

# Ferrolli



## Force W

High power modular generator



# MODULAR POWER

For new buildings and high-power upgrades



FORCE W is a family of high-power condensation modular generators designed to fully meet design requirements in the field of new buildings and upgrades of central heating systems.

FORCE W range generators can be installed individually or with up to four cascade modules for a maximum overall power of 600 kW.

The technical and construction features are in line with the highest standards requested by professionals in the central heating systems industry.

The efficiency of the FORCE W range enables the purchaser to apply for current tax benefits to upgrade climate-control systems.

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**THE RANGE** the range consists of 5 generators, certified **B23**, with an open chamber and forced draught

## mod. W 60

HEAT INPUT 58.0 KW  
EFFECTIVE HEATING OUTPUT (50°C-30°C) 61.5 KW  
CLASS ERP A

## mod. W 99

HEAT INPUT 96.6 KW  
EFFECTIVE HEATING OUTPUT (50°C-30°C) 100 KW  
MAXP EFFICIENCY (50°C-30°C) 103.5

## mod. W 150

HEAT INPUT 143 KW  
EFFECTIVE HEATING OUTPUT (50°C-30°C) 148 KW  
MAXP EFFICIENCY (50°C-30°C) 103.5

## mod. W 80

HEAT INPUT 74.4 KW  
EFFECTIVE HEATING OUTPUT (50°C-30°C) 77.0 KW  
MAXP EFFICIENCY (50°C-30°C) 103.5

## mod. W 120

HEAT INPUT 113.0 KW  
EFFECTIVE HEATING OUTPUT (50°C-30°C) 117 KW  
MAXP EFFICIENCY (50°C-30°C) 103.5



# CHARACTERISTICS

## Product benefits

- > **High power thermal condensing module**, designed for single installations or in banks up to 600 kW
- > **Hydraulic, gas and flue gas accessories** for bank installation, with 2, 3 and 4 modules
- > Heat exchanger with pre-assembled elements in **aluminium-silicon alloy** designed to achieve maximum exchange efficiency and low pressure drops on the water circuit
- > Full pre-mixing **combustion unit** with metal fibre micro-flame burner with very low polluting emissions (**Class 6** according to EN 15502-1). The modules can run on **Methane and LPG**
- > **Generator protection systems:**
  - \* Double sensor (delivery and return) system for operation at  **$\Delta T$  constant** (adjustable from 0 to 60°C)
  - \* Exchanger overtemperature protection sensor calibrated at 95°C
  - \* Flue gas safety sensor
  - \* Water pressure switch with minimum threshold of 0.8 bar
- > Hydraulic unit (provided as an accessory) with three-way shut-off valve for discharge into the atmosphere and option of choosing between two **circulators, standard and high head**
- > Air / Flue gas circuit with intake in the installation site and **check valve** on the flue gas ejection duct to size the pressurised manifold
- > Module bank management with **self-configuring Master / Slave system** and option of setting the generator on/off sequence
- > Electronics on board the machine to manage a **system with two direct zones and one DHW storage** or systems with differentiated temperatures (direct and mixed) in combination with the FZ4 B temperature control unit
- > **Range Rated** certified generator to adjust the generated power to the system's needs by increasing the efficiency of the system and preserving the mechanics of the machine
- > The modules can be controlled and operated remotely:
  - \* Power or temperature adjustment with 0 - 10V signal
  - \* Blocking alarm signal for safety and to restart operation
  - \* **Opentherm (OT) and Modbus** communication protocols with settable parameters

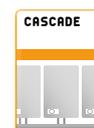
## THE PRODUCT IN BRIEF



Device suitable for operation in a **partially protected place** with a minimum temperature of -5°C, as standard



Appliance certified as "range rated" according to UNI EN 483



Cascade operation



**Remote control** of boiler parameters via remote control



Device operates with **climatic control** and sliding system temperature (optional external temperature probe)

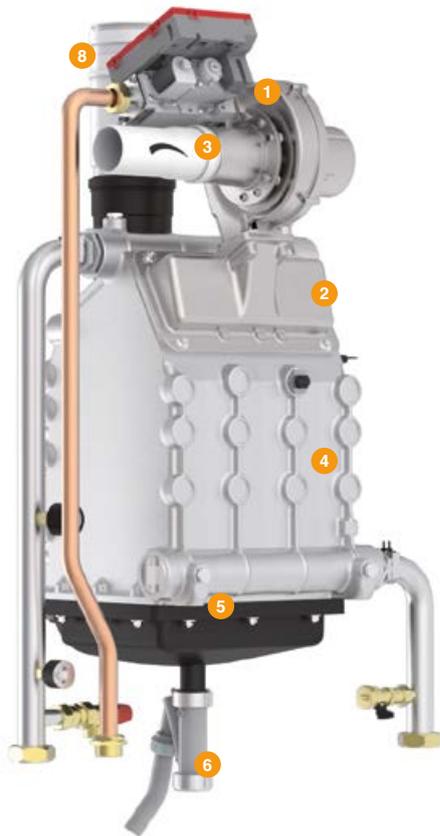


Minimum polluting emissions (**class 6 according to EN 15502-1**) as required by Directive ErP of 26.09.2018 (NOx emissions < 56mg/kWh)

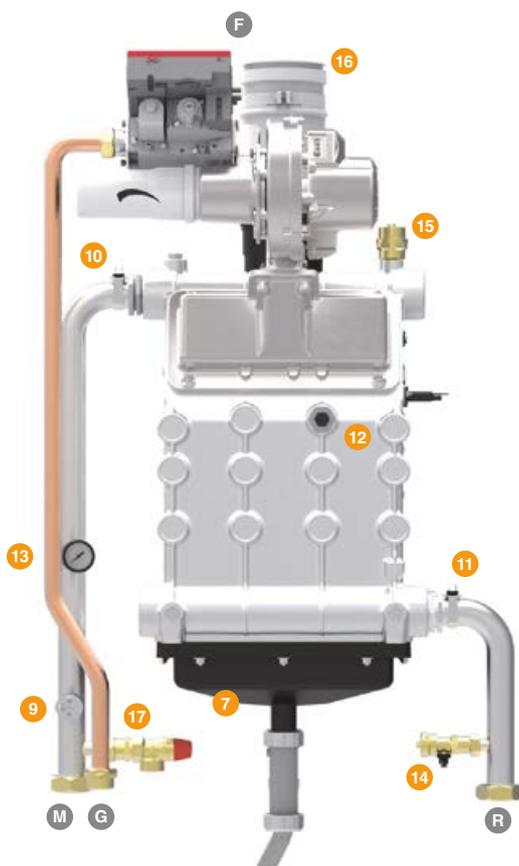


# FORCE W

## Components



- 1 Pre-mixing unit
- 2 Burner
- 3 SILENCER The combustion unit can operate with Methane, 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 for the Class 6 certification of the generator in accordance with UNI 15502-1
- 4 Aluminium heat exchanger in AL/Si alloy single block obtained by die-casting. The water passages inside the heat exchanger are particularly wide to ensure low pressure drops. Completely wet combustion chamber integrated in the casting
- 5 Condensate collection manifold
- 6 Condensate discharge
- 7 Flue gas safety sensor 110°C
- 8 SWING CHECK VALVE A thermostat calibrated at 110°C has been installed on the flue gas manifold to ensure perfect operation of the flue gas exhaust together with a swing check valve with a gravity damper that prevents flue gas return into the boiler. Appliances provided with this device enable design engineers to size the pressurised flue gas channel



- 9 Water pressure switch min 0.8 bar
- 10 System delivery temperature sensor
- 11 System return temperature sensor
- 12 HEAT EXCHANGER OVER-TEMPERATURE SAFETY SENSOR The heat exchanger's operating temperature is checked by three independent sensors that are positioned in 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 cock
- 15 Air bleed valve
- 16 Combustion analysis outlet
- 17 Safety valve 6 bar
- M System delivery  $\varnothing$  1' 1/2
- R System return  $\varnothing$  1' 1/2
- G Gas inlet  $\varnothing$  1'
- F Flue gas outlet  $\varnothing$  100

FORCE W is provided without a circulator and hydraulic kit with the shut-off valves.

For correct installation, the boiler must always be purchased complete with the following kits:

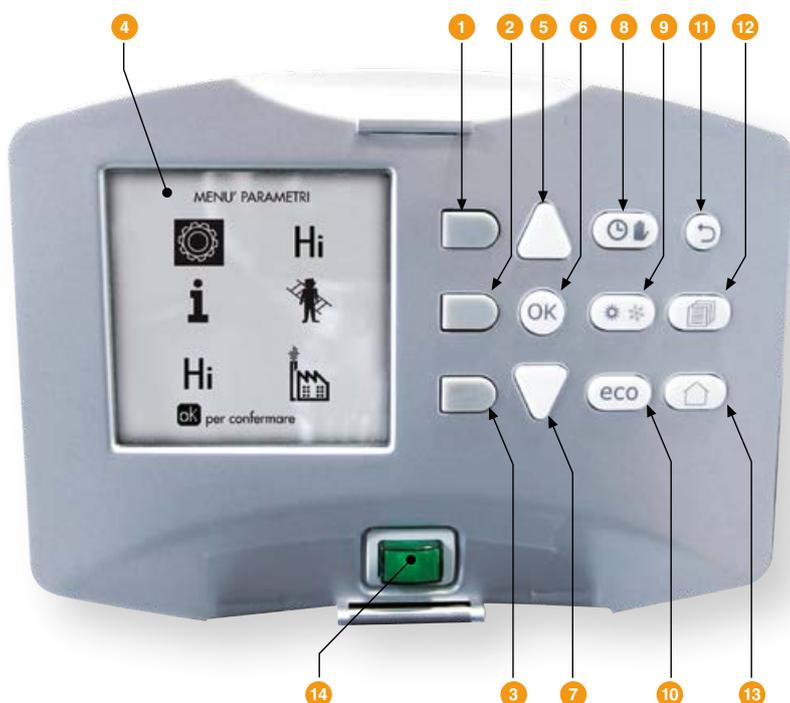
- Modulating circulator
- System hydraulic kit

# CHARACTERISTICS

## Control panel

Characterised by a large dot matrix display and keys to set the basic functions of the generator and to select the parameterisation menus.

The interface is designed to make it easier to read the parameters and browse the menus, both for the USER to adjust and set the basic functions and the TECHNICIAN for maintenance and advanced parameters.



### KEY

- 1 Contextual key 1
- 2 Contextual key 2
- 3 Contextual key 3
- 4 Dot matrix display (example of main screen)
- 5 Menu navigation key
- 6 Menu input/confirmation key
- 7 Menu navigation key
- 8 DHW/heating Manual/Automatic 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 (back to the main screen)
- 14 Main switch

**CONTEXTUAL KEYS** (part. 1, 2, 3) are grey, have no silk-screen printing and can have a different meaning based on the selected menu. It is essential to follow the indications provided by the display (icons and text). For example, by using contextual key 2 (part. 2), it is possible to access information about the device, such as: the temperature of the sensors, the operating power, etc.

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

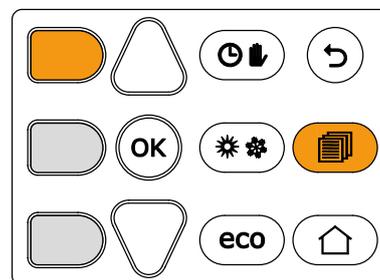
### MENU/NAVIGATION KEYS

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

Two distinct levels of parameterisation can be accessed from the control panel's main menu:

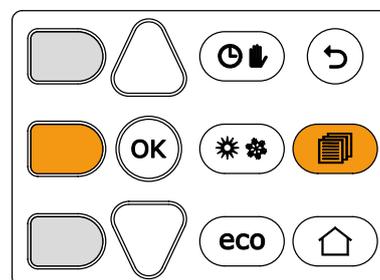
### USER level

Since it is not password-protected, it enables the "system manager" to set the operating mode of the single or cascade generator in order to sync them as much as possible with the type of system based on user requirements



### TECHNICIAN level

Since it is password-protected, it enables the "authorised technician" to check and modify the thresholds of each single component of the generator and boiler system.

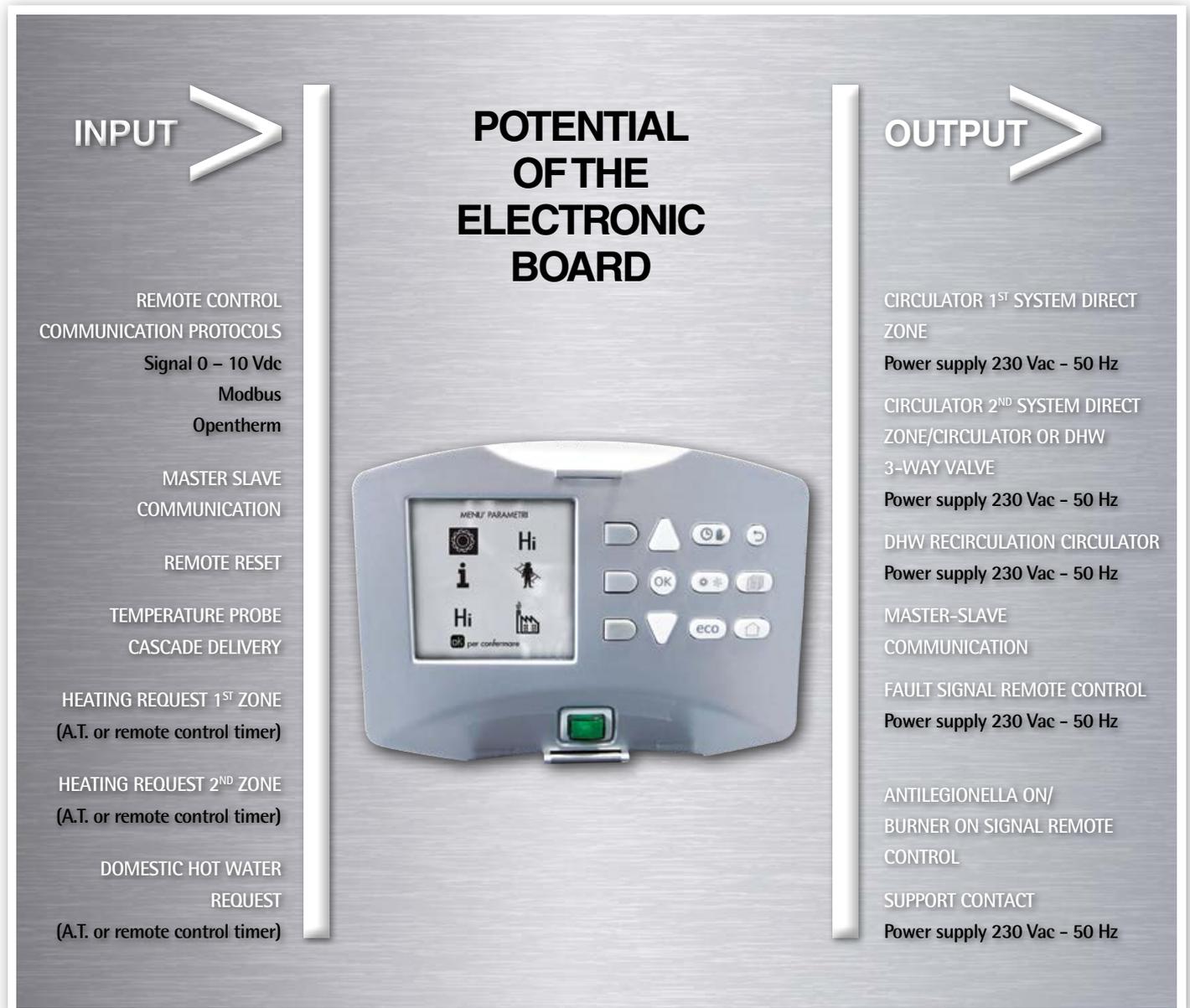




# CHARACTERISTICS

## Control electronics

For all "PROFESSIONAL" range high-power condensation heat exchangers, Ferroli uses a single electronic platform and the same interface panel that is able to manage correct operation and safety of the generator, cascade installation and the main components of a heating system for domestic hot water production.



### KEY (referred to the diagrams on the next page)

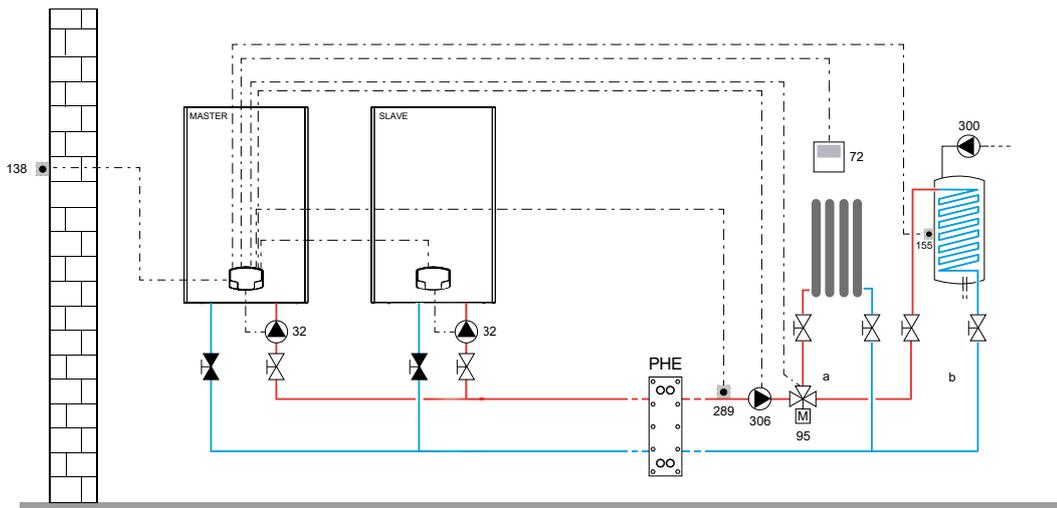
**32** Boiler circulator **72a** Room thermostat 1st zone (mixed) **72b** Room thermostat 2nd zone (mixed) **72c** Room thermostat 3rd zone (direct) **138** External probe **139a** Remote timer control 1st zone (mixed) **139b** Remote timer control 2nd zone (mixed) **139c** Remote timer control 3rd zone (direct) **155** Storage tank probe **300** Antilegionella circulator **315a** Mixing valve 1st zone (mixed) [ A = OPENING PHASE B = NEUTRAL C = CLOSING PHASE] **315b** Mixing valve 2nd zone (mixed) [A = OPENING PHASE B = NEUTRAL C = CLOSING PHASE] **317a** Safety thermostat 1st zone (mixed) **317b** Safety thermostat 2nd zone (mixed) **318a** Circulator 1st zone (mixed) **318b** Circulator 2nd zone (mixed) **318c** Circulator 3rd zone (direct) **319a** Delivery sensor 1st zone (mixed) **319b** Delivery sensor 2nd zone (mixed) **a** 1st zone (mixed) **b** 2nd zone (mixed) **c** 3rd zone (direct) **d** Storage tank circuit **FZ4 B** Zone control card **PHE** Steel plate heat exchanger



# CHARACTERISTICS

## Control electronics

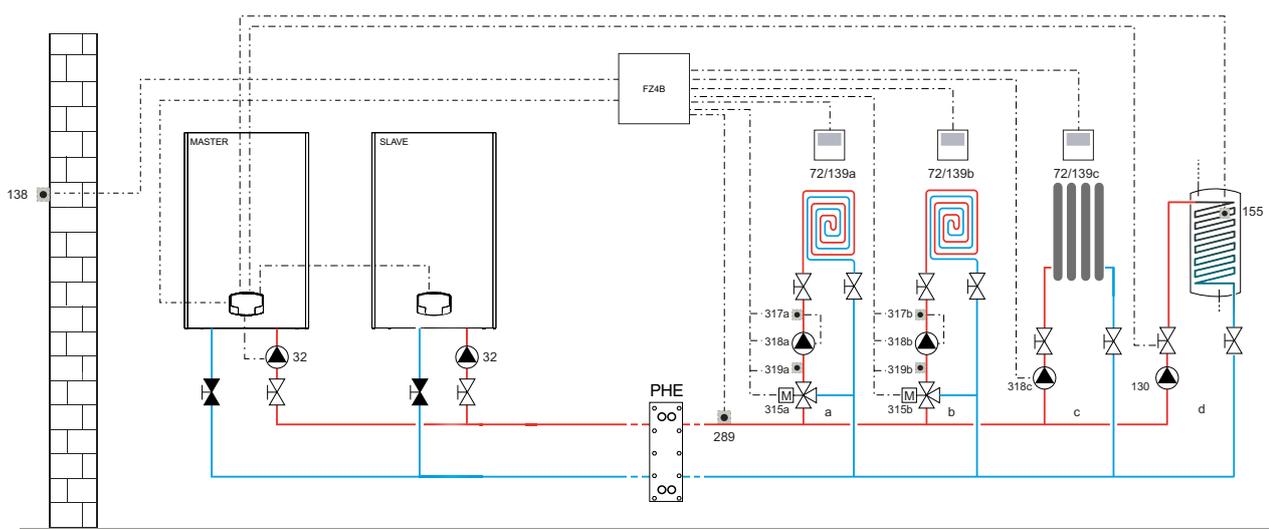
In the event of FORCE W installation in a direct two-zone system (such as a heating circuit and DHW production), the standard electronics can manage the system autonomously without using any optional external equipment. With regard to mixed systems with high and low operating temperature, the boiler must be coupled with the FZ4 B temperature control module designed to manage a heating system up to three zones, two of which mixed.



### CASE A: REPLACEMENT OF THE EXISTING GENERATOR ON A HIGH TEMPERATURE SYSTEM

Thermal system with two loops separated by a plate heat exchanger (PHE). The primary circuit is fed by two FORCE W modules connected as a bank operating in AUTO-CASCADE mode managed directly by the boiler electronics. A “direct” high temperature circuit and a DHW storage with recirculation pump are connected on the secondary circuit (system side).

In addition to SLAVE thermal unit management, without any additional equipment, the MASTER generator can control the system's main components.



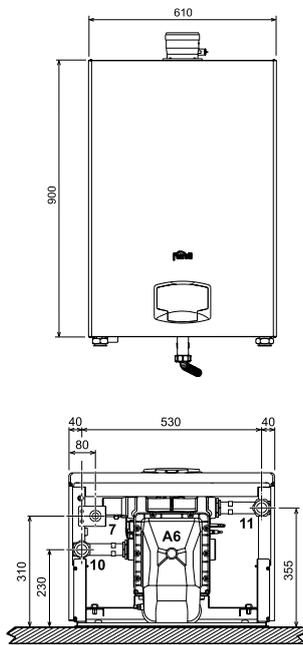
### CASE B: NEWLY DESIGNED SYSTEM

Thermal system with two loops separated by a plate heat exchanger (PHE). The primary circuit is fed by two FORCE W modules connected as a bank operating in AUTO-CASCADE mode managed directly by the boiler electronics. The secondary circuit is composed of two mixed low temperature “zones”, a high temperature direct one and a DHW storage. The MASTER generator controls DHW production directly, in addition to managing the SLAVE thermal unit. The heating zones are controlled by card FZ4 B, connected to the generators through Open Therm.

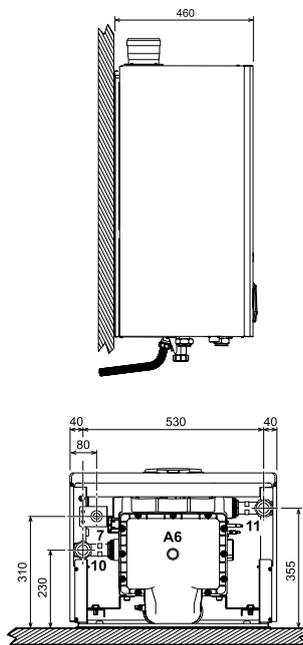


# TECHNICAL DATA

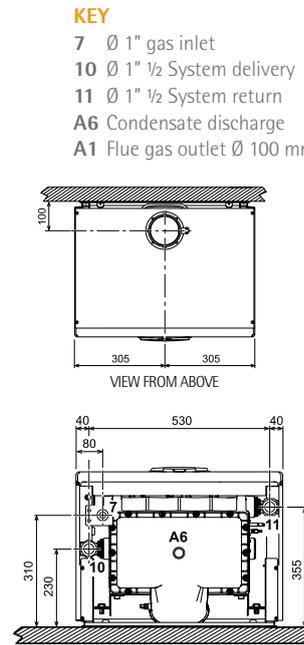
## Dimensions and summary table



VIEW FROM BELOW mod. FORCE W 66 AND 80



VIEW FROM BELOW mod. FORCE W 99 AND 120



VIEW FROM BELOW mod. FORCE W 150

**KEY**

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

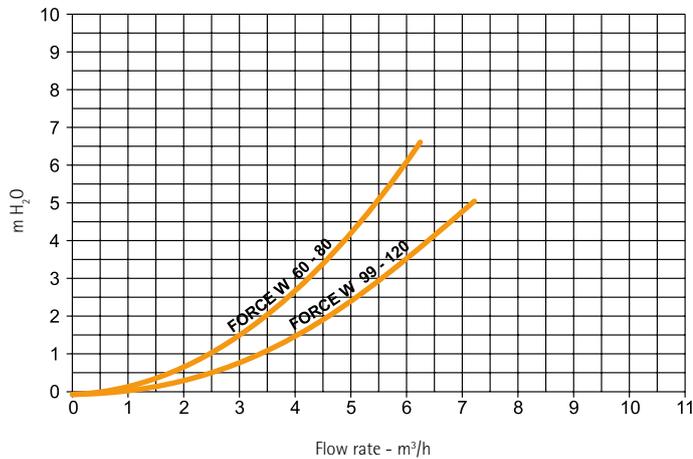
FORCE		W 60	W 80	W 99	W 120	W 150
ERP Class		A	-	-	-	-
Fuel		MTN / LPG				
Heating max heat input	kW	58	74.4	96.6	113	143
Heating min heat input	kW	15	15	19	19	24
Heating max heat output (80/60°C)	kW	57	72.9	94.7	110.5	140
Heating min heat output (80/60°C)	kW	14.7	14.7	18.7	18.7	23.6
Heating max heat output (50/30°C)	kW	60.8	77	100	117	148
Heating min heat output (50/30°C)	kW	16.3	16.3	20.5	20.5	25.9
MaxP efficiency (80/60°C)	%	98.3	98	98	97.8	97.8
MinP efficiency (80/60°C)	%	98.3	98.3	98.3	98.3	98.3
MaxP efficiency (50/30°C)	%	104.8	103.5	103.5	103.5	103.5
MinP efficiency (50/30°C)	%	108.5	108.5	108	108	108
Efficiency 30%	%	108.6	108.6	108.1	108.1	108.1
NOx emissions class	-	6	6	6	6	6
NOx (O <sub>2</sub> =0%) weighted	mg/kWh	50	54	39	38	40
MaxP flue gas temperature (80/60°C)	°C	64	70	71	72	73
MinP flue gas temperature (80/60°C)	°C	60	60	60	60	60
MaxP flue gas temperature (50/30°C)	°C	44	48	53	54	54
MinP flue gas temperature (50/30°C)	°C	30	30	30	30	30
MaxP flue gas flow rate	g/s	26	34	44	51	65
MinP flue gas flow rate	g/s	7	7	9	9	11
CO <sub>2</sub> max G20	%	9.3	9.3	9.3	9.3	9.3
CO <sub>2</sub> min G20	%	8.9	8.9	8.9	8.9	8.9
CO <sub>2</sub> max G31	%	10.5	10.5	10.5	10.5	10.5
CO <sub>2</sub> min G31	%	10	10	10	10	10
Max heating working pressure	bar	6	6	6	6	6
Min heating working pressure	bar	0.8	0.8	0.8	0.8	0.8
Max heating temperature	°C	95	95	95	95	95
Protection rating	IP	IPX4D				
Supply voltage	V/Hz	230/50				
Absorbed electric power	W	60	93	120	175	250
Heating water content	litres	4.2	4.2	5.6	5.6	6.7
Empty weight	kg	54	54	63	63	73
Appliance type		B23				



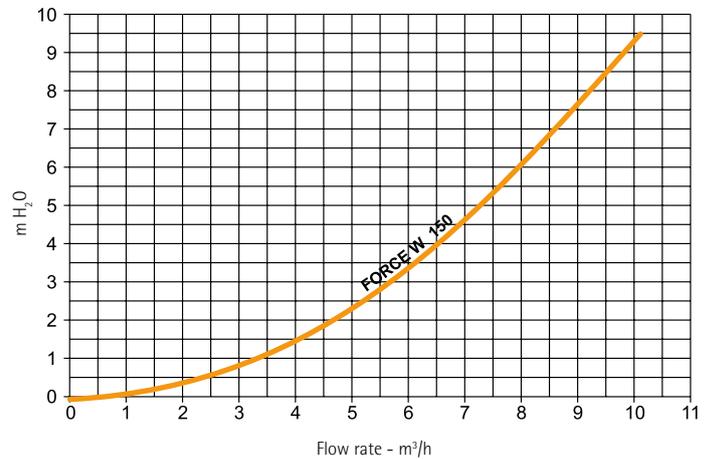
# TECHNICAL DATA

## Diagrams of generator pressure drops

FORCE W 60 - FORCE W 80 - FORCE W 99 - FORCE W 120



FORCE W 150

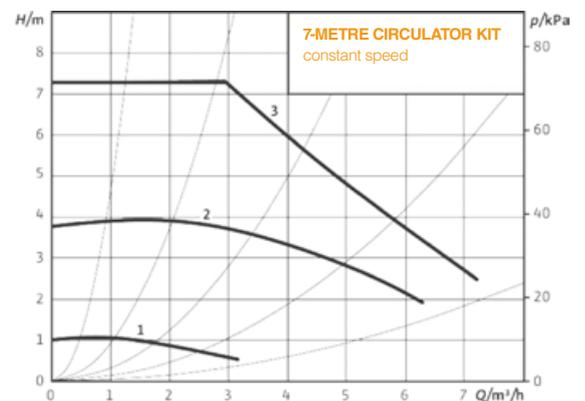
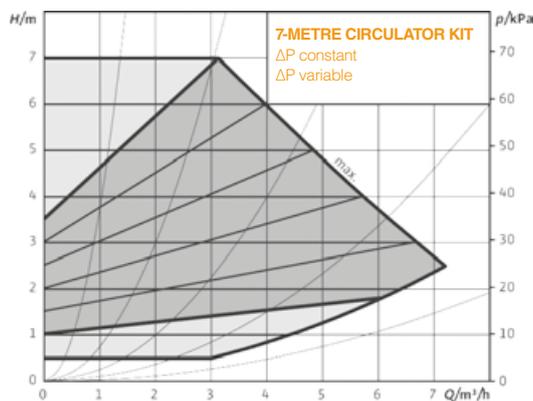


# TECHNICAL DATA

## Characteristic circulator head/flow rate curves

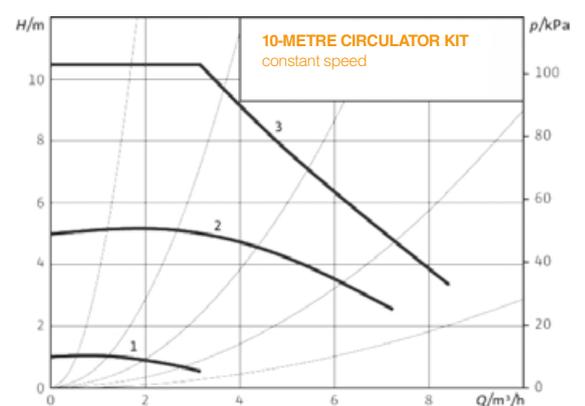
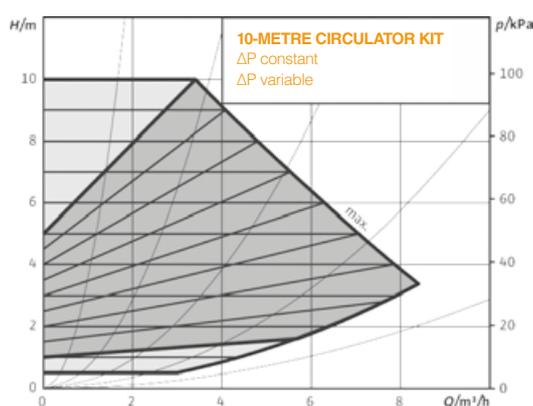
CIRCULATOR KIT

7 m



CIRCULATOR KIT

10 m





# CASCADE INSTALLATION

## Characteristics and strong points

The **FORCE W cascade system** has been designed by drawing from Ferrol's extensive experience in field of central heating generators and with feedback from design engineers and installers. All boiler parts have designed to **facilitate coil installation**. The generators are supplied (optional) with all the accessories for rapid, sound and safe **cascade central heating installation**:



- 1 The FORCE W range can be coupled in banks with **2, 3 and 4 generator combinations** up to a **maximum power of approximately 600 kW, with a modulation ratio up to 1:32**.
- 2 The **dimensions of generators** and **positioning of fittings** are **identical**. All range models are perfectly interchangeable with each other.
- 3 Each cascade configuration is complete with flue gas, hydraulic and gas accessories.
- 4 FORCE W is fitted with a standard **swing check valve that prevents flue gas return into the boiler**. This device enables pressurised flue gas duct designs with much smaller and more cost-effective diameters.
- 5 The electronics fitted as per standard was designed to autonomously manage the dynamics of several generators in cascade, with MASTER-SLAVE logic, **with maximum 6 generators**.
- 6 By setting the parameters of the cascade MASTER board, **the ignition sequence of the various modules can be set and rotated so as to evenly divide the number of operating hours**.

GENERATORS				COIL MODULES	HEAT INPUT kW	HEAT OUTPUT		CASCADE MODULATION	
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	123.0	113.0	15.7 - 123.0	1:8
60	80			2	132.4	138.5	129.4	15.7 - 138.5	1:9
80	80			2	148.8	154.0	145.8	14.7 - 154.0	1:10
60	120			2	171.0	178.5	166.8	15.7 - 178.5	1:11
80	120			2	187.4	194.0	183.2	14.7 - 194.0	1:13
99	120			2	209.6	217.0	204.9	20.5 - 217.0	1:10
120	120			2	226.0	234.0	220.6	20.0 - 234.0	1:12
120	150			2	272.0	265.0	250.3	20.0 - 265.0	1:13
150	150			2	318.0	296.0	280.0	25.9 - 296.0	1:11
99	120	120		3	322.6	334.0	315.2	20.5 - 334.0	1:16
120	120	120		3	339.0	351.0	330.9	20.0 - 351.0	1:18
80	150	150		3	392.4	373.0	352.9	14.7 - 373.0	1:25
99	150	150		3	414.6	396.0	374.6	20.5 - 396.0	1:19
120	150	150		3	431.0	413.0	390.3	20.0 - 413.0	1:21
150	150	150		3	477.0	444.0	420.0	25.9 - 444.0	1:17
120	120	120	120	4	452.0	468.0	441.2	20.0 - 468.0	1:23
60	150	150	150	4	535.0	505.5	476.5	15.7 - 505.5	1:32
120	120	150	150	4	544.0	530.0	500.6	20.0 - 530.0	1:26
120	150	150	150	4	590.0	561.0	530.3	20.0 - 561.0	1:28
150	150	150	150	4	636.0	592.0	560.0	25.9 - 592.0	1:23



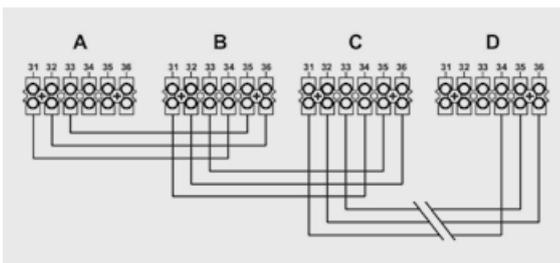
# CASCADE INSTALLATION

## Operating logic

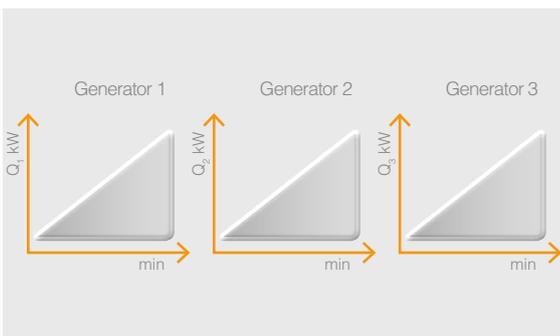
The standard electronics installed on each FORCE W module can control a bank of 6 generators without using any optional additional control units.

The logic chosen by the design engineers is MASTER / SLAVE and, when duly connected, it ensures that all coils work as a single generator managed by a single control (MASTER) able to:

- Distinguish the number of generators installed and connected in bank and identify the system components connected to the MASTER generator terminal board.
- Modify the burner's ignition sequence independently in order to distribute the total number of operating hours equally.
- Using a specific parameter, it is possible to customise the switch-off logic of the bank generators (Parallel or Sequential), without the need to resort to optional sequence control units or to additional control modules.



- A** 1<sup>st</sup> MASTER module
- B** 2<sup>nd</sup> SLAVE module
- C** 3<sup>rd</sup> SLAVE module
- D** 6<sup>th</sup> SLAVE module

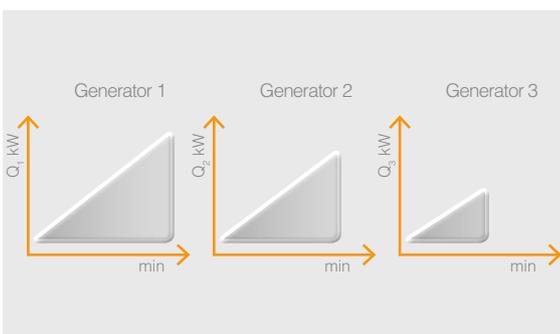


## Parallel operation

Parallel operation of the modules provides for simultaneous ignition, power modulation and switch-off of the burners.

This solution allows for maximum system efficiency since most generators running at the lowest power enable maximum condensation.

The modulation range of the system's power is instead limited.



## Sequential operation

The ignition and power modulation of the burners with sequential operation enable a wide modulation range that runs from minimum power of a single generator to a total maximum power of all burners running together.

This makes the system more flexible compared to the system's heating requirements, but at the expense of the loss of a certain degree of energy efficiency.



# CASCADE INSTALLATION

## Accessories



**Notes:** Pump choice / Plate separator / Hydraulic separator

P <sub>out</sub> (50/30°C)	MODULES FORCE W				Tot. modules	6	7	1		2	3	4	8	9	10	11	12	13	
						Self-standing frame (start)	Self-standing frame (extension)	7-m modulating circulator	10-m modulating circulator	FORCE W hydraulic kit (3-way 1"1/2 cock - 2-way 1" 1/2 cock, 1" 1/2 check valve)	hydraulic (DN65 delivery and return), gas (DN40) manifolds kit for bank installation	Blind flange kit DN65	Storage tank, probe and/or system delivery 5 m	Flue gas manifold starter kit	Flue gas manifold extension kit	Hydraulic separator (up to 300 kW)	Hydraulic separator connection kit (up to 300 kW)	Hydraulic separator (up to 600 kW)	Hydraulic separator connection kit (up to 600 kW)
					042076X0	042077X0	042070X0	042071X0	042072X0	042074X0	042073X0	043005X0	041091X0	041092X0	042078X0	042079X0	042080X0	042081X0	see table
62	1				1	1	-	1	1	1	1	1	1	-	-	1	1	-	1
77		1			1	1	-	1	1	1	1	1	1	-	-	1	1	-	1
98			1		1	1	-	1	1	1	1	1	1	-	-	1	1	-	1
117				1	1	1	-	1	1	1	1	1	1	-	-	1	1	-	1
148					1	1	-	1	1	1	1	1	1	-	-	1	1	-	1
124	2				2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
139	1	1			2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
154		2			2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
179	1			1	2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
194		1	1		2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
215			1	1	2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
234				2	2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
265			1	1	2	1	1	2	2	2	2	1	1	1	2	1	1	-	1
296				2	2	1	1	2	2	2	2	1	1	1	2	-	-	1	1
332			1	2	3	1	2	3	3	3	3	1	1	1	3	-	-	1	1
351				3	3	1	2	3	3	3	3	1	1	1	3	-	-	1	1
373		1			3	1	2	3	3	3	3	1	1	1	3	-	-	1	1
394			1		2	3	1	2	3	3	3	1	1	1	3	-	-	1	1
413				1	2	3	1	2	3	3	3	1	1	1	3	-	-	1	1
444					3	3	1	2	3	3	3	1	1	1	3	-	-	1	1
468				4	4	1	3	4	4	4	4	1	1	1	4	-	-	1	1
506	1				3	4	1	3	4	4	4	1	1	1	4	-	-	1	1
530				2	2	4	1	3	4	4	4	1	1	1	4	-	-	1	1
561			1		3	4	1	3	4	4	4	1	1	1	4	-	-	1	1
592				4	4	1	3	4	4	4	4	1	1	1	4	-	-	1	1



# PLATE EXCHANGERS

## Sizing and choice

Below are some examples of sizing of plate heat exchangers to be combined with FORCE W generators. The choice and testing of the heat exchanger to be used, in relation to the system, is always the responsibility of the customer. The installation technician is in charge of installation.

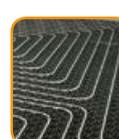
### HIGH TEMPERATURE SYSTEMS

System power	Models FORCE W					INSPECTABLE PLATE EXCHANGERS PHE						
						MODEL	CODE	Primary: 80/60°C		Secondary: 50/70°C		
								Flow rates	Pressure drops	Flow rates	Pressure drops	
kW	60	80	99	120	150	m³/h	m.c.H <sub>2</sub> O	m³/h	m.c.H <sub>2</sub> O			
62	1					PHE 32380 29P	052682X0	2.72	0.6745	2.71	0.5968	
77		1				PHE 32380 41P	052683X0	3.38	0.6205	3.37	0.6136	
98			1			PHE 32380 41P	052683X0	4.31	1.0001	4.29	0.9891	
117				1		PHE 32380 47P	052684X0	5.14	1.1973	5.12	1.1852	
148					1	PHE 50420 35P	052686X0	6.50	0.6655	6.47	0.6655	
124	2					PHE 32380 47P	052684X0	5.45	1.3435	5.42	1.3299	
139	1	1				PHE 32380 53P	052685X0	6.11	1.1245	6.08	1.4589	
154		2				PHE 50420 35P	052686X0	6.77	0.7169	6.74	0.7169	
179	1			1		PHE 50420 35P	052686X0	7.86	0.9512	7.83	0.9510	
194		1		1		PHE 50420 35P	052686X0	8.52	1.1068	8.49	1.1065	
215			1	1		PHE 50420 35P	052686X0	9.45	1.3430	9.41	1.3430	
234				2		PHE 50420 43P	052687X0	10.28	1.1238	10.24	1.1233	
265				1	1	PHE 50420 43P	052687X0	11.64	1.4220	11.59	1.4213	
296					2	PHE 50420 53P	052688X0	14.59	1.2763	14.52	1.2754	
332			1	2		PHE 50420 53P	052688X0	15.42	1.5776	15.36	1.5863	
351					3	PHE 50420 59P	052689X0	15.42	1.5179	15.36	1.5166	
373		1			2	PHE 50420 59P	052689X0	16.39	1.7046	16.32	1.703	
394			1		2	PHE 50420 67P	052690X0	17.31	1.6019	17.24	1.6019	
413				1	2	PHE 50420 67P	052690X0	18.15	1.7531	18.07	1.7512	
444					3	PHE 50420 67P	052690X0	19.60	2.0138	19.42	2.0116	
468					4	PHE 50420 67P	052690X0	20.56	2.0745	20.47	2.0722	
506	1				3	PHE 50420 81P	052692X0	22.23	2.0738	22.14	4.0838	
530					2	2	PHE 50420 81P	052692X0	23.29	2.2676	23.19	2.2645
561					1	3	PHE 50420 85P	052693X0	24.65	2.4048	24.54	2.4014
592					4	PHE 50420 97P	052694X0	26.01	2.3475	25.90	2.3437	



### LOW TEMPERATURE SYSTEMS

System power	Models FORCE W					INSPECTABLE PLATE EXCHANGERS PHE						
						MODEL	CODE	Primary: 60/40°C		Secondary: 30/40°C		
								Flow rates	Pressure drops	Flow rates	Pressure drops	
kW	60	80	99	120	150	m³/h	m.c.H <sub>2</sub> O	m³/h	m.c.H <sub>2</sub> O			
62						PHE 32380 29P	052682X0	2.70	0.680	5.37	3.615	
77		1				PHE 32380 29P	052682X0	3.36	1.042	6.67	4.014	
98			1			PHE 32380 29P	052682X0	4.27	1.677	8.49	6.468	
117				1		PHE 32380 41P	052683X0	5.10	1.427	10.14	5.530	
148					1	PHE 32380 53P	052685X0	6.45	3.104	12.83	6.513	
124	2					PHE 32380 47P	052684X0	5.40	1.348	10.75	5.238	
139	1	1				PHE 32380 47P	052684X0	6.06	1.690	12.05	6.570	
154		2				PHE 32380 53P	052685X0	6.71	1.809	13.35	7.048	
179	1			1		PHE 50420 35P	052686X0	7.80	0.937	15.51	3.646	
194		1		1		PHE 50420 35P	052686X0	8.45	1.148	16.81	4.244	
215			1	1		PHE 50420 35P	052686X0	9.37	1.392	18.63	5.155	
234				2		PHE 50420 35P	052686X0	10.20	1.632	20.28	6.052	
265				1	1	PHE 50420 43P	052687X0	11.55	1.470	22.97	5.467	
296					2	PHE 50420 53P	052688X0	12.90	1.316	25.85	4.915	
332			1	2		PHE 50420 53P	052688X0	14.47	1.635	28.77	1.635	
351					3	PHE 50420 59P	052689X0	15.29	1.561	30.42	6.804	
373		1			2	PHE 50420 59P	052689X0	16.25	1.752	32.33	6.579	
394			1		2	PHE 50420 67P	052690X0	17.17	1.643	34.15	6.192	
413				1	2	PHE 50420 67P	052690X0	18.00	1.798	35.79	6.778	
444					3	PHE 50420 71P	052691X0	19.35	1.920	38.48	7.258	
468					4	PHE 50420 81P	052692X0	20.39	1.823	40.56	6.918	
506	1				3	PHE 50420 97P	052694X0	22.05	1.763	43.85	6.735	
530					2	2	PHE 50420 97P	052694X0	23.09	1.928	45.93	7.368
561					1	3	PHE50750 71P	052695X0	24.44	1.711	48.62	6.568
592					4	PHE50750 71P	052695X0	25.79	1.899	51.31	7.292	





# PLATE EXCHANGERS

Phe - She

**Ferrol offers a full range of plate heat exchangers made of braze-welded steel for small and medium systems and a type that can be inspected for systems up to approximately 1 MW.**



## PHE

HEAT EXCHANGERS WITH INSPECTABLE STEEL PLATES

- Stainless steel plate inspectable heat exchangers (AISI 316L), for medium and small power systems
  - Single-pass circuit in counter-current with four threaded stainless steel connections (AISI 316)
  - Plug-in NBR gaskets (installed without glue or silicones)
  - The optional kits of ground support brackets and insulation are available for the entire range
  - Ideal for replacing a heat generator in an existing system or to combine it with systems with high flow rates
- 
- Maximum operating pressure: 10 bar
  - Max operating temperature: 100°C



## SHE

HEAT EXCHANGERS WITH BRAZE-WELDED STEEL PLATES

- Stainless steel plate heat exchangers (AISI 316L), copper brazed, for medium and small power systems
  - Single-pass circuit in counter-current with four threaded stainless steel connections (AISI 304)
  - Ideal for replacing a heat generator in an existing system or to combine it with systems with high flow rates
- 
- Maximum operating pressure: 16 bar
  - Max operating temperature: 200°C



# HYDRAULIC SEPARATORS

## Characteristics - Accessories to complete installation

The hydraulic separator guarantees independence between the primary circuit (generator) and the secondary circuit (system) without any disturbance or interference between them. The separator is proposed complete with deaerator, sludge separator and is fully insulated.

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

### HYDRAULIC SEPARATOR

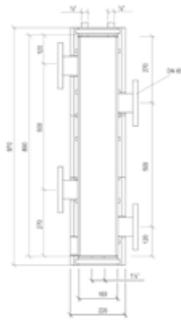
#### FOR INSTALLATIONS UP TO 300 KW



Hydraulic separator DN 65  
**042078X0**



DN 65 separator hydraulic connection manifolds  
**042079X0**



### HYDRAULIC SEPARATOR

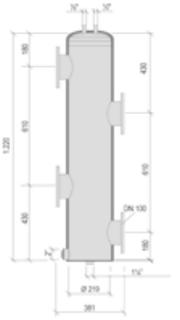
#### FOR INSTALLATIONS UP TO 600 KW



Hydraulic separator DN 100  
**042080X0**



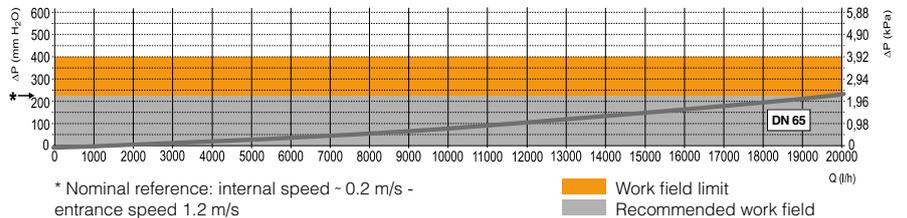
DN 100 separator hydraulic connection manifolds  
**042081X0**



### DIMENSIONS AND TECHNICAL DATA

MODEL		DN 65	DN 100
Flow rate	m <sup>3</sup> /h	18	30
Capacity	l	21	46
Max temperature	°C	100	
Max pressure	bar	6	
Raw material	-	ST37.1 steel	
Insulation	-	EPP Black - 40 g/l	

### PRESSURE DROPS



### COMPLETION ACCESSORIES



Temperature control - Water treatment - Plates



ø 100 flue gas terminal  
**1KWMA29K**



Neutralisers



M/F flue gas outlet reduction ø 100/80 mm  
**041090X0**



Kit for management with thermostat (not supplied) of a DHW storage tank (for heating only boilers)  
**013017X0**



90° bend kit in PPS  
ø 80 mm **1KWMA01W** - ø 100 mm **041077X0**  
ø 200 mm **041060X0**



Additional sensor for storage tank and/or system delivery for cascade configurations with and without hydraulic separator  
2 m cable **1KWMA11W** - 5 m cable **043005X0**



90° PPS ø 80 mm bend kit  
**041072X0**



Outdoor probe  
**013018X0**



1 m MF mm PPS flue gas duct kit  
ø 80 **1KWMA83W** - ø 100 **041073X0**  
ø 200 **041062X0**



**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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