THE HYDRONICS COMPONENT LIBRARY (GENERAL DESCRIPTIONS)

TYPE 642: SINGLE SPEED FAN

Type642, donated at Type112 to the standard TRNSYS Library with the release of v. 16, models a fan that is able to spin at a single speed and thereby maintain a constant mass flow rate of air. As with most pumps and fans in TRNSYS, Type642 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type642 sets the downstream flow rate based on its rated flow rate parameter and the current value of its control signal input.

TYPE 644: TWO SPEED FAN/BLOWER

Type644 models a fan that is able to spin at one of two speeds, thereby maintaining one of two constant mass flow rates of air. As with most pumps and fans in TRNSYS, Type644 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type644 sets the downstream flow rate based on its rated flow rate parameters and the current value of its control signal inputs.

TYPE 646: AIR SUPPLY PLENUM WITH UP TO 100 PORTS

Type646 models a supply air plenum. One inlet flow of air is split up into as many as 100 individual streams whose mass flow rates are user specified fractions of the inlet air flow rate. The limit of 100 inlet flows can be modified in the Fortran source code.

TYPE 647: FLOW DIVERTER WITH UP TO 100 PORTS

Type647 models a diverting valve that splits a liquid inlet mass flow into fractional outlet mass flows. One inlet flow may be split into as many as 100 individual streams. The limit of 100 inlet flows can be modified in the Fortran source code.

TYPE 648: AIR RETURN PLENUM WITH UP TO 100 PORTS

Type648 models a return air plenum. Up to 100 individual flows of air are mixed together to determine the properties of the air exiting the plenum. The limit of 100 inlet flows can be modified in the Fortran source code.

TYPE 649: FLOW MIXER WITH UP TO 100 PORTS

Type649 models a mixing valve that combines up to 100 individual liquid streams into a single outlet mass flows. The limit of 100 inlet flows can be modified in the Fortran source code.

TYPE 654: CONSTANT SPEED PUMP

Type654, donated at Type114 to the standard TRNSYS Library with the release of v. 16, models a single (constant) speed pump that is able to maintain a constant fluid outlet mass flow rate. Pump starting and stopping characteristics are not modeled, nor are pressure drop effects. As with most pumps and fans in TRNSYS, Type654 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type654 sets the downstream flow rate based on its rated flow rate parameter and the current value of its control signal input.

TYPE 656: VARIABLE SPEED PUMP

Type656, donated to the standard TRNSYS Library with the release of TRNSYS v. 16, models a variable speed pump that is able to maintain any outlet mass flow rate between zero and a rated value. The mass flow rate of the pump varies linearly with control signal setting. Pump power draw, however, is modeled using a polynomial. Pump starting and stopping characteristics are not modeled, nor are pressure drop effects. As with most pumps and fans in TRNSYS, Type656 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type656 sets the downstream flow rate based on its rated flow rate parameter and the current value of its control signal input.

TYPE 662: VARIABLE SPEED FAN/BLOWER

Type662, donated as Type111 to the standard TRNSYS Library with the release of v. 16, models a fan that is able to turn at any speed between 0 (full stop) and its rated speed. While the mass flow rate of air moved by the fan is linearly related to the

control signal, the power drawn by the fan at a given flow rate can be any polynomial expression of the control signal. As with most pumps and fans in TRNSYS, Type662 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type662 sets the downstream flow rate based on its rated flow rate parameters and the current value of its control signal inputs.

TYPE 695: VARIABLE SPEED PUMP, CONTROL SIGNAL INPUT, POWER CALCULATED FROM HEAD AND DESIRED FLOW RATE

Type695 models a pump that sets its outlet mass flow rate equal to a user specified maximum mass flow rate multiplied by a control signal that can vary between a value of 0 and 1. By insuring that the control signal only ever has a value of 0 or 1 (never anything in between) Type695 can equally well be used to model a constant speed pump. Like most pumps and fans in TRNSYS, Type695 ignores the inlet mass flow rate of liquid and sets the downstream flow. The pump's power draw is calculated based upon a user specified polynomial. Pump starting and stopping characteristics are not modeled.

TYPE 709: PIPE (U VALUE CALCULATED FROM PHYSICAL CHARACTERISTICS)

Very much like standard TRNSYS Type31, this component models the thermal behavior of fluid flow in a pipe or duct using variable size segments of fluid. Entering fluid shifts the position of existing segments. The mass of the new segment is equal to the flow rate multiplied by the simulation time step. The new segment's temperature is that of the incoming fluid. The outlet of this pipe is a collection of the elements that are "pushed" out by the inlet flow. This so-called "plug-flow" model does not consider mixing or conduction between adjacent elements. A maximum of 25 segments are allowed in the pipe. When the maximum is reached, the two adjacent segments with the closest temperatures are combined to make a single segment. Where Type709 differs from Type31 is that instead of asking the user to provide an overall UA value for the pipe and its insulation, the user is here asked to provide the physical characteristics of the pipe material, fluid and insulation material.

It should also be noted that the documentation for Type709 is taken largely verbatim from the documentation of Type31.

TYPE 740: CONSTANT SPEED PUMP, CONTROL SIGNAL INPUT, POWER CALCULATED FROM PRESSURE DROP AND PUMP EFFICIENCY

Type740 models a single (constant) speed pump that is able to maintain a constant fluid outlet mass flow rate. The pump's power draw is calculated from pressure rise, motor efficiency and fluid characteristics. Pump starting and stopping characteristics are not modeled. As with most pumps and fans in TRNSYS, Type740 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type740 sets the downstream flow rate based on its rated flow rate parameter and the current value of its control signal input.

TYPE 741: VARIABLE SPEED PUMP, CONTROL SIGNAL INPUT, POWER CALCULATED FROM PRESSURE RISE AND PUMP EFFICIENCY

Type741 models a variable speed pump that is able to produce any mass flow rate between zero and its rated flow rate. The pump's power draw is calculated from pressure rise, motor efficiency and fluid characteristics. Pump starting and stopping characteristics are not modeled. As with most pumps and fans in TRNSYS, Type741 takes mass flow rate as an input but ignores the value except in order to perform mass balance checks. Type741 sets the downstream flow rate based on its rated flow rate parameter and the current value of its control signal input.

TYPE 742: VARIABLE OR CONSTANT SPEED PUMP, MASS FLOW RATE INPUT, POWER CALCULATED FROM PRESSURE RISE AND PUMP EFFICIENCY

Type742 models a pump that sets its fluid outlet mass flow rate equal to the user specified inlet mass flow rate. Because mass flow rate is an input (as opposed to a parameter), Type742 can equally well be used to model a constant or a variable speed pump. Unlike most pumps and fans in TRNSYS, Type742 passes the inlet mass flow rate through to its output. Type742 sets the downstream flow but does not take either a maximum allowable flow rate or a control signal. The pump's power draw is calculated from pressure rise, motor efficiency, fluid flow rate and fluid characteristics. Pump starting and stopping characteristics are not modeled.

TYPE 743: VARIABLE OR CONSTANT SPEED PUMP, MASS FLOW RATE INPUT, POWER CALCULATED FROM POWER CURVE POLYNOMIAL

Type743 models a pump that sets its outlet mass flow rate equal to a user specified inlet mass flow rate. Because mass flow rate is an input (as opposed to a parameter), Type743 can equally well be used to model a constant or a variable speed pump. Unlike most pumps and fans in TRNSYS, Type743 passes the inlet mass flow rate of fluid through to its output. Type743 sets the downstream flow but does not take a control signal. The pump's power draw is calculated based upon a user specified polynomial. Pump starting and stopping characteristics are not modeled.

TYPE 744: VARIABLE OR CONSTANT SPEED FAN, MASS FLOW RATE INPUT, POWER CALCULATED FROM POWER CURVE POLYNOMIAL

Type744 models a fan that sets its outlet mass flow rate equal to a user specified inlet mass flow rate. Because mass flow rate is an input (as opposed to a parameter), Type744 can equally well be used to model a constant or a variable speed fan. Unlike most pumps and fans in TRNSYS, Type744 passes the inlet mass flow rate of air through to its output. Type744 sets the downstream flow but does not take a control signal. The fan's power draw is calculated based upon a user specified polynomial. Fan starting and stopping characteristics are not modeled.

TYPE 745: VARIABLE SPEED PUMP, MASS FLOW RATE CALCULATED FROM AVAILABLE POWER, POWER DRAWN CALCULATED FROM MOTOR EFFICIENCY AND PRESSURE RISE

Type745 models a pump that sets its outlet mass flow rate based upon user specified available power. It calculates the power drawn by the pump based on motor efficiency and pump pressure rise. Like most pumps and fans in TRNSYS, Type745 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type745 sets the downstream flow. Because of the power input, this pump model is particularly useful for direct drive applications in which a pump is directly connected to an intermittent power source.

TYPE 746: VARIABLE SPEED PUMP, MASS FLOW RATE CALCULATED FROM AVAILABLE POWER, POWER DRAWN CALCULATED FROM POWER CURVE

Type746 models a pump that sets its outlet mass flow rate based upon user specified available power. It then calculates the power drawn by the pump using a power curve. Like most pumps and fans in TRNSYS, Type746 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type746 sets the downstream flow. Because of the power input, this pump model is particularly useful for direct drive applications in which a pump is directly connected to an intermittent power source.

TYPE 747: CONSTANT SPEED PUMP, MASS FLOW RATE CALCULATED FROM MATCHING SYSTEM CURVE AND HEAD CURVE

Type747 models a pump whose outlet mass flow rate is based upon a user supplied ON/OFF signal and the intersection point between a user specified system head curve (polynomial) and a user specified pump head curve (external data file). Like most pumps and fans in TRNSYS, Type747 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type747 sets the downstream flow based solely upon the pump / system curve intersection point.

TYPE 748: VARIABLE SPEED PUMP, DESIRED MASS FLOW RATE INPUT, MATCH SYSTEM CURVE AND HEAD CURVE

Type748 models a pump whose outlet mass flow rate is based upon a user supplied ON/OFF signal, a user specified desired mass flow rate and the intersection point between a user specified system head curve (polynomial) and a series of user specified pump head curve for various pump speeds (external data file). Like most pumps and fans in TRNSYS, Type748 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type748 sets the downstream flow based solely upon the pump / system curve intersection point.

TYPE 749: VARIABLE SPEED PUMP, POWER INPUT, MATCH SYSTEM CURVE AND HEAD CURVE

Type749 models a pump whose outlet mass flow rate is based upon a user specified amount of available power and the intersection point between a user specified system head curve (polynomial) and a series of user specified pump head curve for various pump speeds (external data file). Like most pumps and fans in TRNSYS, Type749 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type749 sets the downstream flow based solely upon the pump / system curve intersection point.

TYPE 750: VARIABLE SPEED PUMP, FRACTION OF RATED SPEED INPUT, MATCH SYSTEM CURVE AND HEAD CURVE

Type750 models a variable speed pump whose flow rate is calculated based on the intersection of the pump curve and the system curve. The user must specify coefficients of the system curve polynomial (head pressure versus flow rate) and must provide an external data file containing the pump curve (head versus flow rate) at several values of the rotational speed. Type750 will attempt to find a flow rate that provides the same system head and pump head given the provided fraction of rated rotational speed. Like most pumps and fans in TRNSYS, Type750 takes the inlet mass flow rate of fluid as an input but does not necessarily pass the value through to its output. Type750 sets the downstream flow based solely upon the pump / system curve intersection point.