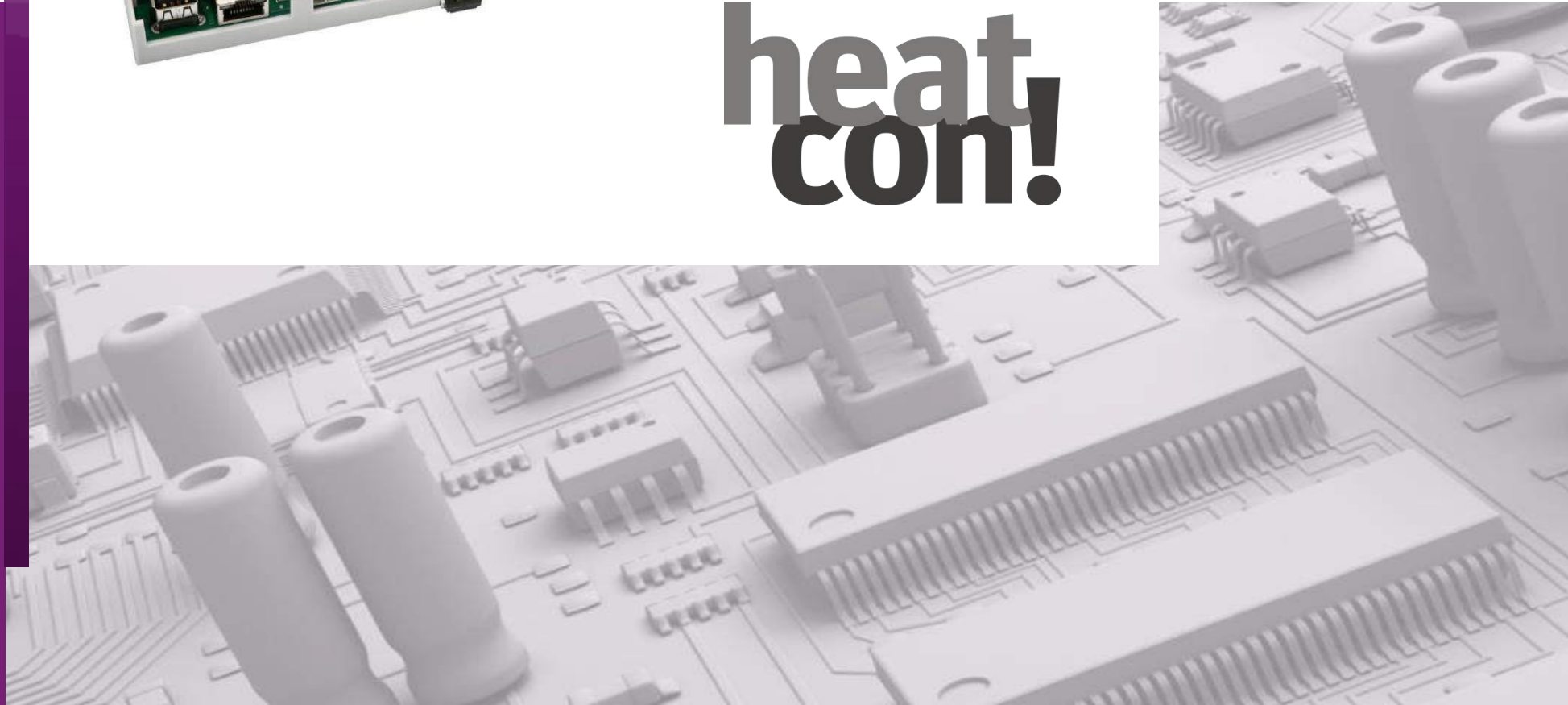


heatcon!
Cascade



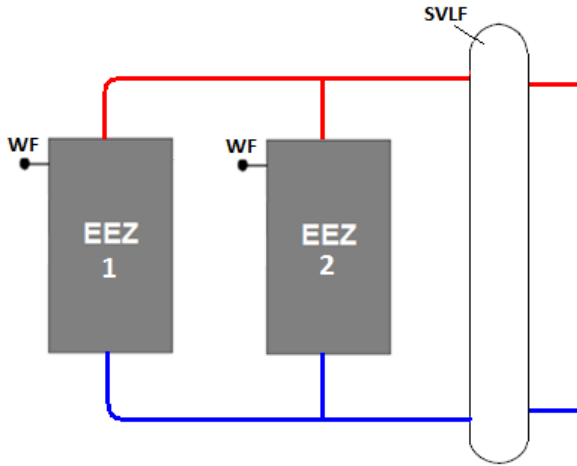
EbV
elektronik

heat
con!

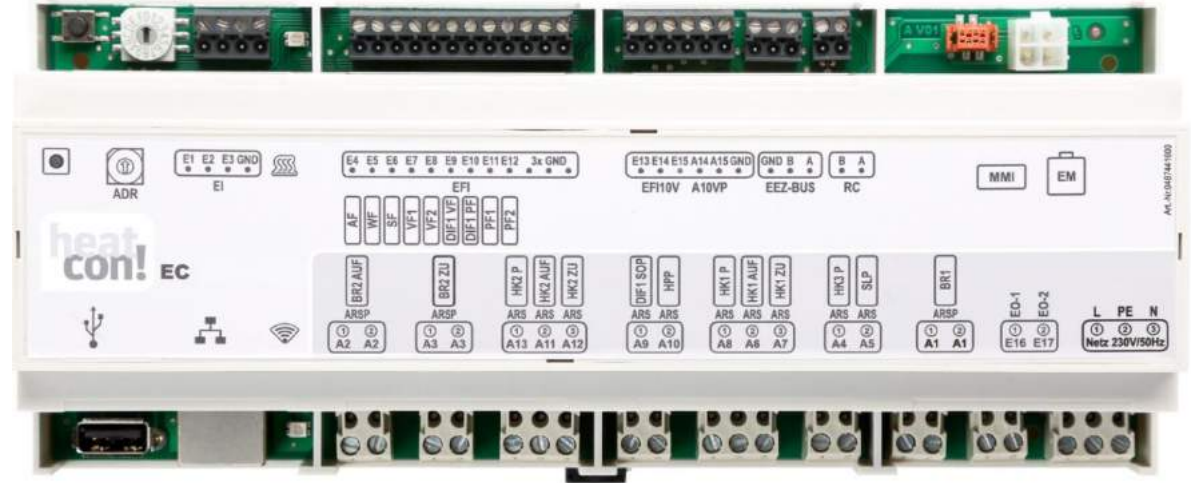


heatcon! Energy cascade

Minicascade

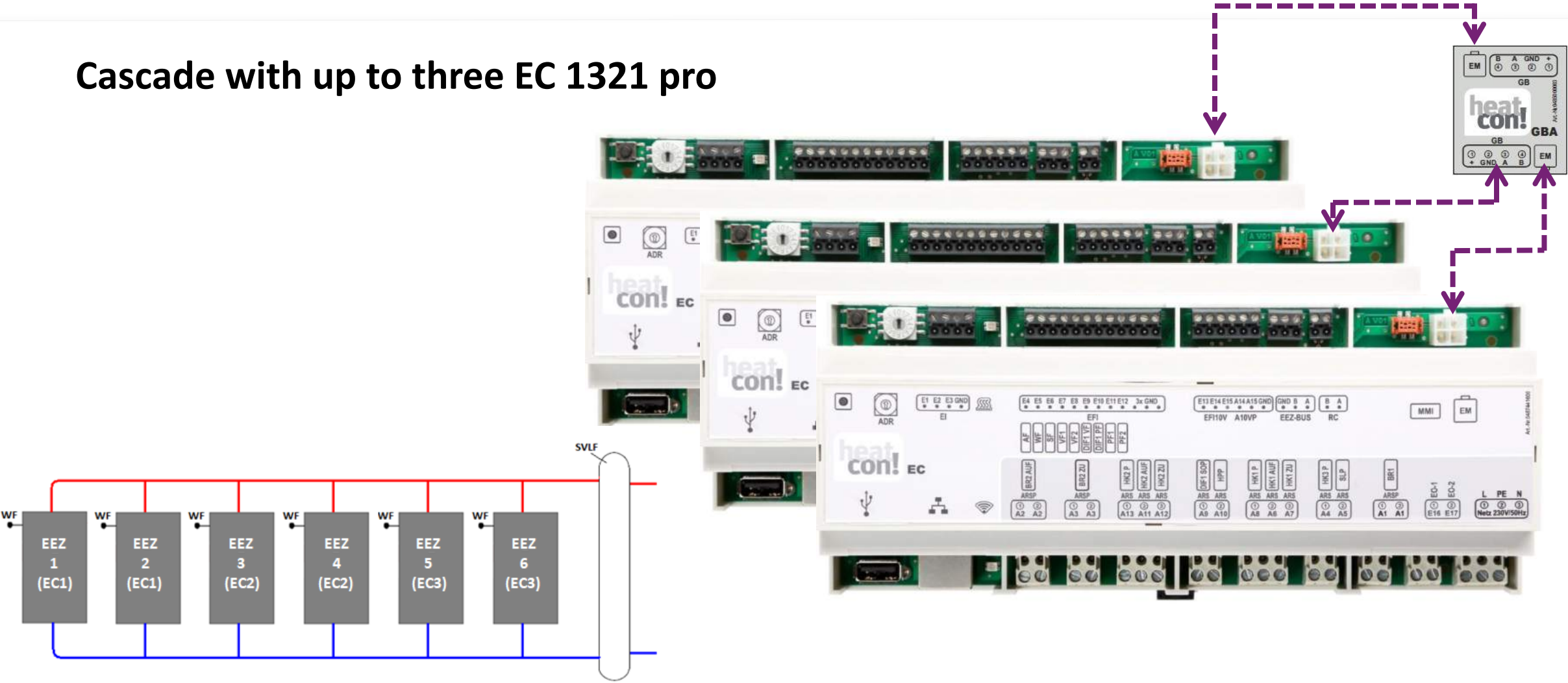


GEN 1	Energy generator type	1 - stage
GEN 2	Energy generator type	1 - stage burner control system temperature signal 10V release contact power signal 10V
GEN 1	Energy generator type	2- stage
GEN 2	Energy generator type	burner control system temperature signal 10V
GEN 1	Energy generator type	power signal on/off
GEN 2	Energy generator type	burner control system temperature signal 10V
GEN 1	Energy generator type	burner control system
GEN 2	Energy generator type	1 - stage temperature signal 10V release contact power signal 10v
GEN 1	Energy generator type	temperature signal 10V
GEN 2	Energy generator type	1 - stage burner control system temperature signal 10V release contact power signal 10v
GEN 1	Energy generator type	release contact
GEN 2	Energy generator type	1 - stage burner control system temperature signal 10V release contact power signal 10v
GEN 1	Energy generator type	power signal 10v
GEN 2	Energy generator type	1 - stage burner control system temperature signal 10V release contact power signal 10v



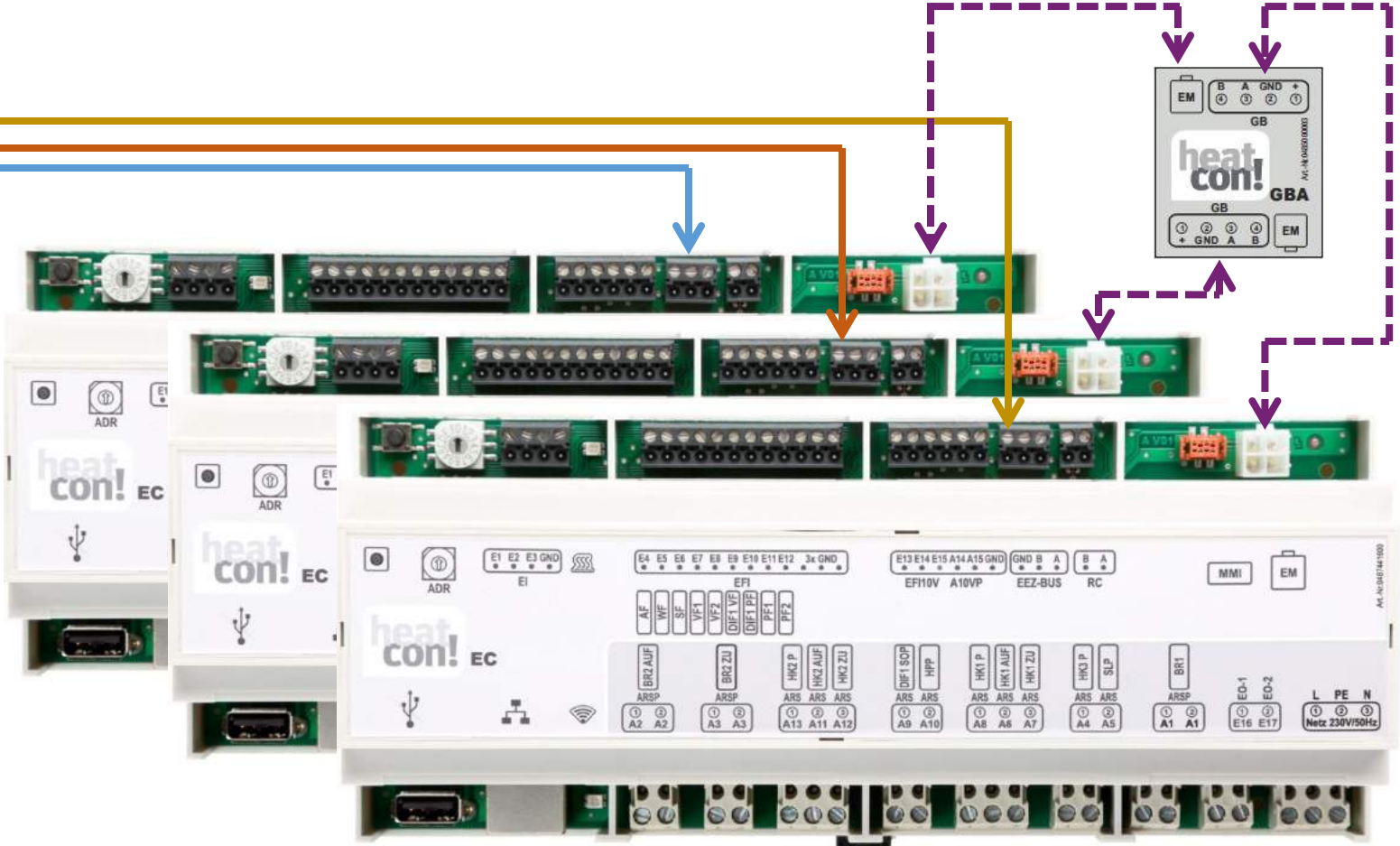
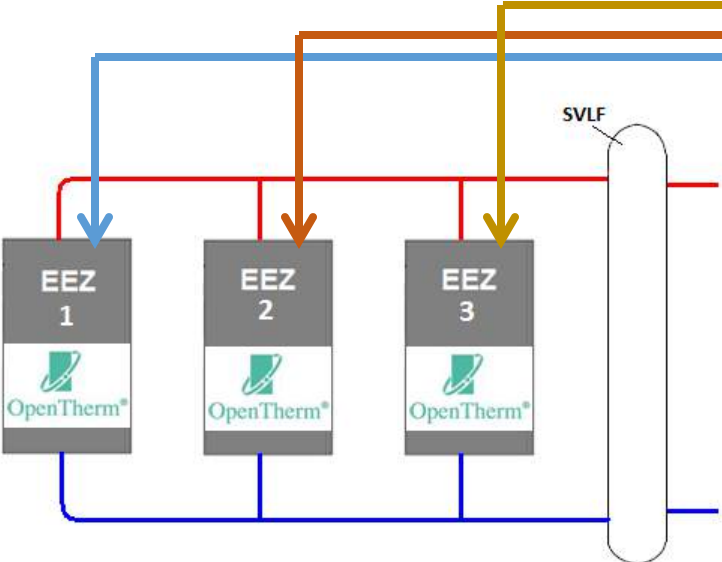
heatcon! Energy cascade

Cascade with up to three EC 1321 pro



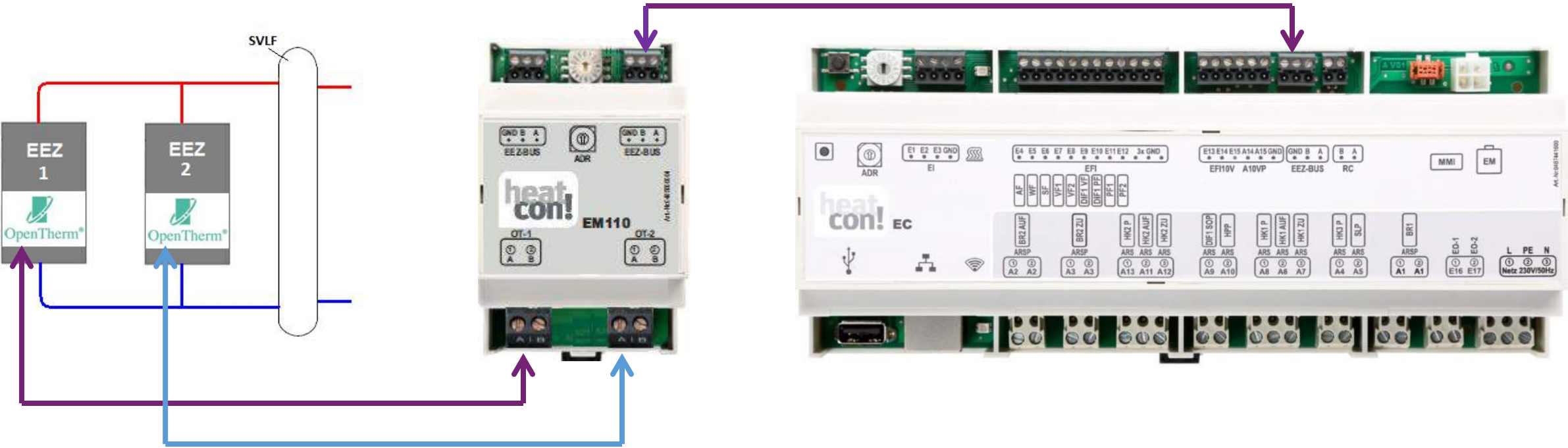
heatcon! Energy cascade

OT Cascade EC 1321 pro



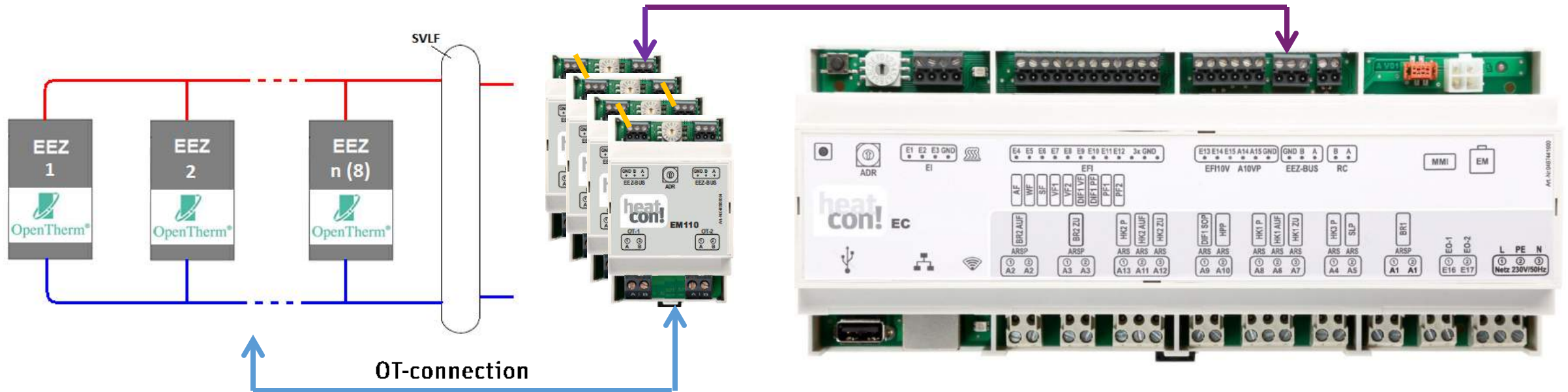
heatcon! Energy cascade

OT Cascade with EM 110-OT and EC 1351 pro



heatcon! Energy cascade

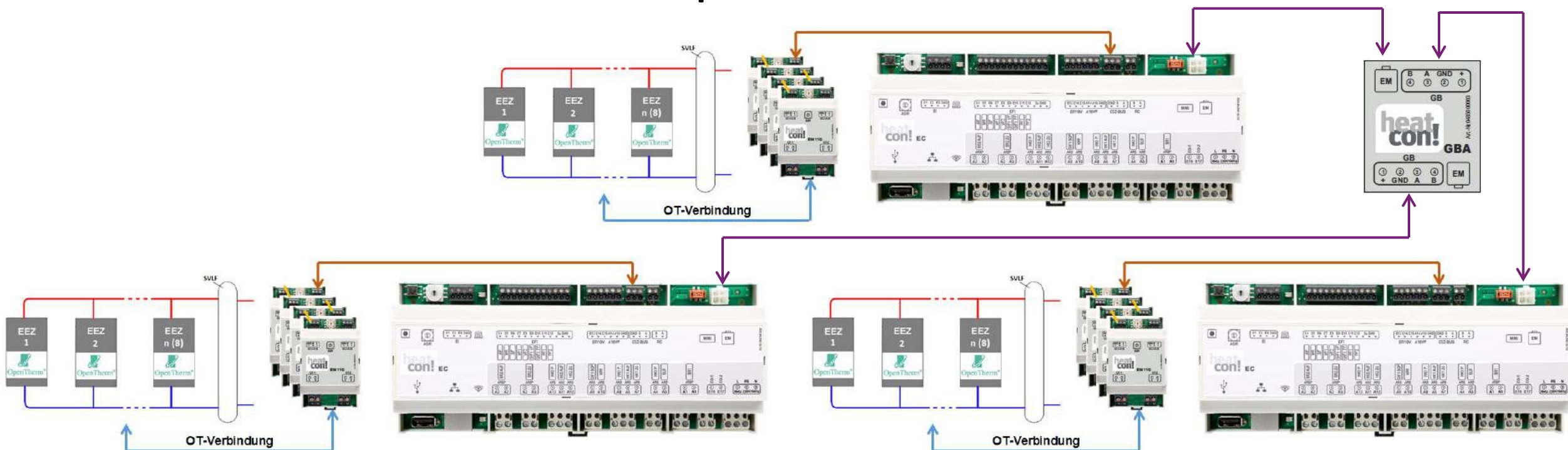
OT Cascade mit EM 110 and EC 1351 pro



The maximum use of 4x EM 110-OT enables cascading of 8 OT power generators

heatcon! Energy cascade

OT Cascade mit EM 110 and EC 1351 pro



The maximum use of 3x EC1351 pro and 12x EM 110 enables cascading of 24 OT power generators.

Definition of Term Cascade

Lead stage

First stage released by Cascade management. This can be set manually or automatically by time control.

Management level

There is only one level of leadership within a cascading system. This is the last energy generator to be connected. This monitors the current cascade setpoint.

Base load stage

When an energy source is switched on, the current energy source becomes the base load stage, and the newly switched on stage becomes the leading stage. The base load stage works with the base load increase parameterised for this energy source.

Switching capacity (modulating energy generator)

As long as not all modulating energy generators are enabled, they are limited by the set switching capacity. Only when all energy generators have been released is the switching capacity cancelled.

Priority Request

The priority setting determines for which requirements HOT WATER / HEAT / COOL the energy generator is used as a priority. This defines the switching sequence as a function of the current requirement in the system.

Cascade – Setpoint monitoring

The setpoint is generated from the requirements chain within the system. This setpoint serves as the basis for the energy requirement.

A PI control automatically adjusts the temperature difference between the setpoint and actual temperature in a specified difference band. This is used for automatic compensation of the temperature losses between the measuring points.

The steps are switched on and off on the basis of the current setpoint deviation in the respective control of the energy generator.

Without total flow sensor

If no total flow sensor is configured, the current flow temperature of the last connected energy generator automatically acts as the reference variable.

With total flow sensor

The minimum and maximum temperatures are individually monitored in each energy generator by means of KF/WF.

Cascade switching sequence (priority)

The switching sequence of Cascade's energy generators is determined by the assignment of individual priority levels (OFF, 1-3). The smaller the key figure, the higher the priority. The priority OFF blocks the energy generator for this requirement type.

Each energy generator is assigned a priority level for

- Heating requirement OFF, 1 - 3
- Hot water demand OFF, 1 - 3
- Cooling requirement OFF, 1 - 3

is assigned.

1 = high priority

2 = medium priority

3 = low priority

Off = no request to this level

Cascade switching sequence (priority)

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	1	1	1	1
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	2	2	2	2
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	3	3	3	3
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

For the same priority selection, the stage sequence is according to the selection of the leading stage.
 1 = high priority, 2 = medium priority, 3 = low priority, Off = no request to this level.

Cascade switching sequence (priority)

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	1	1	2	2
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	1	1	3	3
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	2	2	3	3
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		1	

1 = high priority, 2 = medium priority, 3 = low priority, Off = no request to this level.

Cascade switching sequence (priority)

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	2	2	1	1
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	2	1	1	1
Stage sequence Request HEAT	2		2	
Stage sequence Request DHW	1		2	

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	1	2	1	1
Stage sequence Request HEAT	1		2	
Stage sequence Request DHW	2		1	

1 = high priority, 2 = medium priority, 3 = low priority, Off = no request to this level.

Cascade switching sequence (priority)

Lead stage 1	EC – Adress 0			
	GEN-1 (Lead stage)		GEN-2	
	Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW
	1	2	Off	1
Stage sequence Request HEAT	1		Off	
Stage sequence Request DHW	2		1	

1 = high priority, 2 = medium priority, 3 = low priority, Off = no request to this level.

Cascade switching sequence (priority)

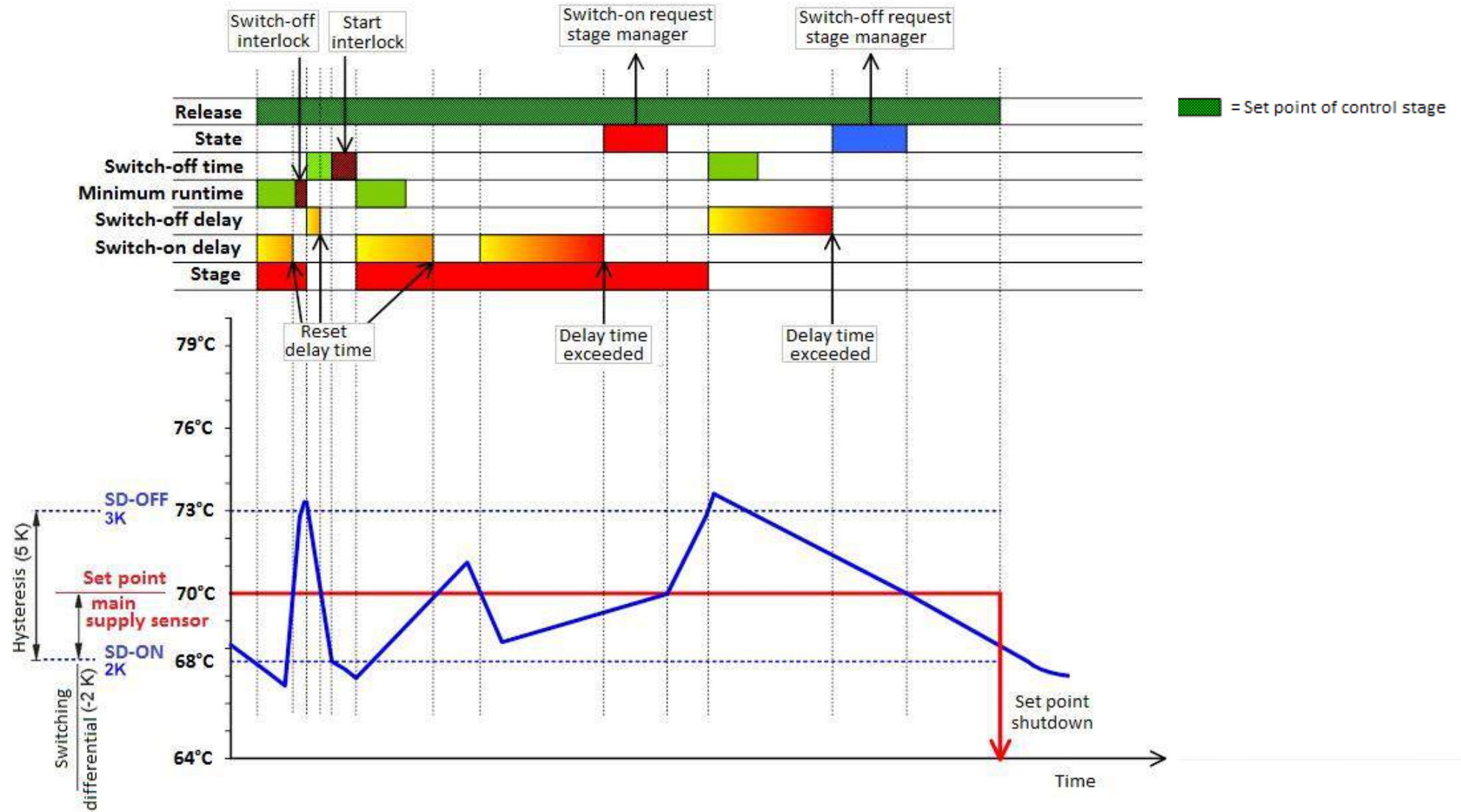
	EC – Adress 0				EC – Adress 1				EC – Adress 2			
	GEN 1 Lead stage		GEN 2		GEN 3		GEN 4		GEN 5		GEN 6	
	Priority Request		Priority Request		Priority Request		Priority Request		Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW
	1	1	1	1	1	1	1	1	1	1	1	1
Stage sequence Request HEAT	1		2		3		4		5		6	
Stage sequence Request DHW	1		2		3		4		5		6	
	GEN 1 Lead stage		GEN 2		GEN 3		GEN 4		GEN 5		GEN 6	
	Priority Request		Priority Request		Priority Request		Priority Request		Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW
	1	1	1	3	Off	2	Off	1	2	1	1	Off
Stage sequence Request HEAT	1		2		Off		Off		4		3	
Stage sequence Request DHW	1		4		5		2		3		Off	

Cascade switching sequence

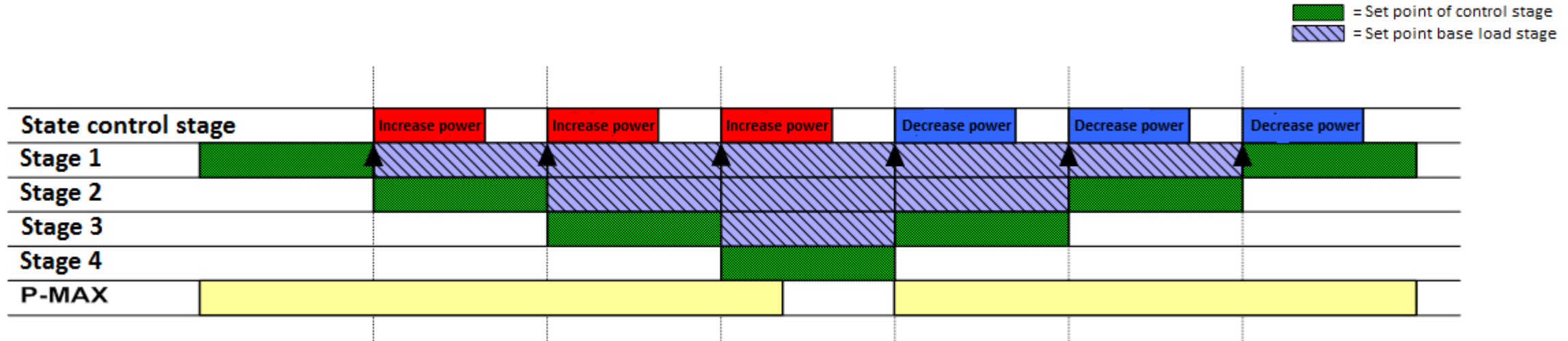
By changing the lead stage, also the switching sequence is changed

	EC – Adress 0				EC – Adress 1				EC – Adress 2			
	GEN 1 Lead stage		GEN 2		GEN 3		GEN 4		GEN 5		GEN 6	
	Priority Request		Priority Request		Priority Request		Priority Request		Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW
	1	1	1	1	1	1	1	1	1	1	1	1
Stage sequence Request HEAT	1		2		3		4		5		6	
Stage sequence Request DHW	1		2		3		4		5		6	
	GEN 1		GEN 2		GEN 3		GEN 4		GEN 5 Lead stage		GEN 6	
	Priority Request		Priority Request		Priority Request		Priority Request		Priority Request		Priority Request	
	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW	HEAT	DHW
	1	1	1	1	1	1	1	1	1	1	1	1
Stage sequence Request HEAT	3		4		5		6		1		2	
Stage sequence Request DHW	3		4		5		6		1		2	

Local stage switching



Cascade management



How it works

- Priority Requirement specifies which requirement is supplied with priority via the energy source.
- Priority Switching sequence determines the order in which the energy sources are switched on.
- Levels with the same priority are switched depending on the EC address.
- Switching on and off takes place via the operating status of the current lead stage.
- Activation of the power limitation (P-MAX) as long as not all available stages are active! The release takes place with a time delay.
- Not available stages are skipped by the management.



**heat
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