

P1-PC: Pressure Control

P1-PC is a feedback control loop for two pressure-control valves (PCV01D and PCV02D) and maintain

the pressure (PIT01) between the main and return water tanks according to an operator's setpoint command (B2016).

B2016

PCV01D

PID

Boiler

PIT01

PCV02D

Saturation Rate Limiter

F()

(P1)

P1-Pressure Control (PC)

Function

FIGURE 4. PRESSURE CONTROL OF THE BOILER

P1-LC: Level Control

P1-LC is a feedback control loop for the level-control valve (LCV01D) and maintain the water level (LIT01) of the return water tank according to the operator's setpoint command (B3004). In addition, a

feed-forward control was used to rapidly suppress any disturbance in the outflow rate (FCV03D).

P1-FC

FCV03D

B3004

LCV01D

Boiler

LIT01

PID

(P1)

Saturation Rate Limiter

Saturation

P1-Level Control (LC)

FIGURE 5. LEVEL CONTROL OF THE BOILER.

P1-FC: Flow rate Control

P1-FC is a feedback control loop for the flow-control valve (FCV03D) and maintain the outflow rate (FT03) for the return water tank according to the operator's setpoint command (B3005).

P1-LC

B3005

FCV03D

Boiler

FT03

PID

(P1)

Saturation Rate Limiter

P1-Flowrate Control (FC)

FIGURE 6. FLOW RATE CONTROL OF THE BOILER.

P1-TC: Temperature Control

P1-TC is a feedback control loop for two flow-control valves (FCV01D and FCV02D) in the heat transfer system and maintain the temperature (TIT01) of the main vessel according to the operator's setpoint command (B4022). Cascade control with feedforward compensation to the flow controller (inner loop) based on the water flow allowed for a quicker response to fluctuations in the water flow.

