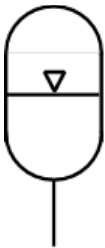

Ackumulator

```
domain = "Hydraulic";
displayName = "Ackumulator";
brief = "This is piston with an inertia load";
componentType = "ComponentQ";
author = "Petter Krus <petter.krus@liu.se>";
affiliation = "Division of Fluid and Mechatronic Systems, Linköping University";
SetFilenames[path, domain, displayName];
ResetComponentVariables[];
```

■ Component description

A general ackumulator. This model does not have any thermodynamic losses. The process is considered to be adiabatic.



■ Variables and parameters

```
Bp = .; Ap = .; p0 = .;

inputParameters = {
  {V0, 0.001, double, "m^3", "Ackumulator Volume"},
  {Kca, 1. × 10^-8, double, "m^3/(s Pa)", "Ack. inlet coeff."},
  {kappa, 1.2, double, "", "polytropic exp. of gas"},
  {p0, 1. × 10^7, double, "N/m^2", "Preload pressure"}
};

outputVariables = {
  {Va, 1. × 10^-3, double, "m^3", "Momentary gas volume"},
  {pa, 1. × 10^7, double, "Pa", "Ackumulator oil pressure"},
  {xmp, 0., double, "m", "State of charge"},
  {vmp, 0., double, "m", "State of charge speed"}
};

nodeConnections = {
  HydraulicQnode[1, 1. × 10^5, "hydraulic node 1"]};
```

■ The system of equations

Using the equations for piston ackumulator by setting stroke to one.

$SL = 1;$

$Ap = V0 / SL;$

The restriction in the inlet is recalculated as a viscous friction on the “piston”.

$$Bp = \frac{Ap^2}{Kca};$$

The generated force on the "piston"

```

fg = Ap p1 - Ap pa;

systemEquationsDA := {
  Bp der[xmp] == fg ,
  Bp vmp == fg,
  q1 == - Ap vmp,
  pa ((SL - xmp) Ap)kappa == p0 (SL Ap)kappa
}

expressions =
  {Va == (SL - xmp) Ap};

Limitatons

variable2Limits = {{xmp, vmp, 0., SL}};

The boundarys

systemBoundaryEquations = {
  p1 == cle + Zcle q1
};

The vector of independent variables of the system are

systemVariables = {xmp, vmp, q1, pa, p1};

Compgen[file]

Bp =.; Ap =.; SL =.;

```