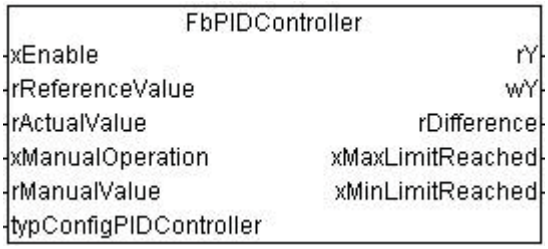
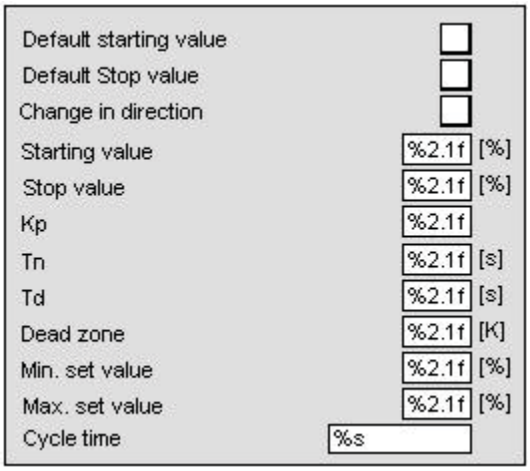
05 Controllers

PID Controller (FbPIDController)

WAGO-I/O-*PRO* Library Elements		
Category:	Building Automation	
Name:	FbPIDController	
Type:	Function ☐	Function block ☒ / Program ☐
Name of library:	Building_HVAC_03.lib	
Applicable to:	See Release Note	
Input parameters:	**Data type:**	**Comment:**
xEnable	BOOL	Enable PID controller Default setting = TRUE
rReferenceValue	REAL	Reference value [°C]
rActualValue	REAL	Actual value [°C]
xManualOperation	BOOL	Enable manual operation
rManualValue	REAL	Set value in manual mode [°C]
typConfigPIDController	←	Configuration parameters:
.xChangeInDirection	BOOL	Operating direction of the controller FALSE = heating; TRUE = cooling
.xPresetON	BOOL	Release start value on activation of the controller
.xPresetOFF	BOOL	Release stop value on deactivation of the controller
.rPresetValueON	REAL	Setting value of the controller when switched on
.rPresetValueOFF	REAL	Setting value of the controller when switched off
.tCycleTime	TIME	Cycle time for the controller Default = t#100ms
.rOutputMin	REAL	Minimum value of the set value (rY)
.rOutputMax	REAL	Maximum value of the set value (rY) Default setting = 100
.rKp	REAL	Proportional gain (P portion) Default setting = 10
.rTn	REAL	Reset time (I part) [s] Default setting = 60 s
.rTd	REAL	Rate time (D portion) [s]
.rDeadZone	REAL	Dead zone +/- [K] Default setting = 0
Return value:	**Data type:**	**Comment:**
rY	REAL	Set value of controller [%]
wY	WORD	Set value of the controller Value range = 0 – 32767

rDifference	REAL	Deviation of the set value from the actual value
xMaxLimitReached	BOOL	Maximum set value reached
xMinLimitReached	BOOL	Minimum set value reached
Graphical illustration:		



Visualization objects:	
ConfigPIDController	

Function description:

The **FbPIDController** function block is a standard PID controller with freely configurable Start and Stop values. Additionally, the function block offers the possibility to change the operating direction of the controller.

Configuration parameters:

The configuration structure ***"typConfigPIDController"*** contains the following parameters:

- ***".rKp"*** defines the proportional gain for the controller.
- ***".rTn"*** defines the reset time of the controller.
- ***".rTd"*** defines the derivative time of the controller.
- ***".rDeadZone"*** defines the range around the reference value in which the set value may not be changed (dead zone).
- ***".rOutputMin"*** defines the minimum setting value for the controller.
- ***".rOutputMax"*** defines the maximum setting value for the controller.
- ***".tCycleTime"*** defines the cycle time for the controller.
- ***".xChangeInDirection"*** allows the operating direction of the controller to be changed.
- ***".xPresetOn"*** ensures that the controller starts with the set value ***".rPresetValueOn"***.
- ***".xPresetOff"*** ensures that the controller outputs the set value ***".rPresetValueOff"*** when it is switched off. If *".xPresetOff"* is not activated, the controller outputs the set value of zero when it is switched off.

If the ***"xEnable"*** input is activated, the input values ***"rActualValue"*** and ***"rReferenceValue"*** are used to calculate the set value ***"rY"***.

Manual override is activated via the ***"xManualOperation"*** input. During manual override, the reference value from the ***"rManualValue"*** input is output at the *"rY"* output.

The output value ***"wY"*** has the same meaning as the *"rY"* output, except that the output has standardized values between 0 – 32767.

When the controller reaches its maximum set value ("***xMaxLimitReached"*** = TRUE) or its minimum set value (***"xMinLimitReached"*** = TRUE), the I portion of the controller is inhibited to prevent the set value from being integrated further (anti-wind-up).

The ***"rDifference"*** output indicates the difference between the specified and actual values.