

# 21cm prime focus receiver (1260-1510 MHz)

This system can be used for sensitive continuum, spectroscopy, and pulsar observations. Additionally, it will be employed in search-programs for space-debris. Be aware, that this band may be influenced by RFI. The central horn has two circular polarizations, each of the outer six horns two linear polarizations.

## Calibration Information

| Frequency [GHz]                                                    | Channel | Polarisation | Tcal [K] | Tsys [K] | Sensitivity [K/Jy] | SEFD [Jy] | Aperture Eff. [%] | TMB/S [K/Jy] | Main Beam Eff. [%] | FWHM [arcsec] | Last update |
|--------------------------------------------------------------------|---------|--------------|----------|----------|--------------------|-----------|-------------------|--------------|--------------------|---------------|-------------|
| 1.408                                                              | A       | LCP          | 4.5      | 23       | 1.37               | 17        | 48                | 1.8          | 63                 | 587           | Jan 2014    |
| 1.408                                                              | B       | RCP          | 4.4      | 22       | 1.37               | 16        | 48                | 1.8          | 63                 | 587           | Jan 2014    |
| normalized Gain curve ( $G = A0 + A1 \cdot Elv + A2 \cdot Elv^2$ ) |         |              |          |          |                    |           | Observed in       | confirmed    |                    |               |             |
| A0 = 1.0                                                           |         | A1 = 0.0     |          | A2 = 0.0 |                    |           | Dec 2007          | Jan 2014     |                    |               |             |

### Comments:

- Values for the other horns will follow

## Version description for OBSINP

| RX Name                                 | Wavelength [cm]                                                                                | Frequency (center) [GHz] | Nr. of Horns |
|-----------------------------------------|------------------------------------------------------------------------------------------------|--------------------------|--------------|
| P217mm 7-Beam (1.26-1.51 GHz)           | 21.0                                                                                           | 1.26-1.51 (1.4)          | 7            |
| Version:                                | Comment                                                                                        |                          |              |
| 1. Beam-Park-Mode (BW: 47 MHz)          | Version for space debris search                                                                |                          |              |
| 2. Continuum/Line (XFFTS) (BW: 100 MHz) | Continuum/Line with the central horn (+1) only.                                                |                          |              |
| 3. Pulsar (BW: 300 MHz)                 | Pulsar wide band filter                                                                        |                          |              |
| 4. Line with AFFTS only                 | HI Survey                                                                                      |                          |              |
| Horn offsets [arcsec]                   | (0.0,0.0),(-785.0,453.0),(0.0,906.0),(785.0,453.0),(785.0,-453.0),(0.0,-906.0),(-785.0,-453.0) |                          |              |

## Channel assignment in the MBFITS data files

Note that the narrow line and VLBA IF channels are usually only available when the specific line version of the receiver was selected. In addition for most receivers with narrow line channels the

cables at the patch board need to be connected by the receiver group.

To select different channel numbers in OBSINP, the online plot, or the toolbox the numbers have to be specified like c(1)+c(2) to add channel 1 and 2. E.g. channel 1 and 2 contain the LCP and RCP broadband channels, then "OnlPlot pen='c(1)+c(2)'" or "toolbox use='c(1)+c(2)'" will select these channels. In OBSINP the pen can be directly specified in the receiver selection menu.

- Abbreviations:
- SB: narrow band channel (Schmalband-Kanal), 100 MHz band width
  - BB: digital broad band channel (Breitband-Kanal), band width varies for different receivers
  - VLBA: VLBA IF, 500 MHz band width
  - BW: band width
  - TP: total power

| 21cm-7beam PFK (only 2 out of 7 horns for continuum) |    |        |                        |
|------------------------------------------------------|----|--------|------------------------|
| Channel                                              | IF | Pol.   | Comment                |
| 1                                                    | SB | LCP    | central horn 1, TP A   |
| 2                                                    | SB | RCP    | central horn 1, TP B   |
| 3                                                    | SB | cross  | central horn 1, cos AB |
| 4                                                    | SB | cross  | central horn 1, sin AB |
| 5                                                    | SB | linear | horn 2, TP A           |
| 6                                                    | SB | linear | horn 2, TP B           |
| 7                                                    | SB | cross  | horn 2, cos AB         |
| 8                                                    | SB | cross  | horn 2, sin AB         |

Spectroscopy modes and resolution

| BW  | nchan | nu   | Df  | Dv    | dv    |
|-----|-------|------|-----|-------|-------|
| MHz |       | MHz  | kHz | km/s  | km/s  |
| 100 | 16384 | 1320 | 6.1 | 1.386 | 1.608 |
| 100 | 16384 | 1340 | 6.1 | 1.366 | 1.584 |
| 100 | 16384 | 1360 | 6.1 | 1.345 | 1.561 |
| 100 | 16384 | 1380 | 6.1 | 1.326 | 1.538 |
| 100 | 16384 | 1400 | 6.1 | 1.307 | 1.516 |
| 100 | 16384 | 1420 | 6.1 | 1.289 | 1.495 |
| 100 | 16384 | 1440 | 6.1 | 1.271 | 1.474 |

- BW ... band width
- nchan ... number of spectral channels
- nu ... center frequency
- Df ... Channel separation (in frequency)
- Dv ... Channel separation (in velocity)
- dv ... Velocity resolution (dv=1.16\*Dv)

Tcal and Tsys measurements



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Last update: **2019/09/03 07:48**

