Standard Interface for Robotic Manipulation

Overview

SIROM by Sener is a modular plug-and-play Standard Interface for in-orbit satellite servicing. The family product line consists of multifunctional interfaces combining:

- **Mechanical** interface for capture and hard docking.
- **Electrical** interface for power transmission.
- **Data** interfaces for high-rate data transfer.
- Optionally, a **resupply** interface for refuelling or heat regulation.

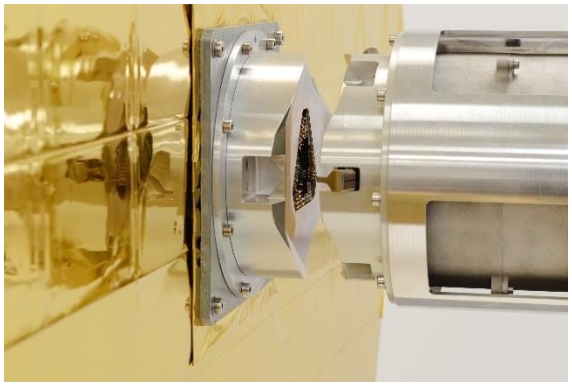
Most SIROM families are available in three basic configurations: Active, Passive, and Active-Passive (which can mate with any other). The characteristics in terms of mass, volume and cost vary among them, allowing **optimization of system design**.

Robot manipulator provided with SIROM as end effector handling a mirror tile.

Features

SIROM is designed as an **androgynous** interface allowing easy mating/demating with other SIROMs. Its **high capture-range latches** combined with its **guiding petals**, provide SIROM a self-aligning capability tolerant to very large misalignment conditions. The docking system keeps the locked position without the need of friction brakes or power consumption. Also, SIROM features a **capture switch** independent of illumination conditions, that gives information once two SIROMs are within the latching capture range. Once mechanically latched, SIROM deploys its connectors board to establish a physical plug for data, electrical power transmission or fluid transmission. The available lines are:

- **CAN bus** control lines (main and redundant)
- **High-speed data** transmission lines, customizable (Gigabit Ethernet, SpaceWire...)
- **Power transfer (28V)** used for SIROM power supply.
- **High-power transfer** that bypasses SIROM electronics.
- **Resupply interface** (based on RIDER connector) allowing transfer of propellant (Xenon, Hydrazine, etc.) or coolant.



Two SIROMs during docking.

Customization

Within each family line, SIROM allows customization of:

- Data protocols and electrical power transfer.
- Active, Passive, or Active-Passive versions.
- Integrated electronics or distributed modular electronics.
- Configurable power supply rails.
- Visual servoing system (marker based).

Applications

- On-orbit servicing, Refuelling, Resupply.
- In-orbit assembly.
- Assembly of large structures in space.
- Payload upgrade or replacement for satellites (refurbishment).
- Robot tool exchange.
- De-orbiting.
- Active debris removal

sirom by sener

ELECTRICAL version for ground demonstrations

ELECTRICAL version for flight applications (on-going)

ELECTRICAL and FLUIDIC versions for flight applications (on-going)

GENERAL INFORMATION

	SIROM C	SIROM E	SIROM G
Size (ø x h)	X: 145 x 132 mm P: 145 x 73 mm	X: 145 x 122.5 mm P: 145 x 69.5 mm	A: 145 x 124.7 mm P: 145 x 109 mm
Mass	X: 1.1 kg P: 0.4 kg	X: 1.85 kg P: 0.632 kg	A: 1.631 kg + 0.685 kg (electronics) P: 1.389 kg
Capture range before contact	Axial: +15 mm Radial: +/-5 mm	Axial: +13.5 mm Radial: +/-6 mm	Axial: +13.5 mm Radial: +/-6 mm
Docking time	5 s	1-7 s	1-7 s
TRL	6	4 (Expected 6 in Q4 2026)	4 (Expected 6 in Q4 2026)
Projects	MIRROR, ISAAC, EU-RISE	EROSS-IOD, ORU-BOAS, InSPoC-1	EROSS-IOD, EROSS-SC

MECHANICAL PERFORMANCE[1]

Traction load	1,3 kN	3 kN | 4.8 kN [2]	3 kN
Compression load	5 kN	3 kN	3 kN
Radial load	5 kN	3 kN	3 kN
Torque	220 Nm	200 Nm | 320 Nm	200 Nm
Bending moment	150 Nm	140 Nm | 280 Nm	140 Nm

[1] Mechanical tests performed for SIROM E and G Active-Passive configuration.
[2] Load estimated for single and double latching scenario. Note that double latching is exclusively possible with androgynous interfaces.

ELECTRICAL PERFORMANCE

	SIROM C	SIROM E	SIROM G
Integrated electronics	Yes	Optional	No
Power consumption	Stand-by: 3 W Active mode: 10 W	Stand-by: 2.5W Active mode: 9.5 W	Stand-by: 2.5 W Active mode: 18.5 W
Power input	20-34V (nominal 28V) DC/DC isolation	Nominal 28V 5, 15, 30V optional	Nominal 28V 5, 15, 30V optional
Power Transfer: **a) regulated** **b) by-pass**	a) 3.5A @ 28V (98 W) b) 15A @ 100V (1.5 kW)	a) 3.5A @ 28V (98 W) b) 10A @ 75V (750W)	a) 3.5A @ 28V (98W) b) 10A @ 75V (750W)
Data Transfer	Gigabit Ethernet or similar	Gigabit Ethernet or similar	Gigabit Ethernet or similar
Connectors plate	132 POGO pins/pads	48 POGO pins/pads	48 POGO pins/pads
ESD cover	No	Yes	Yes
Radiation tolerant	No	Yes (LEO missions)	Yes (LEO missions)

REFUELLING INFORMATION

Resupply	-	-	Fluid transfer connector (coolant/propellant compatible)
MEOP	-	-	150bar
Flow rate	-	-	Gas (He): 5g/s @ 1bar Δp Liquid (Water): 10g/s @ 1bar Δp