

# *User's Manual*

## **W501TMB**



# TABLE OF CONTENTS

INTRODUCTION .....	3
<i>Clock</i> .....	3
<i>Data Display</i> .....	3
<i>Led Description</i> .....	4
COMMUNICATION .....	4
CONFIGURATION MENU .....	5
APPLICATION 1 OR 2 CONFIGURATION.....	5
CONTROLLER OPERATION .....	6
<i>FUNCTIONS COMMON TO ALL CONFIGURATIONS</i> .....	6
Outside Override/enabling, Inputs Id1 and Id2.....	6
Compensation.....	6
<i>APPLICATION 1 – Management of a Floating Output + one Auxiliary Analogue Output</i> .....	7
“3P Driver” Function.....	7
<i>APPLICATION 2 -- Management of a 0-10 Vdc Analogue Loop + one Auxiliary Analogue Output + On/Off Control of the Burner and Enabling of Circulation Pump</i> .....	9
ANNEX 1 – USING THE BUTTON INTERFACE .....	11
CONTROLLER CONFIGURATIONS .....	11
<i>Parameter Changing</i> .....	11
“User” Parameter Setting (Level 1) .....	11
TIME SCHEDULE .....	13
CHANGEOVER TIME .....	13
HEATING LOOP PROGRAMME .....	14
SPECIAL FUNCTIONS.....	15
Sensors Sharing through Id1.....	15
Configuration of Communication Bus (IDL inside bus – ibs outside bus) .....	15
“Floating” Configuration (Application 1).....	17
Heating Loop Control.....	17
User Parameters .....	17
Technical Parameters.....	17
Wiring Diagram – Application 1.....	18
Configuration Example with Pump and Burner Control (Application 2) .....	19
Boiler Control .....	19
User Parameters .....	19
Technical Parameters.....	19
Wiring Diagram – Application 2.....	20
ANNEX 2 – Menu Synoptic – Parameter List and Description.....	21

## INTRODUCTION

This product is a W500TMB branching-off, very similar to the former product. The difference consists in the fact that it manages a “3 Points” floating driver as output control signal output and uses two digital inputs to carry out the Plant Shutdown” and the “Manual Start” override functions.

Therefore, we recommend to refer to the W500TMB (DMP047E) manual for general functional details, taking into account the following limitations and differences.

1. IT IS NOT POSSIBLE TO USE THE OPERATING MODE 3
2. THE DIGITAL INPUTS ARE USED TO CARRY OUT THE ON/OFF OVERRIDE
3. IF THE FLOATING OUTPUT IS USED, THE 2 DIGITAL LOOPS ARE NOT AVAILABLE
4. THE HEATING LOOP COMPENSATION CURVE HAS 3 DEFINITION POINTS INSTEAD OF 2
5. THE LCD SCROLLING MENU IS PARTIALLY DIFFERENT

The product is designed for two main applications which are selectable (and mutually exclusive) by setting to “On” or “Off” the proper parameter (“d3P”) in level 2 of the “Configuration menu”.

Application 1 → to manage the floating output + analogue output n. 2  
or

Application 2 → to manage the 2 analogue outputs + 2 digital outputs.

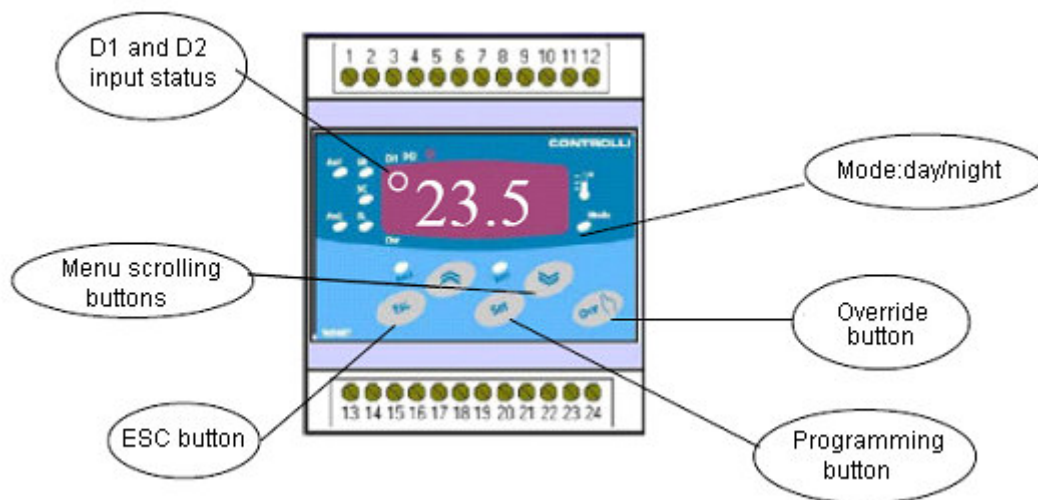
### ***Clock***

The controller has a built-in real time clock and a daily time schedule. The user can combine the time schedule to the desired control loop mode. Three modes are selectable: comfort, reduced and loop stop.

### ***Data Display***

The controller has a user-friendly interface which enables to set the control loop parameters.

The user interface has 5 push-buttons and 12 LEDs which enable to display the installation status.



## Led Description

The user can push the scrolling buttons to display the various input sensors values and the 0-10 analogue values. When pushed, the led related to the selected object lights up and the controller displays the value.

A01	It displays the 0-10 V A01 output
A02	It displays the 0-10 V A02 output
SR	It displays the main sensor of loop 1
SL	It displays the auxiliary sensor
SC	It displays the outside temperature or of the remote set point for loop 1
DI1	led ON to DI1: DI1 closed and Plant Shutdown and override
DI2	led ON to DI2: DI2 closed and Manual Override On
Rel1	led ON to R1: relay on (floating motor on loop 1 stops)
Rel2	led ON to R2: relay on (floating motor on loop 1 starts)



It is not used with this version

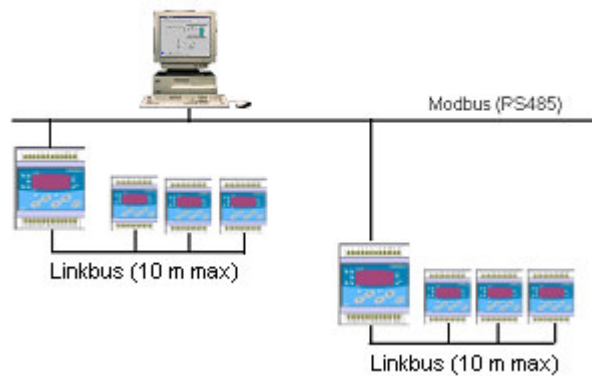
Ovr	Led combined to the override button
Mode	Led combined to the operating mode
On	= comfort mode
Flashing	= reduced mode
Off	= Stop

## COMMUNICATION

- "Link Bus" Local Bus (idl 1÷4)

The controller can exchange sensor information with up to 3 controllers using the local "LinkBus".

Example: The controller with id2 address can operate in compensation mode thanks to the outside temperature sensor connected to the IDL3 controller.



- Outside Bus management (ModBus 1÷256)

The controller has a RS485 serial port to communicate with the Supervision Master unit through the RTU Modbus protocol (details about the protocol are available on request).

## CONFIGURATION MENU

The menu, as for the W500TMB, is organized in two levels and can be browsed by acting on "Set", "Esc", "⏴" (Down), "⏵" (Up) buttons which are placed on the front panel:

a) Level 1 – "User"

At this level it is possible to set:

Set Point

Compensation curves

Time schedule

Actuator/valve stroke time

b) Level 2 – "Technical"

At this level it is possible to carry out:

Operating mode setting

Setting of all parameters which characterize the loops

Enabling of application 1 (d3P = ON) or application 2 (d3P = OFF)

(Refer to the W500TMB (DMP0471) controller manual for details about the levels and the setting of single parameters).

## APPLICATION 1 OR 2 CONFIGURATION

The controller is factory-supplied configured to carry out application 1 (3P driver - d3P parameter=ON); the compensation and the integral loop options are enabled.

For application 2 configuration, it is necessary to disable the 3P driver by acting on the 2<sup>nd</sup> level menu inside the analogue 1 loop parameters (d3P = OFF).

(\*) NOTE:

The compensation sensor is COMPULSORY. If the compensation function is not required, to deactivate it do as follows:

a) put a fixed value resistor (value between 800 and 2000 Ohm) in place of the compensation sensor (connection terminals 1 and 3)

b) Entering the Menu Level 2, deactivate the compensation function (parameter coP=OFF)

c) Take the fixed value resistor away

SAME PROCEDURE TO ACTIVATE IT AGAIN LATER, IF REQUIRED.

# CONTROLLER OPERATION

## FUNCTIONS COMMON TO ALL CONFIGURATIONS

### Outside Override/enabling, Inputs Id1 and Id2

The digital inputs ID1 and ID2 have the following functions (different from the ones of W500TMB):

ID1 digital input will be used to carry out an override stop; while ID2 will be used to override in comfort mode.

The PRIORITY to define the Active Mode will be as follows:

1. Override from outside digital contacts
2. Local User Interface Button override
3. Time schedule

DI1 contact Override stop	DI2 contact Override COMFORT	Active mode
Open	Open	As defined by clock or interface button
Closed	Open	STOP
Open	Closed	COMFORT
Closed	Closed	STOP

The override stop has priority.

### **AE1 and AE2 parameters are not available anymore**

(On the W500TMB are used to enable individually the 4 Loops through the ID1 and ID2 digital inputs.

**The mode 3 (Summer/Winter changeover) must not be used;** since it needs the ID2 contact, now used for OFF override.

### Compensation

FLOATING HEATING LOOP COMPENSATION CURVE (3 Points) (different from W500TMB which is 2-point only)

For the Heating loop only has been defined an extended compensation curve; it will be necessary to set 3 couples of parameters.

COOLING LOOP COMPENSATION CURVE (2 Points)

For cooling loop it is necessary to define the compensation curve through two points.

### Analogue Loop 2 with limit sensor

As for W500TMB model, it is possible to use the Analogue Loop 2 as independent loop if controlling upon the Limit sensor only.

In this case, it will be necessary to set the suitable parameters in order to make the minimum Limit Loop active, while the proportional main loop must result always satisfied.

The Limit Loop will have a proportional action only.

Example of heating loop configuration on independent Analogue loop 2:

ANALOG 2

oP = 1

LLL = ON

StC = -50

SLC = 55

## **APPLICATION 1 – Management of a Floating Output + one Auxiliary Analogue Output**

(Second level parameter d3P="On")

In this application the two digital outputs which are present on the controller are only used for the 3-Points floating control of a motorized valve.

All the parameters destined to the control loop setting on digital outputs will not be displayed when browsing the Configuration menu: it will be necessary to check (or change from the default value) all parameters for "Analogue 1 Loop = floating Loop (Ao1)" management and of the eventual auxiliary "Analogue Loop" available on the analogue (Ao2) output 2.

The voltage value of the analogue output 1 terminals will change in parallel and according to the same control parameters set for the "Floating Loop" (main loop) and it can be used to follow the main loop or to drive an eventual % position indicator with 0-10 Vdc input.

The available control loops are:

"Analogue Loop 1"

- It controls through Supply sensor (SR) by driving the Mixing valve
- The control Loop uses a 3 Points compensation curve on outside sensor (SC)
- The Loop output will be used from 3P driver which drives the actuator through the two digital outputs, while the combined analogue output 1 will "follow" the floating control
- It will be necessary to define the actuator stroke time ("tcs" parameter) for a correct actuator positioning.

"Analogue Loop 2"

The default loop is not used, but the analogue output 2 can be used for a third sensor, through the "Limit sensor" (SL) connection of the controller to achieve alternatively:

- the temperature display combined to the SL sensor
- to operate only in proportional control on SL sensor: for example, for hot water service proportional control by driving a second 0-10 Vdc valve
- the control Set originated from an existing Limit Loop is not compensated

We remind that for the floating output it is necessary to set the "tcs" (actuator stroke time) parameter, which is not available on W500TMB.

The particular control functions related to the "3P driver" are described below.

### **"3P Driver" Function**

#### **START POSITIONING**

At the controller power on, the actuator is driven to "CLOSING" (LOWER control, Relay 1 = ON) for the set stroke time.

Stroke time - Default 135 Seconds.

#### **STROKE TIME CHANGE**

The actuator is driven to "CLOSING" (LOWER control, Relay 1 = ON) for the new stroke time after it has been changed.

### OVERTIME ON STROKE END

When the actuator is driven to one of the two stroke ends (0 or 100% control), the driver powers the actuator for an over time equal to the set stroke time. It enables to recover the mechanical tolerances and any manual adjustment occurred on the actuator.

### CONTROL WITHIN 0-100% WITH DIRECTION CHANGE

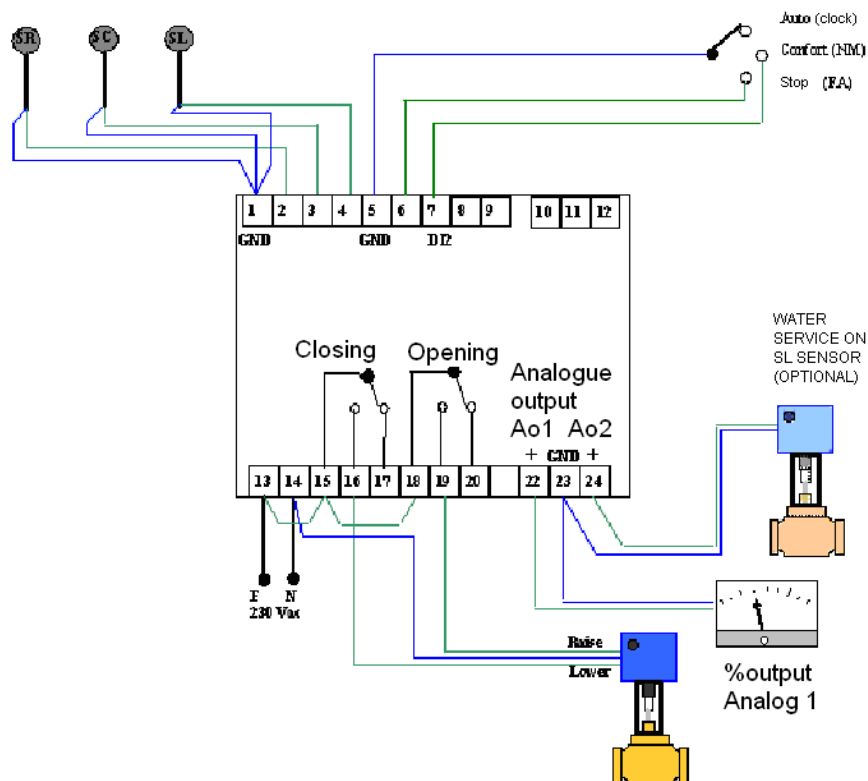
If the actuator is driven to obtain a position but the conditions change, the driver can move the actuator for the new calculated time, towards the direction (opening or closing) which complies with the request.

### CONTROL WITH INTEGRAL ACTION ON

If the integral action is ON, after the positioning due to proportional action, it is possible to notice a sequence of control pulses following the integrator data.

When the signal will reach one of two ends, the driver will move the actuator for a continuous over time equal to the stroke time.

## ELECTRICAL WIRING





## **APPLICATION 2 -- Management of a 0-10 Vdc Analogue Loop + one Auxiliary Analogue Output + On/Off Control of the Burner and Enabling of Circulation Pump**

(second level parameter d3P ="Off")

In this application the 2 digital outputs on the controller are used as for the W500TMB standard model.

All parameters which are used for the control loop setting on digital outputs will be displayed by scrolling the configuration Menu. Then it will be possible to check (or to change according to the default value) all parameters useful for the management of "Analogue Loop 1" on analogue output 1 (Ao1), of the eventual "Analogue Loop 2" available on analogue output 2 (Ao2) and of the two digital Loops (Do1 and Do2).

For heating or cooling fluid circulation plant, the most common function of the digital output in this configuration is:

- to give a preventive consent for starting the burner (chiller) in function of the supply temperature
- to delay the circulation pump shutdown with respect to the switching off of the burner/chiller (default setting).

### **Loop details:**

#### Loop on analogue output 1:

It controls on supply sensor (SR) by driving the proportional mixing valve.

The control Set is compensated (curve with 3 points) on Outside sensor (SC)

#### Loop on analogue output 2:

By default the loop is not used. In this case the output can be used for displaying the temperature combined to a third sensor.

In this case the SL sensor will be used.

It is possible to set optionally the Analogue Loop 2 to operate on the Limit sensor (SL); it can be used as Proportional control of Water service by driving a second 0-10 Vdc valve.

The control Set actually is a limit set and in this case it is not compensated.

#### Loop on digital output 1:

It controls the circulation pump and it is activated without delay with respect to the ON status of the DO2 digital output and it is deactivated with a 900 seconds delay with respect to the OFF status of the DO2 digital output which controls the burner according to time schedules.

#### Loop on digital output 2:

It controls on Supply sensor (SR) by driving the burner. If the supply temperature is higher than the On/off supply set the burner is disabled.

The control Set can be compensated (curve with 3 points) on outside sensor (SC).

## Delayed switching off of the pump – configuration/setting parameter details

In order to manage the digital outputs for controlling a burner and the delayed switching-off of the pump, it is necessary to set data as follows:

First disable the 3P driver inside the analogue 1 (second Level) d3P = OFF. Then:

### DIGITAL 1

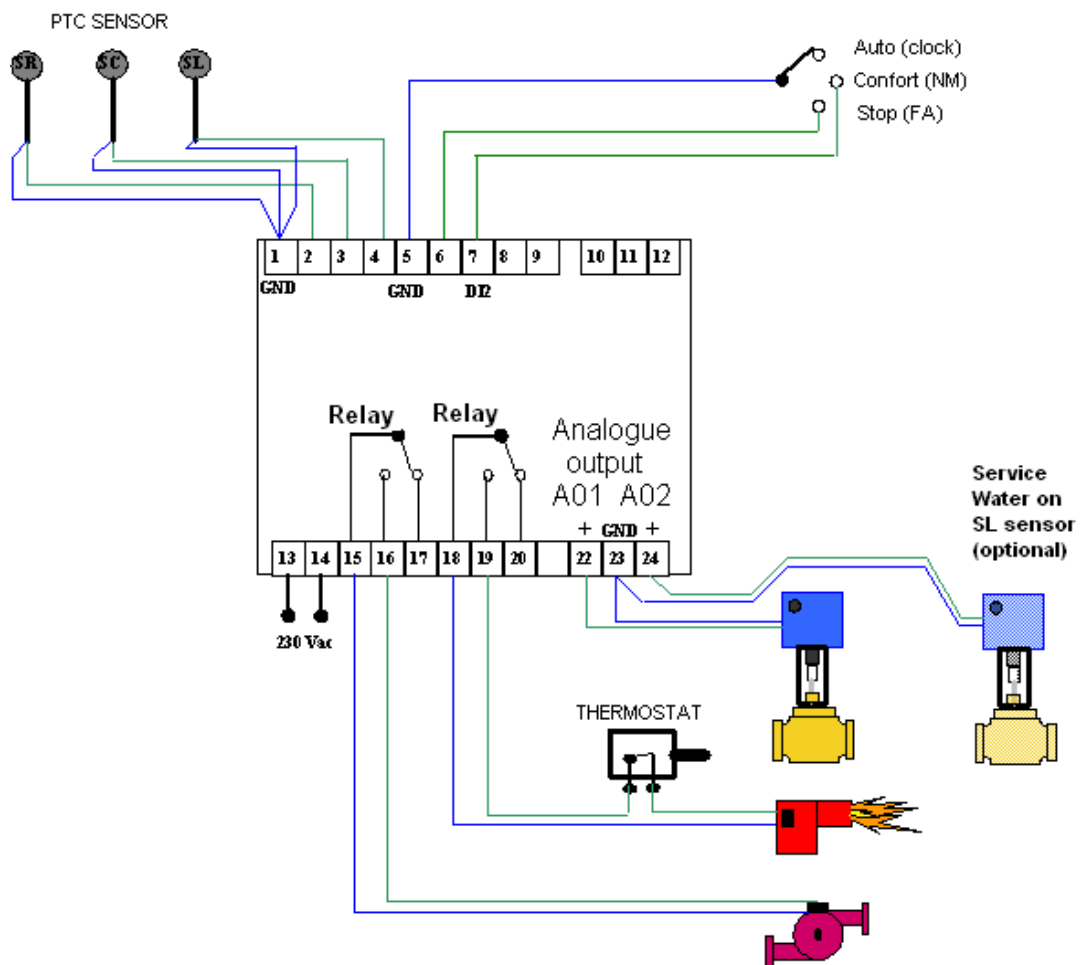
oP = 4  
Abo = OFF  
SEo = ON  
rS = ON  
rA = ON  
AE1 = OFF  
AE2 = OFF

### DIGITAL 2

oP = 1  
Abo = ON  
AE1 = OFF  
AE2 = ON

The burner and the pump will be activated by a time schedule or following digital input 2. As a safety function, it is required an external max. thermostat with burner ON.

### Electrical Wiring








# ANNEX 1 – USING THE BUTTON INTERFACE

## CONTROLLER CONFIGURATIONS

ATTENTION: the controller is pre-programmed for heating applications of compensation loop with floating motor. We do not recommend changing the operating modes. If different applications are required, please contact TAC dealers.

### Parameter Changing

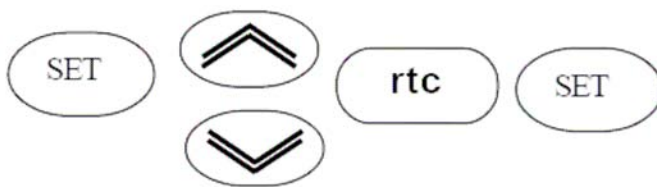
If a parameter has to be changed, select the parameter and:

- 1) Push the  key to be able to change into writing mode (the parameter blinks)
- 2) Change the value using the   keys
- 3) Push the  key to confirm or  to exit

### “User” Parameter Setting (Level 1)

#### Clock

The user has to set the controller clock before programming. To set the clock:



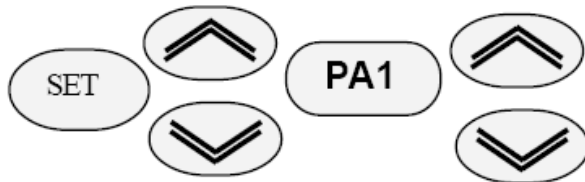
To change the clock setting take into account that:  
D00 corresponds to the day (00 = Monday and Sunday = 06), «h08» corresponds to the hour and «.12» corresponds to the minutes.

## Parameters available at user level

If the control loop has been chosen, it is possible to select the parameters according to the elements, which have been configured in the programme mode.

E.g.: with an active compensation programme, it will be possible to enter the compensation parameters, otherwise only the set point will be achieved.

## Control loop configuration



Choose the control loop to set the parameters:

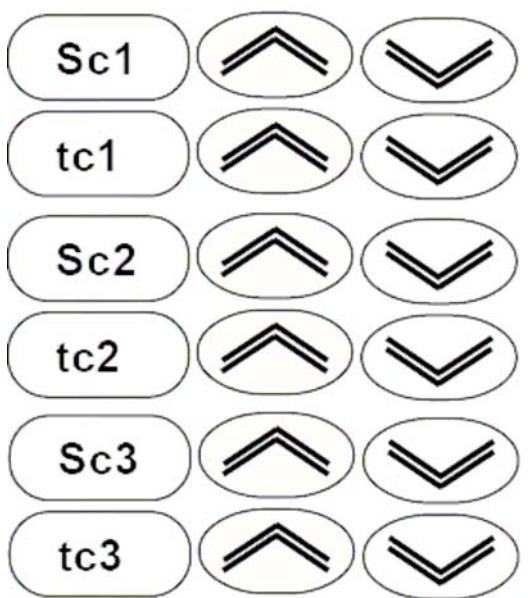
PA1 --> corresponds to the control loop 1

## Example for heating loop (heating loop mode 1)



Heating Set point (it is read-only and it shows the compensated value if the compensation mode is ON)

It is displayed only if compensation = ON (cop = ON)



Max compensation Set point

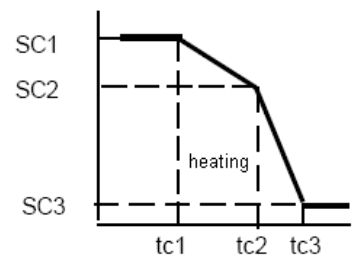
Min. outside temperature

Set point of the compensation curve modification

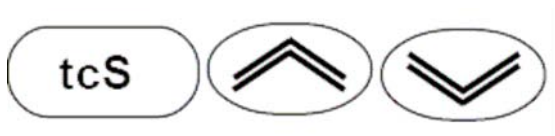
Temperature of slope modification

Min. Set point in compensation

Max. outside Temperature



Only if a floating motor is used:



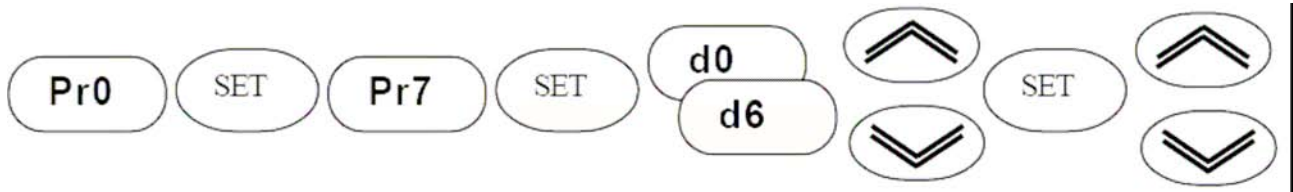
Motor stroke time

## TIME SCHEDULE

Push the **SET** key to start the parameter mode, and then select: **Pr0**

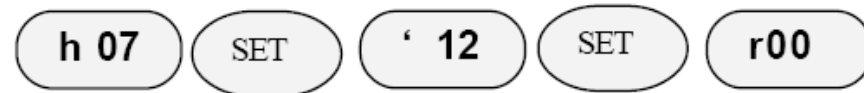
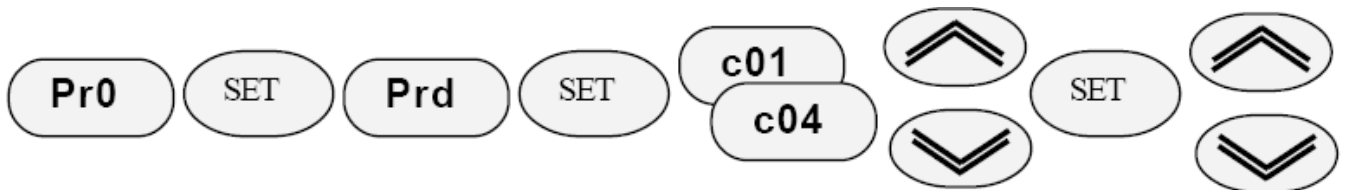
SET Pr7 SET  
d0  
d6  
SET

The following function allows selecting the mode referred to each day, taking into account that D0 corresponds to Monday and D6 corresponds to Sunday. For each day, it is possible to set the mode 0= comfort, mode 1 = Economy, mode 2 = Stop, mode 3 = according to the time schedule.



## CHANGEOVER TIME

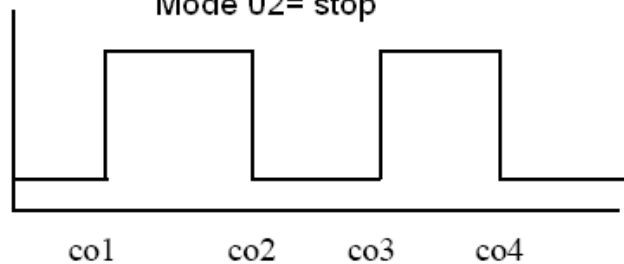
The following function allows setting the changeover times of the time schedule. These changeover times are applied to the programmed days in mode 3 = according to the schedule programme.



Changeover  
time

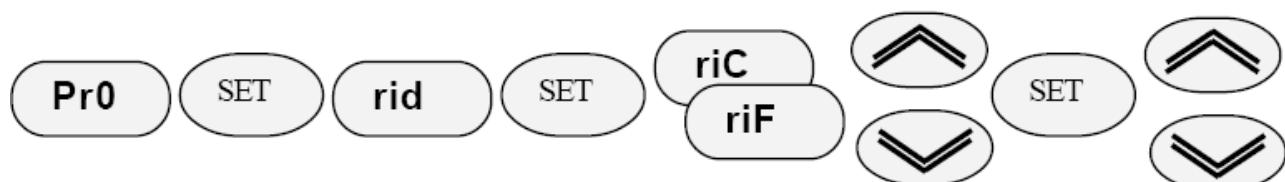
Changeover  
minute

Mode 00= comfort  
Mode 01= economy  
Mode 02= stop



### Value programme to the Economy mode

This function allows programming the Economy mode. riC corresponds to the heating Economy mode and riF corresponds to the cooling Economy mode.




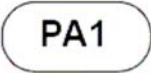








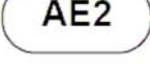
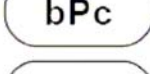
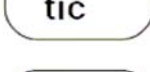
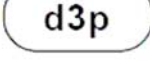
## PROGRAMME MODE – “technical level” (level 2)

ATTENTION: this function has to be carried out by skilled staff. This function allows enabling all the functions which could be displayed in Parameter mode during the “User Level” programming stage (menu level 1).

## HEATING LOOP PROGRAMME

This function allows configuring the controller and enabling the different functions which can be changed through the user mode.

Push the  for 10 seconds to start the programme mode

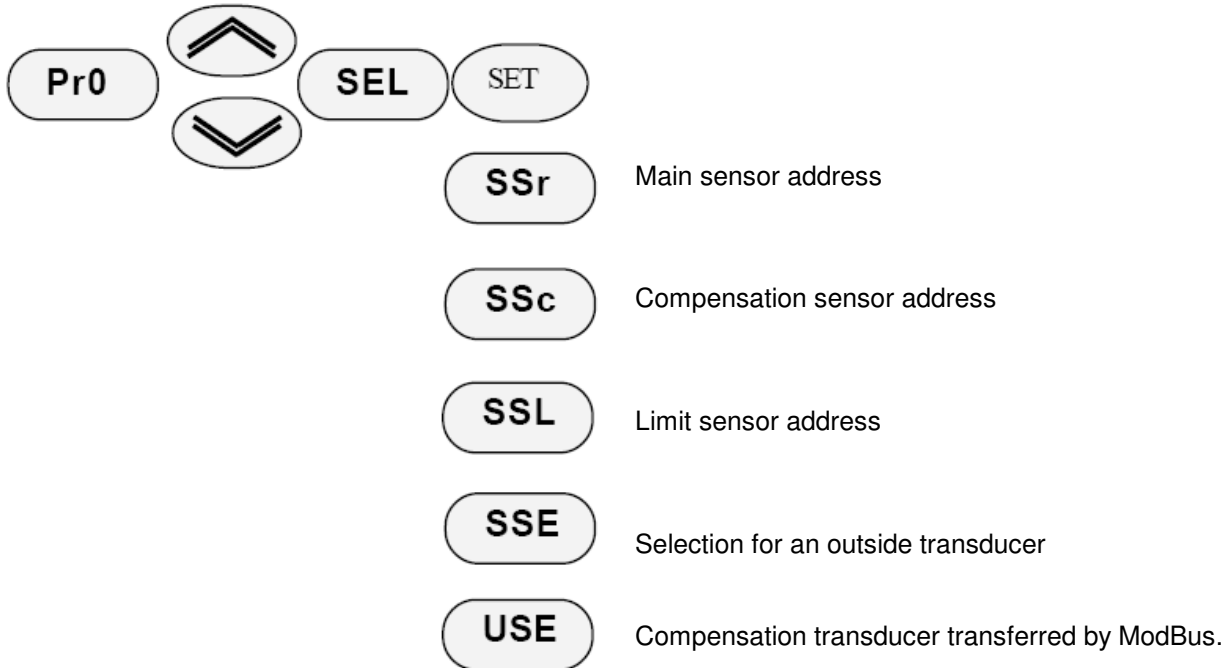
			PA1 corresponds to the Analogue Loop 1
			Loop mode configuration: set n.1 “Heating”
			Clock activation (compulsory for the schedule programme)
			Integral mode enable
			Compensation mode enable if an outside sensor is connected to SC
			Closing Loop if DI1 is enabled
			Day extension contact. If the loop is stopped according to the time schedule, the DI2 contact enables to re-start it in daily mode.
			Proportional band
			Integral action
			3Points Floating motor Driver (ON=Active)

## SPECIAL FUNCTIONS

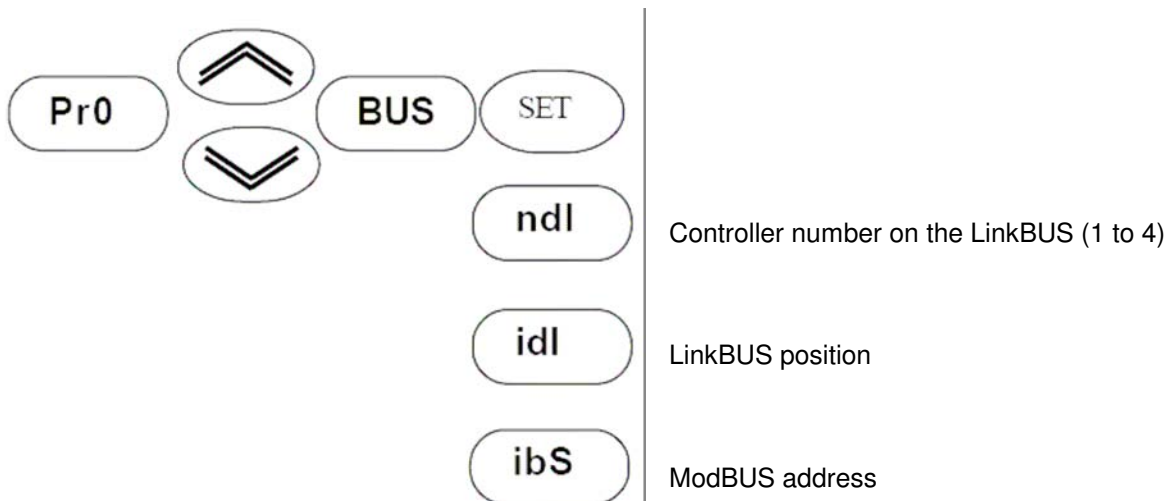
### Sensors Sharing through Idl

This function enables to configure the sensor position; in case two or more controllers are connected to the local Link bus, they can share the connected sensors values. In order to do this it is necessary to set the Link bus address of the controller connected to the sensor.

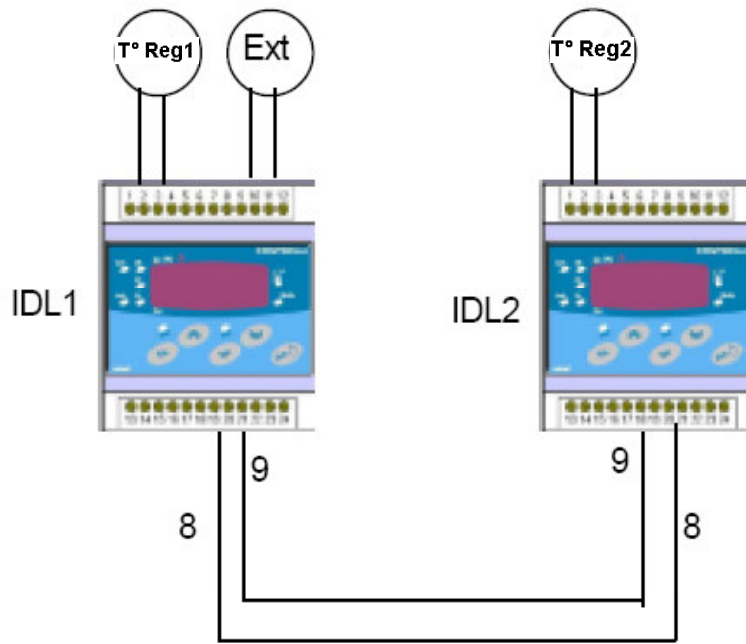
Example: if the compensation transducer is physically connected to controller with address idL=2 of the Link-bus (this function is available only for the IdL Bus) SSc will have value 2 on the following table.



### Configuration of Communication Bus (IDL inside bus – ibs outside bus)



Example of outside temperature transmission. Link Bus is used to transmit an outside temperature value to another controller. Note: the Link Bus must not exceed 10 m.



Example of transmission of the IDL1 outside temperature to IDL2

## DEFAULT PARAMETERS RESTORE AND LAST CONFIGURATION SAVE/RECOVER

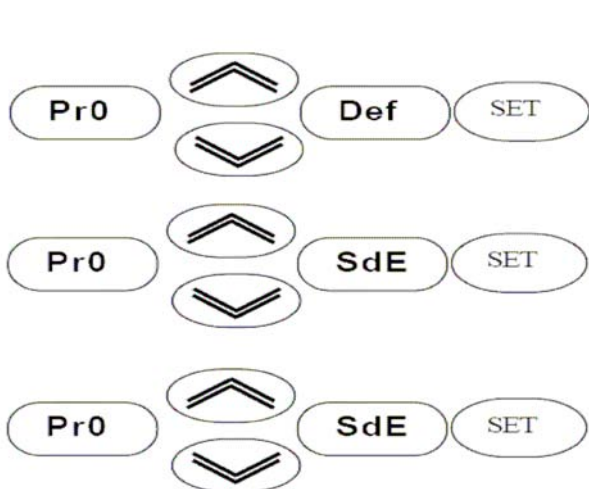
- 1) Connect the two controllers with the Link Bus cable (8 and 9 terminals).
- 2) Select the LinkBus address of each controller.

Transfer the parameters:

NDL -----> Total Number of controllers connected to the link bus: 1 to 4

Idl -----> Link-bus position (1 to 4).

- 3) If you want to transfer only the IDL1 outside temperature to IDL2, with the outside sensor connected to IDL1, it is necessary to set on IDL2 controller



SEL ---- SSr = 2 (main sensor address)

SSc = 1 (outside sensor address)

SSL = 2

Set the default values again (push "Set" for 10 seconds) and wait for the system reset.

Writing on EEPROM (push for 5 seconds and Yes will appear when the parameters are in EEPROM)

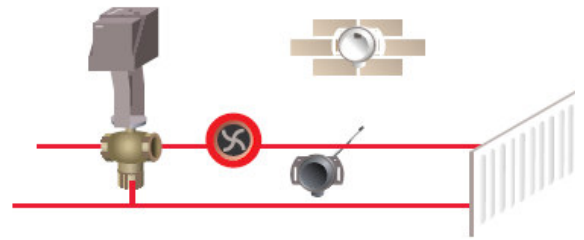
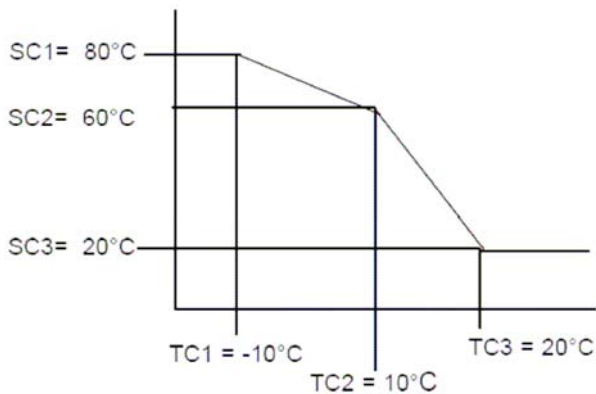
Reload of stored data.



# “Floating” Configuration (Application 1)

## Heating Loop Control

Heating loop control depending on set point temperature and outside temperature. Action on floating or 0-10V motorized valve. Daily extension contact.



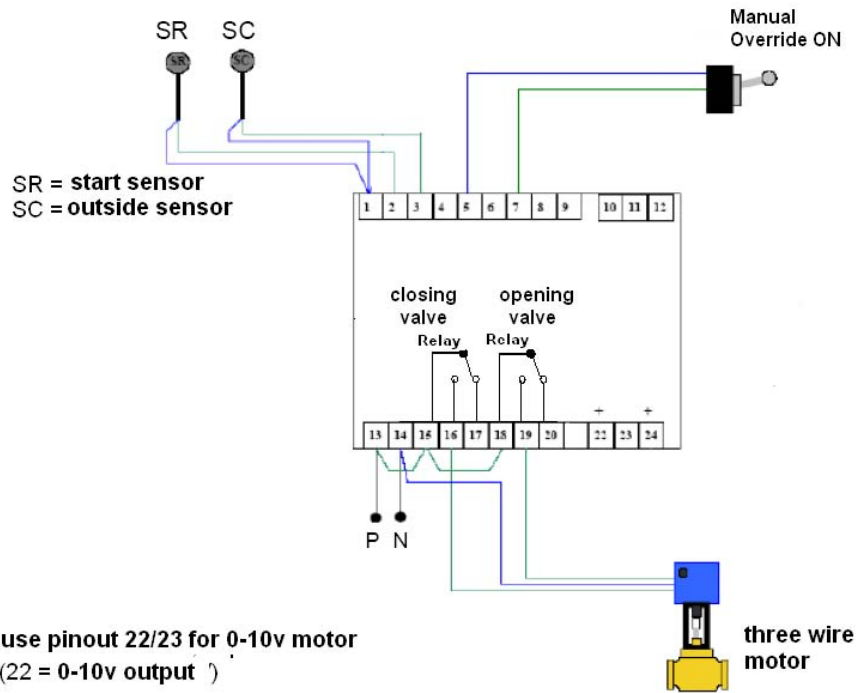
## User Parameters

- PA1 (Heating mode)
- SoC Calculated Set point 21 °C
- SC1 First temperature Set point 80 °C
- TC1 First external temperature -10 °C
- SC2 Second temperature Set point 60 °C
- TC2 Second outside temperature 10 °C
- SC3 Third temperature Set point 20 °C
- TC3 Third outside temperature 20 °C
- TcS Actuator stroke time 130s

## Technical Parameters

- PA1 (Heating mode)
- OP Operating mode 1
- ABO Time schedule ON
- Int Integral action OFF
- Cop Compensation zone ON
- LLL High limit OFF
- LLH Low limit OFF
- AE1 Input Di1 OFF
- AE2 Input Di2 daily extension ON
- BPC Proportional band 15 °C
- TiC Integral action 60s
- d3P Floating motorized valve ON

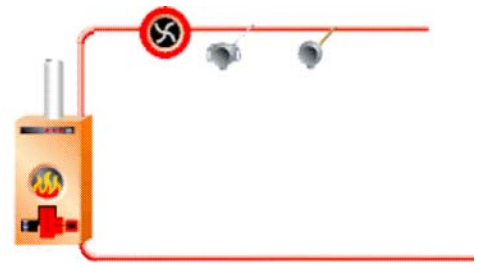
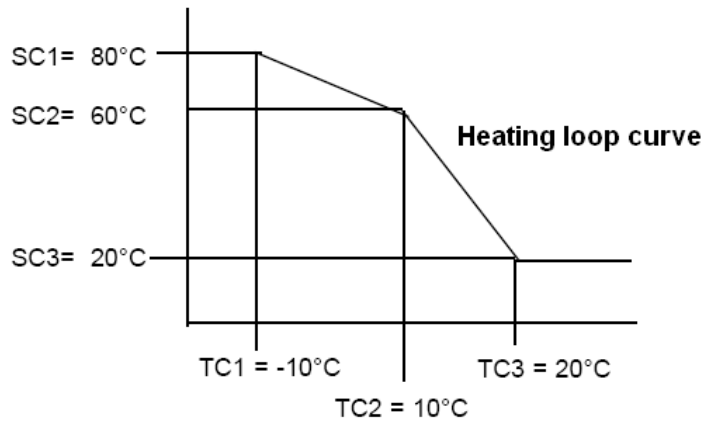
# Wiring Diagram – Application 1



# Configuration Example with Pump and Burner Control (Application 2)

## Boiler Control

Compensated control of a boiler according to the supply and outside temperature, with max limit thermostat. Pump control with timed shutdown.



## User Parameters

PD1 (Boiler control)

SoC	Calculated boiler Set point	21 °C
SC1	1st Set Point T 1	80 °C
TC1	Outside T 1	-10 °C
SC2	2nd Set Point T 2	60 °C
Tc2	Outside T 2	10 °C
SC3	3rd Set Point T 3	20 °C
TC3	Outside T 3	20 °C

PD2 (pump cde)

TrS	Time to Switch Off Delay	60s
TrA	Time to Switch On Delay	0s

## Technical Parameters

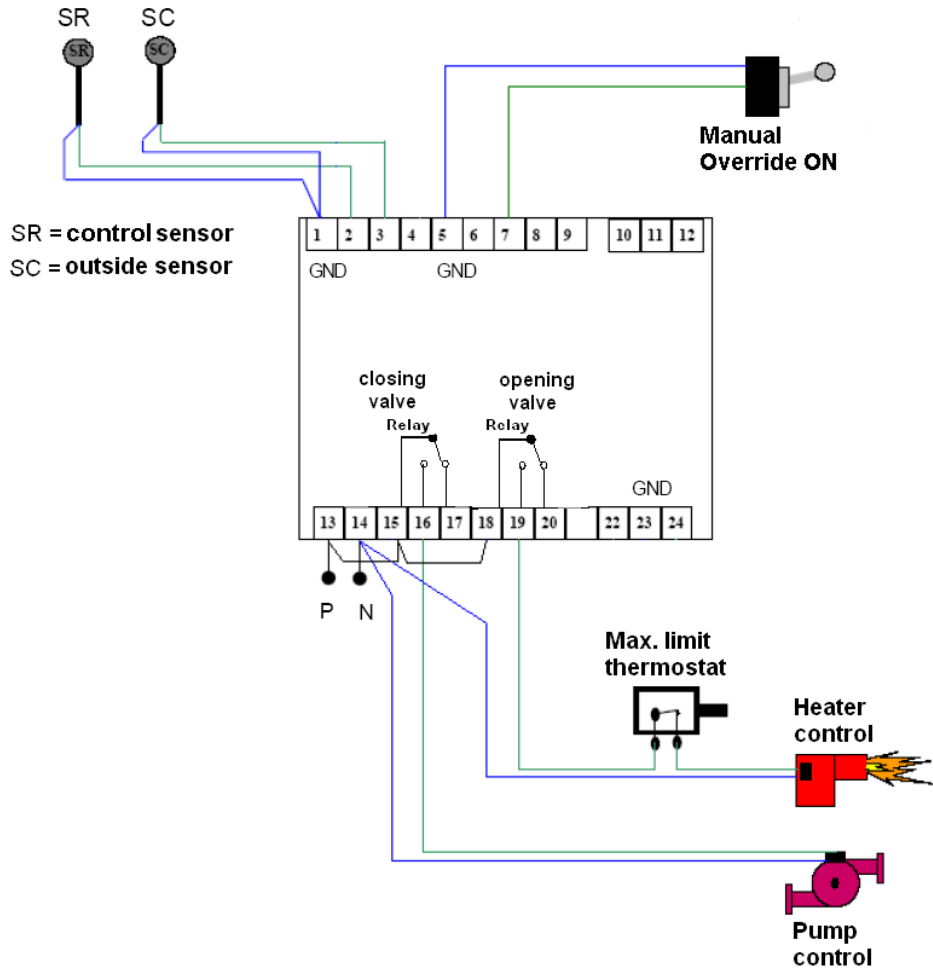
PD1 (Boiler control)

OP	Mode selection	1
ABO	Time schedule	ON
Cop	Compensation	ON
AE1	Di1 input	OFF
AE2	Di2 input	OFF
BPC	Proportional band	4 °C

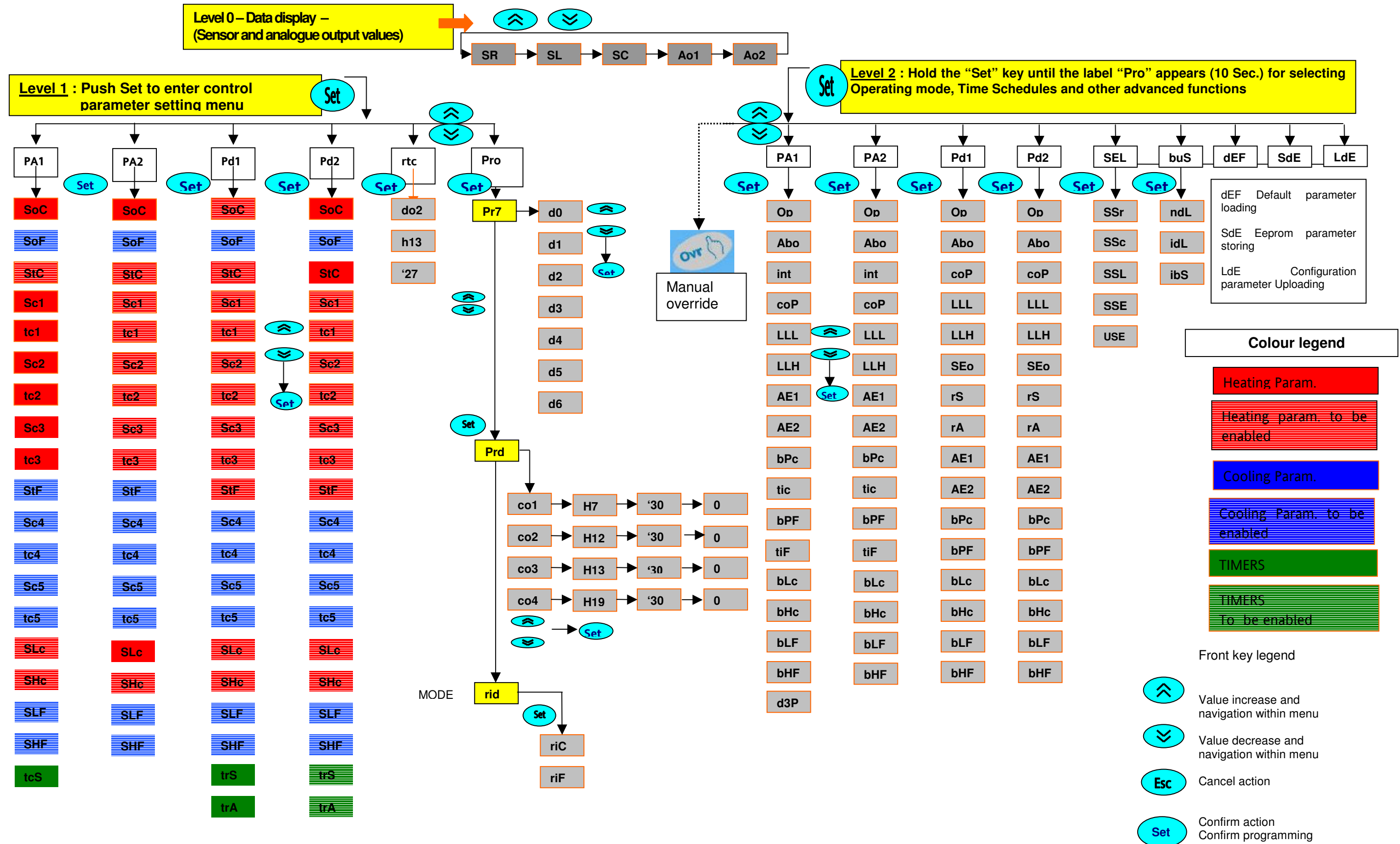
PD2 (pump control)

OP	Mode selection	4
ABO	Time schedule	OFF
SEo	ON/OFF control function	ON
rS	Switch Off delay	ON
rA	Switch On delay	ON
AE1	Di1 input	OFF
AE2	Di2 input	ON

## Wiring Diagram – Application 2



# ANNEX 2 – Menu Synoptic – Parameter List and Description



# CONTROLLER PARAMETERS

## Parameter tables : Level 1 (Loop control parameters)

Analogue controller PA1	Default	Range	Description	Availability
SoC	--		Heating operating Set	Always (Visualisation only, cannot be set)
SoF	--		Cooling operating Set	Always (Visualisation only, cannot be set)
StC	80,0	-50 to 150	Heating Loop Set	With SR, without Compens., 1, 3 and 4 operating mode
Sc1	80,0	-50 to 150	Heating compensation min. Set	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
tc1	-10,0	-50 to 150	Heating compensation min. temperature	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
Sc2	60,0	-50 to 150	Heating compensation average Set	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
tc2	10,0	-50 to 150	Heating compensation average temperature	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
Sc3	20,0	-50 to 150	Heating compensation max. Set	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
tc3	20,0	-50 to 150	Heating compensation max. temperature	With SR and SC, Compens. enabled, 1, 3 and 4 operating mode
StF	23,0	-50 to 150	Cooling Loop Set	With SR, without Compens., 2, 3 and 4 operating mode
Sc4	10,0	-50 to 150	Cooling compensation min. Set	With SR and SC, Compens. enabled, 2, 3 and 4 operating mode
tc4	10,0	-50 to 150	Cooling compensation min. temperature	With SR and SC, Compens. enabled, 2, 3 and 4 operating mode
Sc5	30,0	-50 to 150	Cooling compensation max. Set	With SR and SC, Compens. enabled, 2, 3 and 4 operating mode
tc5	15,0	-50 to 150	Cooling compensation max. temperature	With SR and SC, Compens. enabled, 2, 3 and 4 operating mode
SLc	18,0	-50 to 150	Heating min. limit Loop Set	With LLL enabled, 1, 3 and 4 operating mode
SHc	24,0	-50 to 150	Heating max. limit Loop Set	With LLH enabled, 1, 3 and 4 operating mode
SLF	18,0	-50 to 150	Cooling min. limit Loop Set	With LLL enabled, 2, 3 and 4 operating mode
SHF	24,0	-50 to 150	Cooling max. limit Loop Set	With LLH enabled, 2, 3 and 4 operating mode
tcS	135,0	10 to 600	Actuator Stroke time	With d3P enabled (in PA1 only)

Analogue controller PA2	Default	Range	Description	Availability
SoC	--		Heating operating Set	Always (Visualisation only, cannot be set)
SoF	--		Cooling operating Set	Always (Visualisation only, cannot be set)
StC	-50,0	-50 to 150	Heating Loop Set	With SR, without Compens., 1, 3 and 4 operating mode
Sc1	80,0	-50 to 150	Heating compensation min. Set	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
tc1	-10,0	-50 to 150	Heating compensation min. temperature	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
Sc2	60,0	-50 to 150	Heating compensation average Set	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
tc2	10,0	-50 to 150	Heating compensation average temperature	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
Sc3	20,0	-50 to 150	Heating compensation max. Set	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
tc3	20,0	-50 to 150	Heating compensation max. temperature	With SR and SC, Compens. enabled., 1, 3 and 4 operating mode
StF	23,0	-50 to 150	Cooling Loop Set	With SR, without Compens., 2, 3 and 4 operating mode
Sc4	10,0	-50 to 150	Cooling compensation min. Set	With SR and SC, Compens. 2, 3 and 4 operating mode
tc4	10,0	-50 to 150	Cooling compensation min. temperature	With SR and SC, Compens. 2, 3 and 4 operating mode
Sc5	30,0	-50 to 150	Cooling compensation max. Set	With SR and SC, Compens. 2, 3 and 4 operating mode
tc5	15,0	-50 to 150	Cooling compensation max. temperature	With SR and SC, Compens. 2, 3 and 4 operating mode
SLc	55,0	-50 to 150	Heating min. limit Loop Set	With LLL enabled, 1, 3 and 4 operating mode
SHc	24,0	-50 to 150	Heating max. limit Loop Set	With LLH enabled, 1, 3 and 4 operating mode
SLF	18,0	-50 to 150	Cooling min. limit Loop Set	With LLL enabled, 2, 3 and 4 operating mode
SHF	24,0	-50 to 150	Cooling max. limit Loop Set	With LLH enabled, 2, 3 and 4 operating mode

On/Off controller Pd1	Default	Range	Description	Availability
SoC	--		Heating operating Set	Always (Visualisation only, cannot be set)
SoF	--		Cooling operating Set	Always (Visualisation only, cannot be set)
StC	21,0	-50 to 150	Heating ON/OFF set	With SR, without Compens., 1 and 3 operating mode
Sc1	20,0	-50 to 150	Heating compensation min. Set	With SR and SC, compens. enabled, 1 and 3 operating mode
tc1	5,0	-50 to 150	Heating compensation min. temperature	With SR and SC, compens. enabled, 1 and 3 operating mode
Sc2	35,0	-50 to 150	Heating compensation average Set	With SR and SC, compens. enabled, 1 and 3 operating mode
tc2	10,0	-50 to 150	Heating compensation average temperature	With SR and SC, compens. enabled, 1 and 3 operating mode
Sc3	35,0	-50 to 150	Heating compensation max. Set	With SR and SC, compens. enabled, 1 and 3 operating mode
Tc3	10,0	-50 to 150	Heating compensation max. temperature	With SR and SC, compens. enabled, 1 and 3 operating mode

SLc	24,0	-50 to 150	Heating min. ON/OFF limit Set	With LLL enabled, 1 and 3 operating mode
SHc	24,0	-50 to 150	Heating max. ON/OFF limit Set	With LLH enabled, 1 and 3 operating mode
SLF	18,0	-50 to 150	Cooling min. ON/OFF limit Set	With LLL enabled, 2 and 3 operating mode
SHF	24,0	-50 to 150	Cooling max. ON/OFF limit Set	With LLH enabled, 2 and 3 operating mode
StF	24,0	-50 to 150	Cooling ON/OFF Set	With SR, without Compens., 2 and 3 operating mode
Sc4	8,0	-50 to 150	Cooling compensation min. Set	With SR and SC, compens. enabled., 2 and 3 operating mode
tc4	0,0	-50 to 150	Cooling compensation min. temperature	With SR and SC, compens. enabled., 2 and 3 operating mode
Sc5	15,0	-50 to 150	Cooling compensation max. Set	With SR and SC, compens. enabled., 2 and 3 operating mode
tc5	40,0	-50 to 150	Cooling compensation max. temperature	With SR and SC, compens. enabled., 2 and 3 operating mode
trS	900	0 to 1999	Switch off delay time (sec)	Operating mode 4
trA	0	0 to 1999	Switch on delay time (sec)	Operating mode 4

On/Off controller Pd2	Default	Range	Description	Availability
SoC	--		Heat operating Set	Always (Visualisation only, cannot be set)
SoF	--		Cool operating Set	Always (Visualisation only, cannot be set)
StC	95,0	-50 to 150	Heat ON/OFF set	With SR, without Compens., 1 and 3 operating mode
Sc1	20,0	-50 to 150	Heating compensation min. Set	With SR and SC, compens. enabled, 1 and 3 operating mode
tc1	5,0	-50 to 150	Heating compensation min. temperature	With SR and SC, compens. enabled, 1 and 3 operating mode
Sc2	35,0	-50 to 150	Heating compensation med. Set	With SR and SC, compens. enabled, 1 and 3 operating mode
tc2	10,0	-50 to 150	Heating compensation med. temperature	With SR and SC, compens. enabled, 1 and 3 operating mode
Sc3	35,0	-50 to 150	Heating compensation max. Set	With SR and SC, compens. enabled, 1 and 3 operating mode
Tc3	10,0	-50 to 150	Heating compensation max. temperature	With SR and SC, compens. enabled, 1 and 3 operating mode
SLc	24,0	-50 to 150	Heating min. ON/OFF limit Set	With LLL enabled, 1 and 3 operating mode
SHc	24,0	-50 to 150	Heating max. ON/OFF limit Set	With LLH enabled, 1 and 3 operating mode
SLF	18,0	-50 to 150	Cooling min. ON/OFF limit Set	With LLL enabled, 2 and 3 operating mode
SHF	24,0	-50 to 150	Cooling max. ON/OFF limit Set	With LLH enabled, 2 and 3 operating mode
StF	24,0	-50 to 150	Cooling ON/OFF set	With SR, without Compens., 2 and 3 operating mode
Sc4	8,0	-50 to 150	Cooling compensation min. Set	With SR and SC, compens. enabled, 2 and 3 operating mode
tc4	0,0	-50 to 150	Cooling compensation min. temperature	With SR and SC, compens. enabled, 2 and 3 operating mode
Sc5	15,0	-50 to 150	Cooling compensation max. Set	With SR and SC, compens. enabled, 2 and 3 operating mode
tc5	40,0	-50 to 150	Cooling compensation max. temperature	With SR and SC, compens. enabled, 2 and 3 operating mode
trS	0	0 to 1999	Switch off delay time (sec)	Operating mode 4
trA	0	0 to 1999	Switch on delay time (sec)	Operating mode 4

**Parameter tables : Level 2 (Time schedules, operating modes, Special functions)**

**Time schedules (Pro)**

<b>Weekly schedule (Pr7)</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
d0 (MON)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d1 (TUE)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d2 (WED)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d3 (THU)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d4 (FRI)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d5 (SAT)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always
d6 (SUN)	3	0 to 5	Fixed mode or daily schedule (NM, RF, FA, PG, PG1,PG2)	Always

<b>Daily schedule (Prd)</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
co 1: h	0	0 to 23	Change-over time 1	Always
:'	0	0 to 59	Change-over minutes 1	Always
:r	1	0 to 2	Change-over mode 1(NM, RF, FA)	Always
co 2: h	6	0 to 23	Change-over time 2 (0-23)	Always
:'	0	0 to 59	Change-over minutes 2 (0-59)	Always
:r	0	0 to 2	Change-over mode 2 (NM, RF, FA)	Always
co 3: h	18	0 to 23	Change-over time 3 (0-23)	Always
:'	0	0 to 59	Change-over minutes 3 (0-59)	Always
:r	1	0 to 2	Change-over mode 3 (NM, RF, FA)	Always
co 4: h	18	0 to 23	Change-over time 4 (0-23)	Always
:'	0	0 to 59	Change-over minutes 4 (0-59)	Always
:r	1	0 to 2	Change-over mode 4 (NM, RF, FA)	Always

<b>Reduced Set (rid)</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
RiC	10,0	0 to 20	Heating Set decrease	Always
RiF	20,0	0 to 20	Cooling Set decrease	Always



<b>Operating modes</b>					
<b>Analogue controller</b>					
<b>PA1</b>					
	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>	
Op	1	1 to 4	Operating mode (1, 2, 3, 4)	Always	<b>Note: For details about the Operating modes see also the data sheet</b>
Abo	ON		Automatic/Manual enable (Clock)	Always	
Int	ON		Integral action enable	Always	
coP	ON		Compensated set enable	With SC sensor	
LLL	OFF		Min. limit loop (Low) enable	With SL sensor	
LLH	OFF		Max limit Loop (high) enable	With SL sensor	
AE1	OFF		Loop stop on DI1 (outside enable 1)	Always	
AE2	ON		Loop stop on DI2 (outside enable 2)	Operating mode 1, 2 and 4. Operating mode 3: W(off)/S changeover	
bPc	15,0	0 to 25	Heating loop proportional band	With SR, operating mode 1, 3 and 4	
tiC	60	30 to 1200	Heating integration time (sec)	With integral action enable	
tiF	480	30 to 1200	Cooling integration time (sec)	With integral action enable	
bLc	4,0	0 to 25	Heating min. limit proportional band	With LLL enabled, operating mode 1, 3 and 4	
bHc	4,0	0 to 25	Heating max. limit proportional band	With LLH enabled, operating mode 1, 3 and 4	
bLF	4,0	0 to 25	Cooling min. limit proportional band	With LLL enabled, operating mode 2, 3 and 4	
bHF	4,0	0 to 25	Cooling max. limit proportional band	With LLH enabled, operating mode 2, 3 and 4	
bPF	4,0	0 to 25	Cooling loop proportional band	With SR, operating mode 2, 3 and 4	
d3p	ON		Floating driver enable	Always	

<b>Operating mode</b>					
<b>Analogue controller</b>					
<b>PA2</b>					
	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>	
Op	1	1 to 4	Operating mode (1, 2, 3, 4)	Always	<b>Note: For details about the Operating modes see also the data sheet</b>
Abo	ON		Automatic/manual enable (clock)	Always	
Int	OFF		Integral action enable	Always	
coP	OFF		Compensated set enable	With SC sensor	
LLL	ON		Min. limit loop enable (Low)	With SL sensor	
LLH	OFF		Max limit loop enable (High)	With SL sensor	
AE1	OFF		Loop stop on DI1 (outside enable 1)	Always	
AE2	ON		Loop stop on DI2 (outside enable 2)	Operating mode 1, 2 and 4. operating mode 3: W(off)/S changeover	
bPc	4,0	0 to 25	Heating loop proportional band	With SR, operating mode 1, 3 and 4	
tiC	480	30 to 1200	Heat integral time (sec)	With enabled integral action	
tiF	480	30 to 1200	Cool integral time (sec)	With enabled integral action	
bLc	4,0	0 to 25	Heating min. limit proportional band	With LLL enabled, operating mode 1, 3 and 4	
bHc	4,0	0 to 25	Heating max. limit proportional band	With LLH enabled, operating mode 1, 3 and 4	
bLF	4,0	0 to 25	Cooling min. limit proportional band	With LLL enabled, operating mode 2, 3 and 4	
bHF	4,0	0 to 25	Cooling max. limit proportional band	With LLH enabled, operating mode 2, 3 and 4	
bPF	4,0	0 to 25	Cooling loop proportional band	With SR, operating mode 2, 3 and 4	

<b>On/Off Controller Pd1</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
Op	4	1 a 4	Operating mode (1, 2, 3, 4)	Always
Abo	OFF		Automatic/manual enable (Clock)	Always
coP	OFF		Compensated set enable	With SC, operating mode 1, 2 and 3
LLL	OFF		Min. ON/OFF limit enable (Low)	With SL, operating mode 1, 2 and 3
LLH	OFF		Max. ON/OFF limit enable (High)	With SL, operating mode 1, 2 and 3
SEo	ON		Other ON/OFF control enable	Operating mode 4
RS	ON		Switch off delay enable	Operating mode 4
RA	OFF		Switch on delay enable	Operating mode 4
AE1	OFF		Loop stop on DI1 (outside enable 1)	Always
AE2	OFF		Loop stop on DI2 (outside enable 2)	Operating mode 1, 2 and 4. Operating mode 3: W(off)/S changeover
bPc	4,0	0 to 25	Heating ON/OFF hysteresis	With SR, operating mode 2 and 3
bPF	4,0	0 to 25	Cooling ON/OFF hysteresis	With SR, operating mode 2 and 3
bLc	4,0	0 to 25	Heating min. ON/OFF limit hysteresis	With LLL enabled, operating mode 1 and 3
bHc	4,0	0 to 25	Heating max. ON/OFF limit hysteresis	With LLH enabled, operating mode 1 and 3
bLF	4,0	0 to 25	Cooling min. ON/OFF limit hysteresis	With LLL enabled, operating mode 1 and 3
bHF	4,0	0 to 25	Cooling max. ON/OFF limit hysteresis	With LLH enabled, operating mode 1 and 3

<b>On/Off Controller Pd2</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
Op	1	1 to 4	Operating mode (1, 2, 3, 4)	Always
Abo	ON		Automatic/manual enable (Clock)	Always
coP	OFF		Compensated set enable	With SC, operating mode 1, 2 and 3
LLL	OFF		Min. ON/OFF limit enable (Low)	With SL, operating mode 1, 2 and 3
LLH	OFF		Max. ON/OFF limit enable (High)	With SL, operating mode 1, 2 and 3
SEo	OFF		Other ON/OFF control enable	Operating mode 4
RS	OFF		Switch off delay enable	Operating mode 4
RA	OFF		Switch on delay enable	Operating mode 4
AE1	OFF		Loop stop on DI1 (outside enable 1)	Always
AE2	ON		Loop stop on DI2 (outside enable 2)	Operating mode 1, 2 and 4. Operating mode 3: W(off)/S changeover
bPc	4,0	0 to 25	Heating ON/OFF hysteresis	With SR, operating mode 2 and 3
bPF	4,0	0 to 25	Cooling ON/OFF hysteresis	With SR, operating mode 2 and 3
bLc	4,0	0 to 25	Heating min. ON/OFF limit hysteresis	With LLL enabled, operating mode 1 and 3
bHc	4,0	0 to 25	Heating max. ON/OFF limit hysteresis	With LLH enabled, operating mode 1 and 3
bLF	4,0	0 to 25	Cooling min. ON/OFF limit hysteresis	With LLH enabled, operating mode 1 and 3
bHF	4,0	0 to 25	Cooling max. ON/OFF limit hysteresis	With LLH enabled, operating mode 1 and 3

<b>Special functions</b>				
<b>Sensor selection (SEL)</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
SSr	1		Selection of control sensor	Always
SSc	1		Selection of compensation sensor	Always
SSL	1		Selection of limit sensor	Always
SSE	1		Selection of outside sensor	Always
USE	OFF		ModBus compensation sensor enable	Always

<b>Communication (buS)</b>	<b>Default</b>	<b>Range</b>	<b>Description</b>	<b>Availability</b>
ndL	1	1 to 4	Number of devices on LinkBus (1 - 4)	Always
idL	1	1 to 4	LinkBus position (1 - ndL)	Always
ibS	1	1 to 255	ModBus Supervisor bus address	Always