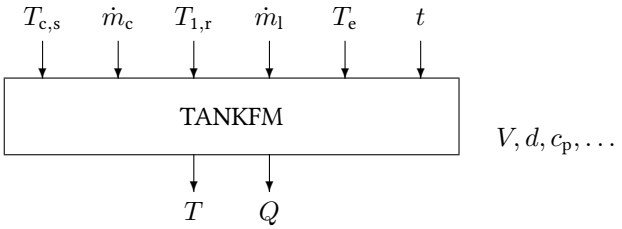
Block TANKFM

The TANKFM block simulates a fully-mixed storage tank.





Name	TANKFM
Function	st0028
Inputs	6
Outputs	2
Parameters	6
Strings	0
Group	S

Inputs

1 Supply temperature from collector $T_{c,s}$ / °C
2 Collector mass flow rate $\dot{m}_c$ / kg s^{-1}
3 Return temperature from load $T_{l,r}$ / °C
4 Load mass flow rate $\dot{m}_l$ / kg s^{-1}
5 Environment temperature T_e / °C
6 Time / s

Outputs

1 Storage temperature T / °C
2 Energy content of the storage Q / J

Parameters

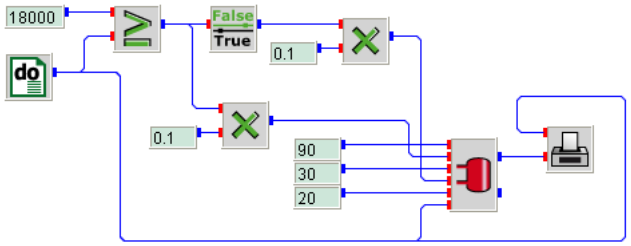
1 Tank volume V / m^3
2 Tank diameter d / m
3 Specfic heat of fluid c_p / J kg^{-1} K^{-1}
4 Fluid density ρ / kg m^{-3}
5 Overall heat-loss coefficient U / W m^{-2} K^{-1}
6 Initial tank temperature T_0 / °C

Strings

None

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tankfm.vseit

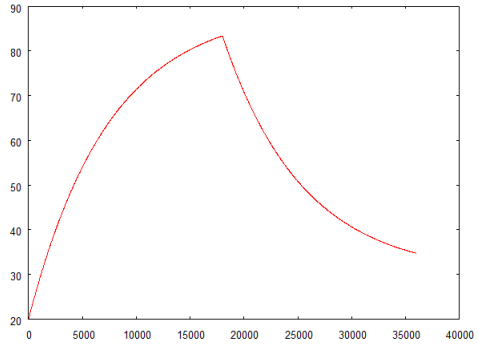


A fully mixed storage tank with a volume of 0.75 m^3 and a diameter of 0.7 m is simulated over a time period of 36 000 seconds (10 hours) in steps of 20 seconds, as defined by a DO block. The tank fluid is assumed to be water with a specific heat capacity of 4190 $J\,kg^{-1}\,K^{-1}$ and a density of 1000 kg/m^3. The overall heat-loss coefficient is set to 0.5 $W\,m^{-2}\,K^{-1}$ at an initial tank temperature of 20 °C.

The supply temperature of the tank is set constant to 90 °C, the return temperature is assumed to be 30 °C, and the environment temperature of the tank is set to 20 °C, as defined by three CONST blocks.

The logics implies that the tank is charged for 18000 seconds (5 hours) at a mass flow of of 0.1 kg/s and then discharged with the same mass flow. As long as the value 18 000, defined by a CONST block is greater or equal to the output of the DO block, the GE block outputs one. This signal, multiplied by the constant mass flow rate of 0.1 kg/s by a MUL block gives the mass flow rate at 90 °C into the tank. The inverse signal of the hot water supply mass flow, generated by the INV block, is used as load mass flow of the tank.

The PLOT block shows the resulting temperature profile in the tank.



See also Block TANKST.