Alignment

The alignment part requires the to-be-docked module to have thrusters in order to move. The alignment could be done via a RF beacon (very unprecise) or via the ISS (host) sensors, as a Soyuz does when is getting docked.

Once the guest module is in position, it has to rotate to the right position. This is done via 4 thrusters, which align as much as possible the guest to the host module.

The locking system could take place (see quick release valve for air compressors). The docking system uses bearings all around (cylinders with smoothed corners and edges).

Before completing the locking, a final alignment system could be used, of about 3 units. These could be done by a cylinder going in a hollowed cylinder with assisted insertion. Once aligned, the cylinders lock the guest module to the host module to the perfect rotation, then the quick release locking takes place.

After this, an internal pressure is built between the guest and host modules. This can be used to checks for leaks in the docking system, and if this hold, the two airlock doors can be opened. To avoid issues, nitrogen is suggested as inert and not causing any damage to the human beings as well as the structures. If the addition of gas is too much, a nitrogen-removing system could be used and the so-collected nitrogen reused in another docking.

Of course, in case human life is not required in the module, the pressurization is not required and the bearings around the lock should be able to hold the entire structure.

Components:

-host lock module (female)

-guest lock module (male)

-airlocks door

-rotational locking system

<https://www.space-propulsion.com/spacecraft-propulsion/hydrazine-thrusters/index.html>