

Mokon H4, H5, H6 Troubleshooting Guide

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Welcome to our January 2020, Mokon H4, H5, H6 system troubleshooting guide. Both basic and advanced Mokon unit troubleshooting techniques and suggestions are covered in this troubleshooting guide. This information will help you troubleshoot Mokon H4, H5, H6 systems which are manufactured and distributed by Mokon in Buffalo, NY 14207. These troubleshooting techniques do not apply to Mokon Duratherm hot water units. Always refer to your Mokon H4, H5, H6 Owner's Manual and your Mokon H4, H5, H6 instructions manual and follow all safety procedures. If you are broken down and the Mokon spare parts that need can't be supplied quickly, contact us as we may be able to supply you with the Mokon H4, H5, H6 series spare parts you need. For optimum performance always use genuine Mokon spare parts including Mokon Pumps and Mokon Valves and Mokon Temperature Controllers including the Eurotherm, Barber Colman, Compumate or Omron. Always refer to your Mokon manual, schematics, drawing before you start any Mokon repair or Mokon troubleshooting procedure. Common issues are highlighted in Yellow to speed up troubleshooting your Mokon H4, H5, H6 system. Areas of special note are in red font.

1. Mokon Unit does not start when you press the start button:
 - a. Disconnect on wall or beaker box turned off, turn on source power.
 - b. Breaker or fuse(s) are tripped or blown; if tripped or blown this could be a sign of undersized supply circuit or excessive power being drawn by the Mokon H4, H5, H6 series system.
 - i. Assure wiring size and breaker size are correct based on nameplate data on unit.
 - ii. A second device on the same electrical circuit could be causing the issue, assure circuit is sized correctly for total load.
 - iii. Check for short in the Mokon H4, H5, H6 system.
 - c. Incorrect voltage, check voltage and name plate requirements, correct as necessary

- d. The high temperature safety should be closed at room temperature. Check with ohm meter to confirm that it is closed – if it is open at room temperature replace the sensor.
2. No pump pressure:
 - a. **Pump rotation is incorrect.** We have had customers call us on their Mokon H4, H5, H6 system as many as three times before they have figured out it was running backward. Example, when plugged into the power in the maintenance area, pump rotation was correct, but when plugged in to power on the production floor it was wrong. It happens all the time – don't feel bad!
 3. System runs for short period of time and then shuts down.
 - a. **If you have low pump pressure on initial start-up, continue to press the start button until pump pressure builds to 10 psi or greater. If this is a new process loop it could take some time to fill the system with enough fluid to be able to maintain pump pressure.**
 - b. Confirm that the low pressure switch is operating correctly.
 4. Pump pressure is not sufficient:
 - a. **Incorrect pump rotation,** confirm motor/pump rotation.
 - b. **Air trapped in the process oil-loop.** Vent the trapped air at the highest possible point in your process loop. **NOTE; This is the most common issue that customers encounter. You must remove ALL of the air from the system for the system to work correctly. The air in the system also cause pumps to be very noisy. Unless you vent the air out of your system it is trapped forever!**
 - c. **Pressure Relief Valve (PRV) stuck open;** inspect the PRV valve for proper operation. Remove and clean if necessary **(a partially open PRV can be difficult to diagnose – you can have good pump pressure at lower temperatures when the fluid is thicker but not at higher temperatures when the fluid is thin).** Clean or replace as required. **NOTE: Some, not many in our experience Mokon units have relief valves on both the pump and in the system piping. Make sure that both are normally closed and working correctly.**

- d. Low fluid level, confirm that sight glass reads at least $\frac{1}{2}$ full after your process has been filled and vented; if low add correct fluid.
 - e. **Pump needs adjusting.** Refer to manual for proper procedure to perform thrust bearing adjustment. Note, in our experience, the pumps supplied on Mokon H4, H5, H6 system hot oil units have very long life expectancies; if your pump is worn out you need to look at the big picture and ask yourself is it time to replace this unit.
5. Pressure gauge(s) show surges in pressure erratically, unit (pump) is noisy and system will not hold a continuous pressure and/or temperature:
- a. Entrapped air in the process loop, vent air from process loop. We can't say it enough – entrapped air needs a way to escape and your process circuit is sealed – you must give the air a way out of your HTF-500 System. If air continues to get into your oil process loop – you may have a suction leak on the supply side of your pump or your fluid level could be getting too low before you reach process temperature. Note: thermal fluid (oil) expands as it heats and it could “look like” enough oil when hot but not necessarily part-way during your start-up procedures. Also, you could have developed an oil leak in your system, if your system was fine for months or years and suddenly is low on oil check for leaks. Repair the leak, refill the system.
6. Strange, erratic behavior of the unit including noisy pumps, wild pressure swings, unexpected system shut down (especially in the 200 F – 350 F range), oil suddenly overflowing from the oil reservoir. Many Mokon Mokon H4, H5, H6 system (maybe all??) units have holes punched in the steel deck that is the top of the oil reservoir (this is where the motor, pump and other Mokon H4, H5, H6 system hardware is mounted). These hoses are used so that the piping system can gain access to the reservoir tank. People will decide to clean their Mokon H4, H5, H6 system unit (worse yet, power-wash it) and water and/or cleaning chemicals run into the reservoir tank and ultimately end up in the process loop. As the thermal fluid (oil) temperature increases these fluids vaporize (water turns to steam) and will cause the pressure to surge and then drop. Also, this becomes the equivalent of “entrapped air” in your system causing the pumps to be very noisy. This is a very difficult situation to rectify. Even if

you drain the oil in the tank and replace it you still have contamination in your process lines. Remember, one cubic inch of water make makes 16,000 cubic inches of steam (at atmospheric pressure) – so even one drop of water is a huge problem. Worse yet, at least water boils off at 212 F but cleaning chemicals could have a higher or lower vaporization temperature potentially causing problems from 150 F to 350 (in our experience). This piping layout out is the Achilles heel of a Mokon! It is so easy for contamination to enter the tank. Since replacing the fluid in your reservoir does not in itself fix the problem, we have found it best to solve the problem is to run the Mokon H4, H5, H6 systems at 200 F with the system open (venting) to the atmosphere. You very gradually raise the temperature perhaps to as high as 400 F. Note: this is a problem best avoided in the first place. We have spent as long as 2 days clearing contaminated HTF 500 systems. If your process loop has 100 gallons of thermal fluid it can be a very long and expensive process.

7. Very high system pressures:

- a. If this is a start-up of a new process, the oil passageway size or number of passageways are insufficient for pump volume.
- b. Plugged or partially plugged flow paths in your process;
 - i. potential cause: Forklift parked on oil hose (don't laugh, we have seen it).
 - ii. Plugged strainers (or optional filers if added to the system). Clean or replace strainers and/or filters.
 - iii. Too many 90 degree elbows in your system
 - iv. System plugged with carbon build-up

8. Loss of pressure and volume output

- a. Pump or pumps (multi-zone like two zone (2 zone) or triple zone (3 zone)) need adjusting. Read the manual carefully for proper thrust bearing adjustment. The adjustment of the pump is tricky because the hotter the fluid gets, the thinner the fluid which means tighter pump clearances – but the pump is expanding and dimensions are changing as the process warms. You can have Mokon H4, H5,

H6 system that makes good pressure at 300 F but fails at 450 F. Again, pump adjustment is tricky and needs to be done with great care. As mentioned above, we have found that Mokon pumps have very long lives and if your pump is worn-out, you need to look at the remaining life for the rest of the unit before spending the money to replace the pump.

- b. Inaccurate pressure gauge readings, compare against known good gauge and replace as necessary.
- c. Low thermal fluid level, correct as necessary
- d. Pressure Relief Valve stuck open or partially open, confirm proper valve operation. Clean or replace it if necessary. Note: A sudden, unexpected pressure jump (like someone suddenly turning off a gate valve) can cause a relief valve to suddenly go wide-open. Experience has taught us that the spool area on the back-side of the relief valve may be corroded causing the spool to become stuck. When this valve is pushed fully open by the pressure spike it becomes stuck “wide open” or “partially open”. Complete disassemble and thorough cleaning is in order.

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9. Mokon H4, H5, H6 system climbs beyond setpoint temperature
 - a. Temperature controller (Eurotherm, Barber-Colman, Omron or Mokon Compu-mate aka Compumate) needs to be auto tuned. Refer to the datasheet for the controller to perform auto-tune.

- b. Heater starter (electrical contactor) stuck closed and keeping the power engaged to HTF500 heaters.
 - c. Faulty temperature sensor probe.
10. Mokon H4, H5, H6 system does not reach and/or hold temperature or has a slow reaction after changing (increasing) setpoint temperature.
- a. MOST COMMON ISSUE: HEATER IS UNDERSIZED FOR THE APPLICATION. A 24 KW UNIT IS NOT GOING TO RAISE THE TEMPERATURE OF LAKE MICHIGAN.
 - b. Cooling valve stuck in the open position. This is much more common that you might expect. Mokon H4, H5, H6 systems have an unusual (and well thought out) cooling system design. When the cooling mode is engaged, HOT OIL is supplied to the reservoir tank from the process. The water cooled tube-in-shell heat exchanger in the tank removes that heat. This is a very good system – however, if the Asco valve that diverts hot oil to the reservoir tank is stuck open (it is a normally closed valve) or is stuck “partially open” your hot oil is being diverted to the tank and cold oil from the tank is replacing the hot oil in your process. Keep in mind that you can check voltage to the Asco valve and it shows no voltage so you think the valve is closed – but it is stuck open – usually only partially. Since oil is passing through the Asco valve carbon in the oil can cause the valve to stick. VERY IMPORTANT NOTE: If you have a Mokon H4, H5, H6 that is multi-zone, each zone has its own Asco valve and any of those valves could be stuck open – so all valves need to be checked. If the pipe to tank after the Asco valve is “hot” and the unit is NOT calling for cooling the Asco valve is open or partially open.
 - c. Blown heater fuse(s) – could be caused by electrically shorted heating element(s) – note some fuses could be good with others bad – check them all.
 - d. Bad heater element(s), verify with OHM meter that no elements are “open”, replace as needed.
 - e. Low supply voltage, your Mokon HTF-500 will not perform optimally on voltages less than the rating.

- f. Eurotherm, Barber-Colman, Omron or Mokon Compumate temperature controller not tuned properly.
- g. Only one heater contactor is engaging (on units with multiple heater contactors).
- h. Loose electrical connections confirm that all electrical connections are tight.
- i. Bad process temperature probe (sensor).
- j. Your process may have a separate cooling loop – unrelated to the Mokon HTF500 heat loop – if that is the case it is possible that your cooling loop is engaged and you don't realize it – meaning that you are trying to heat over the top of the cooling loop.

11. Reservoir tank overheating

- a. Inadequate fluid level in tank, check that sight glass reads at least 50% full, add fluid as necessary – check for leaks if your losing oil.
- b. Water not flowing through heat exchanger; confirm the water supply source is turned on. Your unit may be equipped with an Asco control valve that controls the flow of water to the heat exchanger, confirm that the valve is operating properly.
- c. System heat exchanger could be plugged. This is very common on Sterlco and AEC units but is uncommon on Mokon – but you do need to check.
- d. If your cooling water is from a closed loop system, your process water could be too hot keeping your Mokon HTF-500 from cooling properly.
- e. Asco cooling valve(s) (this is the valve on the hot oil circuit(s) is stuck open allowing for continuous flow of hot oil into the tank. Clean or replace the Asco valve as needed; keep in mind that there is one Asco valve for each zone – any of them could be stuck open or partially open.
- f. Heat Exchanger is too small for process needs. This can be very common if you have a process that you heat and then need to cool

your process at the end. A heat exchanger that is only used to “regulate a constant temperature” is under less load than a heat exchanger that is being used to “cool your process at the end of its cycle”.

- g. When your Pressure Relief Valve is open, the by-pass oil is sent to the tank; so if your pressure relief valve could be stuck open (or partially open) it must be cleaned and adjusted or replaced.

12. Noisy pump

- a. Entrapped air; air in your system is the Devils workshop – get that air vented from process.
- b. Pump needs adjusting. As mentioned above, these pumps can be very tricky for the inexperienced to get adjusted correctly. A pump that works good at 300 F may not produce enough pressure at 450 F.
- c. Pump needs alignment – pump shaft and motor shaft are not parallel to each other.
- d. The spider in the coupling between motor and pump is worn out, or hard and brittle. Very common problem. NOTE: Usually the pump and motor do not have to be moved to replace the spider, slide each coupling up the shafts – refer to owner’s manual for correct safe technique.
- e. Insufficient lubrication (grease) in pump bearing housing. Be sure to grease the pump at least every 500 hours. Note, in continuous operation this would be every 20 days – don’t let your faithful Mokon unit down – keep is serviced.

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