

Total energy consumption of the equipment with specific parameters and number of batteries

1. Total power consumption of Mobile Surveillance system equipment

Table 1 lists the power consumption of each piece of equipment in the mobile surveillance system at 20°C.

Table 1 | Actual power consumption of MSS equipment at ambient temperature 20°C

Equipment	Qty	Actual power consumption at ambient temperature 20°C
MS One-V: cooled thermal imaging camera	1	35 W, 24 VDC
MS One-V: color camera	1	12 W, 24 VDC
MS One-V: laser rangefinder	1	1 W, 24 VDC
Pan/tilt unit	1	50 W, 24 VDC
Lifting mechanism	1	360 W, 24 VDC max 25 W, 24 VDC in stand-by mode
Workstation with display	1	90 W, 24 VDC
Teltonika RUT956	1	7 W, 24 VDC

2. Consumption of lifting mechanism

The lifting mechanism does not consume energy during the entire operation of the system, but only during its lifting and retracting. The duration of one lifting or retracting operation of the lifting mechanism is up to 45 seconds.

During normal use of the MSS, one lifting operation and one retracting operation are performed in the operating mode, respectively at the beginning and end of the MSS operating period. For the purposes of this calculation, we assume that the lifting mechanism will perform five times more lifting and retracting operations during the 10-hour operation of the system.

Consumption of the lifting mechanism during five lifting and five retracting operations for the 10-hour operating period of the MSS:

$$E_1 [Wh] = P [W] \cdot t [h] = 360 \cdot \frac{(5 + 5) \cdot 45}{3600} = 45 Wh$$

3. Consumption of the laser rangefinder

The power consumption of the laser rangefinder in standby mode is 0.4 W.

When measuring the distance to the observed object, the power consumption of the laser rangefinder increases to 3.6 W for the duration of the measurement. For the purposes of this calculation, we assume that 100 measurements will be made in 10 hours. One measurement lasts 1.5 seconds.

Power consumption of the laser rangefinder when measuring the distance to a selected target:

$$E_2[Wh] = P[W]. t[h] = 3,6 \cdot \frac{100 \cdot 1,5}{3600} = 0,15 Wh$$

4. Consumption of the remaining system components

We assume that all other components of the MSS operate without interruption during the 10-hour operating period.

Consumption of the remaining system components (cooled thermal imaging camera, color camera, laser rangefinder (in stand-by mode), pan/tilt unit, lifting mechanism (in stand-by mode), operator workstation and monitor and Teltonika RUT956):

$$E_3[Wh] = P[W]. t[h] = (35 + 12 + 0,4 + 50 + 25 + 90 + 7) \cdot 10 = 2194 Wh$$

5. Total system consumption

$$E_{\text{overall}}[Wh] = E_1[W] + E_2[W] + E_3[W] = 2239,15 Wh$$

6. Number and parameters of batteries for powering the MSS

Two 12V/200 Ah batteries (deep cycle batteries with maintenance-free gel technology) will be used to power the MSS. Each battery has a capacity of 200 Ah. A series connection scheme for the batteries will be implemented; thus the system will have a maximum capacity of 200 Ah at a voltage of 24 V.

As required by the Technical Specification, the maximum permissible discharge of the batteries is up to 25% of the capacity, therefore the permissible capacity for use is 150 Ah at 24 V.

Energy of the batteries:

$$E_{\text{bat.}}[Wh] = 150[Ah]. 24[V] = 3600 Wh$$

$$E_{\text{bat.}}[Wh] = 3600 Wh > E_{\text{overall}} [Wh] = 2239,15 Wh$$

The energy of the batteries is greater than the total consumption of the system, therefore the selected batteries have sufficient capacity to ensure continuous ten-hour operation of the system.



Table 2 | Parameters of batteries

VOLTAGE AND CAPACITY	
Nominal voltage	12V
Nominal capacity	200Ah
LIFE CYCLE	
Project life	12 years
With maintenance-free gel technology	Yes
Cells per unit	6
Deep cycle batteries	Yes