LOGICA Digital

Energy-series DN10-DN80 (DN100 Ultra) BACnet Integration Guide

Application

The LOGICA Digital is a digital actuator designed to optimize energy usage in Heating, Ventilation and Air Conditioning (HVAC) systems.

Paired with an OPTIMA Compact valve it offers intelligent hydronic control and insight.

The actuator simplifies system integration from easy installation to direct communication with the Building Management system (BMS) to selectable control methods to suit different applications.

Built-in energy management algorithms and functions greatly reduce system integration hours.

The actuator can communicate using Modbus RTU or BACnet MS/TP.

This document describes how to integrate the actuators using BACnet MS/TP.

For actuator installation on the OPTIMA Compact valve and electric wiring, please refer to the LOGICA Digital Energy-series Technote.

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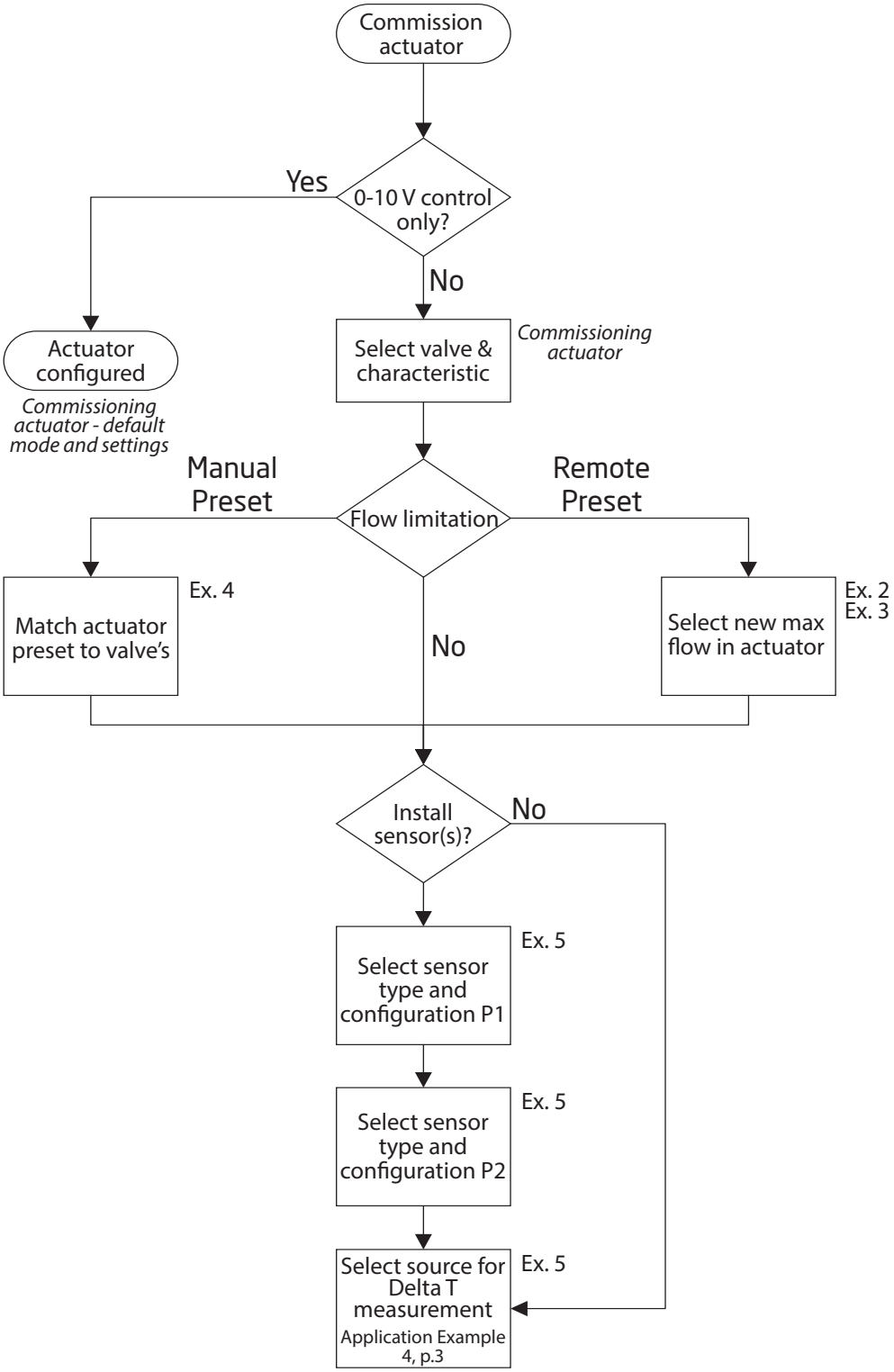
Overview

The flowchart below describes the complete actuator commissioning process. The guide starts by explaining the basic communication settings and valve selection process. Then, an application example is provided for each step of the flowchart and lastly, a complete register list is provided. Beside each step there is a reference such as Ex. 2.
This refers to an application example, so the example given is Application example 2 on page 5.
A basic commissioning can be done very quickly by jumping over the optional steps.



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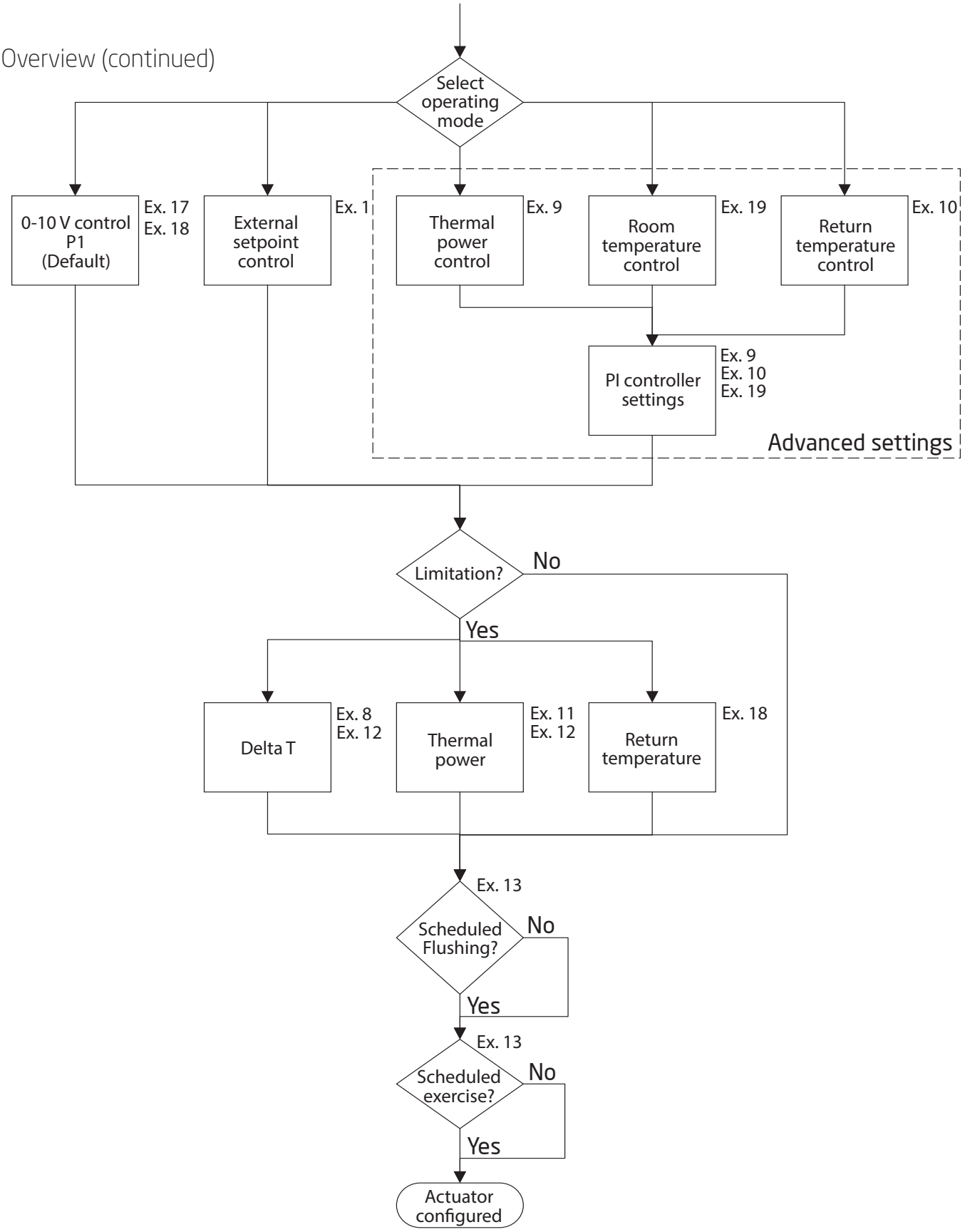
Overview (continued)



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Commissioning actuator - default mode and settings

The LOGICA Digital, Energy-series actuator is factory configured to run in analogue 0-10 V control mode. In this mode a standard 0-10 V control signal from a controller, room thermostat etc can be connected directly to the actuator's P1 input without requiring any further configuration. In this factory configuration, the following parameters are set:

Actuator control curve:	Linear
Valve type:	Default
Valve actuating direction:	Direct (0 V = closed; 10 V = open)
Actuating speed:	22 s/mm
Sensor/output type P2:	Off

These and other parameters can be changed via the BACnet interface using any standard BACnet software.

Hybrid control - analogue 0-10 V control with BACnet MS/TP communication

The LOGICA Digital, Energy-series can be controlled by a 0-10 V control signal whilst connected to a BACnet MS/TP control network. This allows for applications such as room thermostat control with 0-10 V output signal and high level status information sent to the Building Management System (BMS) via BACnet. In this hybrid mode, the following limitations will override the 0-10 V control signal if activated:

- Thermal power limitation (Object AV22)
- Return temperature limitation (Object AV23)
- Delta-T limitation (Object AV24)

Application examples 17 and 18 give details of possible configurations.

Digital control via BACnet

The LOGICA Digital, Energy series can also be used digital-only mode. The configuration steps for this are described in the flow chart at the beginning of this document and in application examples 1 - 16.

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Commissioning actuator

This basic setup prepares the valve and actuator to control the flow using algorithms. The actuator should be mounted on a valve before starting this process. Given that the BACnet-address has already been setup using the DIP-switches shown in the LOGICA Digital Technote, these objects are needed to setup the BACnet communication. In objects where "**W**" is shown in the R/W column, values must be written into the object. By default, the BACnet communication is set to: No parity and one stop bit, shown as 19200 8-N-1.

Name	Object	R/W	Values	Unit
RS485 baud rate	MSV7	W	1: default (19200)	-
			2: 9600	-
			3: 19200	-
			4: 38400	-
			5: 57600	-
			6: 76800	-
			7: 115200	-
MAC address*	AV28	R/(W)	1..127	-
Service command	MSV1	W	6: bus restart	-

* This object is only writeable if DIP-switch address is set to 63.

Valve selection

Name	Object	R/W	Values	Unit
Valve selection**	MSV8	W	5: OPTIMA Compact DN15-20 220-1330 l/h	-
Actuating control curve***	MSV13	W	1: Equal Percentage (EQ%)	-
Flow value of the selected valve****	AV30	W	1330 -> 1000	l/h

** The valve used in this example is an OPTIMA Compact High 5.0 DN15/20. The complete range of OPTIMA Compact DN10-DN50 valves are selectable. (See page 22).
*** The selected control characteristic in this example is Equal Percentage (EQ%).
**** Can be changed according to the manual preset of the valve - In the example above Preset 3.0 = 1000 l/h

When the commissioning has been done, the examples on the following pages can be performed

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Application Example 1 · Flow control using external (BMS) control signal

Example: Control the flow in the selected valve 0-100 %.
No extra flow limitation algorithm or temperature measurements are used in this simple setup.

Object AV1: Input signal can vary from 0-100 % by the input signal from the BMS controller.

Name	Object	R/W	Values	Unit
Operating mode	MSV4	R/W	1: Control via external control signal	-
Flow setpoint	AV1	W	0..100	98: %

Note: Object AI7 can be used for estimated flow feedback in l/h or Object AI6 can be used for flow feedback in percentage.
Following examples uses external setpoint (Object MSV4 = 1) unless otherwise stated

Application Example 2 · Remote heating flow limitation via stroke limitation

Example: Limit the heating flow remotely by reducing the maximum valve stroke.
Reduce the heating flow to 500 l/h for the selected valve.

Object MSV9: HVAC mode - Select heating.
Object AV11: Limit the heating flow to 500 l/h.
Object AV1: Input signal can vary from 0-100 % from the BMS controller.

Name	Object	R/W	Values	Unit
HVAC mode	MSV9	W	2: Heating	-
Stroke limitation by flow for heating	AV11	W	500	l/h
Flow setpoint (Actuating signal)	AV1	W	(0-100 %) 100 % : 500 l/h	98: %

Application Example 3 · Remote cooling flow limitation via stroke limitation

Example: Limit the cooling flow remotely by reducing the maximum valve stroke.
Reduce the cooling flow to 500 l/h for the selected valve.

Object MSV9: HVAC mode - Select cooling.
Object AV12: Limit the cooling flow to 500 l/h.
Object AV1: Input signal can vary from 0-100 % from the BMS controller.

Name	Object	R/W	Values	Unit
HVAC mode	MSV9	W	3: Cooling	-
Stroke limitation by flow for heating	AV12	W	500	l/h
Flow setpoint (Actuating signal)	AV1	W	(0-100 %) 100 % : 500 l/h	98: %

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Application Example 4 · Matching valve's manual preset in actuator

Example: OPTIMA Compact High 5.0 DN15/20 220-1330 l/h. Manual preset 2.8 ≈ 940 l/h. (Please refer to OPTIMA Compact Technote)

Object MSV8: Select "**5**" : OPTIMA Compact High 5.0 DN15/20 valve.
Object AV30: Change maximum flow to match manual preset, e.g. 940 l/h.

Name	Object	R/W	Values	Unit
Select valve type (DN10-32)	MSV8	W	5: OPTIMA Compact High 5.0 DN15/20 valve	-
Maximum flow	AV30	W	940	136: l/h

Application Example 5 · Installation of temperature sensors for DT measurement

Example: Select Pt1000 sensors for measurement of supply and return temperatures.

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature.
Object AI8: Read the values for the differential temperature.

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential tempera-ture calculation	MSV5	W	2: Supply: P1, Return: P2	-
Differential temperature	AI8	R	Example: **15** (Measured 15 °K => Value = **15)**	63: °K

Application Example 6 · Read estimated flow

Example: Read the estimated actual flow on the selected valve #5 and control the flow from 0-100 %. Valve is preset to 3.0 providing a maximum flow of approximately 1000 l/h. Please refer to OPTIMA Compact Technote.

Object AV30: Change maximum flow to match manual preset. E.g. 1000 l/h.
Object AV1: Input signal can vary from 0-100 % by the input from the BMS controller. E.g. 30 (30 %).
Object AI7: Estimated flow from actuator using the maximum flow found in Object AV30.

Name	Object	R/W	Values	Unit
Maximum flow	AV30	W	1000	136: l/h
Flow setpoint (Actuating signal)	AV1	W	30 (Input from BMS controller)	98: %
Actual flow rate	AI7	R	Example: 300 = 300 l/h	136: l/h

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Application Example 7 · Read estimated power output

Example: Read the estimated power output delivered at terminal unit. This requires the return and supply temperature readings which, in this case, come from 2 Pt1000 sensors attached to the actuator.

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature.
Object AV1: Input signal can vary from 0-100 % by the input from the BMS controller. E.g 60 (60 %).
Object AI16: Actual thermal power, calculated from differential temperature, estimated flow and medium energy constant.
In the example below, the valve #5 is preset to 3.0 ≈ 1000 l/h max, and 15 °K is read across the terminal unit.

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential temperature calculation	MSV5	W	2: Supply: P1, Return: P2	-
Flow setpoint (Actuating signal)	AV1	W	60	98: %
Actual thermal power	AI16	R	Example: 10.5 = 10.5 kW*	48: kW

* Thermal power: P = 4.2 * (1000 * 0.6 / 3600) * 15 = 10.5 kW

Application Example 8 · Control minimum Delta T

Example: Control minimum differential temperature (Delta T) at the terminal unit.
In this example the actuator will limit the flow if the actual measured Delta T is lower than the designed minimum Delta T setup in object AV24. If the actual Delta T is OK then the flow will be fully controlled by object AV1 (BMS-value).

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature
Object AV24 : Minimum differential temperature.
Object AV1: Input signal can vary from 0-100 % from the BMS controller. E.g 60 (60 %).

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential temperature calculation	MSV5	W	2: Supply: P1, Return: P2	-
Minimum differential temperature limitation value	AV24	W	Example: 4.0 = 4.0 °K	63: °K
Flow setpoint (Actuating signal)	AV1	R/W	60	98: %

Please note: If the minimum Delta T setpoint is set too high, the system can go into a deadlock. A minimum flow is recommended when the Delta T algorithm is active. Please define minimum flow in Object AV2. E.g. 20 (Minimum flow 20 %).

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Application Example 9 · Operating mode: Control by thermal power

Example: Using a thermal power setpoint and the controller's built-in PI-controller.

Object MSV4: Select "**8**" : Control by thermal power.
Object AV19: Set "**6.5**" : Thermal power setpoint. E.g. 65 (6.5 kW).
Object AV31: Set "**13.5**" : Gain constant of actuator's PI-controller. E.g. 13.5 (13.5).
Object AV16: Set "**60**" : Time constant of actuator's PI-controller. E.g. 60 (60 s).
Object AI16: Read current thermal power.

Name	Object	R/W	Values	Unit
Operating mode	MSV4	W	8: Control by thermal power	-
Thermal power setpoint	AV19	W	6.5	48: kW
Xp PI controller	AV15	W	13.5	95: No Units
Tn PI controller	AV16	W	60	73: seconds
Actual value of thermal power	AI16	R	Example 5.8 = 5.8 kW	48: kW

Application Example 10 · Operating mode: Control by return temperature

Example: Using a return temperature setpoint and the controller's built-in PI-controller, with 1 Pt1000 sensor.

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV5: Select "**6**" : P1 for the the return temperature.
Object MSV4: Select "**9**" : Control by return temperature.
Object AV20: Set "**35**" : Return temperature setpoint. E.g. 35 (35 °C).
Object AV15: Set "**13.5**" : Gain constant of actuator's PI-controller. E.g. 13.5 (13.5).
Object AV16: Set "**60**" : Time constant of actuator's PI-controller. E.g. 60 (60 s).
Object AV5: Read current return temperature.

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: PT1000 sensor	-
Source for supply and return temperature	MSV5	W	6: P1 for the return temperatur	-
Operating Mode	MSV4	W	9: Control by return temperature	-
Return temperature setpoint	AV20	W	35	62: °C
Xp PI controller	AV15	W	13.5	95: No Units
Tn PI controller	AV16	W	60	73: seconds
Return temperature actual value	AV5	R	Example: 32 = 32 °C	62: °C

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Application Example 11 · Limit power output

Example: Limiting the maximum thermal power output in the terminal unit.

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature.
Object AV22: Select "**8.5**" : Maximum thermal power limitation value. 0 in this object disables the function. E.g. 8.5 (8.5 kW).
Object AV1: Input signal can vary from 0-100 % by the input from the BMS controller. E.g. 60 (60 %).

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential temperature calculation	MSV5	W	2: Supply: P1, Return: P2	-
Maximum thermal power limitation value	AV22	W	Example: 8.5 = 8.5 kW	48: kW
Flow setpoint (Actuating signal)	AV1	W	60	98: %

Application Example 12 · Control minimum Delta T and limit power output

Example: Control minimum Delta T and limit energy output at the terminal unit.
Please note: Advanced setup - be carefully not to generate deadlocks.

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature.
Object AV24: Select "**4.0**" : Minimum differential temperature. E.g. 4.0 (4.0 °K).
Object AV22: Select "**8.5**" : Maximum thermal power limitation value. 0 in this object disables the function. E.g. 8.5 (8.5 kW).
Object AV1: Input signal can vary from 0-100 % by the input from the BMS controller. E.g. 60 (60 %).

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential temperature calculation	MSV5	W	2: Supply: P1, Return: P2	-
Minimum differential temperature limitation value	AV24	W	Example: 4.0 = 4.0 °K	63: °K
Maximum thermal power limitation value	AV22	W	Example: 8.5 = 8.5 kW	48: kW
Flow setpoint (Actuating signal)	AV1	W	60	98: %

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Application Example 13 · Full flow flushing

Example: Full flow flushing for 60 minutes, occurring every 14 days.
In this example the valve will be 100 % open when flushing for the time defined in Object AV36 and the flushing will be repeated by the hours defined in Object AV35.

Object AV35: Select "**336**" : Flushing interval in hours.
Object AV36: Select "**60**" : The amount of time the valve is fully open in minutes.
Object AI9: Remaining time until flushing (in hours) or end of current flushing in minutes.

Name	Object	R/W	Values	Unit
Flush timer	AV35	W	336	71: Hours
Flush function open timer	AV36	W	60	72: Minutes
Flush timer actual value	AI9	R	Example: 253 = 253 hours	-

Application Example 14 · Energy counter

Example: Count the energy consumption

Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV5: Select "**2**" : P1 for the supply temperature and P2 for the return temperature.
Object DEV1: RTC Time (No battery-buffer).
Object AI20 : Energy counter duration in hours since last reset / overflow.
Object AI17: Energy consumption since 00:00 - RTC must be setup for readout to match.
Object AI18: Energy consumption in the last 24 hours.
Object AV34: Continous energy counter. Write 0 to reset counter.

Name	Object	R/W	Values	Unit
Sensor type P1	MSV2	W	7: Pt1000 sensor	-
I/O type P2	MSV3	W	7: Pt1000 sensor	-
Config. of sources for differential temperature calculation	MSV5	W	2: Supply: P1, Return: P2	-
RTC Time	DEV1	W	10:39:00	Local time
RTC Time (minute)	DEV1	W	10:39:00	Local time
Energy counter duration	AI20	R	Example: 575	71: Hours
Energy since 00:00	AI17	R	Example: 74.5 = 74.5 kWh	19: kWh
Energy in the last 24 hours	AI18	R	Example: 148.1 = 148.1 kWh	19: kWh
Continous energy counter	AV34	R	Example: 3406.3 = 3406.3 kWh	19: kWh

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Application Example 15 · Status objects

Example: Monitoring system status objects
BACnet BI3-BI8 returns combined values for status.

Name	Object	R/W	Values	Unit
Actuator is busy	BI3	R	Example: 1: Actuator is calibrating or flushing	Bool
Actuator in malfunction	BI4	R	Example: 1: Defective hardware or overrange P1 or P2 (Check connections)	Bool
Error during valve adaptation	BI5	R	Example: 1: Valve adaptation faulty (Valve incorrectly installed)	Bool
Error: Valve blocked	BI6	R	Example: 1: Valve permanently blocked*	Bool
Warning: Leak detected	BI7	R	Example: 1: Leak detected (Differential temperature over 8 °K while valve is closed for over 6 hours)	Bool
Limit function active	BI8	R	Example: 1: Delta T or Power limitation active	Bool

* Please check valve manually. The warning bit can be reset by e.g. a power cycle

Application Example 16 · HVAC mode

Example: Heating, cooling or auto-select can be selected in object.

Object MSV9: Change the HVAC mode to Cooling
Auto-select can be chosen to allow the actuator to detect if cooling or heating is in effect.
The auto-select point is 25 °C for supply. Above 25 °C the actuator is in heating mode, and below 25 °C the actuator is in cooling mode.

Name	Object	R/W	Values	Unit
HVAC mode	MSV9	W	3: Cooling	-

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Application Example 17 · Analogue 0-10 V control, with DT measurement

Example: Using P1 for analogue 0-10 V control and Modbus for status information to the BMS.
By default factory setting the Actuator is set up for analogue control via the analogue input P1.
Eg. 10 V at P1 gives 100 % open valve.
Object MSV2: Set "**3**": Gives 0-10 V input.
Object MSV4: Set "**11**": Control by 0-10 V P1.
Object MSV5: Set "**7**": Supply: Bus-value, Return: P2".

Name	Object	R/W	Values	Unit
Sensortype P1	MSV2	W	3: 0-10 V input	-
Operation Mode	MSV4	W	11: Control by 0-10 V P1	-
Config of sources for differential temperature calculation	MSV5	W	7: Supply: Bus-value, Return: P2	-

Application Example 18 · Analogue 0-10 V control & Return temperature limitation

Example: Using P1 for analogue 0-10V control P2 for return temperature measurement and Modbus for status information to the BMS.

By default factory setting the Actuator is set up for analogue control via the analogue input P1.
Eg. 10 V at P1 gives 100 % open valve.
Object MSV2: Set "**3**": Gives 0-10 V input.
Object MSV3: Select "**7**": Pt1000 as sensor type P2.
Object MSV4: Set "**11**": Control by 0-10 V P1.
Object MSV5: Set "**7**": Supply: Bus-value, Return: P2".
Object AV23: Set "**30**": Limits the return temperature to a fixed value of 30.0 °C.

Name	Object	R/W	Values	Unit
Sensortype P1	MSV2	W	3: 0-10 V input	-
I/O type P2	MSV3	W	7: PT1000 sensor	
Operation Mode	MSV4	W	11: Control by 0-10 V P1	-
Config of sources for differential temperature calculation	MSV5	W	7: Supply: Bus-value, Return: P2"	-
Return temperature limiting value	AV23	W	Example: 30 = 30.0 °C	62: °C

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Application Example 19 · Room temperature control via Modbus with DT limitation

Example: Controlling room temperature with Modbus and limiting DT.
Using P1 and P2 to measure DT temperature and Modbus to control the room temperature
Object MSV2: Select "**7**" : Pt1000 as sensor type P1.
Object MSV3: Select "**7**" : Pt1000 as sensor type P2.
Object MSV4: Set "**7**": Control by Room temperature
Object MSV10: Set "**1**" : Room temperature source"
Object AV17: Actual room temperature
Object AV18: Set "**25**" : Sets the room tempereature to 25.0 °C
Object MSV5: Set "**7**" : Supply: Bus-value, Return: P2"
Object AV24: Set "**20**" : Sets the minimum differential temperature to 20.0 °C

Name	Object	R/W	Values	Unit
Sensortype P1	MSV2	W	7: PT1000 sensor	-
I/O type P2	MSV3	W	7: PT1000 sensor	-
Operation Mode	MSV4	W	7: Control by Room temperature	-
Select source of room temperature	MSV10	W	1: Write to Object AV17	-
Room temperature Actual	AV17	R	"Example: 24 = 24.0 °C	62: °C
Room temperature Setpoint	AV18	W	"Example: 25 = 25.0 °C	62: °C
Config of sources for differential temperature calculation	MSV5	W	7: Supply: Bus-value, Return: P2"	-
"Minimum differential temperature limitation value"	AV24	W	Example: 20 = 20.0 °K	63: °C

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Object List

Name	Description	R/W	Object	Values	Unit
HW version	Hardware version	R	In DEV1	LOGICA Digital DN10-32	--
				LOGICA Digital DN40-50	
RTC time	RTC time (No battery-buffer)	R	In DEV1	--	--
Network-Port MS/TP	MS/TP Network Port Object	--	NP1	--	--
Software version	Software version	R	AI1	2.06	95: No Units
Serial number	Serial number	R	In AI1	--	--
Analogue Input P1	Measured value at input P1. Unit dependent on selected sensor object	R	AI2	0 / 1	Bool
				0 - 100	98: %
				-50 to +150	62: °C
				-200 to +200	63: °K
Analogue Input P2	Measured value at input P2. Unit dependent on selected sensor object	R	AI3	0 / 1	Bool
				0 - 100	98: %
				-50 to +150	62: °C
				-200 to +200	63: °K
Target position	Current target in mm for the stem	R	AI4	0 - 15	30: mm
Actual position	Actual position of the stem	R	AI5	0 - 15	30: mm
Actual Value control signal	Actual value relative flow rate in percent	R	AI6	0 - 100	98: %
Actual flow rate	Actual value flow rate calculated from valve parameters	R	AI7	0 - 65535	136: l/h
Differential temperature actual value	Calculated from supply/ return temperature	R	AI8	-200 to +200	63: °K
Flush timer actual value	Remaining time until start of flushing (hours)	R	AI9	0 - 4320	95: No Units
	Remaining time until until end of flushing (Minutes)			0 - 600	

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Object List

Name	Description	R/W	Object	Values	Unit
Valve blocking protection timer actual value	Remaining hours until activation of valve blocking protection	R	AI10	0 - 4320	71: Hours
Operating hours	Total operating time of the actuator	R	AI11	0 - 1193046	71: Hours
Distance counter	Overall distance covered by the actuator since manufacturing	R	AI12	0 - 4294967295	30: mm
Overall stroke	Stroke between upper position of actuator and fully closed	R	AI13	0 - 15	30: mm
Actual volume flow rate limitation	Current active limitation, dependent on heating or cooling mode	R	AI15	50 - 50000	136: l/h
Actual value of thermal power	Current thermal power calculated	R	AI16	0 - 6553.5	48: kW
Energy since 00:00	Thermal power since midnight (Based on the internal RTC time)	R	AI17	0 - 6553.5	19: kWh
Energy in the last 24 h	Energy in the last 24 hours	R	AI18	0 - 6553.5	19: kWh
Energy counter duration	Time since last reset/ overflow of continous energy counter	R	AI20	0 - 65500	71: Hours
Analogue Output P2	Value at the output P2 (For configuration of Sensor/Output type P2 = 0 - 10 V output)	R/W	AO1	0 - 100	98: %
External control signal	External control signal for relative volume flow rate	R/W	AV1	0 - 100	98: %
Minimum control signal	Lower limit of permissible control signal	R/W	AV2	0 - 100	98: %
Maximum control signal	Upper limit of permissible control signal	R/W	AV3	0 - 100	98: %
Supply temperature actual value	Supply temperature actual value (write protected when source P1 or P2 is assigned)	R/(W)	AV4	-50 to +150	62: °C
Return temperature actual value	Return temperature actual value (write protected when source P1 or P2 is assigned)	R/(W)	AV5	-50 to +150	62: °C
Correction value P1	Offset of sensor value P1	R/W	AV6	-5 to +5	63: °K
Correction value P2	Offset of sensor value P2	R/W	AV7	-5 to +5	63: °K
Emergency position	Position in case of bus communication failure or invalid control function. Default = 30 %	R/W	AV8	0 - 100	98: %
Valve blocking protection timer	Configuration of timer value. Function inactive with timer value "0"	R/W	AV10	0 - 4320	71: Hours

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Object List

Name	Description	R/W	Object	Values	Unit
Stroke limitation by flow for heating	Range between min/max of the selected valve	R/W	AV11	10 - 50000	136: l/h
Stroke limitation by flow for cooling	Range between min/max of the selected valve	R/W	AV12	10 - 50000	136: l/h
Valve stroke	Valve stroke of the selected valve	R/W	AV13	0.5 - 9.0	30: mm
Medium energy constant	Default value (water) 4183 J/(kg*K)	R/W	AV14	180 - 18000	128: J/(kg*K)
Xp PI controller	Proportional gain constant of PI controller	R/W	AV15	2 - 6000	95: No Units
Tn PI controller	Time constant of PI controller	R/W	AV16	0 - 720	73: Seconds
Room temperature actual value	Room temperature actual value (write protected when source P1 or P2 is assigned)	R/(W)	AV17	-50 to +150	62: °C
Room temperature setpoint	Room temperature setpoint	R/W	AV18	0 - 50	62: °C
Thermal power setpoint	Thermal power setpoint. Positive values for both heating and cooling.	R/W	AV19	0 - 5000	48: kW
Return temperature setpoint	Return temperature setpoint	R/W	AV20	0 - 120	62: °C
Maximum thermal power limiting value	Permissible maximum value for thermal power. Positive values for heating and cooling. Value 0 = Inactive	R/W	AV22	0 - 5000	48: kW
Return temperature limiting value	Permissible maximum value for return temperature. (max/min depending of heating/cooling mode) Value 0 = Inactive	R/W	AV23	0 - 120	62: °C
Differential temperature limiting value	Permissible maximum value for diffrential temperature. Positive values for heating and cooling. Value 0 = Inactive	R/W	AV24	0 - 100	63: °K
MAC Address	Address for the actuator Writeable if DIP-switch is set to 63	R/(W)	AV28	1 - 127	95: No Units
Close when adjusting range	Region of control signal where the end positions in which the actuator stays in position	R/W	AV29	0 - 5 (3 Default)	98: %
Maximum flow	Maximum flow of the selected valve	R/W	AV30	10 - 50000	136: l/h
Xp thermal power limitation	Gain constant for power limitation	R/W	AV31	2 - 6000	95: No Units
Xp return temperature limitation	Gain constant for return temperature limitation	R/W	AV32	2 - 6000	95: No Units

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Object List

Name	Description	R/W	Object	Values	Unit
Xp dT limitation	Gain constant Delta T limitation	R/W	AV33	2 - 6000	95: No Units
Continuous energy counter	Calculated value of energy (Write 0 to reset)	R/W	AV34	0 - 6550	19: kWh
Flush timer	Configuration of timer value. Function inactive if timer = "0"	R/W	AV35	0 - 4320	71: Hours
Flush function open timer	Duration the actuator stays at 100 % open during flushing event	R/W	AV36	0 - 600	72: Minutes
Initial control signal	Initial control signal after power on	R/W	AV37	0 - 100	98: %
Binary input P1*	Off	R	BI1	0	Bool
	On			1	
Binary input P2*	Off	R	BI2	0	Bool
	On			1	
Actuator is busy	Normal operation	R	BI3	0	Bool
	Actuator is calibrating or flushing			1	
Actuator in malfunction	No error	R	BI4	0	Bool
	Defective hardware or overrange P1 or P2 (Check connections)			1	
Error during valve adaptation	No error	R	BI5	0	Bool
	Valve adaptation faulty (Valve incorrectly installed)			1	
Error: Valve blocked	No error	R	BI6	0	Bool
	Actuator unable to open or close			1	
Warning: Leak detected	No warning	R	BI7	0	Bool
	Leak detected (Differential temperature over 8 °K while valve is closed for over 6 hours)			1	
Limit function active	No limit function active	R	BI8	0	Bool
	Delta T or Power limitation active			1	

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Object List

Name	Description	R/W	Object	Values	Unit
P1 inversion* (Binary input)	Direct	R/W	BV1	0	--
	Inverted			1	
P2 inversion* (Binary input)	Direct	R/W	BV2	0	--
	Inverted			1	
P2 inversion* (Analogue output)	Direct	R/W	BV3	0	--
	Inverted			1	
Inversion of the valve actuating direction	Direct	R/W	BV4	0	--
	Inverted			1	
Status HVAC mode (Changeover)	Off (shut-off)	R	MSI1	1	--
	Heating			2	
	Cooling			3	
Service command	Normal operation	R/W	MSV1	1	--
	Valve adaption			2	
	Flush valve			3	
	Synchronize valve			4	
	Reset error messages			5	
	Bus restart			6	
	Reset to factory settings			7	

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Object List

Name	Description	R/W	Object	Values	Unit
Sensor type P1	Off	R/W	MSV2	1	--
	Binary input*			2	
	0-10 V input			3	
	KP10*			4	
	Ni1000-DIN*			5	
	Ni1000-LG*			6	
	Pt1000			7	
	Potentiometer 10 k*			8	
	Potentiometer 10 K setpoint adjustment +/- 3 K*			9	
	Potentiometer 10 K setpoint adjustment +/- 5 K*			10	
Sensor/output type P2	Off	R/W	MSV3	1	--
	Binary input*			2	
	0-10V input			3	
	KP10*			4	
	Ni1000-DIN*			5	
	Ni1000-LG*			6	
	PT1000			7	
	Potentiometer 10 K*			8	
	0-10 V output (Object AO1)*			9	
	0-10 V Y position feedback (Object AI6)*			10	
	Changeover signal for 6 way valve (Object MSV9)*			11	

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Object List

Name	Description	R/W	Object	Values	Unit
Operating mode	Control via external control signal (Object AV1)	R/W	MSV4	1	--
	Open (100 %)			2	
	Closed (0 %)			3	
	Min. Pos (Object AV2)			4	
	Reserved			5	
	Max. Pos (Object AV3)			6	
	Control by room temperature (Object AV17 and AV18)			7	
	Control by thermal power (Object AI16 and AV19)			8	
	Control by return temperature (Object AV5 and AV20)			9	
	Reserved			10	
	Control by Y-in 0..10 V (P1)			11	
Source for supply and return temperature	Bus values via object AV4 and AV5	R/W	MSV5	1	--
	Supply: P1, return: P2			2	
	Supply: P2, return: P1			3	
	Supply: P1, return: Bus value			4	
	Supply: P2, return: Bus value			5	
	Supply: Bus value, return: P1			6	
	Supply: Bus value, return: P2			7	
Communication failure mode	No change	R/W	MSV6	1	--
	Closed (0 %) when time is exceeded (120 s)			2	
	Open (100 %) when time is exceeded (120 s)			3	
	Emergency position (Object AV8) when time is exceeded (120 s)			4	

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Object List

Name	Description	R/W	Object	Values	Unit
RS485 Baud Rate	Default 19200	R/W	MSV7	1	--
	9600			2	
	19200			3	
	38400			4	
	57600			5	
	76800			6	
	115200			7	
Select valve type (DN10-32)	**Linear (Default)**	R/W	MSV8	1	--
	OPTIMA Compact Low 2.5 DN10/15 30-200 l/h			2	
	OPTIMA Compact Low 5.0 DN10/15 65-370 l/h			3	
	OPTIMA Compact High 2.5 DN15/20 100-575 l/h			4	
	OPTIMA Compact High 5.0 DN15/20 220-1330 l/h			5	
	OPTIMA Compact High 5.5 DN20 300-1800 l/h			6	
	OPTIMA Compact low 5.5 DN25 280-1800 l/h			7	
	OPTIMA Compact High 5.5 DN25L 600-3609 l/h			8	
	OPTIMA Compact 5.5 DN32 550-4001 l/h			9	
Select valve type (DN40-50) (DN50-80 flanged) (DN50-100 Ultra)	**Linear (Default)**	R/W	MSV8	1	--
	OPTIMA Compact DN40 1370-9500 l/h			2	
	OPTIMA Compact DN50 1400-11500 l/h			3	
	OPTIMA Compact DN50 flanged LF 2.5-15.0 m3/h			4	
	OPTIMA Compact DN50 flanged HF 3.9-24.0 m3/h			5	
	OPTIMA Compact DN65 flanged LF 4.4-25.0 m3/h			6	
	OPTIMA Compact DN65 flanged HF 5.9-35.0 m3/h			7	
	OPTIMA Compact DN80 flanged LF 5.3-34.0 m3/h			8	
	OPTIMA Compact DN80 flanged HF 7.0-43.0 m3/h			9	
	OPTIMA Compact DN50 Ultra HF 1.4-11.5 m3/h			10	
	OPTIMA Compact DN65 Ultra LF 3.0-16.0 m3/h			11	
	OPTIMA Compact DN65 Ultra HF 4.2-24.0 m3/h			12	
	OPTIMA Compact DN80 Ultra LF 4.4-25.0 m3/h			13	
	OPTIMA Compact DN80 Ultra HF 6.0-35.0 m3/h			14	
	OPTIMA Compact DN100 Ultra LF 5.3-34.0 m3/h			15	
	OPTIMA Compact DN100 Ultra HF 7.0-43.0 m3/h			16	

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Object List

Name	Description	R/W	Object	Values	Unit
Choose HVAC mode (Changeover)	Shut-off	R/W	MSV9	1	--
	Heating			2	
	Cooling			3	
	Automatic via supply temp (No activation of Change Over output signal (P2))			4	
Select source for room temperature	Bus value via object AV17	R/W	MSV10	1	--
	P1			2	
	P2			3	
LED mode	LED off	R/W	MSV11	1	--
	Device status without bus			2	
	Device status with bus			3	
Actuating speed	Normal: 22 s/mm	R/W	MSV12	1	--
	Slow: 28 s/mm			2	
	Fast: 16 s/mm			3	
Actuating control curve characteristic	Linear	R/W	MSV13	1	--
	Equal percentage (EQ%)			2	

*** Please Note:** The object list above and the device may contain object properties that are not supported by Frese

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