

## DEFENCE AND SPACE

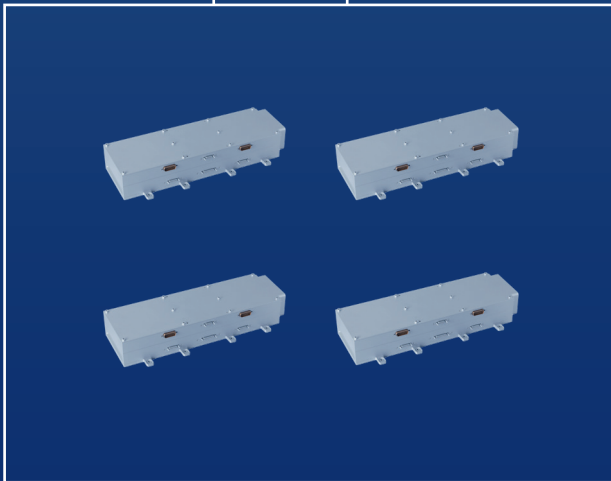
Spacecraft Equipment

# Pearl

Power Conditioning and  
Distribution Unit



P u r e L i n e



**About PureLine** - The PureLine series was initially developed for constellation applications with large quantities, paving the way to offer disruptive unit prices while keeping high quality products. This approach can now be extended to global satellite applications.

PureLine is aimed at markets that can embrace the following key features: models are produced in large batches, with automotive quality grade parts and justification files based on constellation heritage. The main advantage of this product line is that it offers very cost-effective products without compromising reliability and quality. This new value proposition is a pivotal enabler for commercial space-based applications, and is made possible solely thanks to the innovative business approach of Airbus Spacecraft Equipment.

The PureLine Pearl Power and Distribution unit offers the best of essential functionalities in our most compact and lightweight design ever. Pearl provides an unregulated 22V-38V nominal voltage range up to 1.5kW.

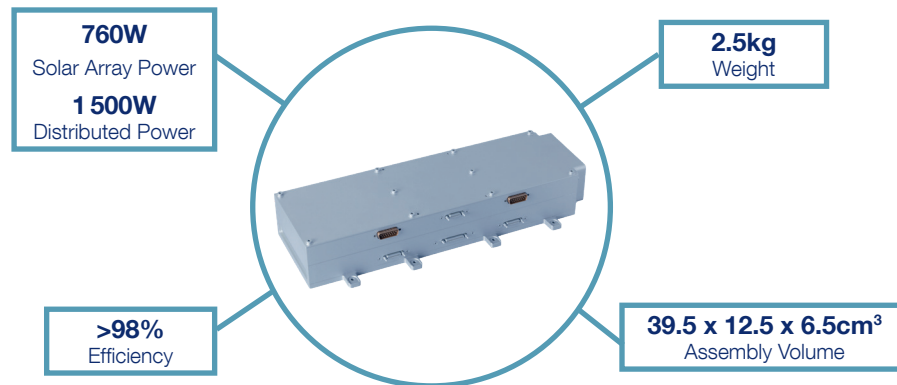
Pearl is the core element of the spacecraft Electrical Power Subsystem, and comprises the following main functions:

- Conditioning of primary power sources from Solar Array and Battery

- Distribution of switched, fuse protected power lines to supply external users and heater loads
- Fuse protection lines up to 5Amp Class
- Bus Capacitance to offer low impedance point for the avionics
- TM & TC Interface with OBC via redundant CAN serial bus and discrete commands
- Removable fuse plug to ease satellite integration

Innovations introduced on our PureLine products allow us to offer to the global space market cost-effective power electronics featuring a typical 10-year lifetime in LEO.

All components of Pearl have been intensively radiation-tested to ensure flawless in-orbit operations.



## FUNCTIONS

- Conditioning of primary power sources
- Power distribution lines to external users

## KEY FEATURES

- Power capability:
  - Solar Array Power: 760W (20A charge)
  - Distributed Power: 1 500W @ 38V (40A)
- SA Regulation: Direct Energy Transfer
- SA sections: 6 DET sections @ 3.5A BOL (20A)
- Bus Voltage: 22-38V (Battery follower)
- Bus Capacitance: 150uF
- Distribution Lines: 35
  - Fuses lines: 4
  - Fuses + Switch lines: 6
  - Fuses + Double Switch lines: 25
- Fuse capability up to 5Amp

## BUDGETS

- Mass: 2.5kg
- Volume: 395 x 125 x 65mm<sup>3</sup>
- Power dissipation: < 20W
- Energy transfer efficiency: > 98%

## INTERFACES

- TM/TC interface: CANBUS (N&R)
  - 51+51 Analog TM
  - 1+1 Digital TM
  - 47+47 Switch TC
- Input Solar Array Voltage: 22-75V
- Battery Current I/F: 40Amp. Max

## ENVIRONMENT / RELIABILITY

- Temperature: [-30°C; +60°C]
- Vibration level: // 18.3g Rms ⊥ 9.5g Rms
- Shock level: 1 000g (10 000Hz)
- EMI/EMC: ECSS-E-ST-20-07C

### RADIATION

- Latch-Up Free parts
- Error Protection Mechanisms
- Total dose TID compatible with typical 10 years LEO

### RELIABILITY

- Reliability better than 250 FIT (FIDES standard)

## HERITAGE

- Airbus Spacecraft Equipment quality legacy
- Automotive COTS process
- On orbit since February 2019

## Hardware and Functional architecture

Pearl provides six DET sections, a complete set of the distribution lines, two internal TM / TC interface, analogue acquisition and command chains, and auxiliary power supplies.

Pearl is composed of 3 boards:

- **Conditioning Board** containing:
  - DET architecture to simplify the electrical design, and to minimize power dissipation losses
  - Power bus 22V-38V nominal range
  - 6 Solar Sections with up to 760W
- **Distribution Board** containing:
  - Protected lines with: serial fuse, serial fuse + switch, and fuse + double switch
  - TM / TC interface including redunded CAN, Analog Chain and direct commands
  - Auxiliary power supplies
- **Fuse Plug** containing the fuse matrix

Supported by:

