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<td>30</td>
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<td>31</td>
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</tr>
<tr>
<td>32</td>
<td>Battery state of charge (read):</td>
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<tr>
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</tr>
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<th>#</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
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<td>No load threshold (set):</td>
</tr>
<tr>
<td>22</td>
<td>No load threshold (read):</td>
</tr>
<tr>
<td>23</td>
<td>Output voltage control (set):</td>
</tr>
<tr>
<td>24</td>
<td>Output voltage control (read):</td>
</tr>
<tr>
<td>25</td>
<td>Bypass (set):</td>
</tr>
<tr>
<td>26</td>
<td>Bypass (read):</td>
</tr>
<tr>
<td>27</td>
<td>Hardware status report (read):</td>
</tr>
<tr>
<td>28</td>
<td>A/D average values (read):</td>
</tr>
<tr>
<td>29</td>
<td>Bus voltages (read):</td>
</tr>
<tr>
<td>30</td>
<td>Battery thresholds (set):</td>
</tr>
<tr>
<td>31</td>
<td>Battery thresholds mode (read):</td>
</tr>
<tr>
<td>32</td>
<td>Line frequency autoselect (set):</td>
</tr>
<tr>
<td>#</td>
<td>Description</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>37</td>
<td>Battery state of charge (read)</td>
</tr>
<tr>
<td>38</td>
<td>Battery discharge learning (set)</td>
</tr>
<tr>
<td>39</td>
<td>Battery autonomy management</td>
</tr>
<tr>
<td>41</td>
<td>Battery reserve time (read)</td>
</tr>
</tbody>
</table>
1. **UPS Protocol**

1.1. **Technical specifications**

Serial protocol: 2400 Baud, No Parity, 8 Data bits, 1 Stop bit

Packet format:

```
STX  data length  ...  data  ...  Checksum
(ASCII 0x02)  int8u  int8u
```

The whole packet has a maximum length of 256 bytes.

All the numeric data are little-endian, i.e. are sent LSB first.

STX indicates the start of the packet.

Data length is the number of bytes of data + the check byte.

The "check" byte is computed as the sum modulus 256 of all the bytes in the packet except the STX and the check byte itself.

In case of reception of an invalid checksum or a partial packet, no answer will be supplied.

In case of an invalid command the answer will be:

```
int8u = STX [0x02]
int8u = data length [0x04]
int8u = received command [...]
int8u = 'K' [0x4B]
int8u = 'o' [0x6F]
int8u = Checksum [...]
```

In order to flush the receiver buffer of UPS, send 255 bytes of NUL (ASCII 0) without expecting any answer.

The serial communication is half duplex: while the UPS is sending an answer to a pending packet, the receiver is disabled.

1.2. **RS232 cable layout**

<table>
<thead>
<tr>
<th>UPS</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket D-SUB</td>
<td>Plug D-SUB</td>
</tr>
<tr>
<td>9 pins (male pins)</td>
<td>9 pins (female pins)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
### 1.3. Families of UPS

<table>
<thead>
<tr>
<th>id code</th>
<th>cfg</th>
<th>family</th>
<th>model</th>
</tr>
</thead>
<tbody>
<tr>
<td># 11</td>
<td>1</td>
<td>ally HF 800/1600</td>
<td>ally HF 800</td>
</tr>
<tr>
<td># 11</td>
<td>2</td>
<td>ally HF 800/1600</td>
<td>ally HF 1600</td>
</tr>
<tr>
<td># 12</td>
<td>1</td>
<td>ally HF 1000/2000</td>
<td>ally HF 1000</td>
</tr>
<tr>
<td># 12</td>
<td>2</td>
<td>ally HF 1000/2000</td>
<td>ally HF 2000</td>
</tr>
<tr>
<td># 13</td>
<td>1</td>
<td>ally HF 1250/2500</td>
<td>ally HF 1250</td>
</tr>
<tr>
<td># 13</td>
<td>2</td>
<td>ally HF 1250/2500</td>
<td>ally HF 2500</td>
</tr>
<tr>
<td># 14</td>
<td>1</td>
<td>HF Megaline</td>
<td>Megaline 1250</td>
</tr>
<tr>
<td># 14</td>
<td>2</td>
<td>HF Megaline</td>
<td>Megaline 2500</td>
</tr>
<tr>
<td># 14</td>
<td>3</td>
<td>HF Megaline</td>
<td>Megaline 3750</td>
</tr>
<tr>
<td># 14</td>
<td>4</td>
<td>HF Megaline</td>
<td>Megaline 5000</td>
</tr>
<tr>
<td># 15</td>
<td>4</td>
<td>HF Megaline / 2</td>
<td>Megaline 5000 / 2</td>
</tr>
<tr>
<td># 15</td>
<td>5</td>
<td>HF Megaline / 2</td>
<td>Megaline 6250 / 2</td>
</tr>
<tr>
<td># 15</td>
<td>6</td>
<td>HF Megaline / 2</td>
<td>Megaline 7500 / 2</td>
</tr>
<tr>
<td># 15</td>
<td>7</td>
<td>HF Megaline / 2</td>
<td>Megaline 8750 / 2</td>
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<tr>
<td># 15</td>
<td>8</td>
<td>HF Megaline / 2</td>
<td>Megaline 10000 / 2</td>
</tr>
<tr>
<td># 17</td>
<td>1</td>
<td>WHAD 800</td>
<td>WHAD 800</td>
</tr>
<tr>
<td># 18</td>
<td>1</td>
<td>WHAD 1000</td>
<td>WHAD 1000</td>
</tr>
<tr>
<td># 19</td>
<td>1</td>
<td>WHAD 1500</td>
<td>WHAD 1500</td>
</tr>
<tr>
<td># 20</td>
<td>1</td>
<td>DHEA 1000</td>
<td>DHEA 1000</td>
</tr>
<tr>
<td># 21</td>
<td>1</td>
<td>DHEA 1500</td>
<td>DHEA 1500</td>
</tr>
<tr>
<td># 27</td>
<td>1</td>
<td>WHAD 2000</td>
<td>WHAD 2000 EXP</td>
</tr>
<tr>
<td># 28</td>
<td>1-2</td>
<td>WHAD 1250-2500 / WHAD CAB</td>
<td>WHAD 1250-2500 EXP / CAB</td>
</tr>
</tbody>
</table>
2. **Common commands**

### # 0 UPS info (read)
Request command:

- `int8u = 0`

Answer:

- `int8u` Command (replica of the request command)
- `int8u` Model (see model table at the beginning of this document)
- `int8u` Configuration (number and/or type of modules)
- `int16u` Maximum active power (W)
- `int8u` Firmware version
- `int8u` Firmware subversion
- `char [1..12]` Serial number

### # 1 Output data (read)
Request command:

- `int8u = 1`

Answer:

- `int8u` Command (replica of the request command)
- `int16u` Active power (W) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Voltage (V) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Current (Arms*10) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Peak current (A*10) 
  - { -1: overrange }
  - { -2: not available }

### # 2 Input data (read)
Request command:

- `int8u = 2`

Answer:

- `int8u` Command (replica of the request command)
- `int16u` Active power (W) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Voltage (V) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Current (Arms*10) 
  - { -1: overrange }
  - { -2: not available }
- `int16u` Peak current (A*10) 
  - { -1: overrange }
  - { -2: not available }
# 3  UPS status (read)
Request command:
```
int8u  = 3
```
Answer:
```
int8u  Command (replica of the request command)
int8u  Status
  0: Running on mains power
  1: Running on battery power
  2: Battery reserve
  3: Bypass engaged
  4: Manual bypass engaged
int8u  Fault
  0: All right
  1: Overload
  2: Overheat
  3: Hardware Fault
  4: Battery charger failure (overcharging)
  5: Replace batteries
int8u  UPS Temperature in °C + 128

{ i.e T = n-128 °C }
{ 0: not available }
```

# 4  Battery data (read)
Request command:
```
int8u  = 4
```
Answer:
```
int8u  Command (replica of the request command)
int16u  Actual value (V*10)
int16u  Reserve Threshold (V*10)
int16u  Exhaust Threshold (V*10)
```

# 5  History data (read)
Request command:
```
int8u  = 5
```
Answer:
```
int8u  Command (replica of the request command)
int32u  UPS Total Run Time (s)
int32u  Inverter Total Run Time (s)
int16u  Inverter Interventions
int16u  Battery Full Discharges
int16u  Stabilizer or Bypass Interventions
int16u  Overheatings

{-2: not available}
```

# 6  Scheduling (read)
Request command:
```
int8u  = 6
```
Answer:
```
int8u  Command (replica of the request command)
int32u  Remaining time to shutdown (s)
int32u  Programmed time to restart (s)

{-1: no shutdown}
{-1: no restart}
```
# 7 Event list (most recent first) (read)

Request command:

```
int8u   = 7
```

Answer:

```
int8u   Command (replica of the request command)
int8u   Event Absolute Counter (roll over at 256)
variable length: 1 byte for each event; the list can be empty

1: Odd Turn Off
2: Memory Error!
3: Battery Limit
4: Battery Charger
5: Overload
6: Long Overload
7: Neutral Wrong
8: Neutral Wrong while running
9: Modules Number
10: Programmed battery time expired
11: Programmed reserve time expired
12: Earth Fault
13: Load Waiting
14: HV Bus Runaway
15: Output DC Level
16: Bad Wiring
17: Hardware Fault: Unknown
18: Hardware Fault: Inverter
19: Hardware Fault: P.F.C.
20: Hardware Fault: Inverter P.F.C.
21: Hardware Fault: Booster
22: Hardware Fault: Inverter Booster
23: Hardware Fault: P.F.C. Booster
24: Hardware Fault: Inverter P.F.C. Booster
25: Hardware Fault: Overheat
26: Hardware Fault: Inverter Overheat
27: Hardware Fault: P.F.C. Overheat
28: Hardware Fault: Inverter P.F.C. Overheat
29: Hardware Fault: Booster Overheat
30: Hardware Fault: Inverter Booster Overheat
31: Hardware Fault: P.F.C. Booster Overheat
32: Hardware Fault: Inverter P.F.C. Booster Overheat
33: Hardware Fault: Battery charger
34: Hardware Fault: Overheat & Battery charger
35: Output Plug Removed
```

# 8 Times on battery (read)

Request command:

```
int8u   = 8
```

Answer:

```
int8u   Command (replica of the request command)
int16u  Max time on battery (s)  { 0: not limited }
int16u  Max time after battery reserve (s)  { -2: not available }
int8u   not 0 -> Autorestart after battery depleted enabled
```

# 9 Neutral sense (read)

Request command:

```
int8u   = 9
```

Answer:

```
int8u   Command (replica of the request command)
int8u   not 0 -> Neutral sense enabled
int8u   not 0 -> Ignore while running
```
# 10 Scheduling (set)
Request command:
```
int8u = 10
int32u Remaining time to shutdown (s)   {-1 = no shutdown}
int32u Programmed time to restart (s)  {-1 = no restart}
```
Answer:
```
int8u Command (replica of the request command)
int32u Remaining time to shutdown (s)   {-1 = no shutdown}
int32u Programmed time to restart (s)  {-1 = no restart}
```
*N.B.: If a selected time is longer than the maximum allowed the UPS uses the maximum and reports this in the answer.*

# 11 Neutral sense (set)
Request command:
```
int8u = 11
int8u not 0 -> Neutral sense enabled
int8u not 0 -> Ignore while running
```
Answer:
```
int8u Command (replica of the request command)
int8u not 0 -> Neutral sense enabled
int8u not 0 -> Ignore while running
```

# 12 Times on battery (set)
Request command:
```
int8u = 12
int16u Max time on battery (s)        {0 = not limited}
int16u Max time after battery reserve (s) {0 = not limited}
int8u not 0 -> Autorestart after battery depleted enabled
```
Answer:
```
int8u Command (replica of the request command)
int16u Max time on battery (s)        {0 = not limited}
int16u Max time after battery reserve (s) {0 = not limited}
int8u not 0 -> Autorestart after battery depleted enabled
```
*N.B.: If a selected time is longer than the maximum allowed the UPS uses the maximum and reports this in the answer.*

# 13 Buzzer mute (set)
Request command:
```
int8u = 13
int8u 0 -> not muted
1 -> muted
2 -> read current status
```
Answer:
```
int8u Command (replica of the request command)
int8u 0 -> not muted
1 -> muted
```
*N.B.: Buzzer can be disabled only up to the next alarm condition.*
# 14 Battery test (set)

Request command:

```
int8u = 14
int8u
  0 -> perform the battery test
  1 -> force the UPS to work on battery power
  2 -> restore the UPS standard mode (on mains power)
```

Answer (at the end of the battery test if it's required):

```
int8u Command (replica of the request command)
int8u
  0 -> Generic ok
  1 -> Battery charge: 20 %
  2 -> Battery charge: 40 %
  3 -> Battery charge: 60 %
  4 -> Battery charge: 80 %
  5 -> Battery charge: 100 %
  254 -> Batteries must be replaced
  255 -> Test impossible
```
3. **MEGALINE specific commands**

### # 21 No load threshold (set)

Request command:

- int8u = 21  
- int16u No load threshold (W)

Answer:

- int8u Command (replica of the request command)  
- int16u No load threshold (W)

*N.B.: If the threshold is above or below the allowed range the UPS uses the maximum or minimum value respectively. This will be reported in the answer.*

### # 22 No load threshold (read)

Request command:

- int8u = 22

Answer:

- int8u Command (replica of the request command)  
- int16u No load threshold (W)

### # 23 Output voltage control (set)

Request command:

- int8u = 23  
- int8u Output set level (V)  
- int8u not 0 -> Output 60 Hz  
- int8u not 0 -> PLL inhibited  
- int8u not 0 -> Extended PLL lock range  
- int8u Dip detector speed:  
  - 1 -> fast  
  - 2 -> standard  
  - 3 -> slow

Answer:

- int8u Command (replica of the request command)  
- int8u Output set level (%) (for internal use only)  
- int8u not 0 -> Output 60 Hz  
- int8u not 0 -> PLL inhibited  
- int8u not 0 -> Extended PLL lock range  
- int8u Dip detector speed:  
  - 1 -> fast  
  - 2 -> standard  
  - 3 -> slow

*N.B.: If the level is above or below the allowed range, the UPS uses the maximum or minimum value respectively. This will be reported in the answer.*
# 24 Output voltage control (read)
Request command:
\[
\text{int8u} = 24
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Output set level (\%)} \quad \text{(for internal use only)} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Output 60 Hz} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{PLL inhibited} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Extended PLL lock range} \\
\text{int8u} & \quad \text{Dip detector speed:} \\
& \quad 1 \rightarrow \text{fast} \\
& \quad 2 \rightarrow \text{standard} \\
& \quad 3 \rightarrow \text{slow}
\end{align*}
\]

# 25 Bypass (set)
Request command:
\[
\text{int8u} = 25
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Bypass enabled} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Bypass is forced} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Off-line mode of operation} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Load Waiting Mode enabled} \\
\end{align*}
\]
N.B.: Load Waiting Mode, Off-line mode and forced bypass can not be enabled if the bypass is disabled.

# 26 Bypass (read)
Request command:
\[
\text{int8u} = 26
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Bypass enabled} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Bypass is forced} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Off-line mode of operation} \\
\text{int8u} & \quad \text{not 0} \rightarrow \text{Load Waiting Mode enabled}
\end{align*}
\]

# 27 Hardware status report (read)
Request command:
\[
\text{int8u} = 27
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Number of faulty modules} \quad \{ -2 = \text{not available} \} \\
\text{int8u} & \quad \text{Hardware Fault:} \\
& \quad 0: \text{Unknown or none} \\
& \quad 1: \text{Inverter} \\
& \quad 2: \quad \text{P.F.C.} \\
& \quad 3: \quad \text{Inverter} \quad \text{P.F.C.} \\
& \quad 4: \quad \text{Booster} \\
& \quad 5: \quad \text{Inverter} \quad \text{Booster} \\
& \quad 6: \quad \text{P.F.C.} \quad \text{Booster} \\
& \quad 7: \quad \text{Inverter} \quad \text{P.F.C.} \quad \text{Booster} \\
& \quad 8: \quad \text{Overheat} \\
& \quad 9: \quad \text{Inverter} \quad \text{Overheat} \\
& \quad 10: \quad \text{P.F.C.} \quad \text{Overheat} \\
& \quad 11: \quad \text{Inverter} \quad \text{P.F.C.} \quad \text{Overheat} \\
& \quad 12: \quad \text{Booster} \quad \text{Overheat} \\
& \quad 13: \quad \text{Inverter} \quad \text{Booster} \quad \text{Overheat} \\
& \quad 14: \quad \text{P.F.C.} \quad \text{Booster} \quad \text{Overheat}
\end{align*}
\]
# 31 Bus voltages (read)
Request command:
\[
\text{int8u} = 31
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int16u} & \quad \text{Positive bus voltage} \\
\text{int16u} & \quad \text{Negative bus voltage (absolute value)}
\end{align*}
\]

# 32 Battery thresholds (set)
Request command:
\[
\begin{align*}
\text{int8u} & = 32 \\
\text{int16u} & \quad \text{Reserve Threshold (V*10)} \quad \{0 = \text{automatic}\} \\
\text{int16u} & \quad \text{Exhaust Threshold (V*10)} \quad \{0 = \text{automatic}\} \\
\text{int8u} & \quad \text{not 0 -> Perform an automatic battery test after turn on with mains power present}
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int16u} & \quad \text{Reserve Threshold (V*10)} \quad \{0 = \text{automatic}\} \\
\text{int16u} & \quad \text{Exhaust Threshold (V*10)} \quad \{0 = \text{automatic}\} \\
\text{int8u} & \quad \text{not 0 -> Perform an automatic battery test after turn on with mains power present}
\end{align*}
\]

N.B.: If a threshold is above or below the allowed range the UPS uses the maximum or minimum value respectively.
If Reserve Threshold < Exhaust Threshold then Reserve Threshold = Exhaust Threshold. This will be reported in the answer.
Exception: selecting a level of 0 V for at least one of the thresholds means using for both the default levels that are load dependent (automatic mode).

# 33 Battery thresholds mode (read)
Request command:
\[
\text{int8u} = 33
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{not 0 -> Automatic battery thresholds} \\
\text{int8u} & \quad \text{not 0 -> Perform an automatic battery test after turn on with mains power present}
\end{align*}
\]

# 36 Line frequency autoselect (set)
Request command:
\[
\begin{align*}
\text{int8u} & = 36 \\
\text{int8u} & \quad 0 \rightarrow \text{Line frequency autoselect disabled} \\
\text{int8u} & \quad 1 \rightarrow \text{Line frequency autoselect enabled} \\
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad 0 \rightarrow \text{Line frequency autoselect disabled} \\
\text{int8u} & \quad 1 \rightarrow \text{Line frequency autoselect enabled}
\end{align*}
\]
# 37 Battery state of charge (read)
Request command:
\[
\text{int8u} = 37
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad 0 \rightarrow \text{Data are valid} \\
& \quad 1 \rightarrow \text{Data are not valid (battery discharge learning required)} \\
& \quad 255 \rightarrow \text{Impossible (classic management is selected)} \\
\text{int16u} & \quad \text{Remaining time to battery exhaust (s)} \\
\text{int8u} & \quad \text{Battery remaining charge (\%)}
\end{align*}
\]

# 38 Battery discharge learning (set)
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 38 \\
\text{int8u} & \quad 0 \rightarrow \text{Start battery discharge learning} \\
& \quad 1 \rightarrow \text{Read battery discharge learning status} \\
& \quad 2 \rightarrow \text{Abort battery discharge learning}
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Battery discharge learning status} \\
& \quad 0: \text{Running} \\
& \quad 1: \text{Not running} \\
& \quad 2: \text{Ended} \\
& \quad 255: \text{Impossible (UPS on battery power or classic management is selected)}
\end{align*}
\]

# 39 Battery autonomy management
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 39 \\
\text{int8u} & \quad 0 \rightarrow \text{Set classic management} \\
& \quad 1 \rightarrow \text{Set S.O.C. management} \\
& \quad 2 \rightarrow \text{Read actual status}
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Actual battery autonomy management} \\
& \quad 0: \text{Classic management} \\
& \quad 1: \text{S.O.C. management}
\end{align*}
\]

# 40 Battery reserve time (set)
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 40 \\
\text{int16u} & \quad \text{ Reserve time (m)}
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int16u} & \quad \text{Actual reserve time (m)}
\end{align*}
\]

# 41 Battery reserve time (read)
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 41
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int16u} & \quad \text{Actual reserve time (m)}
\end{align*}
\]
# 44 Output voltage control (set)
Request command:

\[
\begin{align*}
\text{int8u} & = 44 \\
\text{int8u} & \quad \text{Output set level (V)} \\
\text{int8u} & \quad \text{not 0 \to Output 60 Hz} \\
\text{int8u} & \quad \text{not 0 \to PLL inhibited} \\
\text{int8u} & \quad \text{not 0 \to Extended PLL lock range} \\
\text{int8u} & \quad \text{Dip detector speed:} \\
& \quad \text{1 \to fast} \\
& \quad \text{2 \to standard} \\
& \quad \text{3 \to slow}
\end{align*}
\]

Answer:

\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Output set level (V)} \\
\text{int8u} & \quad \text{not 0 \to Output 60 Hz} \\
\text{int8u} & \quad \text{not 0 \to PLL inhibited} \\
\text{int8u} & \quad \text{not 0 \to Extended PLL lock range} \\
\text{int8u} & \quad \text{Dip detector speed:} \\
& \quad \text{1 \to fast} \\
& \quad \text{2 \to standard} \\
& \quad \text{3 \to slow}
\end{align*}
\]

\textit{N.B.: If the level is above or below the allowed range, the UPS uses the maximum or minimum value respectively. This will be reported in the answer.}

# 45 Output voltage control (read)
Request command:

\[
\begin{align*}
\text{int8u} & = 45 \\
\text{int8u} & = 0 \quad \text{Reset (answer will contain most recent event)} \\
& = 1 \quad \text{Autoincrement}
\end{align*}
\]

Answer:

\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Output set level (V)} \\
\text{int8u} & \quad \text{not 0 \to Output 60 Hz} \\
\text{int8u} & \quad \text{not 0 \to PLL inhibited} \\
\text{int8u} & \quad \text{not 0 \to Extended PLL lock range} \\
\text{int8u} & \quad \text{Dip detector speed:} \\
& \quad \text{1 \to fast} \\
& \quad \text{2 \to standard} \\
& \quad \text{3 \to slow}
\end{align*}
\]

# 46 Single event read
Request command:

\[
\begin{align*}
\text{int8u} & = 46 \\
\text{int8u} & = 0 \to \text{Reset (answer will contain most recent event)} \\
& = 1 \to \text{Autoincrement}
\end{align*}
\]

Answer:

\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Time Stamp - Year (BCD packed)} \\
\text{int8u} & \quad \text{Time Stamp - Month (BCD packed)} \\
\text{int8u} & \quad \text{Time Stamp - Day (BCD packed)} \\
\text{int8u} & \quad \text{Time Stamp - Hour (BCD packed)} \\
\text{int8u} & \quad \text{Time Stamp - Min (BCD packed)} \\
\text{int8u} & \quad \text{Event Code – LSB} \\
& \quad 0 = \text{Regular Turn Off} \\
& \quad 1 = \text{Irregular turn Off} \\
& \quad 2 = \text{Memory Error!} \\
& \quad 3 = \text{Low Battery Turn Off} \\
& \quad 4 = \text{Battery Runaway} \\
& \quad 5 = \text{Overload Turn Off} \\
& \quad 6 = \text{Long Overload} \\
& \quad 7 = \text{Neutral Wrong Turn Off} \\
& \quad 8 = \text{Neutral Wrong while running} \\
& \quad 9 = \text{Modules Number Error}
\end{align*}
\]
10 = Programmed battery time expired
11 = Programmed reserve time expired
12 = Earth Fault Turn Off
13 = Load Waiting Turn Off
14 = HV Bus Runaway
15 = Output DC Level
16 = Bad Wiring
17 = Hardware Fault: Unknown
18 = Hardware Fault: Inverter
19 = Hardware Fault: P.F.C.
20 = Hardware Fault: Inverter P.F.C.
21 = Hardware Fault: Booster
22 = Hardware Fault: Inverter Booster
23 = Hardware Fault: P.F.C. Booster
24 = Hardware Fault: Inverter P.F.C. Booster
25 = Hardware Fault: Overheat
26 = Hardware Fault: Inverter Overheat
27 = Hardware Fault: P.F.C. Overheat
28 = Hardware Fault: Inverter P.F.C. Overheat
29 = Hardware Fault: Booster Overheat
30 = Hardware Fault: Inverter Booster Overheat
31 = Hardware Fault: P.F.C. Booster Overheat
32 = Hardware Fault: Inverter P.F.C. Booster Overheat
33 = Hardware Fault: Battery charger
34 = Hardware Fault: Overheat & Battery charger
35 = Output Plug Removed
36 = Mains Power: voltage very high
37 = Watchdog reset
38 = Battery Startup failed
39 = Battery Calibration aborted by user
40 = Mains Power: SAG
41 = Mains Power: SWELL
42 = Mains Power: BROWNOUT
43 = Mains Power: SPIKE
44 = Mains Power: Harmonic distortion
45 = Neutral Voltage: SWELL
46 = Neutral Voltage: SPIKE

int8u Event Code - extended byte 1
int8u Event Code - extended byte 2
int8u Event Memory Position

**# 48 Date/Time (set)**

Request command:

```c
int8u = 48
int8u Year (BCD packed)
int8u Month (BCD packed)
int8u Day (BCD packed)
int8u Hour (BCD packed)
int8u Min (BCD packed)
int8u Sec (BCD packed)
int8u Day of Week { 0 = Sunday; 1 = Monday; … }
```

Answer:

```c
int8u Command (replica of the request command)
int8u Year (BCD packed)
int8u Month (BCD packed)
int8u Day (BCD packed)
int8u Hour (BCD packed)
int8u Min (BCD packed)
int8u Sec (BCD packed)
int8u Day of Week { 0 = Sunday; 1 = Monday; … }
```
# 49 Date/Time (read)
Request command:
\[
\text{int8u } = 49
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Year (BCD packed)} \\
\text{int8u} & \quad \text{Month (BCD packed)} \\
\text{int8u} & \quad \text{Day (BCD packed)} \\
\text{int8u} & \quad \text{Hour (BCD packed)} \\
\text{int8u} & \quad \text{Min (BCD packed)} \\
\text{int8u} & \quad \text{Sec (BCD packed)} \\
\text{int8u} & \quad \text{Day of Week } \{ 0 = \text{Sunday}; 1 = \text{Monday}; \ldots \}
\end{align*}
\]

# 52 Calendar scheduling (set)
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 52 \\
\text{int8u} & \quad \text{Step index } (0..\text{step_memory_dimension-1}) \\
\text{int8u} & \quad \text{Month (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day of Week } \{ 0 = \text{Sunday}; 1 = \text{Monday}; \ldots ; 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Hour (BCD packed)} \\
\text{int8u} & \quad \text{Min (BCD packed)} \\
\text{int8u} & \quad \text{Action} \\
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Step index } (0..\text{step_memory_dimension-1}) \\
\text{int8u} & \quad \text{Month (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day of Week } \{ 0 = \text{Sunday}; 1 = \text{Monday}; \ldots ; 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Hour (BCD packed)} \\
\text{int8u} & \quad \text{Min (BCD packed)} \\
\text{int8u} & \quad \text{Action} \\
\end{align*}
\]
\[
\begin{align*}
0: & \text{No Action -- Delete Step} \\
1: & \text{Turn Off} \\
2: & \text{Turn On} \\
3: & \text{Battery Calibration} \\
4: & \text{Battery Test} \\
\end{align*}
\]
\[
255: \text{Step index out of range}
\]

# 53 Calendar scheduling (read)
Request command:
\[
\begin{align*}
\text{int8u} & \quad = 53 \\
\text{int8u} & \quad \text{Step index } (0..\text{step_memory_dimension-1})
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{Step index } (0..\text{step_memory_dimension-1}) \\
\text{int8u} & \quad \text{Month (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day (BCD packed)} \quad \{ 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Day of Week } \{ 0 = \text{Sunday}; 1 = \text{Monday}; \ldots ; 0xAA = \text{wildcard} \} \\
\text{int8u} & \quad \text{Hour (BCD packed)} \\
\text{int8u} & \quad \text{Min (BCD packed)} \\
\text{int8u} & \quad \text{Action}
\end{align*}
\]
# 54 Calendar scheduling enable

Request command:

```
int8u  = 54
int8u  0 -> Disable
       1 -> Enable
       2 -> Read actual status
```

Answer:

```
int8u  Command (replica of the request command)
int8u  0 -> Disabled
       1 -> Enabled
```
4. **WHAD specific commands**

# 21  No load threshold  (set)  
     same as  MEGALINE specific command #21

# 22  No load threshold  (read)  
     same as  MEGALINE specific command #22

# 23  Output voltage control  (set)  
     same as  MEGALINE specific command #23

# 24  Output voltage control  (read)  
     same as  MEGALINE specific command #24

# 25  Bypass  (set)  
     same as  MEGALINE specific command #25

# 26  Bypass  (read)  
     same as  MEGALINE specific command #26

# 27  Hardware status report  (read)  
     same as  MEGALINE specific command #27

# 31  Bus voltages  (read)  
     same as  MEGALINE specific command #31

# 32  Battery thresholds  (set)  
     same as  MEGALINE specific command #32

# 33  Battery thresholds mode  (read)  
     same as  MEGALINE specific command #33

# 36  Line frequency autoselect  (set)  
     same as  MEGALINE specific command #36

# 37  Battery state of charge  (read)  
     same as  MEGALINE specific command #37

# 38  Battery discharge learning  (set)  
     same as  MEGALINE specific command #38

# 39  Battery autonomy management  
     same as  MEGALINE specific command #39

# 40  Battery reserve time  (set)  
     same as  MEGALINE specific command #40

# 41  Battery reserve time  (read)  
     same as  MEGALINE specific command #41

# 44  Output voltage control  (set)  
     same as  MEGALINE specific command #44

# 45  Output voltage control  (read)  
     same as  MEGALINE specific command #45
# 59 External KB (set)
Request command:
\[
\begin{align*}
\text{int8u} & = 59 \\
\text{int8u} & \quad \text{External KB}
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{External KB}
\end{align*}
\]

# 60 External KB (read)
Request command:
\[
\begin{align*}
\text{int8u} & = 60
\end{align*}
\]
Answer:
\[
\begin{align*}
\text{int8u} & \quad \text{Command (replica of the request command)} \\
\text{int8u} & \quad \text{External KB}
\end{align*}
\]
5. **DHEA specific commands**

# 21  No load threshold (set):
    same as MEGALINE specific command #21

# 22  No load threshold (read):
    same as MEGALINE specific command #22

# 23  Output voltage control (set):
    same as MEGALINE specific command #23

# 24  Output voltage control (read):
    same as MEGALINE specific command #24

# 25  Bypass (set):
    same as MEGALINE specific command #25

# 26  Bypass (read):
    same as MEGALINE specific command #26

# 27  Hardware status report (read):
    same as MEGALINE specific command #27

# 31  Bus voltages (read):
    same as MEGALINE specific command #31

# 32  Battery thresholds (set):
    same as MEGALINE specific command #32

# 33  Battery thresholds mode (read):
    same as MEGALINE specific command #33

# 36  Line frequency autoselect (set):
    same as MEGALINE specific command #36

# 37  Battery state of charge (read):
    same as MEGALINE specific command #37

# 38  Battery discharge learning (set):
    same as MEGALINE specific command #38

# 39  Battery autonomy management:
    same as MEGALINE specific command #39

# 40  Battery reserve time (set):
    same as MEGALINE specific command #40

# 41  Battery reserve time (read):
    same as MEGALINE specific command #41

# 44  Output voltage control (set):
    same as MEGALINE specific command #44

# 45  Output voltage control (read):
    same as MEGALINE specific command #45
# 46 Single event read:
 same as MEGALINE specific command #46

# 48 Date/Time (set):
 same as MEGALINE specific command #48

# 49 Date/Time (read):
 same as MEGALINE specific command #49

# 52 Calendar scheduling (set):
 same as MEGALINE specific command #52

# 53 Calendar scheduling (read):
 same as MEGALINE specific command #53

# 54 Calendar scheduling enable:
 same as MEGALINE specific command #54

# 55 Auxiliary output (set):
 Request command:
 int8u = 55
 int8u AUX OUT 1 max time on battery (m)
 int8u AUX OUT 2 max time on battery (m)
 int8u AUX OUT 1 OFF on battery reserve {1 => OFF on battery reserve}
 int8u AUX OUT 2 OFF on battery reserve {1 => OFF on battery reserve}

Answer:
 int8u Command (replica of the request command)
 int8u AUX OUT 1 max time on battery (m)
 int8u AUX OUT 2 max time on battery (m)
 int8u AUX OUT 1 OFF on battery reserve
 int8u AUX OUT 2 OFF on battery reserve

# 56 Auxiliary output (read):
 Request command:
 int8u = 56

Answer:
 int8u Command (replica of the request command)
 int8u AUX OUT 1 max time on battery (m)
 int8u AUX OUT 2 max time on battery (m)
 int8u AUX OUT 1 OFF on battery reserve
 int8u AUX OUT 2 OFF on battery reserve
6. **ALLY HF specific commands**

# 21 No load threshold (set)  
same as MEGALINE specific command #21

# 22 No load threshold (read)  
same as MEGALINE specific command #22

# 23 Output voltage control (set)  
same as MEGALINE specific command #23

# 24 Output voltage control (read)  
same as MEGALINE specific command #24

# 25 Bypass (set)  
same as MEGALINE specific command #25

# 26 Bypass (read)  
same as MEGALINE specific command #26

# 27 Hardware status report (read)  
same as MEGALINE specific command #27

# 30 A/D average values (read)  
Request command:
```plaintext
int8u = 30
```
Answer:
```plaintext
int8u Command (replica of the request command)
int8u Vin A/D
int8u Iin A/D
int8u Vout A/D
int8u Iout A/D
```

# 31 Bus voltages (read)  
same as MEGALINE specific command #31

# 32 Battery thresholds (set)  
same as MEGALINE specific command #32

# 33 Battery thresholds mode (read)  
same as MEGALINE specific command #33

# 36 Line frequency autoselect (set)  
same as MEGALINE specific command #36

# 37 Battery state of charge (read)  
same as MEGALINE specific command #37

# 38 Battery discharge learning (set)  
same as MEGALINE specific command #38

# 39 Battery autonomy management  
same as MEGALINE specific command #39

# 40 Battery reserve time (set)  
same as MEGALINE specific command #40
# 41 Battery reserve time (read)
same as MEGALINE specific command #41