




# Clover

## Condensing thermal generator for large volume of water

- High power condensing thermal module with large water content, designed for single or cascade installations, in combination with a complete range of water, gas and flue gas accessories, up to 1350 kW
- Hydraulic, gas and flue gas accessories for cascade installation with 2 and 3 modules
- Flue gas tube heat exchanger, made with AISI 316 Ti stainless steel, with vertical configuration, helical cross-section, set up perpendicularly to the flue gas chamber
- Full pre-mixing combustion unit with metal fibre front combustion burner with very low emissions (CLASS 6 according to EN 15502-1). The modules can run on natural gas and LPG
- The combustion chamber has an extremely contained overall vertical dimension so that the exchange of water/flue gases can take place over the entire extension of the exchanger
- Generator protection systems: Double sensor (delivery and return) system for operation at  $\Delta T$  constant / Flue gas safety sensor / Water pressure switch with minimum threshold at 0.8 bar
- Air / Flue gas circuit with intake in the installation site and check valve integrated on the intake unit to size the pressurised flue gas manifold
- Control panel protected by a door built into the outer casing with key lock
- Four heavy-duty floating wheels fitted per standard to facilitate unloading and mobility inside the thermal power plant. Adjustable feet for positioning
- It reaches one of the highest seasonal space heating efficiencies in its category:  $\eta_s$  94%
- : combined with the modulating remote control and the outdoor probe (optional) it reaches the top efficiency class A+ (scale from G to A+++)
- The large volume of water of the generator allows the boiler to be connected to the system without the need for separating devices and allows for a very high design  $\Delta t$
- Management of the modules in cascade set-up with self-configuring MASTER / SLAVE system
- Setting of switching on and off of generators (which can be switched on and off in sequence or work simultaneously in parallel) through the control panel of the MASTER generator
- 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 thermoregulator THETA+
- 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 conducted remotely: Regulation of power or temperature with 0 - 10V signal / Signalling of block alarm for safety and restoration of operation / OPENTHERM (OT) and MODBUS parameterisable communication protocols
- Electronic control of microprocessor combustion allows 1/5 modulation on the single generator and of the 1/20 for the maximum configuration (3 x 450 modules in cascade set-up)

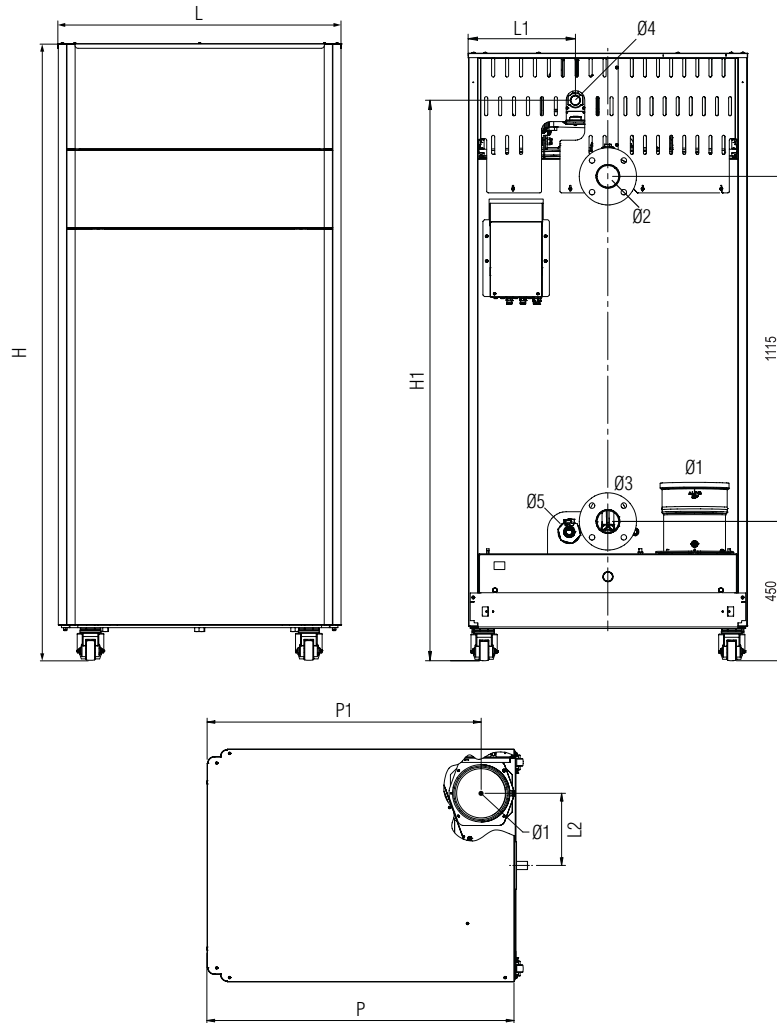
Boiler code	Boiler model
ORBMA4AWD	<b>CLOVER 70</b>
ORBMA7AWD	<b>CLOVER 125</b>
ORBMA8AWD	<b>CLOVER 160</b>
ORBMAAWD	<b>CLOVER 220</b>
ORBMDAWD	<b>CLOVER 320</b>
ORBMGAWD	<b>CLOVER 450</b>

MODEL			70	125	160	220	320	450
ERP Class		(Class G - A++)		-	-	-	-	-
Heating heat input	Max / Min	kW	65.5 / 14.0	116.0 / 23.0	150.0 / 41.0	207.0 / 41.0	299.0 / 62.0	420.0 / 80.0
Heat output (80°C / 60°C)	Max / Min	kW	64.4 / 13.7	114.0 / 22.5	147.0 / 40.2	204.0 / 40.2	294.5 / 60.8	412.7 / 78.4
Heat output (50°C / 30°C)	Max / Min	kW	69.9 / 15.0	125.0 / 24.8	160.0 / 44.2	220.0 / 44.2	320.0 / 66.8	448.6 / 86.2
Efficiency (80°C / 60°C)	PMax / PMin	%	98.3 / 98.0	98.3 / 98.0	98.4 / 98.0	98.5 / 98.0	98.5 / 98.0	98.3 / 98.0
Efficiency (50°C / 30°C)	PMax / PMin	%	106.8 / 107.7	106.8 / 107.7	106.8 / 107.7	106.8 / 107.7	106.8 / 107.7	106.8 / 107.7
Efficiency	30% partial load	%	109.6	109.6	109.5	109.6	109.6	109.3
NOx emissions class			6	6	6	6	6	6
Max operating pressure	Max / Min	bar	6 / 0.5	6 / 0.5	6 / 0.5	6 / 0.5	6 / 0.5	6 / 0.5
Water content of the generator		litres	160	265	380	380	530	561
Empty weight		Kg	180	280	400	400	500	640

Accessories for single installations

Code	Description	Code	Description
052000X0	motorised valve, DN 50 powered 230V - 50Hz <b>for model 70 and 125</b>	041072X0	500 mm - 100 mm long PPS M/F flue gas pipe
052001X0	motorised valve, DN 65 powered 230V - 50Hz <b>for model 160 220 and 320</b>	041074X0	500 mm - 160 mm long PPS M/F flue gas pipe
013018X0	Outdoor probe kit	041076X0	500 mm - 200 mm long PPS M/F flue gas pipe
1KWMA11W	additional sensor for storage tank and/or system flow for cascade configurations with and without hydraulic separator - 2 mt cable	041073X0	1000 mm - 100 mm long PPS M/F flue gas pipe
043005X0	additional sensor for storage tank and/or system flow for cascade configurations with and without hydraulic separator - 5 mt cable	041018X0	1000 mm - 160 mm long PPS M/F flue gas pipe
-	<b>Plates</b>	041062X0	1000 mm - 200 mm long PPS M/F flue gas pipe
-	<b>Temperature control - Neutralisers</b> in chapter <b>ACCESSORIES</b>	041077X0	PPS M/F 90° bend in PPS - 100 mm
-		041015X0	PPS M/F 90° bend in PPS - 160 mm
-		041060X0	PPS M/F 90° bend in PPS - 200 mm

## Views and dimensions



## Hydraulic, gas fittings and flue gas outlets

MODEL	70	125	160	220	320	450
Ø 1 Flue gas outlet Ø (mm)	80	100	160	160	200	200
Ø 2 System flow	1"1/4	1"1/4	2"	2"	DN65	DN65
Ø 3 System Return	1"1/4	1"1/4	2"	2"	DN65	DN65
Ø 4 Gas inlet	3/4"	1"	1"	1"	1"	1"
Ø 5 Boiler discharge	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"

## Heights and dimensions

ITEMS	L	L1	L2	H	H1	P	P1
	mm	mm	mm	mm	mm	mm	mm
<b>CLOVER 70</b>	540	305	210	1883	1815	730	685
<b>CLOVER 125</b>	660	390	160	1903	1800	880	810
<b>CLOVER 160</b>	780	450	240	1933	1815	1050	950
<b>CLOVER 220</b>	780	300	240	1933	1770	1050	950
<b>CLOVER 320</b>	900	350	280	1963	1810	1190	1060
<b>CLOVER 450</b>	900	345	280	2200	2050	1190	1060

## Cascade installation



It is possible to connect in cascade a minimum of two 70 kW generators to a maximum of three 450 kW generators, in the combinations shown in the table.

### Every detail of the CLOVER range has been designed to simplify cascade installations.

- The hydraulic connections have been positioned at the same heights to simplify connection to the system delivery and return manifolds.
- The satellite flue gas outlet with respect to the generator body and the backflow prevention damper positioned directly on the fan facilitate sizing and implementation of the flue gas manifold (pressurised).
- Coupled with a complete series of accessories for several two or three-generator bank combinations, reaching a maximum output of 1350 kW.
- The electronics fitted as per standard was designed to autonomously manage the dynamics of several generators in cascade, with MASTER-SLAVE logic, up to a max of 6.
- By setting the parameters of the cascade MASTER board, the ignition and shutdown sequence of the various modules can be set and rotated so as to evenly divide the number of operating hours.

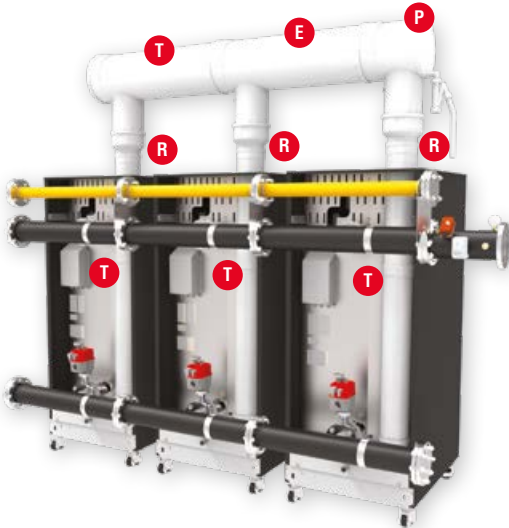
BATTERY COMBINATIONS OF 2 GENERATORS				
HEAT OUTPUT (50/30°C) kW	COMBINATION MODEL		CASCADE MODULATION PMIN/PMAX (50/30°C)	
	1°	2°	kW	MODULATION RATIO
<b>139,8</b>	70	70	15,0/139,8	1 / 9
<b>194,9</b>	70	125	15,0 / 194,9	1 / 13
<b>250,0</b>	125	125	24,8 / 250,0	1 / 10
<b>285,0</b>	125	160	24,8 / 285,0	1 / 11
<b>320,0</b>	160	160	44,2 / 320,0	1 / 7
<b>380,0</b>	160	220	44,2 / 380,0	1 / 9
<b>440,0</b>	220	220	44,2 / 440,0	1 / 10
<b>540,0</b>	220	320	44,2 / 540,0	1 / 12
<b>640,0</b>	320	320	66,8 / 640,0	1 / 10
<b>818,6</b>	320	450	66,8 / 768,6	1 / 11
<b>897,2</b>	450	450	86,2 / 897,2	1 / 10

BATTERY COMBINATIONS OF 3 GENERATORS					
HEAT OUTPUT (50/30°C) kW	COMBINATION MODEL			CASCADE MODULATION PMIN/PMAX (50/30°C)	
	1°	2°	3°	kW	MODULATION RATIO
<b>209,7</b>	70	70	70	15,0 / 209,7	1 / 14
<b>264,8</b>	70	70	125	15,0 / 264,8	1 / 18
<b>319,9</b>	70	125	125	15,0 / 319,9	1 / 21
<b>375,0</b>	125	125	125	24,8 / 375,0	1 / 15
<b>410,0</b>	125	125	160	24,8 / 410,0	1 / 16
<b>445,0</b>	125	160	160	24,8 / 445,0	1 / 18
<b>480,0</b>	160	160	160	44,2 / 480,0	1 / 11
<b>540,0</b>	160	160	220	44,2 / 540,0	1 / 12
<b>600,0</b>	160	220	220	44,2 / 600,0	1 / 14
<b>660,0</b>	220	220	220	44,2 / 660,0	1 / 15
<b>760,0</b>	220	220	320	44,2 / 760,0	1 / 17
<b>860,0</b>	220	320	320	44,2 / 860,0	1 / 19
<b>960,0</b>	320	320	320	66,8 / 960,0	1 / 14
<b>1088,6</b>	320	320	450	66,8 / 1088,6	1 / 16
<b>1217,2</b>	320	450	450	66,8 / 1217,2	1 / 18
<b>1345,8</b>	450	450	450	86,2 / 1345,8	1 / 15

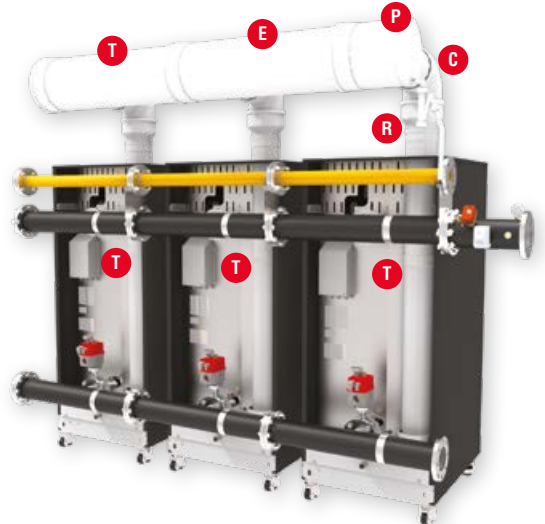
# Premixed gas condensing thermal modules

## Configuration of hydraulic and gas manifold accessories

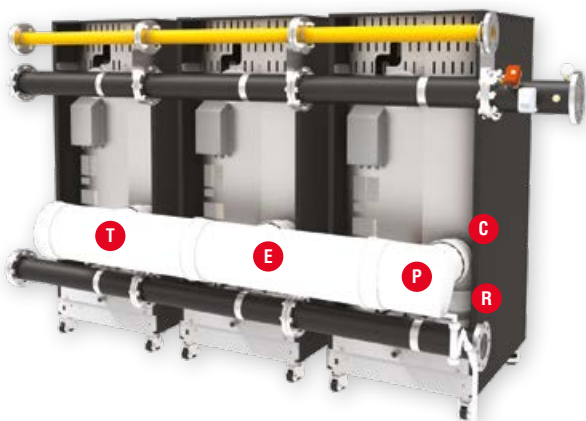
**FLUE GAS MANIFOLD HIGH OUTLET**



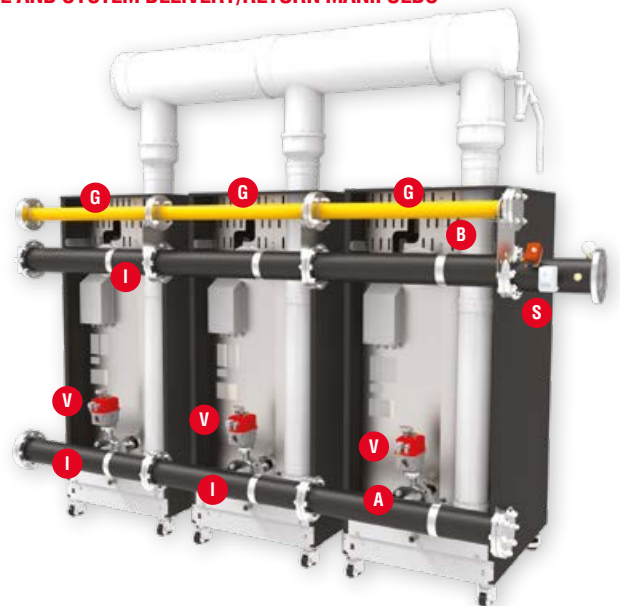
**FLUE GAS MANIFOLD MEDIUM OUTLET**



**FLUE GAS MANIFOLD LOW OUTLET**



**GAS LINE AND SYSTEM DELIVERY/RETURN MANIFOLDS**



## Accessories for cascade installations

Code	Description
052000X0	motorised valve, DN 50 powered 230V - 50Hz <b>for model 70 and 125</b>
052001X0	motorised valve, DN 65 powered 230V - 50Hz <b>for model 160, 220 and 320</b>
-	<b>Temperature control - Neutralisers</b> in chapter <b>ACCESSORIES</b>















Code	Description
013018X0	Outdoor probe kit
1KWMA11W	additional sensor for storage tank and/or system flow for cascade configurations with and without hydraulic separator - 2 mt cable
043005X0	additional sensor for storage tank and/or system flow for cascade configurations with and without hydraulic separator - 5 mt cable
-	<b>Plates</b>

Hydraulic and gas accessories necessary to correctly install 2 CLOVER generators in a bank

HEAT OUTPUT (50/30°C)	MODULES CLOVER			COLLECTOR	G	G	G	I	I	I	F	F	F	B	B	A	A	A		
					1" 1/2 - 1" gas manifold	2" - 1" gas manifold	2" 1/2 - 1" gas manifold	DN50 - 2" hydraulic manifold	DN65 - 2" hydraulic manifold	DN100 - DN65 hydraulic manifold	DN50 flange kit	DN65 flange kit	DN100 flange kit	F-F 1"1/4 coupling	F-F 2" coupling	2" - 1"1/2 M-F reduction nipple	Flange DN50 - sleeve 1"1/4	Flange DN65 - sleeve 2"		
	1	2	3	042050X0	042051X0	042052X0	042053X0	042054X0	042055X0	042059X0	042060X0	042061X0	042062X0	042063X0	042064X0	042065X0	042066X0	no.	no.	no.
139,8	70	70	-	Gas	2															
				Flow			2			1			2							
				Return			2			1								4		
194,9	70	125	-	Gas	2															
				Flow			2			1		2								
				Return			2			1								4		
250,0	125	125	-	Gas	2															
				Flow			2			1		2								
				Return			2			1								4		
285,0	125	160	-	Gas		2														
				Flow				2			1			2	1					
				Return				2			1					1			4	
320,0	160	160	-	Gas		2														
				Flow				2			1		2							
				Return				2			1								4	
380,0	160	220	-	Gas		2														
				Flow				2			1		2							
				Return				2			1								4	
440,0	220	220	-	Gas		2														
				Flow				2			1		2							
				Return				2			1								4	
540,0	220	320	-	Gas			2					1								
				Flow					2			1							1	
				Return					2				1						1	
640,0	320	320	-	Gas			2				1									
				Flow					2			1								
				Return					2				1							
818,6	320	450	-	Gas			2				1									
				Flow					2			1								
				Return					2				1							
897,2	450	450	-	Gas			2				1									
				Flow					2			1								
				Return					2				1							

# Premix condensing gas heating modules

## Hydraulic and gas accessories necessary to correctly install 3 CLOVER generators in a bank

HEAT OUTPUT (50/30°C)	MODULES CLOVER			COLLECTOR	G	G	G	I	I	I	F	F	F	B	B	A	A	A				
					1" 1/2 - 1" gas manifold	2" - 1" gas manifold	2" 1/2 - 1" gas manifold	DN50 - 2" hydraulic manifold	DN65 - 2" hydraulic manifold	DN100 - DN65 hydraulic manifold	DN50 flange kit	DN65 flange kit	DN100 flange kit	F-F 1"1/4 coupling	F-F 2" coupling	2" - 1"1/2 M-F reduction nipple	Flange DN50 - sleeve 1"1/4	Flange DN65 - sleeve 2"				
																						
	1	2	3	042050X0	042051X0	042052X0	042053X0	042054X0	042055X0	042059X0	042060X0	042061X0	042062X0	042063X0	042064X0	042065X0	042066X0	no.	no.	no.		
209,7	70	70	70	Gas	3																	
				Flow				3			1			3								
				Return					3			1							6			
264,8	70	70	125	Gas	3																	
				Flow				3			1			3								
				Return					3			1							6			
319,9	70	125	125	Gas	3																	
				Flow				3			1			3								
				Return					3			1							6			
375,0	125	125	125	Gas		3																
				Flow					3			1			3	3						
				Return						3			1					3				6
410,0	125	125	160	Gas		3																
				Flow					3			1			3	2						
				Return						3			1			2						6
445,0	125	160	160	Gas		3																
				Flow					3			1			3	1						
				Return						3			1				1					6
480,0	160	160	160	Gas			3					1										
				Flow						3			1								3	
				Return							3			1								3
540,0	160	160	220	Gas			3					1										
				Flow						3			1								3	
				Return							3			1								3
600,0	160	220	220	Gas			3					1										
				Flow						3			1								3	
				Return							3			1								3
660,0	220	220	220	Gas			3					1										
				Flow						3			1								3	
				Return							3			1								3
760,0	220	220	320	Gas			3					1										
				Flow						3			1								2	
				Return							3			1								2
860,0	320	320	220	Gas			3					1										
				Flow						3			1								1	
				Return							3			1								1
960,0	320	320	320	Gas			3					1										
				Flow						3			1									
				Return							3			1								
1088,6	320	320	450	Gas			3					1										
				Flow						3			1									
				Return							3			1								
1217,2	320	450	450	Gas			3					1										
				Flow						3			1									
				Return							3			1								
1345,8	450	450	450	Gas			3					1										
				Flow						3			1									
				Return							3			1								

Flue gas accessories necessary to correctly install 2 CLOVER generators in a bank

HEAT OUTPUT (50/30°C)	MODULES CLOVER			FLUE GAS EJECTION	P	P	P	E	E	E	T	T	T	T	T	T	C	C	C	R	R	R			
					Starting flue gas manifold F 300 mm	Starting flue gas manifold F 200 mm	Starting flue gas manifold F 160 mm	Flue gas manifold F 300 mm	Flue gas manifold F 200 mm	Flue gas manifold F 160 mm	Pipe f 200 M-F L 1000 mm PPS	Pipe f 200 M-F L 500 mm PPS	Pipe f 160 M-F L 1000 mm PPS	Pipe f 160 M-F L 500 mm PPS	Pipe f 100 M-F L 1000 mm PPS	Pipe f 100 M-F L 500 mm PPS	Bend 90° F 200 M-F PPS	Bend 90° F 160 M-F PPS	Bend 90° F 100 M-F PPS	Reduction F 160-200 mm M-F PPS	Reduction F 100-160 mm M-F PPS	Reduction F 80-100 mm M-F PPS			
					041070X0	041068X0	041066X0	041071X0	041069X0	041067X0	041062X0	041076X0	041018X0	041074X0	041073X0	041072X0	041060X0	041015X0	041077X0	041080X0	041079X0	041078X0			
				no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.			
139,8	70	70	-	Low			1			1										2			2		
				Medium			1			1					2	2			2						2
				High			1			1					2	2									
194,9	70	125	-	Low			1			1										2			1		
				Medium			1			1					2	2			2						1
				High			1			1					2	2									
250,0	125	125	-	Low			1			1										2					
				Medium			1			1					2	2			2						
				High			1			1					2	2									
285,0	125	160	-	Low	1				1										2				1		
				Medium	1				1				1	2	1	1			2						1
				High	1				1				1	2	1	1									
320,0	160	160	-	Low	1				1										2						
				Medium	1				1				2	2					2						
				High	1				1				2	2											
380,0	160	220	-	Low	1				1										2						
				Medium	1				1				2	2					2						
				High	1				1				2	2											
440,0	220	220	-	Low	1				1										2						
				Medium	1				1				2	2					2						
				High	1				1				2	2											
540,0	220	320	-	Low	1			1										2				1			
				Medium	1			1		1	1		3				2						1		
				High	1			1		1	1		3										1		
640,0	320	320	-	Low	1			1										2							
				Medium	1			1			2	2					2								
				High	1			1			2	2													
818,6	320	450	-	Low	1			1										2							
				Medium	1			1			4						2								
				High	1			1			4														
897,2	450	450	-	Low	1			1										2							
				Medium	1			1			4	4					2								
				High	1			1			4	4													



# Premix condensing gas heating modules

## Flue gas accessories necessary to correctly install 3 CLOVER generators in a bank

HEAT OUTPUT (50/30°C)	MODULES CLOVER			FLUE GAS EJECTION	P	P	P	E	E	E	T	T	T	T	T	T	C	C	C	R	R	R			
					Starting flue gas manifold F 300 mm	Starting flue gas manifold F 200 mm	Starting flue gas manifold F 160 mm	Flue gas manifold F 300 mm	Flue gas manifold F 200 mm	Flue gas manifold F 160 mm	Pipe f 200 M-F L 1000 mm PPS	Pipe f 200 M-F L 500 mm PPS	Pipe f 160 M-F L 1000 mm PPS	Pipe f 160 M-F L 500 mm PPS	Pipe f 100 M-F L 1000 mm PPS	Pipe f 100 M-F L 500 mm PPS	Bend 90° F 200 M-F PPS	Bend 90° F 160 M-F PPS	Bend 90° F 100 M-F PPS	Reduction F 160-200 mm M-F PPS	Reduction F 100-160 mm M-F PPS	Reduction F 80-100 mm M-F PPS			
	041070X0	041068X0	041066X0		041071X0	041069X0	041067X0	041062X0	041076X0	041018X0	041074X0	041073X0	041072X0	041060X0	041015X0	041077X0	041080X0	041079X0	041078X0						
no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.	no.			
209,7	70	70	70	Low			1			2									3			3			
				Medium			1			2				3	3			3					3		
				High			1			2			3	3										3	
264,8	70	70	125	Low			1			2										3			2		
				Medium			1			2				3	3			3						2	
				High			1			2			3	3										2	
319,9	70	125	125	Low			1			2										3			1		
				Medium			1			2			3	3			3							1	
				High			1			2			3	3											1
375,0	125	125	125	Low		1			2										3			3			
				Medium		1			2				3	3			3						3		
				High		1			2	2			3	3			0							3	
410,0	125	125	160	Low		1			2										3			2			
				Medium		1			2			1	2	2	2		3							2	
				High		1			2			1	2	2	2										2
445,0	125	160	160	Low		1			2											3			1		
				Medium		1			2			2	4	1	1		3							1	
				High		1			2			2	4	1	1									1	
480,0	160	160	160	Low		1			2											3					
				Medium		1			2			3	3				3								
				High		1			2			3	3												
540,0	160	160	220	Low		1			2											3					
				Medium		1			2			3	3				3								
				High		1			2			3	3												
600,0	160	220	220	Low	1				2										3			3			
				Medium	1				2				9				3						3		
				High	1				2				9										3		
660,0	220	220	220	Low	1				2										3			3			
				Medium	1				2				9				3						3		
				High	1				2				9										3		
760,0	220	220	320	Low	1				2										3			2			
				Medium	1				2			1	1				3						2		
				High	1				2			1	1				6						2		
860,0	220	320	320	Low	1				2										3			1			
				Medium	1				2			2	2				3						1		
				High	1				2			2	2				3						1		
960,0	320	320	320	Low	1				2										3						
				Medium	1				2			3	3				3								
				High	1				2			3	3												
1088,6	320	320	450	Low	1				2										3						
				Medium	1				2			6	6				3								
				High	1				2			6	6												
1217,2	320	450	450	Low	1				2										3						
				Medium	1				2			6	6				3								
				High	1				2			6	6												
1345,8	450	450	450	Low	1				2										3						
				Medium	1				2			6	6				3								
				High	1				2			6	6												