Physiolibrary 2.3

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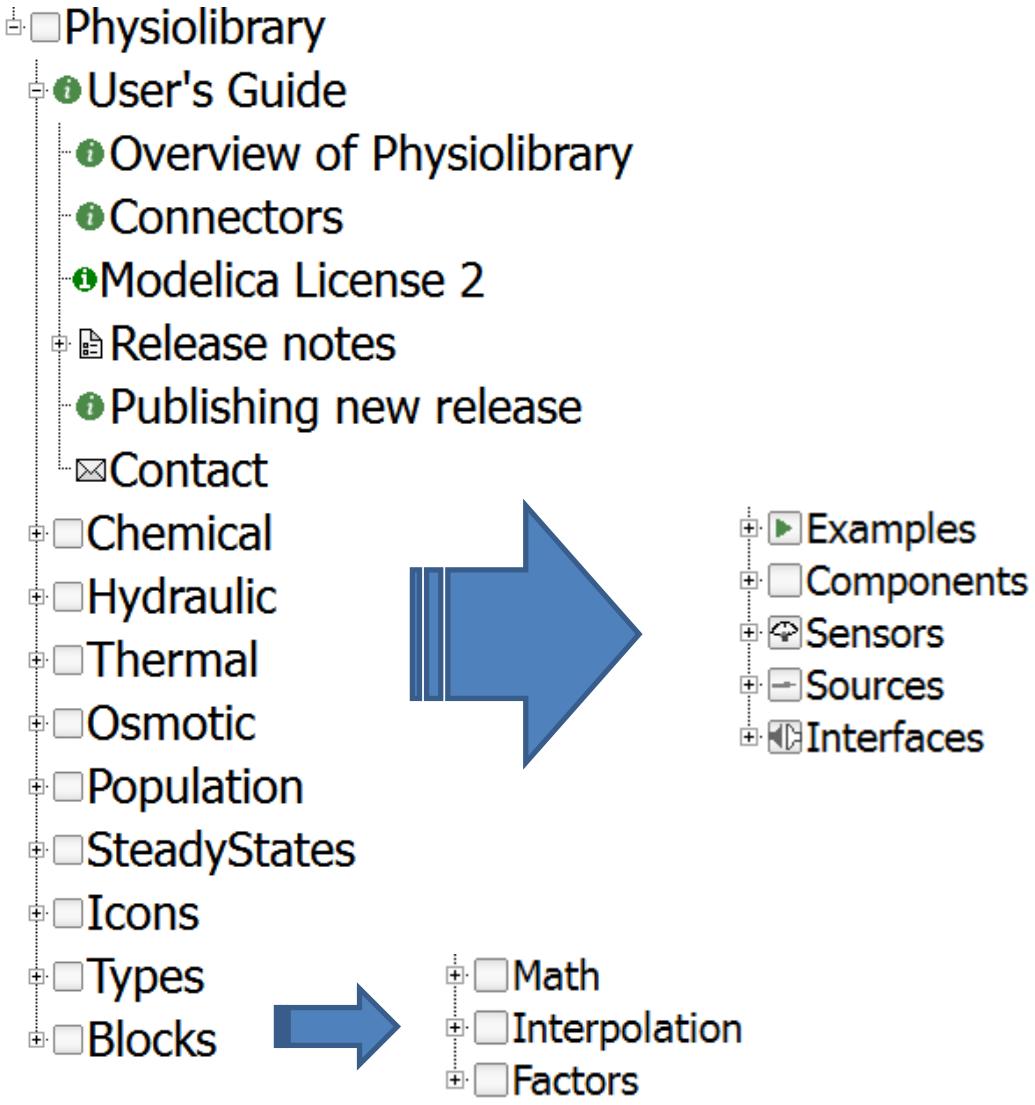
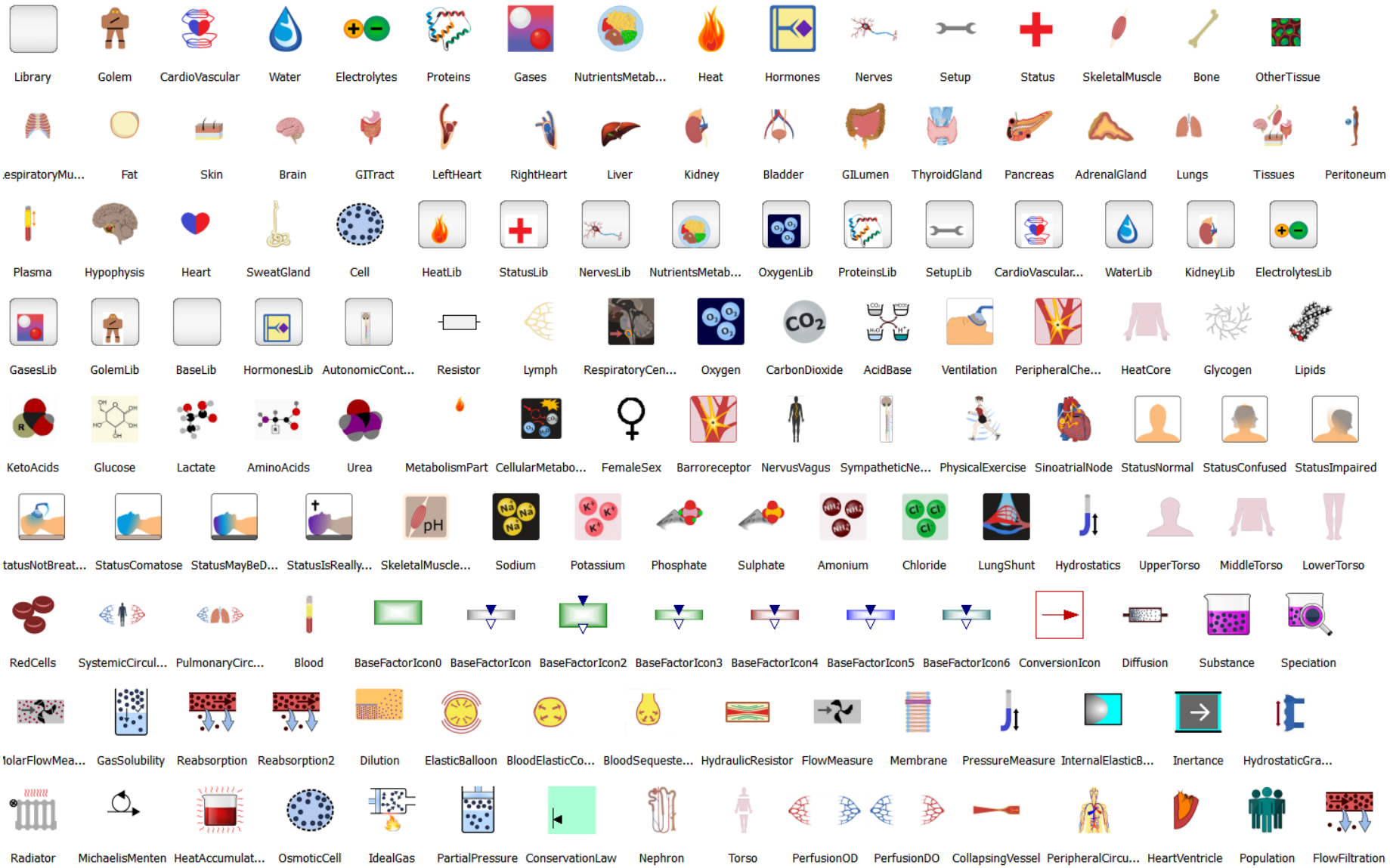
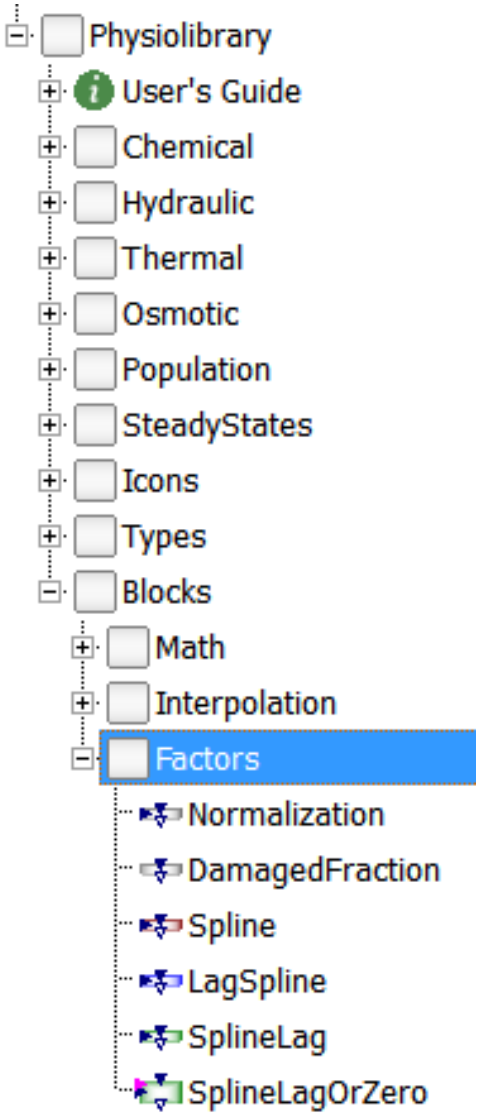
Physiolibrary Structure

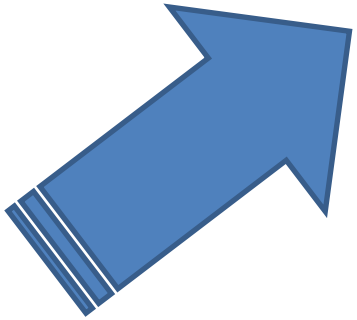


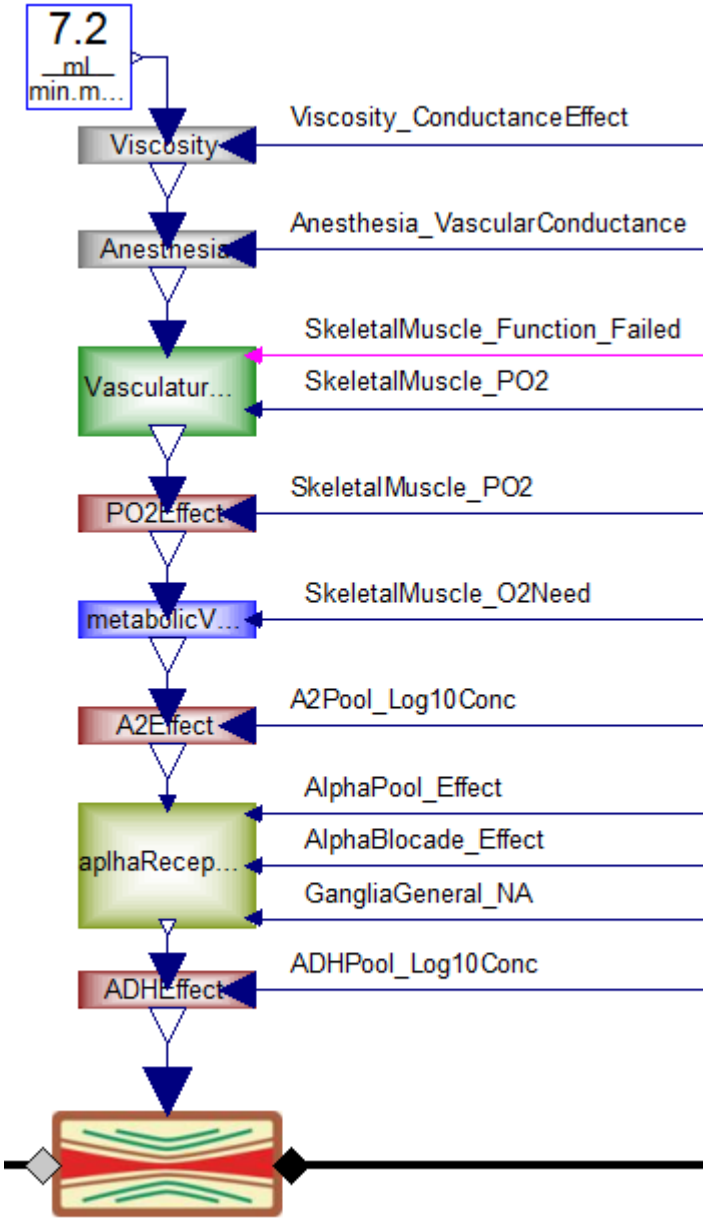
Icons


Library
Golem
CardioVascular
Water
Electrolytes
Proteins
Gases
NutrientsMetab...
Heat
Hormones
Nerves
Setup
Status
SkeletalMuscle
Bone
OtherTissue
espiratoryMu...
Fat
Skin
Brain
GITract
LeftHeart
RightHeart
Liver
Kidney
Bladder
GILumen
ThyroidGland
Pancreas
AdrenalGland
Lungs
Tissues
Peritoneum
Plasma
Hypophysis
Heart
SweatGland
Cell
HeatLib
StatusLib
NervesLib
NutrientsMetab...
OxygenLib
ProteinsLib
SetupLib
CardioVascular...
WaterLib
KidneyLib
ElectrolytesLib
GasesLib
GolemLib
BaseLib
HormonesLib
AutonomicCont...
Resistor
Lymph
RespiratoryCen...
Oxygen
CarbonDioxide
AcidBase
Ventilation
PeripheralChe...
HeatCore
Glycogen
Lipids
KetoAcids
Glucose
Lactate
AminoAcids
Urea
MetabolismPart
CellularMetabo...
FemaleSex
Barroreceptor
NervusVagus
SympatheticNe...
PhysicalExercise
SinoatrialNode
StatusNormal
StatusConfused
StatusImpaired
tatusNotBreat...
StatusComatose
StatusMayBeD...
StatusIsReally...
SkeletalMuscle...
Sodium
Potassium
Phosphate
Sulphate
Amonium
Chloride
LungShunt
Hydrostatics
UpperTorso
MiddleTorso
LowerTorso
RedCells
SystemicCircul...
PulmonaryCirc...
Blood
BaseFactorIcon0
BaseFactorIcon
BaseFactorIcon2
BaseFactorIcon3
BaseFactorIcon4
BaseFactorIcon5
BaseFactorIcon6
ConversionIcon
Diffusion
Substance
Speciation
olarFlowMea...
GasSolubility
Reabsorption
Reabsorption2
Dilution
ElasticBalloon
BloodElasticCo...
BloodSequeste...
HydraulicResistor
FlowMeasure
Membrane
PressureMeasure
InternalElasticB...
Inertance
HydrostaticGra...
Radiator
MichaelisMenten
HeatAccumulat...
OsmoticCell
IdealGas
PartialPressure
ConservationLaw
Nephron
Torso
PerfusionOD
PerfusionDO
CollapsingVessel
PeripheralCircu...
HeartVentricle
Population
FlowFiltration

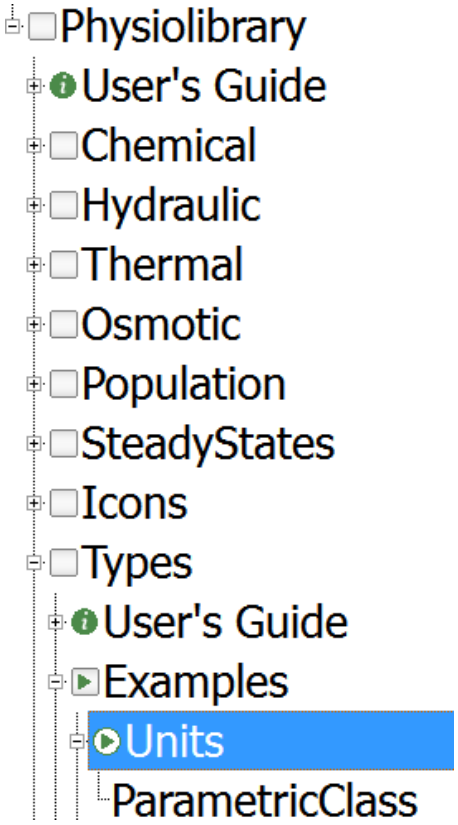
Blocks.Factors

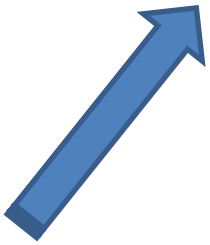


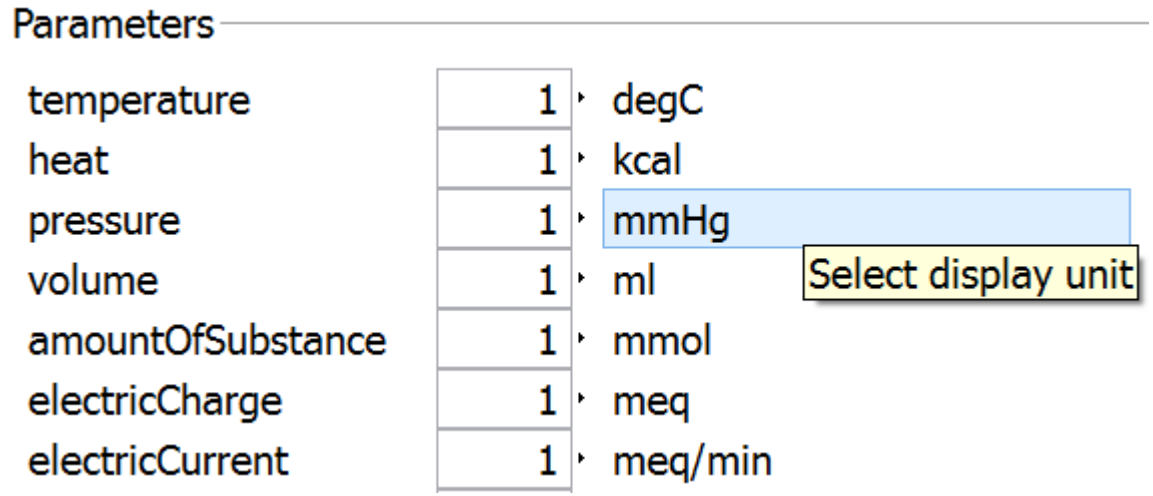




Types

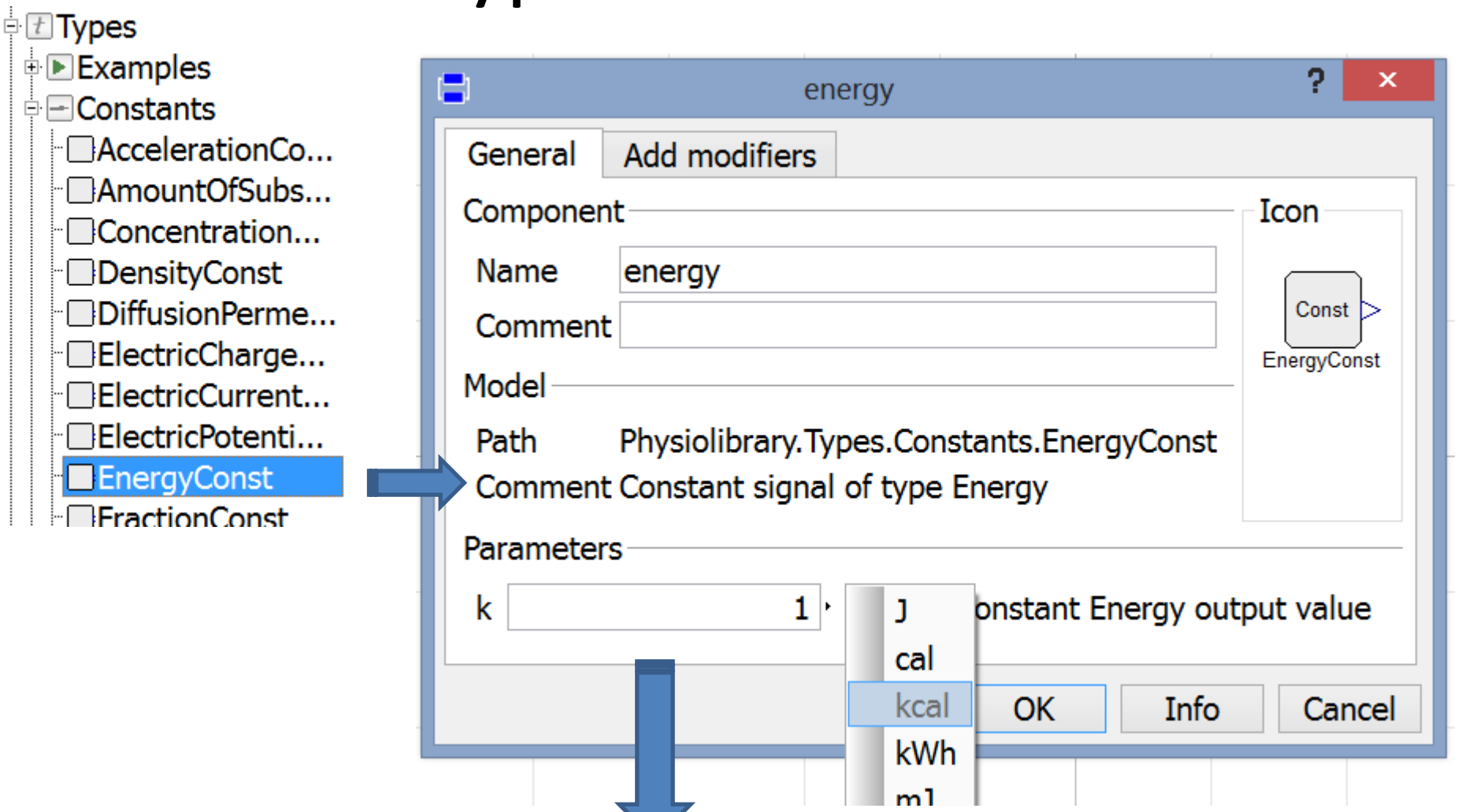






```
model Units
 ParametricClass parametricClass(
   temperature(displayUnit="degC") = 274.15,
   heat(displayUnit="kcal") = 4186.8,
   pressure(displayUnit="mmHg") = 133.322387415,
   volume(displayUnit="ml") = 1e-06,
   amountOfSubstance(displayUnit="mmol") = 0.001,
   electricCharge(displayUnit="meq") = 96.4853399,
   electricCurrent(displayUnit="meq/min") = 1.6080889983333,
```

Types.Constants

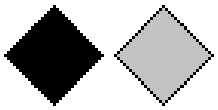



```
Physiolibrary.Types.Constants.EnergyConst energy(k=4186.8)
  a;
```

Connectors

ChemicalPort

- molar concentration, molar flow



HydraulicPort

- pressure, volumetric flow

ThermalPort

- temperature, heat flow

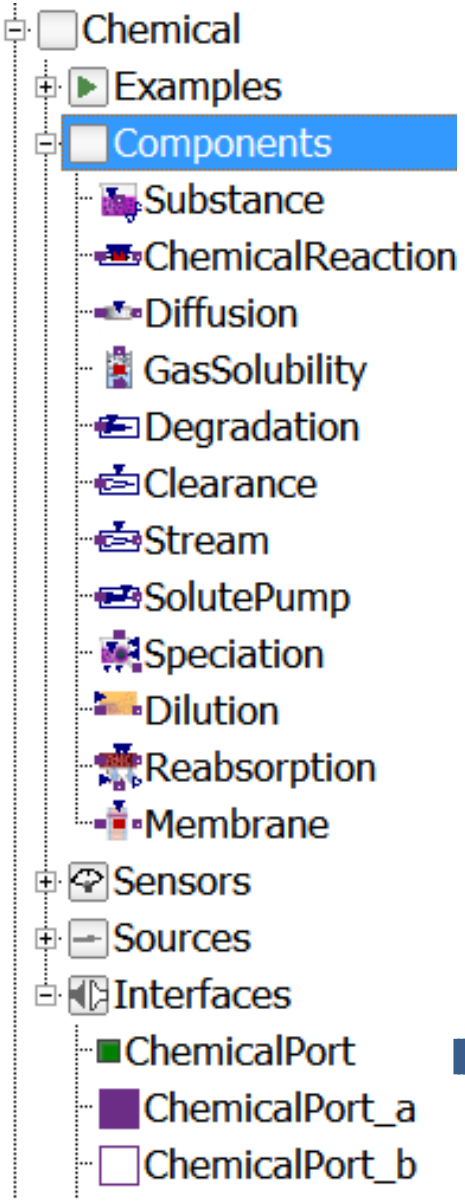
OsmoticPort

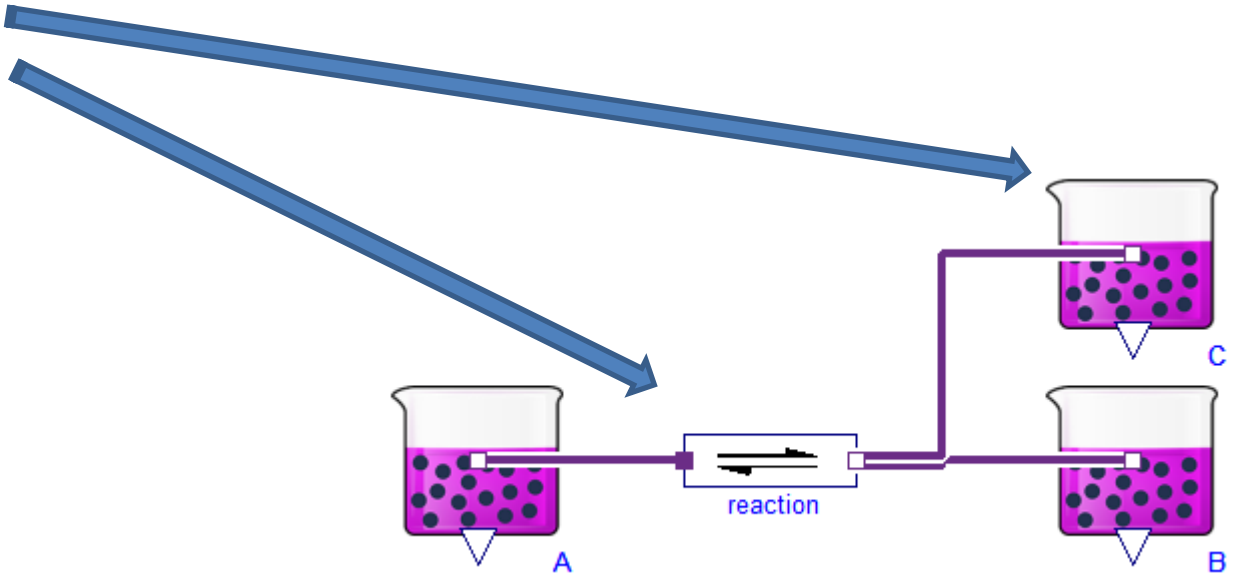
- osmolarity, osmotic volumetric flow

PopulationPort

- size of population, change of population

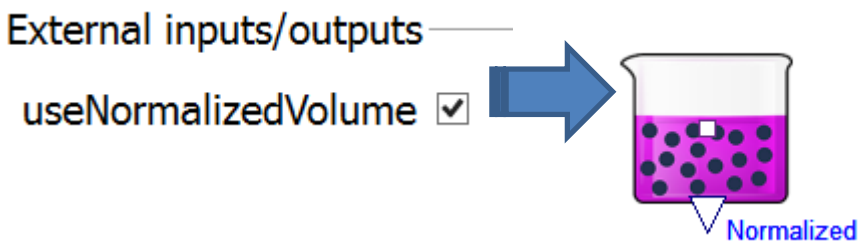
Chemical

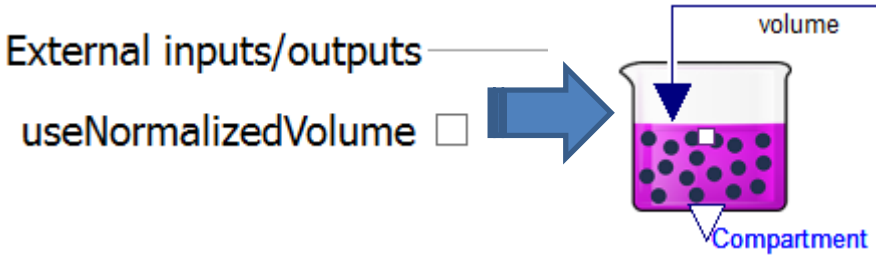


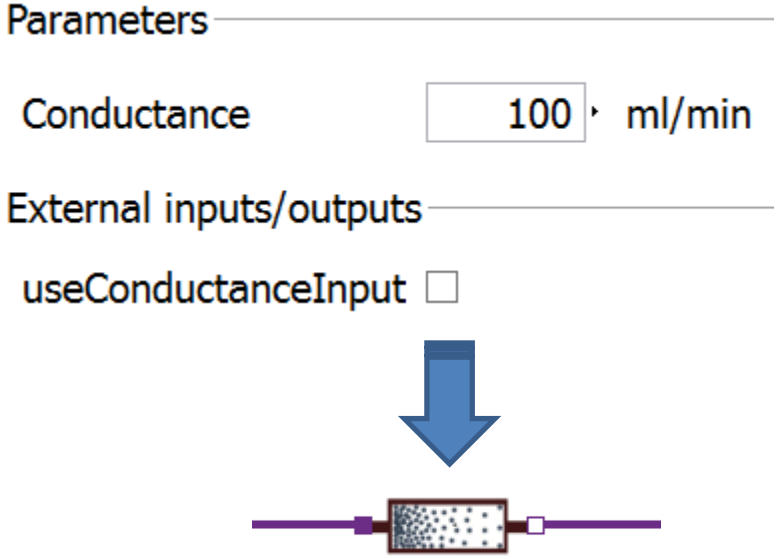


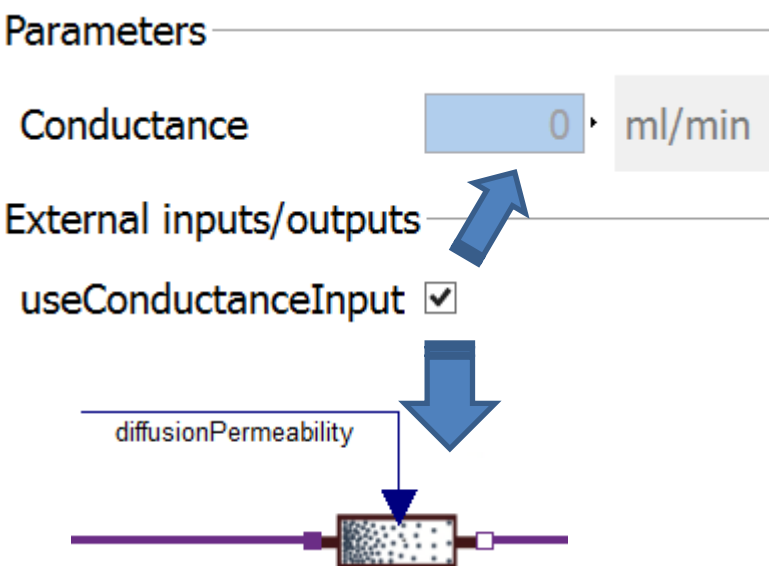

```
connector ChemicalPort
  Types.Concentration conc;
  flow Types.MolarFlowRate q;

end ChemicalPort;
```

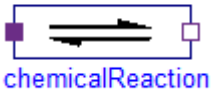
CONDITIONAL INPUTS











Chemical Reaction

reaction in Physiolibrary.Chemical.Examples.SimpleReaction

General | Reaction type | Temperature dependence | Add modifiers

Component

Name: reaction

Comment:

Icon

Chemic...

Model

Path: Physiolibrary.Chemical.Components.ChemicalReaction

Comment: Chemical Reaction

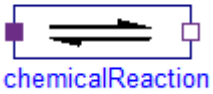
Parameters

K	1		Fixed dissociation constant [SI-unit] if useDissociationConstantInput=false
kf	10^8		Forward reaction rate coefficient [SI unit]
solventFraction	100	%	Free solvent fraction in liquid (i.e. water fraction in plasma=0.94, in RBC=0.65, in blood=0.81)

External inputs/outputs

useNormalizedVolume	☑	=true, if solvent volume is 1 liter
useDissociationConstantInput	☐	=true, if external dissociation ratio is used
useForwardRateInput	☐	=true, if external forward rate is used
useHeatPort	☐	=true, if HeatPort is enabled

OK | Info | Cancel



Chemical Reaction

reaction in Physiolibrary.Chemical.Examples.SimpleReaction

General | Reaction type | Temperature dependence | Add modifiers

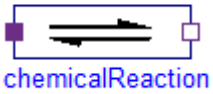
Substrates

nS	1		Number of substrates types
s	ones(nS)	1	Stoichiometric reaction coefficient for substrates
as	ones(nS)	1	Activity coefficients of substrates

Products

nP	1		Number of products types
p	ones(nP)	1	Stoichiometric reaction coefficients for products
ap	ones(nP)	1	Activity coefficients of products

OK | Info | Cancel



Chemical Reaction

reaction in Physiolibrary.Chemical.Examples.SimpleReaction

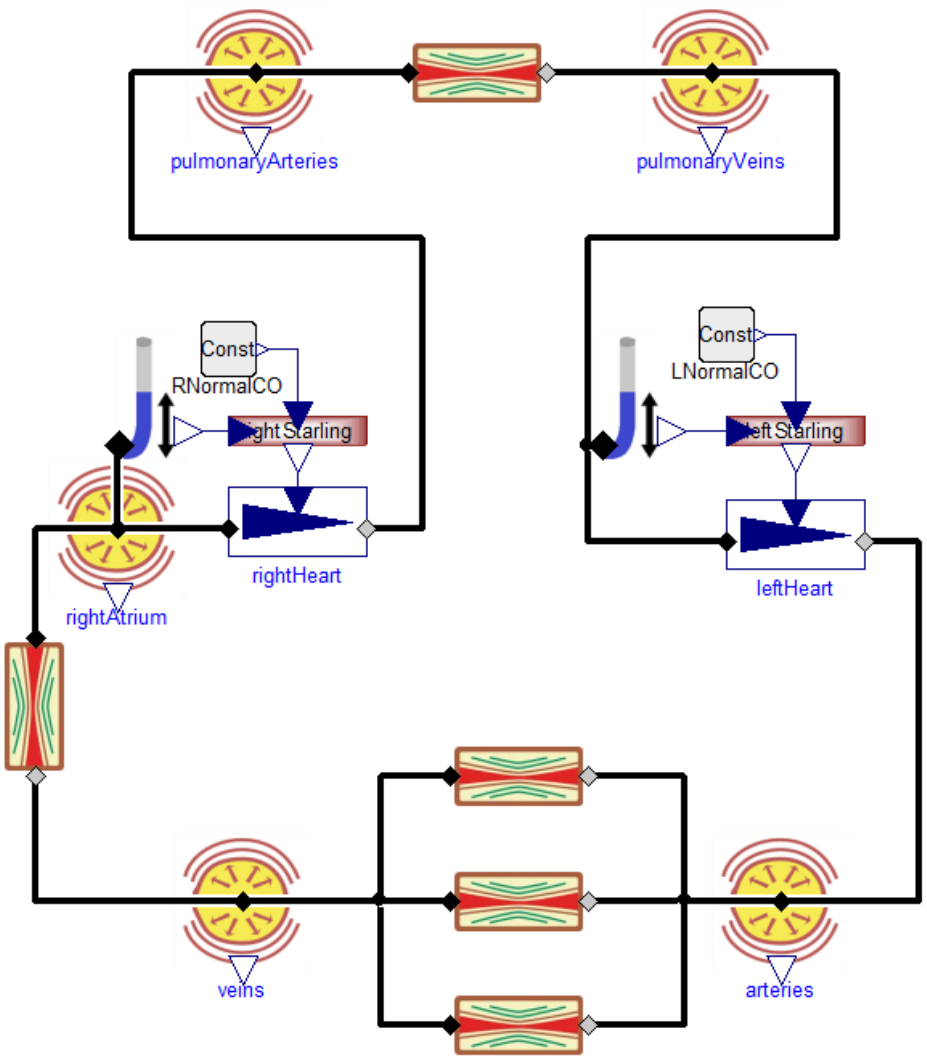
General | Reaction type | Temperature dependence | Add modifiers

T	37	degC	Fixed device temperature if useHeatPort = false
TK	25	degC	Base temperature
dH	0	kcal/mol	Standard Enthalpy Change (negative=exothermic)

OK | Info | Cancel

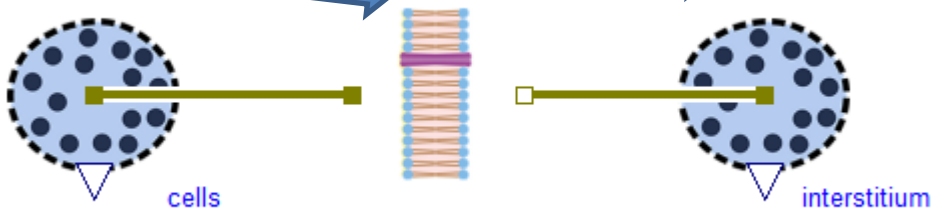
- Physiolibrary
  - User's Guide
  - Chemical
  - Hydraulic
    - Examples
    - Components
      - ElasticVessel
      - Conductor
      - HydrostaticColumn
      - Pump
      - IdealValve
      - Inertia
      - ElasticMembrane
      - Reabsorption
    - Sensors
      - FlowMeasure
      - PressureMeasure
    - Sources
      - UnlimitedPump
      - UnlimitedVolume
      - UnlimitedOutflowPump
    - Interfaces
      - HydraulicPort
      - HydraulicPort_a
      - HydraulicPort_b
      - OnePort

Hydraulic



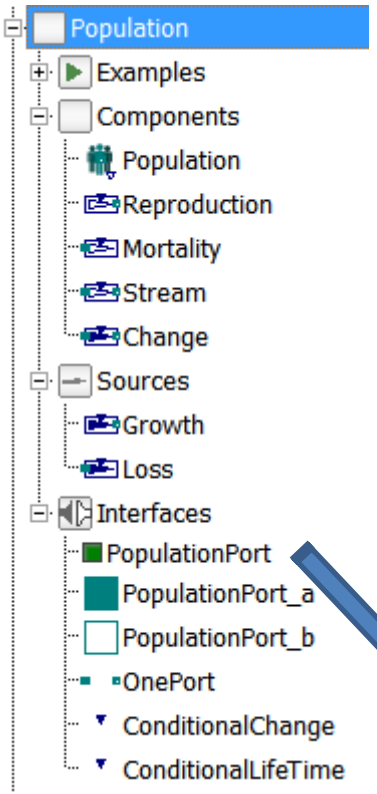
Osmotic

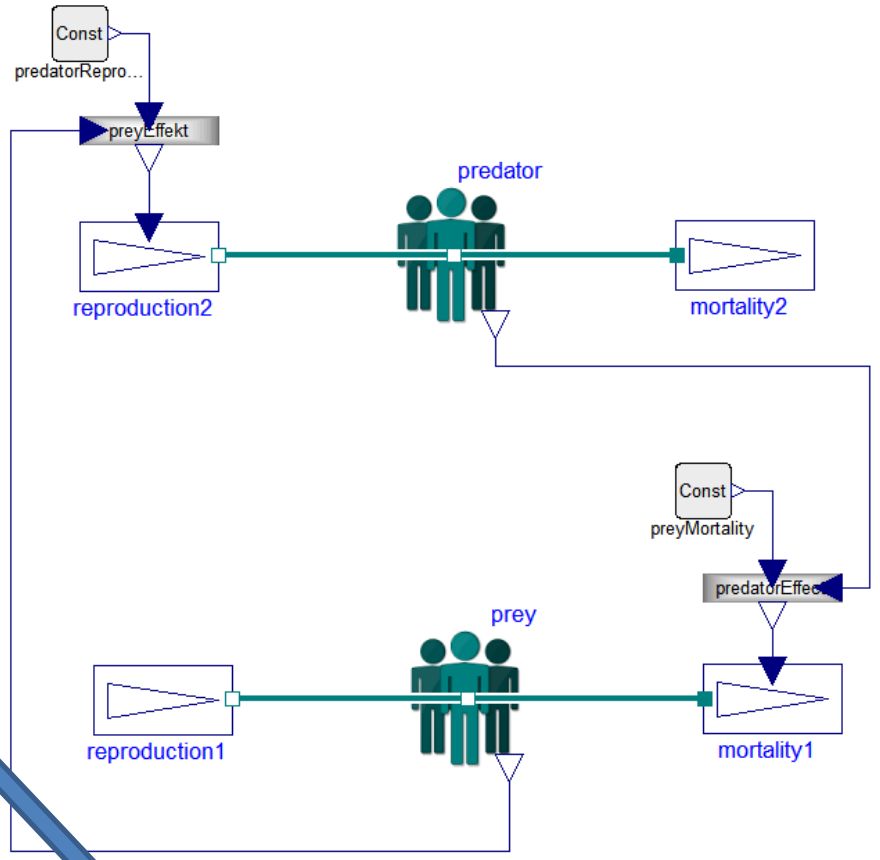
- Physiolibrary
  - User's Guide
  - Chemical
  - Hydraulic
  - Thermal
  - Osmotic
    - Examples
    - Components
      - OsmoticCell
      - Membrane
      - SolventFlux
      - IdealFlowFiltration
      - Reabsorption
    - Sensors
      - FlowMeasure
    - Sources
      - SolventInflux
      - SolventOutflux
      - UnlimitedSolution
    - Interfaces
      - OsmoticPort
      - OsmoticPort_a
      - OsmoticPort_b
      - OnePort




```
connector OsmoticPort
  "Osmolarity and osmotic flux"
 Types.Concentration o "Osmolarity";
 flow Types.VolumeFlowRate q "Osmotic flux";
 a
end OsmoticPort;
```

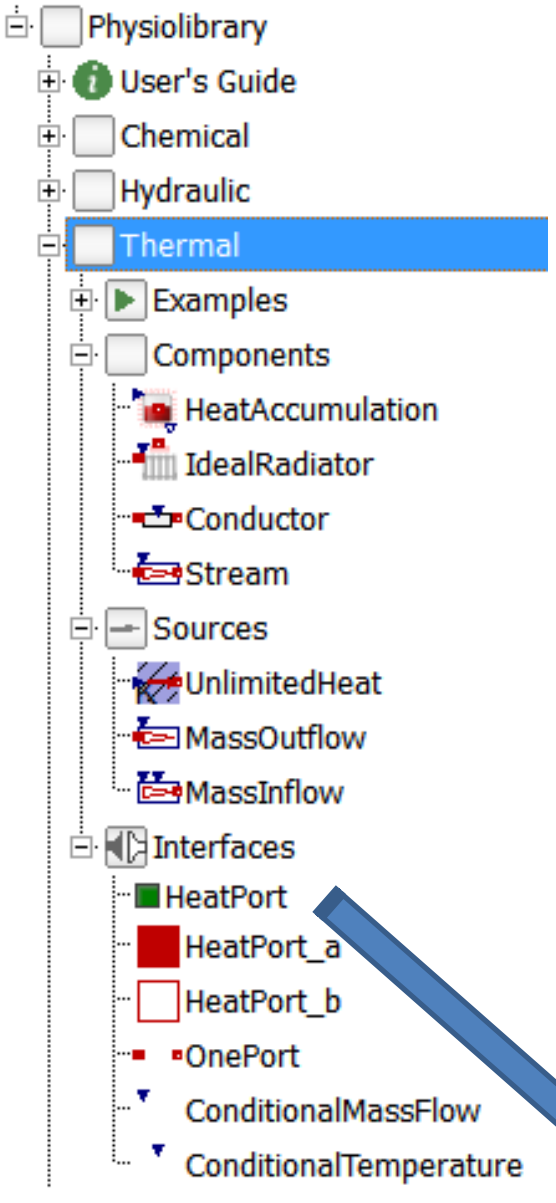
Population

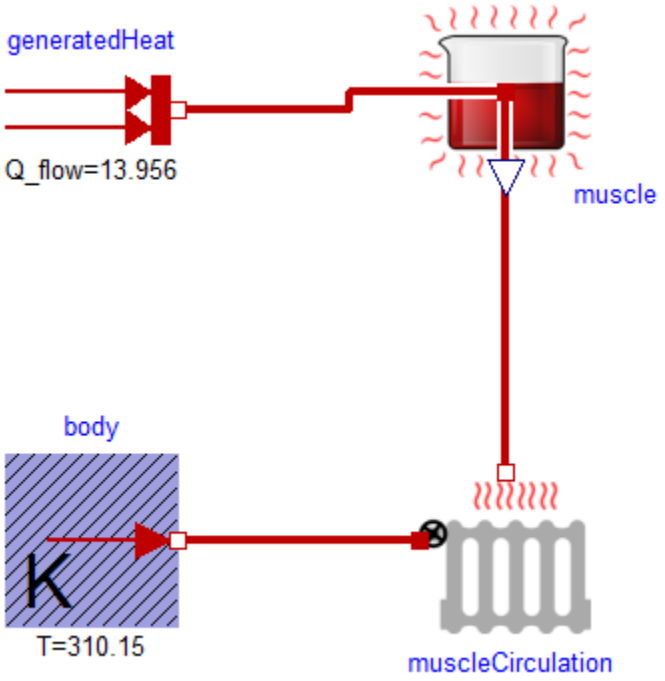




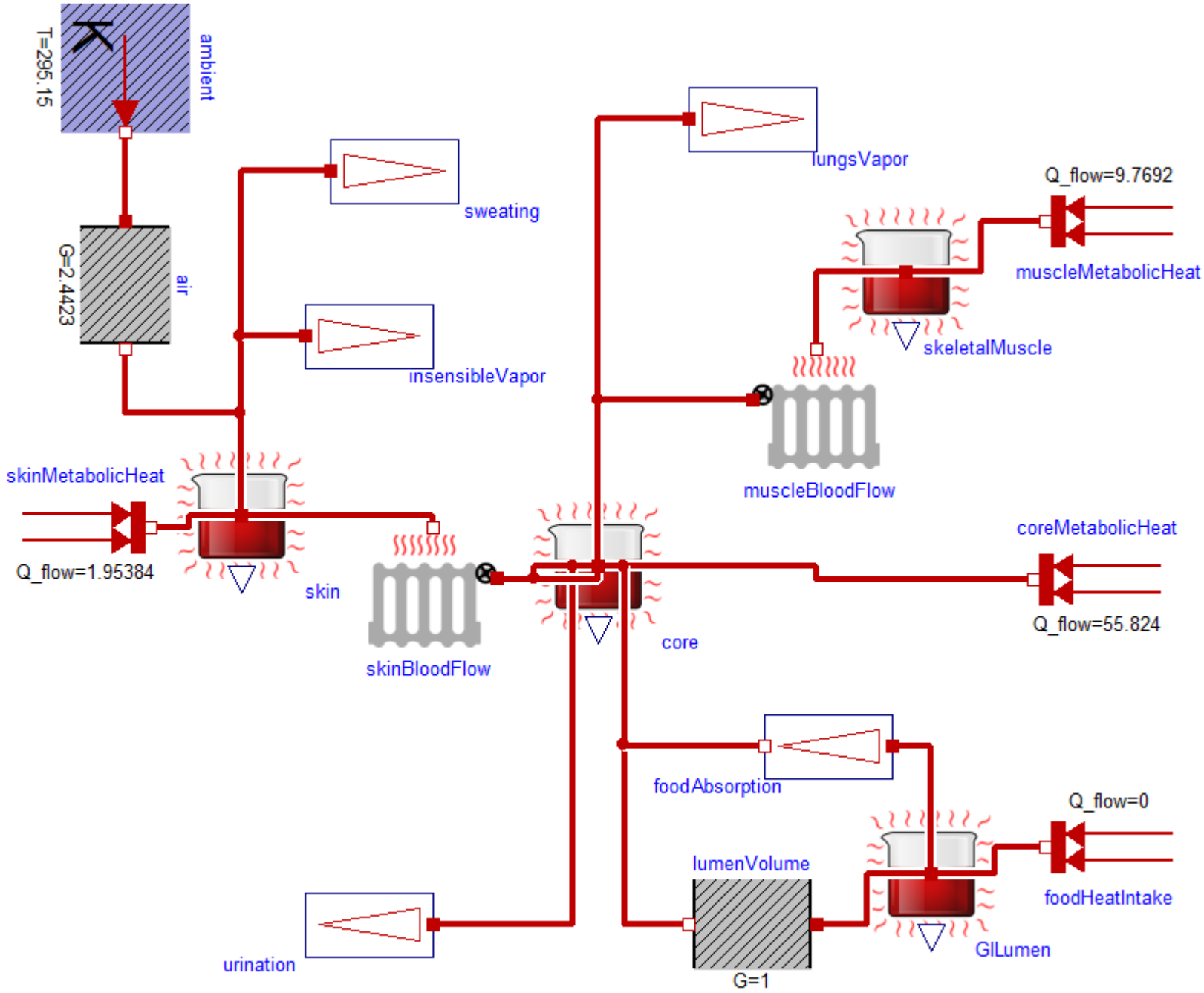

```
connector PopulationPort "Average number of population members and their change"
  Types.Population population "Average number of population individuals";
  flow Types.PopulationChange change "Average population change = change of population individuals";
  a
end PopulationPort;
```

Thermal






```
connector HeatPort = Modelica.Thermal.HeatTransfer.Interfaces.HeatPort
```


T=295.15
ambient
G=2.4423
air
sweating
insensibleVapor
lungsVapor
Q_flow=9.7692
muscleMetabolicHeat
skeletalMuscle
muscleBloodFlow
skinMetabolicHeat
Q_flow=1.95384
skin
skinBloodFlow
core
coreMetabolicHeat
Q_flow=55.824
foodAbsorption
Q_flow=0
foodHeatIntake
lumenVolume
GILumen
G=1
urination

Thank you for your attention!

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