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INTRODUCTION

In combination with a Celcia 20, the Remeha Celcia MC4 is a regulator for the modulating control of between 1 and 4 Remeha boilers in cascade.

This Installation and User manual is intended for installers and end users. The document contains important information about the regulator, preparation for assembly and installation, operation, inspection, maintenance, technical specifications and the identification and elimination of errors.

afb. 01 Remeha Celcia MC4 documentation

In addition to the Installation and User manual, the Remeha Celcia MC4 documentation consists of:

- The Product Data Sheet, for those interested in technical and/or commercial aspects.



afb. 02 Uk.remeha.com

For further useful information see the Remeha internet site: uk.remeha.com

afb. 03 Read these instructions

Please note:

- Please read this manual carefully before mounting and connecting the regulator, or putting it into operation; familiarize yourself with how the regulator works and how to use it, and follow the instructions exactly.
- Remeha B.V. will not be liable for any damage resulting from the instructions in this documentation not being followed.

Remeha B.V. continually seeks to improve its products. The data published in this manual are based on the most recent information and are issued subject to later modifications. We reserve the right to modify the construction and/or finish of our products at any given time without any obligation to adapt earlier supplies accordingly.





Please do not hesitate to contact us if you have any suggestions to improve this documentation.

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1 SAFETY

1.1 General safety

The following pictograms are used in this Installation and User manual to specifically draw certain points to your attention:

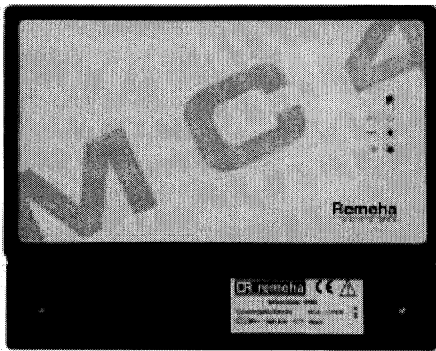
- Tip:**  Useful tip or practical advice
- Indication**  Possible difficulties in carrying out a particular operation or function of the regulator.
- Warning!**  Possible danger of personal injury or material damage to the regulator, building or environment.
- Danger!**  Risk of electric shocks. Serious personal injury can occur.

1.2 Safety during assembly and installation

Observe the appropriate safety measures, as given in these instructions.

2 INSTALLATION

2.1 Scale of delivery



afb. 04 Remeha Celcia MC4

The standard delivery of the Remeha Celcia MC4 includes:

- the Remeha Celcia MC4 cascade regulator;
- earthed plug;
- drilling template and fixtures for wall mounting;
- strain relief clips and screws;
- outside temperature sensor and system flow temperature sensor;
- Installation and User manual

2.2 Mounting and connecting the regulator

This chapter includes the guidelines and instructions for the connection of the regulator, sensors, thermostats, pump outlet and failure relay.

2.2.1 Mounting guidelines

- Mount the regulator in an easily accessible position at eye level at eye level.
- Make sure it is near an earthed 230 VAC / 50HZ mains connection. The mains lead supplied is 1.5 m long.
- Ensure that the cable connection between the Celcia MC4 and other system components is as short as possible and preferably not close to any other cables.



- Note the requirements regarding ambient temperature and the permissible relative humidity.
- Make sure the regulator cannot get splashed.

2.2.2 Mounting the Celcia MC4

The regulator is mounted using three screws. The top screw is to hang the regulator on and cannot be tightened once the regulator has been mounted. The bottom screws (behind the small cover) are to hold it firmly in place.

afb. 05 Mounting instructions 'Mounting the Celcia MC4'

Mount the regulator as follows:

- Determine the position of the regulator and press the drilling template against the wall.
- Drill the three holes (Ø 5 mm) as indicated by the template.
- Insert the plugs.
- Screw the top screw into the plug and mount the regulator without any play.
- Remove the small cover from the regulator to make the lower slots accessible.
- Screw the bottom two screws into the plugs.
- Straighten the regulator and tighten these two screws.
- Replace the cover.

2.2.3 Additional guidelines for connecting the sensors and wiring the system components

- Mount the regulator as close as possible to the system components to be controlled (max. cable length for OpenTherm regulators is 50 metres)
- An earth terminal has been fitted next to the connection for the mains lead. Always connect this in order to comply with EMC guidelines.
- Use double insulated wiring for the exit relays that switch a power supply with no earth connection..
- Fit a strain relief to all cable connections.



Looping the supply voltage and/or earth to e.g. a pump, is not allowed.



2.2.4 Connecting the sensors and wiring the system components

Connect temperature sensors, thermostats, boilers and other wiring as follows:



Always switch the mains voltage off before assembling any electrical components,

- Remove the small cover.
- Fit the required temperature sensors and other system components.
- Lead the cables to the regulator and connect them; *see tabel 01 and afb. 06* for the appropriate terminal connection.
- Connect the mains lead.
- Fit the strain relief clips and check that all the cables are properly clamped.
- Replace the cover.

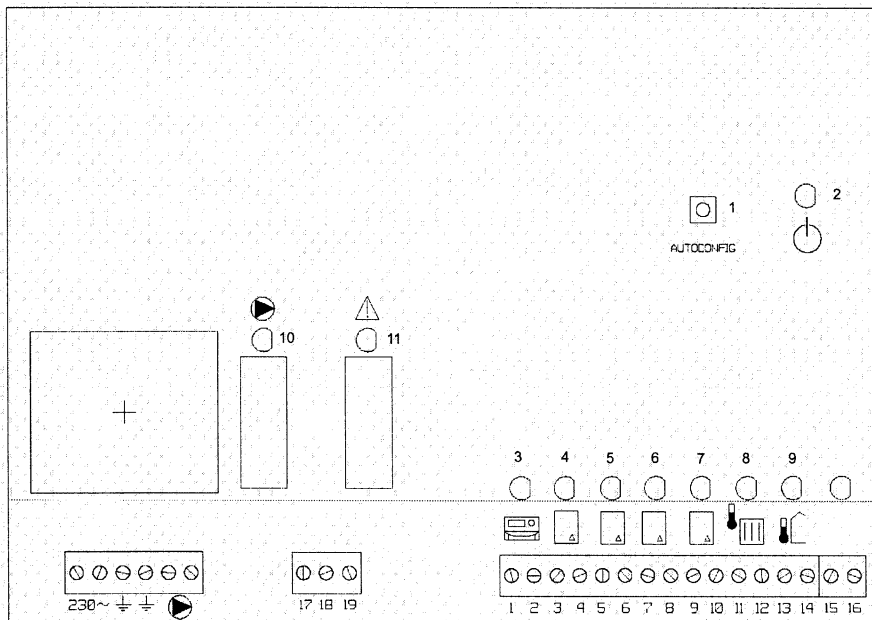
Terminals on the regulator	Connecting system components
230 ~	Mains voltage 230 VAC / 50 Hz
	Earth terminals
	Pump connection (U)
1 and 2	OpenTherm or On-off thermostat
3 and 4	Boiler connection (OpenTherm) ¹⁾
5 and 6	Boiler connection (OpenTherm) ¹⁾
7 and 8	Boiler connection (OpenTherm) ¹⁾
9 and 10	Boiler connection (OpenTherm) ¹⁾
11 and 12	System flow temperature sensor (Bv)
13 and 14	Outside temperature sensor (Ba)
15 and 16	No function
17 and 18	Potential free contacts ²⁾
17 and 19	Potential free contacts ³⁾

tabel 01 I/O connections Celcia MC4

¹⁾ Must be connected to the OpenTherm connection terminals on the boiler

²⁾ Operation signal; contacts 17 and 18 are closed if everything is as it should be

³⁾ Operation signal; contacts 17 and 19 are closed if a failure occurs (internal, boiler failure, communication failure or wiring fault)

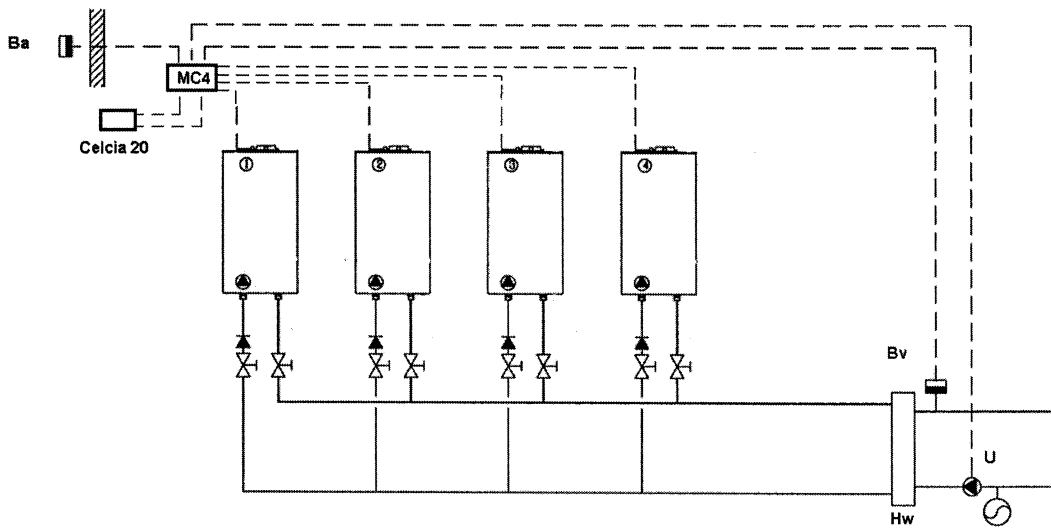


afb. 06 Terminal connection sensors and wiring system components



No (sequential) regulators are to be coupled to the Celcia MC4, as in a mixing group, swimming pool or boiler regulation, for example. The tap water system is regulated via the control unit of one of the boilers.

2.2.5 Principle diagram of the connection of system components



afb. 07 Principle diagram of the connection of system components

Ba = Outside temperature sensor

Bv = System flow temperature sensor

U = System pump

Hw = Open distributor

2.2.6 Choice of boilers

All boilers in the cascade system should have OpenTherm communication.



For a correct cascade regulation, the maximum difference between the capacities of the different boilers may not be more than 2.5x.

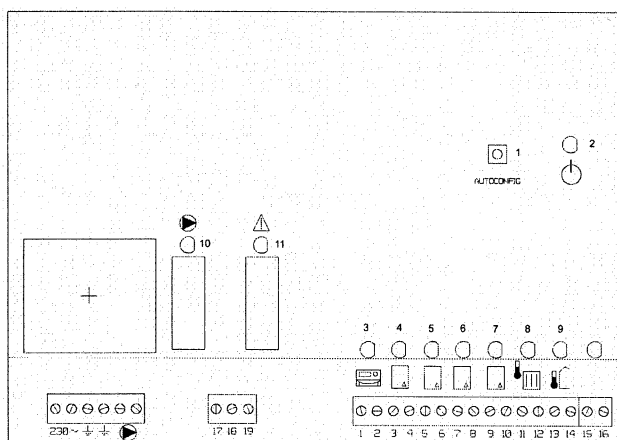
A good combination would be e.g.: 40 kW + 80 kW + 80 kW (80 : 40 = 2 is < 2.5 i.e. right)

A bad combination would be e.g.: 40 kW + 40 kW + 120 kW (120 : 40 = 3 is > 2.5 i.e. wrong)

2.3 Putting into Operation

2.3.1 Control Panel

The Celcia MC4 control panel has 1 function button for automatic configuration and 11 LED indicators (10 of which are under the large cover)



afb. 08 Control Panel

- 1 = **'automatic configuration'** button
- 2 = status LED
- 3 = thermostat LED
- 4 - 7 = boiler LEDs
- 8 = system flow temperature sensor LED
- 9 = outside temperature sensor LED
- 10 = pump LED
- 11 = failure relay LED

2.3.2 Definition of LED indicators

The following LED indicators can light up on the Celcia MC4 control panel:

LED indicator	Colour	Indication and definition
status LED	green	not lit, no mains voltage continuously lit, Celcia MC4 is working normally flashing slowly; boiler or communication fault flashing quickly; Celcia MC4 is configuring
thermostat LED	yellow	lit continuously; Celcia MC4 is connected to OpenTherm thermostat or on/off thermostat is closed not lit; no OpenTherm thermostat connected or on/off thermostat is open flashing slowly; Celcia MC4 has no thermostat connection flashing quickly; Celcia MC4 is configuring
boiler LEDs	yellow	lit continuously; if the appropriate boiler is connected not lit; if the appropriate boiler is not connected flashing slowly; communication fault (only if the boiler is connected) flashing quickly; Celcia MC4 is configuring
system flow temperature sensor LED	yellow	lit continuously; if the appropriate sensor is connected not lit; if the appropriate sensor has not been found flashing slowly; sensor measuring value beyond the limits flashing quickly; Celcia MC4 is configuring
Outside temperature sensor LED	yellow	lit continuously; if the appropriate sensor is connected not lit; if the appropriate sensor has not been found flashing slowly; sensor measuring value beyond the limits flashing quickly; Celcia MC4 is configuring
pump LED	yellow	lit continuously; pump is switched on not lit; pump is switched off
failure relay LED	yellow	lit continuously; an internal failure has occurred, boiler, communication or wiring fault not lit; everything working properly flashing quickly; Celcia MC4 is configuring

tabel 02 Definition of LED indicators

2.3.3 Putting regulator into working order

This section details the procedure for putting the regulator into working order. What to do:

- Leave the regulator unplugged.
- Remove the small cover.
- Check that all the connections, including earth connections, have been made correctly.
- Remove the large cover.
- Switch all system components on.
- Insert the plug into the wall socket.
- Press the **'automatic configuration'** button, until all the LEDs start to flash quickly; all system components will be detected.
- The configuration will be stored in the regulator memory within 10 seconds.
- Now the status LED will stay on (unless there is a fault) and the Celcia MC4 is ready for operation.

2.3.4 Checking the working of the Celcia MC4

The working of the regulator can be checked by connecting the OpenTherm connection to terminals 1 and 2. The Celcia MC4 will control the boilers at minimum load. After 1 minute, all boilers will simultaneously be set to full load for 10 minutes. The system flow temperature can then rise to the maximum flow temperature of the boilers connected.

2.4 Normal start-up procedure

The Celcia MC4 receives the required flow temperature from the OpenTherm thermostat and calculates the required capacity on the basis of the difference between the measured and the required flow temperatures. The Celcia MC4 distributes this capacity over the connected boilers, according to a set switching method.

If an outdoor sensor (Ba) is connected the Celcia MC4 will transmit the outside temperature to the connected OpenTherm thermostat, enabling weather-dependent control. The Celcia MC4 has no internal heat curve.



If the OpenTherm is used as a weather-dependent regulator, the outdoor sensor (Ba) is connected to terminals 13 and 14 of the Celcia MC4.

2.4.1 Adjusting the regulator according to the system

The Celcia MC4 can be adjusted to a new system, literally 'at the touch of a button'. If the current system has been configured with three CH boilers and is to be extended with a fourth, complete the hydraulic and electrical connections and then press the '**automatic configuration**' button for about 3 seconds. The regulator will now distribute the required capacity over four boilers instead of three.

2.4.2 Removing a boiler from the cascade

Reducing the system, e.g. from four boilers to two, is just as simple. Disconnect the hydraulic and electrical boiler connections (unplug them) and then press the '**automatic configuration**' button for about 3 seconds. The regulator will now distribute the required capacity over two boilers instead of four.



Other newly added components (OpenTherm regulators or temperature sensors) are also added to the configuration automatically.

3 FAULTS

3.1 General

If any of the connected boilers goes into fault mode, or is heating tap water, the Celcia MC4 will automatically switch the following boiler on.

The LED indicators on the Celcia MC4 also serve as fault indicator. If the regulator is controlled via the Celcia 20, the failure signal will be displayed on the Celcia 20.

3.1.1 Failure signals via the LED indicators.

The LED indicators on the Celcia MC4 display failures as follows:

LED indicator flashing slowly	Indication and definition	Check / solution
status LED	Celcia MC4 internal failure, sensor, boiler or communication fault.	First check the other LEDs under the large cover and resolve the failure.
thermostat LED	Celcia MC4 is no longer connected to the OpenTherm thermostat.	Check the wiring to and from the thermostat, or has the thermostat been removed?
boiler LEDs	Celcia MC4 is no longer connected to the boiler, or the boiler is in failure mode.	Is the boiler in failure mode or switched off? Check the OpenTherm connection.
system flow temperature sensor LED	Sensor measuring value no longer within the limits.	Check for a break in the wire. Measure the sensor resistance value, see tabel 04 .
outside temperature sensor LED	Sensor measuring value no longer within the limits.	Check for a break in the wire. Measure the sensor resistance value, see tabel 04.

tabel 03 LED failure indications

Temperature [°C]	Resistance Outside temperature sensor [Ohm]	Resistance System flow temperature sensor [Ohm]
-10	58.820	27.649
- 5	45.910	21.034
0	36.100	16.325
5	28.590	13.023
10	22.790	9.952
20	14.770	6.247
25	12.000	5.000
40	6.653	2.662
60	3.253	1.244
80	1.707	628
100	952	339

tabel 04 Sensor resistance values

3.1.2 Failure signals via the Celcia 20 display

If the regulator is controlled via the Celcia 20, the code of any failure occurring can be read from the Celcia 20 display. Any boiler failures are also transmitted.

Failure code	Description	Check / solution
210	System flow temperature is below 0°C or above 100°C	Check that the collective flow temperature sensor is properly connected.
211	No communication between the Celcia MC4 and one or more of the boilers.	Check the wiring. Is one of the boilers switched off?
Other numbers	See the appropriate manual for the Celcia 20, the boiler or any other connected components.	

3.1.3 Failure signals via the failure relay

If a failure occurs or if there is a failure in the power supply to the Celcia MC4, connect the fault contact between terminals 17 and 19 (with a 1 minute time delay). This contact can be used to control such things as a light, a buzzer or a failure signal.

4 REGULATIONS

4.1 Standards

The installer is responsible for ensuring that the installation complies with the current (safety) regulations as laid down in

- this Installation and User manual and any other relevant Remeha documentation;
- NEN 1010; Safety provisions for low-voltage installations;

4.2 Remeha factory test

Each Remeha Celcia MC4 regulator is a precision instrument and is programmed and tested before it leaves the factory.

4.3 Additional guidelines

It applies for all regulations and guidelines mentioned in this Installation and User manual that any additions or new regulations and guidelines at the time of installation will also apply.

5 TECHNICAL SPECIFICATIONS AND WORKING PRINCIPLE

5.1 Technical data

Remeha Celcia MC 4		
General		
Dimensions (w x h x d)	mm	205 x 163 x 53
Weight	g	approx. 700
Nominal supply voltage	VAC / Hz	230 / 50
Rated input	VA	4
Safety requirements (household use)	-	EN 60730-1
EMC interference suppression (immunity)	-	EN 61000-6-2
EMC interference suppression (emission)	-	EN 61000-6-3
Maximum ambient temperature (storage and transport)	°C	- 20 - 70
Maximum ambient temperature (operational situation)	°C	0 - 50
Maximum relative humidity (non-condensation)	%	10 - 90
Inputs		
Outside temperature sensor	-	NTC sensor (range 10 – 40 °C)
System flow temperature sensor	-	NTC sensor (range 10 – 100 °C)
Outputs		
Pump output (live, make contact*)	-	switching power 230 VAC, 2A max.
Failure relay output (potential free break contact)	-	switching power 230 VAC, 3A max.
OpenTherm connections		
OpenTherm regulator connections	quantity	4
OpenTherm thermostat connection	quantity	1

tabel 05 Summary of technical data

*) Protect this output externally

5.1.1 Regulator construction

afb. 09 Celcia MC4 components

1. *Cover*
2. *Status LED*
3. *LEDs for failure analysis*
4. *Connection terminals*
5. *Configuration button*

5.1.2 Working principle

The Celcia MC4 is a regulator for the modulating control of between 1 and 4 Remeha boilers in cascade, according to the flow temperature demanded (via the OpenTherm input). With the exception of the Remeha Selecta, all OpenTherm boilers in the Remeha range can be controlled by the Celcia MC4. Please contact our Sales Support department if you wish to use the Celcia MC4 in combination with older boiler types or the Gas 210 ECO and Gas 310 ECO.

The Celcia MC4 has a failure relay (the contact in the event of a power failure and/or a failure in the Celcia MC4 or one of the boilers) and also regulates the system pump. The (internal) boiler pumps are controlled by the boiler control units.

Required capacity

Data are exchanged between the regulator and the boilers via the OpenTherm connections. The Celcia MC4 receives the flow temperature demand from an OpenTherm thermostat, such as the Celcia 15 or the Celcia 20.

In the case of a room thermostat the flow temperature demand is determined on the basis of the ambient temperature. In the case of a weather-dependent regulator the flow temperature demand is determined on the basis of the heat curve and the outside temperature. The Celcia MC4 transmits the measured outside temperature to the controlling OpenTherm thermostat (e.g. Celcia 20). The required capacity is determined according to the difference between the measured flow temperature and the flow temperature demanded.

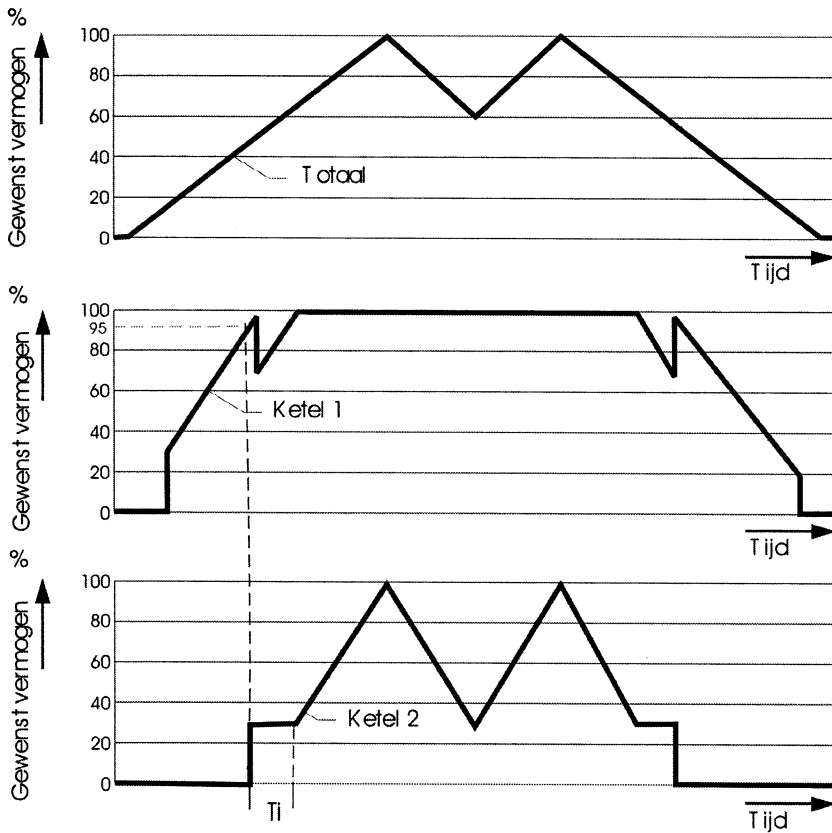
The Celcia MC4 distributes this capacity over the (OpenTherm controlled) boilers connected. A set switching method determines the distribution.

5.1.3 Switching methods

By way of a set switching method the Celcia MC4 determines when the boiler is switched on and the required capacity. The regulator ensures that the boilers are equally loaded by recording the number of hours each boiler is in operation. The switching method is such that as the required capacity increases, the regulator will wait as long as possible (the first boiler will then operate at 95% of its own capacity) before switching the second boiler on (after a time delay $T_i = 5$ minutes). As the required capacity decreases, the regulator will wait as long as possible before switching the first boiler off.

Setting the operating sequence

The sequence in which the boilers are to be switched on and off, is set during the configuration. It is determined on the basis on the number of operating hours. The boiler with the least operating hours is switched on first and the boiler with the most operating hours is switched on last. The boilers are switched off in reverse order, so the boiler that was switched on first is switched off last.



afb. 10 MC4 Operating sequence

art. no. 62285 field test March 2005