

# Chemical Propulsion Systems for Small Satellites

T4i chemical propulsion systems are based on highly stabilized hydrogen peroxide and are targeted to low cost platforms.

**Highly Stabilized Hydrogen Peroxide** allows the reduction of safety issues and costs during handling and operations. Thanks to our transportable concentration unit, it can be also concentrated in situ, eliminating any transportation issues related with propulsive grade hydrogen peroxide (>85% concentration).

**Depending on customer needs** T4i offers three types of propulsion options:

- **Mono-propellant motor**
- **Hybrid motor**
- **Bi-propellant motor**

**Common features of these propulsion units are:**

- **Low cost:** main target are small low cost platforms .
- **Highly customizable:** being internally developed at T4i, the engine can be fully reconfigured depending on specific needs of the platform.
- **Green:** all the combinations are green, non-toxic and non-carcinogenic, providing minimum environmental impact.
- **Restartable / throttleable:** all the systems provide these options to perfectly match with mission requirements.
- **All-in-one:** sharing the same oxidizer, the monoprops can be combined with the other propulsion units to provide a comprehensive propulsion package.

# Hydrogen Peroxide Monopropellant

## Specifications

|                               |   |
|-------------------------------|---|
| <b>Thrust</b>                 | 10 - 500 N  |
| <b>Burning time</b>           | > 100 sec   |
| <b>Specific Impulse</b>       | > 150 sec   |
| <b>Propellant combination</b> | 90-95% Hydrogen Peroxide  |
| <b>Multiple restarts</b>      | yes   |
| <b>Throttleability</b>        | 1:5   |
| <b>TRL</b>                    | 5   |
| <b>Time to market</b>         | 1 year  |
| <b>Applications</b>           | orbit raising, re-positioning, station-keeping, de-orbiting, reaction control |



# Hydrogen Peroxide Hybrid motor

## Specifications

|                               |   |
|-------------------------------|---|
| <b>Thrust</b>                 | 100 - 1000 N                                  |
| <b>Burning time</b>           | < 100 sec                                     |
| <b>Specific Impulse</b>       | > 280 sec                                     |
| <b>Propellant combination</b> | 90-95% Hydrogen Peroxide -<br>Plastics        |
| <b>Multiple restarts</b>      | yes   |
| <b>Throttleability</b>        | 1:5   |
| <b>TRL</b>                    | 5   |
| <b>Time to market</b>         | 1 year  |
| <b>Applications</b>           | orbit raising, re-positioning,<br>de-orbiting |



# Hydrogen Peroxide Liquid Motor

## Specifications

|                               |  |
|-------------------------------|--|
| <b>Thrust</b>                 | 100 - 1000 N   |
| <b>Burning time</b>           | > 100 sec  |
| <b>Specific Impulse</b>       | > 280 sec  |
| <b>Propellant combination</b> | 90-95% Hydrogen Peroxide - Diesel                              |
| <b>Multiple restarts</b>      | yes  |
| <b>Throttleability</b>        | 1:5  |
| <b>TRL</b>                    | 4  |
| <b>Time to market</b>         | 2 years  |
| <b>Applications</b>           | orbit raising, re-positioning,<br>station-keeping, de-orbiting |



# Motors Main Features

|                 |   |
|-----------------|---|
| Toxicity        | No  |
| Storability     | Yes, >5 years   |
| Safety          | High  |
| Concentration   | 90-95%. Tailored to customer requirements   |
| Transportation  | Motor can be filled in situ. In-situ concentration option available to avoid transportation issues of highly concentrated hydrogen peroxide |
| Handling        | Standard chemical protection suits, no SCAPE suits  |
| Throttleability | 1:5   |
| Restartability  | Yes   |
| Cost            | Low   |
| Customization   | Yes   |

## Contacts

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