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1 Introduction

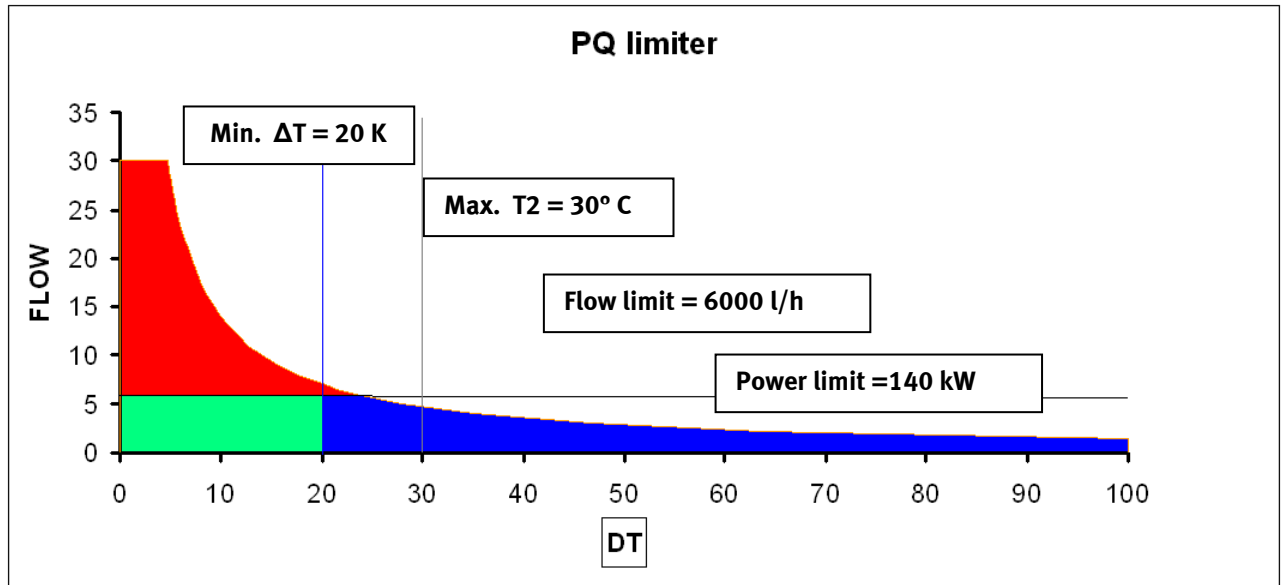
MULTICAL[®] 801 can control a motor-operated valve for projects, where power and/or flow control is required. Furthermore, the temperatures ΔT and T2 can be added as additional control features. The limitation is based on the power, flow and temperature limits programmed into the calculator.

These parameters are entered by use of the PC-software METERTOOL for MULTICAL[®] 801 (type 6699707).

It is necessary to mount a Kamstrup Flow Controller to be able to use the PQT-controller function.

2 Function

PQT controller function ensures that the limits are not exceeded.



It appears from above chart how the PQT controller ensures that the limit of e.g. 140 kW is not exceeded. At low cooling (e.g. below 20 K) the controller function ensures that a limit of e.g. 6000 l/h is not exceeded.

As additional parameters further regulation can be carried out by minimum ΔT and maximum T_2 . If these limits are exceeded, the system will reduce flow thus forcing a higher ΔT and/or lower T_2 . To assure that the regulation functionality ΔT and T_2 regulation are only active above a programmable minimum flow, the system will ignore the ΔT and T_2 functions if the flow drops below this value.

If only power control is required, the flow limit q is marked "Deactivated" and if only flow control is required the power limit is "Deactivated".

If no ΔT function is required the limit is marked "Deactivated" and if no T_2 function is required the limit is marked "Deactivated".

"UP-COM-DN" output terminals are used as UP and DOWN control output for the motor-operated valve.

The control function requires a relatively fast signal from the attached flow meter. Because of that mechanical flow meters with reed contact output (CCC=0XX) cannot be used.

As the pulse outputs are only intended for electrical signal levels (low current and low voltage) a Kamstrup flow controller must be used when connecting the motor-operated valve.

3 Flow Controller and valve specification

Flow Controller Type no. S7590006

Technical data of Flow Controller:

Relay type:	Solid State, galvanically isolated.
Supply power (8-15):	24 VAC
Motor voltage (1-3):	24 VAC
Motor current (1-10-11):	< 1.0 A
Mutual blockage:	Must be included

The motor-operated valve must have a total valve traction between 120...460 sec.

If a motor-operated valve has a spindle velocity of 10 sec./mm and the matching valve has a spindle drift of 25 mm, the total valve traction will be 250 sec.

Faster motor-operated valves with spindle velocities of e.g. 1...3 sec./mm are generally unsuitable for heat systems and cannot be used in connection with MULTICAL[®] 801.

The flow controller is supplied with default setup of regulation parameters (please see screen dump on the next page). When the PQT controller is put into operation, the parameters can be changed by use of METERTOOL for MULTICAL[®] 801.

3.1 General data

Control function:	3-position contact function
Motor-operated valve:	24 VAC
Characteristics:	Linear
Valve traction:	120....460 sec.

3.2 Dynamic range

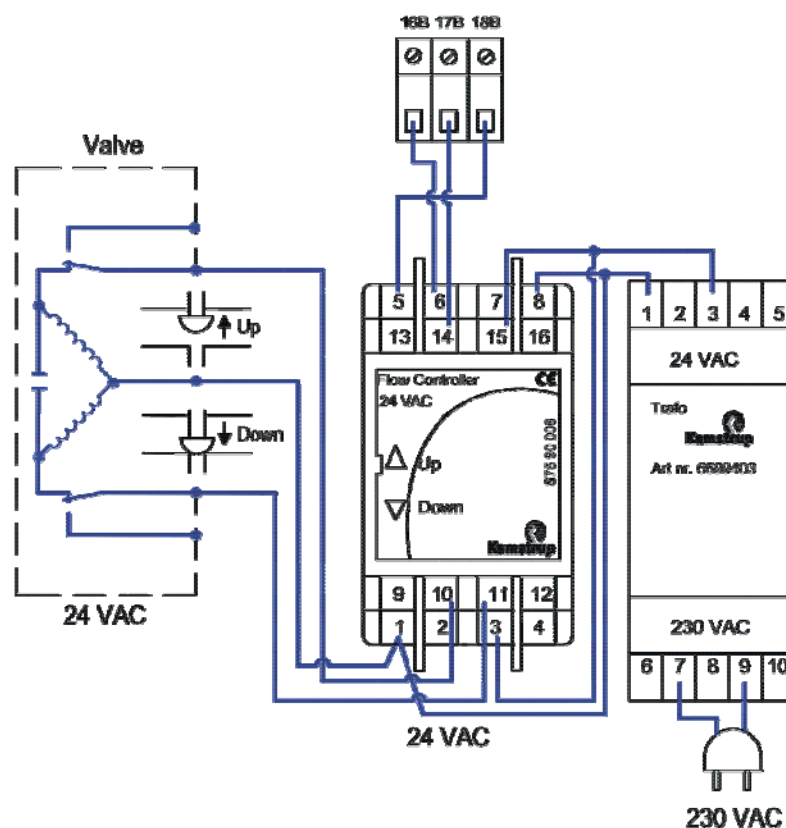
Power:	ps...ps/10 (100...10%)
Flow:	qs...qs/50 (100.....2%)

4 Installation: 24 VAC

4.1 Installation diagram:

NB! Below installation only applies to 24 VAC Flow Controllers.

Installation chart for 24 VAC Flow Controller and 24 VAC valve motor:



4.2 Testing the installation:

The flow controller and the motor valve function can be tested:

1. Connect supply power.
2. Short-circuit terminals 16B and 17B by means of a small piece of insulated wire. The "UP" – arrow on the flow controller is lit, and the motor valve must operate until the valve has opened.
3. Short-circuit terminals 17B and 18B by means of a small piece of insulated wire. The "DOWN" – arrow on the flow controller is lit, and the motor valve must operate until the valve has closed.
4. If this simple test works as described, the UP/DOWN control is operating correctly.

5 Operation

5.1 Operation by METERTOOL

To use then PQT-controller function the meter must be programmed with limit and valve parameters.

The programming is done using METERTOOL for MULTICAL® 801 and an optical head. All necessary data can be programmed without subsequent reverification.

Place the optical head on MULTICAL® 801 and open the METERTOOL for MULTICAL® 801 program. Activate "Features" and select "PQT Limiter". Activate "Read" and read out the current limit and valve parameters.

Meter settings

Flow meter qp size:

General settings

Valve parameters

(Max flow = 2 x qp):

PQ settings

Limit data, flow and/or power:

Gain result in faster regulation, but more overshooting.

Temperature settings

Limit data, temperatures:

PQ limiter

Meter settings
qp: 1,5 m³/h

General settings
Max flow: 3000 l/h
Total valve traction: 280 s
Hysteresis time: 500 ms
Special functions: 0

PQ settings
Flow limit: 1500 l/h Deactivated
Power limit: 300,0 kW Deactivated
Gain factor (PQ): 150 %

Temperature settings
Min T1-T2 limit: 0,00 K Deactivated
Max T2 limit: 200,00 C Deactivated
Gain factor (T): 50 %
Flow cut off: 150 l/h

Key in the changes required, activate "Configure", and the new data is transferred to MULTICAL® 801.

NB! When parameters (limits) are changed, the controller assumes the valve to be fully open.

This has no influence when parameters are reduced (lower), the controller will continue normal operation.

But if parameters are raised (higher), it results in slow operation towards the new parameters. This can be compensated by forcing the valve to fully open position.

6 Trouble shooting

Symptom	Possible cause	Suggestion for correction
The motor valve remains totally closed and the "UP" light-emitting diode (LED) is constantly lit	The "UP" and "DOWN" connections have been interchanged	Switch the connections
The valve function is not working after reprogramming MULTICAL®	During "Total programming with METERTOOL" the "PQT-Controller data" is deleted. The "PQT-Controller data" must be reprogrammed.	Enter new data using METERTOOL
The motor valve responds too slowly in connection with flow or power peaks	The regulating parameters do not fit the valve	Enter new "PQT-Controller data" by means of METERTOOL. If the response is too slow the running time (Total Traction) must typically be raised.
The motor valve is unstable, does not stabilise	The regulation parameters do not fit the valve	Enter new "PQT-Controller data" by means of METERTOOL. In connection with "hunting" the running time (Total Traction) must typically be reduced.
The "UP" and "DOWN" of the controller are functioning, but the valve is not running	The valve is at a limit stop	Adjust the motor valve limit stop (refer to valve documentation)
The "UP" and "DOWN" of the controller are functioning, but the valve is not running	The controller is out of step due to changes of parameters	Reset the controller by switching off voltage to the controller for 30 sec. Check the voltage to the valve (perhaps the valve is defective).
The motor valve responds too slowly	The working area is too low compared to the installation. E.g. if the limit should be set at 10% or less of the dynamic range.	Make sure that the installation is dimensioned correctly
The motor valve responds too slowly (lack of accuracy)	Hysteresis is set too high, and thus the motor valve is not running so often (less wear) on account of the accuracy of the regulation.	Enter new hysteresis, in practice rarely more than 0.5-1 sec.

NB!! Remember that in connection with closed valve motor a minimum flow must be present to prevent frost bursts.