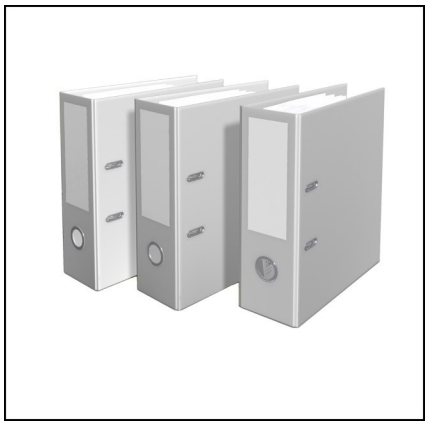
Planner Documentation

R40 EVO



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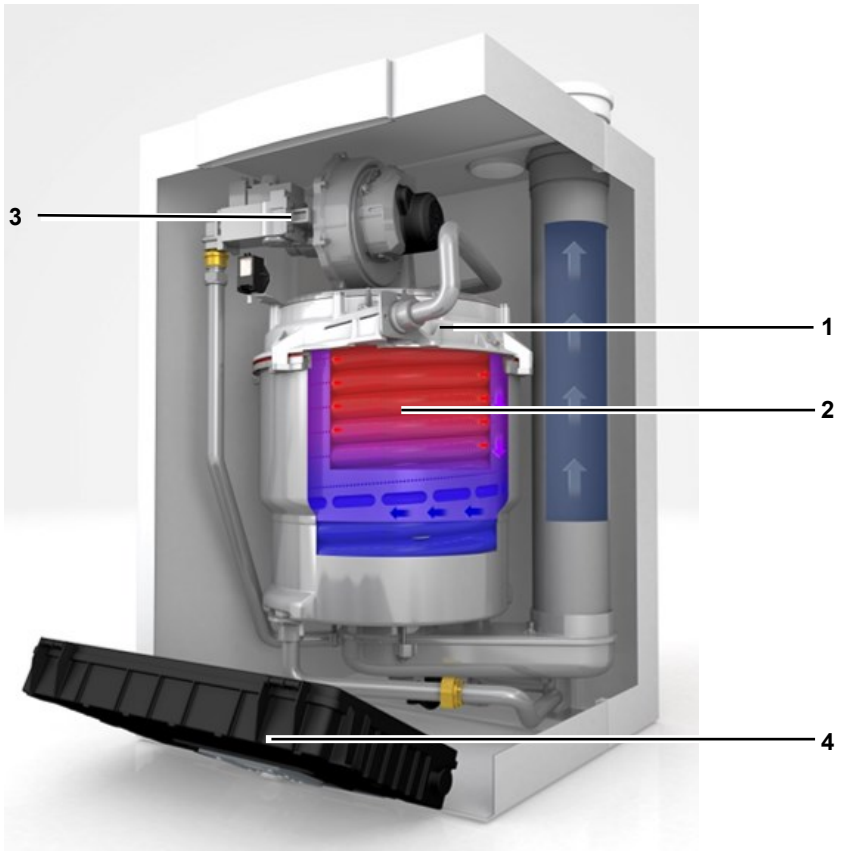
Models and output
The wall hung gas condensing boiler R40 EVO is available in 6 types within an output range from 56 until 130 kW (Nominal heat output at 80/60ºC).

Application possibilities
The gas condensing boiler R40 EVO is applicable for alle central heating systems built according to EN12828 with a maximum flow temperature of 90°C and a minimum water pressure of 1,0 bar.
In cascade applications (max. 8 boilers with LMS14 master/slave cascade control) the R40 EVO can cover installations up to 1040 kW.
Preferred applications are central heating and sanitary hot water production in multi-family buildings, municipal and industrial buildings.

Value propositions
- Unique high power wall hung boiler up to 138kW (Nominal heat output at 40/30°C).
- Unequalled lifetime high efficiency >110% due to corrosion resistant stainless steel heat exchanger
- Highest system flexibility
  easy planning and installation with Plug & Play cascade accessories
- Environmental friendly
  lowest emission values
- Easy maintenance
  boiler design optimised for easy access on servicing



1 Premix burner
2 Stainless steel spiral heat exchanger
3 Speed controlled gas/air mixing system
4 LMS14 boiler management unit

Description
The R40 EVO is a fully modulating boiler. The control unit of the boiler adapts the modulation ratio automatically to the heat demand requested by the system. This is done by controlling the speed of the fan. As a result, the mixing system will adapt the gas ratio to the chosen fan speed, in order to maintain the best possible combustion figures and therewith the best efficiency. The flue gases created by the combustion are transported downwards through the heat exchanger and leave at the boiler at the top into the chimney connection.

The return water from the system enters the boiler in the lower section, where is the lowest flue gas temperature in the boiler. In this section condensation takes place. The water is being transported upwards through the heat exchanger, in order to leave the boiler at the flow connection. The cross flow working principle (water up, flue gas down) ensures the most efficient combustion results.

Technical description

Technical data

		R40 EVO					
		60	**70**	**80**	**100**	**120**	**140**
Nominal heat output at 80/60ºC max/min	kW	56,5/15,5	65,5/15,6	75,3/19,4	92,9/18,7	111,9/22,5	130,4/26,2
Nominal heat output at 50/30ºC max/min	kW	60,4/17,2	70,0/17,2	79,7/21,2	98,9/20,6	118,5/24,8	137,8/28,9
Nominal heat output at 40/30ºC max/min	kW	60,5/17,3	70,0/ 17,4	79,7/21,5	98,9/20,9	118,5/25,2	137,8/29,3
Nominal heat input Hi max/min	kW	57,9/16,0	66,8/16,0	76,8/19,8	95,2/19,0	114,3/22,9	133,3/26,7
Modulation ratio	-	3,6	4,2	3,9	5,0	5,0	5,0
Efficiency at 80/60ºC max/min	%	97,6/97,0	98,0/97,5	98,0/97,9	97,6/98,3	97,9/ 98,3	97,8/ 98,3
Efficiency at 50/30ºC max/min	%	104,4/107,4	104,8/107,3	103,8/107,2	103,9/108,5	103,7/108,4	103,4/108,3
Efficiency at 40/30ºC max/min	%	104,5/108,3	104,8/108,5	103,8/108,6	103,9/110,0	103,7/109,9	103,4/109,8
Efficiency at 36/30°C load 30%	%	107,2	107,2	107,1	107,8	107,9	107,6
RAL 40/30 average	%	108,7	109,1	109,4	109,4	109,1	108,7
Heat Loss (Pstby)	W	81,0	81,0	81,0	92,7	92,7	92,7
Max. condensate flow	l/h	3,6	4,4	4,3	5,4	6,4	7,1
Gas consumption G20 max/min (10,9 kWh/m^3)	m^3/h	5,3/1,5	6,1/1,5	7,0/1,8	8,7/1,7	10,5/2,1	12,2/2,4
Gas consumption G25 max/min (8,34 kWh/m^3)	m^3/h	6,9/1,9	8,0/1,9	9,2/2,4	11,4/2,3	13,7/2,7	16,0/3,2
Gas consumption G31 max/min (12,8 kWh/kg)	kg/h	4,5/1,3	5,2/1,3	6,0/1,5	7,4/1,5	8,9/1,8	10,4/2,1
Gas pressure G20	mbar	20					
Gas pressure G25	mbar	25					
Gas pressure G31	mbar	30/50					
Maximum gas pressure	mbar	50					
Max. temperature flue gas (high limit)	ºC	90					
Flue gas temperature at 80/60ºC max/min	ºC	59/57	60/57	61/58	60/56	63/56	66/57
Flue gas temperature at 50/30ºC max/min	ºC	43/35	44/34	45/33	44/33	46/33	48/33
Flue gas temperature at 40/30ºC max/min	ºC	42/33	44/33	44/33	43/32	45/32	47/32
Flue gas temperature at 36/30°C load 30%	ºC	34	35	35	33	34	35
Flue gas quantity max/min	m^3/h	83/22	98/22	113/27	139/27	168/33	202/38
CO level at 80/60 °C max/min	ppm	75/11	92/11	87/7	67/5	82/4	62/7
CO level at 80/60 °C max/min	mg/kWh	80/11	99/11	94/7	72/5	88/5	67/7
CO year emission EN15502	ppm	35,79	43,76	51,73	41,53	40,76	39,99
CO year emission EN15502	mg/kWh	38,44	47,00	55,56	44,60	43,78	42,95
CO2 level G20-G25 max. load	%	8,5 (+0 -0,2)	8,4 (+0 -0,2)	8,4 (+0 -0,2)	8,4 (+0 -0,2)	8,4 (+0 -0,2)	8,2 (+0 -0,2)
CO2 level G20-G25 min. load	%	9,0 (+0 -0,2)	9,0 (+0 -0,2)	9,0 (+0 -0,2)	8,5 (+0 -0,2)	8,5 (+0 -0,2)	8,5 (+0 -0,2)
Restriction ΔCO2 max. - min.load (G20-G25)	%	-	-	-	-	-	<0,3
CO2 level G31 max. load	%	9,6 (0 +0,2)					
CO2 level G31 min. load	%	9,6 (0 +0,2)					
Restriction ΔCO2 max. - min. load (G31)	%	CO2 Min. load ≤ CO2 Max. load					
NOx level at 80/60 °C max/min	ppm	26/10	30/11	34/16	26/11	22/15	15/15
NOx level at 80/60 °C max/min	mg/kWh	45/17	53/19	60/28	46/19	38/27	26/26
NOx year emission EN15502	ppm	13,94	18,78	23,61	28,38	22,61	16,84
NOx year emission Hi/Hs EN15502	mg/kWh	24,60/22,15	32,61/29,36	40,61/36,57	46,67/42,03	38,19/34,40	29,71/26,76
NOx class EN15502	-	6					
Max. permissible flue resistance	Pa	167	200	200	173	134	200
Water volume	l	6	6	6	9	9	9
Water pressure max/min	bar	8/1					
Max. water temperature (High limit thermostat)	ºC	100					
Maximum temperature setpoint	ºC	90					
Nominal water flow at dT=20K	m^3/h	2,4	2,8	3,2	4,0	4,8	5,6
Hydraulic resistance at nominal flow rate	kPa	15	18	22	7	9	11
Electrical connection	V	230					
Frequency	Hz	50					
Mains connection fuse	A	10					
IP class with Appliance Type B23(P)	-	IP30					

Product information E.r.P.

			R40 EVO					
			60	**70**	**80**	**100**	**120**	**140**
IP class with App. Type C13, C33, C43, C53, C63, C83		-	IPX4D					
Weight (empty)		kg	83	83	83	96	96	96
Weight (filled with water)		kg	89	89	89	105	105	105
Sound Power Level (LWA)		dB	55	55	56	62	57	57
Ionisation current		µA	1,15	1,15	1,15	4,2	1,15	4,2
Rpm max / min load G20-G25		rpm	6070/1770	7260/1800	7820/2060	6710/1570	4960/1150	5730/1300
Rpm max / min load G31		rpm	5810/1770	6710/1800	7190/2060	6090/1570	4960/1150	5460/1300
Rpm pre / post purge		rpm	2800/2800					
Pre / post purge time		sec	10/30					
Safety time		sec	5					
PH value condensate		-	3.2					
CE certification code		-	CE-0063CM3576					
Water connections		-	R1.1/2"					
Gas connection		-	R3/4"			R1"		
Flue gas connection	(DN)	-	100					130
Air intake connect. (room sealed use)	(DN)	-	100					130
Condensate connection		mm	22					

Product information about the directive 2009/125/EG and regulation (EU) 811-813/2013

			R40 EVO					
			60	**70**	**80**	**100**	**120**	**140**
Condensing boiler		-	Yes	Yes	Yes	Yes	Yes	Yes
Low-temperature boiler		-	No	No	No	No	No	No
B1 boiler		-	No	No	No	No	No	No
Cogeneration space heater		-	No	No	No	No	No	No
Combination heater		-	No	No	No	No	No	No
ErP Heating 1) by return temperature 30°C 2) by return temperature and feed temperature (60-80°C)								
Rated heat boiler	P_{rated}	kW	57	66	75	93	112	130
At rated heat output and high-temperature regime	P4	kW	56,5	65,5	75,3	92,9	111,9	130,4
At 30 % of rated heat output and lowtemperature regime 1)	P1	%	18,6	21,5	24,7	30,8	37,0	43,0
Seasonal space heating energy efficiency	ηs	%	91,7	91,8	91,7	92,3	92,5	92,3
At rated heat output and high-temperature regime 2)	η4	%	87,9	88,2	88,2	87,9	88,2	88,1
At 30 % of rated heat output and low temperature regime 1)	η1	%	96,5	96,5	96,4	97,1	97,2	96,9
Auxiliary electricity consumption								
At full load	el_{max}	kW	0,10	0,12	0,13	0,13	0,12	0,15
At 30% load	$el_{30\%}$	kW	0,03	0,03	0,04	0,03	0,04	0,03
In stand-by mode	PSB	kW	0,004					
Supplementary heater								
Standby heat loss	P_{stby}	kW	0,081			0,093		
Ignition burner power consumption	P_{ign}	kW	NA	NA	NA	NA	NA	NA
Emissions of nitrogen oxides	NOx	Mg/kWh	22	29	37	42	35	27

Technical data

Product data sheet E.r.P.

Product data about the directive 2010/30/EU and regulation (EU) 811-813/2013

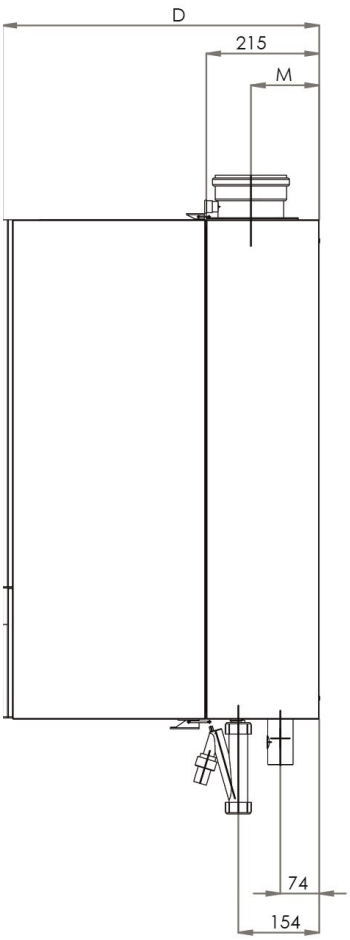
			R40 EVO	
			60	**70**
Seasonal space heating energy efficiency class			A	A
Rated heat output	P_{rated}	kW	57	66
Seasonal space heating energy efficiency	ηs	%	91,7	91,8
Sound power level, indoors/outdoors	LWA	dB	55	55

Important:
The installation, consisting of the boiler and all accessories including temperature control, together define the seasonal heating energy efficiency ηs for the various models, as listed in the below table.

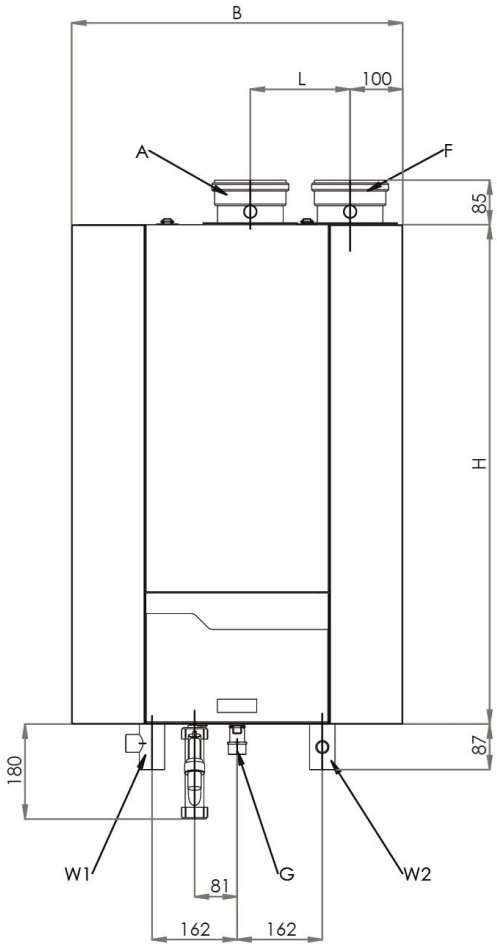
		R40 EVO	
		60	**70**
Class VI, with use of components: - **R40 EVO** - **Ambient temperature sensor** QAA 75 (option) - **External temperature sensor** QAC 34 Temperature controller contribution to ηs : 4%	ηs %	95,7	95,8
Class V, with use of components: - **R40 EVO** - **Ambient temperature sensor** QAA 75 (option) Temperature controller contribution to ηs : 3%	ηs %	94,7	94,8
Class II, with use of components: - **R40 EVO** - **External temperature sensor** QAC 34 Temperature controller contribution to ηs : 2%	ηs %	93,7	93,8

Dimensions

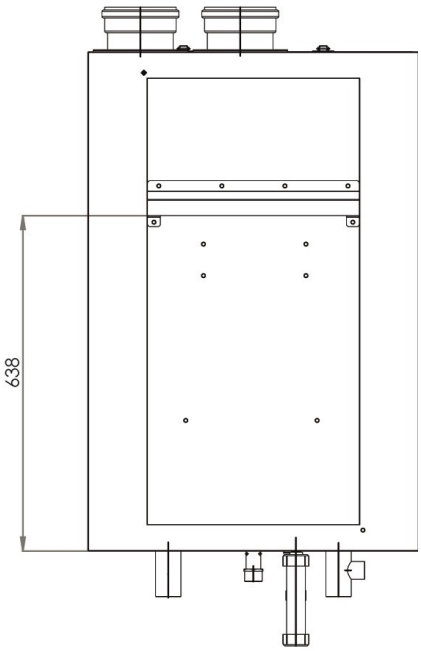
Side view



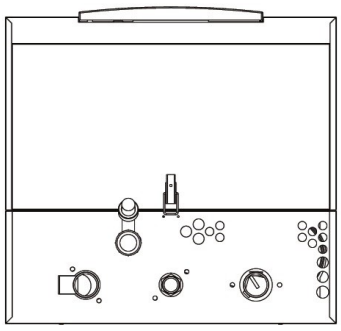
Front view



Back view



Bottom view



Dimensions		R40 EVO		
		60-70-80	100-120	140
A	mm	100	100	130
B	mm	630		
D	mm	605		
H	mm	810	950	950
W1	mm	R 1.1/4"	R 1.1/2"	R 1.1/2"
W2	mm	R 1.1/4"	R 1.1/2"	R 1.1/2"
G	mm	R 3/4"	R 1"	R 1"
F	mm	100	100	130
L	mm	140	140	190
M	mm	115	115	130

Declaration of conformity

Declaration of Conformity

ELCO BV, Hamstraat 76, 6465 AG Kerkrade (NL),
Declares that the product

R40 EVO

Is in conformity with the following standards:

EN 15502-1
EN 15502-2-1
EN 55014-1 / -2
EN 61000-3-2 /-3
EN 60 335-1/ -2

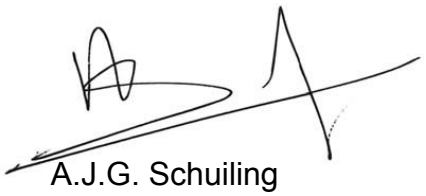
And in accordance with the guidelines of directives:

92 / 42 / EEC (boiler efficiency directive)
2009 / 142 / EEC (gas appliance directive)
2006 / 95 / EEC (low voltage directive)
2004 / 108 / EEC (EMC directive)
2014 / 68 / EU PED directive, art. 4-3
2009 / 125/ CE Energy related Products
811-813 / 2013 EU regulation

This product is designated with CE number:

CE – 0063CM3576

Kerkrade, 01-03-2016



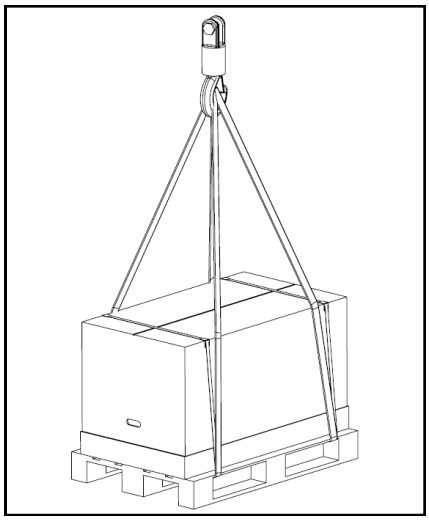
A.J.G. Schuiling
Plant Manager

Technical description

Standard boiler
Boiler transport
Boiler installation

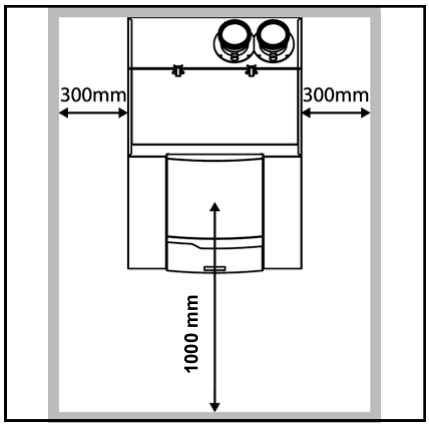
Standard boiler
A boiler delivery package contains the following components:

Component	Pcs.	Package
Boiler fully assembled and tested	1	Cardboard box on pallet
Mounting bracket incl. mounting material	1	Cardboard box in boiler packaging
Syphon for condensate connection	1	In boiler packaging
Operation and Installation manual	1	Folder inside cardboard box in boiler packaging
Spare parts list	1	Folder inside cardboard box in boiler packaging
Wiring diagram	1	Folder inside cardboard box in boiler packaging



Boiler transport
The R40 EVO boiler will be supplied as a complete unit being fully assembled and pre-tested.

The R40 EVO can be transported with a crane, but it has to be ensured that the boiler is packed and fixed on a pallet. The straps must be connected to the pallet.



Boiler installation
The boiler should be positioned in a frost-proof boiler room. If the boiler room is on the roof, the boiler itself may never be the highest point of the installation.
When positioning the boiler, please note the recommended minimum clearance in the picture. When the boiler is positioned with less free space, maintenance activities will be more difficult.

Norms and regulations

Norms

General regulations
This documentation contains important information, which is a base for safe and reliable installation, commissioning and operation of the R40 EVO boiler. All activities described in this document may only be executed by authorized companies.

Changes to this document may be effected without prior notice. We accept no obligation to adapt previously delivered products to incorporate such changes.

Only original spare parts may be used when replacing components on the boiler, otherwise warranty will be void.

Application
The R40 EVO boiler may be used for heating and hot water production purposes only. The boiler should be connected to closed systems with a maximum temperature of 100ºC (high limit temperature), maximum setpoint temperature is 90ºC.

Norms and regulations
When installing and operating the boiler, all applicable norms (European and local) should be fulfilled:

- Local building regulations for installing combustion air and flue gas systems;
- Regulation for connecting the boiler to the electrical appliance;
- Regulations for connecting the boiler to the local gas network;
- Norms and regulations according to safety equipment for heating systems;
- Any additional local laws/regulations with regard to installing and operating heating systems.

The R40 EVO boiler is CE approved and applies to the following European standards:

- **1992 / 42 / EEC** Boiler efficiency directive
- **2004 /108 / EEC** EMC directive
- **2014 / 68 / EU** PED directive art.4-3
- **2006 / 95 / EEC** Low voltage directive
- **2009 / 142 / EEC** Gas appliance directive
- **2009 / 125/ CE** Energy related products
- **811-813/2013** EU regulation
- **EN 15502-1** Gas-fired central heating boilers - Part 1: General requirements and tests
- **EN 15502-2-1** Gas-fired heating boilers - Specific standard for type C and devices type B2, B3, B5 with a nominal heat input not exceeding 1000 kW.
- **EN 60335-1 (2002)** Household and similar electrical appliances - Safety - Part 1: General requirements.
- **EN 60335-2-102 (2006)** Household a similar electrical appliances: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections.
- **EN 50165** Electrical equipment of non-electric appliances for household and similar purposes - Safety requirements.
- **EN 55014-1 (2000)** Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission.
- **EN 55014-2 (1997)** Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard.
- **EN 61000-3-2 (2000)** Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current 16 A per phase)
- **EN 61000-3-3 (2001)** Electromagnetic compatibility (EMC) - Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current 16 A per phase and not subject to conditional connection

Additional national standards

Germany:
- RAL - UZ 61 / DIN 4702-8

Switzerland:
- SVGW

Austria:
- 15a V-BG

Norms and regulations
Maintenance
Fuel
Combustion air
Water quality

Maintenance
Regular maintenance is necessary to secure a safe and economical operation of the installation. For the R40 EVO, one annual maintenance visit is recommended. During this visit, the proper functioning of the complete heating system should be checked as well.

Fuel
The gas condensing boiler R40 EVO is applicable for natural gases G20 and G25. For other types of natural gas, a correction can be made on the gas valve. To operate with G31 gas type use the procedures described on “LPG settings” (s. Installation and Operation manual)

The R40 EVO can work with gas pressures up to 50 mbar. In case of a gas pressure above 50 mbar, a pressure regulator should be fitted in the gas line.

The gas consumption and gas pressures of the different gases can be found in the chapter „Technical data“.

Combustion air
The gas condensing boiler R40 EVO can be used in both non-room sealed and room sealed applications. The combustion air to the boiler shouldn’t contain high concentrations of dust and/or halogen, as they can damage the heat exchanger surface. Especially in buildings, where chemicals are used, the combustion air facility should prevent these chemicals to enter the boiler.

The different room sealed connection possibilities the R40 EVO is approved for, can be found in the chapter „Flue gas system“.

Water quality
The lifetime of the complete heating system is affected by the water quality. Additional costs for water treatment of an installation are always lower than repairing costs for damage created by poor water quality.

The following water quality levels must be respected at all times for warranty claiming. Damage to the boiler due to poor water quality will not be taken under warranty.

The system should be filled with water with a PH value between 8,0 and 9,5. The chloride value of the water should not exceed 50 mg/l. Entry of oxygen by diffusion should be prevented at all times. Damage to the heat exchanger because of oxygen diffusion will not be taken under warranty.

Boiler output	Max. sum of alkaline earths	Max. total hardness	
[kW]	[mol/m^3]	[°dH]	[°f]
50 - 200	2,0	11,2	20
200 - 600	1,5	8,4	15

In installations with higher water volumes, it’s necessary to respect the maximum filling and additional volumes with corresponding hardness values as stated in the german VDI2035 standard. In the table you can find the nominal values for filling and additional water for the R40 EVO according to the VDI2035.

Concentrate $Ca(HCO_3)_2$			Capacity of installation Q (kW)						
			200	250	300	400	500	600	600
mol/m^3	°dH	°f	Maximum water (re)fill volume V_{max} [m^3]						
≤0.5	≤2.8	≤5	-	-	-	-	-	-	-
1.0	5.6	10	-	-	-	-	-	-	-
1.5	8.4	15	3	4	5	6	8	10	12
2.0	11.2	20	3	4	5	6	6,3	7,8	9,4
2.5	14.0	25	1,9	2,5	3,1	3,8	5,0	6,3	7,5
≥3.0	≥16.8	≥30	1,6	2,1	2,6	3,1	4,2	5,2	6,3

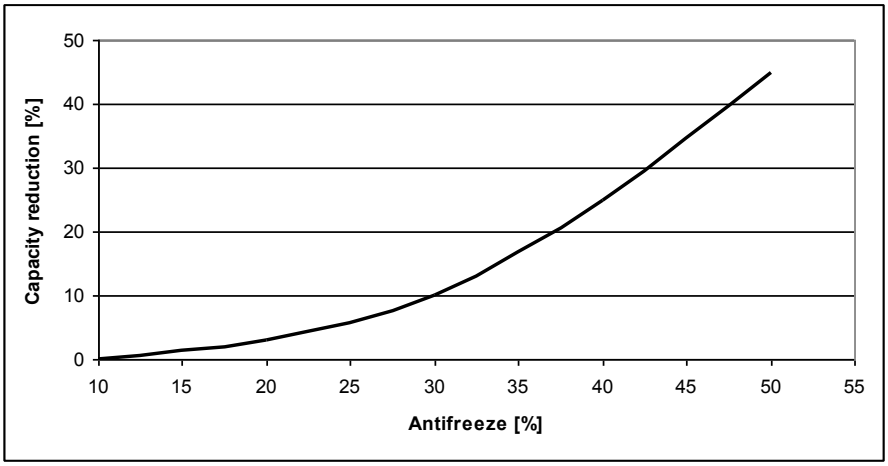
The table at the left gives an indication of the relation between the water quality and the maximum water filling volume during the lifetime of the boiler. Consult the original text of the VDI2035 for more detailed information.

Constant entry of oxygen in the installation should be avoided. The system water pressure should be higher than the atmospheric pressure in all parts of the installation. Underfloor heating components without oxygen diffusion barrier should never be used. When they’re used anyway, a system separation (f.e. with plate heat exchanger) is compulsory.

Noise protection
Antifreeze

Noise protection
The gas condensing boiler R40 EVO is equipped with a premix burner. The noise level of this very quiet premix burner is extremely low in comparison to conventional gas burners. Therefore no further measures have to be taken for noise protection in the boiler room.

Noise created by system components (f.e. pumps) should be taken care of with external measures, in case of higher noise level requirements.



Antifreeze
The R40 EVO can be used with the antifreeze type Shell Antifreeze Concentrate. The concentration of the antifreeze in the system affects the maximum capacity the boiler can work on. The relation between antifreeze concentration and capacity reduction of the boiler can be found in the graph.

Flue gas system

Requirements and regulations
Materials
Flue gas data

Requirements and regulations
Regulations for the construction of flue gas systems are very different for each country. It should be ensured that all national regulations with regard to flue gas systems are respected. The most important national norms can be found in the chapter „Norms“.

Pay attention to the following recommendations when dimensioning a flue gas system:
Only approved flue gas material may be used.
The flue gas system must be properly calculated to ensure a safe functioning of the system.
Flue gas system components should be removable for maintenance purposes.
Horizontal flue gas ways must be mounted under an angle of 3º minimum.

A separate condensate drain for the chimney is not necessary, as the condensate can enter the drain via the syphon connection of the boiler.

The R40 EVO is certified for the flue gas systems B23(P), C13, C33, C43, C53, C63 and C83.

Materials
Exclusively materials, which are heat resistant and resistant to flue gases and aggressive condensate, may be used. Recommended materials are plastic (PPS, category T120) or stainless steel. Aluminium (only thick wall!) can also be used (in Germany only after consulting the chimney sweeper).

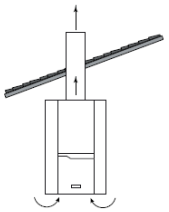
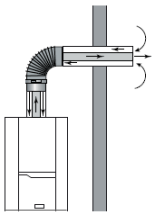
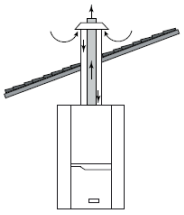
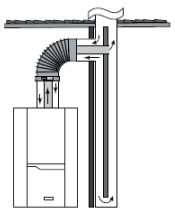
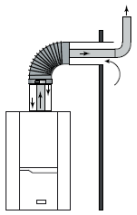
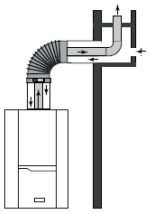
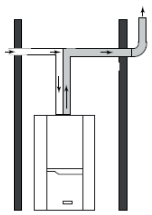
The R40 EVO has an integrated high limit thermostat function for the flue gases. When the flue gas temperature exceeds 90ºC, the burner is switched off. With this function, an additional (external) safety device is not necessary.

Flue gas data

Boiler type	Nominal heat output		Nominal heat input		Flue gas connection (DN)	CO_2 level		Flue gas temperature		Flue gas quantity		Max. permissible flue resistance	
	kW		kW		mm	%		ºC		g/s		Pa	
R40 EVO	max	min	max	min		max	min	max	min	max	min	max	min
60	56,5	15,5	57,9	16,0	100	8,5	9,0	59	57	25	7	167	15
70	65,5	15,6	66,8	16,0	100	8,4	9,0	60	57	29	7	200	15
80	75,3	19,4	76,8	19,8	100	8,4	9,0	61	58	33	8	200	15
100	92,9	18,7	95,2	19,0	100	8,4	8,5	60	56	41	8	173	15
120	111,9	22,5	114,3	22,9	100	8,4	8,5	63	56	49	10	134	15
140	130,4	26,2	133,3	26,7	130	8,2	8,5	66	57	58	11	200	15

Flue gas system

Certified flue gas systems

Combustion air drawn from the room	**B23**	External flue gas exhaust. Air drawn from the room	
Combustion air intake from outside	**C13**	Air/exhaust gas routing through outside wall in the same pressure range. Exhaust gas/fresh air supply system through outside wall. The Terminal outlets from separate combustion and air supply circuits shall fit inside a square of 50 cm for boilers with a heat input to 70 kW and 100 cm with a heat input from 70 up to 100 kW.	
	C33	Flue gas exhaust and air suction duct from outside with roof terminal in the same range of pressure. The Terminal outlets from separate combustion and air supply circuits shall fit inside a square of 50 cm and distance between the planes of the two orifices shall be less than 50cm for boilers with a heat input below 70 kW. A square of 100 cm and distance between the planes of the two orifices shall be less than 100 cm with a heat input above 70 kW.	
	C43	Individual or shared flue gas exhaust and air suction through flue ducting built into the building.	
	C53	Flue gas exhaust leading outside and air suction duct through external wall not in the same range of pressure.	
	C63	Air and exhaust connection to separate tested and supplied air / exhaust pipes. Basement / floor installation. Air and exhaust venting via exterior wall. Exhaust venting through heat insulated exhaust pipe or moisture resistant pipe. Exhaust line (standing air layer) at exterior wall. The terminals for the supply of combustion air and for the evacuation of combustion products shall not be installed on opposite walls of the building.	
	C83	Flue gas exhaust through individual or shared flue ducting built into the building. Air suction through external wall	

Flue gas system

Dimensioning single

Twin Pipe flue gas system					
Maximum permissible height (h) of flue gas system in m					
R40 EVO	**Ø 80**	**Ø 100**	**Ø 110**	**Ø 125**	**Ø 130**
60	17	62	-	-	-
70	13	52	65	-	-
80	7	36	47	-	-
100	-	13	23	56	88
120	-	2	7	22	36
140	-	-	5	14	23

Equivalent length in m					
	Ø 80	**Ø 100**	**Ø 110**	**Ø 125**	**Ø 130**
Straight pipe	1	1	1	1	1
Bend R = D 90° / 87°	1,5	1,8	2	2,2	2,2
Bend R = D 45° / 43°	0,8	0,9	1	1	1

Dimensioning
When dimensioning a flue gas system, it's necessary to perform a calculation check of the flue gas system in order to verify if the choosen system is applicable.

Each flue gas system must be calculated by an authorized company.

The maximum negative flue gas pressure, which doesn't affect the burner modulation ratio, is 30 Pa. Higher negative pressure will lead to limitation of the burner modulation ratio.

The maximum horizontal flue gas run is 20 m. With horizontal ways longer than 20 m, a faultless burner start in cold condition can not be guaranteed.

Concentric flue gas system		
Maximum permissible length of flue gas system in m		
R40 EVO	Ø 80 /125	Ø 100 / 150
60	12	38
70	9	33
80	4	23
100	-	10
120	-	3

Lenth reduction factor
- 1,5 meter per 90/87° bend
- 1 meter per 45/43° bend

Concentric flue gas system
The R40 EVO boiler models 60, 70, 80, 100 and 120 can be connected to a concentric flue gas system.
Via a parallel-to-concentric adapter (optional) the boiler can be connected to:
- 100/150 concentric system from Muelink&Grol;
- 110/150 concentric system from Skoberne.

See table for max. permissible flue lengths.

Flue gas system

Dimensioning cascade
Concentric flue operation / installation

Max. boiler input (kW) by vertical chimney length and diameter (collector/chimney)			
Diameter	Chimney height		
	5m	15m	30m
150/150mm	327	313	288
150/200mm	450	412	370
200/200mm	530	500	482
200/250mm	697	675	646
200/300mm	855	835	797

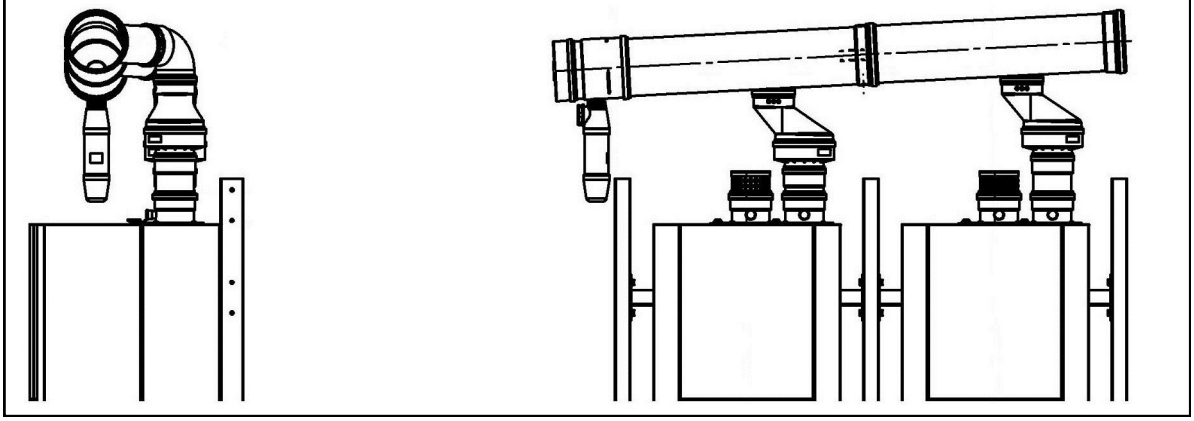
Calculation based on max. 3m horizontal flue

Cascade system
For installing the R40 EVO in cascade installations, dedicated flue systems are defined and available in 150mm and 200mm diameter, both for line and back-2-back installations.

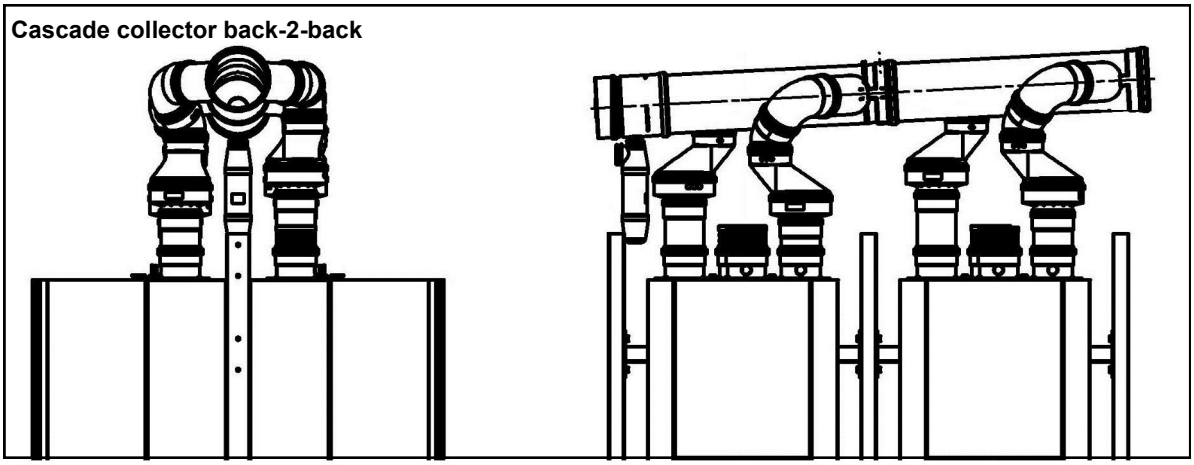
The diameter of the horizontal collector and the vertical chimney depends on the total heat input of the installation and the vertical height of the chimney.

The table shows the maximum system input related to the vertical chimney length (based on max. 3m horizontal length after collector) and diameter (collector/chimney).

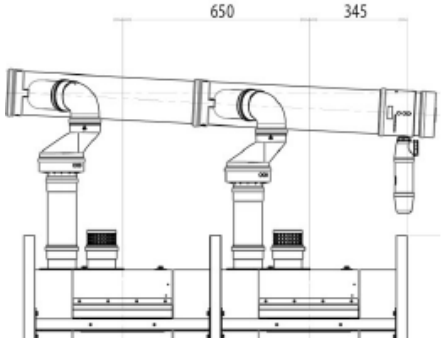
Cascade collector line



Cascade collector back-2-back



Concentric flue operation / installation



Guidance for boiler/s mounted on and flued through an external wall on a single boiler or cascade boiler installation where each boiler has an individual flue system fitted.

A minimum flue centres spacing of 650mm is required for correct operation (please refer to latest regulations for maximum boiler output and location advice to conform with local requirements).
Please ensure all boilers are isolated prior to servicing and ensure safe working procedures are in place prior to boiler casing removal.

Neutralisation

General
Neutralisation systems

General
Condensate, created by the R40 EVO, should be drained into the public draining system. The condensate PH is between 3.0 and 3.5. National and/or local regulations have to be checked, in order to find out whether the condensate should be neutralised before entering the public draining system.

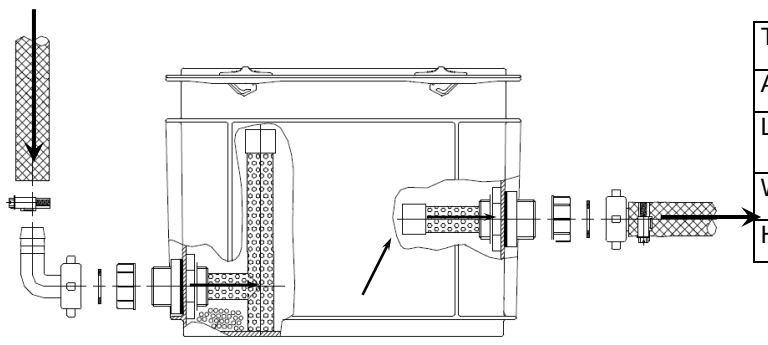
The maximum amount of condensate for each boiler type can be found in the chapter „Technical data“.

Neutralisation systems
The neutralisation systems can be placed in the bottom section of the boiler. The delivery of the system contains the following components:

- Granulate for first filling
- Connection hoses for inlet and outlet connection
- Boiler connection adapter

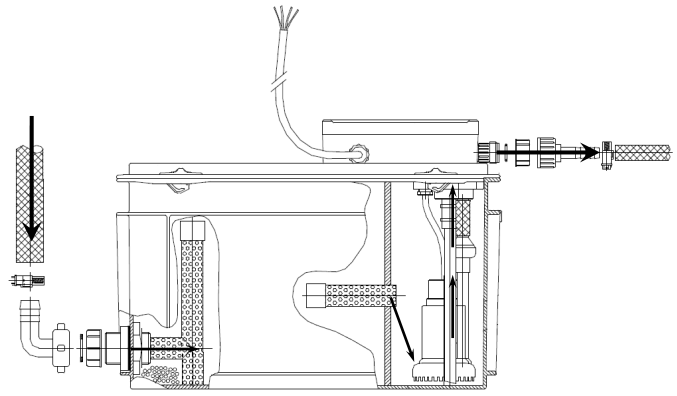
For the neutralisation two different systems are available:

Standard neutralisation system (DN)
The standard neutralisation system is used, when the public draining connection is at lower level than the boiler syphon connection.



Type		DN1	DN2	DN3
Applicable for	[kW]	75	450	1500
Length	[mm]	320	420	640
Width	[mm]	200	300	400
Height	[mm]	230	240	240

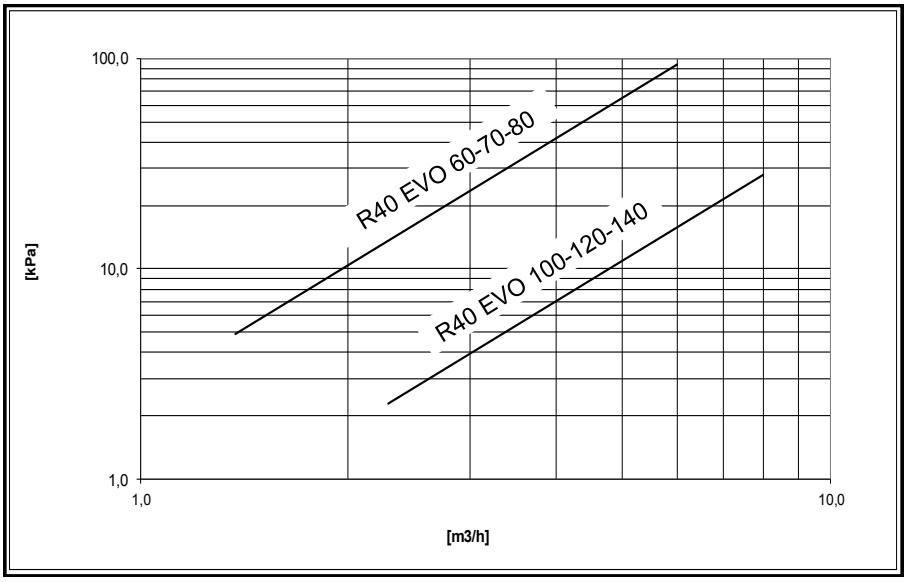
Neutralisation system with pump (HN)
The neutralisation system with pump is used, when the public draining system is at higher level than the boiler syphon connection and the condensate needs to be transported to a higher level before draining is possible. The built-in pump of the neutralisation system takes care of the transport of the condensate.



Type		HN1.5	HN2.5	HN2.7
Applicable for	[kW]	280	540	750
Length	[mm]	410	640	640
Width	[mm]	300	400	400
Height	[mm]	290	240	320
Power consumption pump	[W]	40	150	45
Pump head	[m]	6	3	4

Hydraulic connection

Hydraulic resistance
ΔT-measurement
Δp-measurement



Hydraulic resistance
The hydraulic resistance depends on the flow rate through the boiler and the boiler type. In the graph the resistance for a specific flow rate can be found.

The R40 EVO is able to control a speed controlled pump via a PWM-signal. It makes the flow rate modulate in parallel with the burner load. The minimum flow rate, to which the pump is allowed to modulate with the burner load, is 30% of the nominal flow rate through the boiler.

The flow rate through the boiler can also be checked by calculation. This can be done with a ΔT as well as a Δp measurement.

ΔT-measurement
Check the temperature difference over the boiler (ΔT flow-return) when the boiler is running on 100% load. The nominal ΔT is 20K and must be at least between 10K and 30K for secure boiler operation. An indication of the actual flow rate can be found with the following calculation (see table below for nominal data):

$q_{actual} = (\Delta T_{nominal} / \Delta T_{measured}) * q_{nominal}$

Δp-measurement
Check the pressure difference over the boiler (Δp flow-return) when the boiler pump is running (burner on is not required). The nominal Δp for each boiler type can be found in the table below, actual Δp must be within: $1.0*\Delta p_{nom} \leq \Delta p \leq 4.0*\Delta p_{nom.}$
An indication of the actual flow rate can be found with the following calculation (see table below for nominal data):

$q_{actual} = \sqrt{(\Delta p_{measured} / \Delta p_{nominal})} * q_{nominal}$

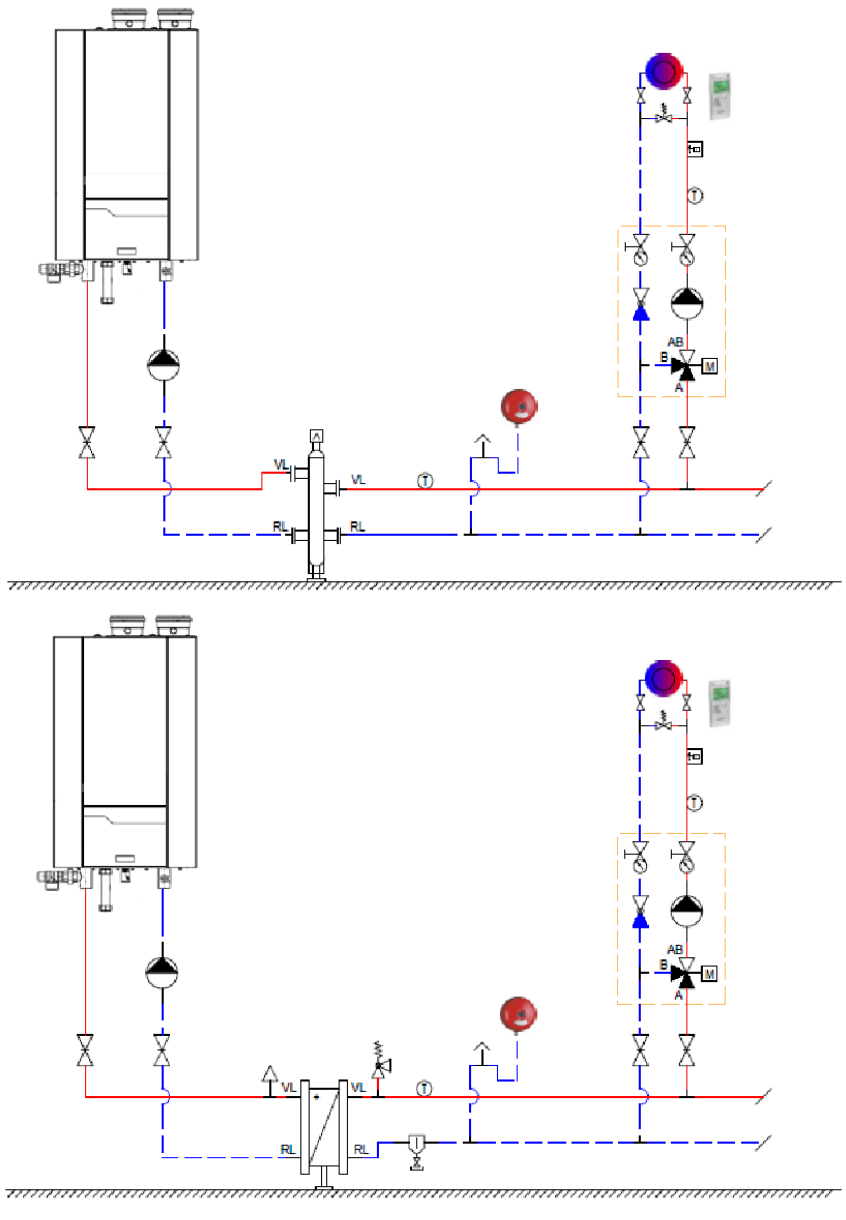
Water flow data		**R40 EVO**					
		60	**70**	**80**	**100**	**120**	**140**
Nominal flow rate	m^3/h	2,4	2,8	3,2	4,0	4,8	5,6
ΔT at nominal flow rate	K	20					
Δp at nominal flow rate	kPa	15	18	22	7	9	11

Hydraulic connection into a system
Single

Hydraulic connection into a system
The R40 EVO must be connected in such a way, that a minimum flow rate of 30% of the nominal flow rate can be ensured at all times, independent from the flow rate in the secondary system. The R40 EVO can be used in single and cascade applications, with low loss header or plate heat exchanger.

Single
By using a low loss header or plate heat exchanger a minimum flow rate can be ensured at all times, independent from the flow rate in the secondary system. The boiler pump is available in a speed controlled version. The speed controlled pump modulates the flow rate in the primary system in parallel with the burner load. This ensures the lowest possible return temperature to the boiler for high efficiency usage.
Details of the available pump kits can be found in the chapter „Accessories“.

Single

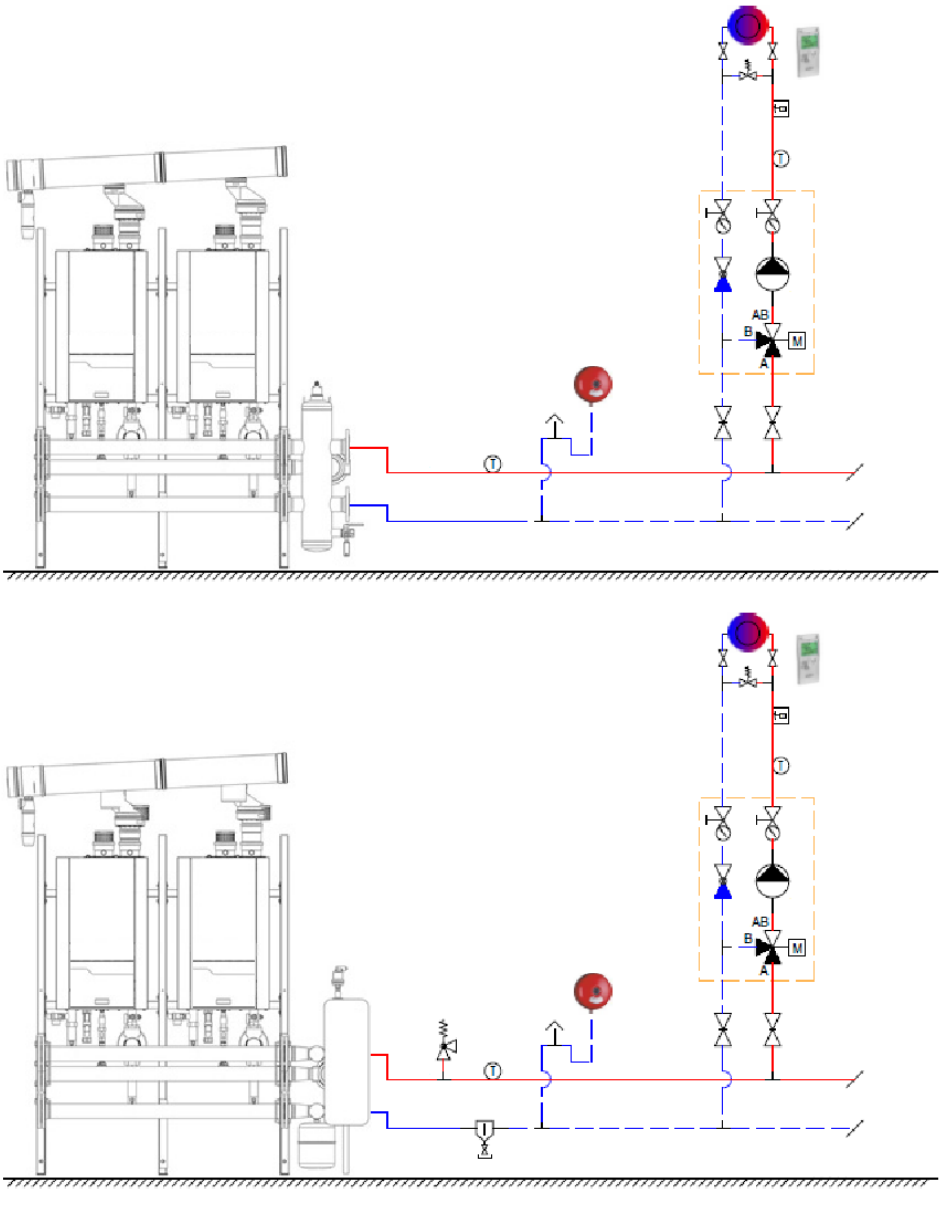


Cascade

Cascade
The R40 EVO is also available with Plug & Play cascade solutions, which are applicable for cascade installations up to 6 boilers in line and up to 8 boilers in back-to-back.
The cascade solutions are defined both with low loss header and plate heat exchanger.

Details of the cascade solutions can be found in the chapter „Accessories“.

Cascade



Controls
Basic controls and connections
Control by building management system
Boiler enable signal
Temperature or capacity setpoint

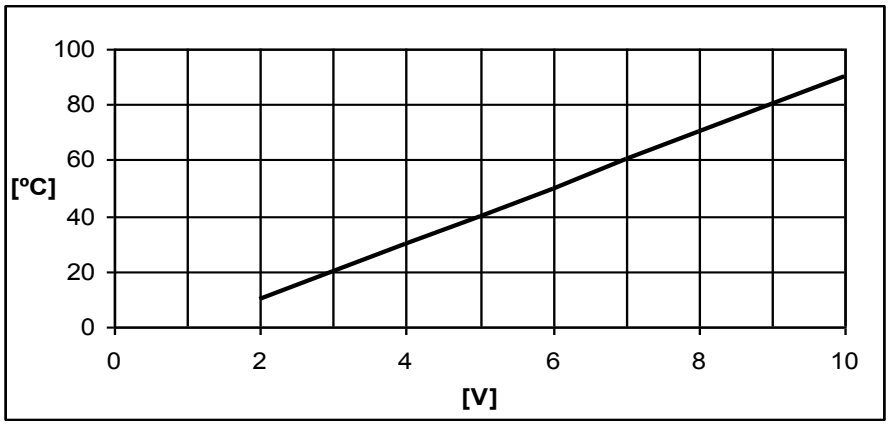
Basic controls and connections
The standard version of the R40 EVO is equipped with a LMS14 boiler management unit. This controller controls both the burner safety operation and the temperature regulation of the boiler. The LMS14 includes the following functions:

- Electronic high limit thermostat
- Electronic flue gas temperature limiter
- Primary boiler pump control (via relay)
- Primary sanitary hot water pump control
  (use of relay necessary when > 1A)
- Interlock input
- Lockout input
- OK/Alarm output signal
- Boiler enable signal
- 0-10VDC temperature or capacity setpoint (programmable)
- Temperature control central heating via PID controller
- Temperature control sanitary hot water (hot water priority)
- Weather compensation (with optional outdoor sensor)
- Connection possibility for external gas valve and/or room fan. See chapter "Accessories" for combinations with an OK/Alarm contact
- Master/Slave cascade control (with optional BUS communication modules).

When additional control of secondary heating zones or cascade systems are required, the R40 EVO can be extended with different additional controls. Explanation of these controls can be found in the next sections.

Control by building management system
The R40 EVO can be connected to a building management system. This can be done by using (one of) the following connections:

Boiler enable signal, H5 plug (purple)
The boiler enable signal is provided with a jumper from the factory. When connecting a (volt free!!!) external signal, the jumper must be removed.



0-10VDC Temperature or capacity setpoint, terminals H1 plug (black)
The R40 EVO can be controlled via a temperature or capacity setpoint.
The signal values are programmable, from the factory the contact is programmed for temperature setpoint with settings as shown in the graphic.

When controlling the boiler via a capacity setpoint, it's highly recommended to control the primary boiler pump with the internal pump control of the LMS14 boiler controller. The minimum flow rate through the boiler must be respected at all times. The nominal ΔT is 20K and should be at least within 10K-30K at full load to secure a safe boiler operation.

Controls

OK/Alarm output signal
Heating zone control
Cascade control

230VAC Alarm output signal, plug QX2 (Green) or extension module AGU2.550 (contact QX21) when combined with external gas valve and/or room fan or gas leakage tester.
The boiler provides, depending on its status and the setting of the relay (factory setting = alarm) an alarm signal at plug QX2 (or QX21 of the AGU2.550).

Heating zone control
The R40 EVO can be extended with an AGU2.550 module for extended heating zone control. The AGU2.550 enables weather compensated operation of one mixed heating zone.

For room temperature optimisation of each heating zone, an additional room unit QAA75 can be connected via bus connection. The values for the specific heating zone can then be displayed and changed on the room unit.

In case of heating systems with more than two heating zones, an additonal kit with LOGON B G2Z2 controller in a wall hung box is available. These kits can be used in a modular way up to a maximum of 8 heating zones.

See chapter "Installation examples" for more details regarding connections of pumps, sensors, etc.

Cascade control
The R40 EVO can be controlled in a cascade system of maximum 8 boilers. This can be done by using the integrated Master/Slave cascade functionality in combination with an optional BUS communication device OCI345 (see chapter "Accessories" for more details).

The LMS14 includes an intelligent cascade control, which allows free programming of boiler sequence after certain hours of operation.

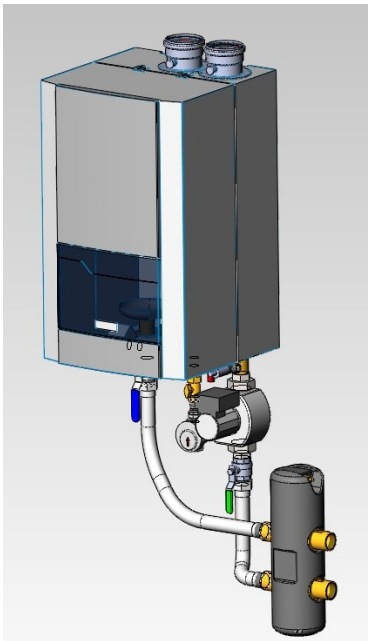
See chapter "Installation examples" for more details regarding connections of pumps, sensors, etc.

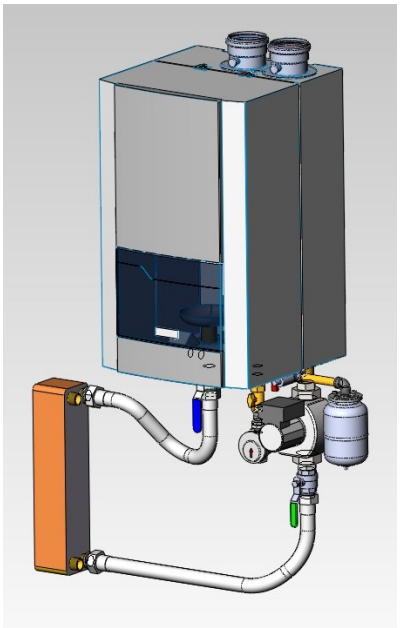
Accessories

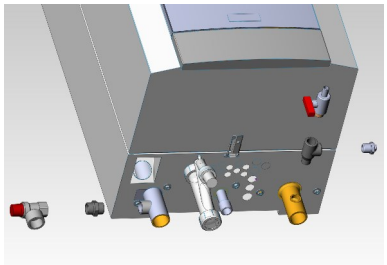
Single

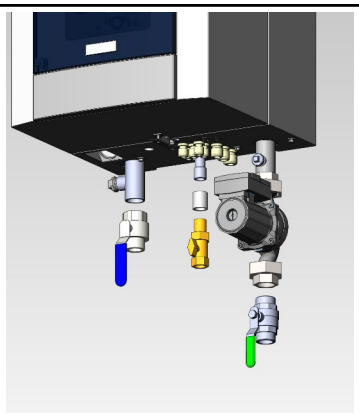
For R40 EVO single boiler installations, a range of single accessories are defined. The different accessory kits can be combined in order to build a primary system with low loss header or plate heat exchanger.

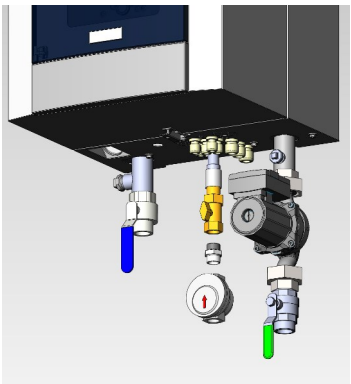
A description of the different accessories can be found on the following pages.











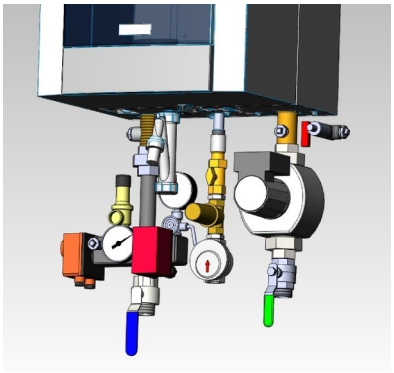
Safety valve
The kit includes a TÜV safety valve (available in 3 or 6 bar), drain valve and connection possibility to connect an expansion vessel.

Shut off valves
The kit includes shut off valves for water (2x, flow and return connection) and gas (1x).

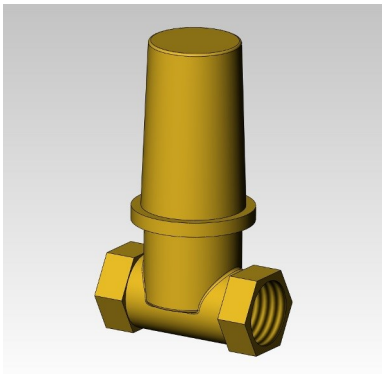
Gas filter
The kit includes a gas filter and connecting material.

Accessories

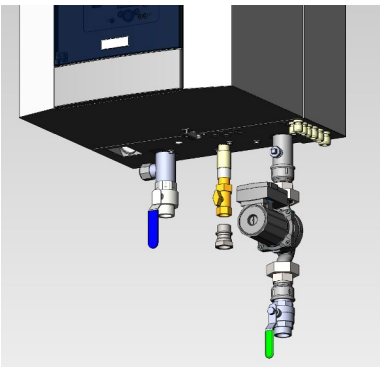
Single



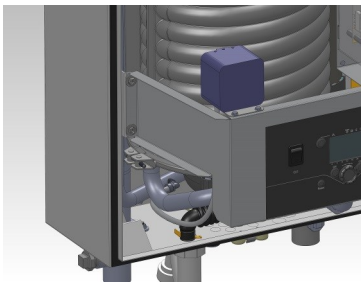
INAIL safety kit (Italy only)
The kit includes a safety valve (4.5 bar), drain valve, connecting possibility for expansion vessel, manometer, thermometer, maximum water pressure switch and thermostat.
All components are approved according to the INAIL requirements.



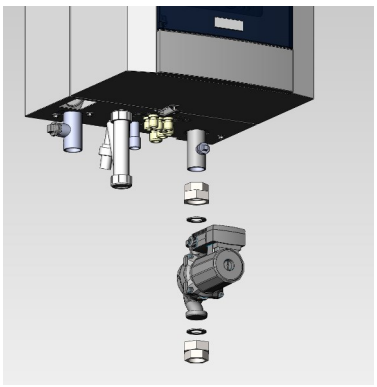
INAIL gas valve (Italy only)
The kit includes an INAIL gas valve and connecting material.
The gas valve is approved according to the INAIL requirements.



TAS gas valve (Germany only)
The kit includes a TAS gas shut off valve.



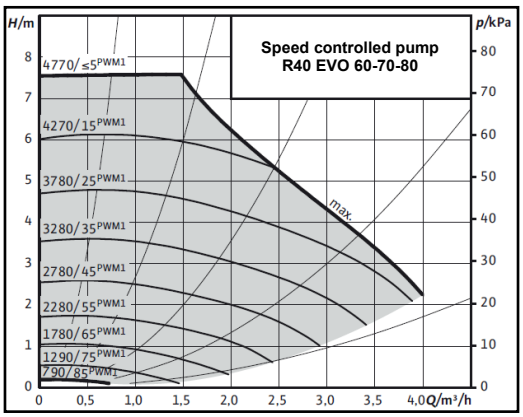
Minimum gas pressure switch
The kit includes a minimum gas pressure switch, connecting material and wiring. The gas pressure switch needs to be connected inside the boiler.

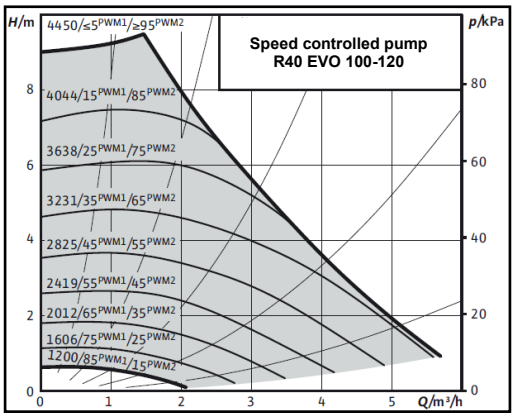


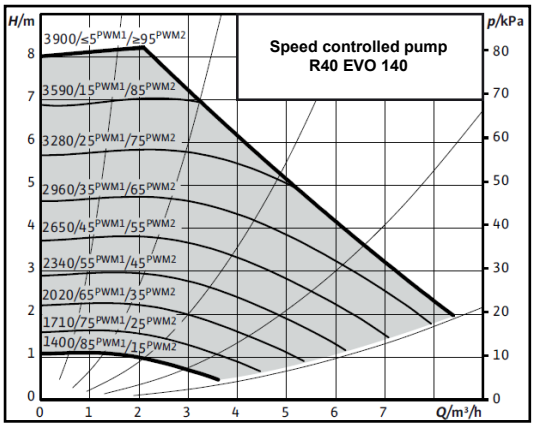
Modulating pump
The kit includes a modulating pump, connecting material, gaskets and wiring.
See next page for the pump curves of the different boiler types.

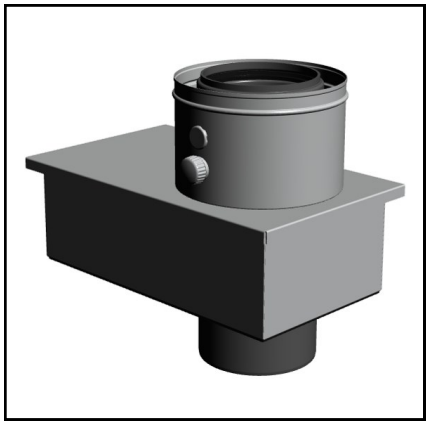
Accessories

Single









Flue adapter parallel
The boiler is equipped with a flue connection of 100mm (R40 EVO 60-120) or 130mm (R40 EVO 140). In case of using 110mm or 125mm flue systems, the original adapter can be replaced as follows:

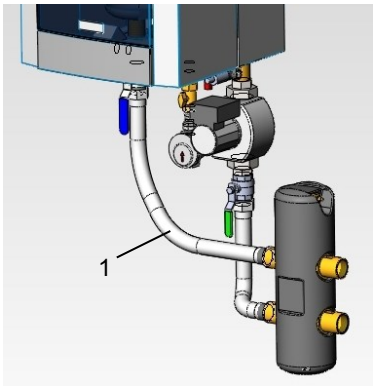
- 100mm replaced by 110mm;
- 130mm replaced by 125mm.

Flue adapter concentric
Concentric flue systems can be used on the R40 EVO 60-120, by using a parallel to concentric adapter.

Air inlet cover
The inlet cover can be used to cover the air inlet connection of the boiler in non room sealed condition, available in 100mm and 130mm.

Accessories

Single



Low loss header
The kit includes a low loss header, wall mounting bracket incl. connecting material. A primary tubing kit (1) is available as an option.

The header integrates the following functionalities:

- Temperature balancing;
- De-aeration;
- Dirt separation.

The low loss header can be used at dT=20K, dT=15K or dT=10K.

See below table for system selection. Insulation for the low loss header is available as an option.

Dimension data can be found on page 29.

			R40 EVO					
			60	**70**	**80**	**100**	**120**	**140**
Primary circuit	dT=20K	m3/h	2,4	2,8	3,2	4,0	4,8	5,6
Secondary circuit	dT=20K	header type	AX125	AX125	AX125	AX150	AX150	AX150
		m3/h	2,4	2,8	3,2	4,0	4,8	5,6
		kPa	0,5	0,7	0,9	0,8	1,1	1,6
	dT=15K	header type	AX125	AX125	AX150	AX150	XC50F	XC50F
		m3/h	3,2	3,7	4,3	5,3	6,4	7,5
		kPa	0,9	1,3	1,0	1,5	0,8	1,1
	dT=10K	header type	AX150	AX150	XC50F	XC50F	XC50F	XC50F
		m3/h	4,8	5,6	6,4	8,0	9,6	11,2
		kPa	1,3	1,7	0,8	1,2	1,7	2,3

Accessories

Single

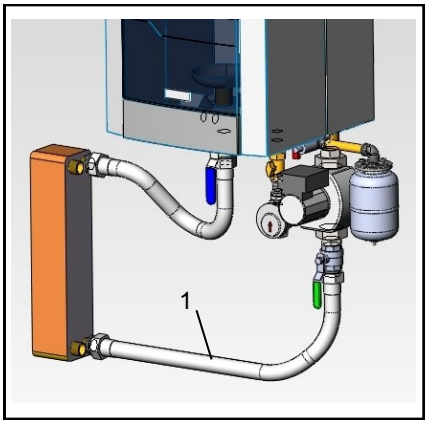


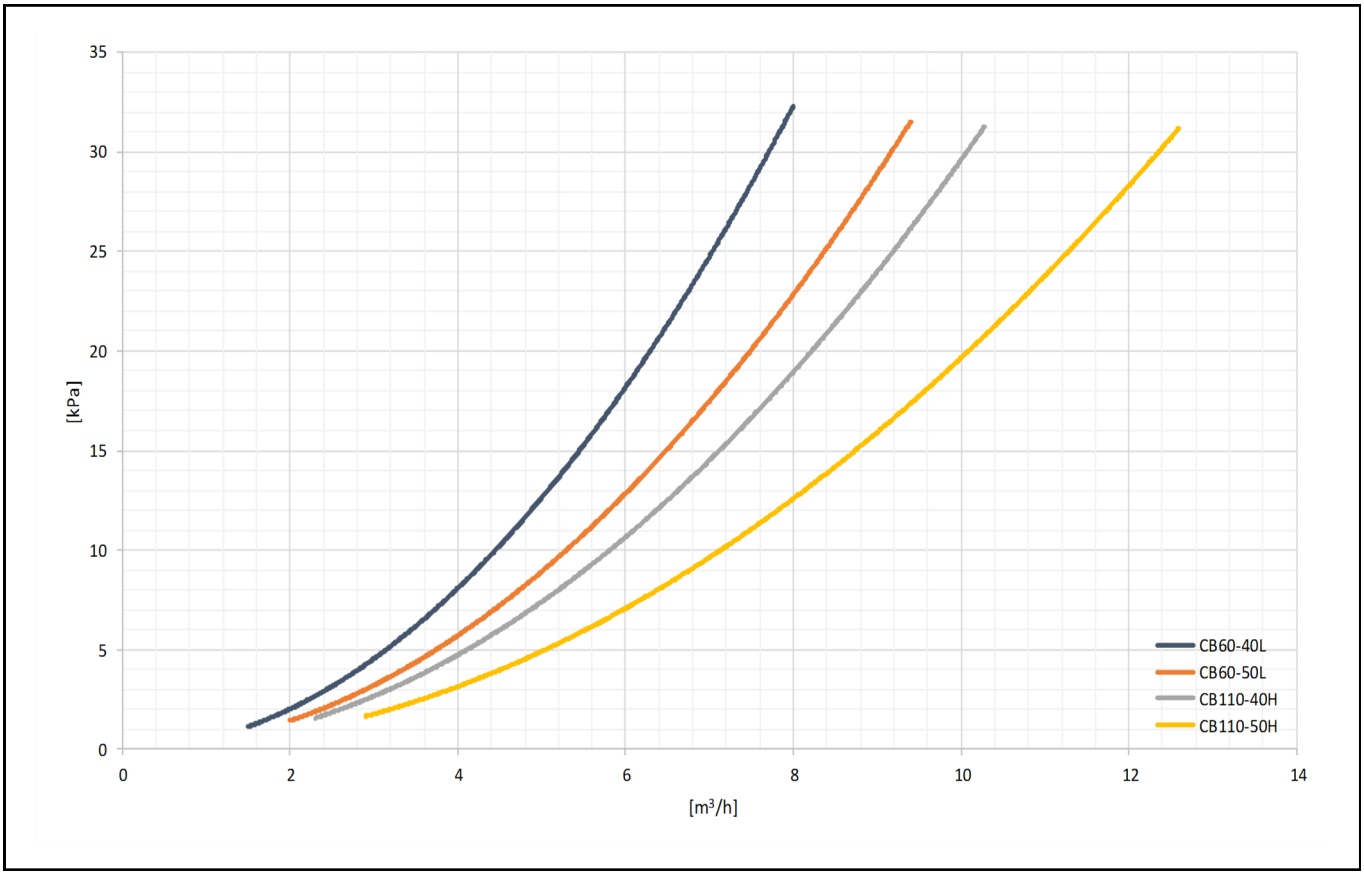
Plate heat exchanger
The kit includes a plate heat exchanger and a wall mounting bracket. A primary tubing kit (1) is available as an option.

The plate heat exchanger is available for use at dT=20K, dT=15K or dT=10K.

See table for system selection.
Insulation for the plate heat exchanger is included in the delivery.

Dimensioning data can be found on page 30.

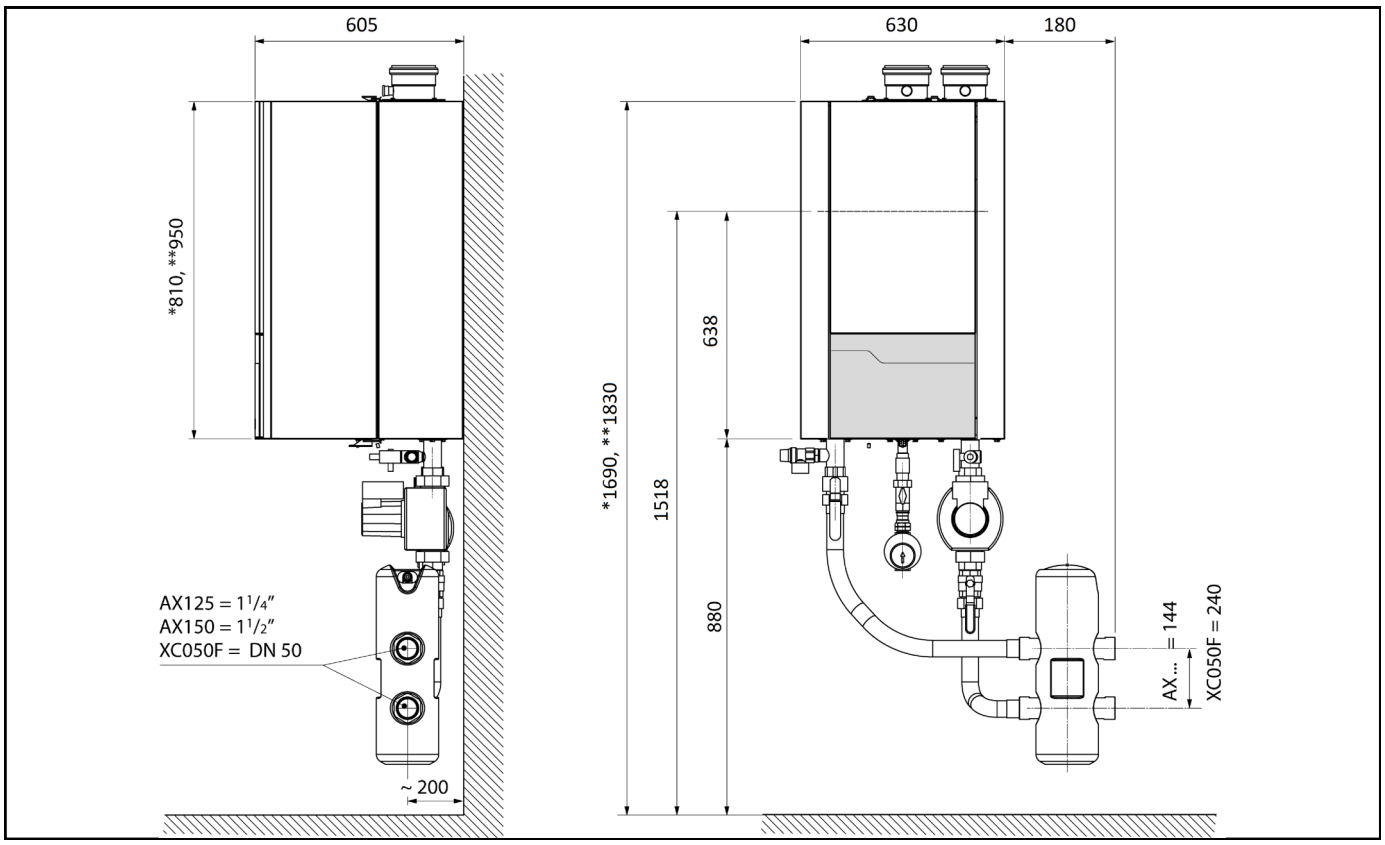
			R40 EVO					
			60	**70**	**80**	**100**	**120**	**140**
Primary circuit	dT=20K	m3/h	2,4	2,8	3,2	4,0	4,8	5,6
Expansion vessel		L	4	4	4	4	4	4
Secondary circuit	dT=20K	header type	CB60-40L	CB60-40L	CB60-40L	CB60-40L	CB60-50L	CB110-40H
		m3/h	2,4	2,8	3,2	4,0	4,8	5,6
		kPa	3,5	4,6	5,9	8,8	8,8	9,6
	dT=15K	header type	CB60-40L	CB60-40L	CB60-40L	CB60-40L	CB60-50L	CB110-40H
		m3/h	3,2	3,8	4,3	5,3	6,4	7,5
		kPa	5,9	7,9	10,2	15,1	15,2	16,7
	dT=10K	header type	CB60-40L	CB60-40L	CB60-50L	CB60-50L	CB110-40H	CB110-50H
		m3/h	4,9	5,6	6,5	8,0	9,6	11,2
		kPa	12,7	16,8	15,4	22,9	27,2	24,3



Accessories

Dimensions single - low loss header

*** = R40 EVO 60 - 80**
**** = R40 EVO 100 - 140**



Accessories

Dimensions single - plate heat exchanger

*** = R40 EVO 60 - 80**
**** = R40 EVO 100 - 140**

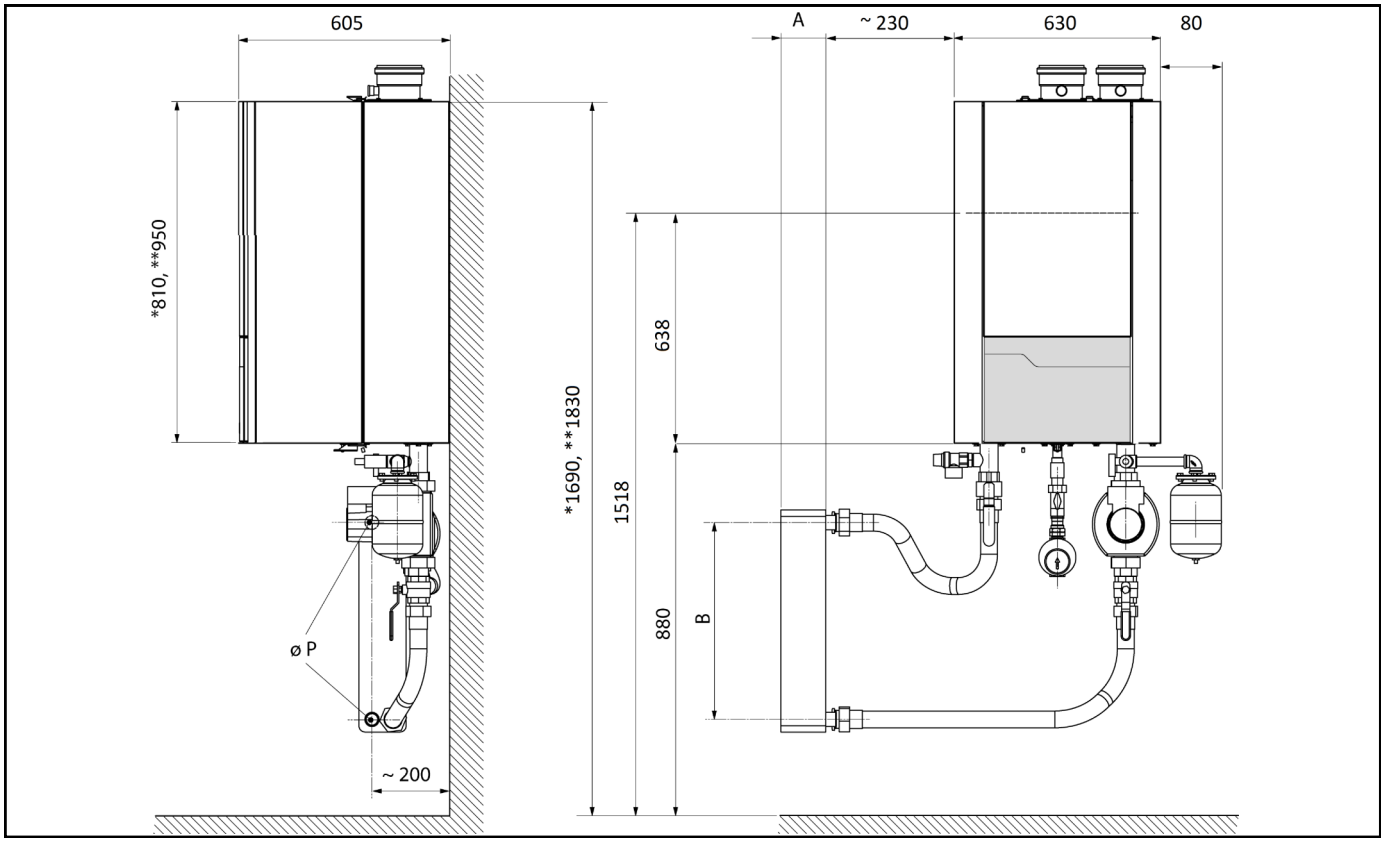
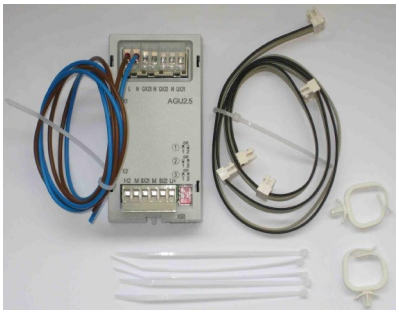
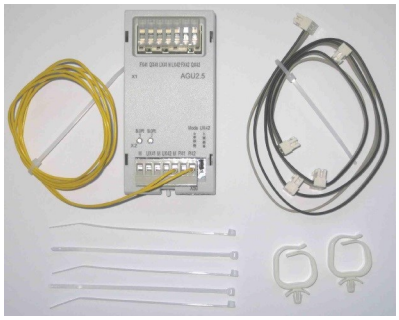


Plate heat exchanger		A	B	ø P
CB60-40L	mm	105	466	G 1 1/4"
CB60-50L	mm	129	466	G 1 1/4"
CB110-40H	mm	124	519	G 2"
CB110-50H	mm	153	519	G 2"

Accessories

Controls

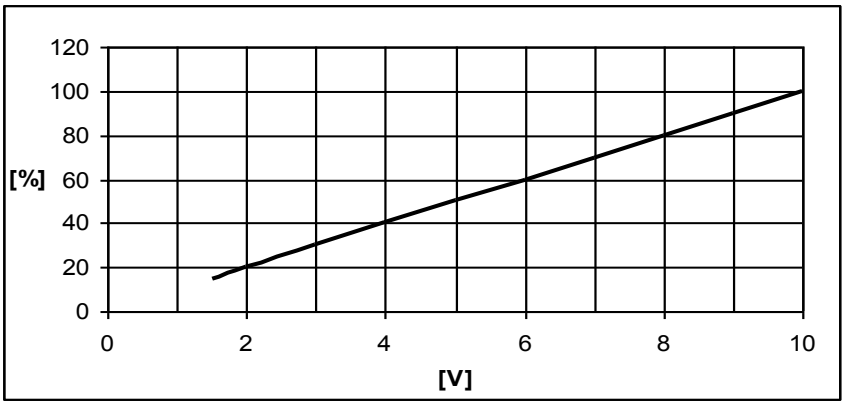


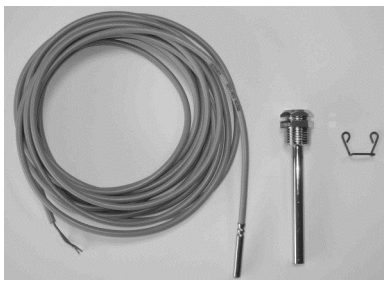


Extension module AGU2.551
The kit contains an **AGU2.551** module for capacity feedback signal from the LMS14 to the building management system.

The output of the feedback signal is displayed in the graph below.

Extension module AGU2.550
The kit contains an **AGU2.550** extension module incl. communication cable to the LMS14 boiler management unit. Maximum 3 **AGU2.550** modules can be connected to one boiler (module 1 and 2 for heating zone control, module 3 for OK/alarm signal when combined with external gas valve control).





Header/hot water sensor QAZ36
The kit contains a header/hot water sensor QAZ36 with 6m cable and a 1/2" pocket.

Heating zone sensor QAD36
The kit contains a clamp sensor QAD36 with 4m cable.

Outdoor sensor QAC34
The kit contains an outdoor sensor QAC34.

Accessories

Controls

Receiver wireless AVS71
The kit contains an AVS71 wireless receiver. When connected to the boiler, it can transmit data between wireless room units QAA78 and/or wireless outdoor sensors (QAC34 + AVS13).

Outdoor sensor wireless AVS13
The kit contains an outdoor sensor QAC34 and a wireless transmitter AVS13.
The kit can be used in combination with a wireless receiver AVS71 to enable wireless communication between the outdoor sensor and the boiler.

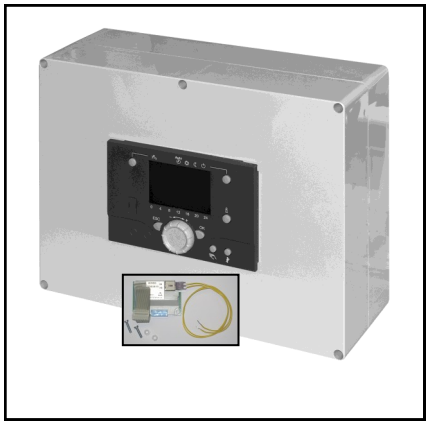
Room unit QAA75
The kit contains a QAA75 room unit, which communicates with the boiler via BUS communication. For each heating zone a QAA75 can be connected.

Room unit QAA78 wireless
The kit contains a QAA78 wireless room unit, which communicates with the boiler via wireless BUS communication. For each heating zone a QAA78 can be connected.

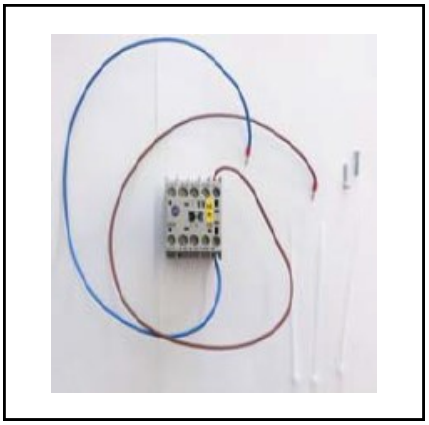
Attention: the mounting position should be chosen as such that uninterrrupted transmitting can be
secured. Following information should be noted:
- Not near electrical wiring, strong magnetic fields or devices such as PC's. TV's, microwaves, etc,
- Not near big steel structures or building materials containing wire netting such as safety glass or concrete.
- Distance to receiver not more than 30 m or 2 floors

Cascade kit MASTER
The kit includes an OCI345 communication module and header sensor (incl. pocket).

Cascade kit SLAVE
The kit includes an OCI345 communication module for the connection of slave boilers.



LOGON B with wall hung box
For control of additional 2 heating zones it's possible to connect a LOGON B controller with wall hung box.
The LOGON B enables the control of 2 heating zones and the control of a DHW recirculation pump.
The kit includes a LOGON B controller, incl. wall hung box and communication cable.



Wiring for room fan and/or external gas valve
The kit includes a wiring package for connecting a room fan and/or external gas valve to the boiler. The parameter settings of contact QX2 must be changed (standard setting = alarm signal).

When using this functionality in combination with an OK/alarm signal, an additional AGU2.550 clip-in is necessary. In this case, the OK/alarm signal must be connected to contact

Accessories

Cascade

For the R40 EVO a full range of cascade accessories are defined, both for hydraulic and flue systems.

Hydraulic
The hydraulic accessories are available for line solutions up to 6 boilers (> 780 kW, with or without frame) and back-2-back solutions up to 8 boilers (> 1040 kW).

The accessories are defined in two diameters, depending on the required output: DN65 up to 462 kW, DN100 for higher outputs. The maximum water pressure for the accessories is 6 bar.

For DN65 it exists also a solution with plate heat exchanger for different temperature trajects. In the table you'll find the secondary flow data for the different types of plate heat exchangers which are used.

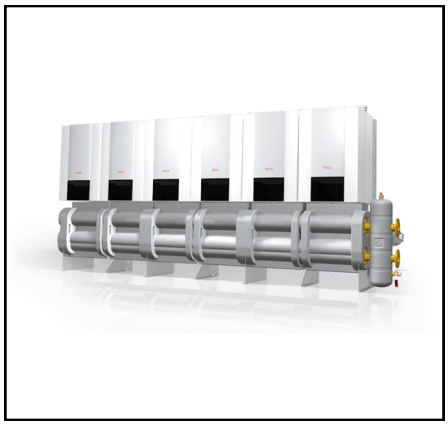
Flue system
For cascade flue systems a range of accessories is available in 150mm and 200mm diameter, both for line and back -2-back solutions. See chapter "Dimensioning cascade" for more info on diameter selection and chimney dimensioning.

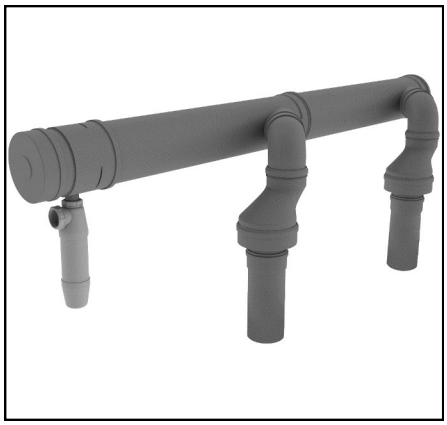
Accessories
Besides the defined cascade packages, following components can be optionally added:

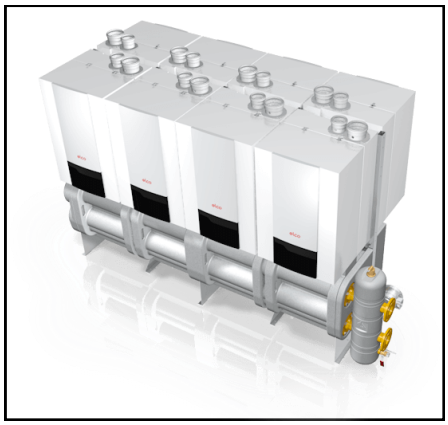
- Gas filter;
- Extension tube for gas filter;
- Insulation kit collector;
- Insulation kit low loss header;
- INAIL safety kit DN65 and DN100 (Italy only);
- 2nd INAIL safety valve (for systems >555kW, Italy only);
- INAIL gas valve (Italy only);
- TAS gas valve (Germany only);

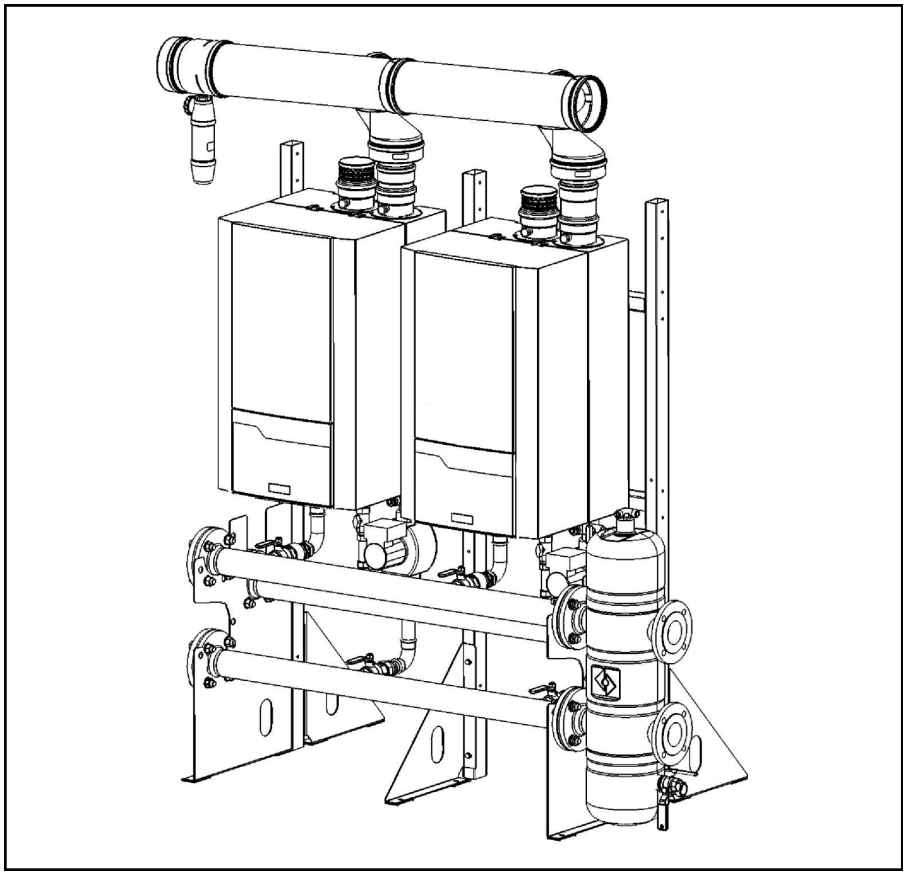
150mm and 200mm flue material.

Please see the price list, cascade manual or online configurator for more info on these full package solutions.



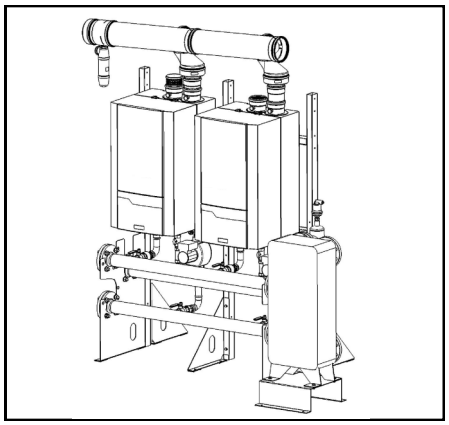




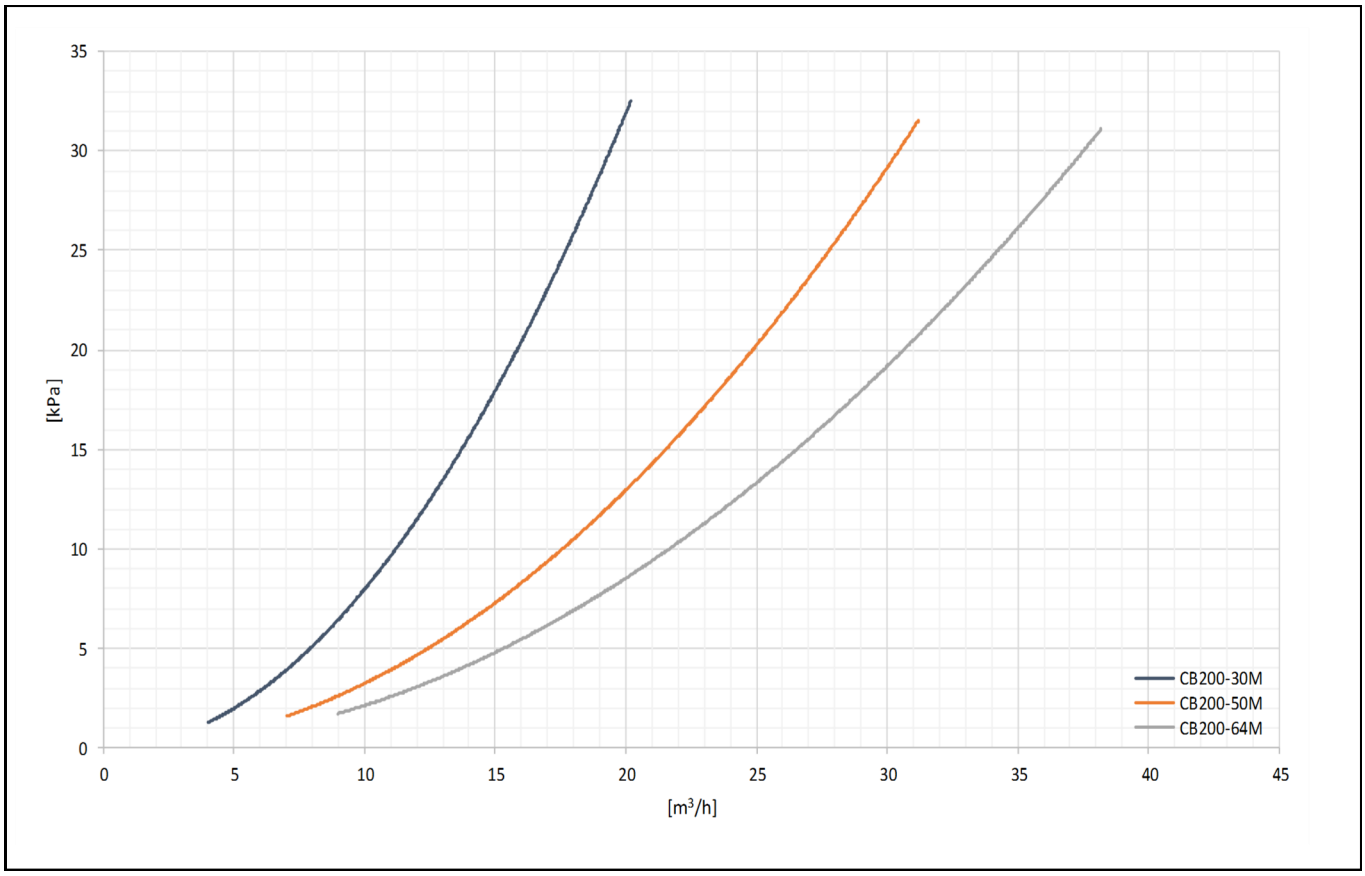


Accessories

Cascade



			0-250 kW	251-462 kW
Primary circuit	dT=20K	m3/h	10.8	19.9
Expansion vessel		L	4	8
Secondary circuit	dT=20K	header type	CB200-30M	CB200-50M
		m3/h	10.8	19.9
		kPa	9.0	12.6
	dT=15K	header type	CB200-30M	CB200-50M
		m3/h	14.3	26.5
		kPa	20.0	21.3
	dT=10K	header type	CB200-30M	CB200-64M
		m3/h	21.5	39.7
		kPa	35.8	29.4



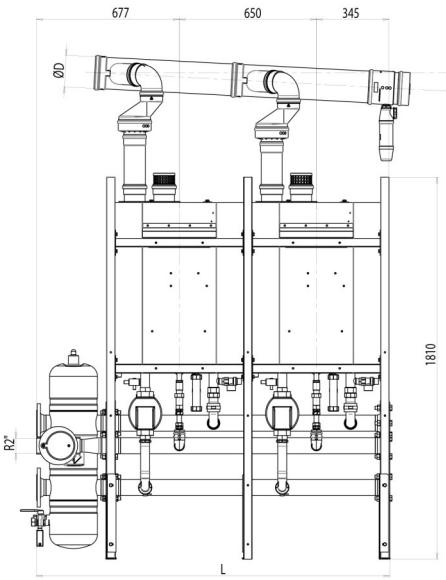
Accessories

Dimensions cascade - DN65 line + low loss header

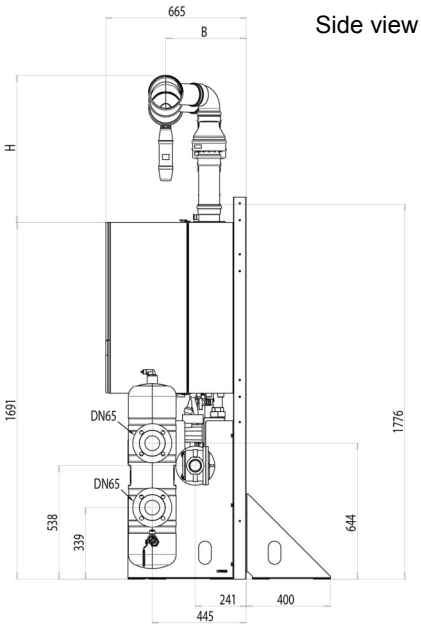
Standard

CASCADE DN65		Number of boilers		2	3	4	5	6
Total width		L	mm	1672	2322	2972	3622	4272
ø D = 150mm	B = 400 - 450	H	mm	553	646	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	616	709	801	894	987

Rear view



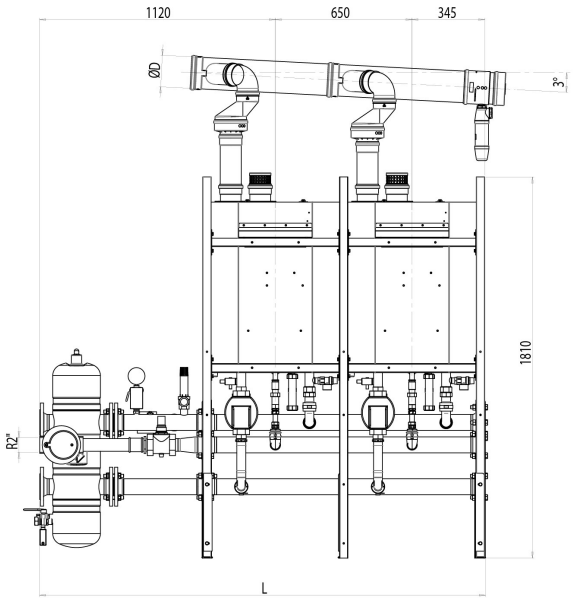
Side view



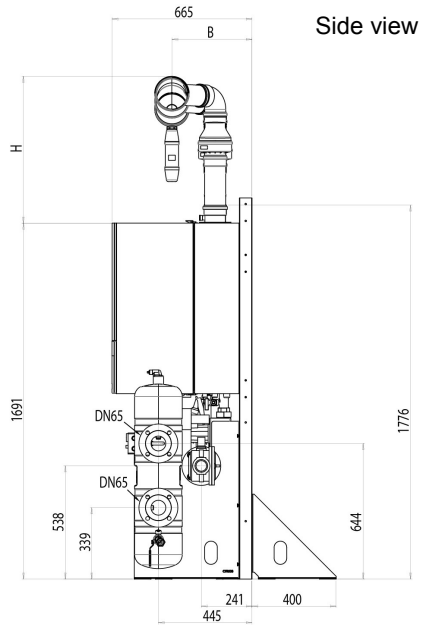
INAIL (Italy only)

CASCADE DN65		Number of boilers		2	3	4	5	6
Total width		L	mm	2115	2765	3415	4065	4715
ø D = 150mm	B = 400 - 450	H	mm	553	646	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	616	709	801	894	987

Rear view



Side view

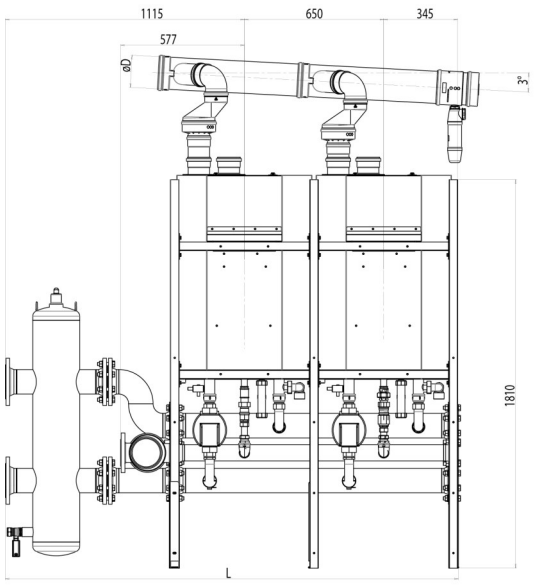


Dimensions cascade - DN100 line + low loss header

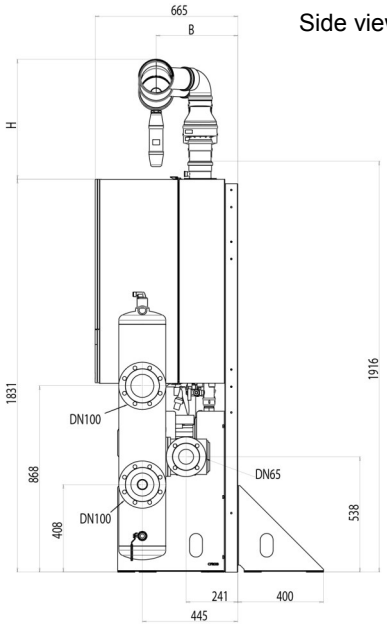
Standard

CASCADE DN100		Number of boilers		4	5	6
Total width		L	mm	3407	4057	4707
ø D = 150mm	B = 400 - 450	H	mm	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	801	894	987

Rear view



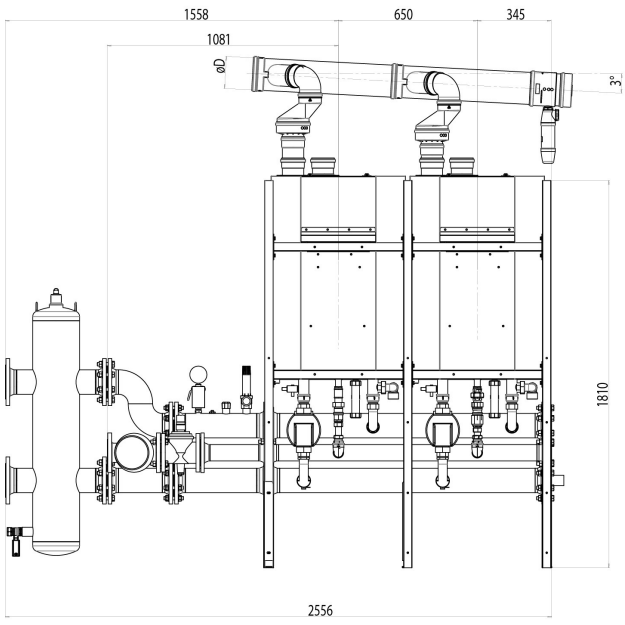
Side view



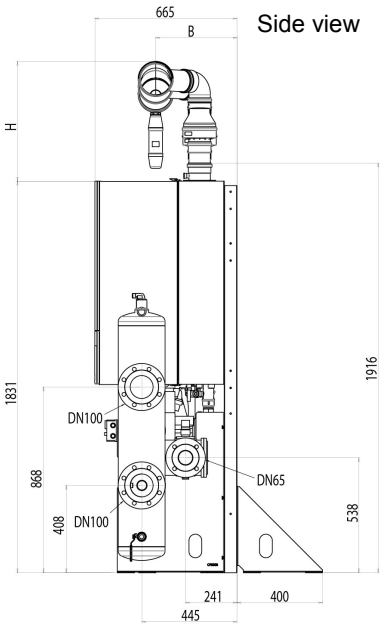
INAIL (Italy only)

CASCADE DN100		Number of boilers		4	5	6
Total width		L	mm	3853	4503	5153
ø D = 150mm	B = 400 - 450	H	mm	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	801	894	987

Rear view



Side view



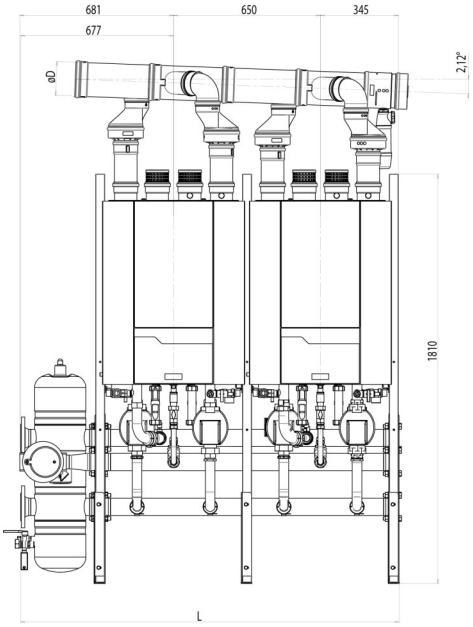
Accessories

Dimensions cascade - DN65 back-2-back + low loss header

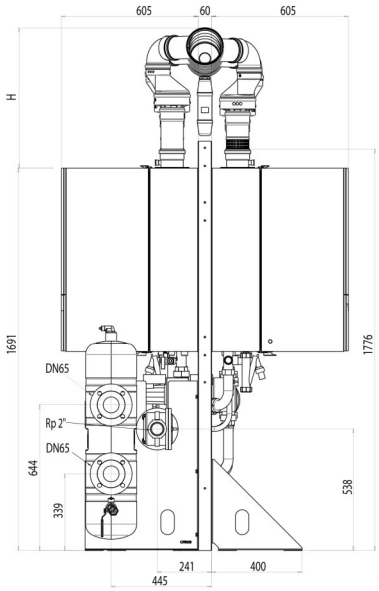
Standard

CASCADE DN65	Number of boilers		3-4	5-6	7-8
Total width	L	mm	1672	2322	2972
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



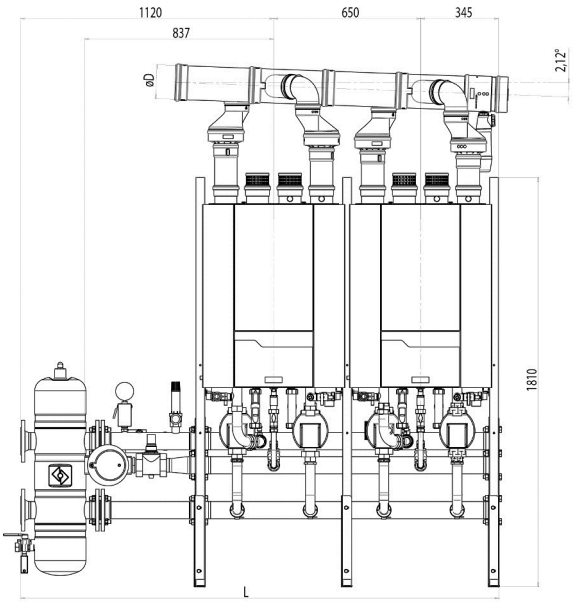
Side view



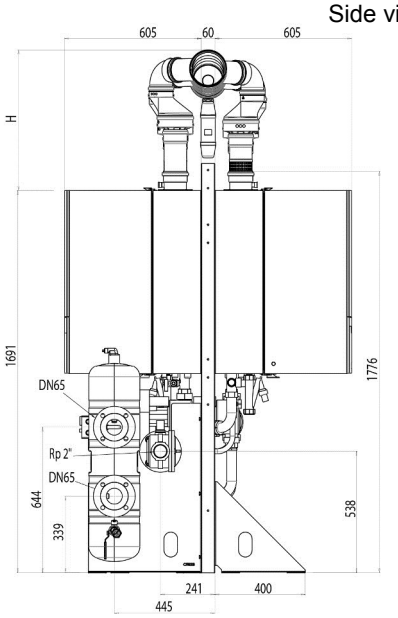
INAIL (Italy only)

CASCADE DN65	Number of boilers		2	3	4
Total width	L	mm	2115	2765	3415
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



Side view

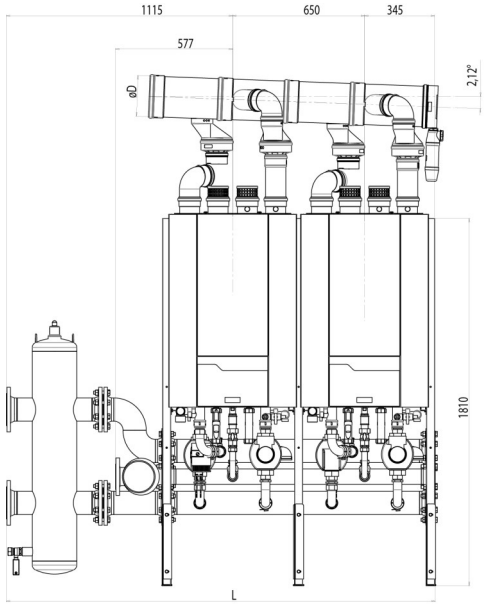


Dimensions cascade - DN100 back-2-back + low loss header

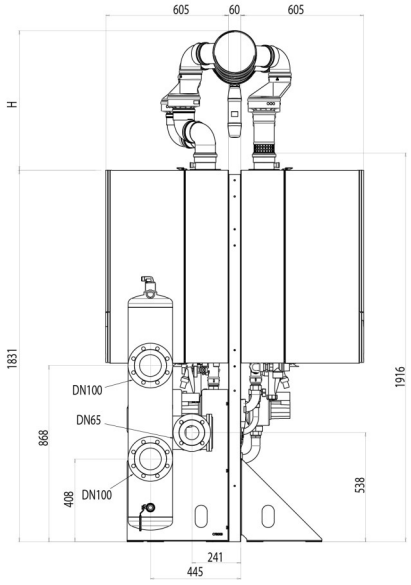
Standard

CASCADE DN100	Number of boilers		3-4	5-6	7-8
Total width	L	mm	2107	2757	3407
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



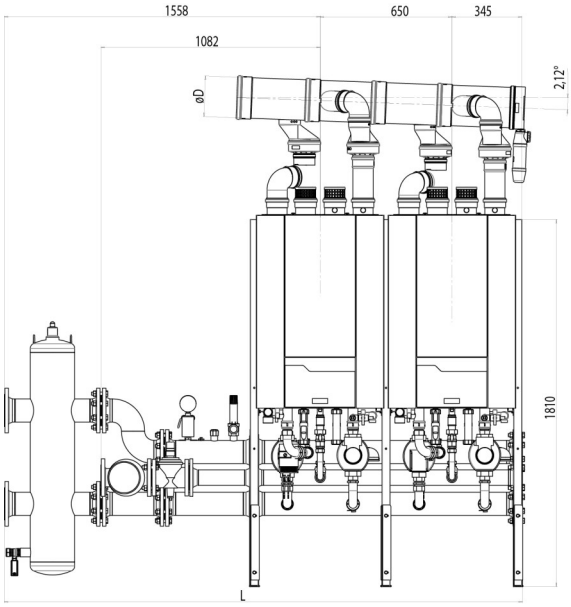
Side view



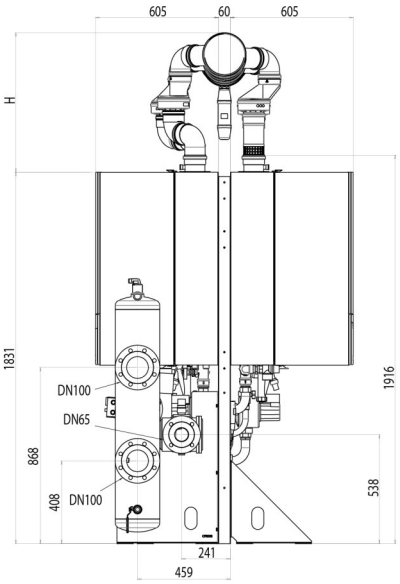
INAIL (Italy only)

CASCADE DN100	Number of boilers		3-4	5-6	7-8
Total width	L	mm	2553	3203	3853
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



Side view



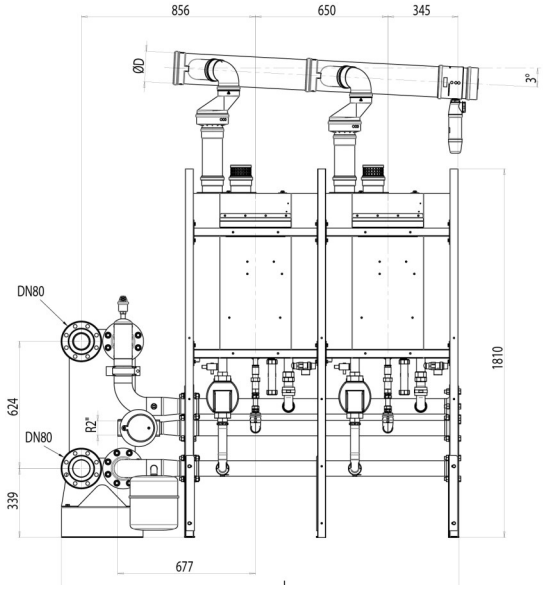
Accessories

Dimensions cascade - DN65 line + plate heat exchanger

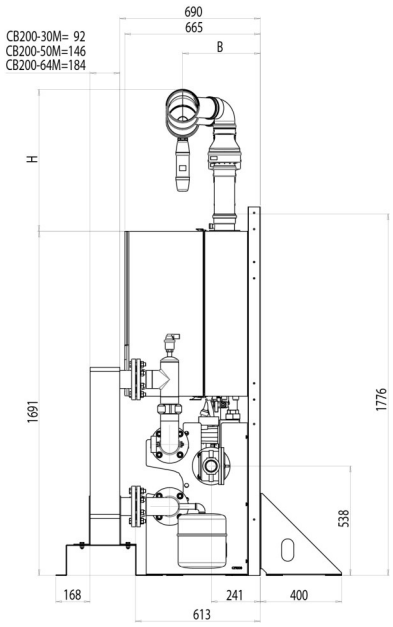
Standard

CASCADE DN65		Number of boilers		2	3	4	5	6
Total width		L	mm	1940	2590	3240	3890	4540
ø D = 150mm	B = 400 - 450	H	mm	553	646	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	616	709	801	894	987

Rear view



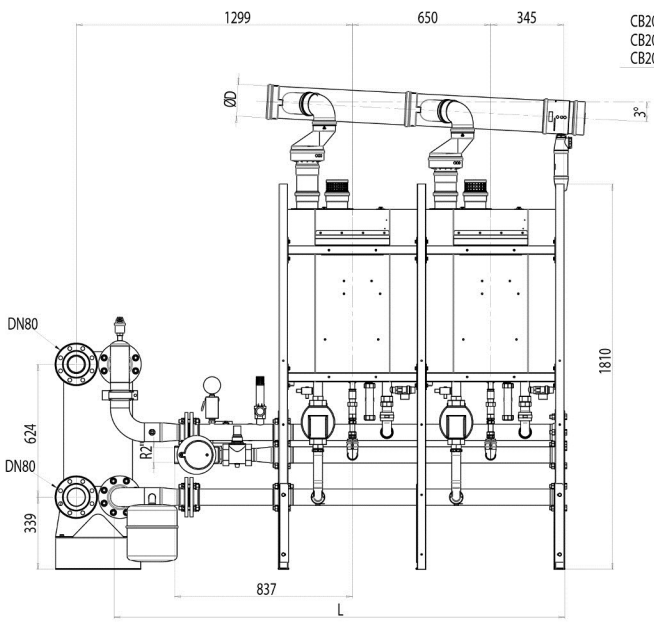
Side view



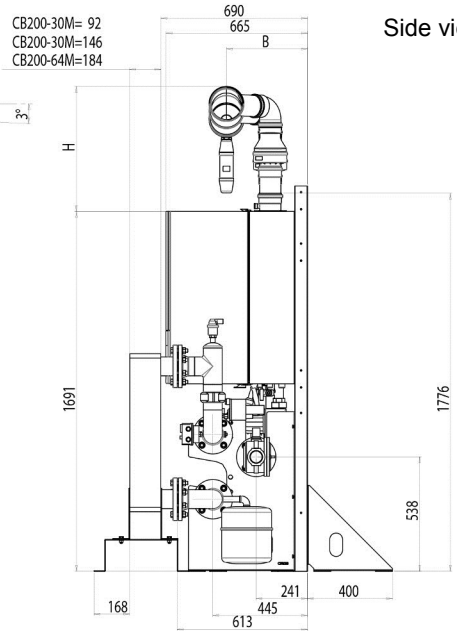
INAIL (Italy only)

CASCADE DN65		Number of boilers		2	3	4	5	6
Total width		L	mm	2383	3033	3683	4333	4983
ø D = 150mm	B = 400 - 450	H	mm	553	646	738	831	924
ø D = 200mm	B = 350 - 400	H	mm	616	709	801	894	987

Rear view



Side view

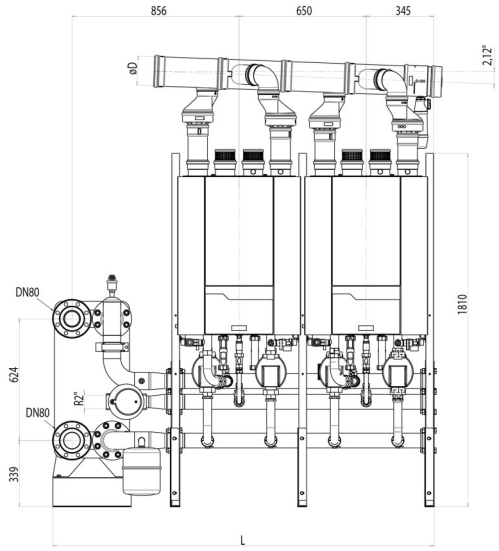


Dimensions cascade - DN65 back-2-back + plate heat exchanger

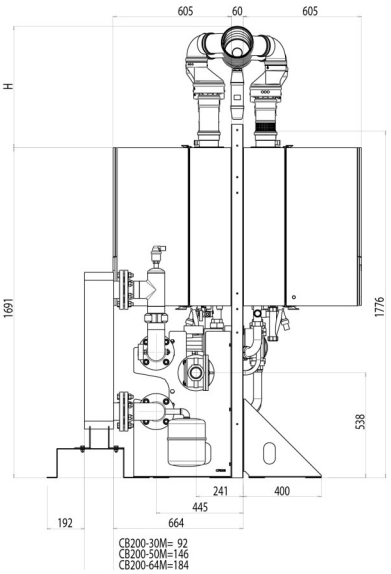
Standard

CASCADE DN65	Number of boilers		3-4	5-6	7-8
Total width	L	mm	1940	2590	3240
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



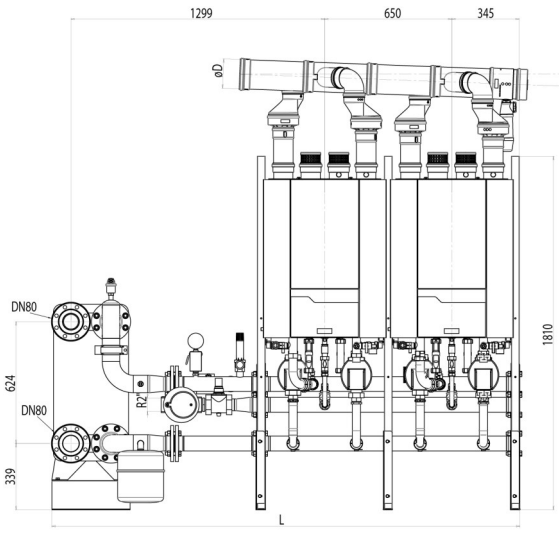
Side view



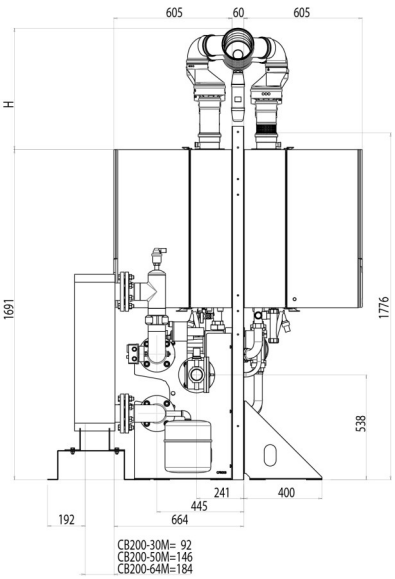
INAIL (Italy only)

CASCADE DN65	Number of boilers		3-4	5-6	7-8
Total width	L	mm	2383	3033	3683
ø D = 150mm	H	mm	553	646	738
ø D = 200mm	H	mm	616	709	801

Front view



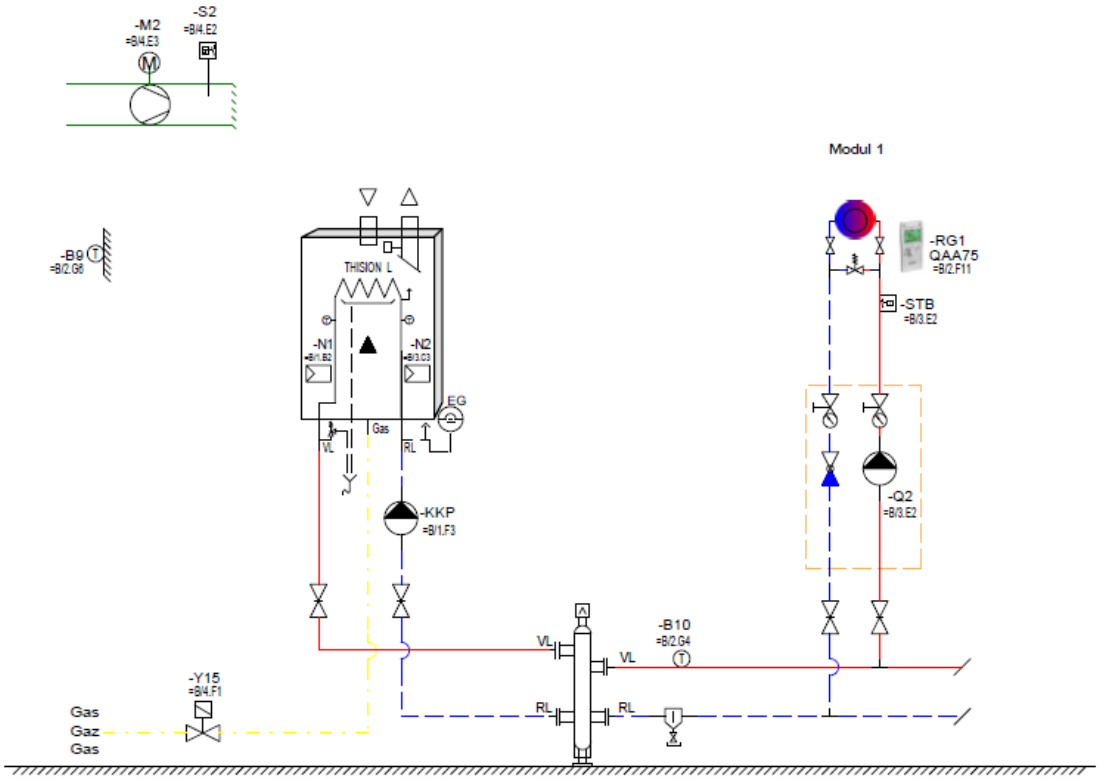
Side view



Installation examples

1-A-C: 1 direct heating zone + low loss header

1-A-C: 1 direct heating zone + low loss header



Description

- R40 EVO with low loss header
- Weather compensated control
- 1 direct heating zone

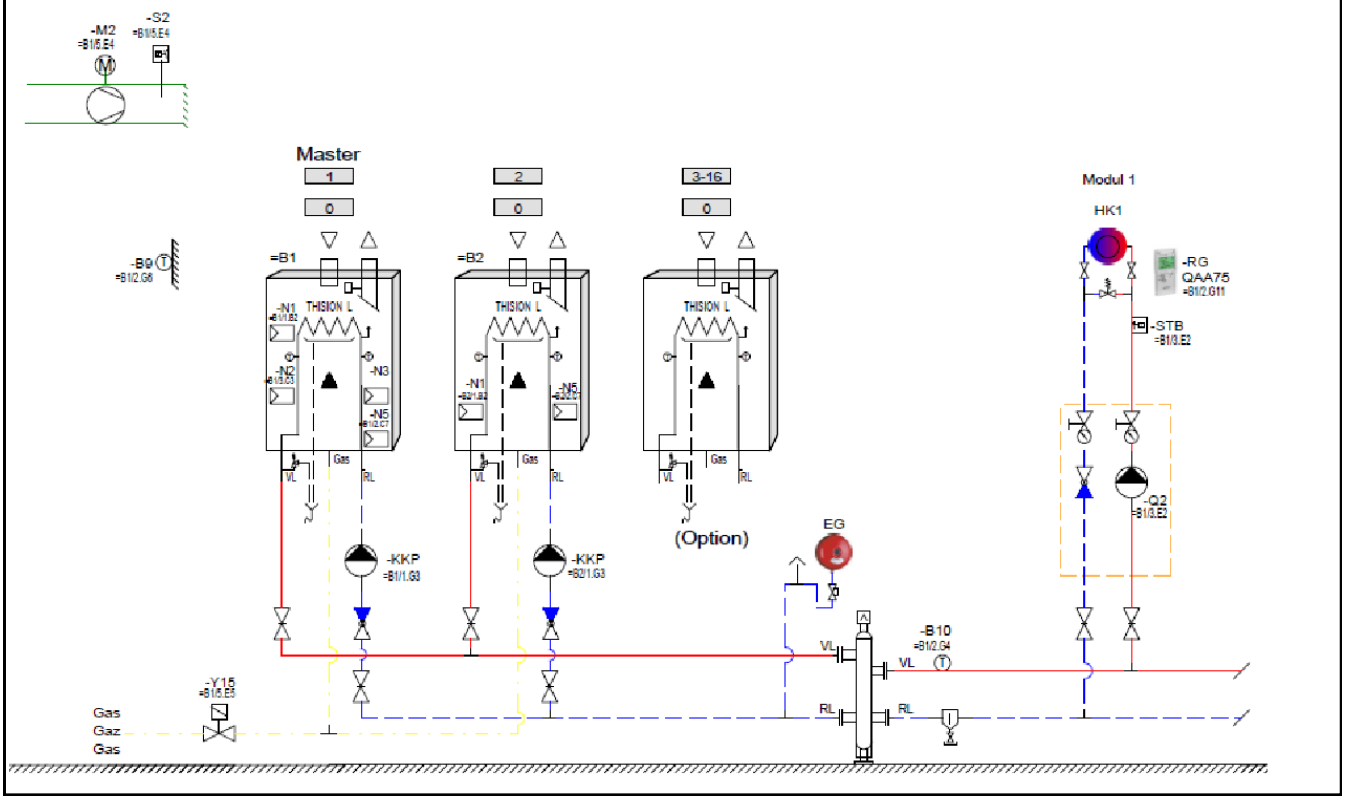
Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

Installation examples

1-A-C-E: 1 direct heating zone + cascade via low loss header

1-A-C-E: 1 direct heating zone + cascade via low loss header



Description

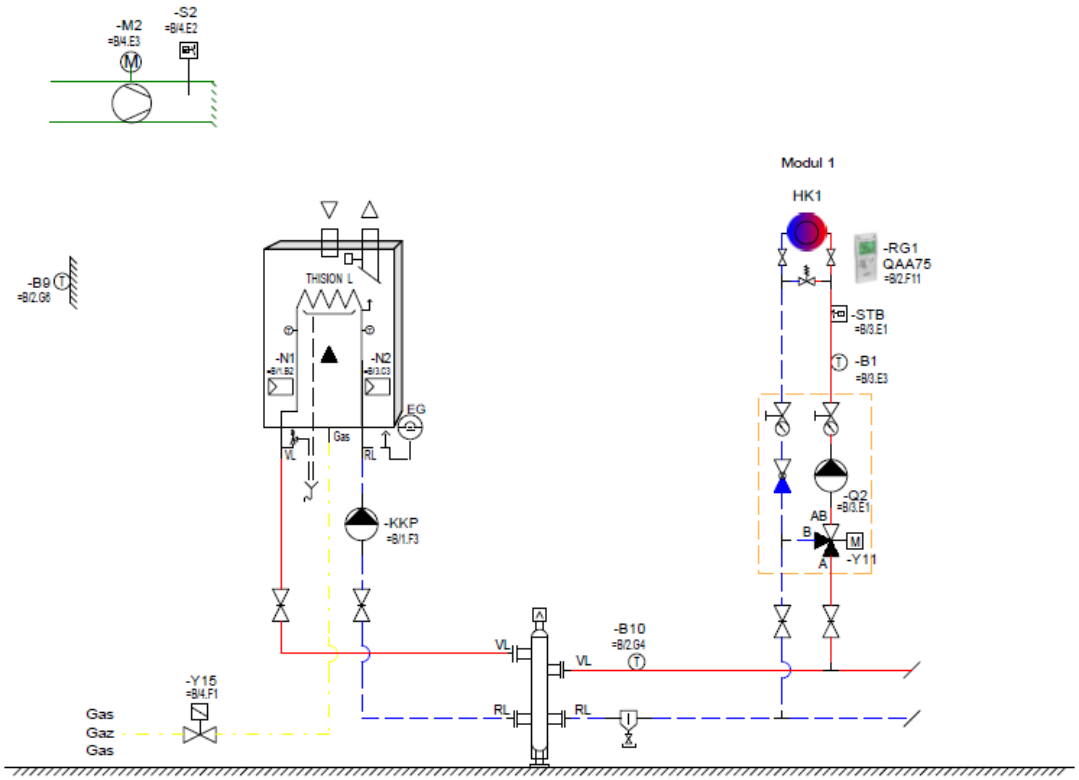
- R40 EVO with low loss header
- Cascade control + weather compensation
- 1 direct heating zone

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

2-A-C: 1 mixed heating zone + low loss header

2-A-C: 1 mixed heating zone + low loss header



Description

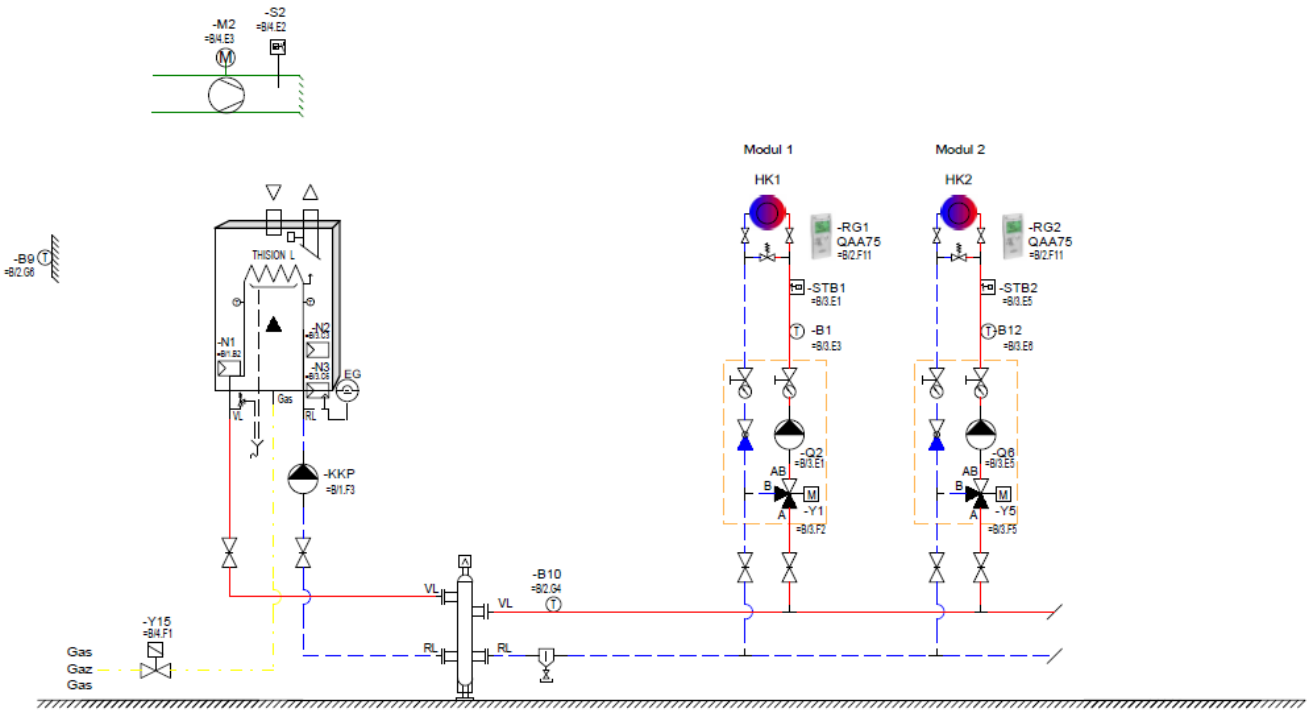
- R40 EVO with low loss header
- Weather compensated control
- 1 mixed heating zone

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

4-A-C: 2 heating zones + low loss header

4-A-C: 2 heating zones + low loss header



Description

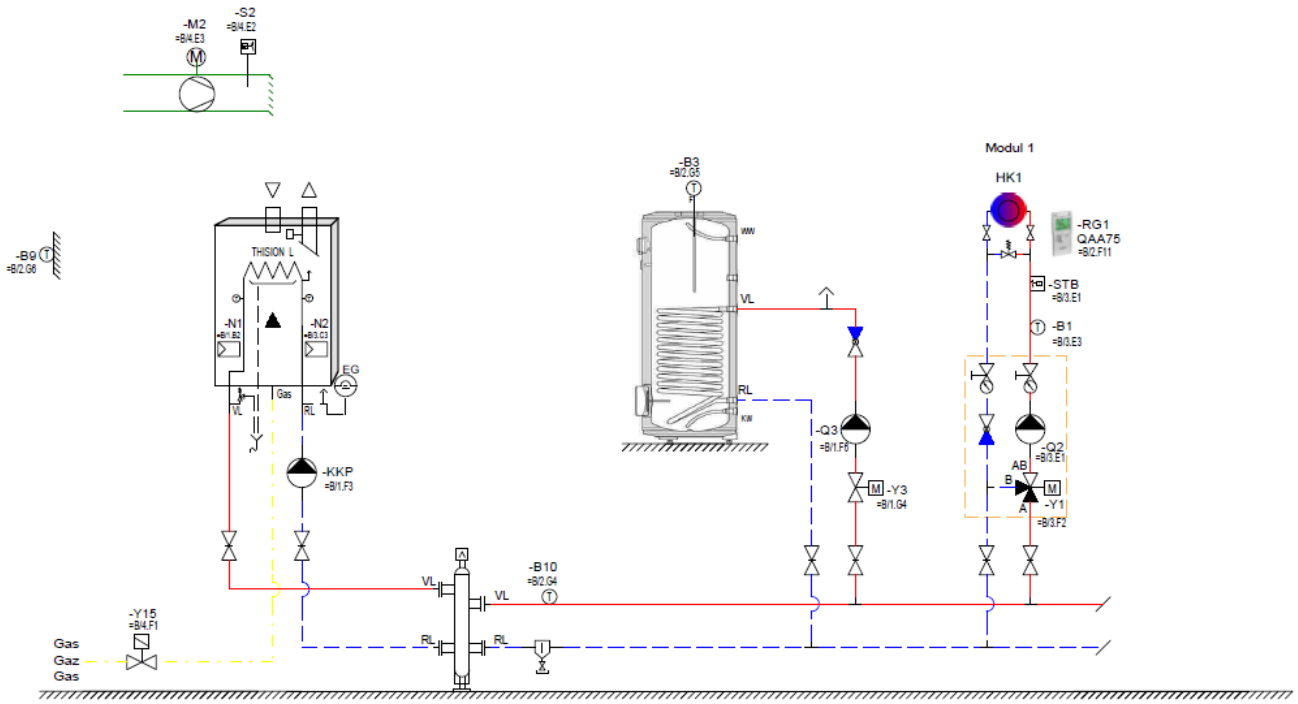
- R40 EVO with low loss header
- Weather compensated control
- 2 mixed heating zones

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

2-5-A-C: 1 heating zone and sanitary hot water + low loss header

2-5-A-C: 1 heating zone and sanitary hot water + low loss header



Description

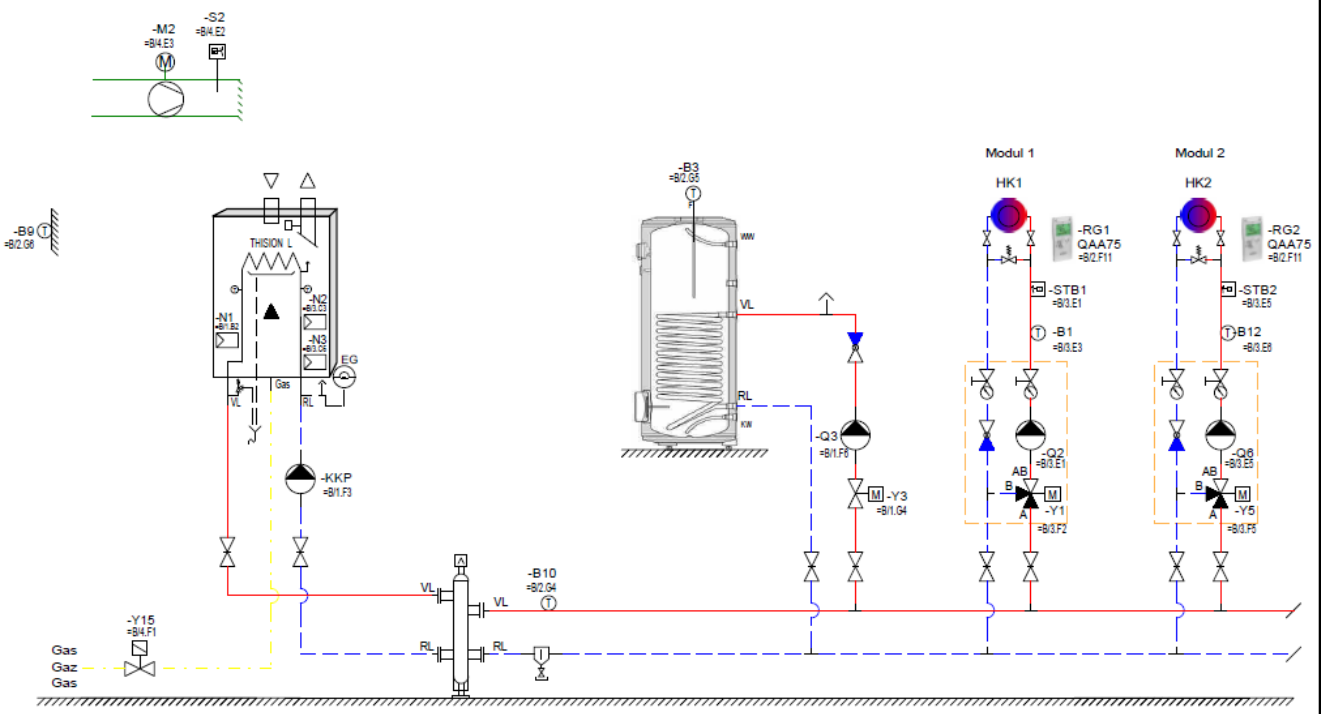
- R40 EVO with low loss header
- Weather compensated control
- 1 mixed heating zone
- Sanitary hot water

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

4-5-A-C: 2 heating zones and sanitary hot water + low loss header

4-5-A-C: 2 heating zones and sanitary hot water + low loss header



Description

- R40 EVO with low loss header
- Weather compensated control
- 2 mixed heating zones
- Sanitary hot water

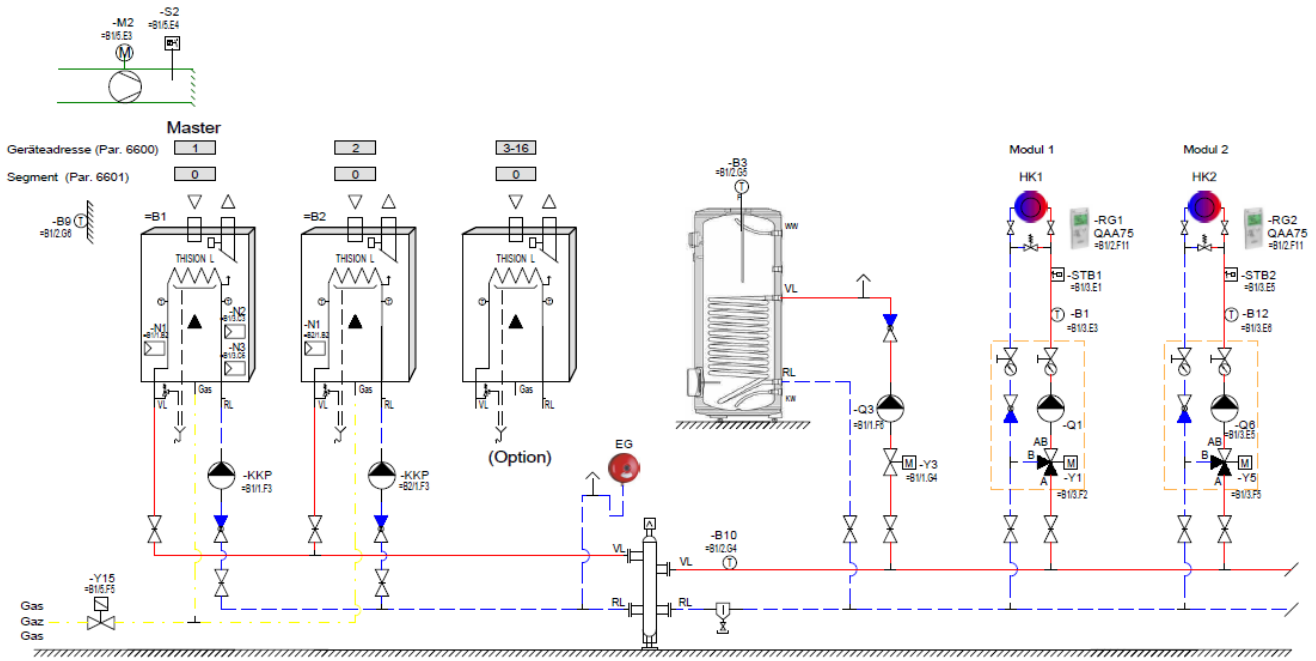
Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

Installation examples

4-5-A-C-E: 2 heating zones and sanitary hot water + cascade via low loss header

4-5-A-C-E: 2 heating zones and sanitary hot water + cascade via low loss header



Description

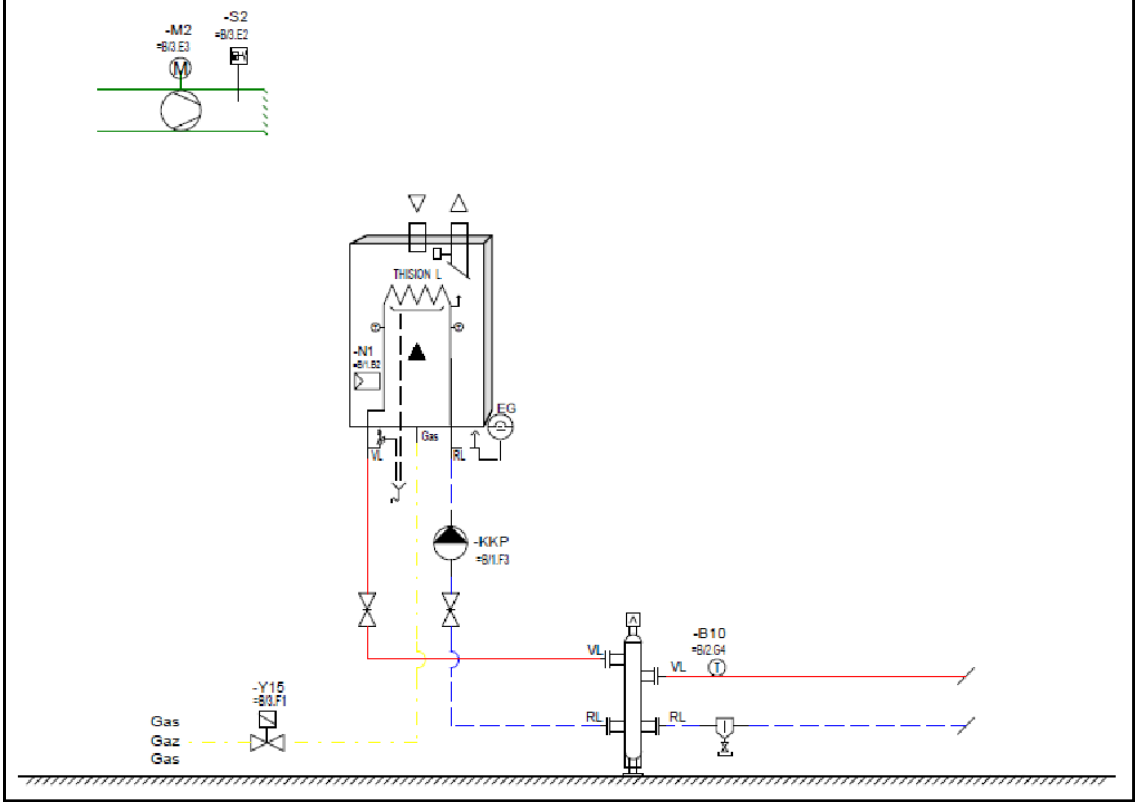
- R40 EVO with low loss header
- Cascade control + weather compensation
- 2 mixed heating zones
- Sanitary hot water

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

A-C: Boiler control via 0-10VDC + low loss header

A-C: Boiler control via 0-10VDC + low loss header



Description

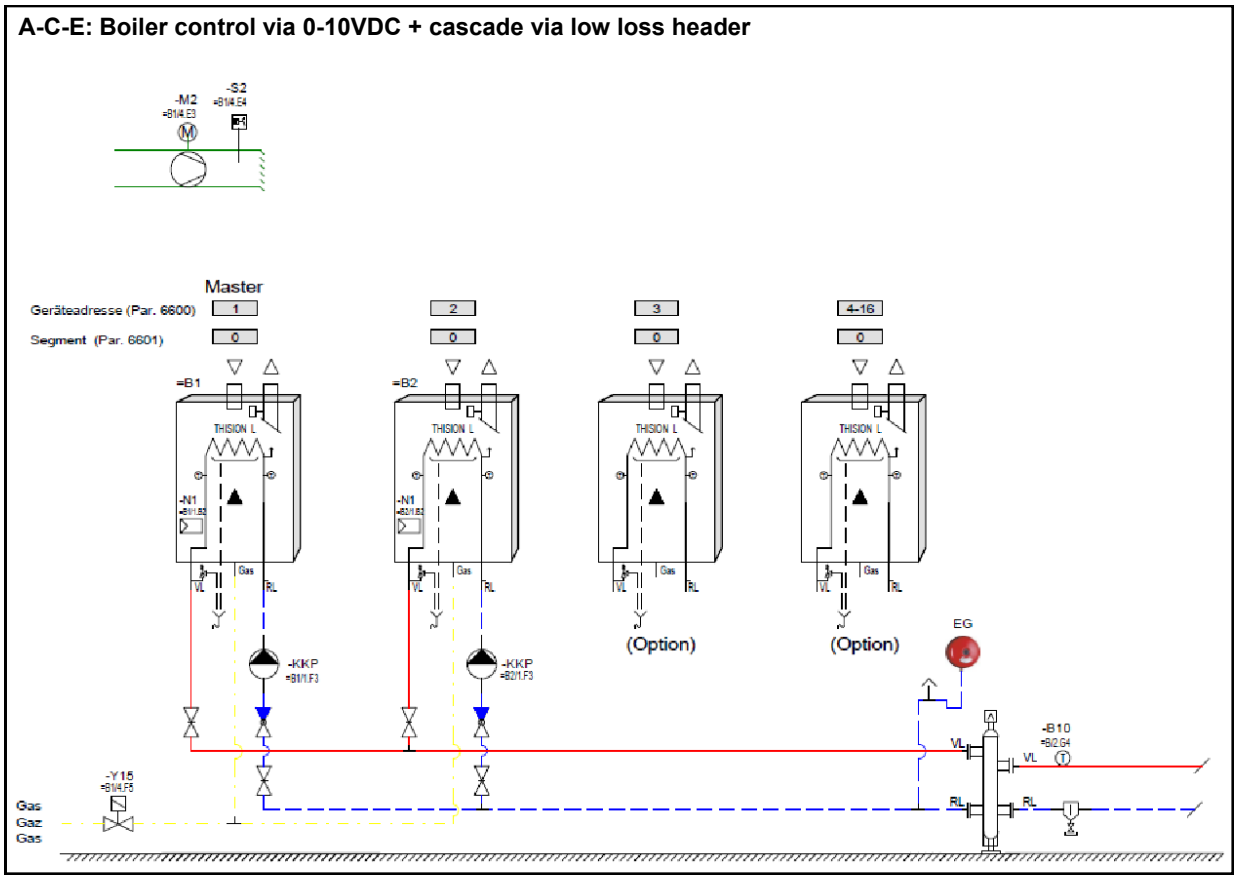
- R40 EVO with low loss header

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

A-C-E: Boiler control via 0-10VDC + cascade via low loss header

A-C-E: Boiler control via 0-10VDC + cascade via low loss header



Description

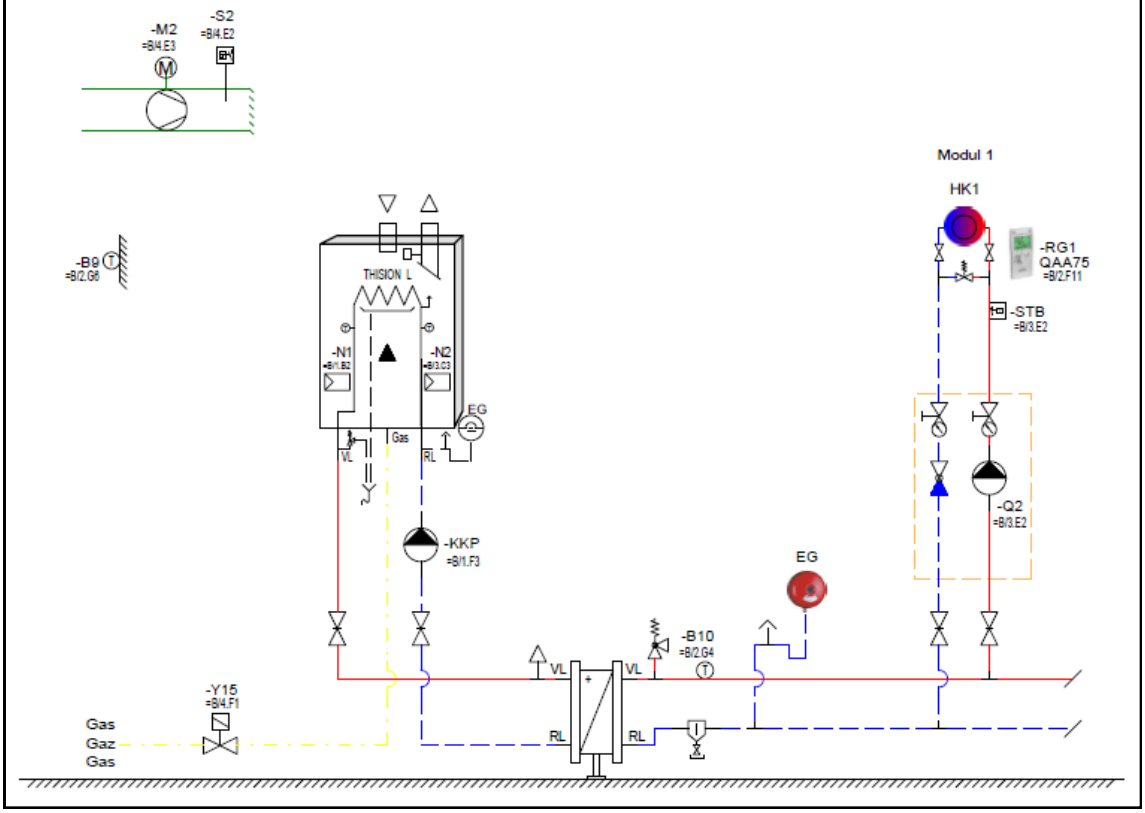
- R40 EVO with low loss header
- Cascade control

Notes

- Complete accessory kits with low loss header are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature in the header will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The header should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

1-B-C: 1 direct heating zone + plate heat exchanger

1-B-C: 1 direct heating zone + plate heat exchanger



Description

- R40 EVO with plate heat exchanger
- Weather compensated control
- 1 direct heating zone

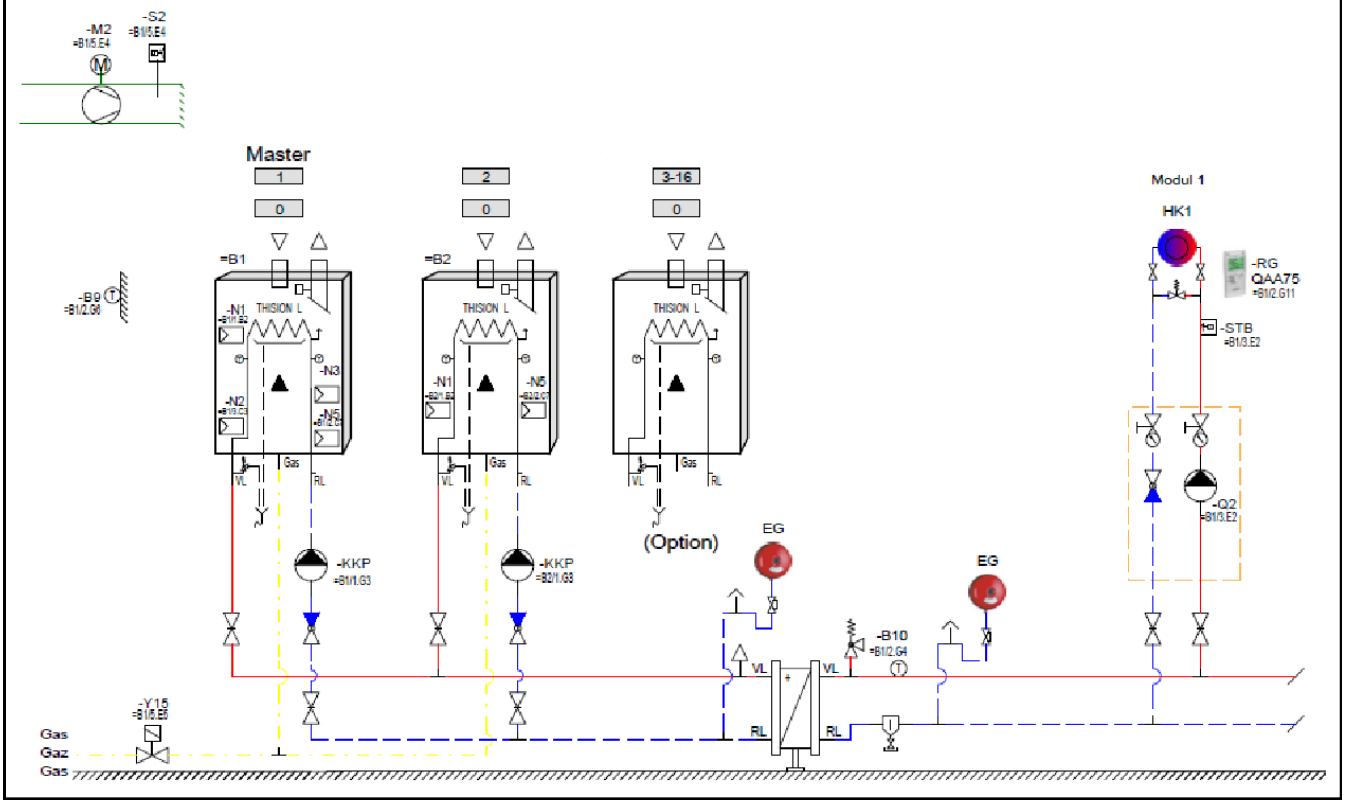
Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

Installation examples

1-B-C-E: 1 direct heating zone + cascade via plate heat exchanger

1-B-C-E: 1 direct heating zone + cascade via plate heat exchanger



Description

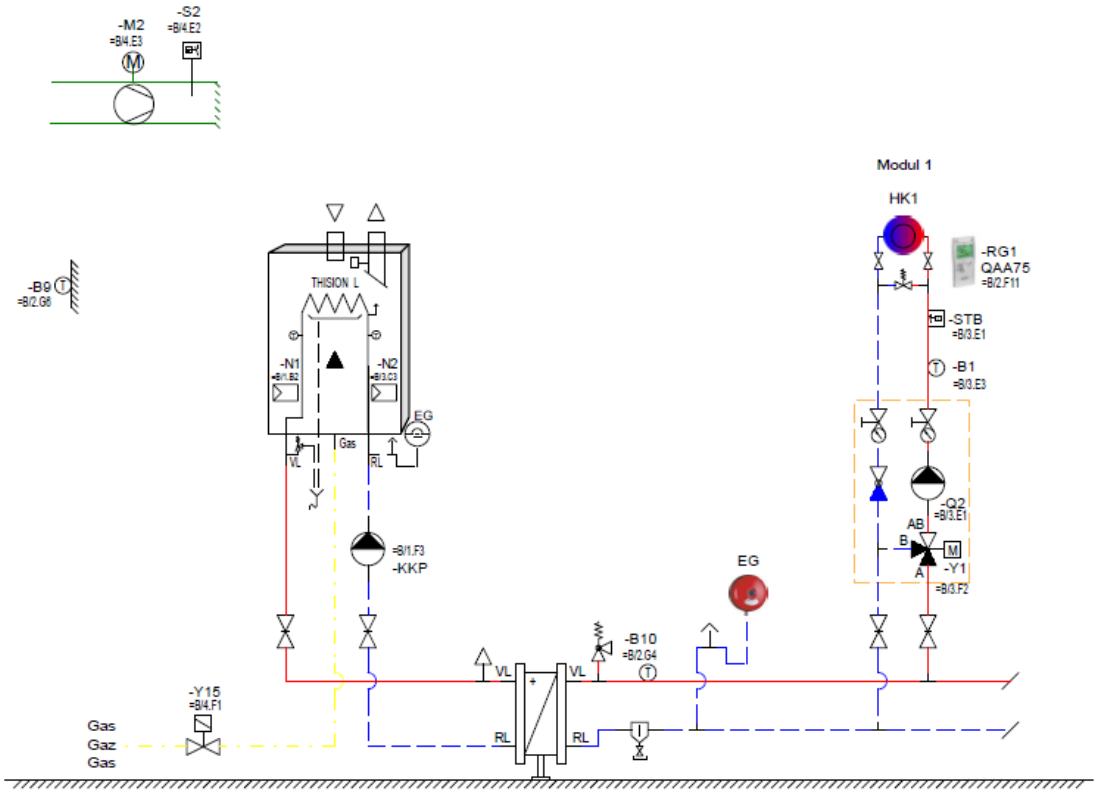
- R40 EVO with plate heat exchanger
- Cascade control + weather compensation
- 1 direct heating zone

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

2-B-C: 1 mixed heating zone + plate heat exchanger

2-B-C: 1 mixed heating zone + plate heat exchanger



Description

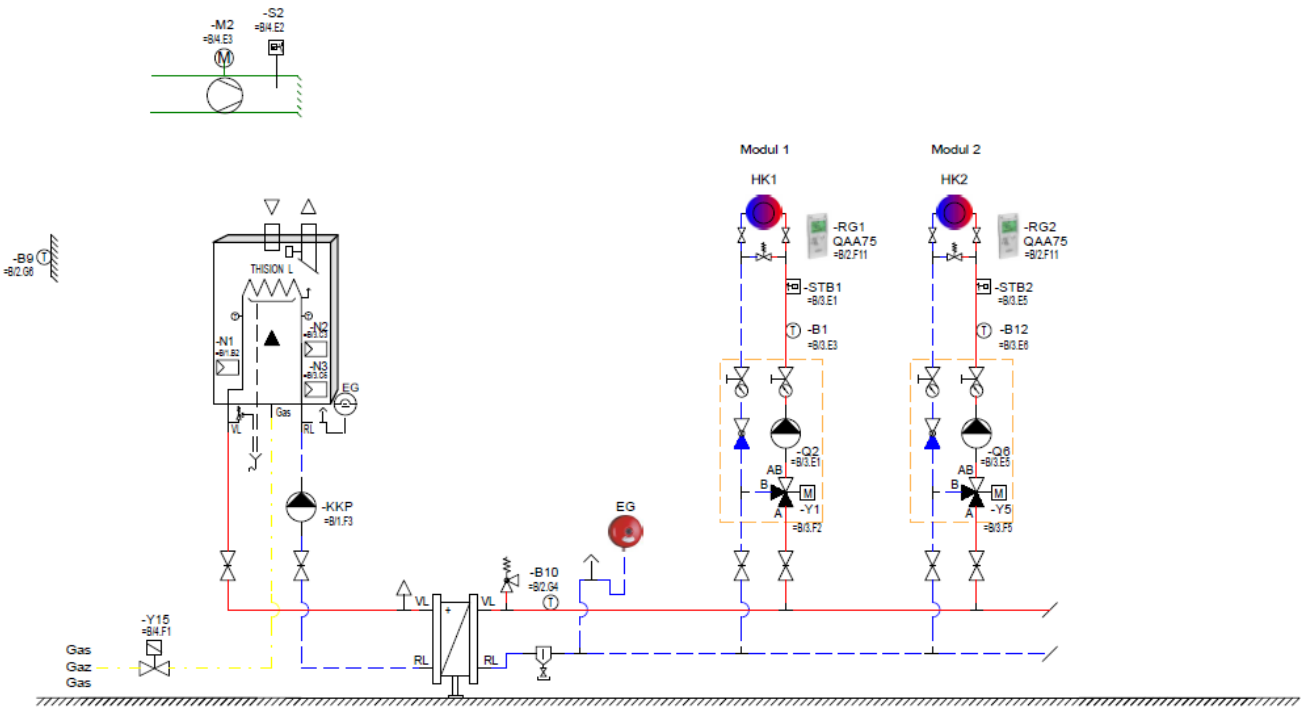
- R40 EVO with plate heat exchanger
- Weather compensated control
- 1 mixed heating zone

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

4-B-C: 2 heating zones + plate heat exchanger

4-B-C: 2 heating zones + plate heat exchanger



Description

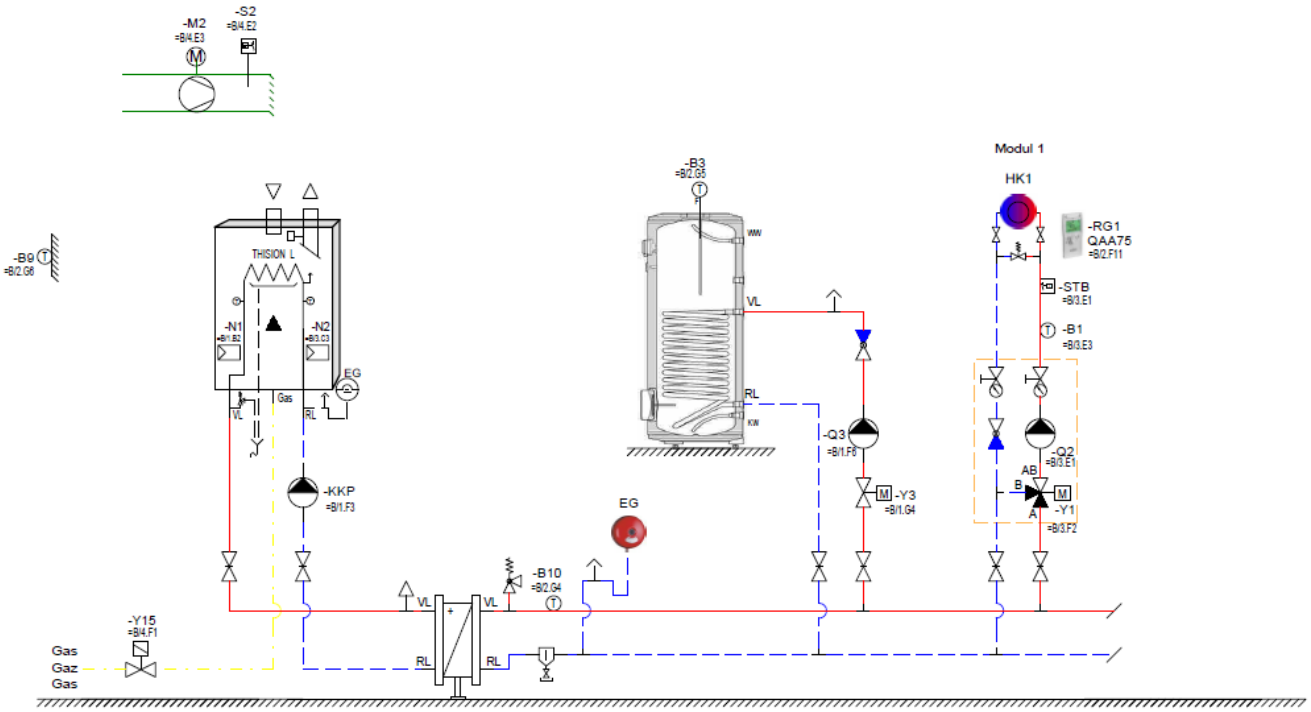
- R40 EVO with plate heat exchanger
- Weather compensated control
- 2 mixed heating zones

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

2-5-B-C: 1 heating zone and sanitary hot water + plate heat exchanger

2-5-B-C: 1 heating zone and sanitary hot water + plate heat exchanger



Description

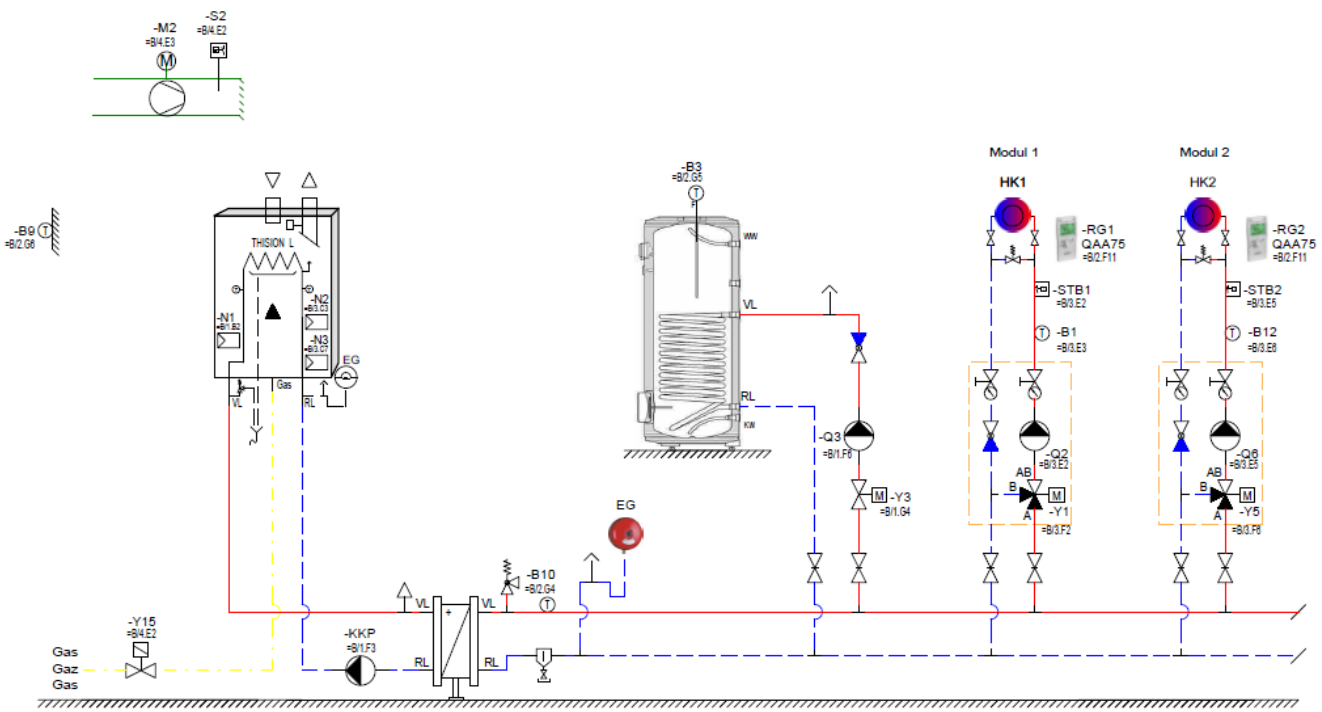
- R40 EVO with plate heat exchanger
- Weather compensated control
- 1 mixed heating zone
- Sanitary hot water

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10 -20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

4-5-B-C: 2 heating zones and sanitary hot water + plate heat exchanger

4-5-B-C: 2 heating zones and sanitary hot water + plate heat exchanger



Description

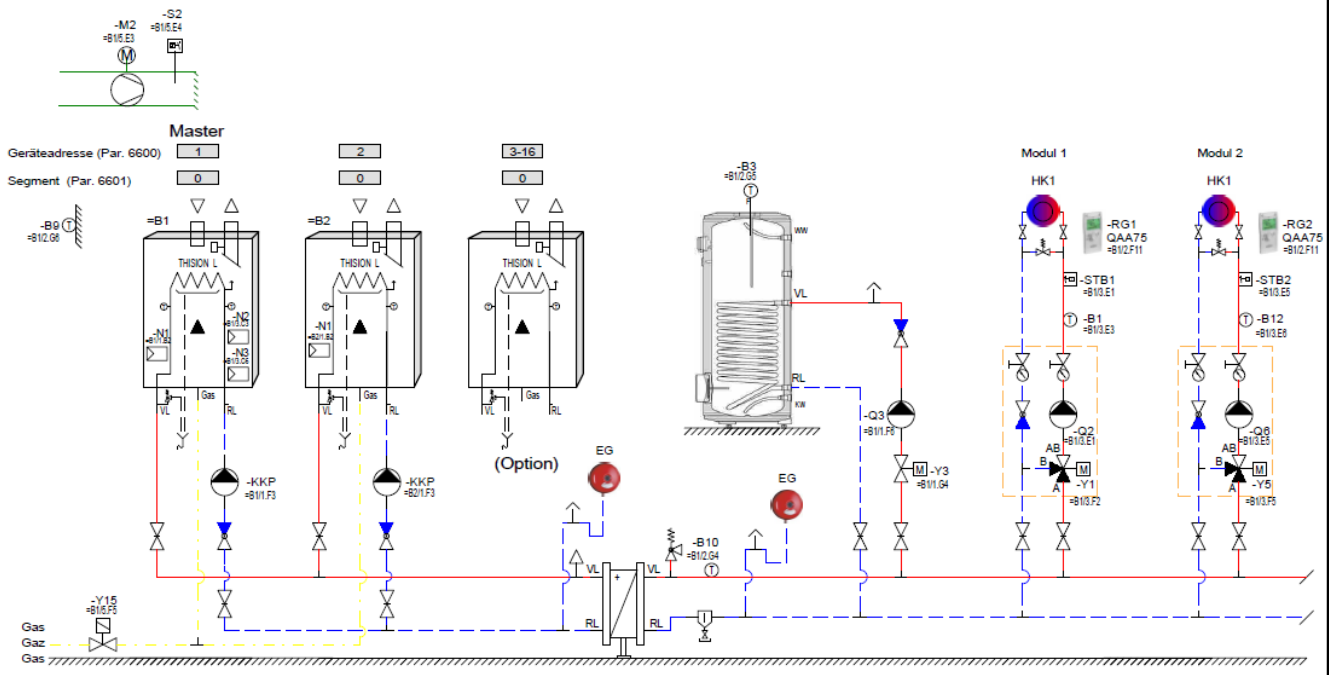
- R40 EVO with plate heat exchanger
- Weather compensated control
- 1 mixed heating zone
- Sanitary hot water

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10 -20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

4-5-B-C-E: 2 heating zones and sanitary hot water + cascade via plate heat exchanger

4-5-B-C-E: 2 heating zones and sanitary hot water + cascade via plate heat exchanger



Description

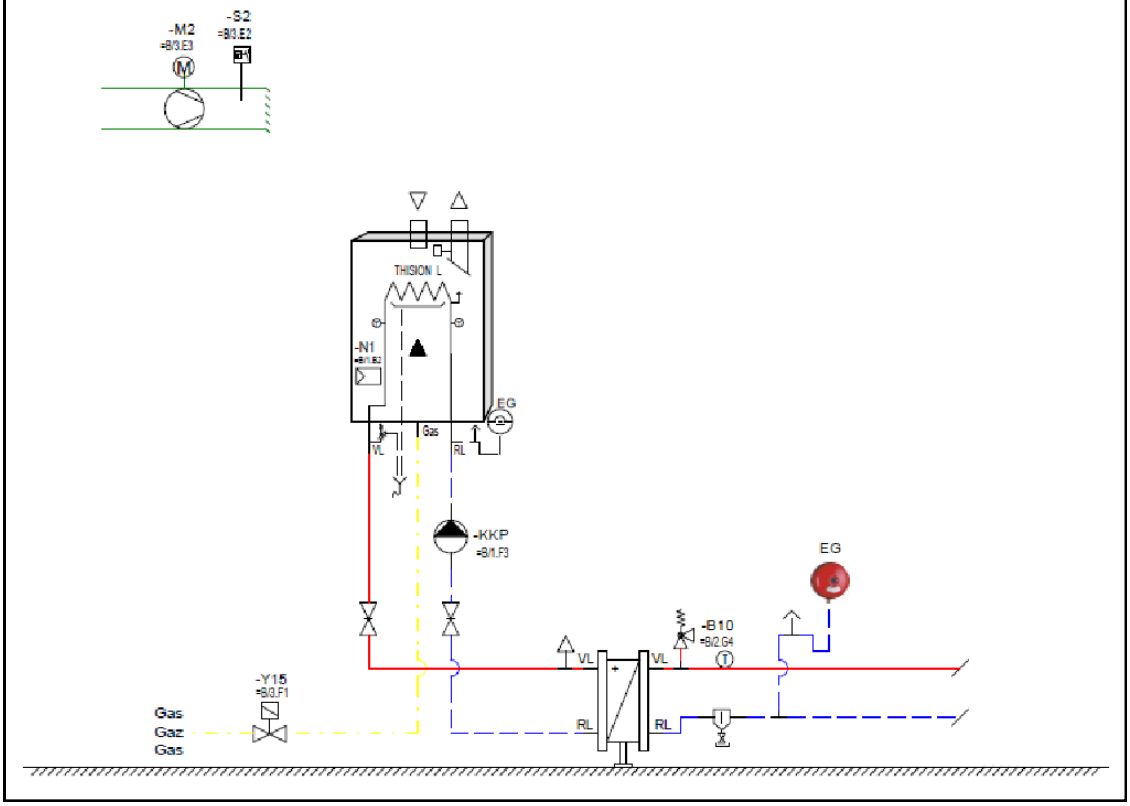
- R40 EVO with plate heat exchanger
- Weather compensated control
- 1 mixed heating zone
- Sanitary hot water

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10 -20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

B-C: Boiler control via 0-10VDC + plate heat exchanger

B-C: Boiler control via 0-10VDC + plate heat exchanger



Description

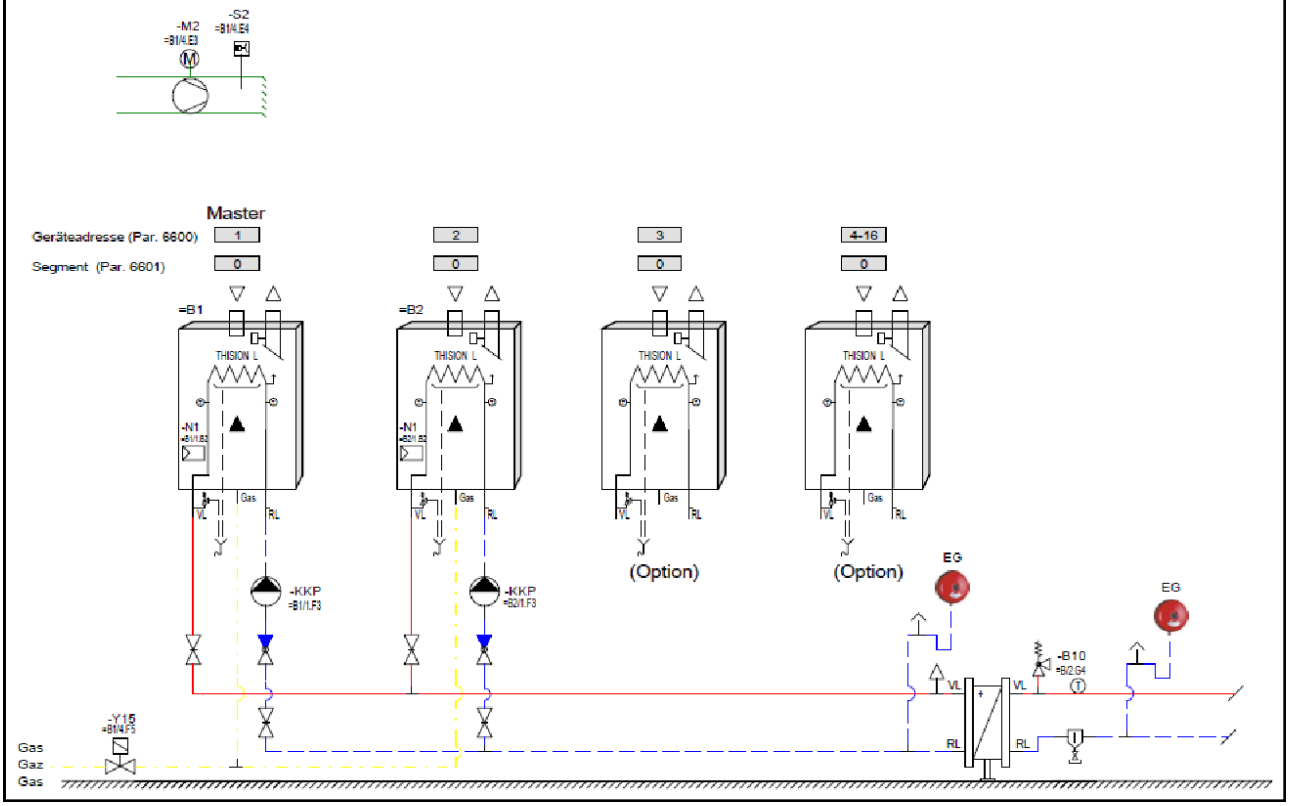
- R40 EVO with plate heat exchanger

Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

B-C-E: Boiler control via 0-10VDC + cascade via plate heat exchanger

B-C-E: Boiler control via 0-10VDC + cascade via plate heat exchanger



Description

- R40 EVO with plate heat exchanger
- Cascade control

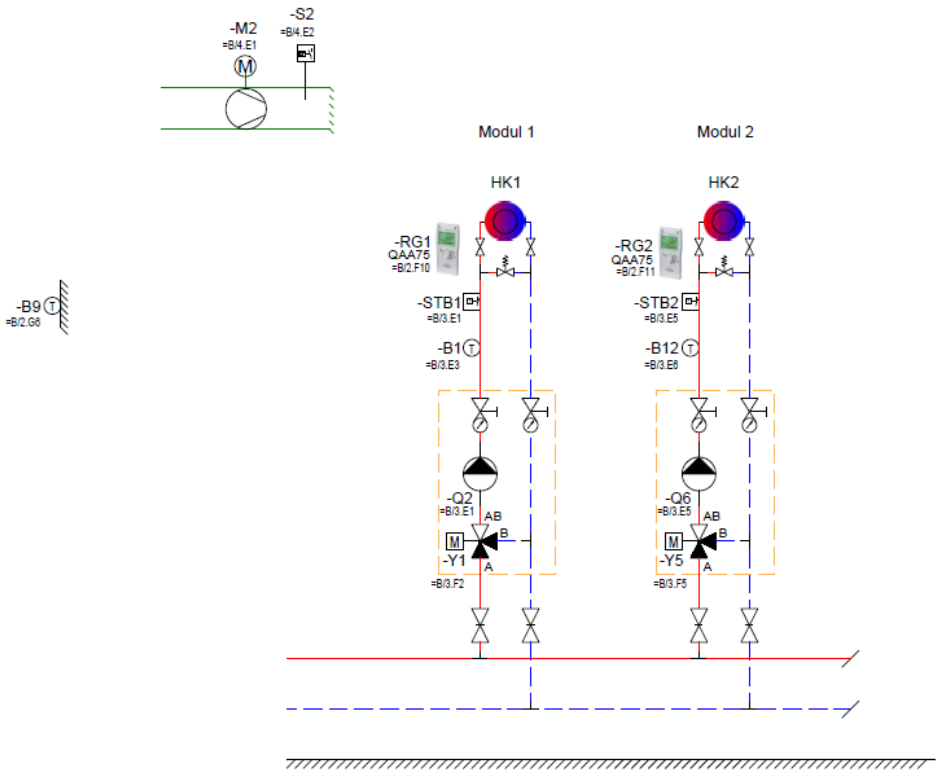
Notes

- Complete accessory kits with plate heat exchanger are available for ΔT=10-20K (see chapter „Accessories“).
- The primary circuit should be designed for ΔT=20K, this guarantees a high boiler efficiency.
- When the secondary circuit is designed for a ΔT smaller than 20K, the flow temperature of the plate heat exchanger will be lower than the flow temperature of the boiler. This should be taken into consideration during the design stage.
- The plate heat exchanger should be positioned close to the boiler, to avoid a negative influence on the temperature control quality.
- In case of a boiler room installed on the roof, the boiler may never be hydraulically connected at the highest point of the installation.

Installation examples

Extension 2 heating zones

Extension 2 heating zones



Description

- Weather compensated controller with wall hung box LOGON B
- Extension of 2 heating zones

Notes

- The extension controller should always be used in combination with the integrated boiler controller LMS14
- With the extension controller 2 additional heating zones can be controlled.
- The heating zone control can be extended up to 15 heating zones.

Country specific

Germany: EnEV (Anlagenaufwandzahl, DIN V4701-10)

		R40 EVO					
		60	**70**	**80**	**100**	**120**	**140**
Nominal heat output at 80/60°C	kW	56,5	65,5	75,3	92,9	111,9	130,4
Nominal heat output at 40/30°C	kW	60,5	70,0	79,7	98,9	118,5	137,8
Efficiency at 80/60°C full load	%	97,6	98,0	98,0	97,6	97,9	97,8
Efficiency at 36/30°C 30% load	%	107,2	107,2	107,1	107,8	107,9	107,6
Fluegas temperature at 36/30°C 30%	°C	34	35	35	33	34	35
Standstill losses (T_{water} = 70°C)	%	0,14	0,12	0,11	0,10	0,08	0,07
Support energy	W	171	197	220	221	219	249

Italy: Legge 10

		R40 EVO					
		60	**70**	**80**	**100**	**120**	**140**
Combustion efficiency (indirect) at 80/60°C full load (burner on)	%	97,9	97,8	97,8	97,8	97,6	97,4
Combustion efficiency (indirect) at 80/60°C min load (burner on)	%	98,1	98,1	98,0	98,0	98,0	98,0
Combustion efficiency (indirect) at 40/30°C full load (burner on)	%	98,8	98,7	98,7	98,7	98,6	98,5
Combustion efficiency (indirect) at 40/30°C min load (burner on)	%	99,3	99,3	99,3	99,3	99,3	99,3
Combustion efficiency (direct) at 80/60°C full load	%	97,6	98,0	98,0	97,6	97,9	97,8
Combustion efficiency (direct) at 80/60°C 30% load	%	97,0	97,5	97,9	98,3	98,3	98,3
Combustion efficiency (direct) at 40/30°C full load	%	104,5	104,8	103,8	103,9	103,7	103,4
Combustion efficiency (direct) at 40/30°C 30% load	%	108,3	108,5	108,6	110,0	109,9	109,8
Thermal losses at chimney, at 80/60°C full load (burner on)	%	2,1	2,2	2,2	2,2	2,4	2,6
Thermal losses at chimney, at 80/60°C min load (burner on)	%	1,9	1,9	2,0	2,0	2,0	2,0
Thermal losses at chimney, at 40/30°C full load (burner on)	%	1,2	1,3	1,3	1,3	1,4	1,5
Thermal losses at chimney, at 40/30°C min load (burner on)	%	0,7	0,7	0,7	0,7	0,7	0,7
Thermal losses at chimney (burner off)	%	<0,10	<0,10	<0,10	<0,10	<0,10	<0,10
Loss on surface (casing)	%	0,14	0,12	0,11	0,10	0,08	0,07
Nett flue gas temperature at 80/60°C full load	°C	39,0	40,0	41,0	40,0	43,0	46,0
CO_2 level gas G20/G25 max	%	8,5	8,4	8,4	8,4	8,4	8,2

Norms

Germany:
- DIN EN 483
- DIN EN 677
- DIN EN 13384-1
- DIN EN 13384-2
- DIN EN 12828
- DIN 18160-1
- DIN 18160-5
- DIN VDE 0100
- DIN VDE 0116
- DVGW-Arbeitsblatt G260/1-2
- Feuerungsverordnung (FeuVO) des jeweiligen Bundeslandes
- Landesbauverordnung (LBO)
- Muster-Feuerungsverordnung (MuFeuVO)
- Technische Regeln für Gas-Installationen DVGW-TRGI 86/96
- VDI2035

Netherlands:
- NEN 2757-1 (2011)
- NEN 2757-2 (2006)
- NEN 3028 (2011)
- NEN 1010
- Bouwbesluit (2012)
- SCIOS (Scope 1)

France:
- EN 12098-1 : regulation system optimiser

UK:
- Gas Safety Installation & Use Regulations.
- BS 5440-1:2008
- BS 5440-2:2009
- BS 6644:2011 Inc corrigendum No1

Austria:
- ÖNORM H 5152: Brennwert-Feuerungsanlagen, Planungshilfen
- ÖNORM M 7443: Gasgeräte mit atm.Brenner Teil 1, 3, 5, 7
- ÖNORM M7457: Gasgeräte mit mechanisch unterstütztem Vormischbrenner
- ÖNORM M 5195-1: Heizwassernorm

ÖVGW Richtlinien:
- G1 Techn. Richtlinie für die Errichtung von Niederdruck-Gasanlagen
- G2 Techn. Richtlinie für die Errichtung von Flüssiggasanlagen
- G41 Gasbrennwert-Feuerungsstätten, Aufstellung und Anschluss
- G4 Heizraumrichtlinie

Der R40 EVO ist zugelassen nach Artikel 15a B-VG und gemäß Feuerungsanlagenverordnung VO (FAV 97)
Die örtlichen Bauordnungen sind zu beachten.

Switzerland:
- PROCAL
- SVGW – Gasleitsätze G1/G2
- EKAS – Form, 1942
- BAFU
- VKF
- Wasserbehandlung laut Richtlinie SWKI Nr. 97-1

Italy:
Sicurezza degli impianti
- Legge 5 marzo 1990 n. 46
- D.P.R. 6/12/91 n. 447
- D.M. 20/2/92
- D.M. 1 dicembre 1975
- I.S.P.E.S.L. (ex A.N.C.C.)
- Norma UNI 8065
- Norma Uni 9615

Sicurezza imiego gas
- Norma prEN 656
- Legge 6 dicembre 1971 n.1083
- D.M. 23/11/72
- Norma UNI 7129-72
- Norma UNI-CIG 7131-72

Risparmio energetico
- Legge 9 gennaio 1991 n.10
- D.P.R. 26-08-93 n.412
- D.P.R. n.551 del 21 dicembre 1999

Sicurezza antincendio
- Decreto del ministero dell'interno 16 febbraio 1982
- Decreto del ministero dell'interno 12 aprile 1996
- Norma CEI EN 60079-10
- Norma CEI 64-8 (giugno 1987)

Provvedimenti contro l'inquinamento atmosferico
- D.P.R. 24/5 1988 n.203

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