TERAL
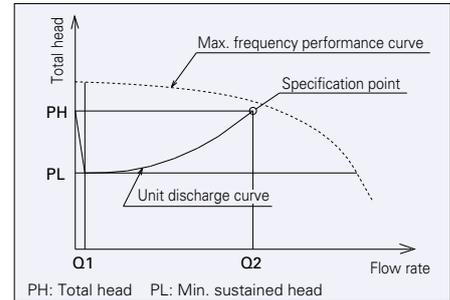
Operation of water supply pumps

1 Estimated terminal pressure constant control
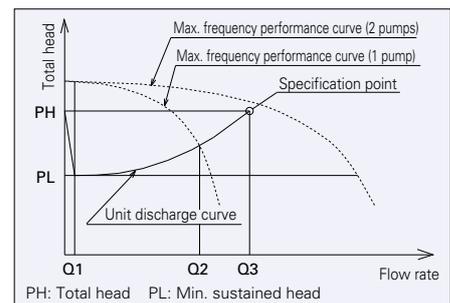
1-1. Automatic alternate operation D

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q2, the rotation speed is controlled by an inverter according to the increase or decrease of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply drops below the specified flow rate for operation, the pump stops.

(5) When water is used again, the pump that was previously standing by starts and the same operation as above is performed.
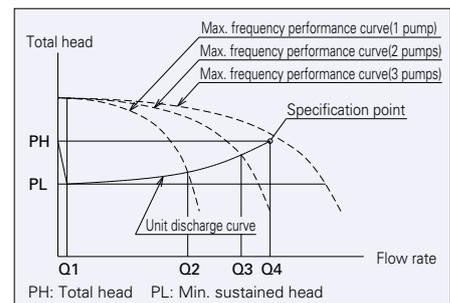

1-2. Automatic alternate parallel operation/2-pump parallel, 3-pump rotation

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q3, the rotation speed is controlled by an inverter according to the increase or decrease of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply during independent operation increases and reaches parallel flow rate Q2, the pump that is standing by starts follow-up operation, and the estimated terminal pressure constant control continues.

(5) When the amount of water supply during parallel operation drops below the parallel flow rate Q2, the pump that has started to following up stops.

(6) When the amount of water supply during independent operation drops below the specified flow rate for operation, the pump stops.

(7) When water is used again, the pump that previously entered the standby state starts up and the same operation as that described above is performed.
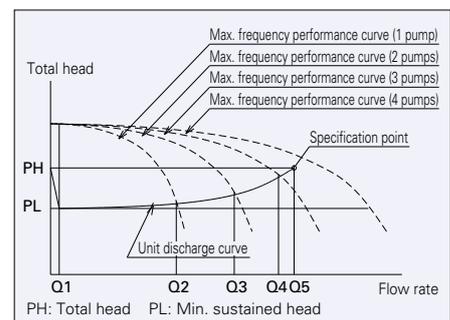

1-3. 3-pump parallel, 3-pump rotation/3-pump parallel, 4-pump rotation

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q4, the speed is controlled by an inverter to match the change of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply increases while one- pump operation and reaches the parallel flow rate Q2, the 2nd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(5) When the amount of water supply increases during parallel operation of two pumps and reaches the parallel flow rate Q3, the 3rd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(6) When the amount of water supply decreases during parallel operation of three pumps and drops to the flow rate Q3 or less, the last pump started stops and the estimated terminal pressure constant control is performed.

(7) When the amount of water supply decreases during parallel operation of two pumps and drops to the flow rate Q2 or less, the 2nd started pump stops and the estimated terminal pressure constant control is performed.

(8) The pump stops when the operating frequency of the pump decreases and the stop condition is met due to a decrease in water supply during independent operation.

(9) When water is used again, the pump that was previously standing by starts and the same operation as above is performed.
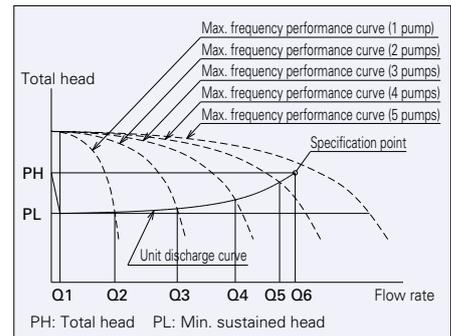

1-4. 4-pump parallel, 4-pump rotation /4-pump parallel, 5-pump rotation

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q5, the speed is controlled by an inverter to match the change of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply increases while one- pump operation and reaches the parallel flow rate Q2, the 2nd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(5) When the amount of water supply increases during parallel operation of two pumps and reaches the parallel flow rate Q3, the 3rd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(6) When the amount of water supply increases during parallel operation of three pumps and reaches parallel flow rate Q4, the fourth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(7) When the amount of water supply decreases during parallel operation of four pumps and drops to the flow rate Q4 or less, the last pump started stops and the estimated terminal pressure constant control is performed.

(8) When the amount of water supply decreases during parallel operation of three pumps and drops to the flow rate Q3 or less, the 3rd pump started stops and the estimated terminal pressure constant control is performed.

(9) When the amount of water supply decreases during parallel operation of two pumps and drops to the flow rate Q2 or less, the 2nd pump started stops and the estimated terminal pressure constant control is performed.

(10) The pump stops when the operating frequency of the pump decreases and the stop condition is met due to a decrease in water supply during independent operation.

(11) When water is used again, the pump that was previously standing by starts and the same operation as above is performed.

1-5. 5-pump parallel, 5-pump rotation /5-pump parallel, 6-pump rotation

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q6, the speed is controlled by an inverter to match the change of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply increases while one- pump operation and reaches the parallel flow rate Q2, the 2nd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(5) When the amount of water supply increases during parallel operation of two pumps and reaches the parallel flow rate Q3, the 3rd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(6) When the amount of water supply increases during parallel operation of three pumps and reaches parallel flow rate Q4, the fourth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(7) When the amount of water supply increases during parallel operation of four pumps and reaches parallel flow rate Q5, the fifth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(8) When the amount of water supply decreases during parallel operation of five pumps and drops to the flow rate Q5 or less, the last pump started stops and the estimated terminal pressure constant control is performed.

(9) When the amount of water supply decreases during parallel operation of four pumps and drops to the flow rate Q4 or less, the fourth pump started stops and the estimated terminal pressure constant control is performed.

(10) When the amount of water supply decreases during parallel operation of three pumps and drops to the flow rate Q3 or less, the 3rd pump started stops and the estimated terminal pressure constant control is performed.

(11) When the amount of water supply decreases during parallel operation of two pumps and drops to the flow rate Q2 or less, the 2nd pump started stops and the estimated terminal pressure constant control is performed.

(12) The pump stops when the operating frequency of the pump decreases and the stop condition is met due to a decrease in water supply during independent operation.

(13) When water is used again, the pump that was previously standing by starts and the same operation as above is performed.


1-6. 6-pump parallel, 6-pump rotation

(1) When water is not used, the pump is stopped.

(2) When water is used and the pressure in the piping drops below the specified pressure, the pump starts immediately.

(3) Up to the maximum flow rate Q7, the speed is controlled by an inverter to match the change of the amount of water supply and the estimated terminal pressure constant control is performed.

(4) When the amount of water supply increases while one- pump operation and reaches the parallel flow rate Q2, the 2nd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(5) When the amount of water supply increases during parallel operation of two pumps and reaches the parallel flow rate Q3, the 3rd pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(6) When the amount of water supply increases during parallel operation of three pumps and reaches parallel flow rate Q4, the fourth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(7) When the amount of water supply increases during parallel operation of four pumps and reaches parallel flow rate Q5, the fifth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(8) When the amount of water supply increases during parallel operation of five pumps and reaches parallel flow rate Q6, the sixth pump starts follow-up operation and the estimated terminal pressure constant control is performed.

(9) When the amount of water supply decreases during parallel operation of six pumps and drops to the flow rate Q6 or less, the last pump started stops and the estimated terminal pressure constant control is performed.

(10) When the amount of water supply decreases during parallel operation of five pumps and drops to the flow rate Q5 or less, the fifth pump started stops and the estimated terminal pressure constant control is performed.

(11) When the amount of water supply decreases during parallel operation of four pumps and drops to the flow rate Q4 or less, the fourth pump started stops and the estimated terminal pressure constant control is performed.

(12) When the amount of water supply decreases during parallel operation of three pumps and drops to the flow rate Q3 or less, the 3rd pump started stops and the estimated terminal pressure constant control is performed.

(13) When the amount of water supply decreases during parallel operation of two pumps and drops to the flow rate Q2 or less, the 2nd pump started stops and the estimated terminal pressure constant control is performed.

(14) The pump stops when the operating frequency of the pump decreases and the stop condition is met due to a decrease in water supply during independent operation.

(15) When water is used again, the pump that was previously standing by starts and the same operation as above is performed.
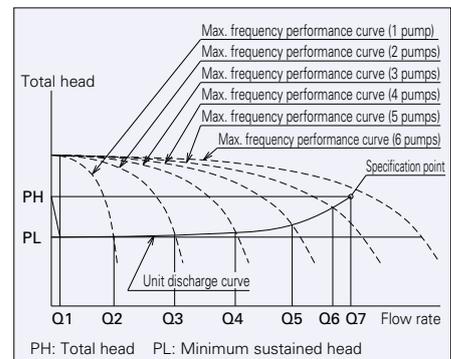
2 Constant pressure water supply

2-1. Independent operation and automatic alternate operation

(1) If water is not used, the piping and pressure tank are pressurized to P1 (stop pressure) and the pump is stopped.

(2) When water is used and the pressure drops to P2 (start-up set value), the pressure is detected by the pressure switch and the pump starts.

(3) When the amount of water supply decreases and drops below the stop flow rate, the flow switch detects the flow rate and stops the pump.
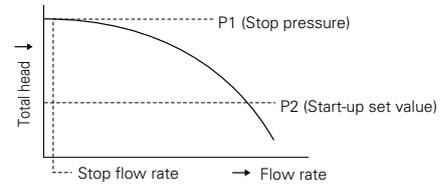
2-2. Automatic alternate parallel operation

(1) If water is not used, the piping and pressure tank are pressurized to P1 (stop pressure) and the pump is stopped.

(2) When water is used and the pressure drops to P2 (start-up set value), the pressure transmitter detects the pressure and starts the pump.

(3) When the amount of water supply decreases and drops below the stop flow rate, the flow switch detects the flow rate and stops the pump.

(4) The above operation is performed by two pumps alternately.

(5) When the amount of water supply decreases and drops below the stop flow rate again to P2 (start-up set value) during one- pump operation, the pressure transmitter detects the pressure and the pump that is standing by starts.

(6) When the amount of water supply decreases and the pressure rises to P3 (parallel-off pressure), the first pump stops.

(7) When the amount of water supply drops below the stop flow rate, the flow switch detects the flow rate and the 2nd pump stops.