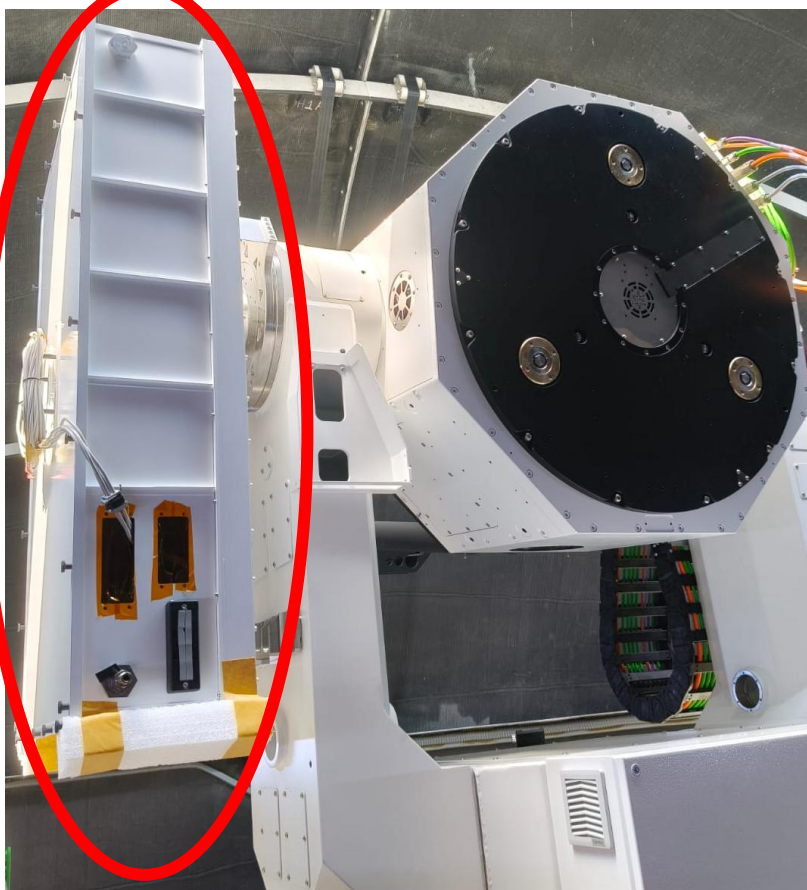


Lasercom OptiCal link InsTrument (LOCK-IT)

Technical Specification Sheet



Model Name	LOKIT
Date	05/08/2026
Serial Number	

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Scope of the document

LOKIT is an OGS subsystem designed to couple the optical signals collected by the optical ground terminal (telescope) with single mode fiber optics, maximizing coupling efficiency by means of adaptive optics. The system have been designed to enable QKD.

LOKIT's outstanding features are:

- Compatibility with a plurality of telecom signals:
 - QKD signals
 - Classic telecom signals
- High efficiency SMF and free-space coupling
- Spectral and spatial filtering for daytime QKD operations
- Integrated wide FoV satellite acquisition detector
- Integrated pointing error measurement for telescope mount coarse tracking feedback
- Integrated SWIR camera for pointing model generation
- Modular design, capable of being integrated with telescopes of different apertures and F numbers

In the following table, the generic specifications of the module are reported. Please note that LOKIT targets a modular design for both wavelength, telescope type and mechanical interfaces. As such, some of the specification listed here below are configuration dependent.

If needed the system could be integrated with capability to transmit up to 2 uplink low datarate telecom signals.

Optical performances

Parameter	Specification	Notes
Compatible classic downlink channel	1553-1563nm	CCSDS compliant
Compatible QKD downlink channels	785-815 nm QKD-C 1530-1537 nm QKD-A 1565-1570 nm QKD-B	Configuration dependent Center wavelength within band to be selected in accordance with WDM grid
Star sensitivity	Star magnitude up to 13	For telescope pointing model generation.
QKD/RX channel isolation	≥114dB	
Spectral filtering bandwidth	50GHz	
Acquisition sensors FOV	±2 mrad	Telescope focal length <9m
Optical bench line losses	≤2.5 dB	For both RX and QKD channels.
AO limited coupling efficiency	Up to 75%	Actual AO limited coupling efficiency depends on telescope diameter and turbulence conditions, as well as on the selected performance specification of the breadboard. Overall coupling efficiency depends on additional terms like telescope obstruction and scintillation.
Compatible telescope focal ratio	f/6 ... f/13	Configuration dependent
Optical inputs	1x SMF FC/APC, 1530-1570nm	For bench testing/diagnostics.
SMF outputs	1 x Classic+QKDA/B 1 x QKDC	Unfiltered output pigtail fiber FC/APC
Free-space outputs	1x QKD (785-815nm)	Alternative to SMF output
Telescope mount tracking accuracy	Better than 50 μrad	
Pointing model camera, band	SWIR	
Pointing model camera, FoV	≥±600μrad.	
Downlink channel, minimum irradiance	≥5μW/m ²	The system relies on the downlink channel for atmospheric turbulence measurement and correction. Operation

		at lower irradiance is possible but may result in increased line loss and/or worse fiber coupling performance.
Mass	<60 kg	TBC. Mass does not take into account the interface plate which is telescope specific
Dimensions	<1150x700x250mm ³	Envelope does not take into account the interface plate which is telescope specific
Compatible Nasmyth MBFL	≥130mm	
Operating Temperature	-10°C to +30°C	
Storage temperature	TBD	
Relative Humidity	0% - 85%	
Cold start time	1h	
Compatible OGS control SW	SCOPE	

Electrical Cabinets

Version designed for installation on a telescopic fork

Parameter	Specification	Notes
Weight	≤120kg	Optimization are possible for specific installation requirements
Volume	Cabinet 1, 800x600x280mm Cabinet 2, 600x600x280mm	
Optical Interfaces	Input: 1x FC/APC port Output: 3x SM fibers (Rx, QKDA/B, QKDC)	
Electrical interfaces	Power	
Data interface	Ethernet	

Version designed for installation on the floor

Parameter	Specification	Notes
Volume	Cabinet 800x600x1600 mm	Architecture and volume can be adapted to the specific installation requirements
Optical Interfaces	Input: 1x FC/APC port Output: 3x SM fibers (Rx, QKDA/B, QKDC)	
Electrical interfaces	Power	
Data interface	Ethernet	

Fiber filter unit

Parameter	Specification	Notes
Weight	≤1kg	
Volume	1U 19" rack	For active Tx beam tip/tilt compensation
Optical Interfaces input	1x SMF @1550nm 1x SMF @800nm	FC/APC female connectors
Optical interfaces output	1x QKD-A/B output 1x QKD C output 1x Rx Fiber output	FC/APC female connectors
Installation location	Cabinet	

Versions

Below reported in order of complexity degrees the different versions:

Complexity degree	Optical configuration	QKD channels	Cabinet
1	2 deformable mirrors (woofer-tweeter)	1530-1537 nm QKD-A 1565-1570 nm QKD-B 785-815 nm QKD-C	Fork mounted
2	2 deformable mirrors (woofer-tweeter)	1530-1537 nm QKD-A 1565-1570 nm QKD-B	Fork mounted
3	2 deformable mirrors (woofer-tweeter)	No fiber filter unit 1550 nm	Fork mounted
4	2 deformable mirrors (woofer-tweeter)	1530-1537 nm QKD-A 1565-1570 nm QKD-B 785-815 nm QKD-C	Floor mounted
5	2 deformable mirrors (woofer-tweeter)	1530-1537 nm QKD-A 1565-1570 nm QKD-B	Floor mounted
6	2 deformable mirrors (woofer-tweeter)	No fiber filter unit 1550 nm	Floor mounted
7	1 deformable mirror	1530-1537 nm QKD-A 1565-1570 nm QKD-B 785-815 nm QKD-C	Fork mounted
8	1 deformable mirror	1530-1537 nm QKD-A 1565-1570 nm QKD-B	Fork mounted
9	1 deformable mirror	No fiber filter unit 1550 nm	Fork mounted
10	1 deformable mirror	1530-1537 nm QKD-A 1565-1570 nm QKD-B 785-815 nm QKD-C	Floor mounted
11	1 deformable mirror	1530-1537 nm QKD-A 1565-1570 nm QKD-B	Floor mounted
12	1 deformable mirror	No fiber filter unit 1550 nm	Floor mounted

Accessories

Item	Description
Tx	Up to 2 Tx benches for the transmission of multiple low data rate or beacon signals towards the counterpart terminal located directly on the tube assembly

Customizations

Depending on the needs of the customer any further versions of the system could be created.

Rx bench I/F general description

Rx bench mechanical ICD

The Rx bench is designed to be interfaced to different telescopes with a minimal redesign effort, involving only the change of the interface.

In general, such an interface is made out the following parts (see pictures in the following)

1. Circular interface flange with central centering cone and flexures
2. Lower cross bar with flexures

The centring of the bench opening with respect to the telescope axis will be guaranteed by mechanical tolerances and will assure a ± 0.5 mm maximum error with respect to the Nasmyth hole. Bench fine focusing will be obtained by actuating the telescope secondary mirror. The addition of an internal actuator for bench fine focusing can be requested as an extra, in case the telescope is not provided with remote secondary mirror actuation capability. As the mechanical interface is telescope-dependent, the following pictures are provided for indication purposes only.

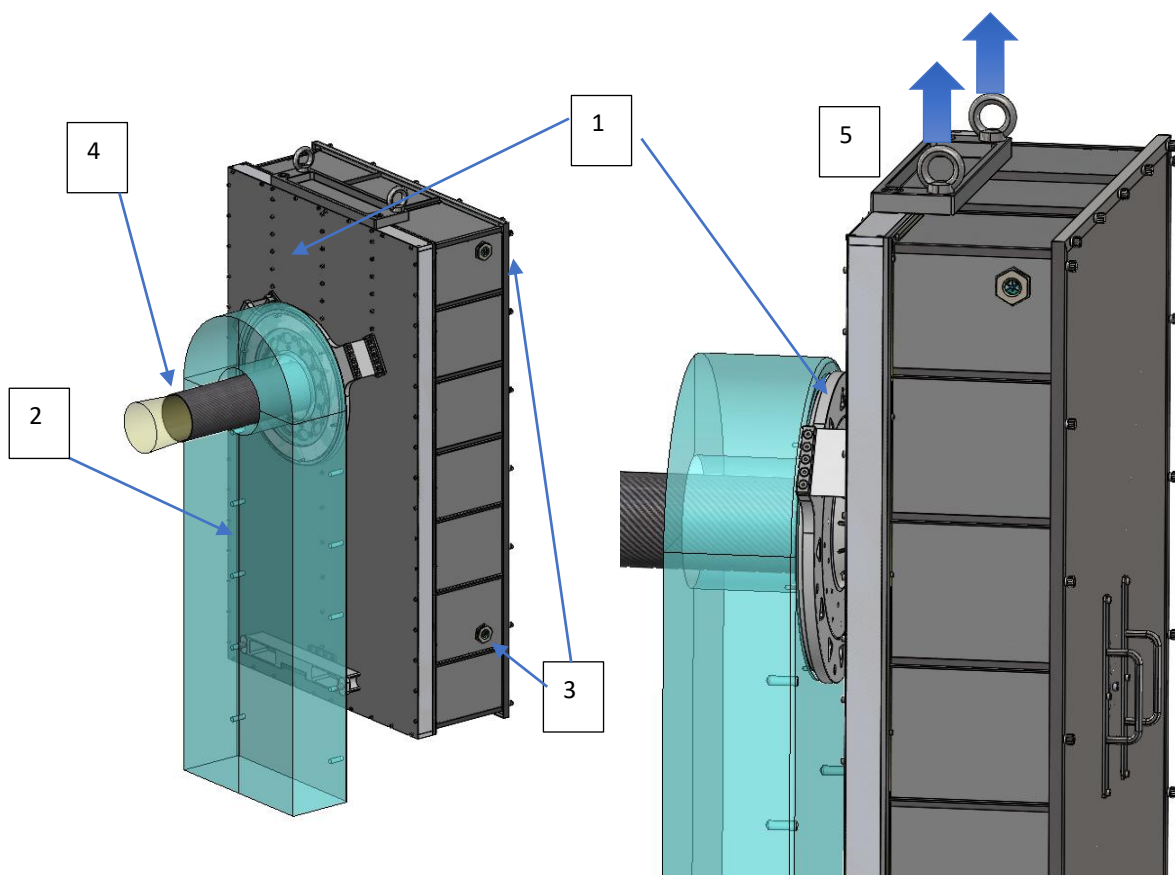


Figure 1. The typical interfaces of the bench.

The bench also features a lifting tool provided with eye bolts to lift the bench in safety (5). The plane of action of the lifting eye-bolts matches the CoG of the bench (when fully equipped with interfaces and optical instrumentation)

A Nasmyth removable dew-shield (4) extends inside the mount and can be fixed and removed depending on the characteristics of the telescope. The picture above shows the dew-shield for the case of the OS OGS700. A similar dew-shield can be developed for the ASA AZ800 telescope if the relevant interface dimensions are provided to OS (currently not available).

Finally, the bench also foresees four replaceable desiccant cartridges located at points (3), on both sides. These cartridges are made by AGM Containers, PN TA366-MS9-123-P.

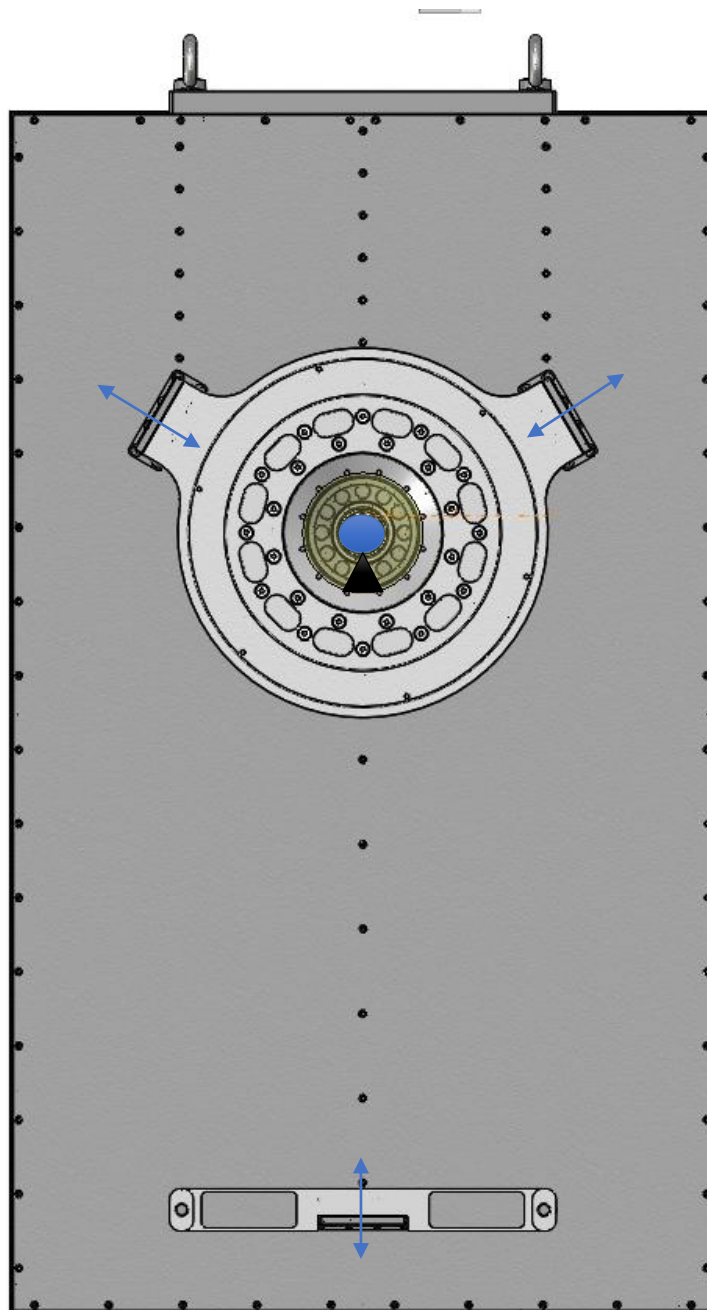


Figure 2. Schematics of the interfaces of the bench and flexures behaviour.

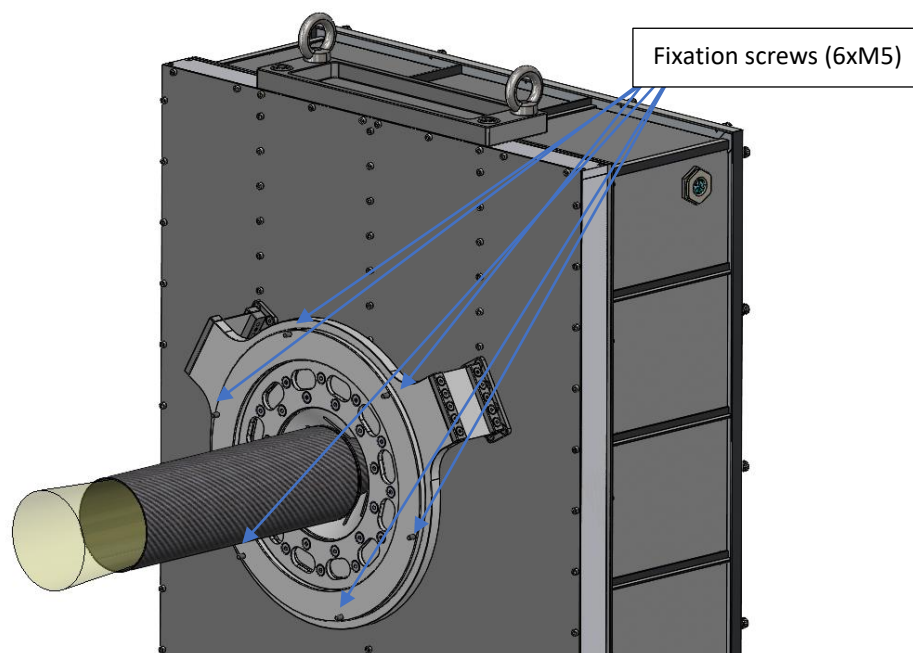


Figure 3. Example of the fixation screws for the ASA AZ800 telescope

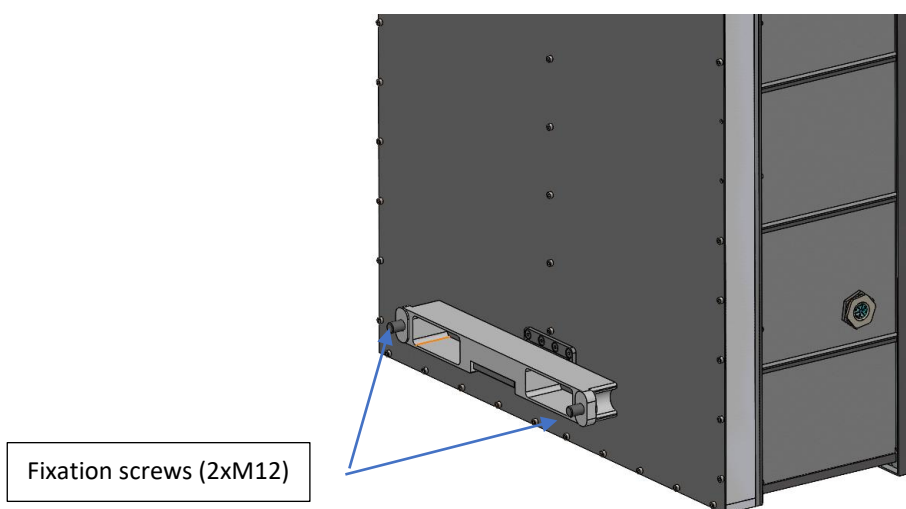


Figure 4. Example of the fixation screws for the ASA AZ800 telescope

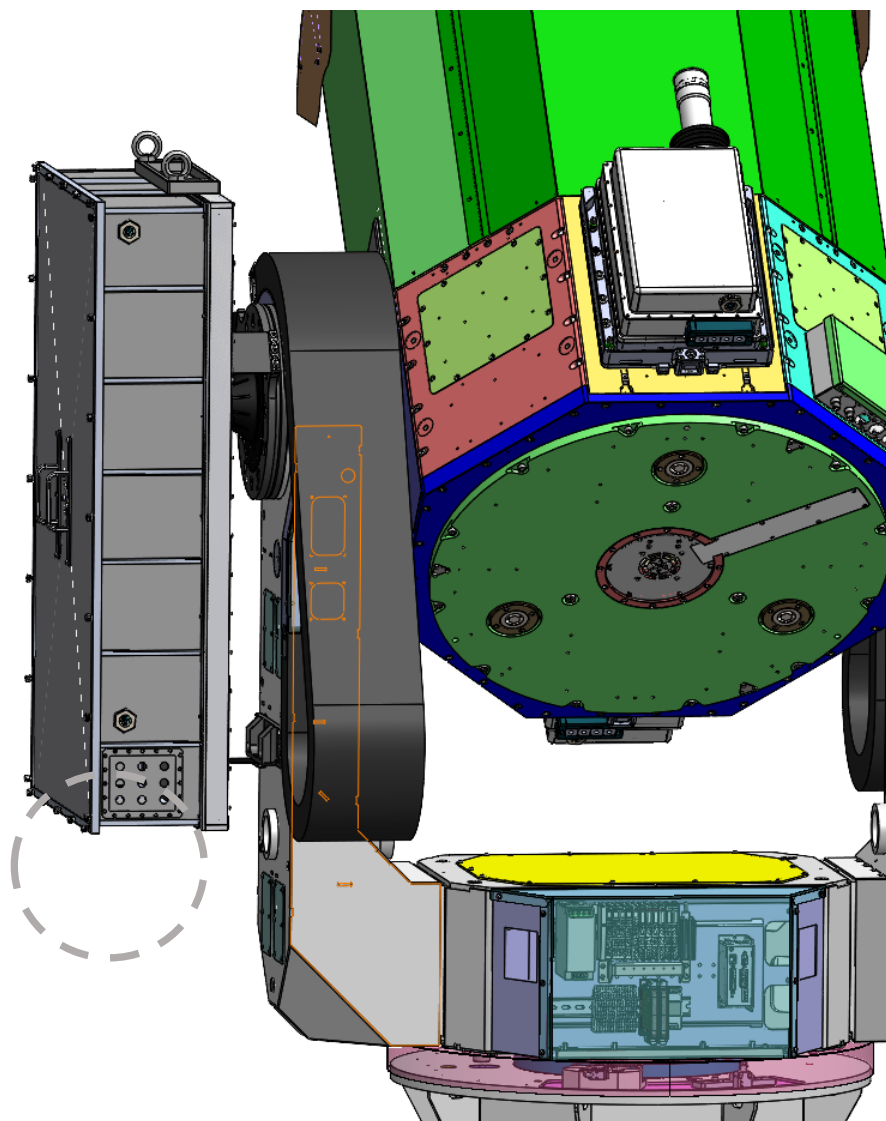
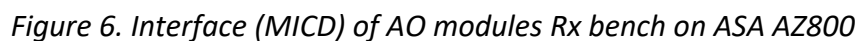


Figure 0. Example of the Rx bench fixed on the OS OGS700, the connectors' panel is visible in the bottom left.

MICD for ASA AZ800 and Officina Stellare OGS700 are provided in Figure 1 and Figure 2 respectively. MICD for ASA AZ800 is based on **Errore. L'origine riferimento non è stata trovata.**



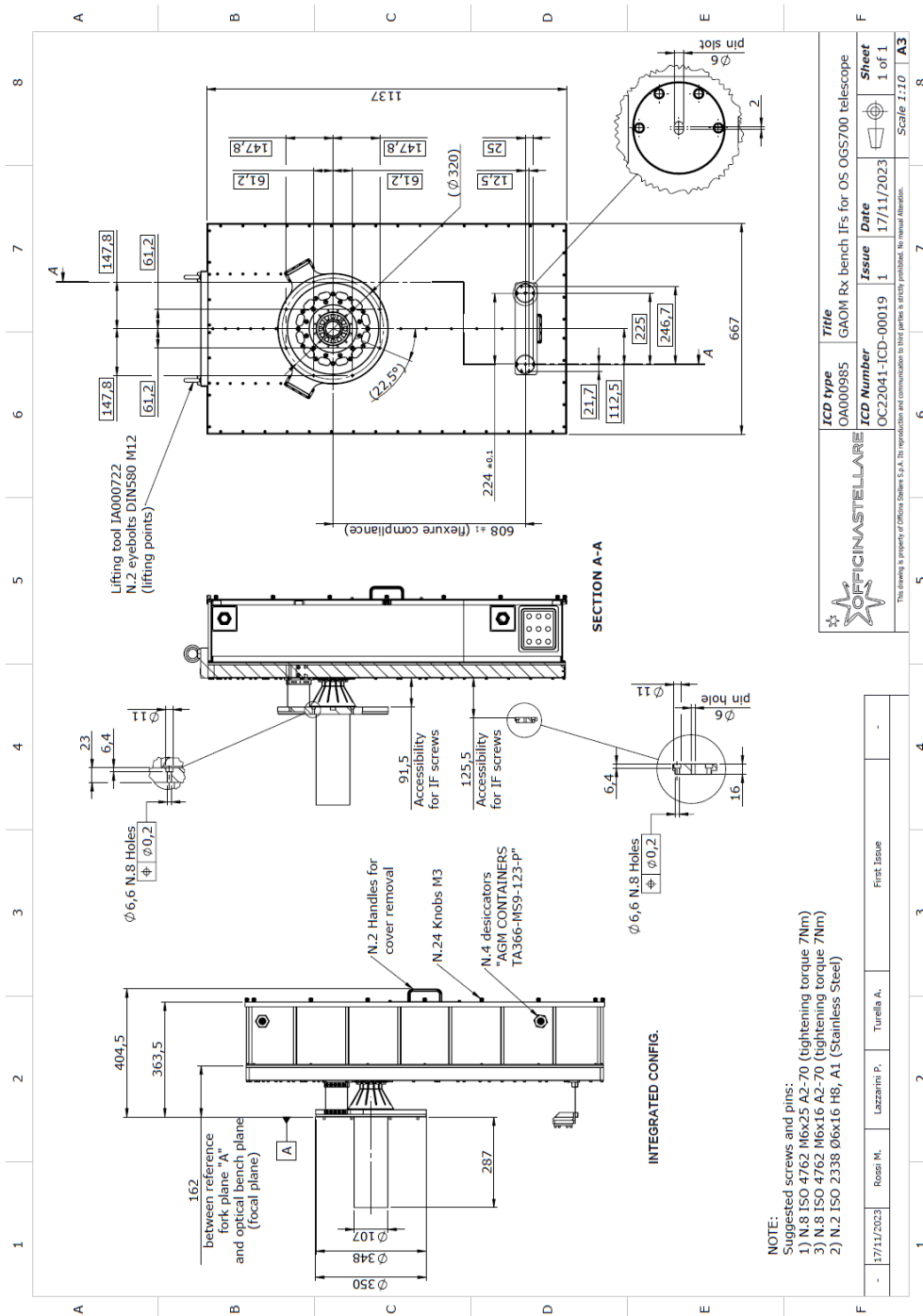


Figure 7. Interface (MICD) of the GAOM Rx bench on OS OGS700

Contact information

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