For the activation of spacecraft thermal knives a specific Thermal Knives Actuation (TKA) Module is available. The module provides drive voltage and selection matrix for 12 thermal knives.

The thermal knives activation is in general performed by a dc/dc converter that when commanded generates a regulated voltage to be fed to the thermal knife selected by an output switch matrix.

The module interfaces to the Terma standard backplane interface providing bus voltage and two independent Command & Monitoring (CM) busses that can perform all commanding and read all module telemetry.

The following steps are required for the module to activate a thermal knife:

1. Separation switch input is open.
2. Arm switch to be activated via a High Level Command (HLC).
3. Setting of the output switch matrix via CM bus command.
4. Activation of drive voltage via CM bus command.

The module provides all telemetry needed to ensure and monitor correct activation of the thermal knives.

Each TKA module is an autonomy function deriving its internal supply voltages directly from the power bus.

References:

- Two modules onboard each of the four Galileo IOV spacecrafts. The first two spacecrafts were launched in October 2011.
Specifications:

Dimensions (L x W x H) 193 x 150 x 24 [mm]
Mass 457 gram
Bus voltage range 28 – 50 volt
Output voltage 20.5 volt
Drive current capability > 2.1 ampere
Output power capability > 41 watt
Number of output selection switches 12
Idle consumption, all switches off < 0.22 Watt

Thermal Knife Actuator

Main Bus

Identical to Equipment Power Distribution LCL

DC/DC Converter

Output Selection

Identical to Heater Power Distribution Switch

4 to 16 Selector

End of Deployment

HLC Arm A

HLC Arm B

Separation Switch

Thermal Knives Actuation Module Functional Schematic