

ASKAP Antenna specification & Operating parameters

ASKAP ANTENNA SPECIFICATION – BASIC OVERVIEW

The ASKAP antennas will be

- Prime focus (single reflector) antennas on an az-el mount/drive with a third (polarisation) axis to provide all-sky coverage (illustrated in Figure 1a)
- A reflector of diameter 12 m, unshaped paraboloid with f/D of 0.5 and painted white;
- Include a quadripod feed leg support and prime focus platform to support a maximum receiver (FPA) load of 200 kg;
- The reflector surface will be capable of operation to 10 GHz (or better).

The pointing accuracy of the antennas will be 30 arcsec (rms) or better in all operational modes. The pointing error is defined as the radial distance between the actual position of the antenna's optical axis and the requested position; it is a true angle on the sky. This pointing error relates to effects such as wind, thermal deformations and bearing run-out. It does not include the servo loop following errors; nor does it include those errors which can be measured and accommodated in a pointing model.

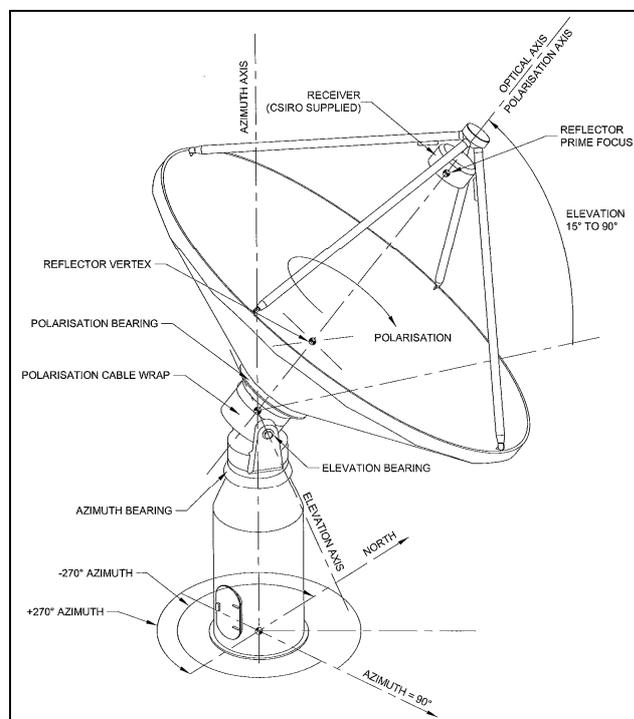


Figure 1a. Indicative third-axis configuration, showing azimuth and elevation ranges of motion.

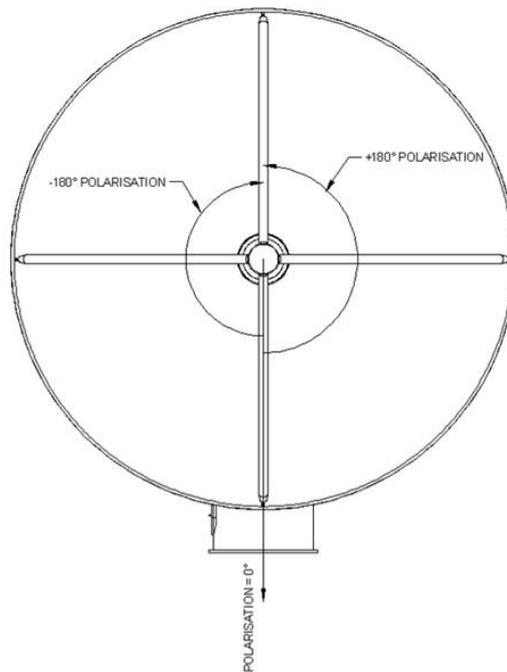


Figure 1b. Polarisation axis and range of motion

Antenna Mount operating characteristics

Axis	Range of Motion	Rotation Range	Slew Rate	Acceleration & Deceleration Speed
Az	Full	+/- 270 degrees (neutral at Az = 90 degrees (defined as East))	3 deg sec ⁻¹	3 deg sec ⁻²
EI	+15 degrees to +89 degrees	N/A	1 deg sec ⁻¹	1 deg sec ⁻²
Polarisation	Full	+/- 180 degrees (zero point defined with antenna at 15 degrees EI, and one pair of opposing quadripod legs is in the vertical plane)	3 deg sec ⁻¹	3 deg sec ⁻²

Dish Loading

The dish surface is not designed as load-bearing – i.e. it is not designed to be walked upon.

Quadripod Structure

The quadripod legs will be attached at or near the rim of the reflector and the shadowing of the quadripod support legs on the dish will be less than 5% of the reflector aperture.

The front face of the CSIRO-supplied FPA receiver will be positioned at the focal plane.

Environmental Constraints

The antenna and its control system will be designed for efficient and reliable operation at the MRO site where the normal operating conditions are:

- Operating at wind speed up to 45 km/hour; and safe drive to stow position up to 72 km/hour.
- Ambient T in the range -10 to +55 degrees C.
- The mean daily solar exposure ranges from 30 MJ/m² (summer) to 13 MJ/m² (winter).
- The antennas will survive wind gusts up to 160 km/hour when in safe stow mode.

The array will operate full time (24/7) and the antennas will support daily astronomical observing which typically involves cycling over a total of ~2400 degrees in azimuth and ~1000 degrees in elevation in a 24-hour period. These totals comprise reasonably short drives in that the average distance is 6 degrees, spread over 150 – 250 separate drives in a day.

Control System

A new control systems interface to the antenna array will be developed for ASKAP based on the EPICs management system. Whilst the details of this system do not impact the astronomical performance of the array, it should be noted that each ASKAP antenna will be a wholly independently controlled unit so that flexible operations are possible (i.e. sub-arraying will be supported).