Levelmaster Trouble shooting Frequently asked Questions

This document is handling the most common questions regarding trouble shooting in Levelmaster products.
For further guidelines, always feel free contacting Kockums Sonics support: service@kockumation.com.

General

Kockum Sonics' Levelmaster is a variety of products building a system to measure levels in tanks and drafts. Based on the configuration, the features may extend to a wide spectre of functions. Always rely on the specific documentation for the system relevant for you.
When information is required for Levelmaster system, some quick points are:

- Ship system number is unique and follows the ship from the first delivery of a system from Kockum Sonics. System number is found in the documentation and on the connection plan on the inside of the cabinet door.
- H8 Utility is a useful tool for troubleshooting Levelmaster. The software is always delivered together with a system from Kockum Sonics, normally found on an USB stick in one of the cabinets. If the software is not found onboard the ship, contact service@kockumation.com for access. When requesting the software, always name the system number, since there is more than one version.
- When ordering spare parts, always name the system number for correct handling.
- When contacting support department, Kockum Sonics will generally request:
    - Ship name
    - IMO
    - System number
    - Error details
    - Screen shot of system status from H8 Utility
    - Screen shot of detailed block status from H8 Utility

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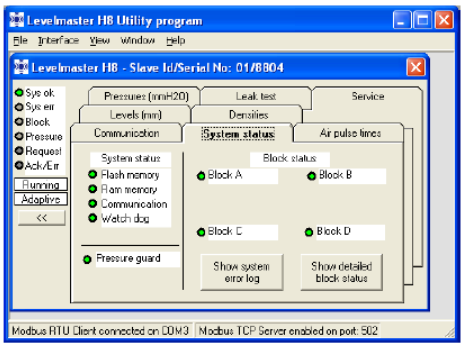
H8P

H8P (pulse) is the standard cabinet for Levelmaster when a compact solution and low air consumption is requested.

System status

In support cases with Kockum Sonics, screen shot of system status and detailed block status will be requested. If more than one system is fitted onboard, it is useful to supply information of all cabinets. In this way, a full analysis of the system and preventive actions can be taken.

System status tab



The LED indications:

Sys ok	Indication that the system is ok and running in measurement mode
Sys err	System error can have the following reasons: o Flash memory error o Ram memory error o Communication error o Watch dog error
Block	One or more blocks have error status, see below.
Pressure	When all blocks indicate pressure guard error. Normally this means that the working pressure is below 15000 mmH2O.
Request	The H8 utility driver sends a request to the connected unit.
Ack/Err	The unit returns an answer to the H8 utility driver or the message time-out timer expires.

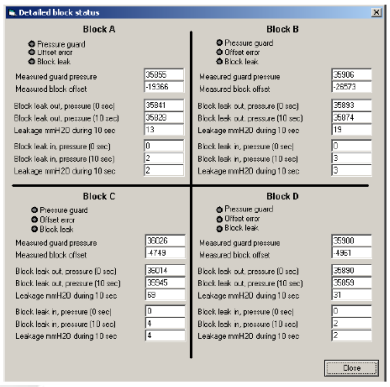
Detailed block status form

The type of block error is shown by the led indication.

The measured guard pressure is the latest measurement of the working pressure. The unit is mmH2O. The guard pressure is normally measured once every two minutes. If a block has a working pressure below the guard pressure the SCU stops measurements for this block. When all blocks have a working pressure below the guard pressure, the Pressure guard error is also set.

The measured block offset is the latest measured calibration offset. Normally this is done once every 8 minutes. The value shown is in digital units.

Block tests are done normally once every hour. The first test will fill the block with working pressure, and then wait 10 seconds with all valves closed. The second test will first ventilate the block to the atmosphere and then wait 10 seconds with all valves closed. The difference between the two measured pressures will give an indication of the status of the valves.



H8P is measuring higher value than real value

- Check the pipeline for blockage
  - Start with disconnecting the pipe from the cabinet and search for the blockage
  - At the cabinet the pressure should go down to close to 0mmH2O
  - Use either purge blow mode or constant flow to search for the blockage.
- Check the solenoid valve is opening as it should
  - Enter service mode in the Utility
  - Open inlet valve and the valve corresponding to the erratic tank
  - If the valve is opening, air should flow through the pipe.
- Check the sensor is measuring correct at vent
  - Enter service mode in the Utility
  - Open inlet valve and check the pressure. It should go to system pressure.
  - Close inlet valve and open vent valve. The pressure should go to 0mmH2O

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H8P is measuring lower value than real value

- Check the system for leakage outside the tank
  - Close the ball valve to the corresponding tank
  - Enter purge blow mode in the Utility
  - Let the pressure stabilize to its maximum
  - Enter minimum blow mode in the Utility
  - The pressure should drop but stabilize. If the pressure drops to 0, there is a leakage outside the tank
- Check the system for leakages inside the tank
  - If the above is not satisfactory, the leakage is inside the tank
  - Block the end piece inside the tank
  - Enter purge blow mode in the Utility
  - Let the pressure stabilize to its maximum
  - Enter minimum blow mode in the Utility
  - The pressure should drop but stabilize. If the pressure drops to 0, there is a leakage inside the tank

Difference between manual measuring and remote sounding

- Levelmaster H8 is measuring pressure. This is different from level since this is depending on density and mechanical offset.
- A manual sounding pipe might be bent and in that case the distance is longer. The correction tables should be used to compare the readings.
- Depending on trim and heel, the reading of the Levelmaster H8 may be different. Use the correction tables to compare the readings.

Replacing valve block

One of the most common errors with H8P is valve operators and blocks. It is possible to either replace the operators one by one or the entire valve block.
If the valve block is to be replaced, note that all pipe fittings in the bottom of the cabinet are to be disconnected.
For replacing operators, a short screwdriver is required.

Replacing Sensor and Control Unit

The Sensor and Control Unit (SCU) is the most advanced part in the H8 cabinet. This is controller, sensor units and communication units in one. When replaced, ensure the settings are correct for the cabinet it is fitted in. To setup a spare SCU, H8 Utility is required. If a spare is ordered from Kockum Sonics for a specific cabinet, this must be stated in the order. If the spare is ordered in that way, the SCU is pre-set at the factory and can be installed without any settings by the crew.

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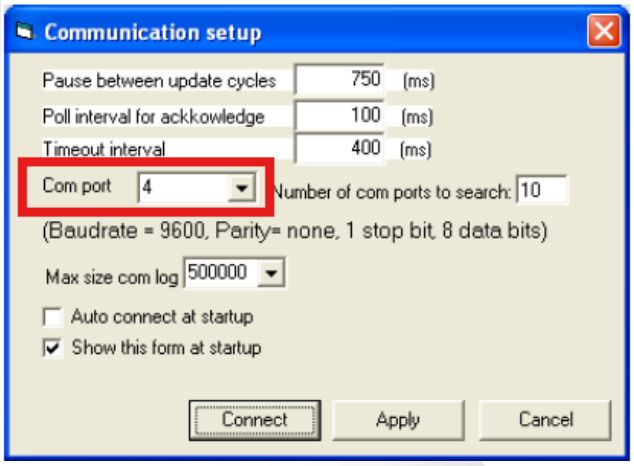
Problems connecting to SCU via USB cable

When USB cable is used, the USB driver must be installed. This driver is included in the software package for H8 Utility but needs to be installed separately.
When the USB cable is connected to the SCU and the driver is installed, it is possible to see the chosen COM port in the device manager. This com port is to be entered in H8 Utility when starting the communication. Only available com ports are shown in the scroll menu.



It is common that more than one H8 is connected in series. In these cases, the SCU: s need different slave ID: s to communicate to the next system. When connecting a laptop via USB cable, the slave ID must be considered.

- Check the set slave ID on the connection plan fitted on the inside of the cabinet door.
- In H8 Utility, the selected slave ID is found in the top.
- To select the correct slave ID, right click in the form to get the popup menu.
- When contact is established with the SCU, the green LED “Ack/Err” is flashing.

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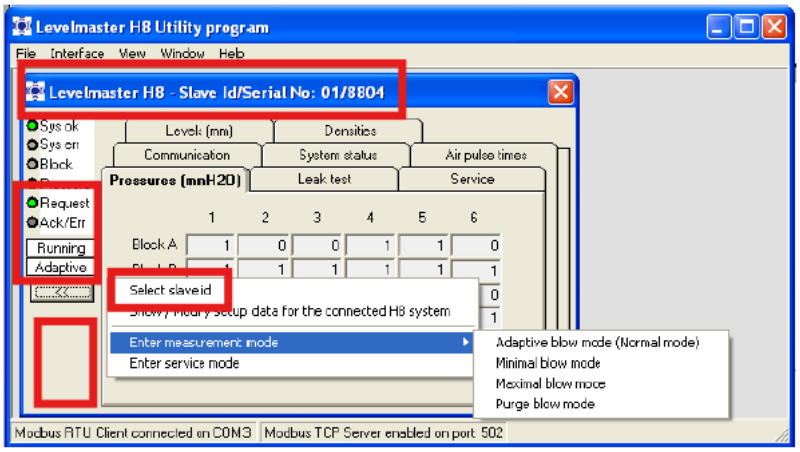
Popup menu

Press the right mouse button in the form to get a popup menu.



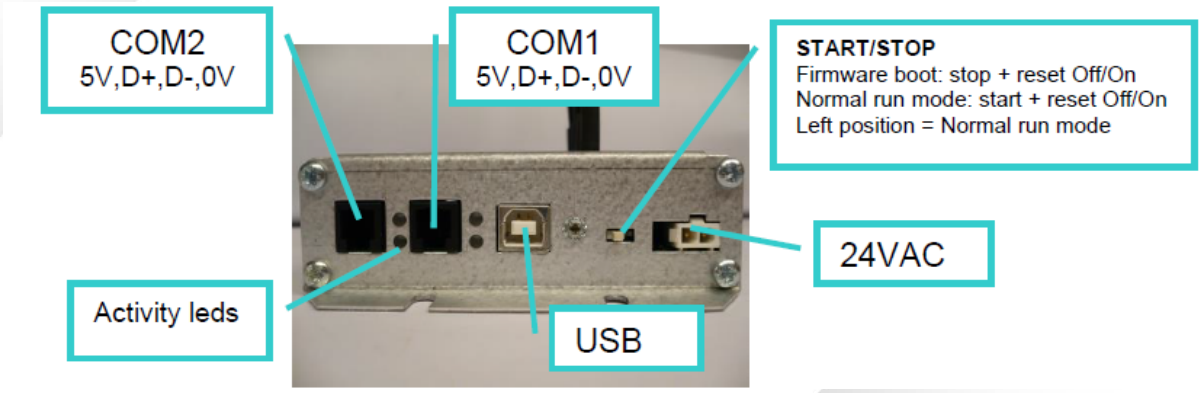
Select slave id	Enter the slave id of the H8 cabinet you wish to connect to.
Show/Modify setup data	Modify the setup data for the selected slave, see below.
Enter measurement mode	The connected unit will switch to measurement mode. Select one of four modes from below.
Adaptive blow mode	The unit will adopt the air pulse to the actual need of air. This is the normal mode of operation.
Minimal blow mode	The unit will pulse with minimal pulse length.
Maximal blow mode	The unit will pulse with maximal pulse length.
Purge blow mode	The unit will give purge pulse and then measure the pressure after app. 4 seconds. Note! If the pipe is long (>200 m) or there is a block in the pipe, the measured pressure for this blow mode may be higher than normal.
Enter service mode	The connected unit will switch to service mode, see below.

If no actions above work, the issue could be in the USB port itself. This is only rectified by replacing the SCU.

H8P is not communicating to other system

If the H8P is not communicating to other system, the first thing to check is if there are any errors in the system. If error in the SCU occur, the communication may stop. Start trouble shooting the error in the H8 cabinet before trouble shooting the communication.

There are two com ports in the SCU. Try swapping the com ports. If this solves the issue, one port is broken. Also try swapping the ports on the com card.



The communication issue may also lay in the cable or other system as well.

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SCU in stop mode

A common issue is that the H8 cabinet stops operating due to the mode switch selector is set in the stop position. This is common during service or installation, since the contacts are very close. When a situation occurs with all LED:s below are red, turn off the power, ensure mode switch in upright position and turn on the power again. If the LED:s are still lit, the SCU needs to be replaced.

Program Boot mode

If the power is turned on when the mode switch is in stop position, the Sensor Unit will enter Program Boot Mode. All error led's will then turn on indicating boot position.

To go back to normal run mode, move the mode switch to run position and cycle power on and off once again.

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SCU LED information

On the front of the SCU, LED:s are indicating some issues. It is always recommended to connect a laptop to the SCU, using H8 Utility for more details.

One common issue is “Press” flashing. Before contacting Kockum Sonics for support, check the float switch and drain out any water in the air system.

Another common issue is “Press” being lit. Before contacting Kockum Sonics for support, check the air supply from compressor and manometer.

Sys ok	● —	System ok indication, SYSOK relay (K1) activated
Sys err	● —	Communication error / Internal unit error (memory) / unstable power / watch dog
Block	● - - -	Sensor fault - offset error
	● —	Internal block leakage – solenoid valves, sensor fittings
Press	● - - -	Air quality sensor - water in air supply
	● —	Pressure guard, work pressuretoo low
Power	● —	Power 24 VAC, check fuses F1, F2

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Common SCU issues

- When all red LED:s are lit, follow instructions for boot mode above. If this does not solve the problem, replace the SCU.
- If “Sys err” is lit, cycle the power and wait minimum one hour. If this does not solve the problem, replace the SCU.
- If “Block” is lit, follow instructions for valves below. In some cases, the leakage is internally in the SCU, especially in MkI where the pipes are fitted with black heat shrink. If the SCU is leaking, replace the SCU.
- If “Block” is flashing, follow instructions for valves below. A common issue is the sensor is faulty. This is rectified by replacing the SCU.
- If “Press” is lit, follow the instructions for valves and air. It is rare that the sensor is broken, giving this alarm. If the sensor is broken, replace the SCU.
- If “Press” is flashing, follow the instructions for air. The air quality guard is a digital signal to the SCU. It is not known that the digital signal has been faulty, more likely, check the cables to the input. If the digital input is broken, replace the SCU.
- It has occurred that the internal power has become unstable. In this scenario, the SCU is constantly restarting. If this happens, replace the SCU.

Note: Since the SCU is calibrated with all its parts intact, it is not possible to replace any faulty components by the crew. The SCU is sold as a complete spare unit.

Valves not opening

If the ventilation valve fails to open, or there are any obstacles in the ventilation pipe, the SCU is self-calibrating with pressurised sensors. This will cause an incorrect calibration. If the calibration offset is too high, there will be an offset error. On the SCU, “Block” is flashing”. Check the operation of ventilation valve before continuing replacing the SCU.

If the air supply valve fails to open, or there are any obstacles in the air supply the following will happen:

- Air will not go to the tanks and tank readings will be shown empty or lower than real.
- Pressure guard will alarm on the corresponding block. On the SCU, “Press” is lit. In H8 Utility, the individual block is shown faulty.

Check operation of the inlet valve, coil, operator, flat cable and valve card before continuing replacing the SCU.

If the tank valve fails to open, the tank reading will be incorrect. There will not be an alarm in this scenario. Check operation of the valve by opening the pipe to the tank and ensure air is being purged according to the correct interval.

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Valve block leaking

If “Block” is lit on the SCU or block leakage is indicated on H8 Utility, there is a leakage either in operators or air fittings in the cabinet.
Check for leakages on pipe connector on SCU and valve block.
Connect the SCU to H8 Utility and check system status.

- If leakage in occurs: The inlet valve is leaking. Replace the operator.
- If leakage out occurs: Any of the other seven valves are leaking, or pipe fitting to sensor. Check pipe fitting to sensor and replace faulty operators.

Note that when restarting the H8 cabinet, there will not be a block leakage alarm until the first self-check has been carried out, normally set to 1 hour after startup.

Air quality and filters

It is recommended to inspect air filters on regular basis. Before inspecting the air filters, ensure the ball valve is closed and the system is drained from pressurised air.

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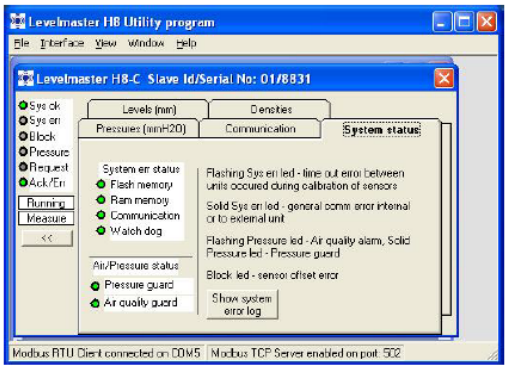
H8C

H8C (continuous) is the standard cabinet for Levelmaster when continuous measuring and individual pressure sensors are requested.

System status

In support cases with Kockum Sonics, screen shot of system status and detailed block status will be requested. If more than one system is fitted onboard, it is useful to supply information of all cabinets. In this way, a full analysis of the system and preventive actions can be taken.
In systems with firmware older than 5515, this must be retrieved from all SCU:s individually in the cabinet.

System status tab



The LED indications:

Sys ok	Indication that the system is ok and running in measurement mode
Sys err	System error can have the following reasons: ○ Flash memory error ○ Ram memory error ○ Communication error ○ Watch dog error
Pressure	Pressure below 3bar -> Pressure guard alarm. Liquid accumulated in the middle filter cup -> Air quality alarm.
Request	The H8 utility driver sends a request to the connected unit.
Ack/Err	The unit returns an answer to the H8 utility driver or the message time-out timer expires.

Note! It the system is restarted many times within a short period of time, the Watch dog error can go on. After 1 minute with stable power the error is reset to normal.

Press **Show system error log** to view the logged system information.
Normally the system log will contain changes made in the mode of operation of the unit, and also changes made between normal and error states.
As an option it is also possible to log every pressure guard check, offset calibration and leak test check. Choose these options from the menu **File – Options**.

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H8C is not measuring correct

1. Have the laptop connected to the SCU and H8 Utility running
2. Have the pressure tab opened as below picture

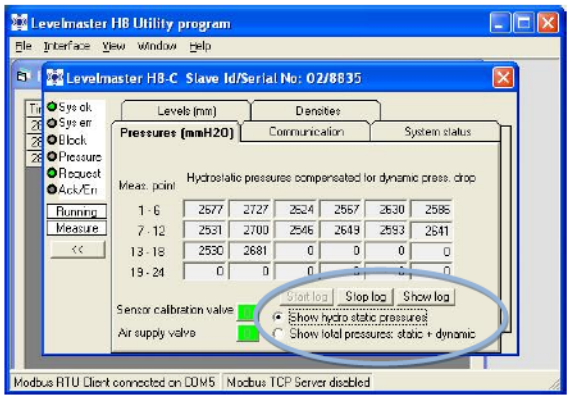
Pressure tab

The form below shows pressures as mmH2O.

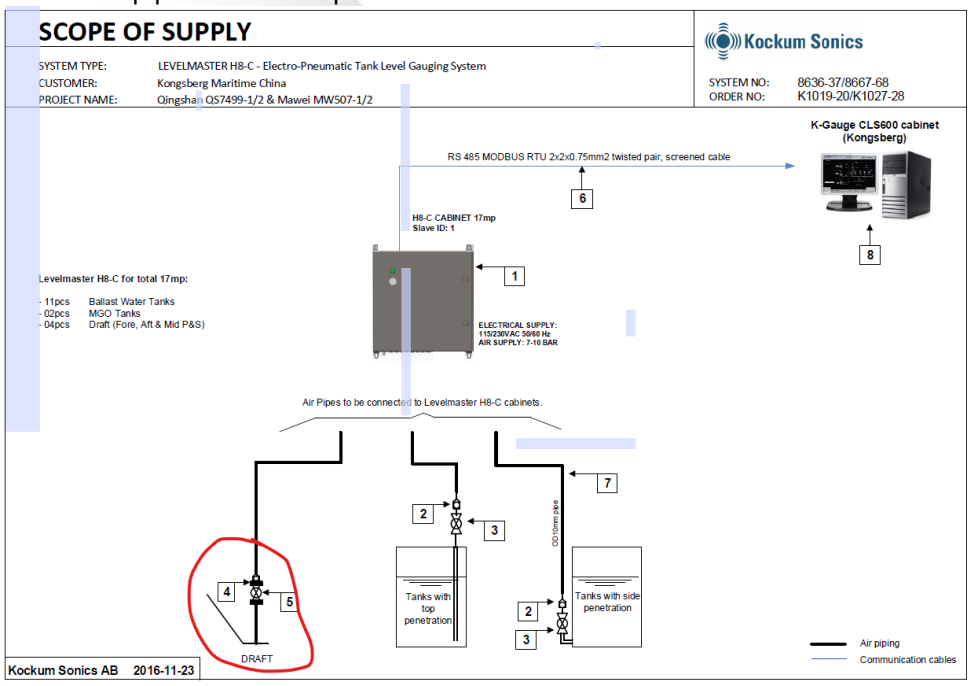
The two option buttons marked below, is used to switch between the total pressures and the compensated hydrostatic pressure.

The total pressure is the sum of hydrostatic pressure and dynamic pressure drop.

The master SCU is responsible for the pressures 1 to 4, slave 1 SCU 5 to 8, slave 2 SCU 9 to 12 and slave 3 SCU 13 to 16.



3. Locate the pipe at the draft penetration side



4. Close the ball valve for the corresponding measuring point. Draft is marked on the picture above
5. The corresponding pressure should raise to its maximum. Draft Mid P is measuring point 15
6. Enter service mode. Right click in the marked area below to get the popup menu.

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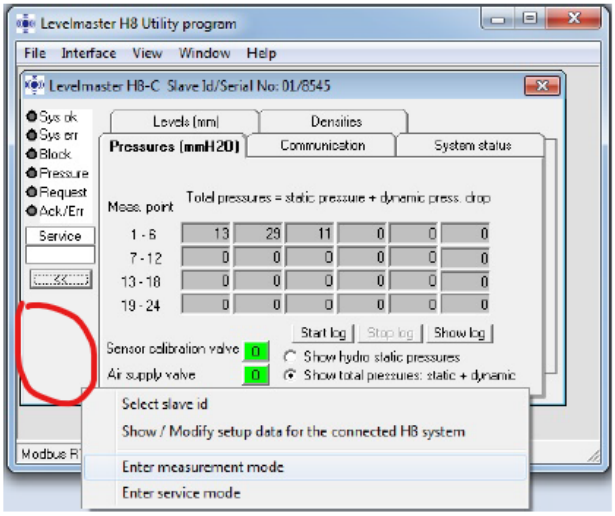
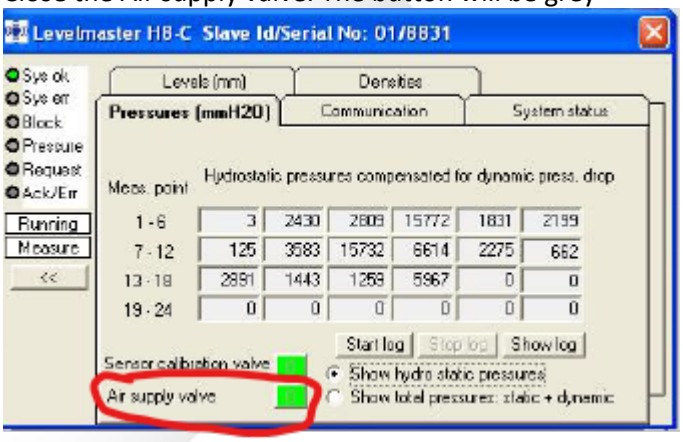
Popup menu

Press the right mouse button in the form to get a popup menu.



Select slave id	Enter the slave id for the H8 cabinet you wish to connect to.
Show/Modify setup data	Modify the setup data for the selected slave, see below.
Enter measurement mode	The connected unit will switch to measurement mode, default mode.
Enter service mode	The connected unit will switch to service mode, see below.

7. Close the Air supply valve. The button will be grey



8. Monitor the pressure for the corresponding measuring point. After a couple of minutes, the pressure would have dropped, but stabilize. If the pressure continues to drop to 0, there is a leakage.
9. Keep the Air supply valve closed and open the calibration valve. Now both buttons will be grey. The measuring pipes will be ventilated.

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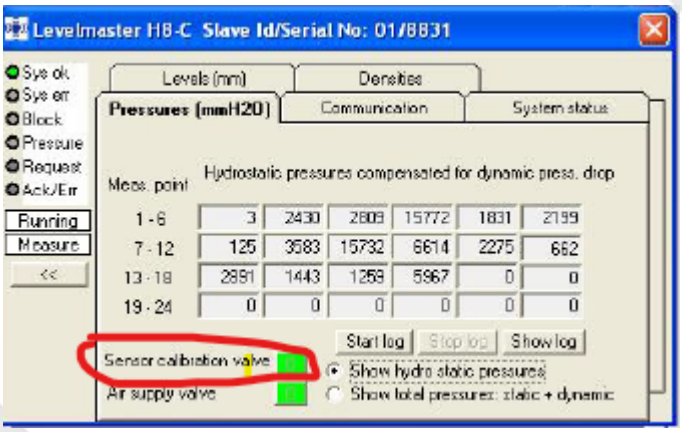
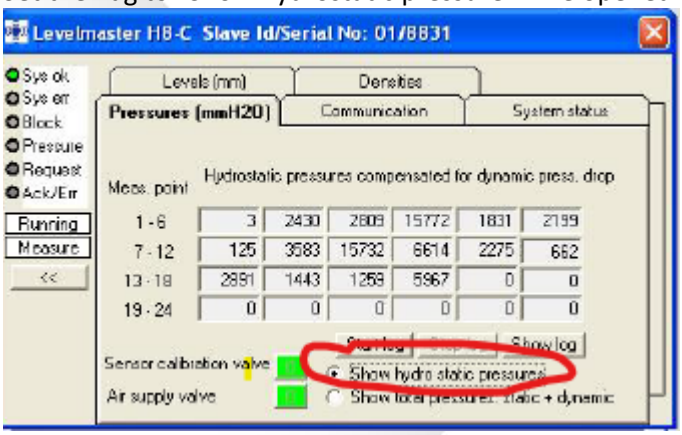


10. Open the pipe at the non-return valve. Referring to the picture in point 3.
11. Check status of non-return valve
12. Set the H8 to measuring mode. Air will be purged through the sensing pipe
13. Set the flag to “Show hydrostatic pressure”. The opened measuring point will show close to 0.



14. If a high value is shown, there is a blockage in the pipe. Otherwise the blockage is in the non-return valve, ball valve or penetration.

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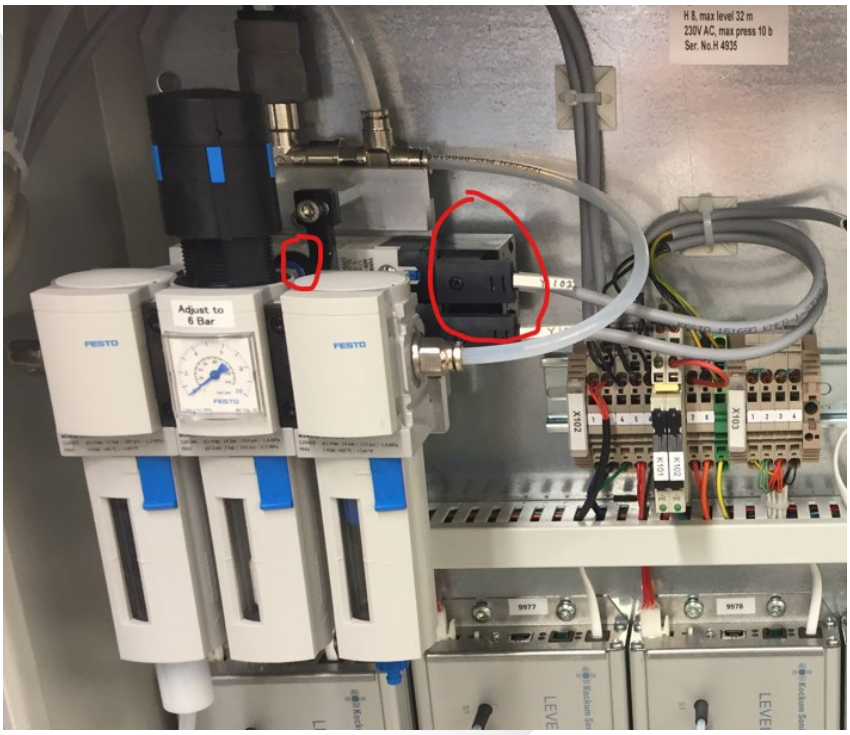
Calibration valve being stuck

If H8-C is getting offset error after approximately 20min. This may be due to calibration valve not ventilating the blocks properly.
Check for any obstacles towards the ventilation. Ensure that air is ventilated when calibration is taken place.
Next to be checked is the calibration valve and air supply valve. Try swapping the power cables and air hoses between these two solenoid valves.



If you experience improvement, it is recommended to replace this valve package with the replacement kit 24801463.

Values are normal but suddenly goes to 0 then to full. It is not possible to enter service mode

Check that the internal power supply is steady 24VAC. The system should go to service mode even if the air pressure is low. If the power is cycled, the cabinet restarts in adaptive blow mode every time. This also could be the reason why the values are normal a while, then suddenly behaves as per below. It is possible the issue with unstable power can be due to the Sensor and Control Unit itself.

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Difference between manual measuring and remote sounding

- Levelmaster H8 is measuring pressure. This is different from level since this is depending on density and mechanical offset.
- A manual sounding pipe might be bent and in that case the distance is longer. The correction tables should be used to compare the readings.
- Depending on trim and heel, the reading of the Levelmaster H8 may be different. Use the correction tables to compare the readings.

Replacing valve block

The flow control block consists of restrictors, check-valves and pilot valves. The pilot valves are possible to be replaced, but in blocks delivered 2025 and earlier, the other parts are not replaceable. All flow control blocks are compatible with each other, although the internal parts are not.
Important details when replacing the flow control block:

- Air and power to be switched off.
- All pipe fittings are push in type. To remove the pipes, push in the lock ring and pull out the pipe firmly.
- Remove the full assembly of blocks before dismantling.
- There are gaskets between the blocks, ensure these are intact. Do not fit the blocks back together with broken gaskets.
- The blocks are fitted together with locking bolts, accessible with Allen keys from the side of the blocks. When assembling the blocks together, ensure the gaskets are compressed equally.
- When the block is replaced and all parts are re-assembled, start the air and power normally. Monitor the function at least one hour after starting the cabinet, since the self-check has to be carried out.

Dynamic pressure drop

The major difference between H8P and H8C is the way the cabinets are measuring the pressure. Since H8P is pulsing, the cabinet is measuring the hydrostatic pressure. This is the pressure without the dynamic pressure drop. Since H8C is measuring the pressure with continuous flow, the dynamic pressure drop must be considered. By calibrating the dynamic pressure drop, the hydrostatic pressure can be calculated.
In newer firmware, it is possible to automatically calibrate the dynamic pressure drop in H8 Utility. Rely on the H8 Utility manual. For older systems, dynamic pressure drop needs to be manually calibrated.

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Replacing Sensor and Control Unit

The Sensor and Control Unit (SCU) is the most advanced part in the H8 cabinet. This is controller, sensor units and communication units in one. When replaced, ensure the settings are correct for the cabinet it is fitted in. To setup a spare SCU, H8 Utility is required. If a spare is ordered from Kockum Sonics for a specific cabinet, this must be stated in the order. If the spare is ordered in that way, the SCU is pre-set at the factory and can be installed without any settings by the crew.

Important details regarding SCU for H8C

- All units must have the same firmware. Firmware is not possible to be changed by the crew. Firmware is stated in the system documentation.
- All SCU:s in the cabinet has unique settings rely on documentation and H8 Utility manual to set the units correctly.
- If the old SCU is possible to communicate, it is recommended to retrieve the settings from this unit and download to the new unit.

SCU LED information

On the front of the SCU, LED:s are indicating some issues. It is always recommended to connect a laptop to the SCU, using H8 Utility for more details.

One common issue is “Press” flashing. Before contacting Kockum Sonics for support, check the float switch and drain out any water in the air system.

Another common issue is “Press” being lit. Before contacting Kockum Sonics for support, check the air supply from compressor and manometer.

Sys ok	● ———	System ok indication, SYSOK relay (K1) activated
Sys err	● - - - - - - -	Internal communication error during offset calibration
	● ———	Communication error / Internal unit error (memory) /unstable power / watch dog
Block	● ———	Sensor fault offset error
Press	● - - - - - - -	Air quality sensor, water in air supply, see appendix A, Air filter.
	● ———	Pressure guard, work pressure below 3 bar, check air supply
Power	● ———	Power 24 VAC, check fuses F1, F2

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Common SCU issues

- When all red LED:s are lit, follow instructions for boot mode above. If this does not solve the problem, replace the SCU.
- If “Sys err” is lit, cycle the power and wait minimum one hour. If this does not solve the problem, replace the SCU.
- If “Block” is lit, the calibration of sensor is erratic. Connect to the SCU using H8 Utility. If only one sensor is failing, the SCU needs to be replaced. If all sensors are failing, the issue may be in the calibration valve being stuck. Follow the instructions for main calibration valve. The error may also be in the pilot valve.
- If “Press” is lit, investigate air supply and the function of the pressure guard. Normal setting for pressure guard is 3,5bar and is a dry contact to the connection card.
- If “Press” is flashing, follow the instructions for air. The air quality guard is a digital signal to the SCU. It is not known that the digital signal has been faulty, more likely, check the cables to the input. If the digital input is broken, replace the SCU.
- It has occurred that the internal power has become unstable. In this scenario, the SCU is constantly restarting. If this happens, replace the SCU.
- In not commissioned systems, there may be incorrect settings in the slave units, affecting the function. As a part of trouble shooting, connect the slave units individually to H8 Utility and check the settings.

Note: Since the SCU is calibrated with all its parts intact, it is not possible to replace any faulty components by the crew. The SCU is sold as a complete spare unit.

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