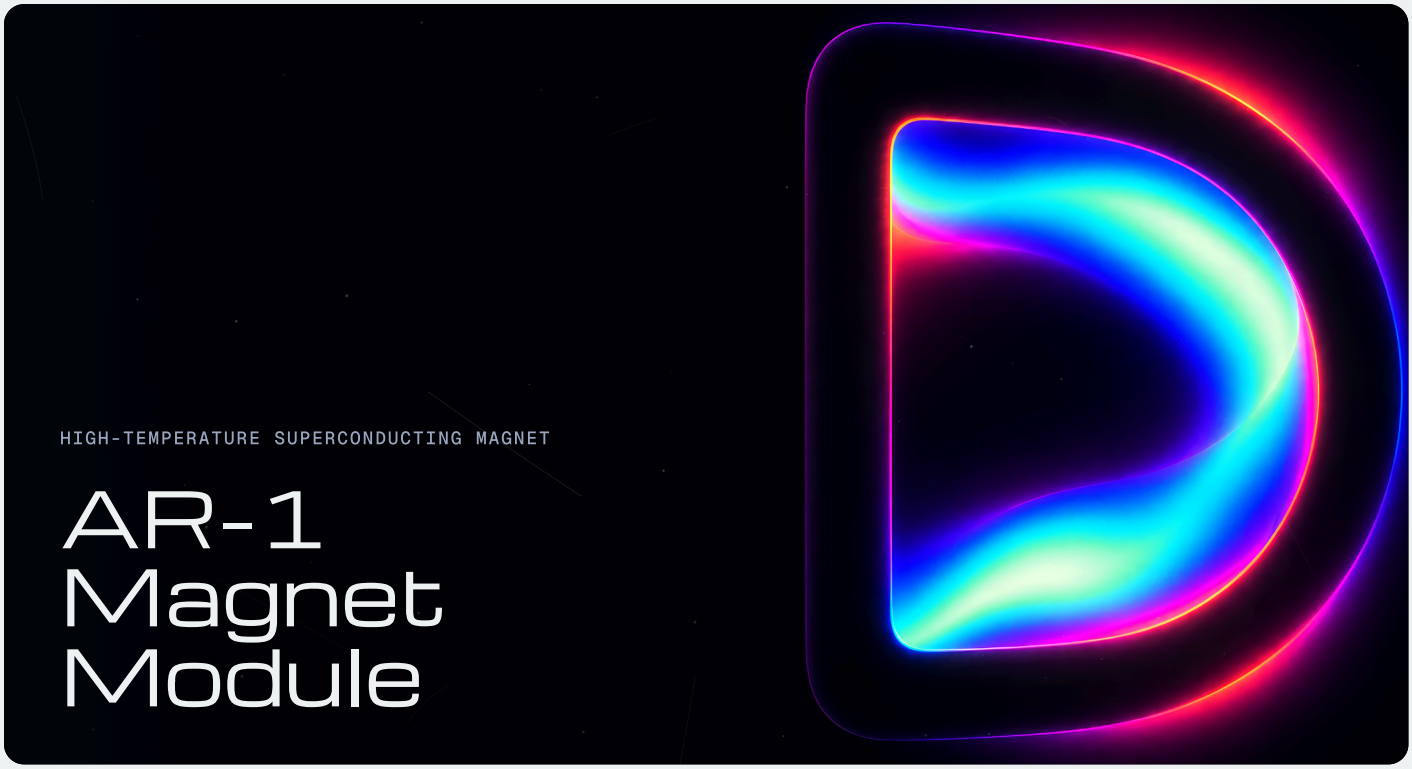


HIGH-TEMPERATURE SUPERCONDUCTING MAGNET

AR-1 Magnet Module

The AR-1 is a toroidal field coil wound from REBCO superconducting tape. It reaches 20 tesla on the coil at 20 kelvin, which lets a fusion reactor confine the same plasma in a much smaller machine. Eighteen modules make one reactor. Each is wound, cooled and tested to full field at our plant before it ships.

20 T	20 K	REBCO	18
Peak field on coil	Operating temperature	Superconducting tape	Modules per reactor

01

Higher field, smaller reactor

In a tokamak, fusion power density rises roughly with the fourth power of the magnetic field. A stronger field lets a smaller machine reach the same output.

02

Runs at 20 K

High-temperature superconductors carry full current at 20 K, so the module is cooled with helium gas instead of liquid helium at 4 K. Cryogenic plant is smaller and cheaper to run.

03

Built and tested in a factory

Each module is wound on a fixed production line and tested to full field before it ships.

04

Monitored end to end

Sensors run along the full winding, so the coil is watched at every point during operation.

LAUNCH CUSTOMER

First evaluation module for a fusion developer, delivered in 2027.

EVALUATION UNITS

Single modules for research partners and test facilities from Q3 2027.

ALSO SUITED TO

High-field research magnets, MRI research, particle beam steering.

TECHNICAL SPECIFICATIONS

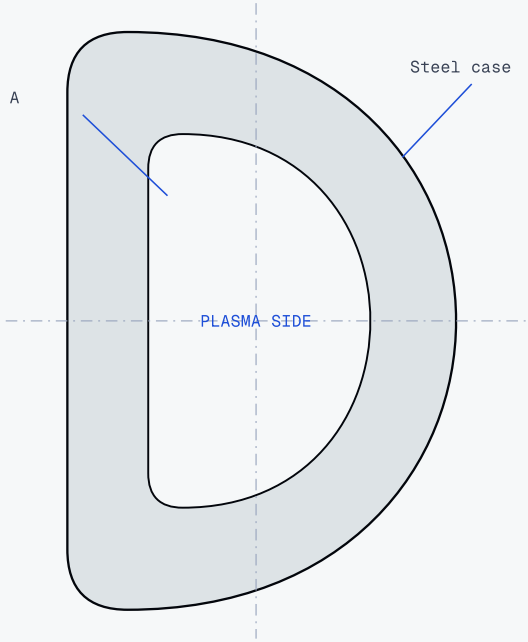
KEY FIGURES

Peak field on coil	20 T
Operating temperature	20 K
Conductor	REBCO coated tape
Coolant	Helium gas
Case	Stainless steel
Modules per reactor	18

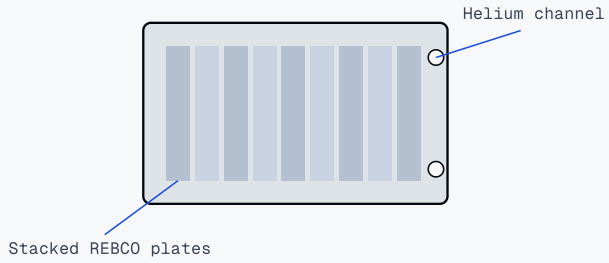
FULL SPECIFICATIONS

Electrical, mechanical, thermal and protection data are shared with partners under NDA. Contact partners@ardent.example.

MODULE GEOMETRY · ILLUSTRATIVE



WINDING PACK · SECTION A-A



INTERFACES

Current leads	HTS and copper
Cryogenics	Helium supply and return
Instrumentation	Voltage and temperature sensing

ARDENT

Sales and partnerships
partners@ardent.example
Ardent · Eindhoven, the Netherlands

All values are design targets for the AR-1 pilot series and may change. This document describes a self-initiated design concept for a fictional company.