## Reply to Referee Comment 1

Thank you very much for your thorough review.

We agree that the missing power consumption information is a fair point. We initially left this out, since power consumption is, as noted in the comment, very much governed by the sensors in use and the monitoring strategy. The logging platform itself only accounts for a minor part of the overall consumption during operation, though arguably this can accumulate over long deployments. In any case, we agree that adding power consumption details for the presented use cases is valuable, giving readers a clear idea of what to expect. We therefore conducted detailed power measurements of all components used. In *Section 2.2 Logging and processing unit*, we added the following text and table:

"Table 2 summarises the approximate average power consumption of the platform's components. For the primary unit, the difference between the Raspberry Pi idling and running ROS amounts to approximately 1 W, with active recording adding a further 1 W. The actual power consumption strongly depends on the acquisition parameters, particularly the measurement frequency. For long-term, low-frequency monitoring applications, arguably the baseload of approximately 8 W is the decisive figure, since all other sensors can be switched off during downtimes and activated only for scheduled or event-triggered measurements."

Table 2. Approximate average power consumption of MOSEP components.

| Components | Approx. average power consumption |
|---|---|
| Primary unit (Raspberry Pi + SSD, u-blox GNNS, display, LTE stick) | 8 W |
| IMU | 0.5 W |
| Lidar interface | 1 W |
| Lidar OS2 (standby mode) | 25 W (7 W) |
| Extension unit | 3 W |
| Radar | 5 W |
| Camera | 3 W |
| WS100 (with heating) | 0.5 W (9 W) |
| WS501 (with heating) | 0.5 W (20 W) |
| Total standby | 28.5 W |
| Total running | 46.5 W |
| Total running with WS heaters | 74.5 W |

Additionally in *Discussion and outlook* we added the following:

"The average power consumption varies between the two field deployments, reflecting their different active sensor sets (compare Table 2). The Digitrans rain test, which combined all mentioned sensors, draws approximately 48.5 W on average, while the Greenland deployment, which relied on lidar, GNSS, and IMU alone, drew approximately 36.5 W."

Regarding the behaviour on power failure: The Raspberry Pi boots automatically as soon as power is back and the docker based software can be registered as a service in Ubuntu so it is coming back up after boot. We added the following sentence in chapter "2.4 Remote control and continuous monitoring":

"The Raspberry Pi boots automatically once power is restored, and the Docker-based software stack, registered as a *systemd* service, resumes operation without manual intervention after a power failure."

We will also provide the suggested wiring diagrams of both the primary unit and the extension unit in the appendix. We tried to make it as detailed as possible, while at the same time keeping it easy to read. See the figure at the end of this document.

We find all other comments are very reasonable and we have addressed them accordingly:

L22: Frequency...
Thank you for pointing out this spelling error.

l85: API not introduced
We added the acronym in the text: Application Programming Interface.

l102: Explain IP68 for a wider audience
We added in brackets: dust and water proof according to the International Protection rating

l121: What does "compare 3" refer to?
Thank you for pointing out this mistake. It is supposed to read compare Figure 3. We corrected it accordingly.

L385: Unclear. First, you state that these reflections are from below the water surface, and now, that they might be from above. Please rephrase to be clearer.
We agree that this was formulated slightly imprecise. We have rewritten the paragraph to better distinguish between apparent and real origin of the returns:

"No returns were received from below the water surface at shallow (near-grazing) angles. At steeper incidence angles, when objects in the water were sufficiently close, the lidar appeared capable of penetrating below the surface. The blue points in panels a) and b) indicate returns from below the waterline, reaching an apparent depth of approximately 3 m. It is important to note that these sub-surface returns may in reality originate from reflections off surfaces above the water, a possibility that is especially likely for the deepest apparent points, since water is highly absorbing in the infrared spectrum."

L420: If the range of the lidar or radar were larger, right now, this might be a limiting factor for many applications
This is an important caveat that we also mention later in the text (L449). We added the limited

range here as well to make the two sections consistent:

“The use of automotive lidar and radar offers an affordable alternative to high-end instruments like TLS, trading some absolute accuracy and, in particular, range, for greater field versatility and higher temporal resolution.”

L454: Does FMCW not refer to radar instead of lidar?
FMCW methodology can be applied to lidar as well (see for example: https://www.nature.com/articles/s41467-025-62027-y). We added the citation in the text.

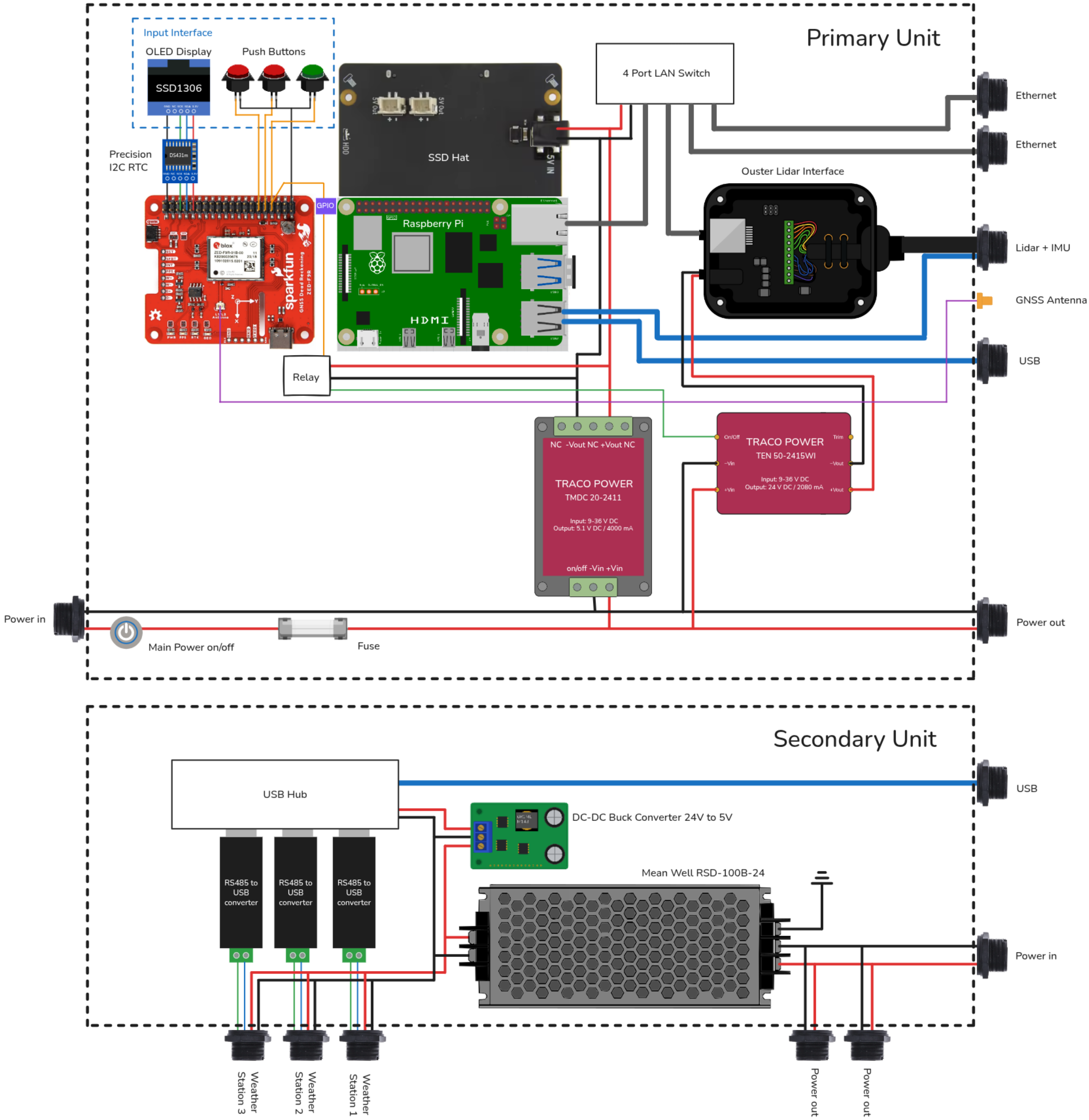


Figure A1. High-level wiring diagram of MOSEP's primary and extension unit.