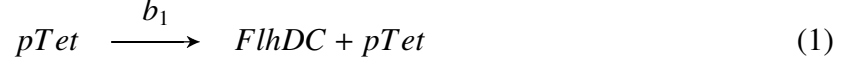
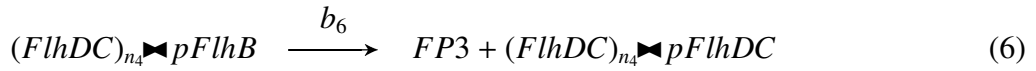
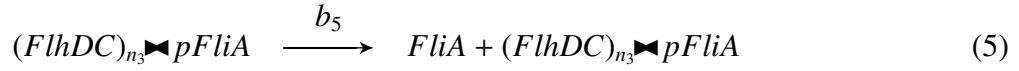
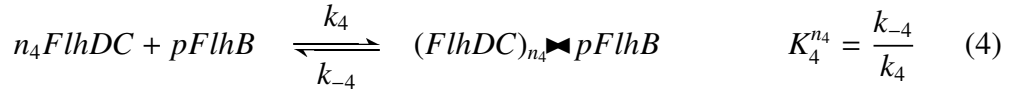
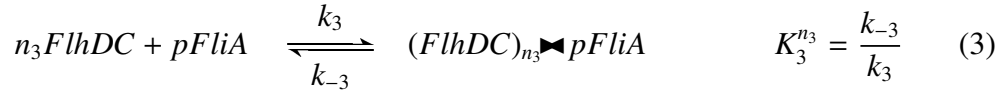


Equations for the  
“*Oscillation Module*”

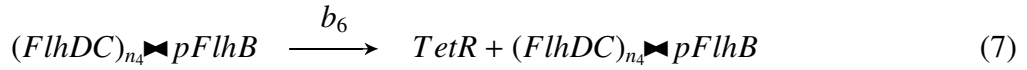
specific to pTet-circuit



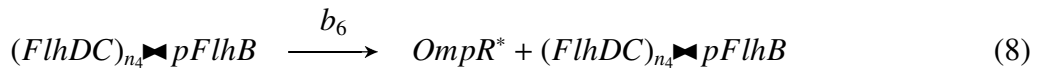
specific to pFlhDC-circuit

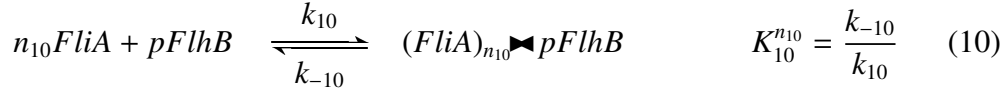
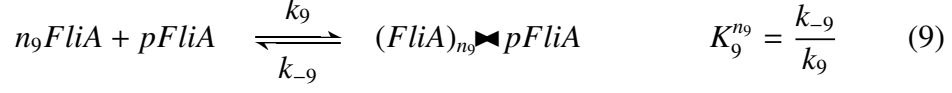


specific to pTet-circuit

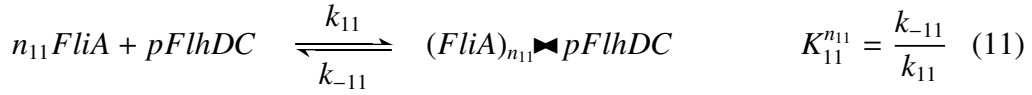


specific to pFlhDC-circuit

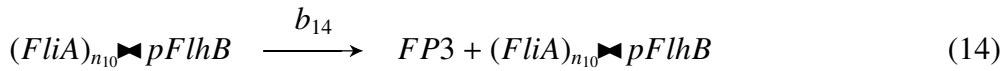
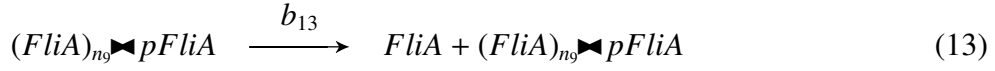
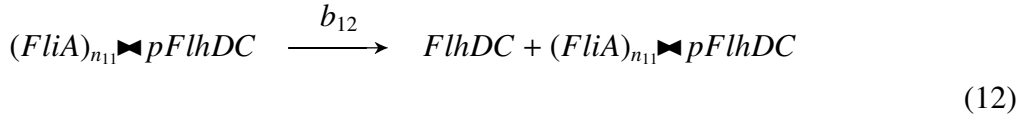




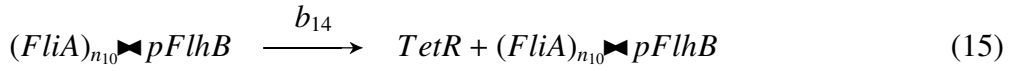
specific to pFlhDC-circuit



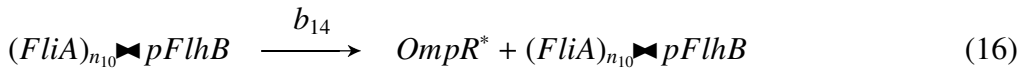
specific to pFlhDC-circuit



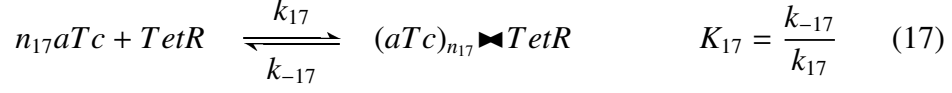
specific to pTet-circuit



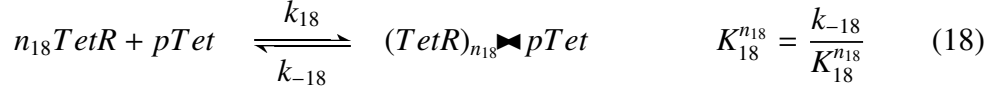
specific to pFlhDC-circuit



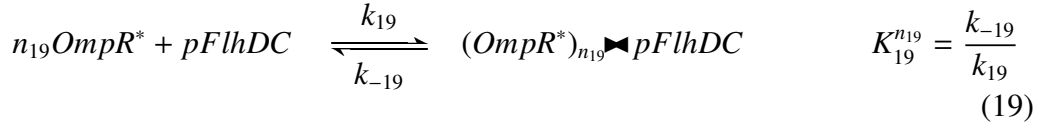
specific to pTet-circuit



specific to pTet-circuit



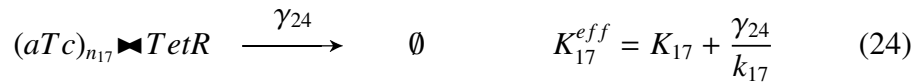
specific to pFlhDC-circuit



specific to pTet-circuit



specific to pTet-circuit



specific to pFlhDC-circuit



---


$$(3) \Rightarrow [(FlhDC)_{n_3} \blacktriangleright pFliA]_{eq} = \frac{[FlhDC]^{n_3}}{K_3^{n_3} + [FlhDC]^{n_3}} \cdot [pFliA^{total}] \quad (26)$$


---

$$(4) \Rightarrow [(FlhDC)_{n_4} \blacktriangleright pFlhB]_{eq} = \frac{[FlhDC]^{n_4}}{K_4^{n_4} + [FlhDC]^{n_4}} \cdot [pFlhB^{total}] \quad (27)$$


---

$$(9) \Rightarrow [(FliA)_{n_9} \blacktriangleright pFliA]_{eq} = \frac{[FliA]^{n_9}}{K_9^{n_9} + [FliA]^{n_9}} \cdot [pFliA^{total}] \quad (28)$$


---

$$(10) \Rightarrow [(FliA)_{n_{10}} \blacktriangleright pFlhB]_{eq} = \frac{[FliA]^{n_{10}}}{K_{10}^{n_{10}} + [FliA]^{n_{10}}} \cdot [pFlhB^{total}] \quad (29)$$


---

specific to pFlhDC-circuit

$$(11) \Rightarrow [(FliA)_{n_{11}} \blacktriangleright pFlhDC]_{eq} = \frac{[FliA]^{n_{11}}}{K_{11}^{n_{11}} + [FliA]^{n_{11}}} \cdot [pFlhDC^{total}] \quad (30)$$


---

specific to pTet-circuit

$$(17) \Rightarrow \left\{ \begin{array}{l} [TetR^{free}] = [TetR^{total}] - [(aTc)_{n_{17}} \blacktriangleright TetR] \\ ([aTc]_i - [(aTc)_{n_{17}} \blacktriangleright TetR]_{eq})^{n_{17}} \left( [TetR^{total}] - [(aTc)_{n_{17}} \blacktriangleright TetR]_{eq} \right) - K_{17}^{eff} [(aTc)_{n_{17}} \blacktriangleright TetR]_{eq} = 0 \\ 0 < n_{17} [(aTc)_{n_{17}} \blacktriangleright TetR]_{eq} < [aTc]_i \quad ; \quad 0 < [(aTc)_{n_{17}} \blacktriangleright TetR]_{eq} < [TetR^{total}] \end{array} \right. \quad (31)$$


---

specific to pTet-circuit

$$(18) \Rightarrow [pTet]_{eq} = \frac{K_{18}^{n_{18}}}{K_{18}^{n_{18}} + [TetR^{free}]^{n_{18}}} \cdot [pTet^{total}] \quad (32)$$


---

specific to pFlhDC-circuit

$$(19) \Rightarrow [pFlhDC]_{eq} = \frac{K_{19}^{n_{19}}}{K_{19}^{n_{19}} + [OmpR^*]^{n_{19}}} \cdot [pFlhDC^{total}] \quad (33)$$

---

specific to pTet-circuit

$$\begin{aligned} (1) & \Rightarrow \frac{d[FlhDC]}{dt} = b_1[pTet]_{eq} - \gamma_{20}[FlhDC] \\ (20) & \end{aligned} \quad (34a)$$

$$\begin{aligned} (31) & \Rightarrow \frac{d[FlhDC]}{dt} = \beta_1 \cdot \frac{K_{18}^{n_{18}}}{K_{18}^{n_{18}} + [TetR^{free}]^{n_{18}}} - \gamma_{20}[FlhDC] \\ (32) & \end{aligned} \quad (34)$$

---

specific to pFlhDC-circuit

$$\begin{aligned} (2) & \Rightarrow \frac{d[FlhDC]}{dt} = b_2[pFlhDC^{free}]_{eq} + b_{12}[(FliA)_{n_{11}} \blacktriangleright pFlhDC]_{eq} - \gamma_{20}[FlhDC] \\ (12) & \\ (20) & \end{aligned} \quad (35a)$$

$$\begin{aligned} (30) & \Rightarrow \frac{d[FlhDC]}{dt} = \frac{K_{19}^{n_{19}}}{K_{19}^{n_{19}} + [OmpR^*]^{n_{19}}} \left( \beta_2 \cdot \frac{K_{11}^{n_{11}}}{K_{11}^{n_{11}} + [FliA]^{n_{11}}} + \beta_{12} \cdot \frac{[FliA]^{n_{11}}}{K_{11}^{n_{11}} + [FliA]^{n_{11}}} \right) - \gamma_{20}[FlhDC] \\ (33) & \end{aligned} \quad (35)$$

$$\begin{aligned} (5) & \Rightarrow \frac{d[FliA]}{dt} = b_5[(FlhDC)_{n_3} \blacktriangleright pFliA]_{eq} + b_{13}[(FliA)_{n_9} \blacktriangleright pFliA]_{eq} - \gamma_{21}[FliA] \\ (13) & \\ (21) & \end{aligned} \quad (36a)$$

$$\begin{aligned} (26) & \Rightarrow \frac{d[FliA]}{dt} = \beta_5 \cdot \frac{[FlhDC]^{n_3}}{K_3^{n_3} + [FlhDC]^{n_3}} + \beta_{13} \cdot \frac{[FliA]^{n_9}}{K_9^{n_9} + [FliA]^{n_9}} - \gamma_{21}[FliA] \\ (28) & \end{aligned} \quad (36)$$

$$\begin{aligned} (6) & \Rightarrow \frac{d[FP3]}{dt} = b_6[(FlhDC)_{n_4} \blacktriangleright pFlhB]_{eq} + b_{14}[(FliA)_{n_{10}} \blacktriangleright pFlhB]_{eq} - \gamma_{22}[FP3] \\ (14) & \\ (22) & \end{aligned} \quad (37a)$$

$$\begin{aligned} (27) & \Rightarrow \frac{d[FP3]}{dt} = \beta_6 \cdot \frac{[FlhDC]^{n_4}}{K_4^{n_4} + [FlhDC]^{n_4}} + \beta_{14} \cdot \frac{[FliA]^{n_{10}}}{K_{10}^{n_{10}} + [FliA]^{n_{10}}} - \gamma_{22}[FP3] \\ (29) & \end{aligned} \quad (37)$$

---

specific to pTet-circuit

$$\begin{aligned} (7) & \Rightarrow \frac{d[TetR]}{dt} = b_6[(FlhDC)_{n_4} \blacktriangleright pFlhB]_{eq} + b_{14}[(FliA)_{n_{10}} \blacktriangleright pFlhB]_{eq} - \gamma_{23}[TetR] \\ (15) & \\ (23) & \end{aligned} \quad (38a)$$

$$(27) \Rightarrow \frac{d[TetR]}{dt} = \beta_6 \cdot \frac{[FlhDC]^{n_4}}{K_4^{n_4} + [FlhDC]^{n_4}} + \beta_{14} \cdot \frac{[FliA]^{n_{10}}}{K_{10}^{n_{10}} + [FliA]^{n_{10}}} - \gamma_{23}[TetR] \quad (38)$$

Solve then eqn.(31) to get  $[TetR^{free}]$  in function of  $[TetR^{total}] := [TetR]$

---

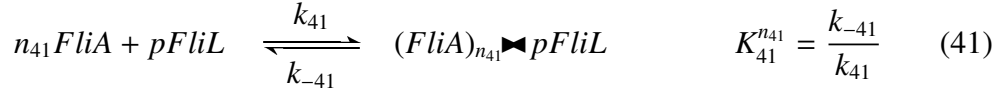
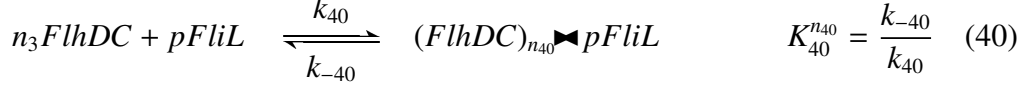
specific to pFlhDC-circuit

$$(8) \Rightarrow \frac{d[OmpR^*]}{dt} = b_6[(FlhDC)_{n_4} \blacktriangleright pFlhB]_{eq} + b_{14}[(FliA)_{n_{10}} \blacktriangleright pFlhB]_{eq} - \gamma_{25}[OmpR^*] \quad (39a)$$

$$(27) \Rightarrow \frac{d[OmpR^*]}{dt} = \beta_6 \cdot \frac{[FlhDC]^{n_4}}{K_4^{n_4} + [FlhDC]^{n_4}} + \beta_{14} \cdot \frac{[FliA]^{n_{10}}}{K_{10}^{n_{10}} + [FliA]^{n_{10}}} - \gamma_{25}[OmpR^*] \quad (39)$$

Added Equations for the  
“*FIFO module*”

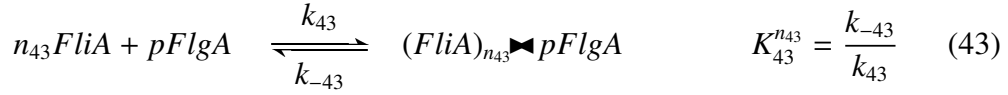




specific to pFlgA-circuit



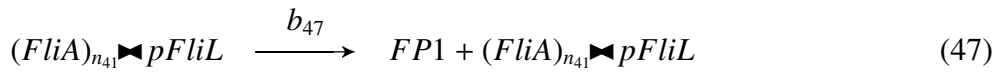
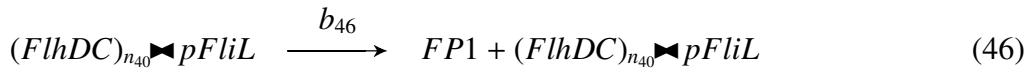
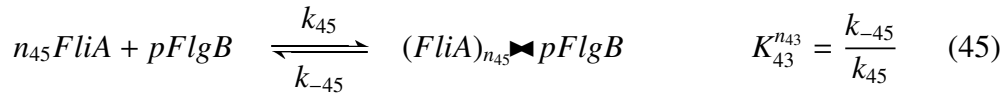
specific to pFlgA-circuit



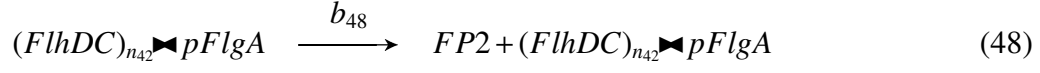
specific to pFlgB-circuit



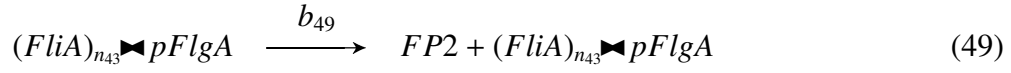
specific to pFlgB-circuit



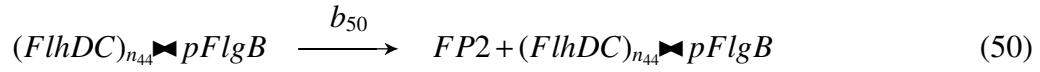
specific to pFlgA-circuit



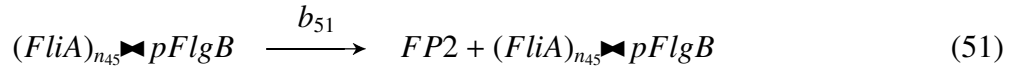
specific to pFlgA-circuit



specific to pFlgB-circuit



specific to pFlgB-circuit



---


$$(40) \Rightarrow [(FlhDC)_{n_{40}} \blacktriangleright pFliL]_{eq} = \frac{[FlhDC]^{n_{40}}}{K_{40}^{n_{40}} + [FlhDC]^{n_{40}}} \cdot [pFliL^{total}] \quad (54)$$


---

$$(41) \Rightarrow [(FliA)_{n_{41}} \blacktriangleright pFliL]_{eq} = \frac{[FliA]^{n_{41}}}{K_{41}^{n_{41}} + [FliA]^{n_{41}}} \cdot [pFliL^{total}] \quad (55)$$


---

specific to pFlgA-circuit

$$(42) \Rightarrow [(FlhDC)_{n_{42}} \blacktriangleright pFlgA]_{eq} = \frac{[FlhDC]^{n_{42}}}{K_{42}^{n_{42}} + [FlhDC]^{n_{42}}} \cdot [pFlgA^{total}] \quad (56)$$


---

specific to pFlgA-circuit

$$(43) \Rightarrow [(FliA)_{n_{43}} \blacktriangleright pFlgA]_{eq} = \frac{[FliA]^{n_{43}}}{K_{43}^{n_{43}} + [FliA]^{n_{43}}} \cdot [pFlgA^{total}] \quad (57)$$


---

specific to pFlgB-circuit

$$(44) \Rightarrow [(FlhDC)_{n_{44}} \blacktriangleright pFlgB]_{eq} = \frac{[FlhDC]^{n_{44}}}{K_{44}^{n_{44}} + [FlhDC]^{n_{44}}} \cdot [pFlgB^{total}] \quad (58)$$


---

specific to pFlgB-circuit

$$(45) \Rightarrow [(FliA)_{n_{45}} \blacktriangleright pFlgB]_{eq} = \frac{[FliA]^{n_{45}}}{K_{45}^{n_{45}} + [FliA]^{n_{45}}} \cdot [pFlgB^{total}] \quad (59)$$

---


$$(46) \Rightarrow \frac{d[FP1]}{dt} = b_{46}[(FlhDC)_{n_{40}} \blacktriangleright pFliL]_{eq} + b_{47}[(FliA)_{n_{41}} \blacktriangleright pFliL]_{eq} - \gamma_{52}[FP1]$$

$$(52) \Rightarrow \frac{d[FP1]}{dt} = \beta_{46} \cdot \frac{[FlhDC]^{n_{40}}}{K_{40}^{n_{40}} + [FlhDC]^{n_{40}}} + \beta_{47} \cdot \frac{[FliA]^{n_{41}}}{K_{41}^{n_{41}} + [FliA]^{n_{41}}} - \gamma_{52}[FP1] \quad (60a)$$

$$(54) \Rightarrow \frac{d[FP1]}{dt} = \beta_{46} \cdot \frac{[FlhDC]^{n_{40}}}{K_{40}^{n_{40}} + [FlhDC]^{n_{40}}} + \beta_{47} \cdot \frac{[FliA]^{n_{41}}}{K_{41}^{n_{41}} + [FliA]^{n_{41}}} - \gamma_{52}[FP1] \quad (60)$$

---

specific to pFlgA-circuit

$$(48) \Rightarrow \frac{d[FP2]}{dt} = b_{48}[(FlhDC)_{n_{42}} \blacktriangleright pFlgA]_{eq} + b_{49}[(FliA)_{n_{43}} \blacktriangleright pFlgA]_{eq} - \gamma_{53}[FP2]$$

$$(53) \Rightarrow \frac{d[FP2]}{dt} = \beta_{48} \cdot \frac{[FlhDC]^{n_{42}}}{K_{42}^{n_{42}} + [FlhDC]^{n_{42}}} + \beta_{49} \cdot \frac{[FliA]^{n_{43}}}{K_{43}^{n_{43}} + [FliA]^{n_{43}}} - \gamma_{53}[FP2] \quad (61a)$$

$$(56) \Rightarrow \frac{d[FP2]}{dt} = \beta_{48} \cdot \frac{[FlhDC]^{n_{42}}}{K_{42}^{n_{42}} + [FlhDC]^{n_{42}}} + \beta_{49} \cdot \frac{[FliA]^{n_{43}}}{K_{43}^{n_{43}} + [FliA]^{n_{43}}} - \gamma_{53}[FP2] \quad (61)$$

---


$$(50) \Rightarrow \frac{d[FP2]}{dt} = b_{50}[(FlhDC)_{n_{44}} \blacktriangleright pFlgB]_{eq} + b_{51}[(FliA)_{n_{45}} \blacktriangleright pFlgB]_{eq} - \gamma_{53}[FP2]$$

$$(51) \Rightarrow \frac{d[FP2]}{dt} = \beta_{50} \cdot \frac{[FlhDC]^{n_{44}}}{K_{44}^{n_{44}} + [FlhDC]^{n_{44}}} + \beta_{51} \cdot \frac{[FliA]^{n_{45}}}{K_{45}^{n_{45}} + [FliA]^{n_{45}}} - \gamma_{53}[FP2] \quad (62a)$$

$$(58) \Rightarrow \frac{d[FP2]}{dt} = \beta_{50} \cdot \frac{[FlhDC]^{n_{44}}}{K_{44}^{n_{44}} + [FlhDC]^{n_{44}}} + \beta_{51} \cdot \frac{[FliA]^{n_{45}}}{K_{45}^{n_{45}} + [FliA]^{n_{45}}} - \gamma_{53}[FP2] \quad (62)$$