

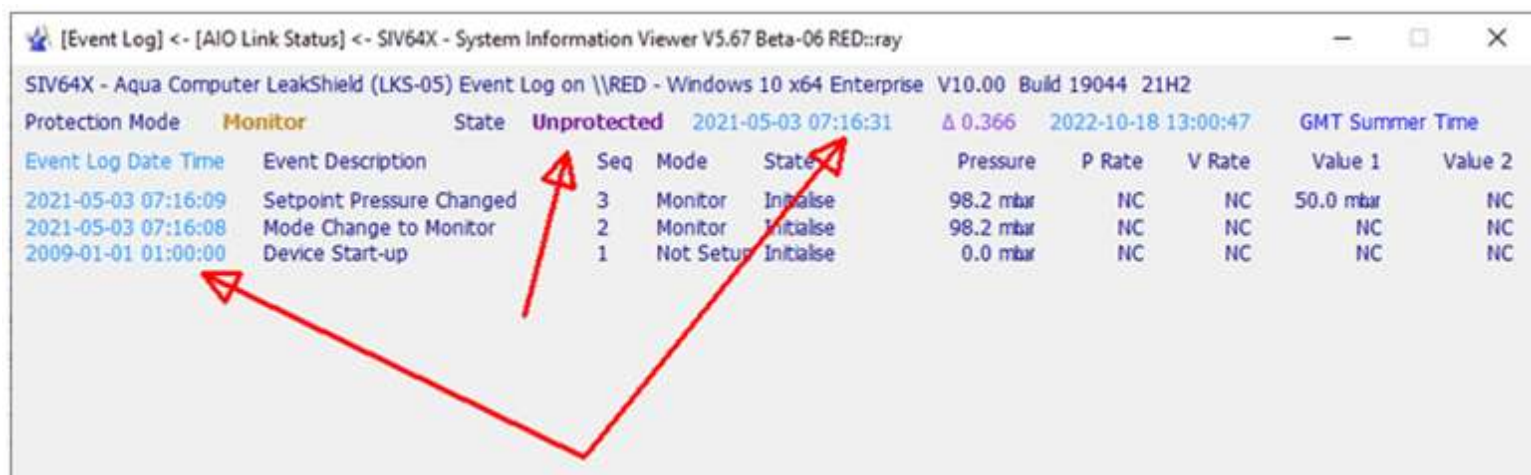
Aqua Computer LeakShield Start-up and Event logging Observations

I have been trying to understand how to best use my Aqua Computer LeakShield and while doing this have noted several inconsistencies and oversights that Aqua Computer could/should address. I was unable to fully understand what was happening using just X.59. As soon as I started X.59 it changed the LKS Date Time so I could not easily tell what it was before X.59 was started so I wrote a few lines of code to provide this information.

While making these observations I was mainly focusing on what would happen when the system was initially powered on before X.59 could be active, further it could be a long time before X.59 could be active as I could be setting things up in the BIOS or booting into a Windows installation that did not have X.59 installed, or Linux. I did so knowing some of the issues would not exist if X.59 was active. I chose to do this as I expect the LeakShield firmware should operate well when X.59 is not active.

Initial Device Start-up

When the device is initially powered on and X.59 is not active, the Device Start-up time is 0x0000 which is 2009-01-01 00:00:00 UTC (01:00:00 GMT) but other event times start from about 2021-05-03 07:16:00 GMT. After considering this I feel both should start from the same base and were I to design how this would be done I would have them all starting from 2009-01-01 00:00:00 UTC. By doing this it would mean that when X.59 is started and sets the correct Date Time as it would know the difference from the current LKS Date Time. It could and should adjust all the event log entries to make them correct. At the moment it's impossible to sensibly update the Device start-up Date Time.



Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2021-05-03 07:16:09	Setpoint Pressure Changed	3	Monitor	Initialise	98.2 mbar	NC	NC	50.0 mbar	NC
2021-05-03 07:16:08	Mode Change to Monitor	2	Monitor	Initialise	98.2 mbar	NC	NC	NC	NC
2009-01-01 01:00:00	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

Currently X.59 could correct all but the Device Start-up, but fails to do this. I consider this a bug.

I also noted that the LKS 1017 firmware fails to measure the fill level when I expected it to do this. As it's recommended that refill operations are done while the system is in stand-by it's likely the level will have changed. Why does the firmware not measure the fill level on start-up?

Given SIV is a 2nd party application I clearly need to show what it reports is the same as X.59 reports, so I started X.59 and when I did this it reported:

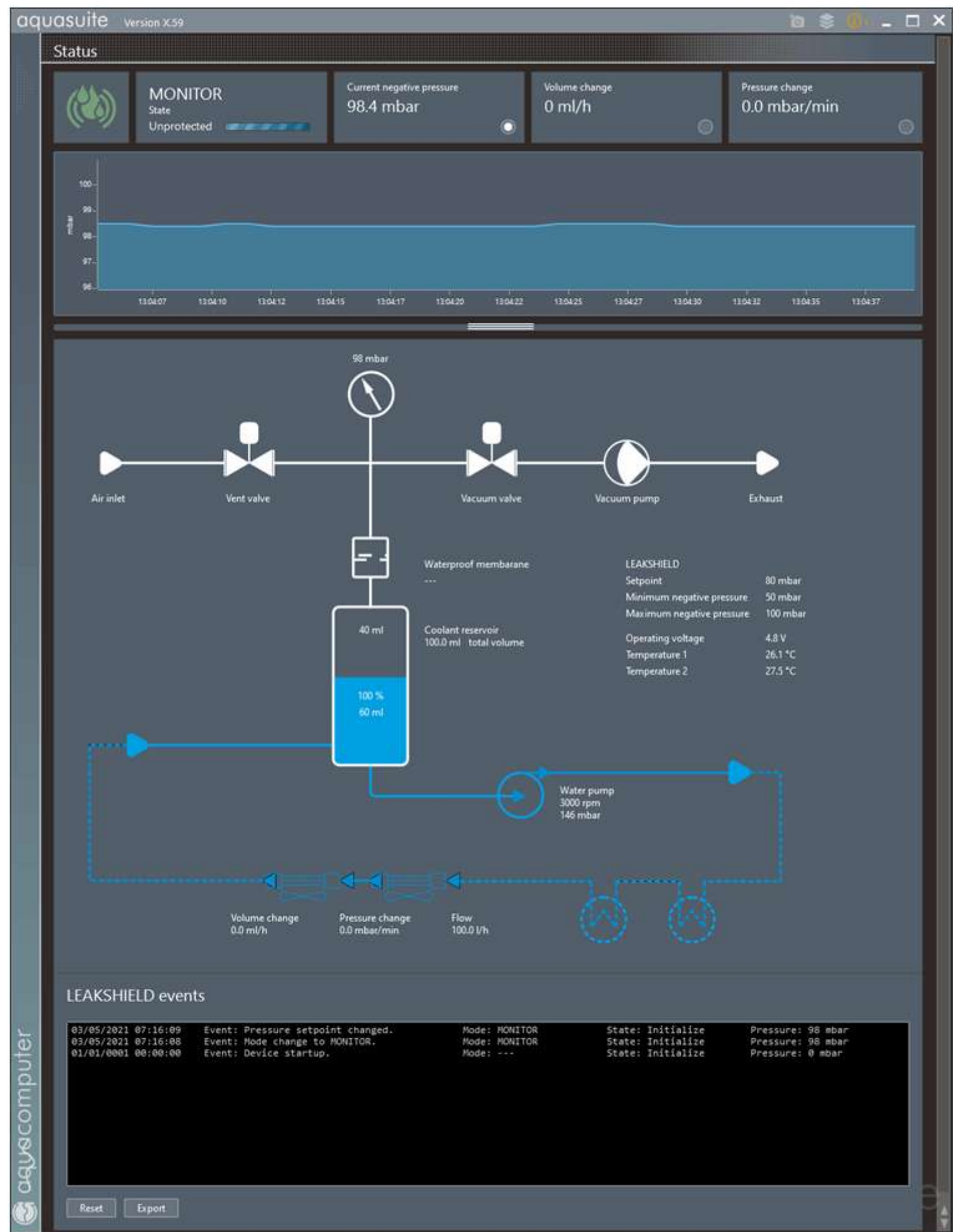
LEAKSHIELD events					
03/05/2021 07:16:09	Event: Pressure setpoint changed.	Mode: MONITOR	State: Initialize	Pressure: 98 mbar	
03/05/2021 07:16:08	Event: Mode change to MONITOR.	Mode: MONITOR	State: Initialize	Pressure: 98 mbar	
01/01/0001 00:00:00	Event: Device startup.	Mode: ---	State: Initialize	Pressure: 0 mbar	

As you can see, the information reported is the same apart from the 01/01/0000 00:00:00 Device start-up time which is incorrect in X.59 so X.59 should be fixed. I also expected there to be an Event Log entry for the time change showing the before and after Date Times and there is not.

I further feel that X.59 having Event: + Mode: + State: + ... on every line is inappropriate and that there should be a title line.

Events not being logged that should be logged

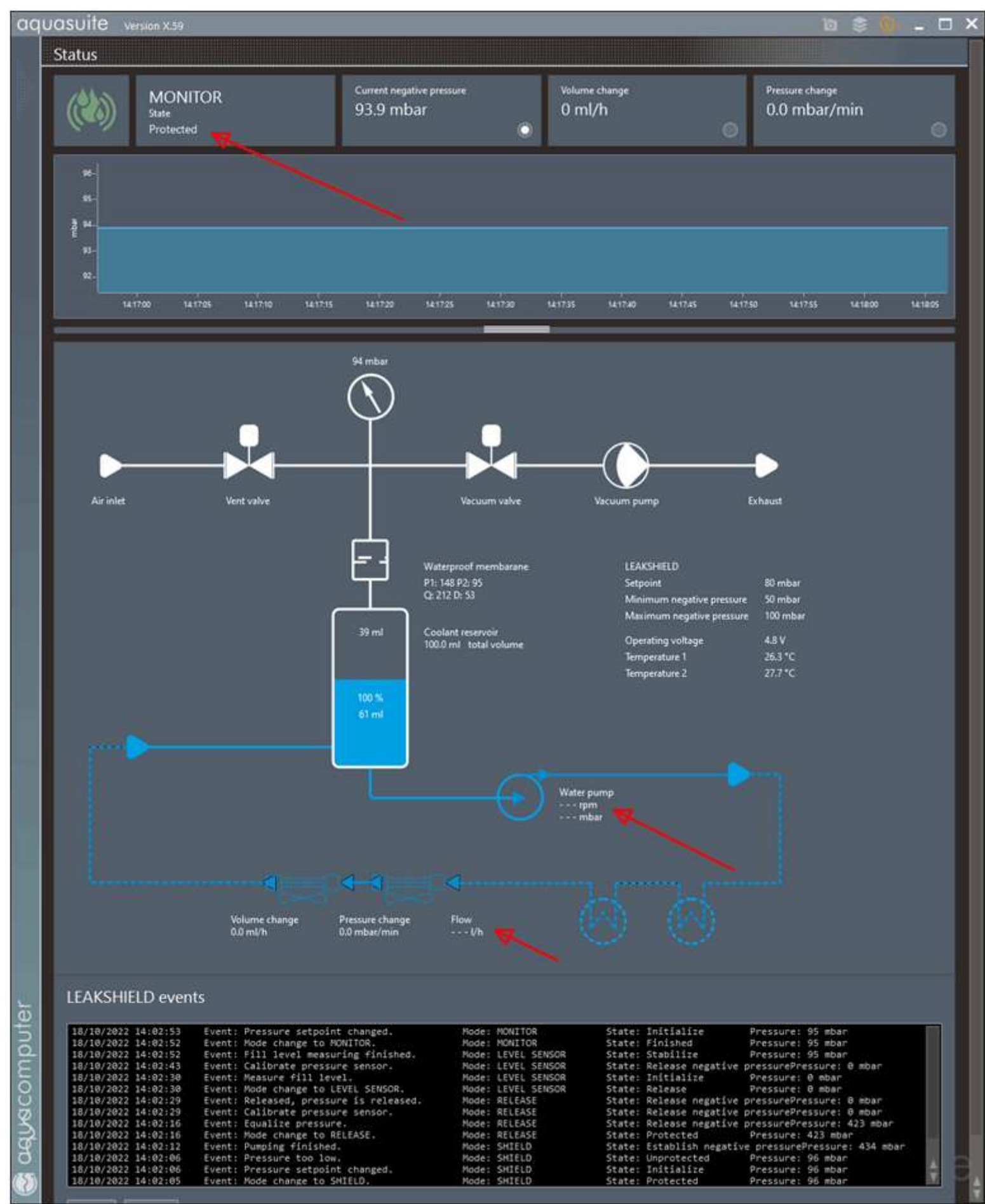
When I started X.59 the status panel was as follows:



Note there is no event to show the state is Monitor Unprotected, there should be.

Monitor Protected when there is no way to know it's Protected

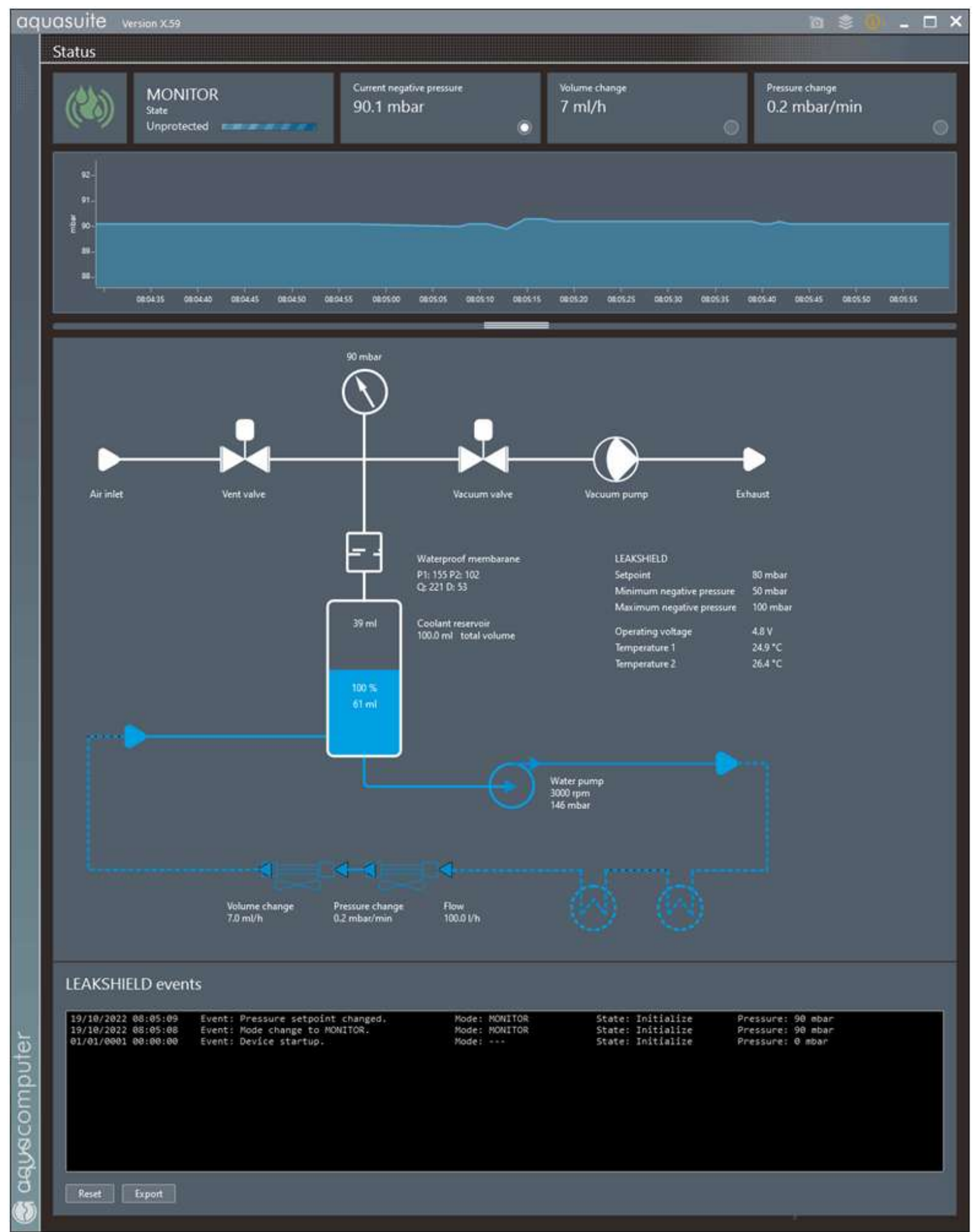
Sometime later I noted the state had changed to Monitor Protected!



Looking at the screen, this is because the pump speed has changed from 3000 RPM to --- meaning it's unknown. Given this, there is no way to know if things are protected or unprotected so for X.59 (actually the LKS 1017 firmware) to report Protected is at best misleading.

X.59 Reporting Stale and possibly incorrect Information

Next I cleared the event log then with X.59 active I unplugged the LKS, waited 10 seconds and reconnected it. X.59 reported:



Notice now the dates are other than 2021, but it's still reporting P1 + P2 + Q + D. When I checked the hardware these values have not been set as they only get set after a measure level which 1017 fails to do on start-up. I know they have not been set in the hardware as I dumped the raw data block and decoded it.

[2:0 0F LKS-05] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-06 RED::ray

RID	LKS-05 (Aqua Computer LeakShield)																@ 837	Input	837	Output	11	Feature	3091	Delay	0.058								
01	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F		10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
0000	00	64	07	8B	E8	8F	03	E9	00	01	00	64	03	F9	00	00	0010	00	06	01	00	00	14	BA	00	00	00	3D	00	22	B6	CF	28
0020	18	00	19	F3	9C	34	38	0D	08	13	0A	07	E6	01	23	03	0030	00	01	BC	5A	00	0E	A4	02	5C	EF	20	00	03	81	03	81
0040	03	83	03	82	04	01	27	10	00	00	00	00	00	00	2F	02	0050	00	03	00	00	00	05	00	02	2E	03	00	01	00	00	00	02
0060	00	00	03	04	7F	FF	7F	FF	7F	FF	7F	FF	0C	05	7F	FF	0070	7F	FF	7F	FF	7F	FF	00	06	7F	FF	00	00	00	00	00	00
0080	00	07	7F	FF	00	00	00	00	00	00	00	08	7F	FF	00	00	0090	00	00	00	00	00	09	7F	FF	00	00	00	00	00	00	00	0A
00A0	7F	FF	00	00	00	00	00	00	00	08	7F	FF	00	00	00	00	0080	00	00	00	0C	7F	FF	00	00	00	00	00	00	00	0D	7F	FF
00C0	00	00	00	00	00	00	00	0E	7F	FF	00	00	00	00	00	00	00D0	00	0F	7F	FF	00	00	00	00	00	00	00	10	7F	FF	00	00
00E0	00	00	00	00	00	11	7F	FF	00	00	00	00	00	00	00	12	00F0	7F	FF	00	00	00	00	00	00	00	00	13	7F	FF	00	00	00
0100	00	00	01	E5	00	00	00	09	C9	00	00	00	00	00	00	00	0110	00	00	22	85	00	00	22	84	03	78	00	09	03	81	0A	5E
0120	7F	FF	01	F4	03	20	03	E8	00	02	00	09	00	00	00	00	0130	00	01	00	03	00	27	00	3D	00	64	27	10	00	00	00	00
0140	00	00	05	F5	00	00	00	6D	00	01	38	8C	00	00	03	FE	0150	00	00	08	A2	00	00	00	00	00	00	00	00	00	00	00	01
0160	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0170	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0180	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0190	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
01A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	01B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
01C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	01D0	19	F3	9A	25	03	13	00	02	00	00	03	85	7F	FF	7F	FF
01E0	01	F4	7F	FF	19	F3	9A	24	02	02	00	02	00	00	03	84	01F0	7F	FF	7F	FF	7F	FF	00	00	00	00	00	01	00	00	00	00
0200	00	00	00	00	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00	0210	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF
0220	00	00	00	00	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF	0230	7F	FF	7F	FF	00	00	00	00	00	FF	00	00	00	00	7F	FF
0240	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00	00	FF	00	00	0250	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00
0260	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF	0270	00	00	00	00	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF
0280	7F	FF	7F	FF	00	00	00	00	FF	00	00	00	00	00	7F	FF	0290	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00	00	FF	00	00
02A0	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00	02B0	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF
02C0	00	00	00	00	00	FF	00	00	00	00	7F	FF	7F	FF	7F	FF	02D0	7F	FF	7F	FF	00	00	00	00	00	FF	00	00	00	00	7F	FF
02E0	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00	00	FF	00	00	02F0	00	00	7F	FF	7F	FF	7F	FF	7F	FF	7F	FF	00	00	00	00
0300	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0310	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0320	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0330	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0340	00	00	00	00																													

Sensor Description	Offset	Data	Current	Data	Minimum	Data	Maximum	Data	Average	Units	Type
LKS Structure	0000	0064	@ 0344								
LKS Serial	0002	078B	01931								
LKS Number	0004	E88F	59535								
LKS Hardware	0006	03E9	1001								
LKS Device	0008	0001	1								
LKS Loader	000A	0064	100								
LKS Firmware	000C	03F9	1017	CP_UTF8							2022-10-19 08:13:56
LKS Protect Mode	0128	0002	2	Monitor							

...

LKS Negative Pressures	0122	01F4	50.0 mbar	0320	80.0 mbar	0381	89.7 mbar	03E8	100.0 mbar		
LKS Volumes and Fill	0134	0027	39.00 ml	003D	61.00 ml	0064	100.00 ml	2710	100.0 %		
LKS Progress	013C	0000	0.00 %	0000	0.00 %						
LKS Membrane P1	0.0	0306	0000	0.0	0000	0.0	0000	0.0	0000		0.0
LKS Membrane P2	0.0	030E	0000	0.0	0000	0.0	0000	0.0			
LKS Membrane D	0.0	0314	0000	0.00	0000	0.00	0000	0.00	0000		0.00
LKS Membrane Q	NA	031C	0000	0.00	0000	0.00	0000	0.00	0000		0.00

Aqua Computer failing to provide insight into what all the values on Status mean.

I have searched the LeakShield manual for insight into what all the numbers on the Status panel mean, but this is not present. For some time I have been watching the <https://forum.aquacomputer.de/weitere-foren/english-forum/112946-leakshield-status-diagram-what-are-the-2-temps-reported> forum thread in the hope of Aqua Computer providing this absent information into what all the numbers on the Status panel mean and am disappointed they have not done this. In general Aqua Computer often just seem to ignore some posts, which I consider unprofessional.

Some forum members have managed to figure out what P1 + P2 + D probably are, but not where they are measured and Q is a total mystery. Also, regarding Temp1 and Temp2 it's impossible to deduce where the two temperatures are measured and/or what they represent. I feel Aqua Computer should provide this information. Why does X.59 prominently display these values but not document them anywhere? Why does Aqua Computer then ignore requests from paying customers who want to understand what these values mean?

How hard would these issues be to fix?

I suspect implementing the changes to fix these would not take long at all, as it only took me a few minutes to correct the Event Log date times as best as possible given inconsistent data. Initially all the 2021 dates were automatically adjusted:

[Event Log] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-06 RED::ray

SIV64X - Aqua Computer LeakShield (LKS-05) Event Log on \\RED - Windows 10 x64 Enterprise V10.00 Build 19045 22H2

Protection Mode **Monitor** State **Unprotected** ☒ 2022-10-19 13:09:55 Δ 0.470 2022-10-19 13:09:55 GMT Summer Time

Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2022-10-19 13:09:08	Setpoint Pressure Changed	3	Monitor	Initialise	94.5 mbar	NC	NC	50.0 mbar	NC
2022-10-19 13:09:07	Mode Change to Monitor	2	Monitor	Initialise	94.3 mbar	NC	NC	NC	NC
2010-06-19 06:52:59	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

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I then started X.59 and did a Measure Level, the adjustment was automatically stopped and I saw:

[Event Log] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-06 RED::ray

SIV64X - Aqua Computer LeakShield (LKS-05) Event Log on \\RED - Windows 10 x64 Enterprise V10.00 Build 19045 22H2

Protection Mode **Monitor** State **Unprotected** ☐ 2022-10-19 13:11:01 Δ 0.476 2022-10-19 13:11:01 GMT Summer Time

Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2022-10-19 13:10:54	Pressure is too High	10	Monitor	Unprotected	101.1 mbar	NC	NC	100.0 mbar	NC
2022-10-19 13:10:53	Setpoint Pressure Changed	9	Monitor	Initialise	101.1 mbar	NC	NC	50.0 mbar	NC
2022-10-19 13:10:52	Mode Change to Monitor	8	Monitor	Finished	101.1 mbar	NC	NC	NC	NC
2022-10-19 13:10:52	Measure Fill Level Finished	7	Measure	Stabalise	101.1 mbar	NC	NC	40.0 mℓ	100.00 %
2022-10-19 13:10:44	Calibrating Pressure Sensor	6	Measure	Negative	-0.3 mbar	NC	NC	NC	NC
2022-10-19 13:10:31	Measure Fill Level Starting	5	Measure	Initialise	94.3 mbar	NC	NC	NC	NC
2022-10-19 13:10:31	Mode Change to Meseure	4	Measure	Unprotected	94.3 mbar	NC	NC	NC	NC
2021-05-03 07:16:09	Setpoint Pressure Changed	3	Monitor	Initialise	94.5 mbar	NC	NC	50.0 mbar	NC
2021-05-03 07:16:08	Mode Change to Monitor	2	Monitor	Initialise	94.3 mbar	NC	NC	NC	NC
2009-01-01 01:00:00	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

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I feel that the most serious issues are the 1017 firmware reporting Protected when the pump speed and hence pump pressure is unknown and state changes from such as Unprotected to Protected not being in the Event log.

[Event Log] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-06 RED::ray

SIV64X - Aqua Computer LeakShield (LKS-05) Event Log on \\RED - Windows 10 x64 Enterprise V10.00 Build 19045 22H2

Protection Mode **Monitor** State **Protected** ☐ 2022-10-19 13:16:03 Δ 0.124 2022-10-19 13:16:03 GMT Summer Time

Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2022-10-19 13:10:54	Pressure is too High	10	Monitor	Unprotected	101.1 mbar	NC	NC	100.0 mbar	NC
2022-10-19 13:10:53	Setpoint Pressure Changed	9	Monitor	Initialise	101.1 mbar	NC	NC	50.0 mbar	NC
2022-10-19 13:10:52	Mode Change to Monitor	8	Monitor	Finished	101.1 mbar	NC	NC	NC	NC
2022-10-19 13:10:52	Measure Fill Level Finished	7	Measure	Stabalise	101.1 mbar	NC	NC	40.0 mℓ	100.00 %
2022-10-19 13:10:44	Calibrating Pressure Sensor	6	Measure	Negative	-0.3 mbar	NC	NC	NC	NC
2022-10-19 13:10:31	Measure Fill Level Starting	5	Measure	Initialise	94.3 mbar	NC	NC	NC	NC
2022-10-19 13:10:31	Mode Change to Meseure	4	Measure	Unprotected	94.3 mbar	NC	NC	NC	NC
2021-05-03 07:16:09	Setpoint Pressure Changed	3	Monitor	Initialise	94.5 mbar	NC	NC	50.0 mbar	NC
2021-05-03 07:16:08	Mode Change to Monitor	2	Monitor	Initialise	94.3 mbar	NC	NC	NC	NC
2009-01-01 01:00:00	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

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When should the LKS 1017 firmware automatically do a Measure Level

I was wondering when the 1017 firmware would do a measure level. Given it does not do one on start-up I wondered what would happen if I used to button to change from Monitor -> Release -> Monitor so tried it.

[Event Log] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-07 RED::ray

SIV64X - Aqua Computer LeakShield (LKS-05) Event Log on \\RED - Windows 10 x64 Enterprise V10.00 Build 19045 22H2

Protection Mode	Monitor	State	Protected	2022-10-20 11:15:00	Δ 0.469	2022-10-20 11:15:00	GMT Summer Time		
Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2022-10-20 11:10:38	Pressure is too High	14	Monitor	Unprotected	102.3 mbar	NC	NC	100.0 mbar	NC
2022-10-20 11:10:38	Setpoint Pressure Changed	13	Monitor	Initialise	102.3 mbar	NC	NC	50.0 mbar	NC
2022-10-20 11:10:37	Mode Change to Monitor	12	Monitor	Finished	102.2 mbar	NC	NC	NC	NC
2022-10-20 11:10:37	Measure Fill Level Finished	11	Measure	Stabalise	102.2 mbar	NC	NC	41.0 mℓ	97.50 %
2022-10-20 11:10:28	Calibrating Pressure Sensor	10	Measure	Negative	-0.2 mbar	NC	NC	NC	NC
2022-10-20 11:10:15	Measure Fill Level Starting	9	Measure	Initialise	-0.1 mbar	NC	NC	NC	NC
2022-10-20 11:10:15	Mode Change to Meseaure	8	Measure	Release	-0.1 mbar	NC	NC	NC	NC
2022-10-20 11:09:51	Released the Pressure	7	Release	Negative	0.0 mbar	NC	NC	NC	NC
2022-10-20 11:09:51	Calibrating Pressure Sensor	6	Release	Negative	0.2 mbar	NC	NC	NC	NC
2022-10-20 11:09:40	Equalising Pressure	5	Release	Negative	84.9 mbar	NC	NC	NC	NC
2022-10-20 11:09:40	Mode Change to Release	4	Release	Unprotected	84.9 mbar	NC	NC	NC	NC
2022-10-20 11:09:10	Setpoint Pressure Changed	3	Monitor	Initialise	84.7 mbar	NC	NC	50.0 mbar	NC
2022-10-20 11:09:09	Mode Change to Monitor	2	Monitor	Initialise	84.7 mbar	NC	NC	NC	NC
2010-06-20 04:53:01	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

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I noted that there was no Measure Level on start- up or when I changed from Monitor to Release, but when I changed from Release to Monitor there was.

I then did Monitor -> Release ->Monitor and while the level was being measured disconnected the LKS. Then I reconnected it I saw:

[Event Log] <- [AIO Link Status] <- SIV64X - System Information Viewer V5.67 Beta-07 RED::ray

SIV64X - Aqua Computer LeakShield (LKS-05) Event Log on \\RED - Windows 10 x64 Enterprise V10.00 Build 19045 22H2

Protection Mode	Monitor	State	Unprotected	2022-10-20 11:25:39	Δ 0.004	2022-10-20 11:25:39	GMT Summer Time		
Event Log Date Time	Event Description	Seq	Mode	State	Pressure	P Rate	V Rate	Value 1	Value 2
2022-10-20 11:22:38	Pressure is too High	8	Monitor	Unprotected	102.3 mbar	NC	NC	100.0 mbar	NC
2022-10-20 11:22:38	Setpoint Pressure Changed	7	Monitor	Initialise	102.3 mbar	NC	NC	50.0 mbar	NC
2022-10-20 11:22:36	Mode Change to Monitor	6	Monitor	Finished	102.4 mbar	NC	NC	NC	NC
2022-10-20 11:22:36	Measure Fill Level Finished	5	Measure	Stabalise	102.4 mbar	NC	NC	43.0 mℓ	92.50 %
2022-10-20 11:22:28	Calibrating Pressure Sensor	4	Measure	Negative	0.3 mbar	NC	NC	NC	NC
2022-10-20 11:22:18	Measure Fill Level Starting	3	Measure	Initialise	0.2 mbar	NC	NC	NC	NC
2022-10-20 11:22:18	Mode Change to Meseaure	2	Measure	Initialise	0.2 mbar	NC	NC	NC	NC
2010-06-20 05:06:10	Device Start-up	1	Not Setup	Initialise	0.0 mbar	NC	NC	NC	NC

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So it did a Measure Level on start-up. Given this I expect it would be quite a small change to have the LKS always do a Measure Level on start-up when the mode is Shield or Monitor.

Why were these and other issues not found by Aqua Computer?

In summary many of the issues are edge cases which makes me wonder what the Aqua Computing software engineering standards specify about the need for edge case testing. Whatever they say it's clear that edge case testing needs to be improved.

These are not the only cases of poor edge case testing I have found. Others include X.59 allowing UTF-16 to be input and then changing what was input to "?" or "??", Aquaero 6 reporting impossible powers such as 13376 W when the flow sensor goes off-line, [F360 failing to report software sensors when I select them](#) and several others.

Power measurements

HFN Power 1 W	0 W
Aqua Power 2 W	13376 W
ASU-1 Power 3 W	0 W
ASU-2 Power 4 W	0 W

Name

Aqua Power 2 W

Data sources

Drag sensor values into the boxes.

Aqua Flow Rate 1	0.0 l/h
Aqua Flow Rate 2	0.0 l/h
HFN Flow Rate	- - - l/h
Aqua Temp 2	22.2 °C
Aqua Temp 5	25.7 °C
HFN H2O Temp ??	0.0 °C
HFN ALT Temp ??	0.0 °C
F360 Temp 1 ??	0.0 °C

Flow sensor

HFN Flow Rate

- - - l/h

Temperature sensor 1

Aqua Temp 2

22.2 °C

1

Temperature sensor 2

Aqua Temp 5

25.7 °C

2

Sensors

F360 Temp 1	F360 Temp 2	F360 Temp 3	F360 Temp 4
25.35 °C	25.50 °C	25.68 °C	25.81 °C
D5N Fan	HFN Flow Rate	D5N Flow Rate	HFN Flow Rate
2966 rpm	- - -	312.0 l/h	- - -
HFN dŸce„ Temp	HFN dŸce‰ Temp	F360 Voltage	D5N dŸce‰ Temp
- - -	- - -	- - -	23.96 °C
D5N Fan W	F360 Soft Sensor 15	D5N Pump V	
0.0 W	- - -	- - -	

D5N Pump V

- - -

Name

D5N Pump V

Data source

LEAKSHIELD (LKS)/Sensor data/D5N Pump V

Scale/Multiplier

1.000

Offset

0.000

Select data source

Search

Data from Aqua Computer service

LEAKSHIELD (LKS)

Sensor data

LKS Fill level

92.5 %

LKS Pump @ D5N

3044 rpm

LKS Flow Rate

311.0 l/h

HFN Conductivity

- - -

Fan #4

- - -

D5N Pump V

11.9 V

D5N Pump A

0.5 A

D5N Pump W

6.0 W

D5N Fan V

12.0 V

D5N Fan A

0.0 A

D5N Fan W

0.0 W

Data

Alarm

Profile

1

Closing Thoughts

In closing, I hope by creating and refining this document Aqua Computer will be more likely to address these issues than if I had simply posted them.

I hope that Aqua Computer will carefully review and thoroughly consider the issues that I have identified in their software and firmware. I have been told that Aqua Computer products and the Aquasuite software are considered to be the best out there for cooling component control. [Aqua Computer has stated in it's forum](#) that "errors that we know about and can reproduce will be fixed as far as possible", and that "the Aquasuite is constantly being further developed and optimised". I offer my observations in an effort to help you do this and hope that you will address the issues I have pointed out in this document.

I would also like to publically thank the 3rd party forum member who proof read this document and suggested changes.