

Training ClimaECO, 2020

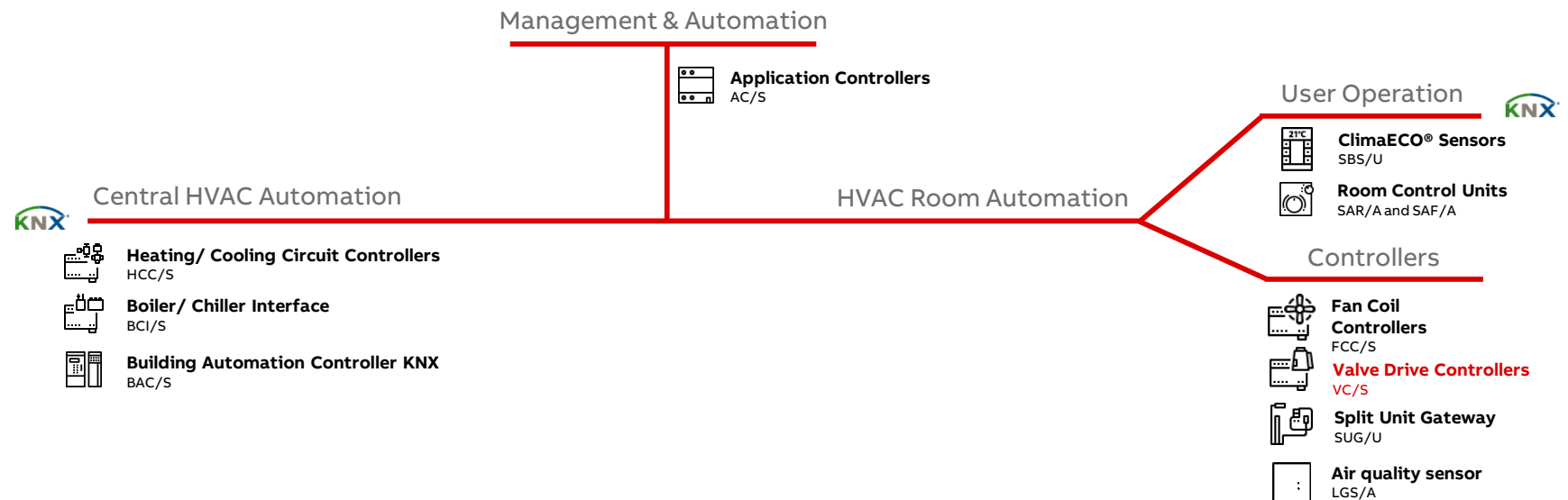
Valve Drive Controller VC/S 4.x.1

ClimaECO

Thorsten Reibel, Competence Center Europe

Valve Drive Controller VC/S 4.x.1

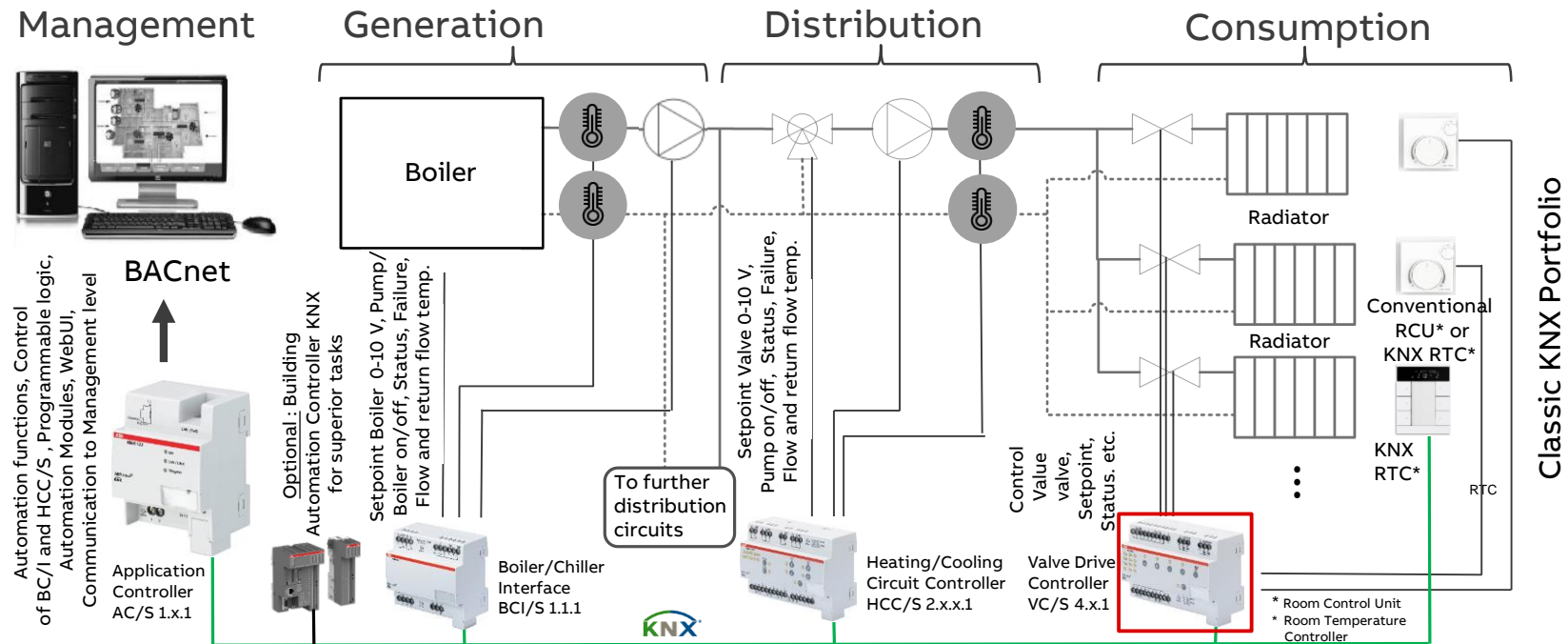
Overview ClimaECO: New Products



A holistic HVAC Building Automation System, over 30 new devices

Valve Drive Controller VC/S 4.x.1

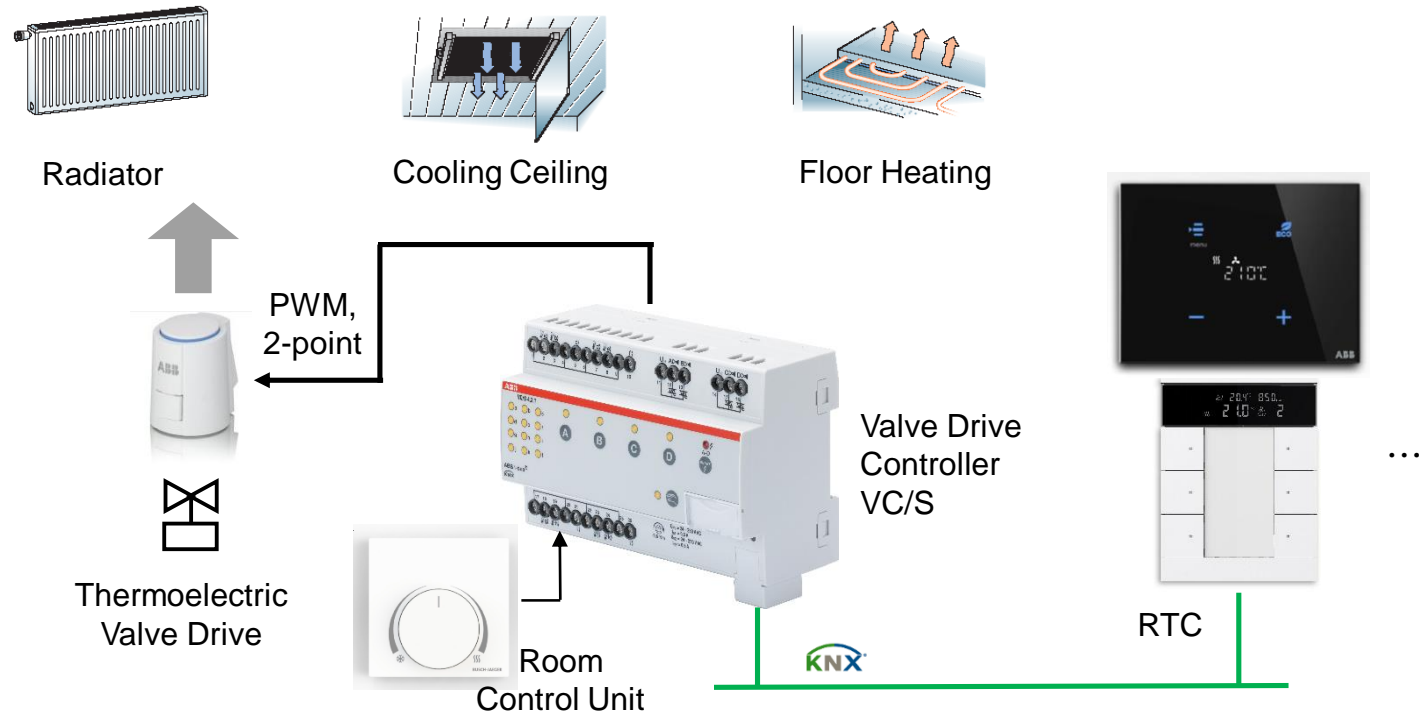
Overview ClimaECO: ABB i-bus® KNX HVAC Solutions



Valve Drive Controller VC/S 4.x.1

Introduction

Applications Valve Control



Valve Drive Controller VC/S 4.x.1

Introduction

Motivation – New Features

- Two devices for valve control
- With and without manual operation
- Four channels for electrothermal valve drives
- 12 inputs (binary and analogue, 3 each channel) for temperature measurement, dew point sensor, window contact, etc.
- Integrated room temperature controller for conventional Room Control Units (RCU)
- Parametrizable as actuator or controller/actuator
- ABB i-bus tool support
- Existing valve actuators will be not replaced
- Please note: For connecting motor valve drives electronic actuator ES/S to be used



Valve Drive Controller and more VC/S 4.x.1

Introduction

ETS

- ETS4 or ETS5
- Function controller/actuator or only actuator adjustable
- Unified RTC with basic and additional stage heating/cooling
- Forced operation with defined valve position
- PWM or open/close signal
- Valve purge
- Temperature limitation via separate sensor, e.g. to protect a floor against over temperature
- Inputs for temperature sensor, window contact, dew point sensor, fill level sensor or binary contacts parametrizable

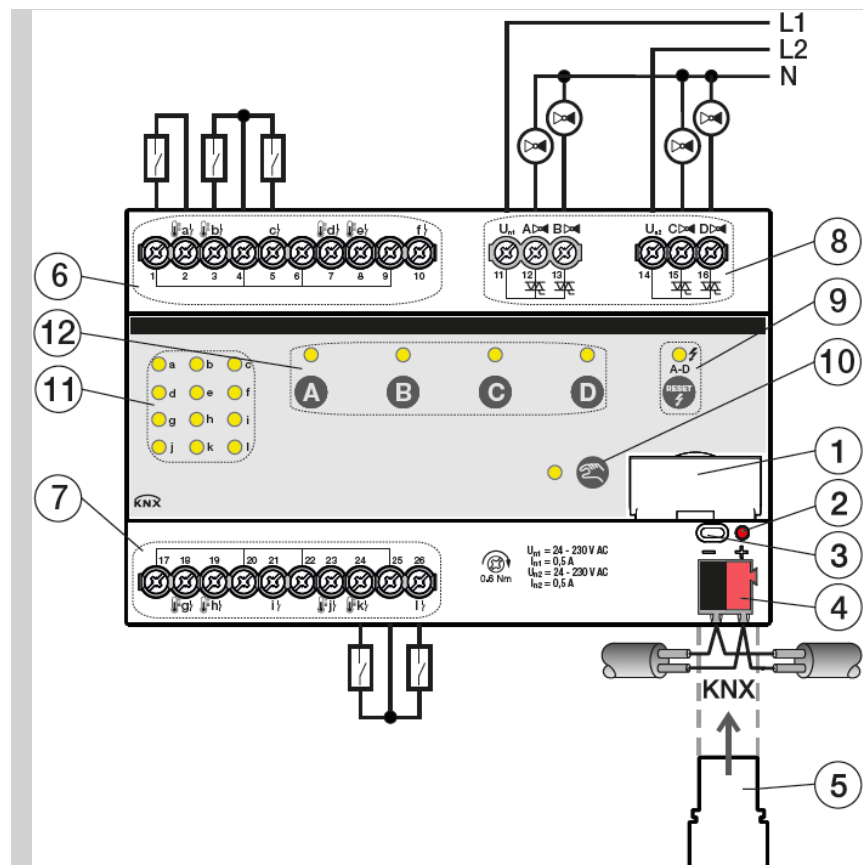


Valve Drive Controller VC/S 4.x.1

VC/S 4.2.1

Connection Terminals, LED, man. Oper.

1. Label carrier
2. KNX programming button
3. KNX programming LED (red)
4. KNX connection
5. Cover cap
6. Inputs (a, b, c, d, e, f)
7. Inputs (g, h, i, j, k, l)
8. Valve output (A, B, C, D)
9. Button/LED Reset /Failure valve output (A...D)
10. Button/LED activate manual operation
11. LED status display inputs (a, b, c, d, e, f, g, h, i, j, k, l)
12. Button/LED switch/status display valve outputs



Valve Drive Controller and more VC/S 4.x.1

Introduction

Family VC/S 4.x.1 – Functional Overview

Function/Device	VC/S 4.1.1	VC/S 4.2.1
Integrated RTC	X	X
Number of channels	4	4
Type of valve control	PWM ON/OFF	PWM ON/OFF
Inputs for binary contacts per channel	3	3
Inputs for temperature per channel	2	2
Connection Room Control Unit (RCU)	1	1
Manual operation	-	X

Valve Drive Controller and more VC/S 4.x.1

Introduction

Technical Data

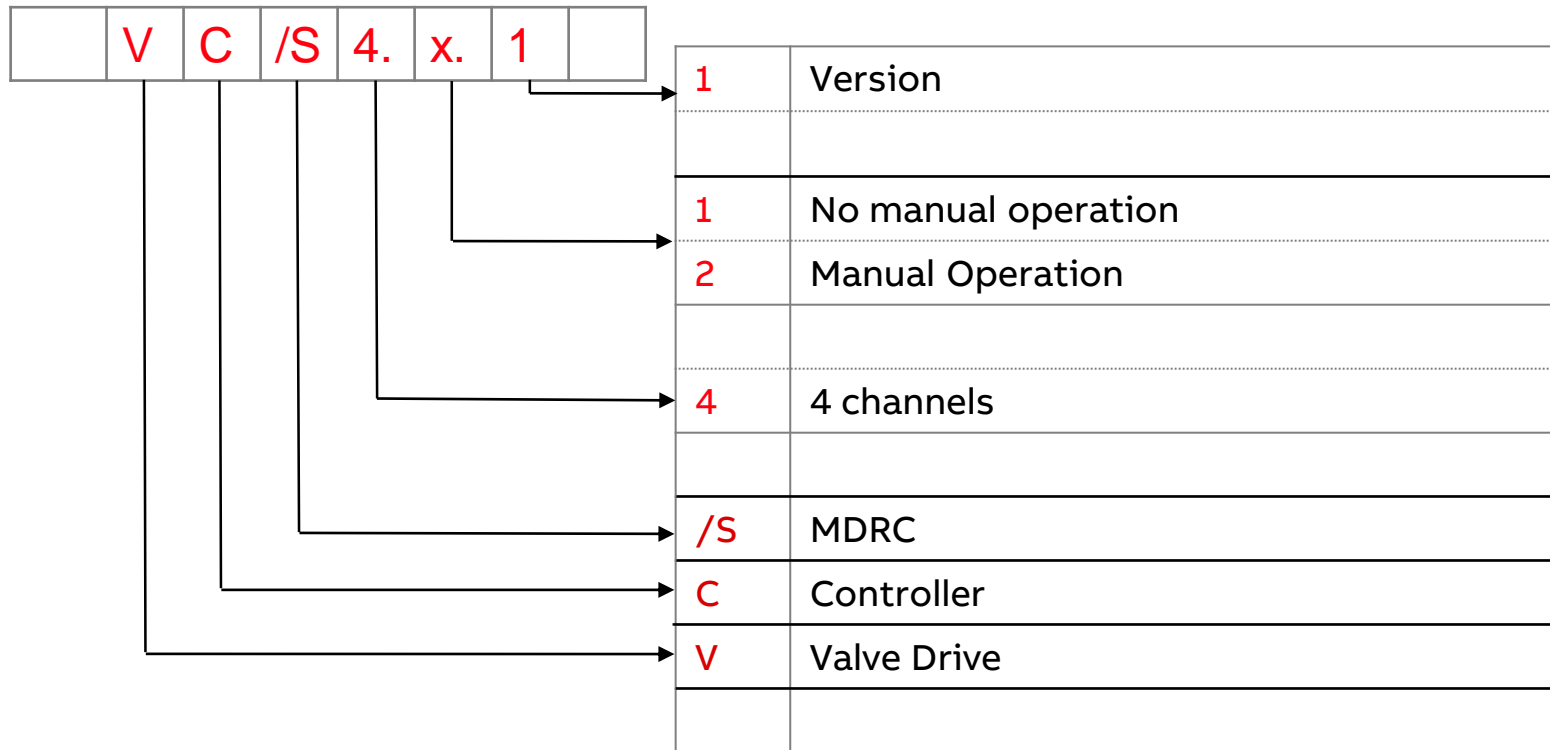
Feature	VC/S 4.x.1
Width	8 Modules
Valve Output	4
Nominal Current per channel	0,25 A
Inrush current	1,6 A for 10 s
Voltage	24 ... 230V AC
Binary Input	12
Scanning voltage	12V
Scanning current	1mA
Cable length	< 100m
Analogue Inputs (Temperature)	4
PT100, PT1000	2 wires
KT, KTY, NI, NTC,	Various resistances



Valve Drive Controller VC/S 4.x.1

Product range

Type Description



Valve Drive Controller VC/S 4.x.1

Commercial Aspects

Family VC/S 4.x.1

- VC/S 4.2.1
- 2CDG 110 217 R0011
- VC/S 4.1.1
- 2CDG 110 216 R0011



Valve Drive Controller VC/S 4.x.1

Why new Valve Drive Controller?

Comparison VC/S – VAA/S and ES/S

- Integrated temperature controller
- Possibility to connect cost efficient Room Control Units SAR/A
- Integrated inputs
- Part of the ClimaECO solution
- ABB i-bus Tool support
- Valve Drive Actuator VAA/S to be used if more channels are required
- Electronic Switch Actuator ES/S to be used if connection of motor valve drives is required
- VAA/S and ES/S will be **not** phased out!



Valve Drive Controller VC/S 4.x.1

Application example

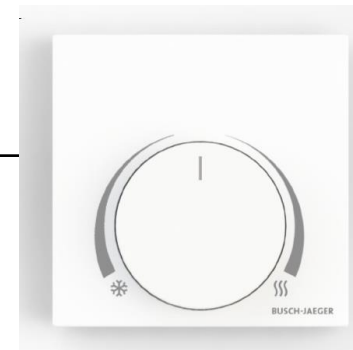
VC/S linked with RCU

VC/S 4.x.1
Working as **Controller**



Direct link
Set point and room temperature
One way communication

SAR/A
Room Control Unit (non KNX)



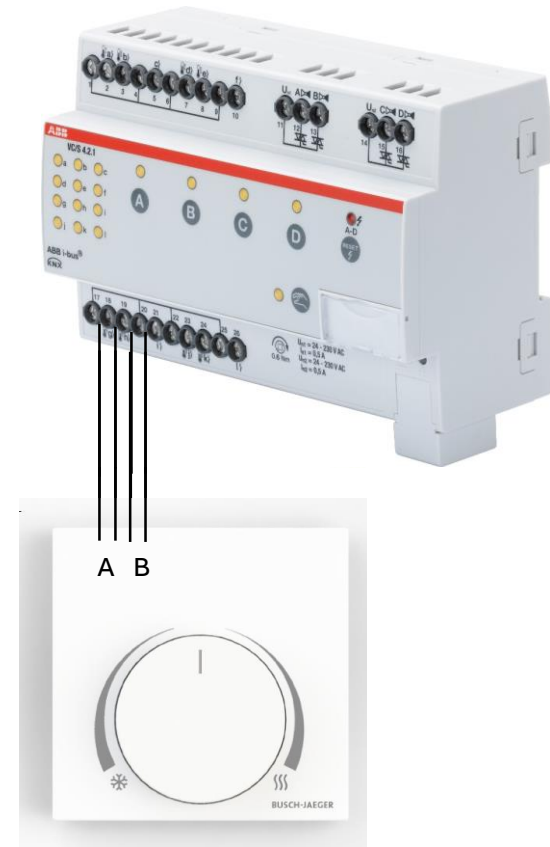
Valve Drive Controller VC/S 4.x.1

Application

Connection VC/S - RCU

4 wires required

- 2 wires for setpoint input A (mandatory)
 - Input in FCC/S is parametrized as 'used as analogue RCU input'
- 2 wires for room temperature input B, C or D
 - optional, can come also from another sensor, e.g. presence detector
 - ETS parameter of input in FCC/S to be adjusted as temperature sensor
 - Type of temperature sensor NTC, NTC type NTC20



Valve Drive Controller VC/S 4.x.1

Application example

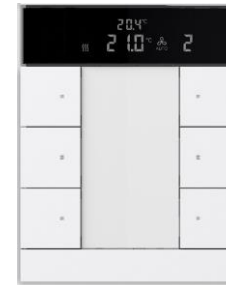
VC/S linked with KNX Room Temperature Controller

VC/S 4.x.1
Working as **Actuator**



KNX link
All option regarding communication
Two way communication

ClimaECO sensor with RTC
or any other RTC



...

Valve Drive Controller VC/S 4.x.1

Application example

VC/S linked with KNX Room Temperature Controller

VC/S 4.x.1
Working as **Controller**



KNX link

All option regarding communication
Two way communication

ClimaECO sensor 'RTC slave'



Valve Drive Controller VC/S 4.x.1

Application example

VC/S linked with ClimaECO sensors with temperature sensor

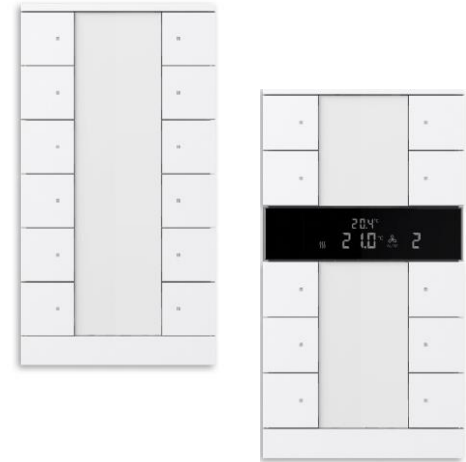
VC/S 4.x.1
Working as **Controller**



KNX link
All option regarding communication
Two way communication



ClimaECO sensors / RTC Slave

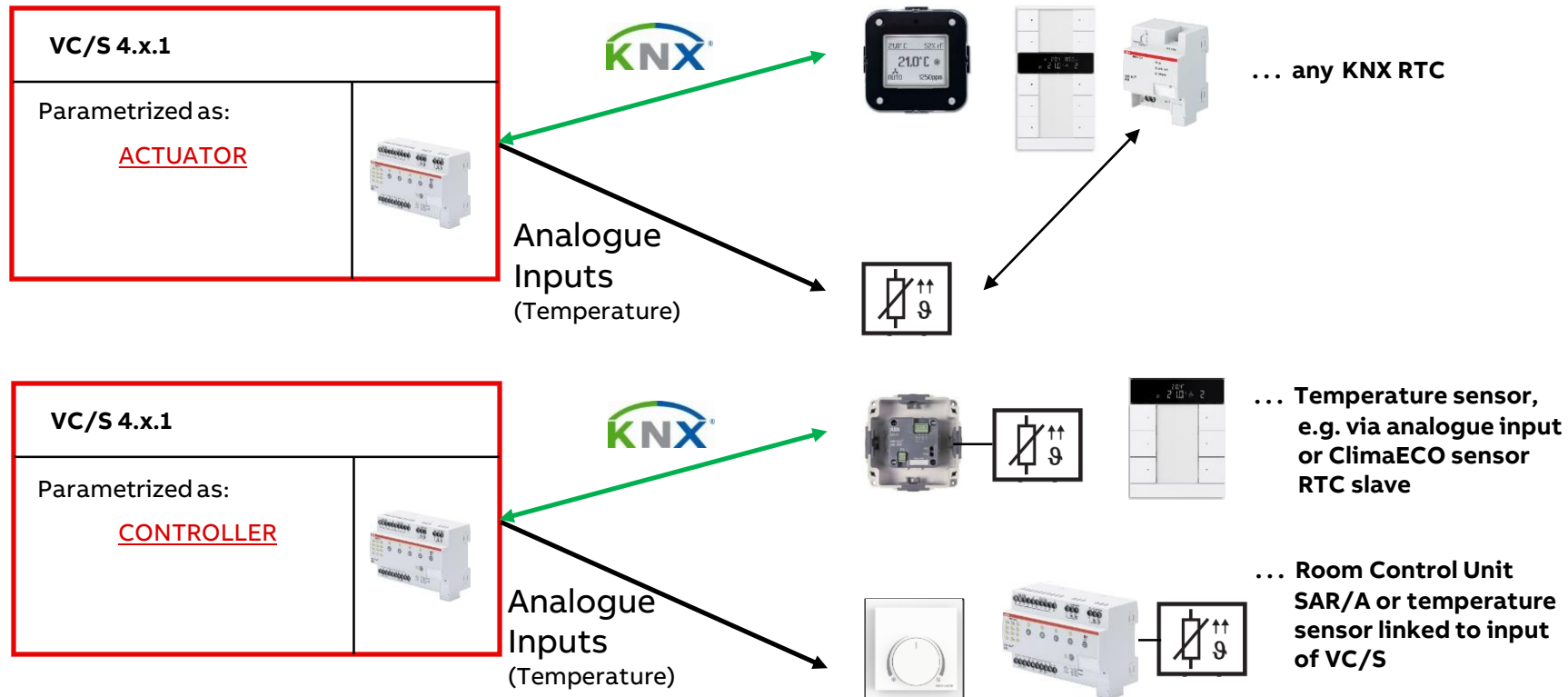


both with temperature sensor

Valve Drive Controller VC/S 4.x.1

Application example

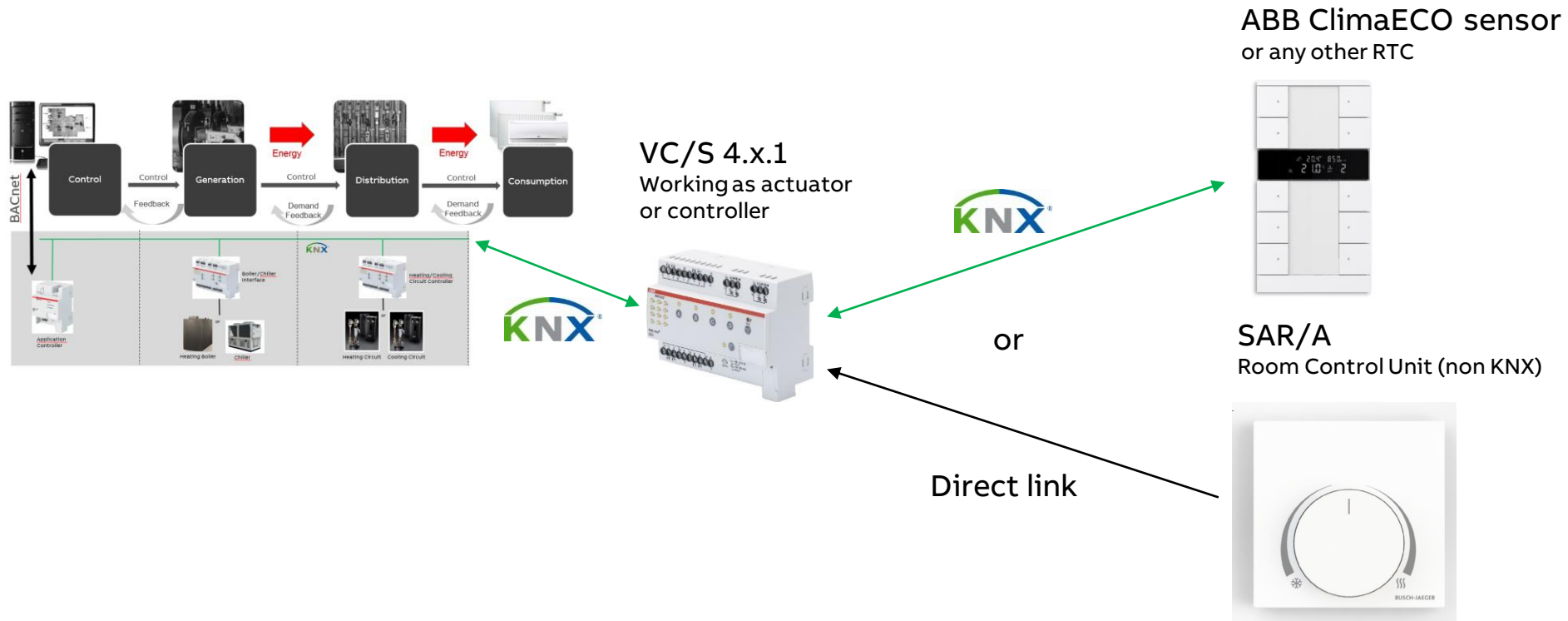
Assignment Controller - Actuator



Valve Drive Controller VC/S 4.x.1

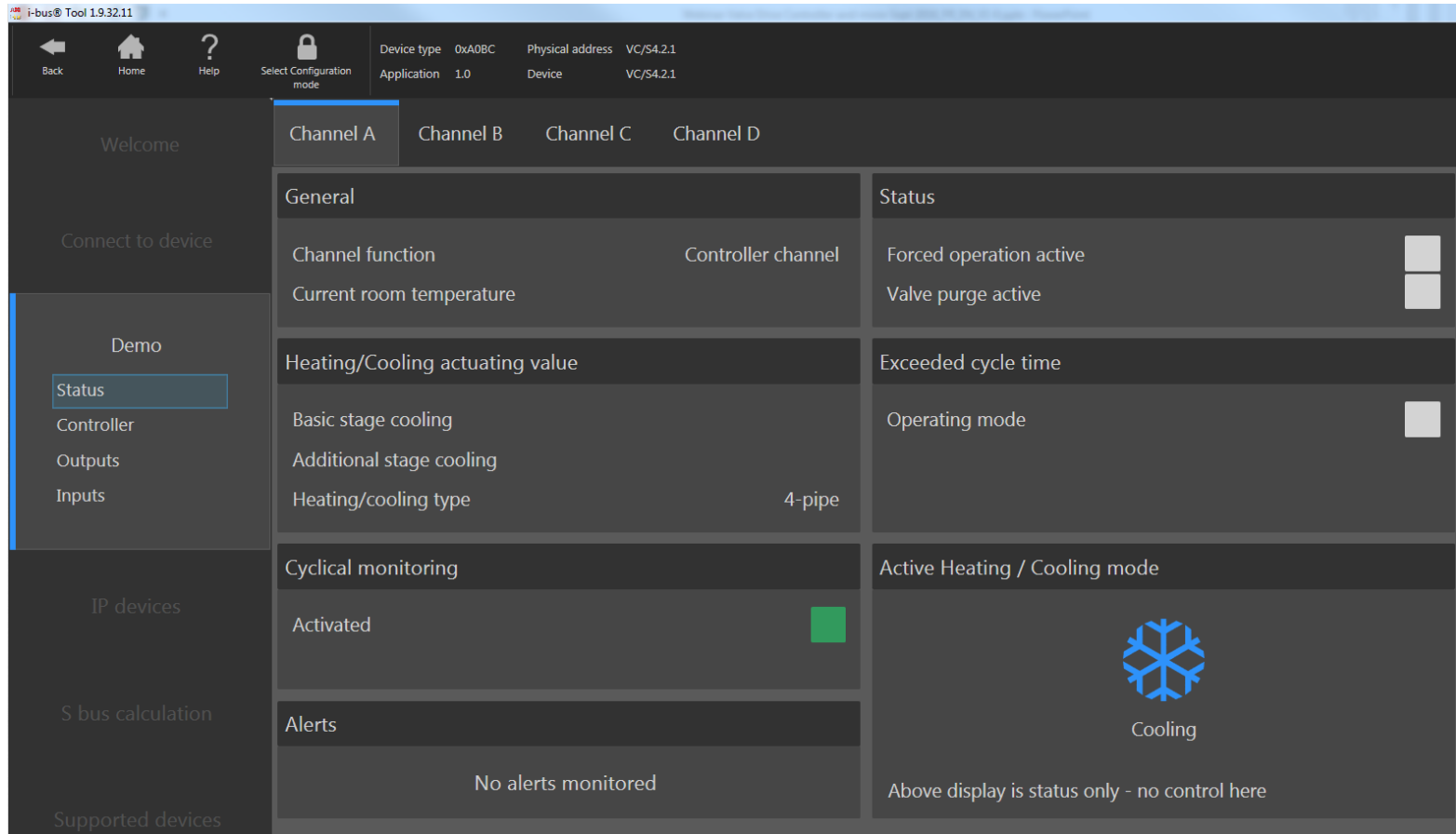
Application example

VC/S integrated in ClimaECO



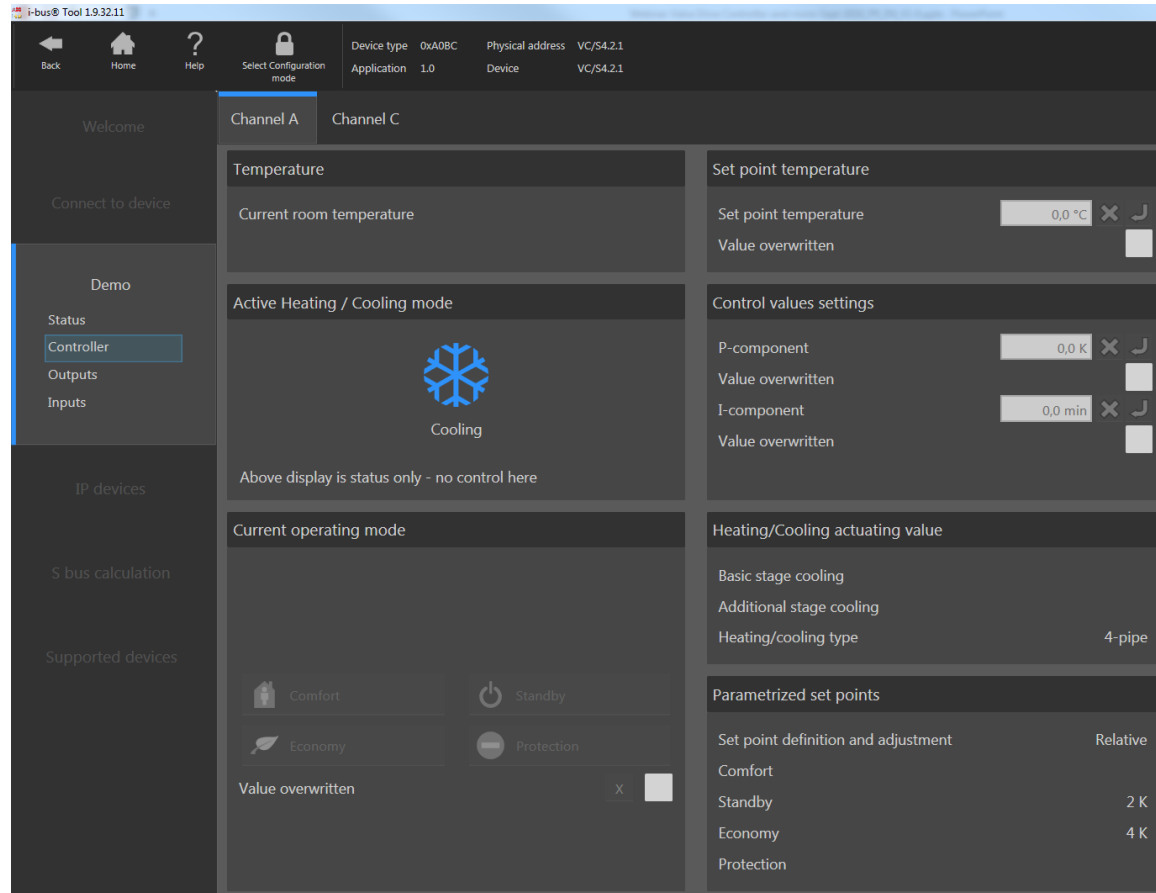
Valve Drive Controller and more

ABB i-bus tool



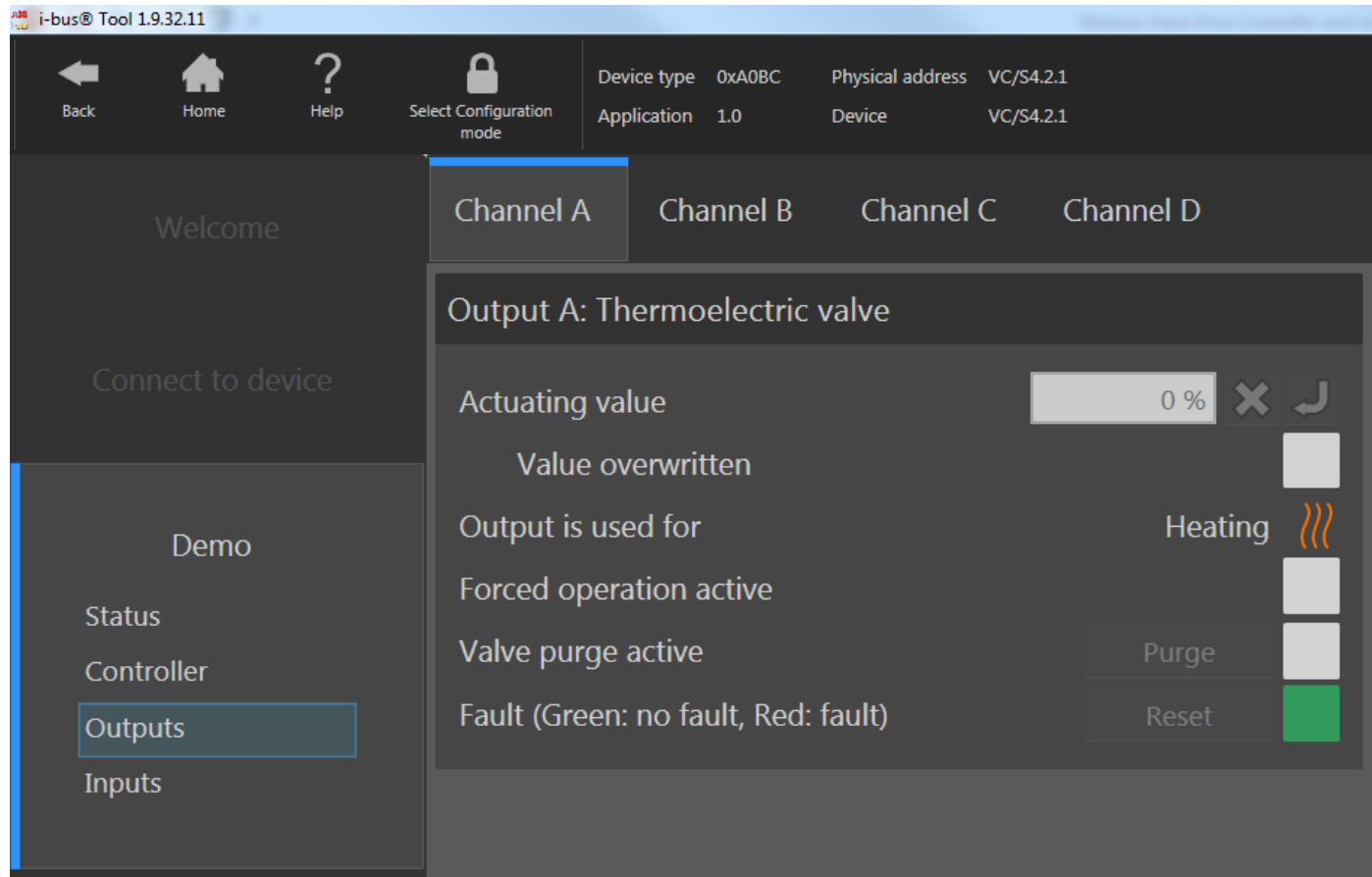
Valve Drive Controller and more

ABB i-bus tool



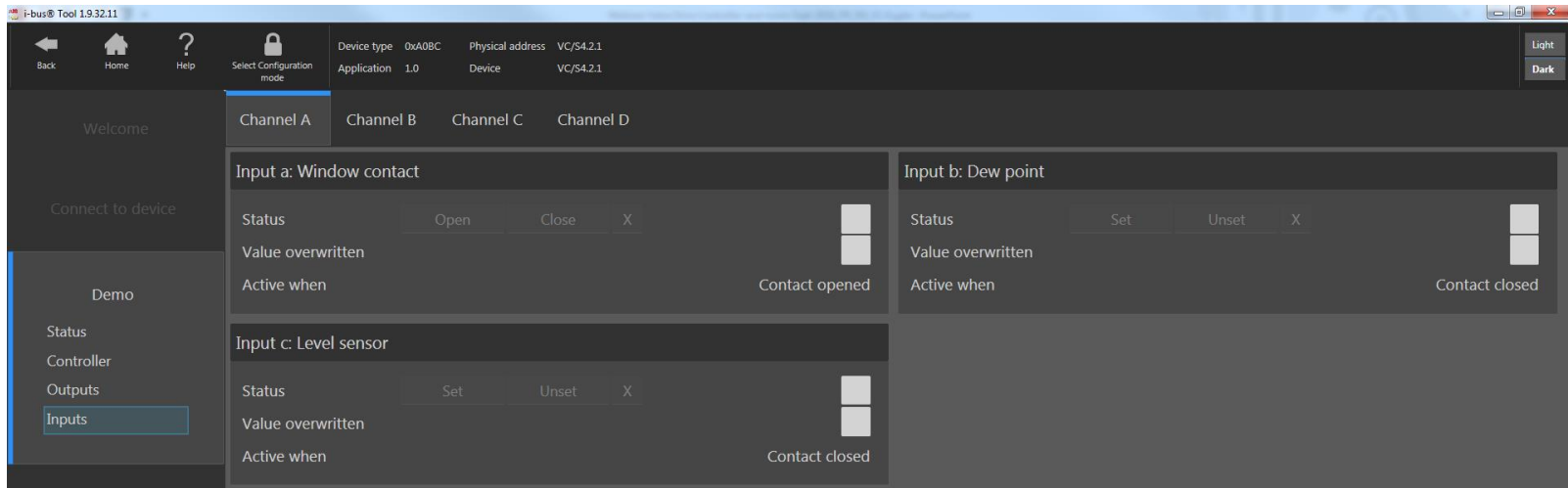
Valve Drive Controller and more

ABB i-bus tool



Valve Drive Controller and more

ABB i-bus tool



Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 1

What is the purpose of a Valve drive Controller VC/S 4.x.1?

- A** Control of radiators, floor heating or cooling ceiling
- B** Control of 0-10V fans
- C** Control motor valve drives

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 1

What is the purpose of a Valve drive Controller VC/S 4.x.1?

- ☒ **A** Control of radiators, floor heating or cooling ceiling
- ☐ **B** Control of 0-10V fans
- ☐ **C** Control motor valve drives

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 2

What is true? Valve Drive Controller ...

- A** ... will replace Valve Drive Actuator VAA/S and Electronic Actuator ES/S
- B** ... is available in 2 versions (with or without controller)
- C** ... needs the current room temperature for the internal controller

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 2

What is true? Valve Drive Controller ...

- ☒ **A** ... will replace Valve Drive Actuator VAA/S and Electronic Actuator ES/S
- ☐ **B** ... is available in 2 versions (with or without controller)
- ☐ **C** ... needs the current room temperature for the internal controller

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 3

What is the right statement?

- A** It is not intended to combine any KNX room temperature controller with VC/S
- B** The Room Control Unit is always necessary for VC/S
- C** VC/S needs only the ambient room temperature for room temperature control

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 3

What is the right statement?

- ☐ A It is not intended to combine any KNX room temperature controller with VC/S
- ☐ B The Room Control Unit is always necessary for VC/S
- ☒ C VC/S needs only the ambient room temperature for room temperature control

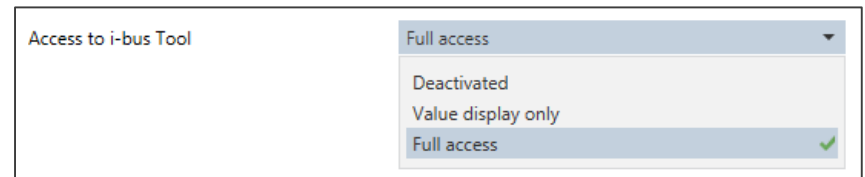
Valve Drive Controller VC/S 4.x.1

ETS

Access i-bus tool

Three options to handle the i-bus tool access

- Deactivated:
 - No operation, no indication
- Display only:
 - No operation, full indication
- Full access:
 - Full operation and indication



Higher security and user friendliness

Valve Drive Controller VC/S 4.x.1

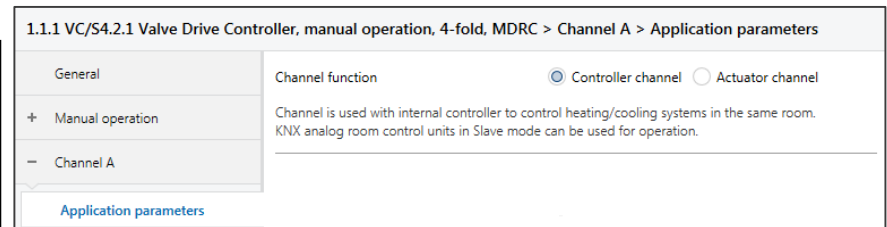
ETS

Controller or Actuator

Device works either as actuator (like VAA/S or ES/S) or room temperature controller plus actuator

- Adjustable per channel
- Part actuator always available
- Function controller:
 - Integrated unified RTC
 - For operation a RTC with display as slave can be used, e.g. ClimaECO sensor

New option and economical solution



Valve Drive Controller VC/S 4.x.1

ETS

Heating and Cooling

Device function actuator

- simple valve control

Device function controller

- Various hardware for heating or cooling adjustable
 - Radiator (heating)
 - Area- heating and cooling

By selecting a type of hardware the appropriate way of control is defined (Parameter Temperature Controller/Heating or Cooling stage)

Free configuration preselects PI control, P- and I-value can be changed

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Application parameters

General	Channel function <input type="radio"/> Controller channel <input checked="" type="radio"/> Actuator channel
+ Manual operation	The channel is used as a pure actuator and receives its control values from a controller (e.g. analog room control unit).
- Channel A	Caution! A change to the parameterization in this section will result in an ETS reset after download
Application parameters	Basic-stage heating <input type="radio"/> Deactivated <input checked="" type="radio"/> Activated

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Application parameters

General	Channel function <input checked="" type="radio"/> Controller channel <input type="radio"/> Actuator channel
+ Manual operation	Channel is used with internal controller to control heating/cooling systems in the same room. KNX analog room control units in Slave mode can be used for operation.
- Channel A	Caution! A change to the parameterization in this section will result in an ETS reset after download
Application parameters	Basic-stage heating Convector (e.g. radiator)
Channel function	Additional-stage heating Deactivated
+ Temperature controller	Basic-stage cooling Convector (e.g. radiator) ✓
Setpoint manager	Additional-stage cooling Area heating (e.g. floor)
	Free configuration

Valve Drive Controller VC/S 4.x.1

ETS

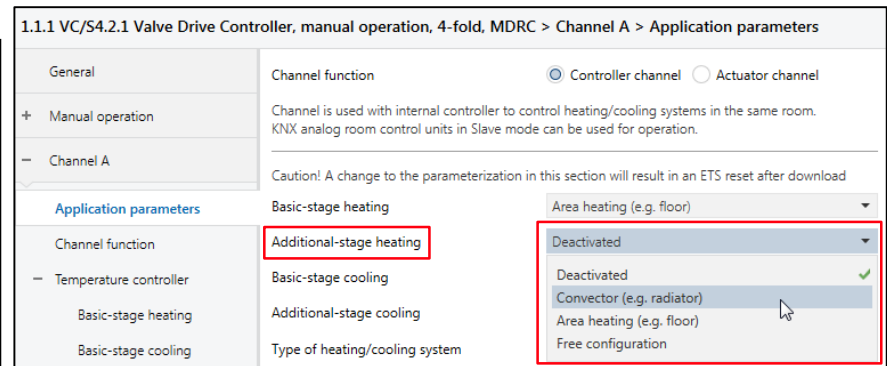
Additional Heating- and Cooling stage

Additional stage for heating and cooling can be programmed individually

See unified RTC concept

Example: Floor heating as basic heating and radiator/towel rack as additional stage for fast heating

Powerful heating/cooling control



Valve Drive Controller VC/S 4.x.1

ETS

Temperature Controller

Depending on selection of heating/cooling hardware way of control is either fixed or dynamic

Example Heating: Radiator → PI continuous (0...100%)

Example cooling: Free configuration → Choice between

- 2-point 1 bit
- 2-point 1 byte
- PI continuous
- PI PWM

Simplification of adjustment

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Temperature controller > Basic-s

General	Basic-stage heating control value type	PI continuous (0...100%)
+ Manual operation	P-proportion	1.5 K
	I-proportion	100 Min
- Channel A	Extended settings	<input type="radio"/> No <input checked="" type="radio"/> Yes
Application parameters	Control value difference for sending control value	5% ▼
Channel function	Send control value cyclically (0 = cyclical sending disabled)	15 ▼ Min
- Temperature controller	Max. control value	100 ▼ %
Basic-stage heating	Min. control value (basic load)	0 ▼ %

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Temperature controller > Basic-s

General	Basic-stage cooling control value type	PI continuous (0...100%) ▼
+ Manual operation	P-proportion	
	I-proportion	
- Channel A	Extended settings	
Application parameters	Control value direction	<input checked="" type="radio"/> Normal <input type="radio"/> Inverted
Channel function	Control value difference for sending control value	5% ▼
- Temperature controller	Send control value cyclically (0 = cyclical sending disabled)	15 ▼ Min
Basic-stage heating	Max. control value	100 ▼ %
Basic-stage cooling	Min. control value (basic load)	0 ▼ %
Setpoint manager		

Valve Drive Controller VC/S 4.x.1

ETS

Temperature Controller

Room temperature for controller can be received from:

- From any device connected to analogue input of VC/S, e.g. RCU SAR/A or connected PT1000
- Via group object: up to two values can be received with weighting
- Via group object and physical device: up to two values via telegram on group object plus one connected temperature sensor with weighting possible

Optimization of control

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Application parameters

General

Channel function ☒ Controller channel ☐ Actuator channel

Channel is used with internal controller to control heating/cooling systems in the same room. KNX analog room control units in Slave mode can be used for operation.

Caution! A change to the parameterization in this section will result in an ETS reset after download

Application parameters

Basic-stage heating Area heating (e.g. floor)

Additional-stage heating Deactivated

Basic-stage cooling Deactivated

Caution! A change to the parameterization in this section will result in an ETS reset after download

Actuate basic-stage heating via ☒ Internal channel output (valve) ☐ Group object

Window contact input Deactivated

Temperature input

Note: Configure in 'Input' parameter window

Via physical device input

Via physical device input

Via group object

Via phys. device input and group object

Temperature input

Via phys. device input and group object

Note: Configure in 'Input' parameter window

Number of temperature input objects ☒ 1 ☐ 2

Weighting of internal measurement 100 %

Weighting of external measurement 1 50 %

Valve Drive Controller VC/S 4.x.1

ETS

Setpoint Manager

One or two setpoint mode

- One setpoint: Setpoint heating and cooling are the same
 - Differentiation via hysteresis
- Two setpoints: Setpoint heating and cooling are different

All values can be either absolute or relative (based on setpoint heating comfort)

Covering all options also from the past

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Setpoint manager

General	Operating modes	Comfort, Standby, Economy, Building Protection
+ Manual operation	Operating mode after bus voltage recovery, ETS download and reset	Comfort
– Channel A	Comfort heating setpoint = Comfort cooling setpoint	<input type="radio"/> No <input checked="" type="radio"/> Yes
Application parameters	Setpoint specification and adjustment	<input type="radio"/> Absolute <input checked="" type="radio"/> Relative
Channel function	Hysteresis for Toggle heating/cooling	2 °C
+ Temperature controller	Comfort heating and cooling setpoint	21 °C
Setpoint manager	Standby heating reduction	2 °C

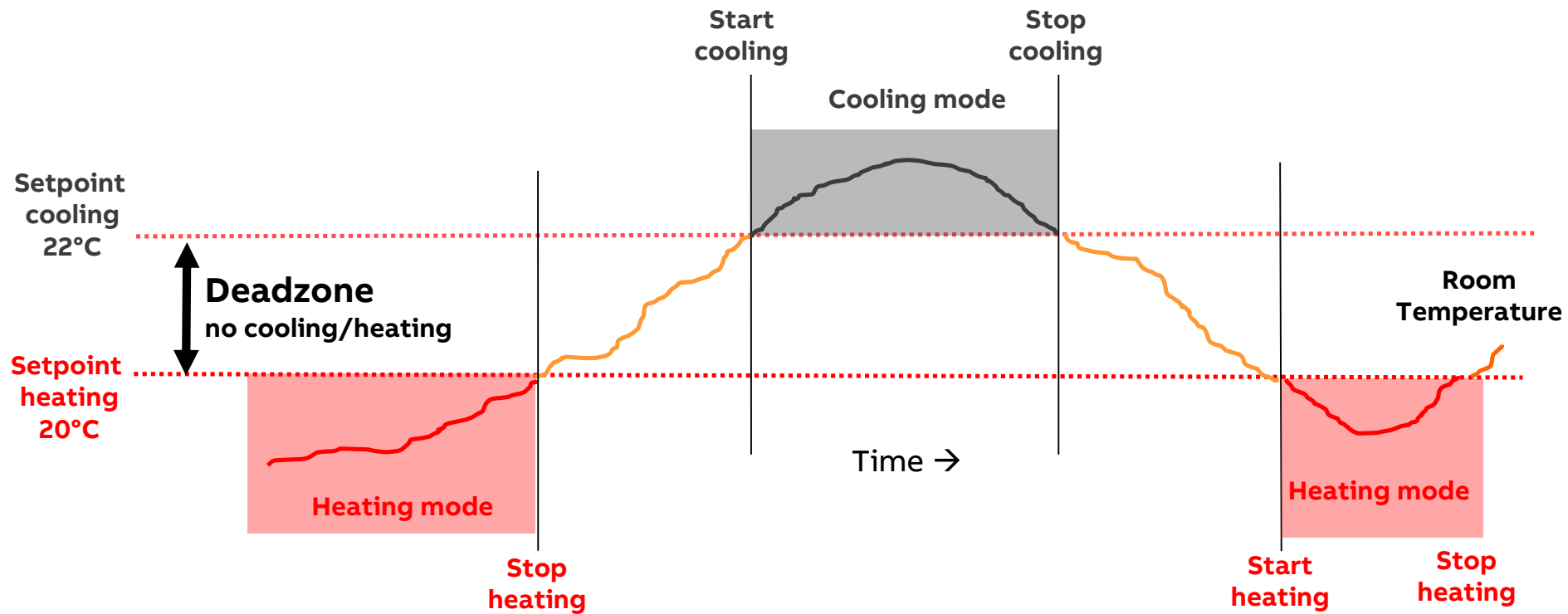
1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Setpoint manager

General	Operating modes	Comfort, Standby, Economy, Building Protection
+ Manual operation	Operating mode after bus voltage recovery, ETS download and reset	Comfort
– Channel A	Comfort heating setpoint = Comfort cooling setpoint	<input checked="" type="radio"/> No <input type="radio"/> Yes
Application parameters	Setpoint specification and adjustment	<input checked="" type="radio"/> Absolute <input type="radio"/> Relative
Channel function	Comfort heating setpoint	21 °C
+ Temperature controller	Standby heating setpoint	19 °C
Setpoint manager	Economy heating setpoint	17 °C
Monitoring and safety	Comfort cooling setpoint	25 °C
Valve output A		

Valve Drive Controller VC/S 4.x.1

Room Temperature Controller

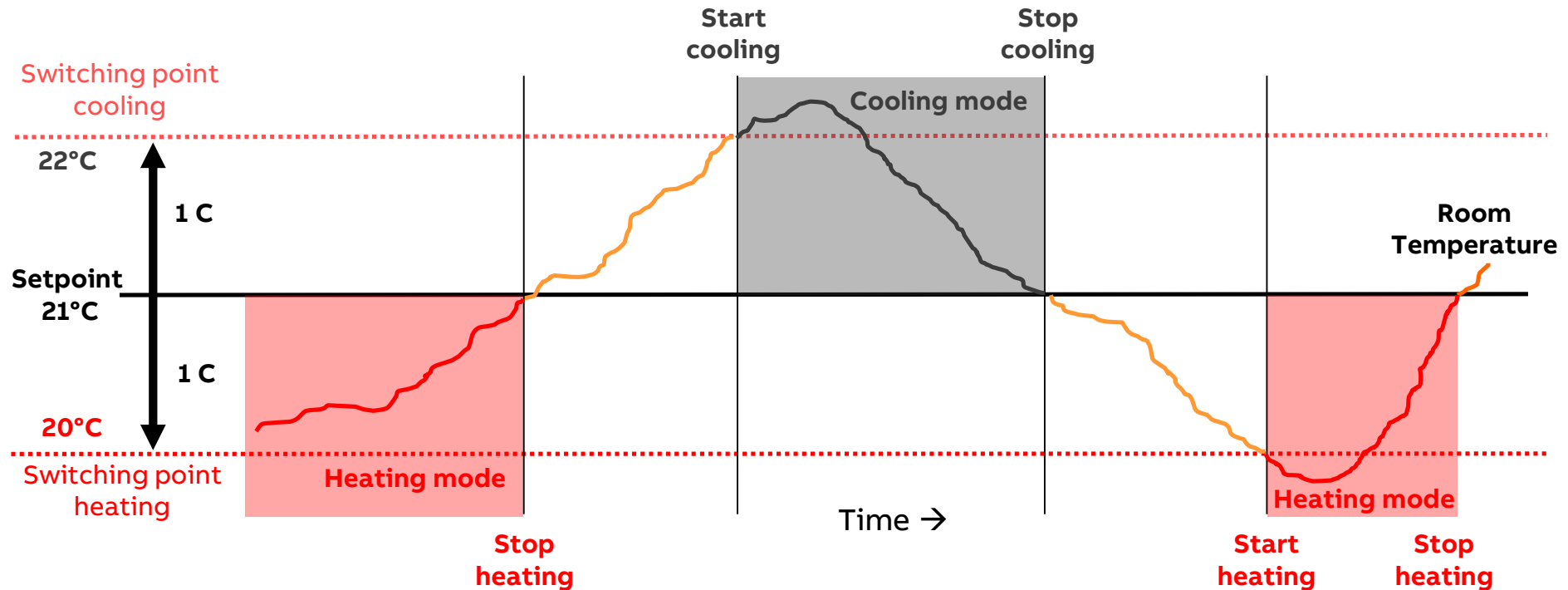
Two Setpoint Mode



Valve Drive Controller VC/S 4.x.1

Room Temperature Controller

One Setpoint Mode



Valve Drive Controller VC/S 4.x.1

ETS

Forced operation

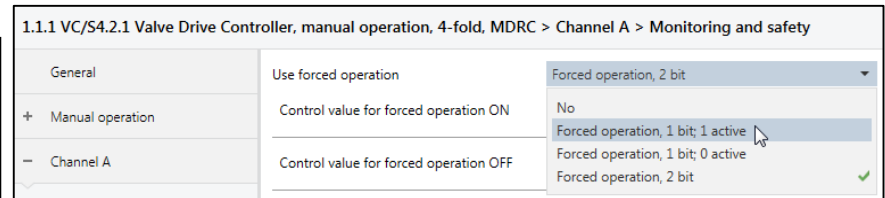
1 bit or 2 bit telegram

Allows to set valve in defined position, e.g. in case of fault or special situation

1 bit command (Forced ON) with value '1 or 0' allows to set defined status for valve

Forced OFF allows to have a valve position depending on control value again

Application: In case of boiler malfunction all valves go to 30% to achieve running water with no risk of frozen pipes in winter



Valve Drive Controller VC/S 4.x.1

ETS

Forced operation – 2 bit

2 bit command allows to define 4 different situations, 3 are used here:

- Forced on (value '3'): defined status for valve
- Forced off (value '3'): another defined status for valve
- Release (value '0 or 1'): status for valve depending on telegrams on related group objects or control value

Basically used with touch panel or visualization but not with push button

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Monitoring and safety

General	Use forced operation	Forced operation, 2 bit
+ Manual operation	Control value for forced operation ON	30 %
- Channel A	Control value for forced operation OFF	50 %
Application parameters	Cyclical monitoring	<input checked="" type="radio"/> Deactivated <input type="radio"/> Activated
Channel function		
+ Temperature controller		
Setpoint manager		
Monitoring and safety		

Valve Drive Controller VC/S 4.x.1

ETS

Valve – electronic outputs

Four electronic outputs, choice between:

- Thermoelectric (PWM), per valve one output needed
- Open/Close signal (2 step control), per valve one output needed

Manual override with 1 byte object possible

Valve purge with cycle time and adjustable control value to reset

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Valve output A

General	Valve output	Thermoelectric (PWM)
+ Manual operation	Valve drive operating principle, de-energized	Thermoelectric (PWM) ✓ Open/Close signal Deactivated
- Channel A	PWM cycle time	180 s
Application parameters	Valve drive opening/closing time	180 s
Channel function	Send status values	After a change or on request
+ Temperature controller	Enable manual valve override	<input checked="" type="radio"/> No <input type="radio"/> Yes
Setpoint manager	Valve purge	Automatically or triggered by object
Monitoring and safety	Purge cycle in weeks	4
Valve output A	Reset purge cycle from control value greater than or equal to	99 %
Setpoint adjustment	Send group object "Status Valve purge"	No, update only
Input a		
Input b		

Valve Drive Controller VC/S 4.x.1

ETS

Temperature limitation

Allows to limit e.g. the temperature of a floor (in case of floor heating) to protect the material and the improve the comfort

NEW

- Temperature sensor to be connected via internal inputs or by telegram
- When active, I-value of controller can be frozen to avoid growing control value

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Temperature controller > Basic-st

General	Basic-stage heating control value type	PI continuous (0...100%)
+ Manual operation	P-proportion	4 K
– Channel A	I-proportion	200 Min
Application parameters	Extended settings	<input type="radio"/> No <input checked="" type="radio"/> Yes
Channel function	Control value difference for sending control value	5% ▼
– Temperature controller	Send control value cyclically (0 = cyclical sending disabled)	15 Min
Basic-stage heating	Max. control value	100 %
Basic-stage cooling	Min. control value (basic load)	0 %
Setpoint manager	Activate temperature limitation	<input type="radio"/> No <input checked="" type="radio"/> Yes
Monitoring and safety	Limit temperature	30 °C
Valve output A	Limit-temperature hysteresis	1 K
Setpoint adjustment	I-proportion with temperature limitation	<input checked="" type="radio"/> Freeze <input type="radio"/> Reset
Input a	Input for temperature limit sensor	Via group object ▼
Input b		Via group object
Input c		Via physical device input a ✓
		Via physical device input b

Safe and comfortable heating system

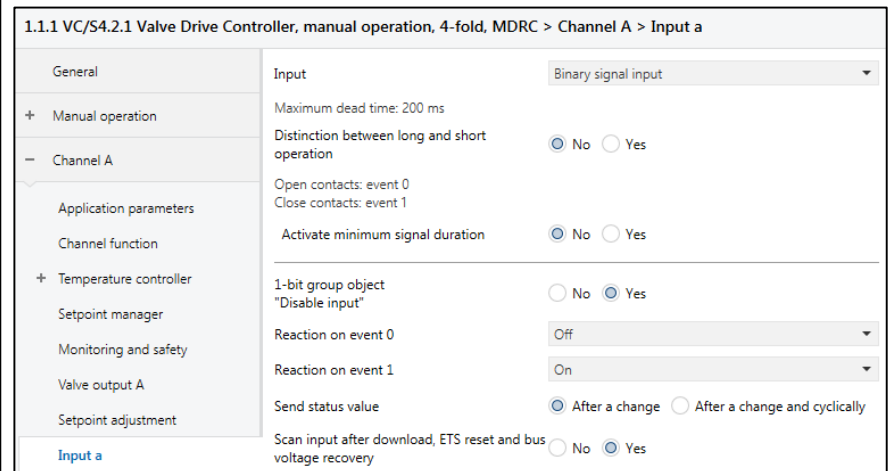
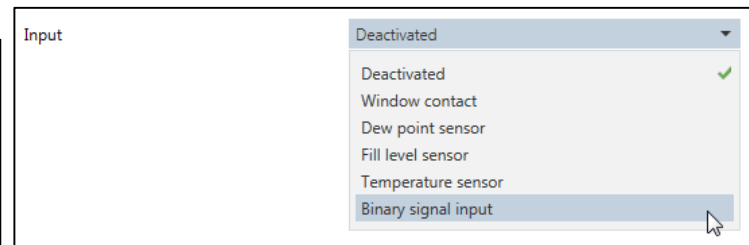
Valve Drive Controller VC/S 4.x.1

ETS

4 inputs with various functions

All useful options

- Window contact
- Dew point sensor: Monitoring dew point
- Fill Level sensor: Monitor condensed water tray
- Temperature sensor: e.g. for temperature limitation or room temperature from RCU
- Binary signal input: classical functions
 - On/off/toggle
 - Long/short operation
 - Enable/disable



Valve Drive Controller VC/S 4.x.1

ETS

Changing Set Values

Set point adjustment via Room Control Unit (RCU)

- Limits to increase/decrease setpoint

Setpoint of RCU automatically linked to input a

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Setpoint adjustment

General	Connect analog room control unit to physical device input <input type="radio"/> No <input checked="" type="radio"/> Yes
+ Manual operation	
– Channel A	
Application parameters	
Channel function	
+ Temperature controller	
Setpoint manager	
Monitoring and safety	
Valve output A	
Setpoint adjustment	

Maximum setpoint increase K

Maximum setpoint reduction K

Note:

For the temperature sensor used in the analog room control unit, please parametrize the input b as follows:
Temperature sensor -> NTC -> NTC 10-02

The setpoint output of the analog room control unit (terminal a) must be connected to device input a.

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Input a

General	Caution: Use the 'Setpoint adjustment' window when deactivating the analog room control unit	
+ Manual operation	Input	Analog room control unit
– Channel A	Send status value	<input checked="" type="radio"/> After a change <input type="radio"/> After a change and cyclically

Valve Drive Controller VC/S 4.x.1

ETS

Changing Set Values

Setpoint adjustment via KNX, no RCU connected

- Limits to increase/decrease setpoint manually
- Different data points for setpoint
- Options to reset manual adjustment

1.1.1 VC/S4.2.1 Valve Drive Controller, manual operation, 4-fold, MDRC > Channel A > Setpoint adjustment

General	Connect analog room control unit to physical device input <input checked="" type="radio"/> No <input type="radio"/> Yes
+ Manual operation	
- Channel A	
Application parame...	
Channel function	
+ Temperature contr...	
Setpoint manager	
Monitoring and saf...	
Valve output A	
Setpoint adjustm...	
Input a	Max. manual increase in heating mode via KNX <input type="text" value="3"/> K
Input b	Max. manual reduction in heating mode via KNX <input type="text" value="3"/> K
Input c	Max. manual increase in cooling mode via KNX <input type="text" value="3"/> K
+ Channel B	Max. manual reduction in cooling mode via KNX <input type="text" value="3"/> K
+ Channel C	
	Manual setpoint adjustment via KNX with <input type="text" value="DPT 9.001 (absolute temperature value)"/>
	Caution: This type of setpoint adjustment only works with ABB devices that support the new master/slave concept
	Reset manual adjustment via KNX when base setpoint received <input type="radio"/> No <input checked="" type="radio"/> Yes
	Reset manual adjustment via KNX when operating mode changes <input type="radio"/> No <input checked="" type="radio"/> Yes
	Reset manual adjustment via KNX using group object <input type="radio"/> No <input checked="" type="radio"/> Yes
	Slave display indicates <input checked="" type="radio"/> Absolute <input type="radio"/> Relative

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 4

What can be done with ABB i-bus Tool together with VC/S?

- A** Change parameter parametrized in the ETS application
- B** Overwrite values for valve position
- C** Change parameter of integrated controller

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 4

What can be done with ABB i-bus Tool together with VC/S?

- ☐ A Change parameter parametrized in the ETS application
- ☒ B Overwrite values for valve position
- ☐ C Change parameter of integrated controller

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 5

The integrated temperature controller of VC/S has ...

- A** Basic and additional heating/cooling stage
- B** Various control value types and freely programmable PI-Controller
- C** One or two setpoint mode

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 5

The integrated temperature controller of VC/S has ...

- A** Basic and additional heating/cooling stage
- B** Various control value types and freely programmable PI-Controller
- C** One or two setpoint mode

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 6

Inputs of VC/S are made for ...

- A** ... connecting analogue or binary signals
- B** ... connecting Room Control Unit SAR/A
- C** ... connecting the valves

Valve Drive Controller VC/S 4.x.1

Which answer is correct?

Question 6

Inputs of VC/S are made for ...

A ... connecting analogue or binary signals

B ... connecting Room Control Unit SAR/A

C ... connecting the valves

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