02 Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>Con. Current</th>
<th>Burst Current (12S)</th>
<th>BEC</th>
<th>LiPo cells</th>
<th>Weight</th>
<th>Size (Excluding Plugs)</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swift - 8A</td>
<td>8A</td>
<td>8A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>6.7g</td>
<td>28x13x5mm</td>
<td>200-250 Multi-Rotor</td>
</tr>
<tr>
<td>Swift - 10A</td>
<td>10A</td>
<td>10A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>8.6g</td>
<td>28x15x6mm</td>
<td>200-280 Multi-Rotor</td>
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<tr>
<td>Swift - 12A</td>
<td>12A</td>
<td>12A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>9.5g</td>
<td>28x15x6mm</td>
<td>200-330 Multi-Rotor</td>
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<tr>
<td>Swift - 15A</td>
<td>15A</td>
<td>15A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>9.5g</td>
<td>28x15x6mm</td>
<td>250-450 Multi-Rotor</td>
</tr>
<tr>
<td>Swift - 20A</td>
<td>20A</td>
<td>20A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>10g</td>
<td>28x15x6mm</td>
<td>330-550 Multi-Rotor</td>
</tr>
<tr>
<td>Swift - 30A</td>
<td>30A</td>
<td>30A</td>
<td>5V/1A</td>
<td>2-4S</td>
<td>11g</td>
<td>28x15x6mm</td>
<td>330-550 Multi-Rotor</td>
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<tr>
<td>Swift - 40A</td>
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<td>No</td>
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<td>40x21x7mm</td>
<td>450-850 Multi-Rotor</td>
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<tr>
<td>Swift - 50A</td>
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<td>No</td>
<td>2-6S</td>
<td>18g</td>
<td>40x21x7mm</td>
<td>650-1000 Multi-Rotor</td>
</tr>
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04 Programming parameter value

<table>
<thead>
<tr>
<th>Function</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Closed loop P gain</td>
<td>0.13</td>
<td>0.17</td>
<td>0.25</td>
<td>0.38</td>
<td>0.50</td>
<td>0.75</td>
<td>1.00</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>2 - Closed loop I gain</td>
<td>0.13</td>
<td>0.17</td>
<td>0.25</td>
<td>0.38</td>
<td>0.50</td>
<td>0.75</td>
<td>1.00</td>
<td>1.5</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>3 - Closed loop mode</td>
<td>MidRange</td>
<td>LoRange</td>
<td>Off</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
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<tr>
<td>4 - Multi gain</td>
<td>0.75</td>
<td>0.88</td>
<td>1.00</td>
<td>1.12</td>
<td>1.25</td>
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</tr>
<tr>
<td>5 - Start up power</td>
<td>0.031</td>
<td>0.047</td>
<td>0.083</td>
<td>0.084</td>
<td>0.125</td>
<td>0.188</td>
<td>0.25</td>
<td>0.38</td>
<td>0.50</td>
<td>0.75</td>
<td>1.00</td>
<td>1.25</td>
<td>1.50</td>
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<tr>
<td>6 - Compensation time</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
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<td>/</td>
<td>/</td>
<td>/</td>
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<tr>
<td>7 - Pwm frequency</td>
<td>High</td>
<td>Low</td>
<td>DampedLight</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
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<td>/</td>
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<tr>
<td>8 - Pwm dither</td>
<td>Off</td>
<td>7</td>
<td>15</td>
<td>31</td>
<td>63</td>
<td>/</td>
<td>/</td>
<td>/</td>
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<td>/</td>
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<tr>
<td>9 - Damag compensation</td>
<td>Off</td>
<td>Low</td>
<td>High</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
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<td>/</td>
<td>/</td>
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<tr>
<td>10 - Rotation direction</td>
<td>Normal</td>
<td>Reversed</td>
<td>Bidirectional</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>11 - Input pwm polarity</td>
<td>Positive</td>
<td>Negative</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
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<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

*Default values are marked in dark gray.

**1** - Only enabled for some ESCs. From code rev 1.4.4, dampd light is default on the ESCs that support it. For prior code revisions, high is default.

**2** - Default start up power varies by ESC. Generally the default power is lower for larger ESCs.

1. Closed loop P gain sets the gain for the control loop. This setting controls the gain from speed error to motor power.
2. Closed loop I gain sets the integral gain for the control loop. This setting controls the gain from integrated speed error (summed over time) to motor power.
3. Closed loop mode sets the range of speeds that the control loop can operate on.
   - For the high range, throttle values from 0% to 100% linearly correspond to rpm targets from 0 to 200000 electrical rpm.
   - For the middle range, throttle values from 0% to 100% linearly correspond to rpm targets from 0 to 100000 electrical rpm.
   - For the low range, throttle values from 0% to 100% correspond to rpm targets from 0 to 50000 electrical rpm.
4. Multi gain scales the power applied to the motor for a given input. Note that this is only for PWM input, for PPM input it has no effect.
5. Start up power sets the initial throttle level at power on. The motor will be accelerated to the rpm target set.
6. Compensation time can be adjusted in three steps. Low is about 0.04, Medium 0.04, High 0.06, Medium High 0.08, High 0.10. Typically a medium setting will work fine, but if the motor stutters it can be beneficial to change timing.
7. Pwm frequency.
   - High: High pwm frequency is around 20kHz.
   - Low: Low pwm frequency is around 4kHz. This can reduce problems like pitch change.
8. Damped light mode adds variation to the motor rpm. Damped light mode adds some variation to the motor rpm off cycle length. This can reduce problems like throttle step or vibration in RPM regions where the PWM frequency is equal to harmonics of the motor commutation frequency, and it can reduce the step to full throttle. It is primarily beneficial when running damped light mode.
9. Rotation direction can be set to reverse. This is intended to be used with receivers that provide negative pwm. When using PWM input it must be set to positive.

[Programming parameters that can only be accessed from configuration software (BLHeliSuite):]
- **3** - Minimum and maximum values for PWM input (will also be changed by using a throttle calibration).
- **4** - Throttle center value for bidirectional operation with PWM.
- **5** - Slew strength, wrench strength and wrench delay.
- **6** - Programming by TX. If disabled, the TX cannot be used to change parameter values (default is enabled).
- **7** - Low thermal protection can be enabled or disabled (default is enabled). Thermal protection is set to 0°C when temperature exceeds 50°C. Above 145°C, motor power is limited to 50%. Above 150°C, motor power is limited to 25%. Above 155°C, motor power is limited to 0%. Above 200°C, all output will cease.
- **8** - Power limiting for low RPMs can be enabled or disabled (default is enabled). Disabling it can be necessary in order to achieve full power on some low RPM motors running on a low voltage supply. However, disabling it increases the risk of damaging motor and ESC.

*All pictures are for reference only.*
06 Beeps - Normal operation

1. Power up:
   - Once

2. Throttle signal detected (arming sequence start):
   - Once

3. Zero throttle detected (arming sequence end):
   - Once

4. After this, the motor will run.

06 Beeps - Throttle calibration and entering programming mode

1. Power up:
   - Once

2. Throttle signal detected (arming sequence start):
   - Once

3. When throttle is above midstick (measuring max throttle):
   - While measuring

4. If throttle is above midstick for 3 seconds:
   - Once
   This beep sequence indicates that max throttle has been stored

5. When throttle is below midstick (measuring min throttle):
   - While measuring

6. If throttle is below midstick for 3 seconds:
   - Once
   This beep sequence indicates that min throttle has been stored.
   If you wanted to enter programming mode, moved throttle stick to max during one of the above sequences.

7. Throttle calibration is complete.
   - Attention:
     - Version 14.4 or higher version applies for this operation.
     - Version 14.3 or below doesn’t have this Beep, You need remove power from the ESC.

8. Beeps - Programming mode:
   - Function 1, parameter value 1
     - Once
   - Function 1, parameter value 2
     - Once
   - etc...
   - Function 2, parameter value 1
     - Once
   - etc...

9. Parameter value stored
   - If the throttle stick is moved to zero during one of the above sequences, the parameter value of that function is selected and stored. And you will hear this sound:
     - Once
   - The ESC then resets itself.

07 Attention

- After the ESC connected to the flight system, it will automatically detect the input throttle signals every time it powered on, and then execute the corresponding signal-receiving mode.
- User need to calibrate the throttle range when starting to use a new ESC or another transmitter.
- BLHeli open-source firmware, when some abnormality occurs in ESC driving the motor or need the motor to reach a higher RPM, user can try to change the timing.
- User also can update the firmware or change the setup via signal cable.
- Please contact Flycolor sales or technical support for more information.