valve on the flue gas outlet path.

Three-point operating temperature control system consisting of the probe on the generator system delivery and return and a third safety and protection probe on the boiler body to control the Δt between the heat exchanger and system delivery temperatures.

The electronics supplied as standard with the generator (without the use of additional modules) are able to:

- Manage a two-user, high-temperature system
- Manage a DHW cylinder probe
- Manage a delivery probe for the secondary heating circuit
- Manage variable temperature operation in combination with an external probe
- Manage the Master/Slave type cascade system
- Set the type of cascade operation (sequential or parallel)
- Set the generators in such a way that they switch on in turn according to the hours of operation
- Manage generator operation remotely with 0/10 V, Opentherm and Modbus protocols.

FORCE W 120

Condensing heat generator in accordance with ErP directives, Range Rated certified for power adjustment to system demand and INAIL certified for cascade operation.

Premixed forced-draught sealed chamber appliance (type B23 - C13 - C33) with structure for wall-mounted installation, consisting of a single firebox with a thermal output of 113.0 kW and continuous modulation of heat output (at temperatures of 50/30°C) from 20.5 kW to 117.0 kW.

Maximum operating pressure 6 bar.

Delivery temperature adjustment range Tmax 80°C-Tmin 20°C

Protection rating IP X4D

Efficiency at Pmax (80/60° C) $> 93 + 2\log(P_n)$

Aluminium alloy (Al/Si) die-cast single block heat exchanger with low hydraulic pressure drops and a high exchange surface area capable of working at high ΔT_s .

Air-gas total premixing combustion unit with variable-speed fan supplied complete with silencer.

Runs on Natural Gas or LPG.

Low NOx metal fibre burner capable of ensuring class 6 emissions according to EN 15502-1 (weighted NOx emission 50 mg/kWh).

Gravitational shut-off smoke anti-return valve on the flue gas outlet path.

Three-point operating temperature control system consisting of the probe on the generator system delivery and return and a third safety and protection probe on the boiler body to control the Δt between the heat exchanger and system delivery temperatures.

The electronics supplied as standard with the generator (without the use of additional modules) are able to:

- Manage a two-user, high-temperature system
- Manage a DHW cylinder probe
- Manage a delivery probe for the secondary heating circuit
- Manage variable temperature operation in combination with an external probe
- Manage the Master/Slave type cascade system
- Set the type of cascade operation (sequential or parallel)
- Set the generators in such a way that they switch on in turn according to the hours of operation
- Manage generator operation remotely with 0/10 V, Opentherm and Modbus protocols.

FORCE W 150

Condensing heat generator in accordance with ErP directives, Range Rated certified for power adjustment to system demand and INAIL certified for cascade operation.

Premixed forced-draught sealed chamber appliance (type B23 - C13 - C33) with structure for wall-mounted installation, consisting of a single firebox with a thermal output of 143.0 kW and continuous modulation of heat output (at temperatures of 50/30°C) from 25.9 kW to 148.0 kW.

Maximum operating pressure 6 bar.

Delivery temperature adjustment range Tmax 80°C-Tmin 20°C

Protection rating IP X4D

Efficiency at Pmax (80/60° C) > 93 + 2log (Pn)

Aluminium alloy (Al/Si) die-cast single block heat exchanger with low hydraulic pressure drops and a high exchange surface area capable of working at high ΔT s.

Air-gas total premixing combustion unit with variable-speed fan supplied complete with silencer.

Runs on Natural Gas or LPG.

Low NOx metal fibre burner capable of ensuring class 6 emissions according to EN 15502-1 (weighted NOx emission 50 mg/kWh).

Gravitational shut-off smoke anti-return valve on the flue gas outlet path.

Three-point operating temperature control system consisting of the probe on the generator system delivery and return and a third safety and protection probe on the boiler body to control the Δt between the heat exchanger and system delivery temperatures.

The electronics supplied as standard with the generator (without the use of additional modules) are able to:

- Manage a two-user, high-temperature system
- Manage a DHW cylinder probe
- Manage a delivery probe for the secondary heating circuit
- Manage variable temperature operation in combination with an external probe
- Manage the Master/Slave type cascade system
- Set the type of cascade operation (sequential or parallel)
- Set the generators in such a way that they switch on in turn according to the hours of operation
- Manage generator operation remotely with 0/10 V, Opentherm and Modbus protocols.

01. ErP PRODUCT DATA SHEETS

Model: FORCE W 60

Brand: FERROLI

Condensing boiler: YES

Low temperature boiler (**): YES

Type B1 boiler: NO

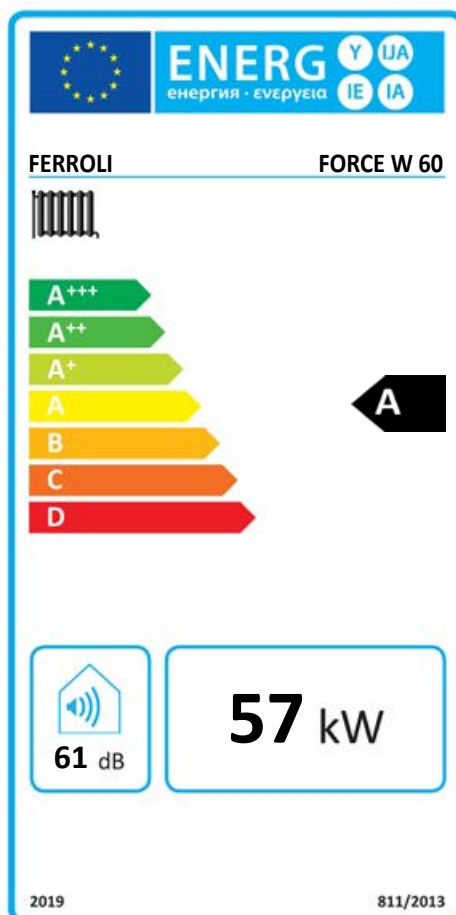
Mixed heating appliance: NO

Cogeneration appliance for space heating: NO

Element	Symbol	Unit	Value
Seasonal space heating energy efficiency class (from A++ to G)			A
Nominal heat output	P _n	kW	57
Seasonal space heating energy efficiency	η_s	%	93
Useful heat output			
At the nominal heat output and high temperature regime (*)	P ₄	kW	57.0
At 30% of the nominal heat output and low temperature regime (**)	P ₁	kW	11.9
Useful efficiency			
At the nominal heat output and high temperature regime (*)	η_4	%	88.5
At 30% of the nominal heat output and low temperature regime (**)	η_1	%	97.8
Auxiliary electricity consumption			
At full load	el _{max}	kW	0.060
At partial load	el _{min}	kW	0.025
In Standby mode	PSB	kW	0.003
Other elements			
Heat loss in Standby mode	P _{stby}	kW	0.140
Ignition burner energy consumption	P _{ign}	kW	0.000
Annual energy consumption	QHE	GJ	111
Indoor sound power level	LWA	dB	61
Nitrogen oxide emissions	NO _x	mg/kWh	50

(*) High temperature regime: return temperature at appliance inlet 60°C and usage temperature at appliance outlet 80°C.

(**) Low temperature: return temperature (at boiler inlet) for condensing boilers 30°C, for low temperature appliances 37°C and for other appliances 50°C.



01. ErP PRODUCT DATA SHEETS

Model: FORCE W 80

Brand: FERROLI

Condensing boiler: YES

Low temperature boiler (**): YES

Type B1 boiler: NO

Mixed heating appliance: NO

Cogeneration appliance for space heating: NO

Element	Symbol	Unit	Value
Nominal heat output	P _n	kW	73
Seasonal space heating energy efficiency	η_s	%	93
Useful heat output			
At the nominal heat output and high temperature regime (*)	P ₄	kW	72.9
At 30% of the nominal heat output and low temperature regime (**)	P ₁	kW	14.6
Useful efficiency			
At the nominal heat output and high temperature regime (*)	η_4	%	88.2
At 30% of the nominal heat output and low temperature regime (**)	η_1	%	97.8
Auxiliary electricity consumption			
At full load	el _{max}	kW	0.093
At partial load	el _{min}	kW	0.025
In Standby mode	PSB	kW	0.003
Other elements			
Heat loss in Standby mode	P _{stby}	kW	0.140
Ignition burner energy consumption	P _{ign}	kW	0.000
Annual energy consumption	QHE	GJ	136
Indoor sound power level	LWA	dB	62
Nitrogen oxide emissions	NO _x	mg/kWh	54

(*) High temperature regime: return temperature at appliance inlet 60°C and usage temperature at appliance outlet 80°C.

(**) Low temperature: return temperature (at boiler inlet) for condensing boilers 30°C, for low temperature appliances 37°C and for other appliances 50°C.

Model: FORCE W 99

Brand: FERROLI

Condensing boiler: YES

Low temperature boiler (**): YES

Type B1 boiler: NO

Mixed heating appliance: NO

Cogeneration appliance for space heating: NO

Element	Symbol	Unit	Value
Nominal heat output	P _n	kW	95
Seasonal space heating energy efficiency	η_s	%	93
Useful heat output			
At the nominal heat output and high temperature regime (*)	P ₄	kW	94.7
At 30% of the nominal heat output and low temperature regime (**)	P ₁	kW	18.7
Useful efficiency			
At the nominal heat output and high temperature regime (*)	η_4	%	88.2
At 30% of the nominal heat output and low temperature regime (**)	η_1	%	97.3
Auxiliary electricity consumption			
At full load	el _{max}	kW	0.120
At partial load	el _{min}	kW	0.021
In Standby mode	PSB	kW	0.003
Other elements			
Heat loss in Standby mode	P _{stby}	kW	0.170
Ignition burner energy consumption	P _{ign}	kW	0.000
Annual energy consumption	QHE	GJ	177
Indoor sound power level	LWA	dB	63
Nitrogen oxide emissions	NO _x	mg/kWh	39

(*) High temperature regime: return temperature at appliance inlet 60°C and usage temperature at appliance outlet 80°C.

(**) Low temperature: return temperature (at boiler inlet) for condensing boilers 30°C, for low temperature appliances 37°C and for other appliances 50°C.

01. ErP PRODUCT DATA SHEETS

Model: FORCE W 120

Brand: FERROLI

Condensing boiler: YES

Low temperature boiler (**): YES

Type B1 boiler: NO

Mixed heating appliance: NO

Cogeneration appliance for space heating: NO

Element	Symbol	Unit	Value
Nominal heat output	P _n	kW	111
Seasonal space heating energy efficiency	η_s	%	92
Useful heat output			
At the nominal heat output and high temperature regime (*)	P ₄	kW	110.5
At 30% of the nominal heat output and low temperature regime (**)	P ₁	kW	21.4
Useful efficiency			
At the nominal heat output and high temperature regime (*)	η_4	%	88.1
At 30% of the nominal heat output and low temperature regime (**)	η_1	%	97.3
Auxiliary electricity consumption			
At full load	el _{max}	kW	0.175
At partial load	el _{min}	kW	0.021
In Standby mode	PSB	kW	0.003
Other elements			
Heat loss in Standby mode	P _{stby}	kW	0.170
Ignition burner energy consumption	P _{ign}	kW	0.000
Annual energy consumption	QHE	GJ	201
Indoor sound power level	LWA	dB	64
Nitrogen oxide emissions	NO _x	mg/kWh	38

(*) High temperature regime: return temperature at appliance inlet 60°C and usage temperature at appliance outlet 80°C.

(**) Low temperature: return temperature (at boiler inlet) for condensing boilers 30°C, for low temperature appliances 37°C and for other appliances 50°C.

Model: FORCE W 150

Brand: FERROLI

Condensing boiler: YES

Low temperature boiler (**): YES

Type B1 boiler: NO

Mixed heating appliance: NO

Cogeneration appliance for space heating: NO

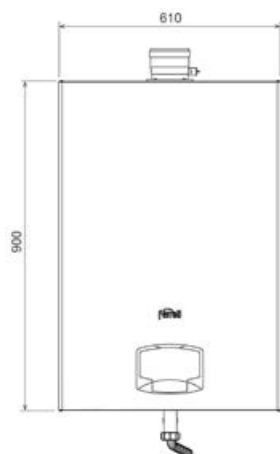
Element	Symbol	Unit	Value
Nominal heat output	P _n	kW	140
Seasonal space heating energy efficiency	η_s	%	93
Useful heat output			
At the nominal heat output and high temperature regime (*)	P ₄	kW	139.8
At 30% of the nominal heat output and low temperature regime (**)	P ₁	kW	27.1
Useful efficiency			
At the nominal heat output and high temperature regime (*)	η_4	%	88.1
At 30% of the nominal heat output and low temperature regime (**)	η_1	%	97.3
Auxiliary electricity consumption			
At full load	el _{max}	kW	0.250
At partial load	el _{min}	kW	0.022
In Standby mode	PSB	kW	0.003
Other elements			
Heat loss in Standby mode	P _{stby}	kW	0.190
Ignition burner energy consumption	P _{ign}	kW	0.000
Annual energy consumption	QHE	GJ	255
Indoor sound power level	LWA	dB	68
Nitrogen oxide emissions	NO _x	mg/kWh	40

(*) High temperature regime: return temperature at appliance inlet 60°C and usage temperature at appliance outlet 80°C.

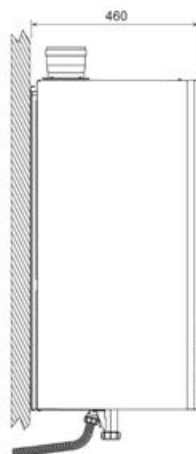
(**) Low temperature: return temperature (at boiler inlet) for condensing boilers 30°C, for low temperature appliances 37°C and for other appliances 50°C.

01. PHYSICAL AND DIMENSIONAL DATA

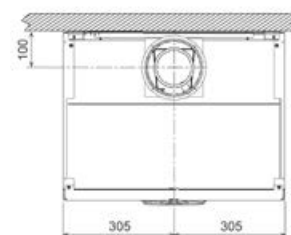
Overall dimensions of indoor unit



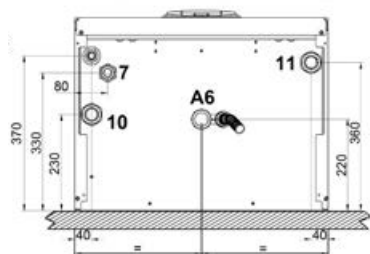
FRONT VIEW OF FORCE W



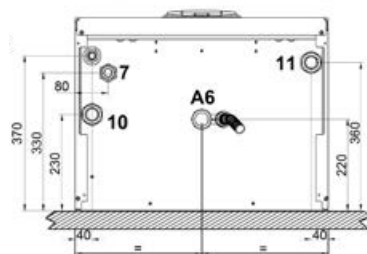
SIDE VIEW OF FORCE W



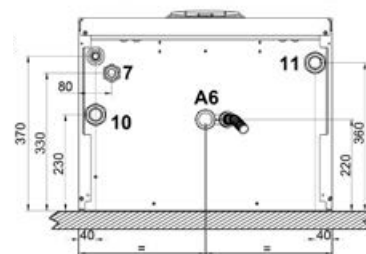
TOP VIEW



BOTTOM VIEW OF mod. FORCE W 60 - 80



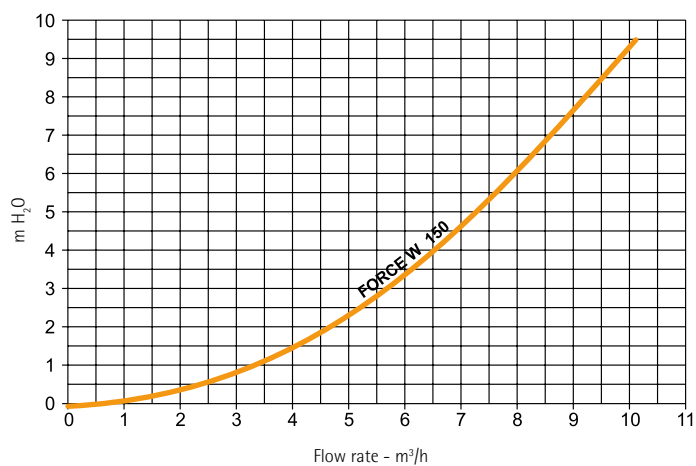
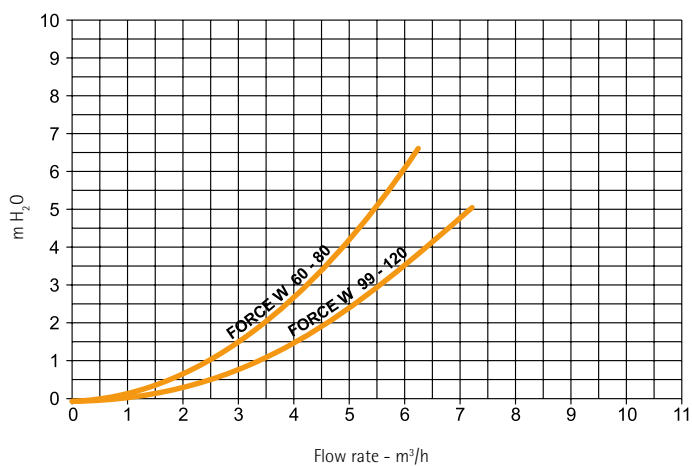
BOTTOM VIEW OF mod. FORCE W 99 - 120



BOTTOM VIEW OF mod. FORCE W 150

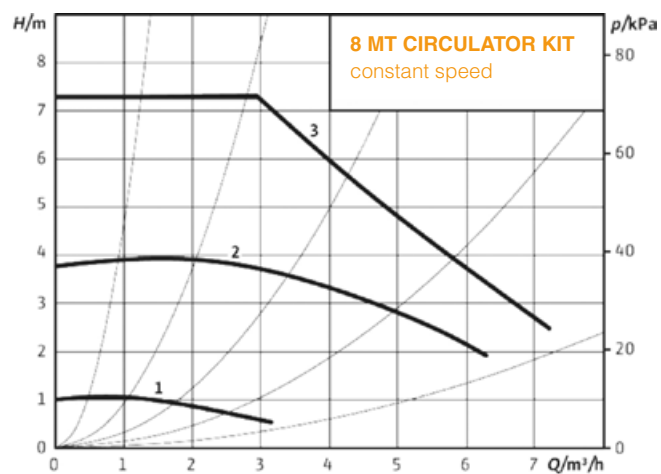
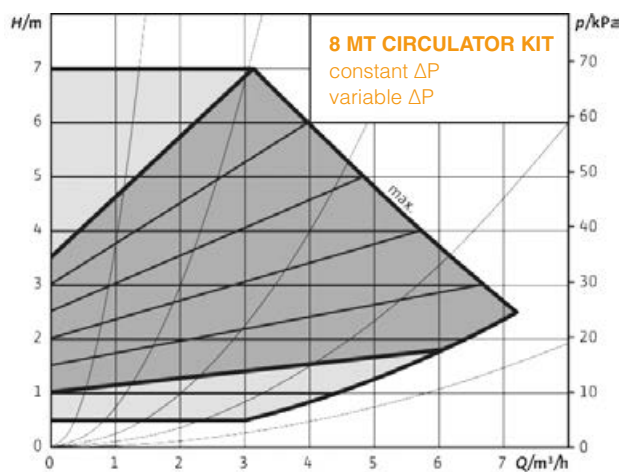
- 7 Ø 1" gas inlet
- 10 Ø 1" ½ System delivery
- 11 Ø 1" ½ System return
- A6 Condensate drain
- A1 Flue gas outlet Ø 100 mm

Generator pressure drop diagrams

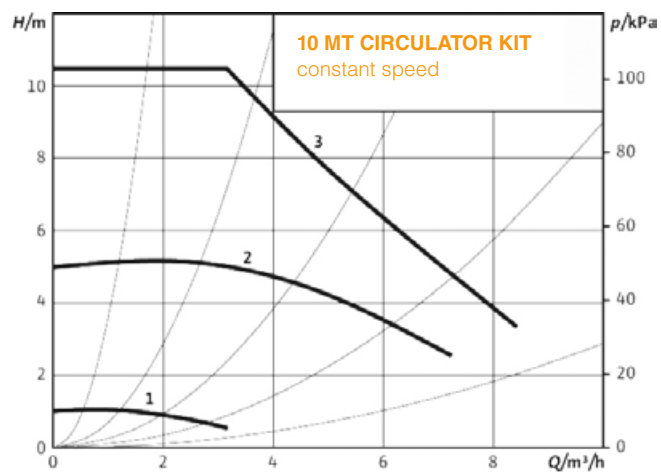
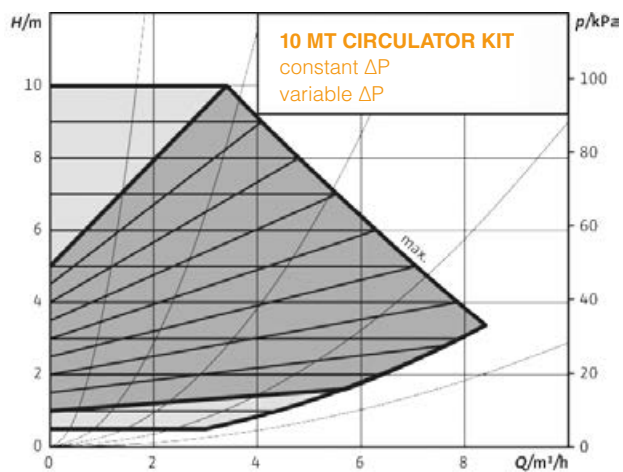


Circulator diagrams

8 m CIRCULATOR KIT



10 m CIRCULATOR KIT

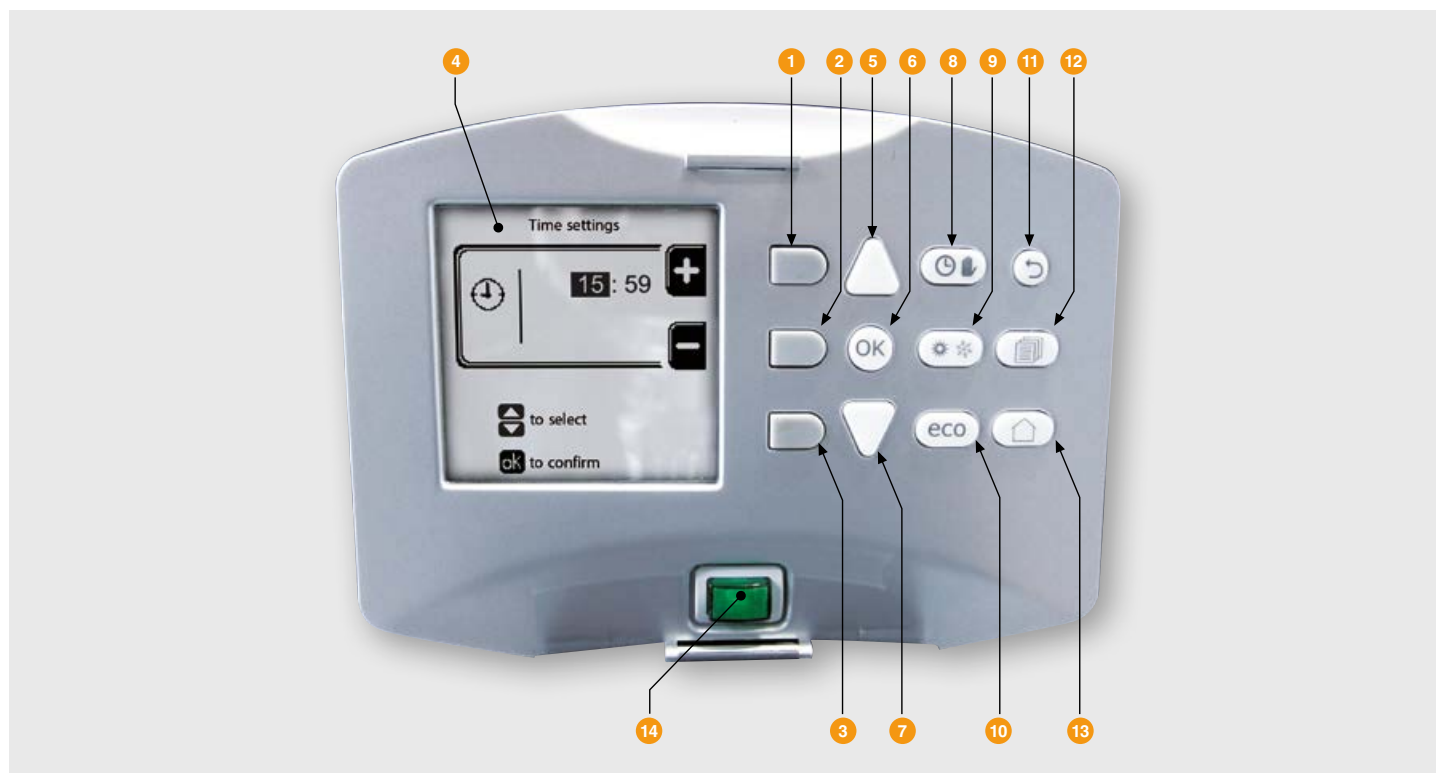




02

Electronic control and system solutions

• CONTROL PANEL



Control panel legend

- | | |
|----|---|
| 1 | Soft key 1 |
| 2 | Soft key 2 |
| 3 | Soft key 3 |
| 4 | Dot-matrix display (example of main screen) |
| 5 | Menu navigation key |
| 6 | Menu entry/confirm key |
| 7 | Menu navigation key |
| 8 | Automatic/Manual heating/DHW operation key |
| 9 | Summer/Winter mode selection key |
| 10 | Economy/Comfort mode selection key |
| 11 | Menu exit key |
| 12 | Main menu key |
| 13 | Home key (return to main screen) |
| 14 | Main switch |

CONTEXTUAL KEYS (part. 1, 2, 3) can be distinguished by their grey colour, the lack of screen printing and can take on a different meaning depending on the selected menu. It is essential to follow the indication provided by the display (icons and texts). for example, using contextual key 2 (part. 2) it is possible to access device information such as: sensor temperatures, operating powers, etc.

DIRECT KEYS (part. 8, 9, 10) always have the same function

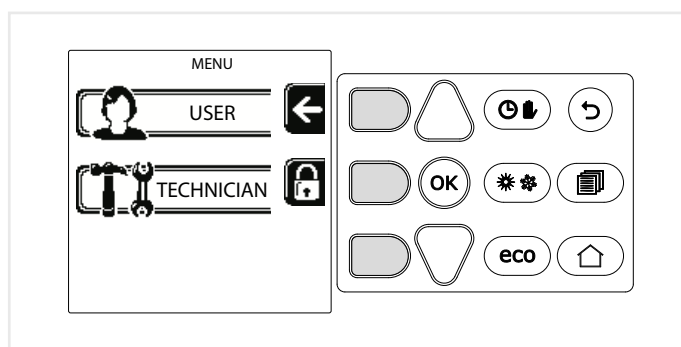
NAVIGATION/MENU KEYS

The navigation/menu keys (part. 5, 6, 7, 11, 12, 13) are used to navigate between the various menus implemented in the control panel

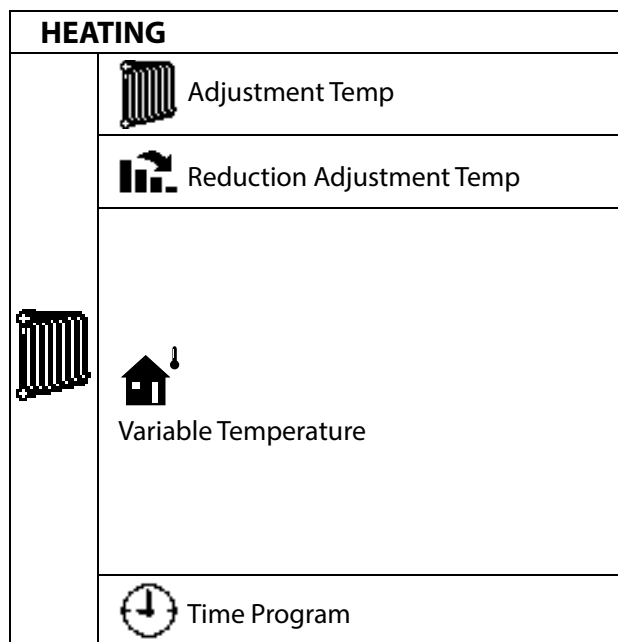
Access to the generator and system parameters via the control panel has two distinct operating levels.

The first one, called **USER MENU**, allows the owner and/or administrator to view the main parameters and make the basic adjustments related to running the central heating plant and the system.

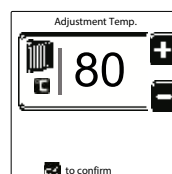
The second one, called **TECHNICAL MENU**, is reserved for qualified professionals and allows them to view and edit the default parameters of the electronic board.



• USER MENU

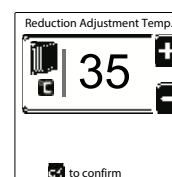


Heating temperature adjustment



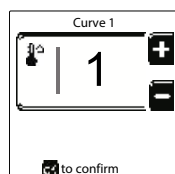
Access the **"USER" MENU > "HEATING" > "Adjustment Temp"** to change the temperature from a minimum of 20°C to a maximum of 80°C. Confirm by pressing OK.

Reduction adjustment temperature

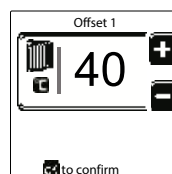


Access the **"USER" MENU > "HEATING" > "Reduction Adjustment Temp"** to change the delivery temperature adjustment range from 20/60°C (default) to 0/50°C.

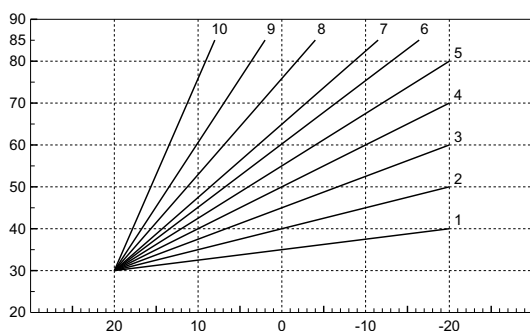
Compensation curve and curve shift



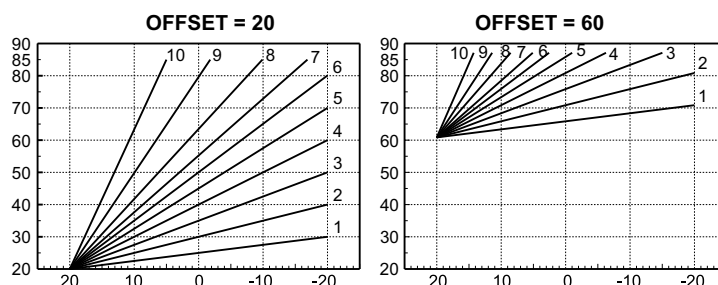
Access the **"USER" MENU > "HEATING" > "Variable Temperature"**. Set the desired curve from 1 to 10 according to the characteristic via the **"Curve1"** parameter and confirm by pressing OK. By setting the curve to 0, variable temperature adjustment is disabled.



Set the parallel shift of the curves from 20 to 60°C (fig. 29), via the **"Offset 1"** parameter and confirm by pressing OK.



Compensation curves

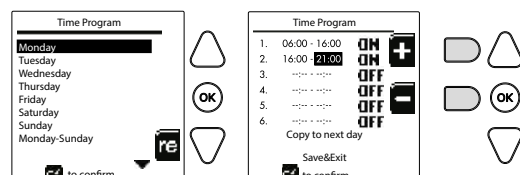


Parallel shift of the compensation curves

Time programming

Time programming is carried out in the same way for both heating and DHW; the two programs are independent.

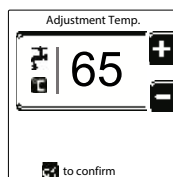
To program Heating, access the "Time Program" menu by following the path **"USER" MENU > "HEATING" > "Time Program"**.



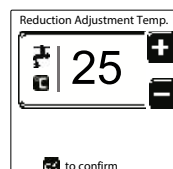
The program is of the **weekly type**: this means that **6 independent time slots can be set for each day** of the week; 4 options can be chosen for each time slot.

• USER MENU

DOMESTIC HOT WATER	
	Adjustment Temp
	Reduction Adjustment Temp
	Legionella
	Time Program
HOLIDAY FUNCTION	
	



DHW temperature reduction adjustment (with optional cylinder installed)
Access the “USER” MENU > “DOMESTIC HOT WATER” > “Adjustment Temp” to change the temperature from a minimum of 10°C to a maximum of 65°C. Confirm by pressing OK.



DHW temperature reduction (with optional cylinder installed)
to change the DHW temperature adjustment range from 10/65°C (default) to 0/50°C.

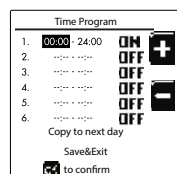
Legionella Programming (with optional cylinder installed)

This function must be activated by enabling an installer parameter.

Access the “Legionella” menu through the path “USER” MENU > “DOMESTIC HOT WATER” > “Legionella” to set:

- Anti-legionella day. Defines the day of the week during which the function will be activated.
- Anti-legionella time of day. Defines the start time of the function.
- Anti-legionella duration. Defines the duration (in minutes) of the function.
- Anti-legionella Adjustment Temperature Defines the DHW adjustment temperature during the function.

DHW time programming



To program the DHW, access the menu “Time Program” > “USER” MENU “DOMESTIC HOT WATER” > “Time Program”.

It is a weekly program: this means that **6 independent time slots can be set for each day of the week**. 4 options can be chosen for each time slot.

- **ON** - In the case a Heating/DHW demand, the boiler operates at the set Heating/DHW Adjustment Temperature.
-  In the case of a Heating/DHW demand, the boiler operates at the Reduced Adjustment Temperature. The Reduced temperature is obtained by subtracting the value of the Reduced Adjustment Temperature from the set Heating/DHW Adjustment Temperature.
- **OFF** - In the case of a Heating/DHW demand, the boiler will not activate Heating/DHW mode.
- **-- OFF** - Time slot disabled.

Holiday function

Access the “HOLIDAY FUNCTION” menu through the path “USER” MENU > “HOLIDAY FUNCTION” to set:

- Holiday start date.
- Holiday end date.

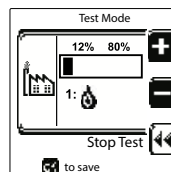
The display can activate two types of icons:

- The Holiday function is programmed but not yet active.
- The Holiday function is in progress. The boiler will behave as if Summer mode and Economy mode are active (with optional cylinder installed).

The Antifreeze function and the Legionella function (if activated) will remain active.

• USER MENU

MAINTENANCE	
	Test Mode
	Service Information
	Service Intervention Date
SETTINGS	
	Language
	Unit of Measurement
	Date Settings
	Time Settings



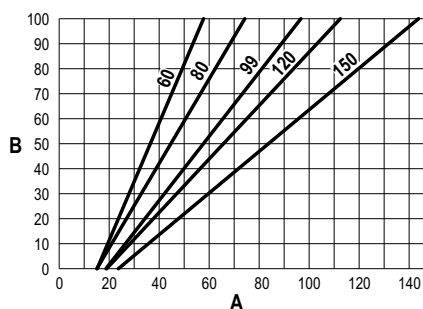
TEST mode activation

Reach the screen by scrolling through the menu following the path "USER" MENU > MAINTENANCE > Test Mode "Test Mode". The boiler switches on and reaches the maximum heating power (Range Rated).

Thermal Output Adjustment (RANGE RATED)

This boiler is of the "RANGE RATED" type (according to EN 483) and can be adapted to the heating requirements of the system by setting the maximum thermal output for operation in heating mode, as indicated below:

- Put the boiler in TEST mode
- Press the **soft keys 1 and 2** to increase or decrease the thermal output (minimum = 00 - Maximum = 100). See the "Thermal Output Adjustment" diagram.



Thermal output adjustment diagram
A = kW - B = Electronic Board Parameter

Information

From the main page (Home), press soft key 2.

Then use the "Menu navigation" keys to display the following values:

Heating demand	OT- Open Therm control demand
	Ta - Room thermostat demand
	0-10 Vdc- 0-10Vdc signal demand
	TA2-Second room thermostat demand
Heating circulator	ON/OFF
3-way heating valve	ON/OFF
3-way DHW valve	ON/OFF
Waiting time	ON/OFF
Delta T Protection	ON/OFF
Flame Supervisor	ON/OFF
Heating Sensor 1	°C
Safety Sensor	°C
Return Sensor	°C
DHW Sensor	°C
External Sensor	°C
Smoke Sensor	°C
Cascade Heating Sensor	°C
Fan Frequency	Hz
Burner Load	%
Plant water pressure	1.4bar = ON, 0.0 bar = OFF
Modulating circulator	%
Cascade modulating circulator	%
Ionising Current	uA
0-10 Vdc input	Vdc
Heating adjustment temperature	Setpoint (°C)
0-10 Vdc power level adjustment	Setpoint (%)

02. ELECTRONIC CONTROL

•TECH MENU

ACCESS TO THE SERVICE MENU AND CHANGING PARAMETERS CAN ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL.
The Technical Menu can be accessed only after entering the code 4 1 8. And it is valid for 15 minutes.

Parameter Menu - Configuration

There are 16 parameters indicated by the letter “b” which cannot be edited using the Remote Control.

Parameter	Description	Range	FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
b01	Gas type selection	Natural Gas/LPG	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
b02	Boiler type selection	1-9	7	7	7	7	7
b03	Water system pressure protection selection	0=Pressure switch 1=Flow switch 1 sec 2=Flow switch 3 sec 3=Flow switch 5 sec 4=Flow switch 10 sec 5=Pressure transducer	0	0	0	0	0
b04	Maximum fan frequency in DHW mode	0-255 Hz	150 Hz	190 Hz	195 Hz	225 Hz	240 Hz
b05	Maximum fan frequency in heating mode	0-255 Hz	150 Hz	190 Hz	195 Hz	225 Hz	240 Hz
b06	Maximum fan frequency in DHW/heating mode	0-255 Hz	50 Hz	50 Hz	45 Hz	45 Hz	50 Hz
b07	Minimum fan frequency offset	0-255 Hz	40 Hz	40 Hz	40 Hz	40 Hz	40 Hz
b08	Operation selection Variable output relay	0=Burner on 1=Legionella pump 2=Boiler room ventilation 3=Motorised shut-off valve	0	0	0	0	0
b09	Post-Ventilation	0-120 seconds	30	30	30	30	30
b10	Pre-Ventilation boiler room	1-15 minutes	1	1	1	1	1
b11	Post-Ventilation boiler room	1-15 minutes	1	1	1	1	1
b13	Not implemented	-	-	-	-	-	-
b14	Maximum flue gas temperature	0-125°C	110	110	110	110	110
b15	Fan type selection	-	-	-	-	-	-
b16	Pump seizing protection operation time	0-20 seconds	5	5	5	5	5

Notes on parameter b02

b02=7 = heating only boiler

b02=8 = heating boiler and DHW storage tank with double circulator

b02=9 = heating boiler and DHW storage tank with three-way valve

•TECH MENU

Parameter Menu - Transparent

There are 31 parameters indicated by the letter “P” which can also be edited using the Remote Control.

Parameter	Description	Range	FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
P01	Ignition Power	0-100%	30	30	30	30	30
P02	Heating ramp	1-10°C/minute	1	1	1	1	1
P03	Minimum virtual setpoint temperature	20-80°C	20	20	20	20	20
P04	Heating wait time	0-10 minutes	4	4	4	4	4
P05	Heat post circulation	0-255 minutes	3	3	3	3	3
P06	Pump operation	0-3 Operation strategy	0	0	0	0	0
P07	Minimum speed modulating pump	0-100%	30	30	30	30	30
P08	Modulating pump start speed	0-100%	75	75	75	75	75
P09	Maximum modulating pump speed	30-100%	100	100	100	100	100
P10	Pump switch-off temperature during Post Circulation	0-100°C	35	35	35	35	35
P11	Pump switch-on hysteresis temperature during Post Circulation	0-20°C	5	5	5	5	5
P12	Minimum heating user setpoint	10-90°C	20	20	20	20	20
P13	Maximum heating user setpoint	20-90°C	80	80	80	80	80
P14	Maximum heating power	0-100%	80	80	80	80	80
P15	DHW ramp	1-10°C/min	5	5	5	5	5
P16	DHW wait time	0-255 seconds	120	120	120	120	120
P17	Dhw pump post circulation	0-255 seconds	30	30	30	30	30
P18	Not implemented	-	-	-	-	-	-
P19	Not implemented	-	-	-	-	-	-
P20	DHW maximum power	0-100%	80%	80%	80%	80%	80%
P21	Not implemented	-	-	-	-	-	-
P22	Not implemented	-	-	-	-	-	-
P23	Not implemented	-	-	-	-	-	-
P24	Fan frequency in standby	0-255 Hz	0	0	0	0	0
P25	Modulating pump adjustment temperature	0-60°C	20	20	20	20	20
P26	Primary heat exchanger protection temperature	0-80°C	35	35	35	35	35
P27	Minimum system pressure value	-	-	-	-	-	-
P28	Rated system pressure value	-	-	-	-	-	-
P29	Exchanger protection triggered	0=No F43, 1-15=1-15°C/second	0=No F43	0=No F43	0=No F43	0=No F43	0=No F43
P30	Heating hysteresis after switch-on	6-30°C	10	10	10	10	10
P31	Heating hysteresis timer after switch-on	0-180 seconds	60	60	60	60	60

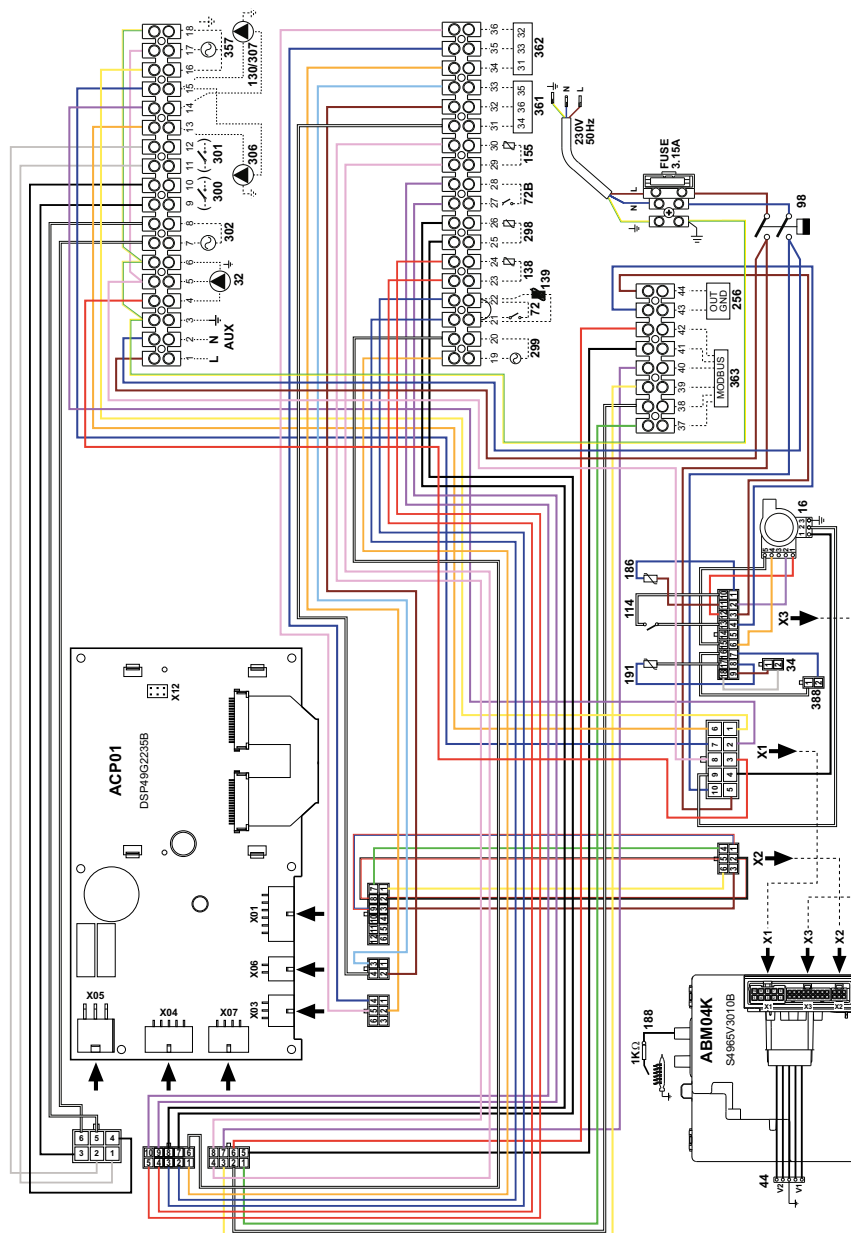
•TECH MENU

Parameter Menu - System type

There are 23 parameters indicated by the letter "P" which cannot be edited using the Remote Control.

Parameter	Description	Range	FORCE W 60	FORCE W 80	FORCE W 99	FORCE W 120	FORCE W 150
P.01	Heating demand selection	0-5	0	0	0	0	0
P.02	Cascade sensor selection	0=Disabled 1 or 2=Enabled	0	0	0	0	0
P.03	No function	0-1	0	0	0	0	0
P.04	3-way valve time	0-255 seconds	0	0	0	0	0
P.05	Activation timer*	0-255 minutes	1	1	1	1	1
P.06	Deactivation timer*	0-255 minutes	5	5	5	5	5
P.07	Activation power*	0-100%	70	70	70	70	70
P.08	Deactivation power*	0-100%	25	25	25	25	25
P.09	Hydraulic separator function	OFF =Disabled ON =Enabled	OFF	OFF	OFF	OFF	OFF
P.10	System loading function	OFF =Disabled ON =Enabled	OFF	OFF	OFF	OFF	OFF
P.11	3-way valve selection	0 =2 or 3 wires 1 =2 wires	0	0	0	0	0
P.12	0-10Vdc Heating voltage OFF (Temperature Control)**	0.1-10 Vdc	2.5	2.5	2.5	2.5	2.5
P.13	0-10Vdc Heating voltage ON (Temperature Control)**	0.1-10 Vdc	3.0	3.0	3.0	3.0	3.0
P.14	0-10Vdc Maximum Voltage (Temperature Control)**	0.1-10 Vdc	10	10	10	10	10
P.15	0-10Vdc Minimum Temperature (Temperature Control)**	0-100°C	20	20	20	20	20
P.16	0-10Vdc Maximum Temperature (Temperature Control)**	0-100°C	90	90	90	90	90
P.17	0-10Vdc Heating voltage OFF (Power Control)**	0.1-10 Vdc	2.5	2.5	2.5	2.5	2.5
P.18	0-10Vdc Heating voltage ON (Power Control)**	0.1-10 Vdc	3.0	3.0	3.0	3.0	3.0
P.19	0-10Vdc Maximum Power (Power Control)**	0.1-10 Vdc	10	10	10	10	10
P.20	0-10Vdc Minimum Power (Power Control)**	0-100%	0	0	0	0	0
P.21	0-10Vdc Maximum Power (Power Control)**	0-100%	100	100	100	100	100
P.22	Slave boiler DHW enabling (Self-cascade)	OFF =Disabled ON =Enabled	OFF	OFF	OFF	OFF	OFF
P.23	Slave boiler continuous comfort (Ax5200SQ)	OFF =Disabled ON =Enabled	OFF	OFF	OFF	OFF	OFF

02. WIRING DIAGRAM

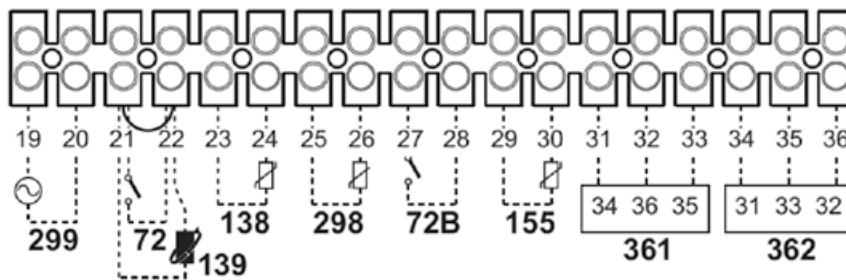


LEGEND

14	Safety valve	193	Siphon
16	Fan	196	Condensate tray
32	Heating circulator (not supplied)	256	Modulating heating circulator signal
34	Heating temperature sensor	275	Drain valve
36	Automatic air vent	298	Cascade temperature sensor (not supplied)
44	Gas valve	299	0-10 Vdc input
72	Room thermostat (not supplied)	300	Burner on contact (clean contact)
72b	Second room thermostat (not supplied)	301	Fault contact (clean contact)
95	2-wire 3-way valve (not supplied)	302	Remote reset input (230 Volt)
	A = Heating phase	306	Heating system circulator (not supplied)
	B = Neutral	307	Second heating system circulator (not supplied)
98	Switch	348	3-wire 3-way valve (not supplied)
114	Water pressure switch		A = Heating phase
130	DHW circulator (not supplied)		B = Neutral
138	External probe (not supplied)		C = DHW phase
139	Remote control (not supplied)	357	Fault contact (230 Volt)
145	Hydrometer	361	Next module cascade connection
154	Condensate drain pipe	362	Previous module cascade connection
155	Cylinder temperature probe (not supplied)	363	MODBUS communication
186	Return sensor	374	Aluminium heat exchanger
188	Ignition/Ionisation electrode	388	Safety sensor
191	Flue gas temperature sensor	A6	Condensate drain connection

02. WIRING DIAGRAM

• LOW VOLTAGE TERMINAL BLOCK DETAIL



298 - Cascade installation delivery sensor input

By connecting the NTC sensor and parametrising the electronics on board the machine, the generator modulates power according to the temperature detected by the sensor on the delivery manifold, ignoring the individual temperature sensors located on the delivery lines of each generator (ref. 278 of the wiring diagram).

155 - DHW production sensor input

By connecting the DHW NTC sensor, the DHW production functions are automatically enabled.

Characteristic data of DHW NTC probe and cascade system delivery.

NTC thermistor 10,000 Ohm $\pm$ 3% at 25°C B 3977 $\pm$ 0.75% (25-85)

T (°C)	R (ohm)	T (°C)	R (ohm)	T (°C)	R (ohm)	T (°C)	R (ohm)	T (°C)	R (ohm)	T (°C)	R (ohm)	T (°C)	R (ohm)
-20	96125	0	32505	20	12483	40	5332	60	2492	80	1257	100	677
-19	90743	1	30898	21	11935	41	5123	61	2404	81	1216	101	657
-18	85694	2	29381	22	11414	42	4923	62	2319	82	1178	102	638
-17	80957	3	27946	23	10919	43	4732	63	2238	83	1141	103	620
-16	76510	4	26590	24	10447	44	4549	64	2160	84	1105	104	602
-15	72335	5	25308	25	9999	45	4374	65	2086	85	1070	105	585
-14	68412	6	24094	26	9572	46	4207	66	2014	86	1037	106	568
-13	64725	7	22946	27	9166	47	4047	67	1945	87	1005	107	552
-12	61259	8	21859	28	8779	48	3894	68	1879	88	974	108	537
-11	57999	9	20829	29	8411	49	3748	69	1815	89	944	109	522
-10	54932	10	19854	30	8060	50	3608	70	1754	90	915	110	507
-9	52045	11	18930	31	7726	51	3473	71	1695	91	887	111	493
-8	49327	12	18054	32	7407	52	3345	72	1638	92	860	112	480
-7	46767	13	17223	33	7103	53	3222	73	1584	93	835	113	467
-6	44354	14	16436	34	6813	54	3104	74	1532	94	810	114	454
-5	42080	15	15689	35	6537	55	2991	75	1481	95	785	115	442
-4	39936	16	14980	36	6273	56	2882	76	1433	96	762	116	430
-3	37914	17	14306	37	6021	57	2778	77	1386	97	740	117	418
-2	36006	18	13667	38	5761	58	2679	78	1341	98	718	118	407
-1	34205	19	13060	39	5551	59	2583	79	1298	99	607	119	396

361 - 362 Terminal block for self-cascade

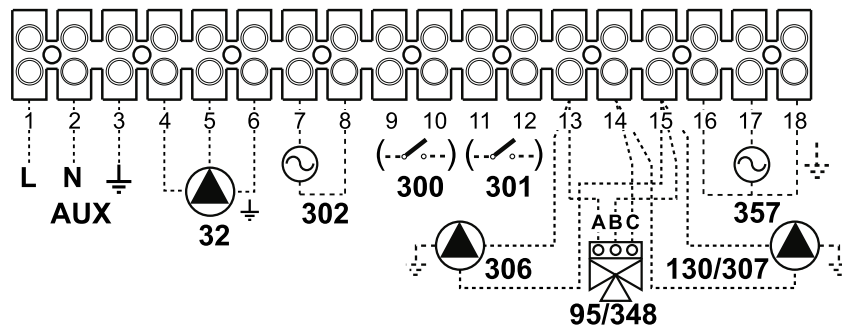
See the "Cascade configuration" section.

361 - Cascade connection with the next module

362 - Cascade connection with the previous module

02. WIRING DIAGRAM

• HIGH VOLTAGE TERMINAL BLOCK DETAIL



L/N AUX Power supply 230 V/50 Hz

Support terminals for the power supply of any auxiliaries.

32 - Primary loop circulator power supply

This circulator is dedicated exclusively to circulation between the generator and any heat exchanger or hydraulic separator. It follows the logic of the NTC sensor on the generator delivery line (Ref. 278 wiring diagram) or, in the case of modular cascade installation, that of the NTC sensor on the delivery manifold (Ref. 155 wiring diagram).

N.B. It cannot be used to serve a heating system in addition to the two served by the dedicated circulators (Ref. 306-307 wiring diagram).

302 - REMOTE RESET input

Powering terminals 7 and 8 at 230 V/50 Hz resets any lockouts due to a fault.

300 - Burner on indication (clean contact output):

Installer Parameter = 0 (default): burner on indication

Installer Parameter = 1: output powered at 230 V on activation of anti-legionella cycle. If connected to the DHW recirculation pump, the anti-legionella cycle can be run on the entire system.

Installer Parameter = 2: an external fan in the boiler room is powered each time there is a burner ignition demand.

Installer Parameter = 3: the contact is closed each time there is a heat demand (heating, DHW, test, antifreeze). It can be used in the case of cascade installations with motorised shut-off valves for each generator.

301 - Fault indication (clean contact output)

The output contact (Phase and Neutral at 230 Vac) is closed each time a fault is generated.

357 - 230V/50Hz fault indication

In the event of a lockout due to a fault, the terminals are powered.

02. MODBUS IMPLEMENTATION

IMPORTANT NOTE

Modbus can be used to control an individual boiler by means of the variables listed below.

In the case of boilers connected in cascade, it is possible to connect the cascade master boiler via Modbus, and therefore control the operating modes, the setpoints and the alarms of the cascade as a whole.

It is not possible to control and monitor the slave boilers of a cascade individually via Modbus.

To test MODBUS communication, it is advisable to use the free QMODBUS SW (<http://qmodbus.sourceforge.net/>).

The connection port is a non-isolated two-wire RS485 + GND.

It is not necessary to set/enable any parameters from the keyboard; simply connect to the specific terminals and communicate.

Supported commands	
The Dot-Matrix display has implemented the basic Modbus commands	
0x03	Read Holding Registers
0x04	Read Input Registers
0x06	Write Single Register
0x10	Write Multiple Registers
0x11	Report Slave ID

Communication settings - fixed and not editable	
Description	Default
speed	38400
data bit	8
parity	N
stop bit	1
Flow contr.	none

Note on 0x11 - Report Slave ID

This command returns a string with the identification of the Dot-Matrix display.

The identification contains information about the product name and software version.

Example: "DSP2110 v.00.04" - DSP2110 - product name

The default Modbus address for all boilers is 1.

To set a different Modbus address, access register ID=61440 and set a value between 1 - 247.

It is not possible to set addresses from the boiler keyboard.

Description of variable	ID	R/W	Accessible by command	Name	Format	Range	Notes
Boiler status	0	R/-	0x04 (Input registers)	MB: Esys flags	Flag8	0-255	Bit: description 0: CH mode 1: DHW mode 2: Test mode 3: flame
Device status				LB: Esys flags	Flag8	0-255	Bit: description 0: fault 1: valve 1 2: valve 2 3: aps - air pressure switch - not used 4: fan 5: pump
Boiler lockout	1	R/-	0x04 (Input registers)	MB: Error flags	Flag8	0-255	Bit: description 1: lockout
Error code				LB: Error code	U8	0-99	OEM specific error number. OEM specific error
For cascade only	2	R/-	0x04 (Input registers)	MB:			For cascade only
Error source identification - combustion board or display				LB: Error source	U8	0-F	0: cascade combustion board F: Dot-Matrix display

02. MODBUS IMPLEMENTATION

	ID	R/W	Accessible by command	Name	Format	Range	Notes
For cascade only				MB:			For cascade only
Cascade functional mode	3	R/-	0x04 (Input registers)	LB: Comfort state	U8	0-255	Cascade state: cascade functional mode 0: Standby 1: CH init - CH heating initialisation 2: CH mode - CH heating mode 3: CH end - CH heating mode end 4: DHW init - DHW initialisation 5: DHW mode 6: DHW end - DHW mode end 7: CHDHW init - CH and DHW initialisation 8: CHDHW mode - CH and DHW mode 9: CHDHW end - CH and DHW mode end 10: CH frost init - CH antifreeze initialisation 11: CH frost mode - CH antifreeze mode 12: CH frost end - CH antifreeze end 13: CH manual test init - CH manual test initialisation 14: CH manual test mode - CH heating manual test 15: CH cascade test init - cascade test initialisation 16: CH cascade test run
Cascade functional status	4	R/-	0x04 (Input registers)	MB	Flag8	0-255	
				LB - Cascade status	Flag8	0-255	Bit description 0: test mode [active, inactive] 1: DHW mode [active, inactive] 2: heating mode [active, inactive] 3: antifreeze [active, inactive] 4: flame presence [present, not present] 5: - CH heating pump [active, inactive] 6: DHW pump [active, inactive] 7: Cascade pump [active, inactive]
Boiler board reset	256	-/W	0x06 (Write single register)	MB: 0xAA	U8		The Dot-Matrix display provides a reset command. Resetting is necessary when the previous command returns a value other than zero.

02. MODBUS IMPLEMENTATION

Commands	ID	R/W	Accessible by command	Name	Format	Range	Notes
DHW enabling/ disabling	S12	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB: Heat demand flags	U8	0-255	Bit: description 0: DHW enabling
Heat demand states				LB: Heat demand	U8	0-255	Reading 0 = heat demand not detected 0x55 = heat demand present 0xFF = test mode demand present Write 0: heating demand not present 0x55 = heating demand present 0xFF = Test demand 0xFF = test demand - The value is valid for 30 seconds after the last valid write. When this register is written, the Modbus control logic is activated and registers 513, 514 are used for control.
Power demand %	513	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB:			
				LB: Max percentage	U8	0-100	0-100% maximum power percentage Modbus control demand
CH heating setpoint setting	514	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB:			
				LB: Control Set Point	U8	Limited by ext. probe op. CH setpoint and max setpoint limit.	Setpoint control in °C. This value is used as the target temperature for the delivery sensor, when there is a heat demand via Modbus.
Heating delivery temperature	768	R/-	0x04 (Input registers)	CH delivery temperature	S16		CH heating delivery temperature Value *0.1 [°C] example : 278 = 27.8°C 0x8000 invalid value
Heating return temperature	769	R/-	0x04 (Input registers)	MB:			
				LB: CH return temperature	S8		CH Heating return temperature Value in °C
DHW temperature	770	R/-	0x04 (Input registers)	MB:			
				LB: DHW temperature	S8		Value in °C

02. MODBUS IMPLEMENTATION

	ID	R/W	Accessible by command	Name	Format	Range	Notes
Flue gas probe temperature	771	R/-	0x04 (Input registers)	MB:			Value in °C 0x8000 - invalid value
				LB: Flue temperature	S8		Switch: ad value > 250 0x7FFF – smoke sensor open ad value < 5 0x0000 – smoke sensor closed If the sensor input is not within the limits 0x8000 - invalid value
External probe temperature	772	R/-	0x04 (Input registers)	MB:			
				LB: OTC temperature	S8		External probe °C 0x8000 - invalid value
Water pressure	773	R/-	0x04 (Input registers)	MB:			
				LB: Water pressure (bar)	U8		Value measured by pressure sensor/pressure switch value * 0.1 [bar]
Flame current	774	R/-	0x04 (Input registers)	MB:			
				LB: Flame current	U8		Flame current in uA
Modulation level	775	R/-	0x04 (Input registers)	MB:			
				LB: Modulation	U8		Current modulation level
Delivery setpoint	776	R/-	0x04 (Input registers)	MB:			
				LB: Calculated setpoint Setpoint calcolato	U8		Current delivery sensor setpoint. Value in °C. 0x8000 Invalid value if a setpoint is not set
Maximum heating setpoint	1280	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB:			
				LB: CH set point max	U8		Maximum user CH setpoint

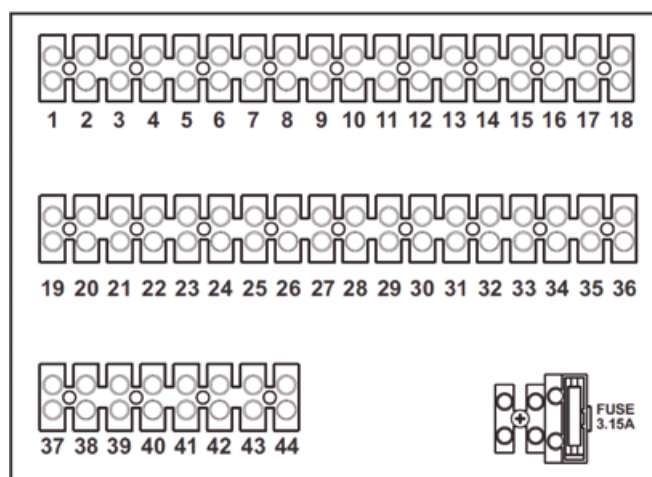
	ID	R/W	Accessible by command	Name	Format	Range	Notes
DHW setpoint	1281	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB:			
				LB: DHW setpoint	U8		User DHW setpoint
Boiler modbus address	61440	R/W	0x03 (Read Holding Registers) 0x06 (Write single register) 0x10 (Write multiple registers)	MB:			
				LB: Modbus address	U8	1-247	Boiler modbus address

02. MODBUS IMPLEMENTATION

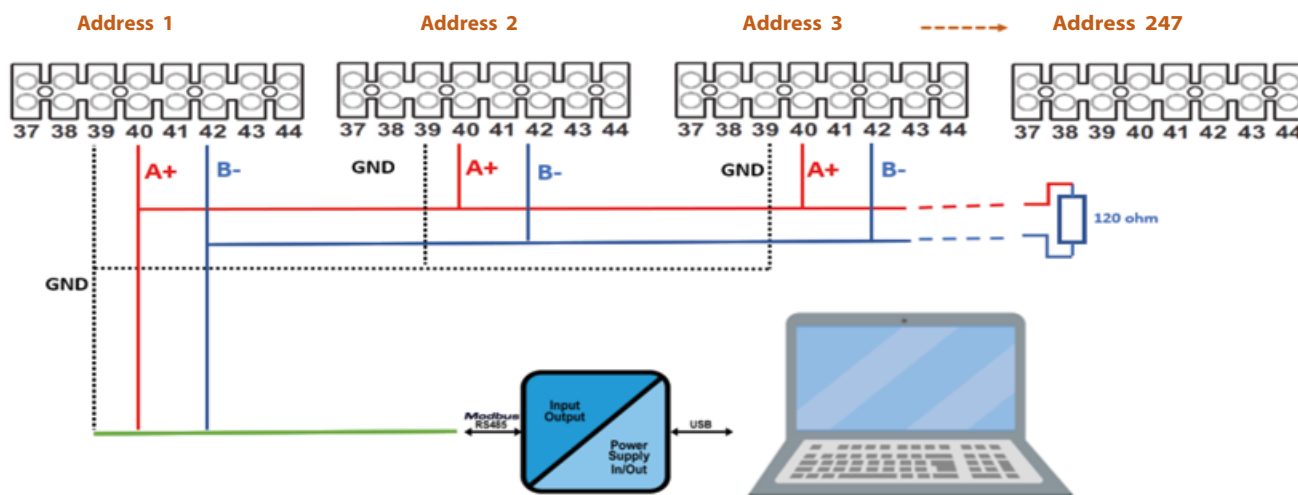
MODBUS connection terminals

Terminals	Descriptions
39	MODBUS Gnd
40	Rs485+ / MODBUS A
42	RS485- / MODBUS B

“FORCE” TERMINAL BLOCK - THE MODBUS TERMINALS ARE 39-40-42



EXAMPLE OF BOILER CONNECTION ON MODBUS NETWORK



Many RS-485 devices feature a GND (ground) terminal, in order to provide a common voltage reference for all RS-485 transceivers of the bus. In this case, it is necessary to connect all GND pins of the devices to each other, using another wire of the RS-485 cable. However, the GND pin is not necessary for DC-powered boards (like Ferroli boilers), as the common voltage reference is represented by the negative pole. The GND pin must not be connected to the system ground and GND must not be connected to the cable shielding, but another wire of the RS-485 can be used. To avoid reflected signals, a 120 Ohm terminating resistor must be installed at the ends of the main cable if it is longer than 50 m. The terminating resistor must be used only at the ends of the main cable. If the total length of the main cable is less than 50 m, it is not necessary to install terminating resistors. For a good connection, the cable to be used is a shielded twisted pair cable, plus another cable for GND (3 wires).

The Belden 3105A cable may be suitable, but different cable types with different characteristics can be used. For example, the cable can consist of two conductors twisted together.

The shielding can be braided (consisting of a group of thin conductor wires) or be a foil (consisting of a metal foil wrapped around the conductors): the two types are equivalent.





03

Installations

FORCE W SYSTEM

The **FORCE W cascade system** has been designed to facilitate cascade installation.

The generators are supplied (optional) with all the accessories required to install the cascade in the central heating plant quickly, sturdily and safely:

1. The FORCE W range can be installed in a cascade system with **combinations of 2, 3 and 4 generators**, up to a **maximum power of about 600 kW**, with a modulation ratio **of up to 1:32**.
2. The **dimensions of the generators** and the **positions of the connections** are absolutely **identical**. All the models in the range are perfectly interchangeable.
3. Each cascade configuration, complete with flue, hydraulic and gas accessories, has been approved by **INAIL** and therefore **certified as a “Single generator”**.

4. FORCE W is fitted as standard with a **clapet valve, which prevents fumes from returning to the boiler**. This device allows for the design of a pressurised flue gas duct with much smaller and more economical “diameters”.
5. The electronics installed as standard are designed to be able to independently manage the dynamics of several generators in cascade, with the MASTER-SLAVE logic, **up to a maximum of 6 generators**.
6. By parametrising the cascade MASTER board, it is possible to **set the ignition sequence of the modules and the rotation of the ignition sequence** in order to distribute the number of hours of operation evenly.



GENERATORS				COIL MODULES	HEAT INPUT kW	HEAT OUTPUT		CASCADE MODULATION		AVAILABLE FUMES HEAD AFTER 200 MM Ø FUMES MANIFOLD
1	2	3	4			50 / 30°C kW	80 / 60°C kW	MinP - MaxP 50 / 30°C kW	MinP / MaxP	
60	60			2	116,0	121,6	114,0	16,3 - 121,6	1:7	77
60	80			2	132,4	137,8	129,9	16,3 - 137,8	1:8	77
80	80			2	148,8	154,0	145,8	16,3 - 154,0	1:9	166
60	120			2	171,0	177,8	167,5	16,3 - 177,5	1:11	77
80	120			2	187,4	194,0	183,4	16,3 - 194,0	1:12	166
99	120			2	209,6	227,0	205,2	20,5 - 227,0	1:11	147
120	120			2	226,0	234,0	221,0	20,5 - 234,0	1:11	199
120	150			2	256,0	265,0	250,5	20,5 - 265,0	1:13	199
150	150			2	286,0	296,0	280,0	25,9 - 296,0	1:11	235
99	120	120		3	322,6	334,0	315,7	20,5 - 334,0	1:16	147
120	120	120		3	339,0	351,0	331,5	20,5 - 351,0	1:17	199
80	150	150		3	360,4	373,0	352,9	16,3 - 373,0	1:23	166
99	150	150		3	386,0	396,0	390,5	20,5 - 396,0	1:19	147
120	150	150		3	399,0	413,0	390,5	20,5 - 413,0	1:20	199
150	150	150		3	429,0	444,0	420,0	25,9 - 444,0	1:17	235
120	120	120	120	4	452,0	468,0	442,0	20,5 - 468,0	1:23	199
60	150	150	150	4	487,0	504,8	477,0	16,3 - 504,8	1:31	77
120	120	150	150	4	512,0	530,0	501,0	20,5 - 530,0	1:26	199
120	150	150	150	4	542,0	561,0	530,5	20,5 - 561,0	1:27	199
150	150	150	150	4	572,0	592,0	560,0	25,9 - 592,0	1:23	235

03. CASCADE INSTALLATION

CASCADE INSTALLATION Indoor or protected Outdoor



ACCESSORIES NECESSARY FOR THE CORRECT INSTALLATION OF FORCE W GENERATORS IN CASCADE

						6	7	1		2	3	4	8	9	
															
P _{out} (50/30° C)	MODULES FORCE W					Tot. modules	self-supporting frame* start kit for single cascade installation* (self-supporting only in the case of installation with hydraulic manifold kit)	self-supporting frame extension kit for cascade installation	low consumption modulating circula- tor. 8 m head	low consumption modulating circula- tor. 10 m head	Starting hydraulic unit: 1 x 3-way valve - 1 x 2-way valve - 1 x non-return valve - gaskets	hydraulic manifold kit (delivery and return DN65), gas (DN40) for cas- cade installation	cascade hydraulic manifold flange kit DN65	flue manifold start kit cascade ø 200 mm *	flue manifold extension kit cascade ø 200 mm *
	60	80	99	120	150										
62	1				1	1	-	1	1	1	1	1	-	-	
77		1			1	1	-	1	1	1	1	1	-	-	
98			1		1	1	-	1	1	1	1	1	-	-	
117				1	1	1	-	1	1	1	1	1	-	-	
148					1	1	1	-	1	1	1	1	-	-	
124	2				2	1	1	2	2	2	2	1	1	2	
139	1	1			2	1	1	2	2	2	2	1	1	2	
154		2			2	1	1	2	2	2	2	1	1	2	
179	1			1	2	1	1	2	2	2	2	1	1	2	
194		1		1	2	1	1	2	2	2	2	1	1	2	
215			1	1	2	1	1	2	2	2	2	1	1	2	
234				2	2	1	1	2	2	2	2	1	1	2	
265				1	1	2	1	1	2	2	2	1	1	2	
296					2	2	1	1	2	2	2	1	1	2	
332			1	2	3	1	2	3	3	3	3	1	1	3	
351				3	3	1	2	3	3	3	3	1	1	3	
373		1			2	3	1	2	3	3	3	3	1	3	
394			1		2	3	1	2	3	3	3	3	1	3	
413				1	2	3	1	2	3	3	3	3	1	3	
444					3	3	1	2	3	3	3	3	1	3	
468				4	4	1	3	4	4	4	4	1	1	4	
530				2	2	4	1	3	4	4	4	4	1	4	
561				1	3	4	1	3	4	4	4	4	1	4	
592					4	4	1	3	4	4	4	4	1	4	

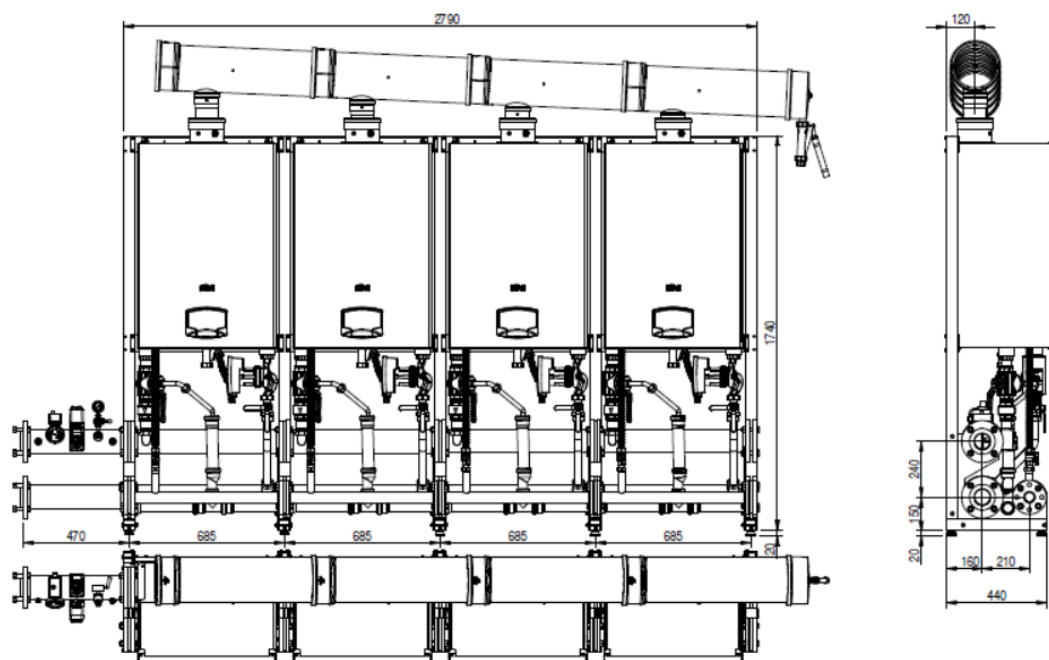
* Certified flue accessories for installation in technical rooms or protected areas

ACCESSORIES ON REQUEST FOR CONFIGURATION ACCORDING TO THE DESIGN SPECIFICATIONS

DESCRIPTION		CODE	
	Additional sensor for cylinder and/or system delivery for cascade configurations with and without hydraulic separator	cable 2 m	1KWMA11W
		cable 5 m	043005X0
	External probe		013018X0
	INAIL connection (complete with equipment) DN65 PN16		042075X0
	Hydraulic separator DN 32 (up to 150 kW). Connection with the generator is the responsibility of the installer		042086X0
	Hydraulic separator DN 65 (from 151 kW up to 300 kW)		042078X0
	Hydraulic separator connection kit (from 151 kW up to 300 kW)		042079X0
	Hydraulic separator DN 100 (from 301 kW up to 600 kW)		042080X0
	Hydraulic separator connection kit (from 301 kW up to 600 kW)		042081X0
	Plate exchanger. The installer is responsible for the hydraulic connection between the generator and the heat exchanger		
	Thermoregulations - Water treatment		
	Neutralisers		

03. DIMENSIONAL DRAWINGS

ASSEMBLY DRAWING



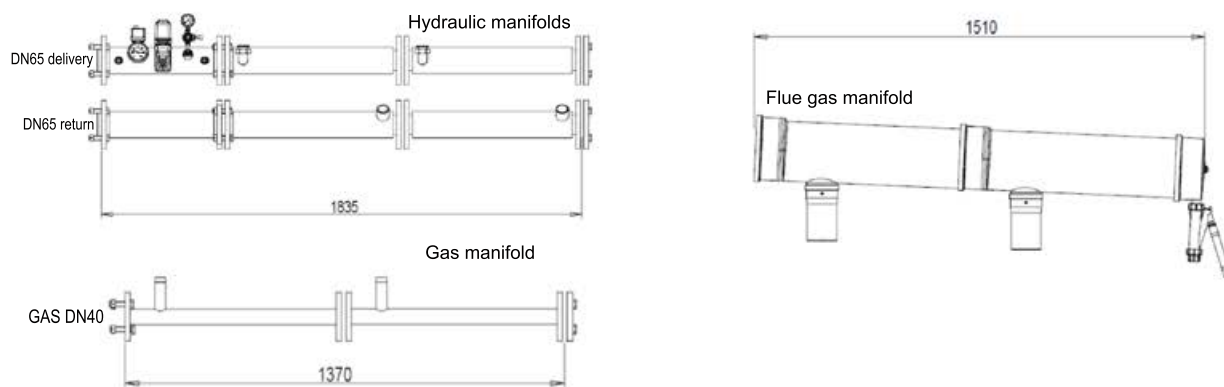
Complete list of INAIL certified FORCE W cascade systems

FORCE W no.	MODELS					CASCADE HEAT OUTPUT (50/30°C)
	60	80	99	120	150	
2	2					121.6
2	1	1				137.8
2		2				154
2			2			200
2	1			1		177.7
2		1		1		194
2			1	1		217
2				2		234
2				1	1	265
2					2	296
3	3					182.4
3		3				231
3			3			300
3			1	2		334
3				3		351
3		1			2	373
3			1		2	396
3				1	2	413
3					3	444
4	4					243.2
4		4				308
4			4			400
4	1			3		411.8
4				4		468
4				2	2	530
4					4	592

03. DIMENSIONAL DRAWINGS

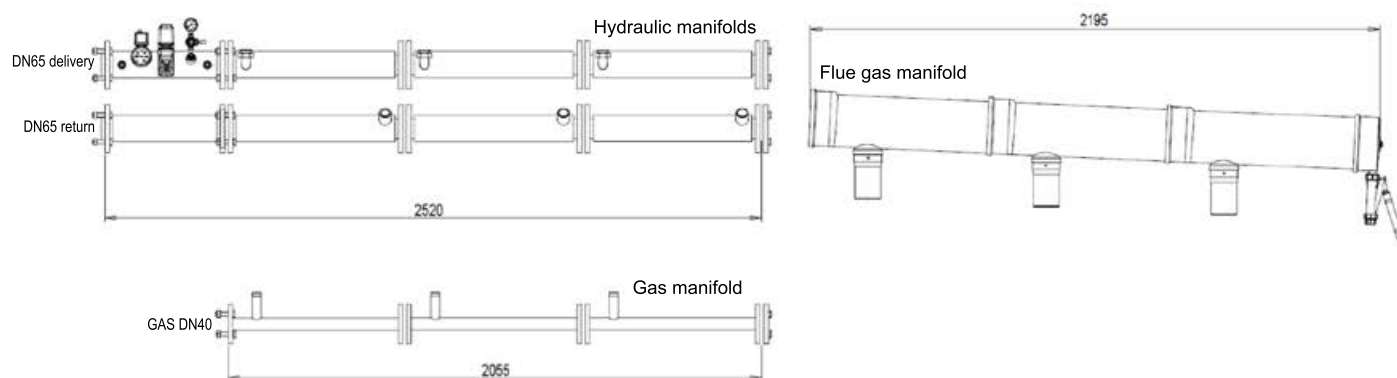
MANIFOLD DIMENSIONS IN CASCADE SYSTEMS WITH 2 GENERATORS

MOD. 60+60, 80+60, 80+80, 99+99, 60+120, 80+120, 99+120, 120+120, 120+150, 150+150



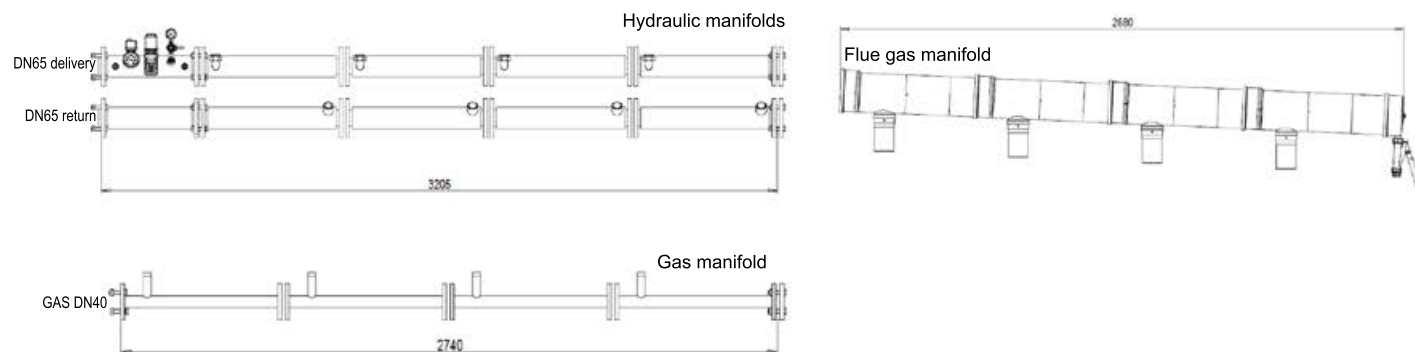
MANIFOLD DIMENSIONS IN CASCADE SYSTEMS WITH 3 GENERATORS

MOD. 60+60+60, 80+80+80, 99+99+99, 99+120+120, 120+120+120, 80+150+150, 99+150+150, 120+150+150, 150+150+150



MANIFOLD DIMENSIONS IN CASCADE SYSTEMS WITH 4 GENERATORS

MOD. 60+60+60+60, 80+80+80+80, 99+99+99+99, 60+120+120+120, 120+120+120+120, 120+120+150+150, 120+150+150+150, 150+150+150+150



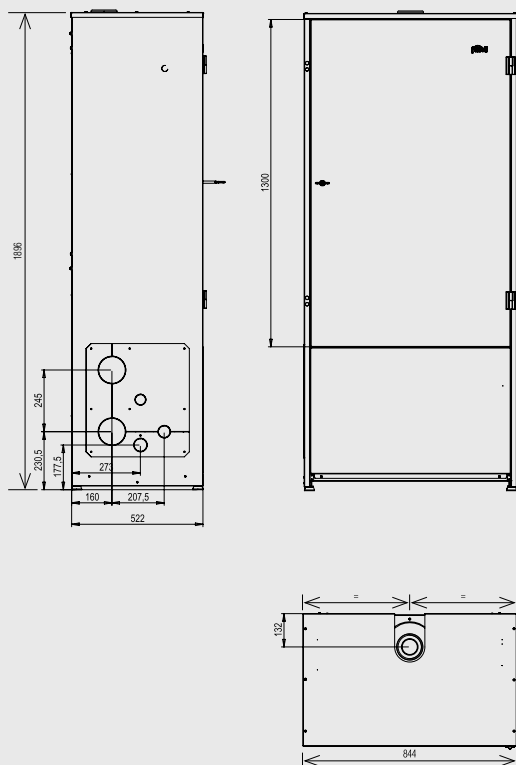


SINGLE OR CASCADE CONFIGURATION

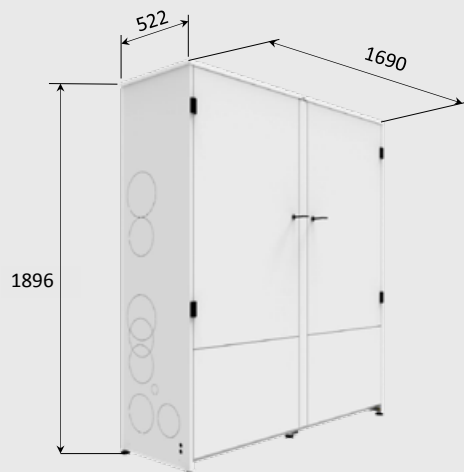
- Cabinet equipped for the installation of FORCE W boilers outdoors in single or cascade configuration up to 600 kW
- The cabinet can be combined with one of the five models in the FORCE W range and with one of the two circulators (8 m and 10 m head)
- Standard equipment includes:
 - * Supporting frame for the FORCE W heat generator
 - * DN 65 system delivery and return manifolds
 - * DN 40 gas manifold
 - * Flanged system connection kit
 - * Condensate collection and drain manifold
 - * Three-way shut-off valve with discharge to the atmosphere
 - * Two-way shut-off valve
 - * Non-return valve
 - * Gas connection pipe between boilers and manifold with shut-off valve
- All optional kits for single or cascade installation, with up to four modules, are available.
- The generator combined with the cabinet kit can be installed without any weather protection (IPX5D) and in environments with temperatures down to -5°C.

Cabinet dimensions

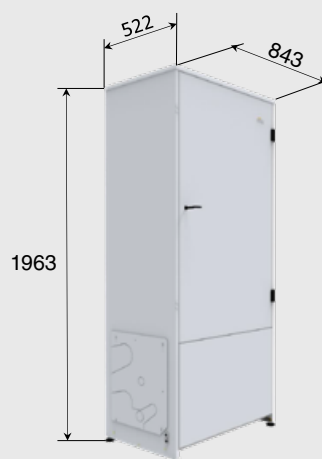
Equipped cabinet



Empty double cabinet

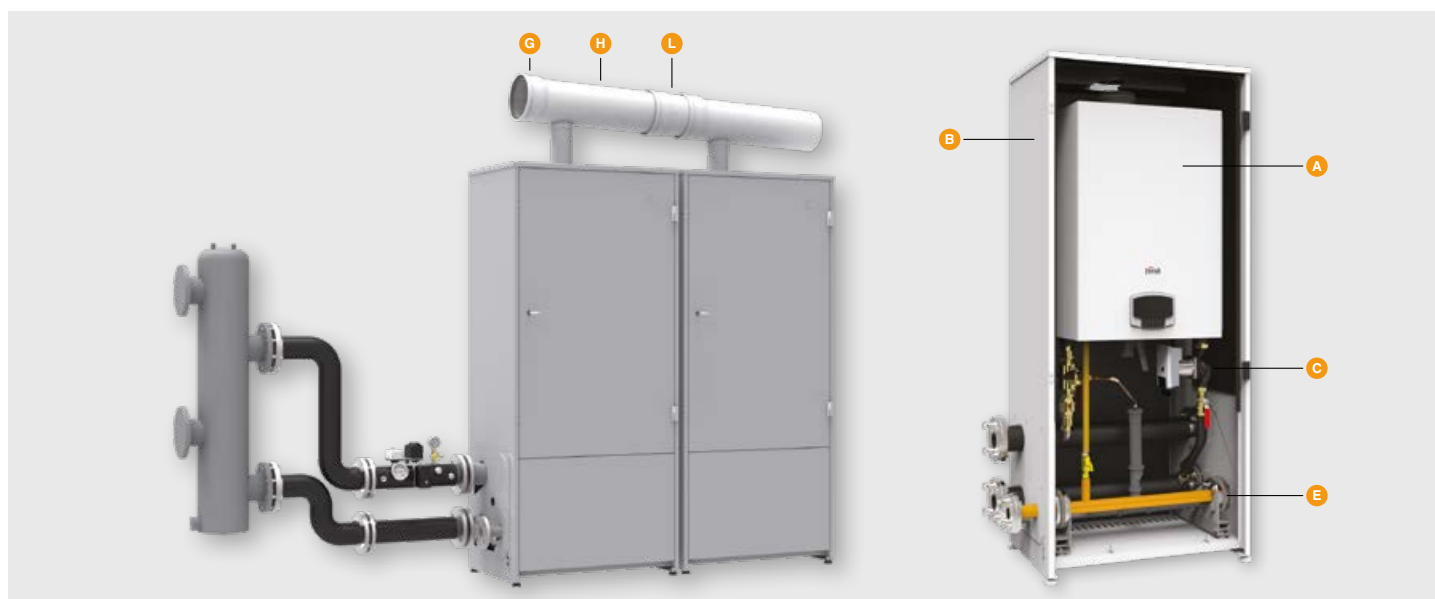


Empty single cabinet



03. OUTDOOR INSTALLATION

SINGLE OR CASCADE CONFIGURATION



ACCESSORIES NECESSARY FOR THE CORRECT INSTALLATION OF FORCE W GENERATORS IN CASCADE

	A					Tot. modules	B	C		E	G	H	L	
								low consumption modulating circulator, 8 m head	low consumption modulating circulator, 10 m head					
P _{out} (50/30°C)	MODULES FORCE W													
	60	80	99	120	150									
62	1					1	1	1	1	1	-	-	-	1
77		1				1	1	1	1	1	-	-	-	1
98			1			1	1	1	1	1	-	-	-	1
117				1		1	1	1	1	1	-	-	-	1
148					1	1	1	1	1	1	-	-	-	1
124	2					2	2	2	2	1	1	2	1	2
139	1	1				2	2	2	2	1	1	2	1	2
154		2				2	2	2	2	1	1	2	1	2
179	1			1		2	2	2	2	1	1	2	1	2
194		1			1	2	2	2	2	1	1	2	1	2
215			1	1		2	2	2	2	1	1	2	1	2
234				2		2	2	2	2	1	1	2	1	2
265				1	1	2	2	2	2	1	1	2	1	2
296					2	2	2	2	2	1	1	2	1	2
332			1	2		3	3	3	3	1	1	3	2	3
351				3		3	3	3	3	1	1	3	2	3
373		1			2	3	3	3	3	1	1	3	2	3
394			1		2	3	3	3	3	1	1	3	2	3
413				1	2	3	3	3	3	1	1	3	2	3
444					3	3	3	3	3	1	1	3	2	3
468				4		4	4	4	4	1	1	4	3	4
530				2	2	4	4	4	4	1	1	4	3	4
561				1	3	4	4	4	4	1	1	4	3	4
592					4	4	4	4	4	1	1	4	3	4

ACCESSORIES ON REQUEST FOR CONFIGURATION ACCORDING TO THE DESIGN SPECIFICATIONS

DESCRIPTION		CODE
	Additional sensor for cylinder and/or system delivery for cascade configurations with and without hydraulic separator	cable 2 m 1KWMA11W
		cable 5 m 043005X0
	External probe	013018X0
	Empty single cabinet for outdoor installation	046060X0
	Empty double cabinet for outdoor installation	046061X0
	INAIL connection (complete with equipment) DN65 PN16	042075X0
	Hydraulic separator DN 32 (up to 150 kW). Connection with the generator is the responsibility of the installer	042086X0
	Hydraulic separator DN 65 (from 151 kW up to 300 kW)	042078X0
	Hydraulic separator connection kit (from 151 kW up to 300 kW)	042079X0
	Hydraulic separator DN 100 (from 301 kW up to 600 kW)	042080X0
	Hydraulic separator connection kit (from 301 kW up to 600 kW)	042081X0
	Plate exchanger. The installer is responsible for the hydraulic connection between the generator and the exchanger.	
	Thermoregulations - Water treatment	
	Neutralisers	

* Certified flue accessories for installation in technical rooms or protected areas



04

System solutions

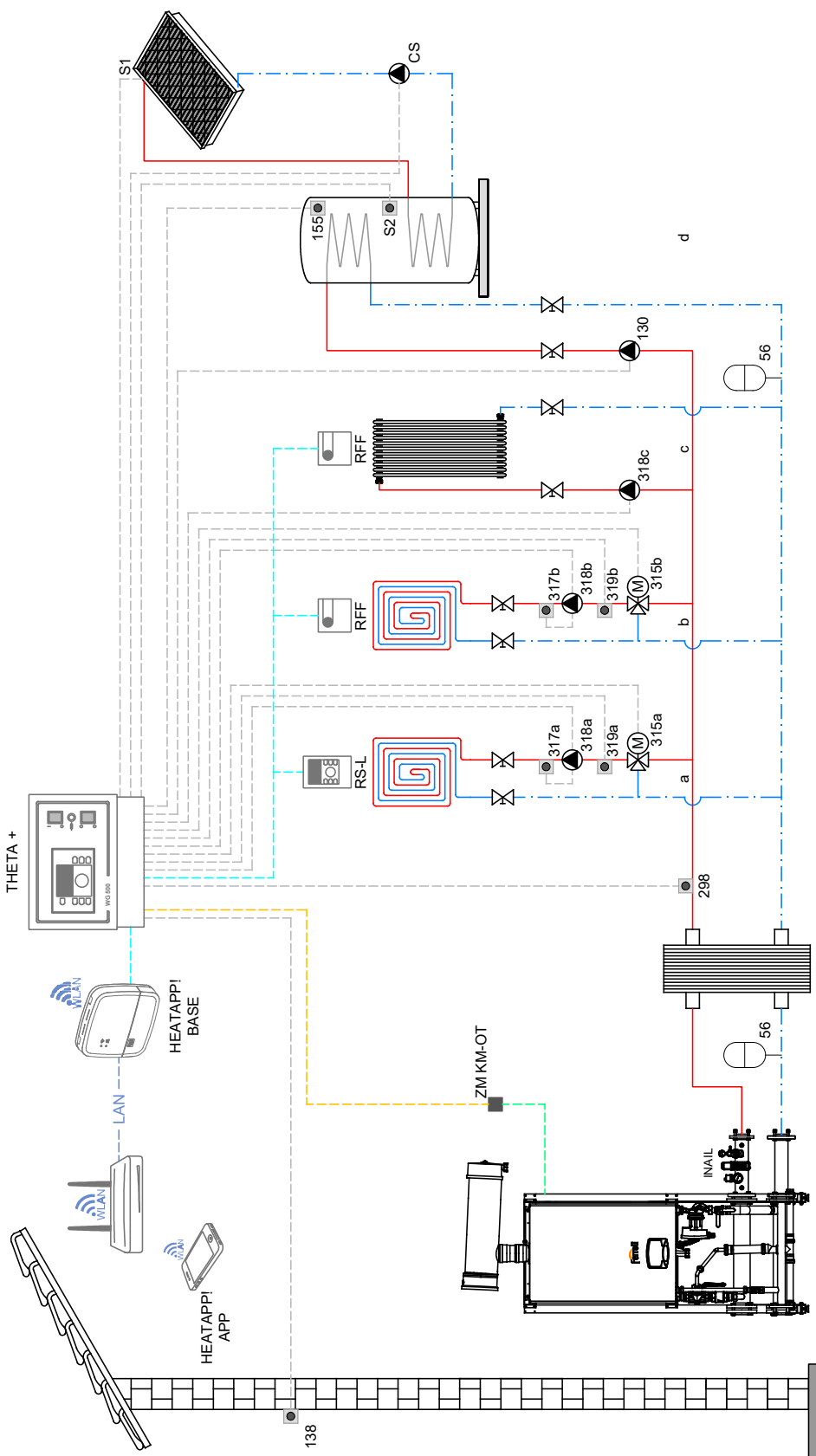
Some system solutions that can be made with the products from our catalogue are suggested in this section. Ferroli has a dedicated portal for system diagrams, which can be accessed from the website www.ferroli.com or via this link:



DIAGRAM 1: SINGLE FORCE W, MULTIZONE SYSTEM WITH VARIABLE TEMPERATURES

The primary circuit consists of a Force W condensing thermal module, with variable temperature operation, connected to an inspectable plate heat exchanger. The distribution on the secondary circuit is obtained by means of two mixed temperature zones, a direct zone, a double coil DHW cylinder integrated with a solar thermal system.

All system components (primary and secondary) are managed remotely via the THETA+ temperature controller connected to the home network with the HEATapp system.



THETA+ Central temperature control unit and cascade manager installed in the wall support **WG500 HEATAPP! BASE** Remote control unit management kit
ZM KM-OT Module for cascade management and communication between the generator and the THETA+ unit via Open Therm **RS-L** Room unit RFF Room probe **a** Low-temperature mixed zone **b** Low-temperature mixed zone **c** High-temperature direct zone **d** DHW production with double coil storage tank **298** System delivery manifold probe (supplied as standard with THETA+) **315 a/b** Motorised mixing valve **319 a/b** Mixed zone delivery probe (supplied as standard with THETA+) **318 a/b/c** Heating system circulator **317 a/b** Safety thermostat **130** DHW storage tank filling circulator **155** Cylinder probe (supplied as standard with THETA+) **INAIL** INAIL safety device connection **56** Expansion tank **138** External probe (supplied as standard with THETA+) **S1** Solar field delivery probe (PT 1000) **S2** Cylinder temperature probe (supplied as standard with THETA+) **CS** Solar circulator
 --- ZM KM-OT --- RS-L/RFF/ZM T2B-GLT --- OpenTherm

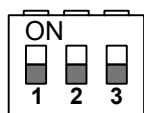
04. SYSTEM DIAGRAMS

DIAGRAM 1: SINGLE FORCE W, MULTIZONE SYSTEM WITH VARIABLE TEMPERATURES

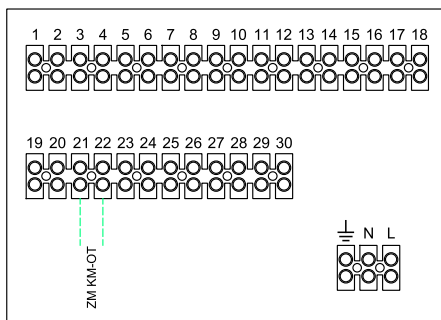
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DIP Switch ZM KM-OT



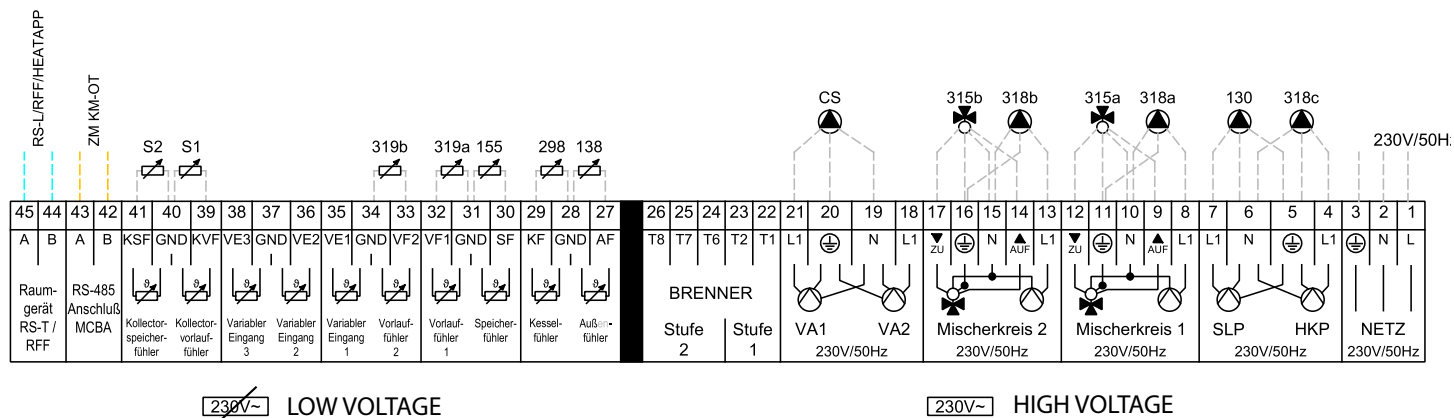
SW 1 = 0
SW 2 = 0
SW 3 = 0



GENERATOR TERMINAL BLOCK

ZM KM-OT Kit for generator cascade management via Open Therm
Open Therm connection

WALL-MOUNTED TERMINAL BLOCK WG500



~~230V~~~ LOW VOLTAGE

230V~ HIGH VOLTAGE

TERMINALS	DESCRIPTION	LEGEND
1-2-3	230 VAC power supply	
4-5-6	Direct zone heating system circulator	318c
5-6-7	DHW storage tank filling circulator	130
8-9-10	Mixed zone 1 heating system circulator	318a
9-10-11-12	Mixed zone 1 motorised mixing valve	315a
13-14-15	Mixed zone 2 heating system circulator	318b
14-15-16-17	Mixed zone 2 motorised mixing valve	315b
19-20-21	Solar circulator	CS
27-28	External probe	138
28-29	Plant delivery manifold probe	298
30-31	Cylinder probe	155
31-32	Mixed zone 1 delivery probe	319a
33-34	Mixed zone 2 delivery probe	319b
39-40	Delivery probe from solar field	S1
40-41	Cylinder temperature probe	S2
42-43	BUS connection towards generators	
44-45	BUS connection towards room unit	

THETA+NORM PARAMETRISATION			
MENU	PARAMETER	VALUE	DESCRIPTION
HYDRAULIC	06	15	Solar supply pump activation
DIRECT CIRC.	03	1	Room sensor activated
MIXED 1	03	1	Room sensor activated
MIXED 2	03	1	Room sensor activated
GENERATOR	01	5	Generator model

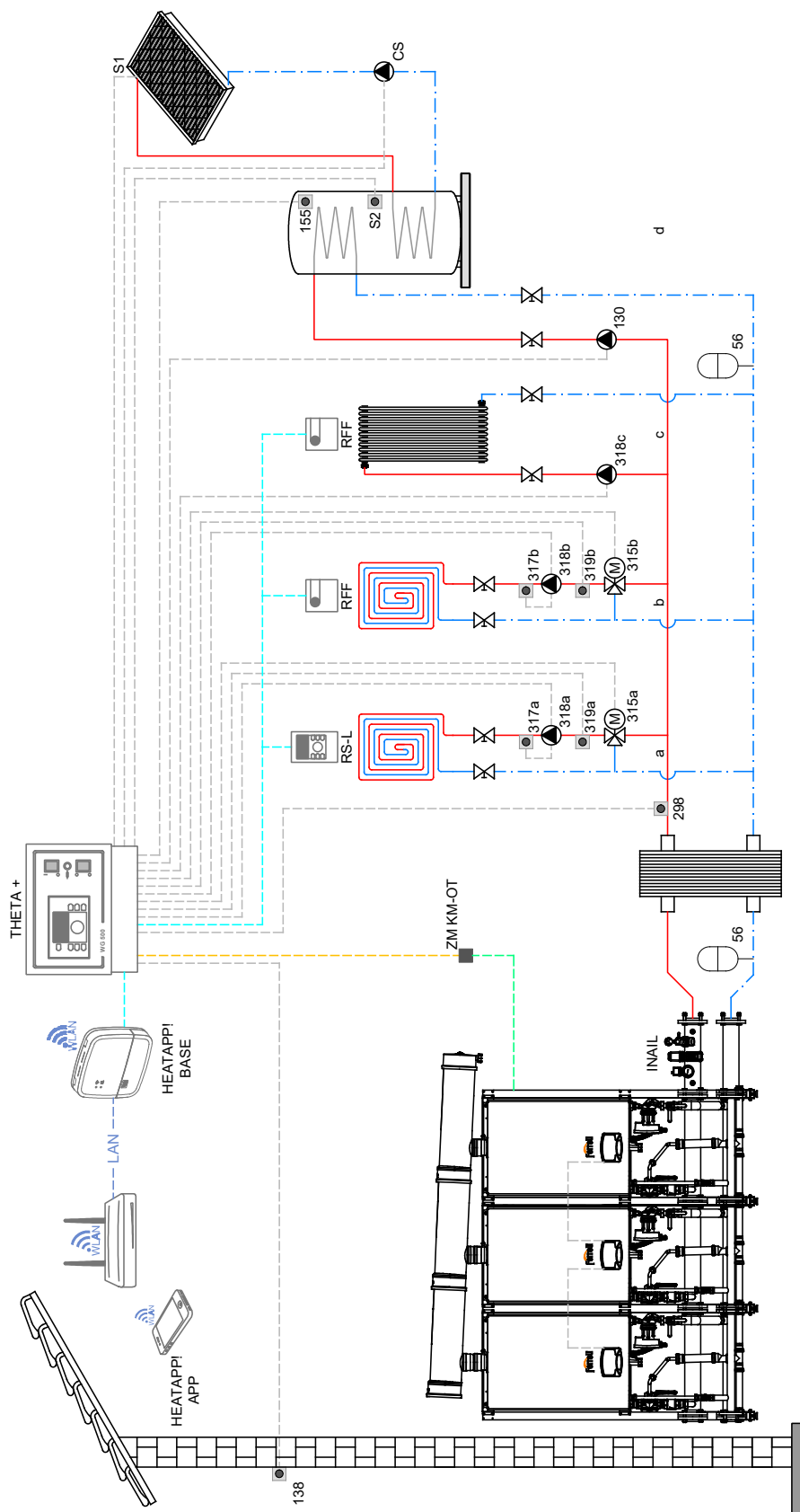
PERIPHERAL STATIONS PARAMETRISATION		
RS_CM1	Bus address	12
RFF_CM2	Bus address	3
RFF_CD	Bus address	1

DIAGRAM 2: FORCE W IN CASCADE, MULTIZONE SYSTEM WITH VARIABLE TEMPERATURES

The primary circuit features a single generator (INAIL certified) consisting of a series of 3 Force W generators in self-cascade, with variable temperature operation, connected to an inspectable plate heat exchanger.

The distribution on the secondary circuit is obtained by means of two mixed temperature zones, a direct zone, a double coil DHW cylinder integrated with a solar thermal system.

All system components (primary and secondary) are managed remotely via the THETA+ temperature controller connected to the home network with the HEATapp system.



THETA+ Central temperature control unit and cascade manager installed in the wall support WG500 **HEATAPP! BASE** Remote control unit management kit
ZM KM-OT Module for cascade management and communication between the generator and the THETA+ unit via Open Therm **RS-L** Room unit **RFF** Room probe **a** Low-temperature mixed zone **b** Low-temperature mixed zone **c** High-temperature direct zone **d** DHW production with double coil storage tank **298** System delivery manifold probe (supplied as standard with THETA+) **315 a/b** Motorised mixing valve **319 a/b** Mixed zone delivery probe (supplied as standard with THETA+) **318 a/b/c** Heating system circulator **317 a/b** Safety thermostat **130** DHW storage tank filling circulator **155** Cylinder probe (supplied as standard with THETA+) **INAIL** INAIL safety device connection **138** Expansion tank **56** External probe (supplied as standard with THETA+) **S1** Solar field delivery probe (PT 1000) **S2** Cylinder temperature probe (supplied as standard with THETA+) **CS** Solar circulator
ZM KM-OT **RS-L/RFF/ZM T2B-GLT** **OpenTherm**

04. SYSTEM DIAGRAMS

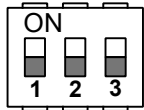
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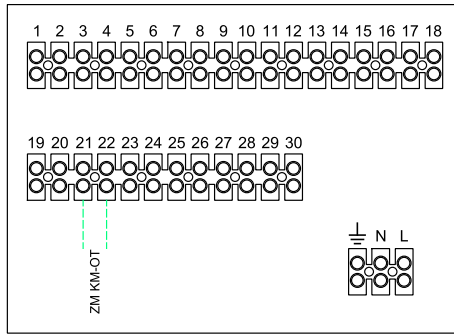
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All system components (primary and secondary) are managed remotely via the THETA+ temperature controller connected to the home network with the HEATapp system.

DIP Switch ZM KM-OT



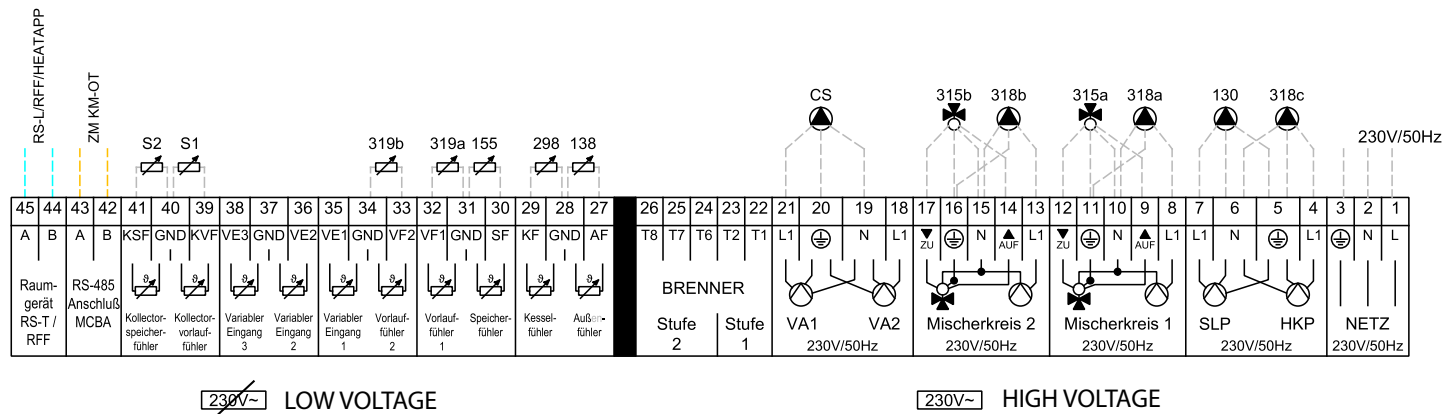
SW 1 = 0
SW 2 = 0
SW 3 = 0



GENERATOR TERMINAL BLOCK

ZM KM-OT Kit for generator cascade management via Open Therm
Open Therm connection

WALL-MOUNTED TERMINAL BLOCK WG500



~~230V~~~ LOW VOLTAGE

230V~ HIGH VOLTAGE

TERMINALS	DESCRIPTION	LEGEND
1-2-3	230 VAC power supply	
4-5-6	Direct zone heating system circulator	318c
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19-20-21	Solar circulator	CS
27-28	External probe	138
28-29	Plant delivery manifold probe	298
30-31	Cylinder probe	155
31-32	Mixed zone 1 delivery probe	319a
33-34	Mixed zone 2 delivery probe	319b
39-40	Delivery probe from solar field	S1
40-41	Cylinder temperature probe	S2
42-43	BUS connection towards generators	
44-45	BUS connection towards room unit	

THETA+NORM PARAMETRISATION			
MENU	PARAMETER	VALUE	DESCRIPTION
HYDRAULIC	06	15	Solar supply pump activation
DIRECT CIRC.	03	1	Room sensor activated
MIXED 1	03	1	Room sensor activated
MIXED 2	03	1	Room sensor activated
GENERATOR	01	5	Generator model

PERIPHERAL STATIONS PARAMETRISATION		
RS_CM1	Bus address	12
RFF_CM2	Bus address	3
RFF_CD	Bus address	1



05

System accessories

05. SIZING AND CHOICE OF PLATE HEAT EXCHANGER

Below are some examples of sizing plate heat exchangers to be combined with FORCE W generators. The choice and verification of the heat exchanger to be used, in relation to the system, is always the customer's responsibility. Installation is the installer's responsibility. The characteristics and technical data of PHE plate heat exchangers are in the section "System accessories".

HIGH-TEMPERATURE SYSTEMS

Models FORCE W					PHE INSPECTABLE PLATE HEAT EXCHANGER					
					MODEL	CODE	Primary: 80/60°C		Secondary: 50/70°C	
							Flow rates	Pressure drops	Flow rates	Pressure drops
60	80	99	120	150			m³/h	m.H ₂ O	m³/h	m.H ₂ O
1					PHE 32380 29P	052682X0	2.50	0.56042	2.49	0.55324
	1				PHE 32380 29P	052682X0	3.20	0.91066	3.19	0.89925
		1			PHE 32380 41P	052683X0	4.16	0.91649	4.14	0.907
			1		PHE 32380 47P	052684X0	4.86	1.04879	4.83	1.03812
				1	PHE 32380 53P	052685X0	6.15	0.153638	6.12	1.140532
2					PHE 32380 47P	052684X0	5.01	0.111567	4.99	0.110397
1	1				PHE 32380 53P	052685X0	5.71	0.126321	5.68	0.125129
	2				PHE 50420 35P	052686X0	6.54	0.065916	6.51	0.065925
1			1		PHE 50420 35P	052686X0	7.36	0.780236	7.33	0.759571
	1		1		PHE 50420 35P	052686X0	8.06	0.97642	8.02	0.97618
		1	1		PHE 50420 35P	052686X0	9.02	1.20682	8.98	1.2066
			2		PHE 50420 35P	052686X0	9.71	1.38831	9.67	1.38805
			1	1	PHE 50420 43P	052687X0	11.01	1.25403	10.96	1.2537
				2	PHE 50420 53P	052688X0	12.31	1.12673	12.25	1.12632
		1	2		PHE 50420 53P	052688X0	13.88	1.415	13.82	1.41448
			3		PHE 50420 53P	052688X0	14.57	1.55244	14.51	1.55186
	1			2	PHE 65456 43P	052689X0	15.51	1.25245	15.44	1.2481
		1		2	PHE 65456 43P	052689X0	16.47	1.40502	16.40	1.39963
			1	2	PHE 65456 49P	052690X0	17.16	1.24313	17.09	1.2387
				3	PHE 65456 49P	052690X0	18.46	1.43011	18.38	1.42461
			4		PHE 65456 49P	052690X0	19.42	1.57653	19.34	1.57098
1				3	PHE 65456 53P	052691X0	20.96	1.62709	20.87	1.62145
			2	2	PHE 65456 61P	052692X0	22.02	1.47266	21.92	1.46795
			1	3	PHE 65456 61P	052692X0	23.31	1.64462	23.21	1.63883
				4	PHE 65456 63P	052693X0	24.61	1.75019	24.50	1.7443



LOW-TEMPERATURE SYSTEMS

Models FORCE W					PHE INSPECTABLE PLATE HEAT EXCHANGER					
					MODEL	CODE	Primary: 60/40°C		Secondary: 30/50°C	
							Flow rates	Pressure drops	Flow rates	Pressure drops
60	80	99	120	150			m³/h	m.H ₂ O	m³/h	m.H ₂ O
1					PHE 32380 29P	052682X0	2.65	0.63893	2.64	0.62871
	1				PHE 32380 41P	052683X0	3.36	0.60944	3.34	0.60147
		1			PHE 32380 47P	052684X0	4.36	0.86066	4.34	0.85034
			1		PHE 32380 53P	052685X0	5.10	1.02585	5.08	1.0145
				1	PHE 50420 35P	052686X0	6.45	0.67494	6.42	0.67664
2					PHE 50420 35P	052686X0	5.30	0.46827	5.28	0.4698
1	1				PHE 50420 35P	052686X0	6.00	0.59086	5.98	0.5925
	2				PHE 50420 35P	052686X0	6.71	0.72687	6.69	0.72561
1			1		PHE 50420 43P	052687X0	7.75	0.67773	7.72	0.67995
	1		1		PHE 50420 43P	052687X0	8.45	0.79794	8.42	0.79953
		1	1		PHE 50420 53P	052688X0	9.46	0.71529	9.42	0.71663
			2		PHE 50420 53P	052688X0	10.20	0.82438	10.16	0.82573
			1	1	PHE 50420 53P	052688X0	11.55	1.04226	11.51	1.04365
				2	PHE 65456 43P	052689X0	12.90	0.91635	12.85	0.9142
		1	2		PHE 65456 49P	052690X0	14.56	0.94288	14.50	0.94055
			3		PHE 65456 49P	052690X0	15.3	1.03482	15.24	1.0331
	1			2	PHE 65456 53P	052691X0	16.26	1.03593	16.20	1.03339
		1		2	PHE 65456 61P	052692X0	17.26	0.95521	17.19	0.95275
			1	2	PHE 65456 61P	052692X0	18.00	1.03509	17.93	1.03253
				3	PHE 65456 61P	052692X0	19.35	1.18903	19.28	1.18645
			4		PHE 65456 71P	052694X0	20.40	1.08502	20.32	1.08237
1				3	PHE 65456 71P	052694X0	22.00	1.25571	21.92	1.25196
			2	2	PHE 65456 73P	052695X0	23.10	1.33453	23.01	1.33069
			1	3	PHE 65456 83P	052696X0	24.45	1.29042	24.36	1.28748
				4	PHE 65456 83P	052696X0	25.80	1.43206	25.70	1.42801



05. CHOICE OF HYDRAULIC SEPARATOR

The hydraulic separator guarantees independence between the primary circuit (generator) and the secondary one (system) without them disturbing or interfering with each other.

The separator is provided complete with deaerator, dirt separator and is completely insulated.

FEATURES:

Max operating pressure: 6 bar - Temperature range: 0 - 100°C - Connections: DN 32 / DN 65 / DN 100

HYDRAULIC SEPARATOR FOR INSTALLATIONS UP TO 150 kW

DESCRIPTION	CODE
 Hydraulic separator DN 32 (Connection with the generator is the responsibility of the installer)	042086X0

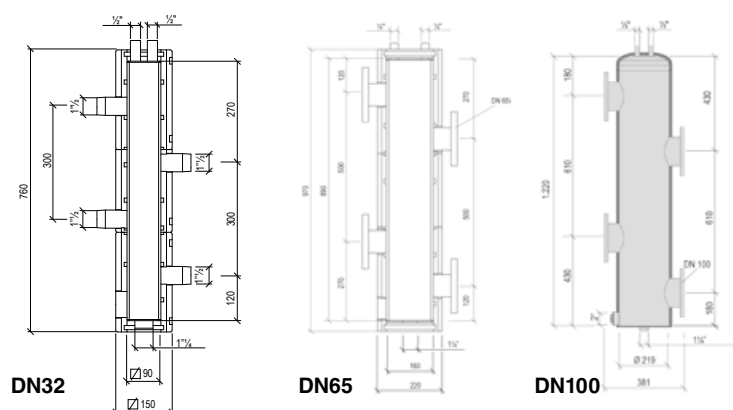
HYDRAULIC SEPARATOR FOR INSTALLATIONS FROM 151 TO 300 kW

DESCRIPTION	CODE
 Hydraulic separator DN 65	042078X0
 Hydraulic separator installation kit	042079X0

HYDRAULIC SEPARATOR FOR INSTALLATIONS FROM 301 TO 600 kW

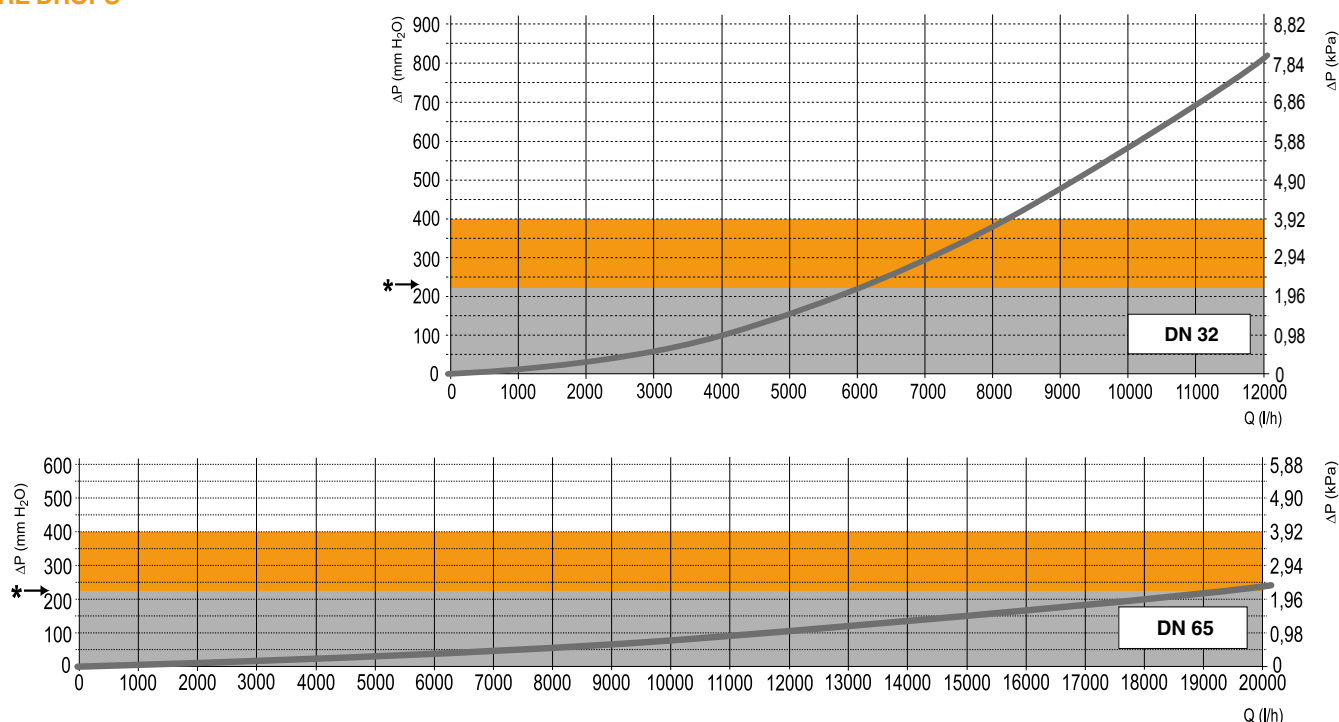
DESCRIPTION	CODE
 Hydraulic separator DN 100	042080X0
 Hydraulic separator installation kit	042081X0

DIMENSIONS AND TECHNICAL DATA



MODEL		DN 32	DN 65	DN 100
Flow rate	m³/h	6.5	18	30
Capacity	lt	4.8	21	46
Max temperature	°C	100		
Max pressure	bar	6		
Raw material	-	ST37.1 steel		
Isolation	-	EPP Black - 40 g/l		

PRESSURE DROPS



* Nominal reference: internal speed ~ 0.2 m/s - inlet speed 1.2 m/s

Limit working range

Recommended working range

05. CONDENSATE NEUTRALISERS FOR CONDENSING BOILERS



> NTR3

Maximum flow rate litres/h 70 - Maximum flow rate of generators kW 320

Consisting of:

- 1 Container 410 x 310 h 220 mm made of food-grade polypropylene
- 2 x 1" panel mount with filter and hose connector with ring nut
- 2 Rubber hoses with diameter 25 x 32 mm, 2 m long each
- 1 x 25 Kg bag of granules

CODE	DESCRIPTION
051000X0	CONDENSATE NEUTRALISER WITHOUT BOOSTER PUMP UP TO 320 kW



> NTR3 P

Maximum flow rate litres/h 150 - Maximum flow rate of generators kW 320 - Maximum delivery height 3.7m - Max condensate temperature 80°C - Max condensate acidity Ph2

Consisting of:

- 1 Container 400 x 300 h 220 mm made of food-grade polypropylene
- 1 x 1" panel mount with filter and hose connector
- 1 Rubber hose with diameter 25 x 32 mm, 2 m long
- 1 Transparent rubber hose with diameter 10 x 14 mm, 5 m long
- 1 Treated condensate booster unit - flow rate 2.5 l/min at 3 metres head - protection rating IPX4
- 1 x 25 Kg bag of granules

CODE	DESCRIPTION
051001X0	CONDENSATE NEUTRALISER WITH BOOSTER PUMP UP TO 320 kW



> NTR6

Maximum flow rate litres/h 300 - Maximum flow rate of generators kW 1500

Consisting of:

- 1 Container 670 x 470 mm h 180, with 4 internal dividers, made of shock-proof ABS
- 2 x 1" panel mounts with filter and hose connector
- 1 x 1" panel mount with elbow and hose connector
- 2 Rubber hoses with diameter 25 x 32 mm, 2 m long each
- 1 x 25 Kg bag of granules

CODE	DESCRIPTION
051002X0	CONDENSATE NEUTRALISER WITHOUT BOOSTER PUMP UP TO 1500 kW



> NTR6 P1

Maximum flow rate litres/h 550 - Maximum flow rate of generators kW 1500

Consisting of:

- 1 Container 670 x 470 mm h 280 mm made of food-grade polypropylene
- 1 x 1" panel mount with filter and hose connector with ring nut
- 1 x 1" panel mount with elbow and hose connector with ring nut
- 1 Rubber hose with diameter 25 x 32 mm, 2 m long
- 1 Transparent rubber hose with diameter 10 x 14 mm, 5 m long
- 1 Treated condensate booster unit - flow rate 9.2 l/min at 3 metres head - protection rating IPX4
- 1 x 25 Kg bag of granules

CODE	DESCRIPTION
051003X0	CONDENSATE NEUTRALISER WITH BOOSTER PUMP UP TO 1500 kW



> N135

Pack of granules for condensate neutralisers, in 25 Kg bags

CODE	DESCRIPTION
057000X0	25 KG BAG OF GRANULES



06

Certifications



EU DECLARATION OF CONFORMITY

Company Name and Address:

Ferroli S.p.A.
Via Ritonda 78/A
IT – 37047 San Bonifacio (VR) Italy
Tel.: +39 045 6139411
Email: info@ferroli.com

The declaration of conformity is issued under the sole responsibility of Ferroli S.p.A.

Appliance type: CONDENSING BOILER

Trademark: FERROLI

Identification of products:

FORCE B 80 – FORCE B 120 – FORCE B 150 – FORCE B 240 – FORCE B 300
FORCE W 60 – FORCE W 80 – FORCE W 99 – FORCE W 120 – FORCE W 150

The appliance types satisfy the essential requirements of the relevant Directives and Standards:

92/42/EEC BED Directive
2014/35/EU LVD Directive
2009/125/EC Ecodesign Directive
2014/30/EU EMC Directive
2016/426 EU Regulation

DIN EN 15502-1 (01.10.2015)
DIN EN 15502-2-1 (01.09.2017)
EN 60335-1:2012 + A11:2014
EN 60335-2-102:2016
EN 55014-1:2017
EN 55014-2:2015
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 62233:2008

PIN N°:

CE-0085CU0181

Notified Body:

0085

Certificate issued by:

DVGW CERT GmbH

Address:

Josef-Wirmer Straße 1-3 D-53123 Bonn

Type examination report:

K 2607 2019 B 5 and K 2607 2019 B 6

Issued by:

TÜV Rheinland Energy GmbH

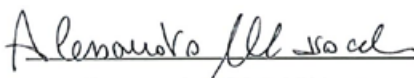
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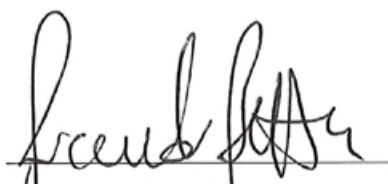
Am Grauen Stein, D-51105 Köln

Any change to the appliance and/or any use not according the instructions will lead the invalidation of this Declaration of Conformity.

San Bonifacio, 13/10/2021
(Place, date)




Corporate R&D Officer
Alessandro Maroccolo


Country Manager
Riccardo Bottura



www.ferroli.com

EU type examination certificate

EU-Baumusterprüfbescheinigung

CE-0085CU0181

Product Identification No.
Produkt-Identnummer

Field of Application <i>Anwendungsbereich</i>	EU Gas Appliances Regulation (EU/2016/426) <i>EU-Gasgeräteverordnung (EU/2016/426)</i>
Owner of Certificate <i>Zertifikatinhaber</i>	Ferrolì S.p.A. Via Ritonda 78A, I-37047 San Bonifacio (VR)
Distributor <i>Vertreiber</i>	Ferrolì S.p.A. Via Ritonda 78A, I-37047 San Bonifacio (VR)
Product Category <i>Produktart</i>	Boilers: Condensing water heater (3102)
Product Description <i>Produktbezeichnung</i>	Wall-hunging gas fired central heating condensing boiler with integrated gas burner in modulating operation method and with enclosed combustion chamber
Model <i>Modell</i>	FORCE W...; FORCE B...
Countries of Destination <i>Bestimmungsländer</i>	AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR
Test Reports <i>Prüfberichte</i>	supplement test: K 2607 2021 B8 from 27.10.2021 (TRG) supplement test: K 2607 2021 E7 from 27.10.2021 (TRG)
Test Basis <i>Prüfgrundlagen</i>	EU/2016/426 A III B (09.03.2016) DIN EN 15502-1 (01.10.2015) DIN EN 15502-2-1 (01.09.2017)

Date of Expiry / File No. 11.07.2029 / 21-0733-GER
Ablaufdatum / AZ

23.05.2022 Kö A-1/2

Date, Issued by, Sheet, Head of Certification Body
Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle



Deutsche
Akkreditierungsstelle
D-ZE-16028-01-01

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Appliance Categories <i>Gerätekatégorien</i>	Supply Pressures <i>Versorgungsdrücke</i>	Countries of Destination <i>Bestimmungsländer</i>	Remarks <i>Bemerkungen</i>
I2E	20 mbar	LU, RO	
I2H	20 mbar	CZ, ES, FR, GR, NL	
I2N	20 mbar	BE, SI	
I3B	30 mbar	ES, IE	
I3B/P	30 mbar	BE, PT	
I3B/P	50 mbar	DE, GR	
II2E+3+	20/25, 28-30/37 mbar	BE, FR	
II2E+3B/P	20/25, 37 mbar	FR	
II2E+3P	20/25, 37 mbar	BE	
II2E3B/P	20, 50 mbar	DE	
II2E3B/P	20, 30 mbar	PL	
II2EK3B/P	20/25, 30 mbar	NL	
II2ELL3B/P	20, 50 mbar	DE	
II2ELw3B/P	20, 30 mbar	PL	
II2H3+	20, 28-30/37 mbar	CH, CY, CZ, ES, GB, GR, IE, IT, LT, PT, SI, SK	
II2H3+	20, 30/37 mbar	TR	
II2H3B/P	20, 30 mbar	CY, CZ, DK, EE, FI, HR, HU, IS, IT, LT, NO, RO, SE, SI, SK	
II2H3B/P	20, 37 mbar	HR, LV, TR	
II2H3B/P	20, 50 mbar	AT, CH, GR, LU, SK	
II2H3P	20, 37 mbar	ES, GB, IE, PT	
II2HM3+	20, 28-30/37 mbar	IT	
II2HM3B/P	20, 30 mbar	IT	
II2HM3P	20, 37 mbar	IT	
II2HS3B/P	25, 30 mbar	HU	
II2L3B/P	25, 30 mbar	NL	

Type <i>Typ</i>	Technical Data <i>Technische Daten</i>	Remarks <i>Bemerkungen</i>
FORCE W 60	nominal heat output: 14,7...57,0 kW nominal heat input (Hi): 15,0...58,0 kW	
FORCE W 80; FORCE B 80	nominal heat output: 14,7...72,9 kW nominal heat input (Hi): 15,0...74,4 kW	
FORCE W 99	nominal heat output: 18,7...94,7 kW nominal heat input (Hi): 19,0...96,6 kW	
FORCE W 120; FORCE B 120	nominal heat output: 18,7...110,5 kW nominal heat input (Hi): 19,0...113,0 kW	
FORCE W 150; FORCE B 150	nominal heat output: 23,6...140,0 kW nominal heat input (Hi): 24,0...143,0 kW	
FORCE B 240	nominal heat output: 18,7...221,0 kW nominal heat input (Hi): 19,0...226,0 kW	
FORCE B 300	nominal heat output: 23,6...280,0 kW nominal heat input (Hi): 24,0...286,0 kW	

Hints of Utilization /Remarks

Verwendungshinweise / Bemerkungen

flue types: B23, C13 and C33

Additionally tested appliance categories, supply pressures and countries of destination:

ES, FR, GR, PT: I2N (20 mbar)

AL: II2E3B/P (20, 50 mbar)

BG, MT: II2H3B/P (20, 30 mbar)

MK: II2E3B/P (20, 50 mbar)

In the non-EU countries the conformity approval will be accepted if the Gas Appliance Regulation EU/2016/426 is transferred into national law by this countries.



EC type examination certificate

EG-Baumusterprüfbescheinigung

CE-0085CU0181

Product Identification No.
Produkt-Identnummer

Field of Application <i>Anwendungsbereich</i>	EC Efficiency Directive (92/42/EEC) EG-Wirkungsgradrichtlinie (92/42/EWG)
Owner of Certificate <i>Zertifikatinhaber</i>	Ferrol S.p.A. Via Ritonda 78A, I-37047 San Bonifacio (VR)
Distributor <i>Vertreiber</i>	Ferrol S.p.A. Via Ritonda 78A, I-37047 San Bonifacio (VR)
Product Category <i>Produktart</i>	Boilers: Condensing water heater (3102)
Product Description <i>Produktbezeichnung</i>	Wall-hunging gas fired central heating condensing boiler with integrated gas burner in modulating operation method and with enclosed combustion chamber
Model <i>Modell</i>	FORCE W...; FORCE B...
Type of Boiler <i>Heizkesseltyp</i>	condensing boiler
Test Reports <i>Prüfberichte</i>	supplement test: K 2607 2019 B 6 from 04.02.2020 (TRG)
Test Basis <i>Prüfgrundlagen</i>	EU/92/42 (21.05.1992)
File Number <i>Aktenzeichen</i>	20-0099-GWR

70008 04-A-CE

12.05.2020 Rie A-1/2

Date, Issued by, Sheet, Head of Certification Body
Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle

DVGW CERT GmbH is an accredited body by DAkkS according to DIN EN ISO/IEC 17065:2013 and notified by the government of the Federal Republic of Germany for certification of heating boilers under EC Directive 92/42/EC.

DVGW CERT GmbH ist von der DAkkS nach DIN EN ISO/IEC 17065:2013 akkreditierte und von der Deutschen Bundesregierung benannte Stelle für die Zertifizierung von Heizkesseln nach der Richtlinie 92/42/EWG.



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Type <i>Typ</i>	Technical Data <i>Technische Daten</i>	Energy Labelling <i>Energieeffizienzkennzeichnung</i>
FORCE W 60	nominal heat output: 14,7...57,0 kW nominal heat input (Hi): 15,0...58,0 kW	
FORCE W 80; FORCE B 80	nominal heat output: 14,7...72,9 kW nominal heat input (Hi): 15,0...74,4 kW	
FORCE W 99	nominal heat output: 18,7...94,7 kW nominal heat input (Hi): 19,0...96,6 kW	
FORCE W 120; FORCE B 120	nominal heat output: 18,7...110,5 kW nominal heat input (Hi): 19,0...113,0 kW	
FORCE W 150; FORCE B 150	nominal heat output: 23,6...140,0 kW nominal heat input (Hi): 24,0...143,0 kW	
FORCE B 240	nominal heat output: 18,7...221,0 kW nominal heat input (Hi): 19,0...226,0 kW	
FORCE B 300	nominal heat output: 23,6...280,0 kW nominal heat input (Hi): 24,0...286,0 kW	





07

INAIL



NATIONAL INSTITUTE FOR INSURANCE
AGAINST OCCUPATIONAL ACCIDENTS

TERRITORIAL OPERATIONAL UNIT OF VERONA

REG. 2033/2019

Ferrolì

Via Ritonda, 78
CAP 37047, San Bonifacio (VR)

SUBJECT: Ferrolì modular heat generators mod. Force W

Reference is made to the request made by the company Ferrolì dated 20/06/2019 to obtain permission to install, for the modular generator indicated in the subject, the safety, protection and control devices provided for by Collection R-2009 Chap. R.3.B within one metre on the delivery piping immediately downstream of the last module. The generators are:

Manufacturer: *Ferrolì*

Model: *Force W*

Trademark(s): *Ferrolì*

Assembly Drawing: *3931D760 dated 21/06/2019*

Considering the documentation supplied with the modular generator and the checks and tests carried out, it is considered that several elements or modules specified above, installed in one of the combinations envisaged by the technical documentation, can be considered, for the purposes of implementing Collection R- Edition 2009, as a single generator and the safety, protection and control devices referred to in Chap. R.3B. of Collection "R" can be placed immediately downstream of the last module within a distance of one metre on the outside of the cladding.

Please note that the modular generator configuration allowed is exclusively the one that can be traced back to the assembly drawing above, a copy of which is kept in this Territorial Operational Unit with the rest of the technical documentation.

The obligations of the user/installer with regard to the plant reporting procedures pursuant to art.18 of the Italian Ministerial Decree dated 1/12/1975 remain unchanged; in this regard, a copy of this document will be part of the project documentation when reporting to the competent INAIL Territorial Operational Unit.

This document is valid for 5 years, date 28/06/2019

Anx.: drawings 3541R830- Rev. 01 dated 09/2019 and 3931D760 dated 21/06/2019

The Verifying Technician

Federico Ing. Di Rocco

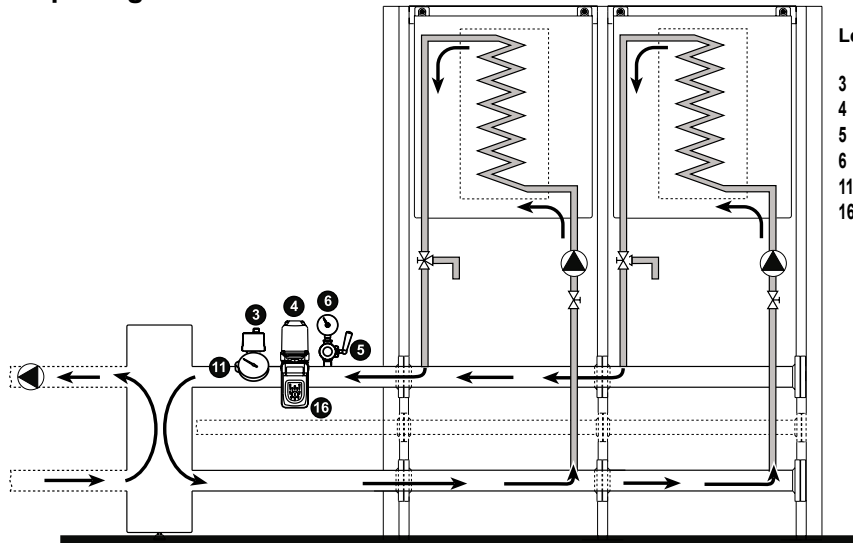


Territorial Operational Unit Director

Francesco Ing. Panin

DIAGRAMS AND ASSEMBLY DRAWINGS OF FERROLI “FORCE W” SERIES MODULAR GENERATORS

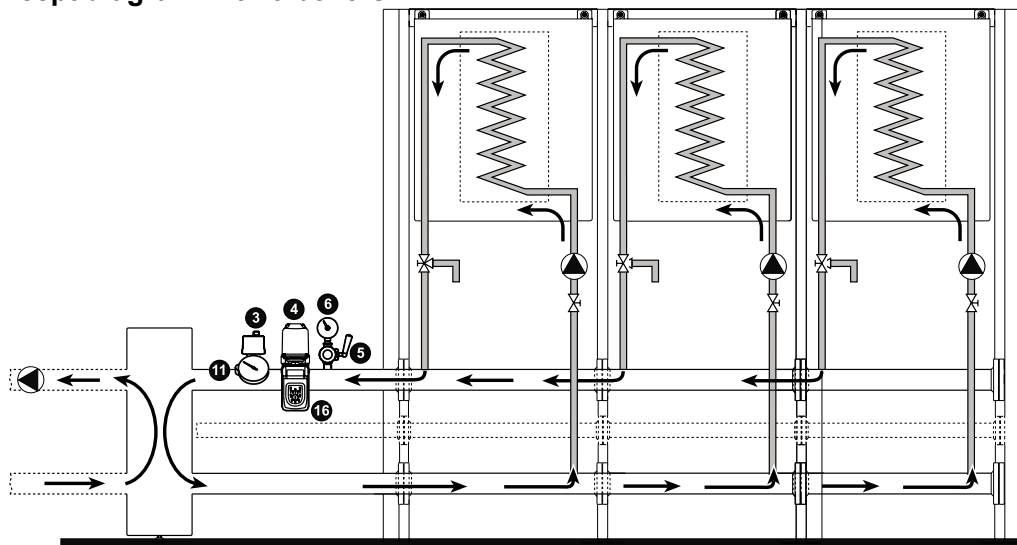
Concept diagram with 2 boilers



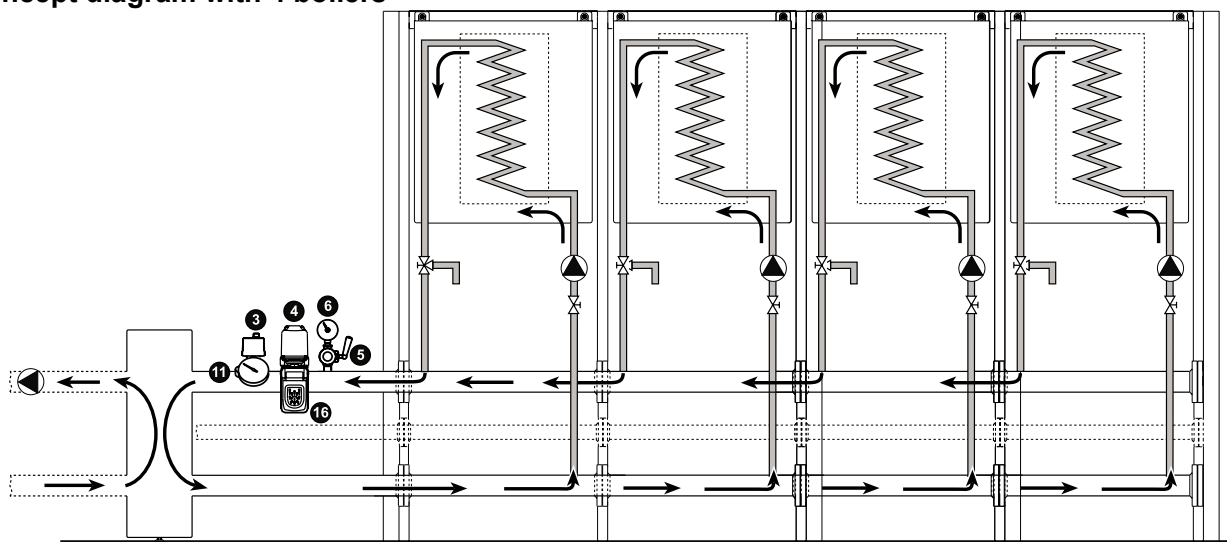
Legend

- 3 Safety thermostat - Code 36402140
- 4 Minimum water pressure switch - Code 36402730
- 5 3-way valve with ISPEL pressure gauge connection - Code 36402220
- 6 Pressure gauge - Code 36402160
- 11 Thermometer - Code 36402150
- 16 Water pressure switch - Code 36402130

Concept diagram with 3 boilers

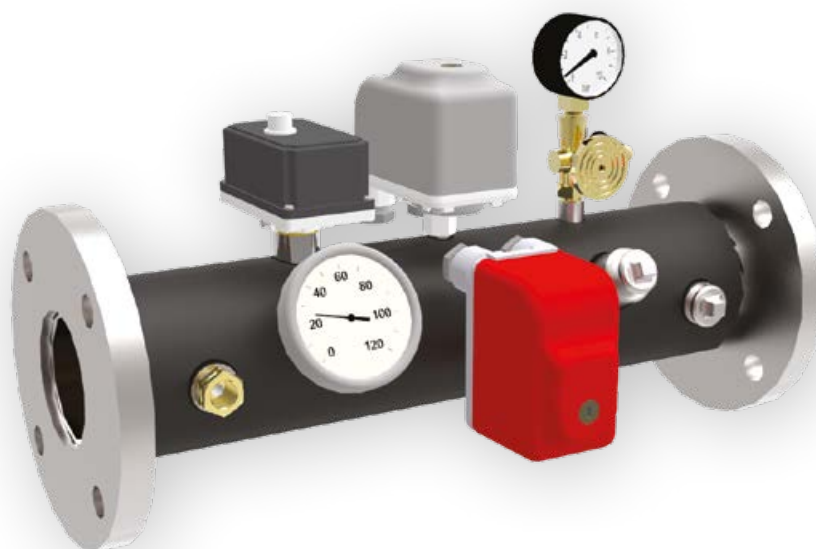


Concept diagram with 4 boilers



INAIL MANIFOLD

HYDRAULIC MANIFOLD COMPLETE WITH INAIL SAFETY EQUIPMENT



PRODUCT CHARACTERISTICS

Hydraulic manifold complete with INAIL safety equipment (former ISPESEL) prescribed by the R Collection for the safety of the central heating plant. PN 16 flanged connections. Complete with:

- Safety pressure switch with manual reset

Operating Pmax: 5 bar
Adjustment range: 2 - 4.5 bar
Fluid temperature range: 20-110°C
Protection rating: IP44

- Minimum level pressure switch with manual reset:

Operating Pmax: 5 bar
Adjustment range: 0.5 - 1.7 bar
Fluid temperature range: 20-110°C
Protection rating: IP44

- Safety thermostat with manual reset

Set at 100°C
Electrical protection rating IP40

- Thermometer

Measuring range 0 - 120°C
Electrical protection rating IP31

- Pressure gauge

Measuring range 0 - 10 bar
Electrical protection rating IP31

- INAIL three-way test pressure gauge valve

Max operating pressure 15 bar

- Connection for INAIL control

**- Connection for shut-off valve (not supplied with the kit)
(not supplied with the kit)**

- Safety valve connection (not supplied with the kit)

MODEL	DIAMETER	FLANGE	LENGTH	CONFIGURATION	CODE
Inail manifold DN 50 PN16	2'	DN50 - PN16	368 mm	Inail delivery manifold only	042056X0
Inail manifold DN 65 PN16	2' 1/2	DN 65 - PN16	368 mm	Inail delivery manifold only	042057X0
Inail manifold DN 100 PN16	4'	DN 100 - PN16	368 mm	Inail delivery manifold only	042058X0
Inail manifold DN 65 PN16	2' 1/2	DN 65 - PN16	460 mm	Inail delivery manifold and hydraulic return manifold	042075X0



08

Generator start-up

ACTIVITY TO BE CARRIED OUT BEFORE COMMISSIONING THE BOILER

Before commissioning the boiler and after having performed the washing/rinsing operations of the hydraulic system according to the reference standard, the installer must check that the supply water is treated in accordance with the Italian Ministerial Decree 26-06-2015 and with Standard UNI 8065 and that all the components envisaged by the above mentioned regulations have been installed. In particular, the installer must guarantee that the main chemical-physical characteristics of the water are within the limits indicated in the boiler's installation, use and maintenance booklet.

The same installer, before the initial check of the product carried out by the Ferroli Authorised Service Centre, must fill in the "PRELIMINARY CHECK REPORT" with the data relating to the boilers and the system components resulting from the implementation of the reference standards.

For this type of boilers, Ferroli offers a free initial check, and consequent validation of the conventional warranty, which consists in the authorised Technical Service Centre checking that the boiler works properly.

On this occasion, the Technical Service Centre also analyses, free of charge, some characteristics of the water and the presence of a suitable concentration of chemical conditioner, reporting the result in the dedicated area in the PRELIMINARY CHECK REPORT, ticking the boxes OK (in case of a positive outcome) or NO (in case of a negative outcome).

The characteristics of the water to be analysed are:

- TOTAL FILLING WATER HARDNESS – AFTER SOFTENER (in French degrees °F)
- TOTAL SYSTEM WATER HARDNESS (in French degrees °F)
- Ph
- PRESENCE OF CHEMICAL CONDITIONER (usually based on molybdenum/molybdate expressed in ppm or mg/l)

In the event of any deviations from the indicated limit values, the installer must implement the appropriate corrective measures to bring the parameters back within the required values.

Below is the PRELIMINARY CHECK REPORT supplied with the documents that come with the boiler.

PRELIMINARY CHECK REPORT
CONDENSING BOILERS WITH OUTPUT GREATER THAN 50 KW

CHECK REPORT No. **VO 000000**

PART TO BE FILLED IN BY INSTALLER

1. **BOILER DATA** MODEL CODE SERIAL NUMBER
- BOILER 1 _____
- BOILER 2 _____
- BOILER 3 _____
- BOILER 4 _____
2. **PLANT REFERENCES**
- CUSTOMER PLACE OF INSTALLATION
- INSTALLER PLANT DESIGNER
3. **PLANT TECHNICAL DATA**
- New plant ☐ Existing plant ☐ Physical separation between boiler and plant (e.g. plate heat exchanger) YES ☐ NO ☐
- Plant water content (m³) Filling water: from aqueduct ☐ From well or other ☐
- Plant water treatment – **REQUIREMENTS** Italian Ministerial Decree 26-06-2015 – reference to technical Standard UNI 8065
- a. PERFORMED WASHING ☐ WASHING PRODUCT USED
- b. MECHANICAL FILTER ON FILLING WATER YES ☐ NO ☐ FLOWMETER ON FILLING WATER YES ☐ NO ☐
- c. SOFTENER ON FILLING WATER YES ☐ NO ☐ SOFTENED WATER FILLING YES ☐ frⁿ NO ☐
- d. DIRT SEPARATOR ON PLANT YES ☐ NO ☐ DEAERATOR ON PLANT YES ☐ NO ☐
- e. PERFORMED CHEMICAL CONDITIONING YES ☐ NO ☐ CONDITIONING PRODUCT USED

WATER PARAMETER LIMITS TO BE COMPLIED WITH

WATER PARAMETER	EXISTING PLANT	NEW PLANT
Total hardness of filling water °F	< 10	< 10
Total hardness of plant water °F	< 15	< 10
PH	7 < Ph < 8,5	
Copper Cu (mg/l)	Cu < 0,5 mg/l	
Iron Fe (mg/l)	Fe < 0,5 mg/l	
Chlorides (mg/l)	Cl < 50 mg/l	
Conductivity (μS/cm)	< 600 μS/cm (*)	

In the presence of conditioners, the limit rises to 1200 μS/cm.

The installer undertakes to inform the owner and/or third party in charge of compliance with the following requirements at his/their expense:

- **EXISTING PLANTS:** in the absence of a plate heat exchanger, a new water treatment parameter check must be carried out within **3-6 weeks** from the date of the initial product inspection: if, after this check, the hardness value of the plant is found to be > 15°F, the plant must be flushed again and refilled with softened water <10°F. A subsequent new check and verification of the indicated limits must be carried out within 6 months from the date of the initial product inspection.
- **NEW AND EXISTING PLANTS:** the water parameters must be checked each time the plant is started up, after any extraordinary intervention such as generator or plant component replacement operations, as well as at least once a year during routine maintenance operations as required by the technical Standard UNI 8065.
- All the **MAINTENANCE REQUIREMENTS** indicated in the installation, use and maintenance booklet must be complied with.

By signing this document, the installer guarantees compliance with the water parameter limits indicated above and compliance with all the requirements of current regulations and of the boiler's installation, use and maintenance booklet. Failure to comply with these requirements and/or a negative outcome of the water test carried out by the authorised Technical Assistance Centre when checking the product, will result in the failure to recognise any consequent damage (presence of limescale, corrosion, etc.) covered by the warranty, as indicated in the conventional warranty certificate attached to the boiler booklet.

DATE

INSTALLER'S SIGNATURE AND STAMP

PART TO BE FILLED IN BY THE COMPANY AUTHORISED ASSISTANCE CENTRE

4. **VERIFICATION OF COMPLIANCE WITH THE WATER PARAMETER LIMITS**

WATER PARAMETER	VALUE READ	RESULT OF LIMIT COMPLIANCE VERIFICATION TABLE 4	
Filling water total hardness °F		OK	NO
System water total hardness °F		OK	NO
Ph		OK	NO

Presence of molybdenum-based chemical conditioner YES ☐ NO ☐ Conditioning concentration found (mg/l)

RESULT OF WATER PARAMETER LIMITS COMPLIANCE VERIFICATION **POSITIVE** ☐ **NEGATIVE** ☐

DATE

NAME OF ASSISTANCE CENTRE TECHNICIAN

SIGNATURE AND STAMP OF
TECHNICAL ASSISTANCE CENTRE

FORCE W BOILER COMMISSIONING

Generator preliminary checks

- Check the tightness of the gas system.
- Make sure that all the air contained in the hydraulic system and in the boiler is discharged.
- Check that there are no water leaks in the system, in any DHW circuits, in the connections or in the boiler.
- Make sure there are no flammable liquids or materials in the immediate vicinity of the boiler.
- Check the correct connection of the electrical system and make sure that the grounding system works.
- Check the electrical connections to any probes and accessories that make up the system and which are managed by the boiler.
- If operation envisages a cascade connection of two or more generators, check the correct connection envisaged by the self-cascade and make sure that the electrical connections of any probes and accessories that make up the system and which are managed by the Master boiler are present on the same.
- Make sure that the condensate is drained correctly and that the siphon is full.

First generator start-up

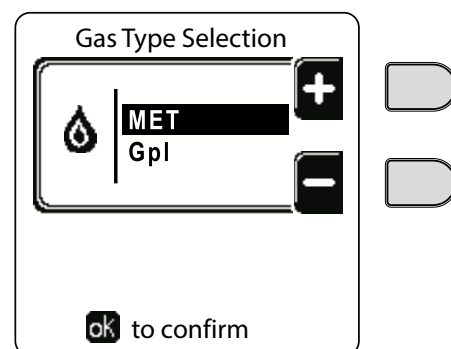
- Make sure that there are no cylinder preparation demands and no demands from the room thermostat.
- Open the gas supply and check that its pressure valve upstream of the appliance complies with the one in the technical data table or, in any case, with the tolerance laid down by the regulation.
- Connect the boiler to the electrical power supply and press the on/off button on the display. For the next 300 seconds, the display shows FH, which identifies the air vent cycle from the heating system. The display also shows the firmware version of the boards.
- Once FH disappears, the boiler is ready to operate automatically whenever there is a demand from the room thermostat (not supplied as standard) or from any cylinder if present.

Supply gas conversion

The appliance can work with Natural Gas or LPG and it is factory-set to use Natural Gas, as clearly stated on the packaging and on the technical data plate of the appliance itself. Should it be necessary to use the appliance with a different gas, it is necessary to use the special conversion kit and follow the instructions given in the boiler booklets. After replacing the nozzles, reassemble the components and check their tightness. Change the parameter relating to the type of gas, as described below. Change the parameter relating to the type of gas, as described below.

Reach the screen shown in the figure by scrolling through the menu following the path "USER MENU", MAINTENANCE, Test Mode, "Gas Type Selection". Press the soft keys + or - to choose the type of gas. Confirm by pressing OK.

By means of a combustion analyser, connected to the flue gas outlet of the boiler, check that the CO₂ content in the flue gas, with the boiler operating at maximum and minimum power, corresponds to the value indicated in the technical data table in the booklet for the respective type of gas; to do this, activate the test procedure.



Fuel type	CO ₂ % Q max	CO ₂ % Q min
G 20	9.3	8.9
G 31	10.5	10.0

TEST mode activation

Reach the screen by scrolling through the menu following the path “USER” MENU, MAINTENANCE, Test Mode “Test Mode”. The boiler switches on and reaches the maximum heating power (Range Rated)

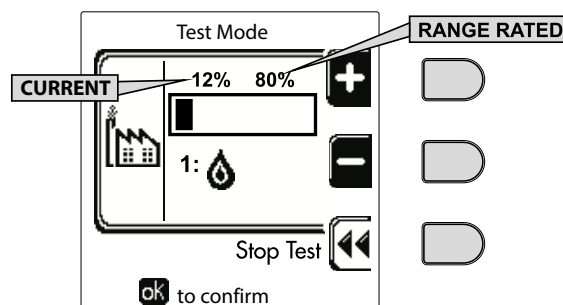
gradually. The current heating power and the set heating power are shown on the display.

Press the soft keys + or - to increase or decrease the maximum power.

To deactivate TEST mode, press the soft key “Stop Test”.

In any case, TEST mode is disabled automatically after 15 minutes.

After activating TEST mode, to exit the TEST it is advisable to deactivate the function only by pressing the soft key “Stop Test”.



Thermal Output Adjustment (RANGE RATED)

The boiler is of the “RANGE RATED” type (according to EN 483) and can be adapted to the heating requirements of the system by setting the maximum thermal output for operation in heating mode, as indicated below:

Put the boiler in TEST mode.

Press the soft keys + and - to increase or decrease the thermal output.

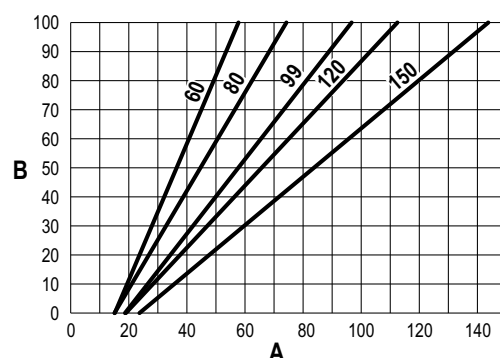
(Minimum = 00 - Maximum = 100). See the “Thermal Output Adjustment” diagram.

By pressing OK, the thermal output value will remain the one just set. Exit TEST mode.

Once the desired thermal output has been set, write down the value on the self-adhesive label supplied and stick it on the boiler under the data plate.

For subsequent checks and adjustments, refer to the set value.

Adapting the thermal output in this way guarantees that the declared performance values are maintained.



Thermal output adjustment diagram

A = kW - B = Electronic Board Parameter

BOILER PARAMETRISATION SEQUENCE

TECHNICAL MENU

ACCESS TO THE SERVICE MENU AND CHANGING PARAMETERS CAN ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL.

The Technical Menu can be accessed only after entering the code 4 1 8. And it is valid for 15 minutes.

Carry out the parametrisation of the boiler according to the system diagrams provided.

See chapters 02 “ELECTRONIC CONTROL” and 04 “SYSTEM SOLUTIONS”

Parameter Menu - Transparent

There are 31 parameters indicated by the letter “P” which can also be edited using the Remote Control, if connected.

See chapters 02 “ELECTRONIC CONTROL” and 04 “SYSTEM SOLUTIONS”

Parameter Menu - System Type

There are 23 parameters indicated by the letter “P.” which cannot be edited using the Remote Control.

See chapters 02 “ELECTRONIC CONTROL” and 04 “SYSTEM SOLUTIONS”

CASCADE CONNECTION

The electronics are able to manage the generators with a simple connection between control units. Connect the modules as shown in the figure (example shown with 3 modules) A= first module MASTER, B=second module SLAVE 1, C=third module SLAVE 2.

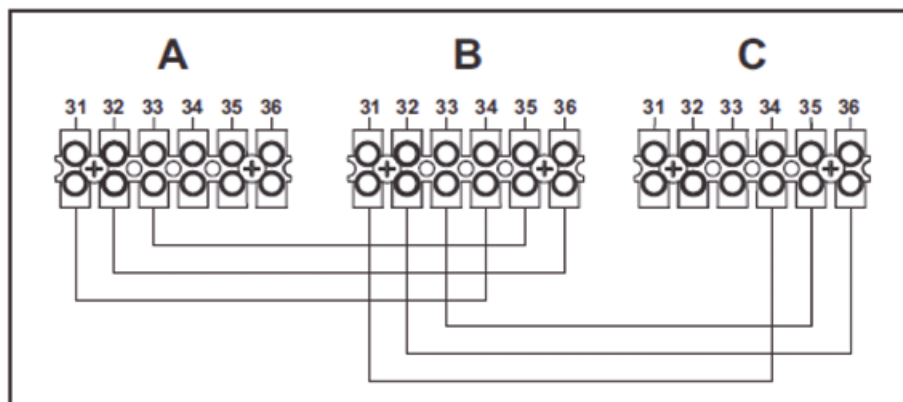
Make all the electrical connections on module no.1 MASTER. On the other modules, connect only the electrical power supply and any contacts relating to: burner on (300), fault contact (301) and remote reset input (302).

4. Power up the entire cascade

5. Once the "FH" procedure is complete, check the correct operation of the cascade:

- Module 1: MASTER icon
- Module 2: SLAVE icon
- Module 3: SLAVE icon

If this does not occur, switch off the power supply and check the wiring.



Settings

All parametrisation settings must be made on all modules, while Time Programming must only be set on Module No.1.

Possible faults

If the electrical connection of a module is interrupted for any reason, module 1 will activate fault F70. If the electrical connection of a module is interrupted for any reason, the next module will activate fault F71.

Further checks by the Technical Assistance Centre

The Technical Assistance Centre proceeds with testing by checking the combustion parameters at both maximum and minimum power for each generator, also checking the correct supply gas pressure.

In the case of gas conversion, the Technical Assistance Centre proceeds with the conversion as illustrated in the booklets, setting the correct parameters for the specific gas.

NOTES



NOTICE FOR SALES AGENTS:

With a view to constantly improve its production range and customer satisfaction levels, the Company hereby specifies that aesthetic and/or dimensional features, specifications and accessories may be subject to changes.

Please place the utmost care to ensure all technical and/or sales documents (lists, catalogues, brochures, etc.) provided to the final Customer are updated according to the latest edition.

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