# Automatic 2K pumps Start-up for HNOSS

**Sensors and actuators used:**
Mean 2K pumps rotation: CstatH-
2Kpumps:AllPumps:sFreq-calc
Accept Cmd to SQ9
2K Pumps: WH:cSetV, DV:cSetV, cOn, sOn, cmdReset
CstatH-RHtr:CV551:sRdV
2Kpumps:Ctrl:sPBcomOK

**Initial conditions:**
SQ9 running

**The user choices**
Automatic operation (Boolean)
Final WH value
Hold current state (Boolean)
Stop sequence

**0 Idle**
Waiting for SQ9 step6 OR (step14 AND CV551 = 0% AND Pumps sOn=1)

SQ9 step6 & Automatic start-up & 2KPumps Not Ready & Not Hold

**1 Reset**
Send RESET command to the 2K pumps

Stop the sequence OR 5 s in this state

SQ9 step14 AND Automatic op AND 2KPumps running

SQ9 step6 AND Automatic start-up AND 2KPumps Ready AND Not Hold

Stop the sequence OR (time-out 30 min AND Not Hold)

**2 Full speed**
WH = 100%, DV = 100%

Mean rotation speed > 90 Hz AND Not Hold

**3 Warm-up the Pumps**
Run the pumps at full speed for 10 min.

Stop the sequence

10 mins in this state AND Not Hold

**4 Ramping down**
WH = "WH final value", DV = 100%

Stop the sequence

Mean rotation speed < expected(WH) AND Not Hold

**5 Waiting for step 8**
Send cmdAccept to SQ9

SQ9 step8 OR Stop the sequence

**6 Stopping**
After 10 s stop 2K pumps

Delay 10 s