Introduction

The 541D20 is a mechanical 2-cycle control valve for softening of drinking and feed water supplies. When the drain paddle is opened, the valve is automatically transferred to the regeneration position; with its few moving parts, this simple and reliable system guarantees years of trouble-free service. The semi-automatic twist timer must be manually initiated by simply turning the knob to the desired brine/slow rinse cycle time; the regeneration will take place and afterwards the valve will automatically return to the service position. The valve is designed for hard water bypass during regeneration. A built-in adjustable blending device for mixing hard and soft water to suit the particular needs of each installation is an optional feature. The valve requires a conventional float-controlled brine valve with aircheck to control the brine refill. The following sequence is followed:

1. **SERVICE:**
   Untreated water flows down through the resin bed and up through the riser tube; the water is conditioned when passing through the resin. The throughput is dependent on the maximum permissible pressure drop for the complete water softener and the maximum permissible specific load of the resin (generally taken as 40 litres soft water per hour per litre resin).

2. **BRINE:**
   Salt brine, drawn from the brine tank by the injector, flows down through the riser tube and slowly up through the resin bed to drain; the resin is being regenerated when the salt brine passes through. The brine cycle is terminated when the air check is shut.

3. **SLOW RINSE:**
   Slow rinse continues for the remainder of the brine cycle; the injectors motive water flows down through the riser tube and slowly up through the resin bed to drain, slowly washing the brine from the resin tank.
Installation Setup

1. Flush the hose before using it to supply water to the resin tank. After the line runs clear turn off the water and connect it to the inlet side of the resin tank.
2. Slowly turn the freshwater supply on until the supply water valve is completely open.
3. Allow freshwater to flow into the resin tank and from the outlet of the resin tank for a minimum of 2 minutes. This will purge the air and any foreign materials from the resin tank.
4. Turn off the freshwater flow to the resin tank.
5. Remove the lid from the brine tank and fill the tank to the ¼ level using only freshwater.
6. Slowly add water softener rock salt (pellets are not recommended) to the water in the brine tank. Add enough salt to reach the top of the water level. Add more freshwater bringing the water level to just below the overflow outlet. Stir the water salt combination very gently (15 seconds) then replace the cover.
7. Connect the brine solution feed-line to both, the brine tank and the resin tank.
8. Shutoff the outlet side of the resin tank using a turn valve or pipe cap.
9. Add a drain tube to the drain outlet elbow. This waste water is a saltwater solution and should be disposed of properly.
10. Slowly turn on the freshwater valve until the water valve is completely open.
11. Turn the manual timer all the way to the two hour position.
12. Water should begin to flow from the end of the drain elbow or drain tube. The resin tank is being regenerated.
13. After 3-5 minutes the brine solution will begin to be drawn from the brine tank. The flow can be checked by disconnecting the brine feed-line from the brine tank. Once the line is disconnected, listen for a vacuum sound at the end of this tube. If you hear a vacuum sound, the system is working correctly; reconnect the feed-line to the brine tank.
14. Special note: If the brine waste-water is flowing too fast – water is wasted or too slow - brine solution draw is reduced. The “Drain Flow Adjuster” can be adjusted to vary the brine waste-water flow rates. For most applications this “Drain Flow Adjuster” should be left to the FULL OPEN position. When you close this “Drain Flow Adjuster” the vacuum and solution draw from the brine tank is reduced.
15. After the two hour regeneration cycle, the manual timer will move to the OFF position. In the off position, the following changes occur.
   - The system is fully regenerated
   - The system is now in service mode (ready to provide soft water)
   - The system allows fresh water to be supplied to the brine tank back through the brine solution feed-line
   - The brine tank will fill with fresh water and the float will close the water supply once the tank is full
   - The discharge elbow/waste water line will stop flowing waste water
16. After the water softener has been operated for a period of time the tank resin will become depleted again, repeat the above steps starting with number 10.

Comment: The quality of the soft water being supplied by the resin tank can be determined using a conductivity meter or by adding a conductivity light to the outlet side of the resin tank.

*Check outlet water conductivity at 150 gallons of use.
**Installation check-out**

When installation has been completed, the unit is ready to be placed into service. Proceed as follows, while checking the unit for any leakages:

1. Place unit in bypass and turn on main water supply; open a cold water tap nearby and allow water to run for a few minutes until all foreign material that may have resulted from the installation is washed out; close the tap.
2. Slowly shift the bypass valve to the service position and secure it; allow water to completely fill the resin tank.
3. Carefully open a cold water tap and allow water to run for at least 2 minutes to set the resin bed and purge air from the system; close the tap.
4. Fill the brine tank with water, higher than the air-check level.
5. Turn the timer knob clockwise past 30 min, to open the drain paddle; the valve is now transferred to the brine/slow rinse position.
6. Allow the valve to draw water from the brine tank until the air-check closes.
7. Place unit in bypass.
8. Add the appropriate amount of water to the brine tank.
9. Add salt to the brine tank.
10. Set float of brine valve to the level of the water in the brine tank.
11. Shift bypass valve back to the service position.
12. Turn the timer knob back counterclockwise to the OFF position, to close the drain paddle; the valve is now transferred back to the service position.

**Mixing valve (optional)**

To adjust the residual hardness, the incorporated mixing valve must be regulated in function of the hardness of the incoming water and the desired residual hardness; the scale on the mixing valve has no absolute indication, but serves only as a reference point:
- To increase the residual hardness: turn screw counterclockwise.
- To decrease the residual hardness: turn screw clockwise.

**Drain flow adjuster**

!!! ATTENTION

When the valve is equipped with an incorporated drain flow control (optional), the drain flow adjuster is assembled and locked in the wide open position! By releasing the locking screw of the locking plate, the drain flow adjuster can still be used, but note that the maximum flow to drain is limited by the incorporated drain flow control (optional).

With the drain flow adjuster it is possible to adjust the water flow to drain during regeneration. The so created counter pressure helps to keep the piston of the valve in the regeneration position when the operating pressure is extremely low (< 1,5 bar). To adjust:

1. Place the unit in brine/slow rinse position.
2. Turn the drain flow adjuster either to the right or to the left until the piston remains stable in the regeneration position.

Do note that closing the drain flow adjuster too much, will result in bad suction of the injector.
Soft Water outlet

Cap or shutoff valve
2 hour regeneration
Drain Elbow
"Drain Flow Adjuster"