

# VISTA Data Flow System (VDFS)

FOR VISTA & WFCAM DATA

**Document Title:** VISTA IR Camera Data Interface  
Dictionary

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## Change Record

| Issue | Date       | Section(s) Affected | Description of Change/Change Request<br>Reference/Remarks |
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## Notification List

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## 1 Introduction

A **Data Interface Dictionary (DID)** is a computer readable dictionary which defines all terms used by the Data Flow System to describe data from the VISTA IR camera. The special keywords used for describing data from the VISTA IR camera must be defined in a DID and includes e.g. the FITS keywords to describe the instrument state in raw data files, keywords in instrument setup files. The DID contains a complete list of term (e.g. keywords) defined for the instrument with a detailed description conforming to AD02.

According to AD01 the DID must be submitted by the VISTA Data Flow System (VDFS) to ESO's Data Interface Control Board (DICB) for approval, version 0.5 being expected by European Instrument Integration, version 0.9 by Commissioning 1, version 1.0 by Commissioning 2, the final version at Final Instrument Delivery.

The VDFS has not yet undergone PDR or FDR by ESO, and this draft DID has not been submitted to ESO's DICB for approval. Until approved by ESO's DICB this document must remain a draft. The document has been provided to assist the camera software team in their design. Any changes to this document that become necessary will be immediately communicated to the camera software team.

## 2 Acronyms and Abbreviations

|      |                              |
|------|------------------------------|
| DICB | Data Interface Control Board |
| DID  | Data Interface Dictionary    |

## 3 Applicable and Referenced Documents

|                                               |                                  |
|-----------------------------------------------|----------------------------------|
| [AD1] Data Flow for VLT instruments Req. spec | VLT-SPE-ESO-19000-1618 issue 1.0 |
| [AD2] Data Interface Control Document         | GEN-SPE-ESO-19400-0794           |

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## 4 Data Interface Dictionary -- ESO-VIS-DIC.FITS

All data generated by the VISTA IR camera are described by a set of data definitions e.g. keywords for FITS files (see [AD2]). These data definitions describe the instrument state at acquisition and are used by the pipeline and quality control. The Dictionary is reviewed by ESO's Data Interface Control Board (DICB) to ensure that it conforms to the standards (see [AD2]).

**Explicit deliveries to ESO:** 1. one file defining the Data Interface Dictionary for the instrument conforming to the DICB standard must be delivered by the Data Flow System (VDFS).

**Usage by ESO:** The DID will be reviewed and accepted by DICB. After the acceptance, it will serve as the reference for the data description of raw data frames when used by the Science Archive, Pipeline and Quality Control.

Dictionary Name: ESO-VIS-DIC.FITS  
 Scope: INSTRUMENT  
 Source: IOA-CASU  
 Version Control: 0.1.9  
 Date: 2003-11-11  
 Status: DRAFT  
 Description: Data dictionary for VISTA telescope plus  
 Infra Red Camera.

Parameter Name: SIMPLE  
 Class: ext-header  
 Context: FITS  
 Type: logical  
 Value Format: %c  
 Unit:  
 Comment Format: Standard FITS (NOST-100-2.0)  
 Description: SIMPLE must be equal to "T" to conform to FITS.

Parameter Name: NAXIS  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: cardinal  
 Comment Format: number of axes of data array  
 Description: VISTA data stored in multi-extension FITS, hence NAXIS=0 in  
 primary header, NAXIS=2 in extension headers.

Parameter Name: BITPIX  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d

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Unit:  
Comment Format: number of bits per pixel value  
Description: Number of bits used to store pixel values  
Standard values are defined in NOST-100.0  
The value for VISTA IR will be  
32 32-bit twos-complement binary integer, but  
there is no primary data so BITPIX is 8 in the primary header.

Parameter Name: EXTEND  
Class: ext-header  
Context: FITS  
Type: logical  
Value Format: %c  
Unit:  
Comment Format: FITS file extension may be present  
Description: VISTAIR files will be multi-extension FITS, so EXTEND  
='T'

Parameter Name: RA  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.6f  
Unit: degrees  
Comment Format: %HOURANG RA of telescope  
Description: Telescope pointing Right Ascension, in ICRF,  
of rotator axis, expressed in decimal degrees.  
The comment field includes the value expressed in sexagesimal.

Parameter Name: DEC  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.6f  
Unit: degrees  
Comment Format: %DECLINATION Dec of telescope  
Description: Telescope pointing declination, in ICRF, of  
rotator axis, expressed in decimal degrees.  
The comment field include the value expressed in sexagesimal.

Parameter Name: RADECSYS  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Name of celestial reference frame  
Description: Standard reference-frame name, will normally be 'ICRS'.  
Note, this implies the EQUINOX keyword is absent.

Parameter Name: EQUINOX  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.1f  
Unit: Year

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Comment Format: Equinox of celestial reference frame.  
Description: Equinox of reference frame, required for precessed  
reference frames, but obsolete for International Coordinate Reference  
System.

Parameter Name: ORIGIN  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: European Southern Observatory  
Description: Observatory source of this file.  
The value is "ESO-PARANAL" for VISTA.

Parameter Name: TELESCOP  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ESO <TEL>  
Description: ESO telescope code as defined in GEN-SPE-ESO-00000-0794  
(VISTA).

Parameter Name: INSTRUME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Instrument used  
Description: ESO acronym for the instrument used.  
VISTAIR for VISTA InfraRed Camera.

Parameter Name: OBJECT  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Target description  
Description: Identification of target observed.

Parameter Name: IMAGETYP  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Exposure type  
Description: Description of type of observation, ie OBJECT, DOMEFLAT,  
SKYFLAT,  
DARK, RESET.

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Parameter Name: AIRMASS  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.5f  
 Unit:  
 Comment Format: Averaged airmass  
 Description: Average airmass for the optical axis during the exposure  
 computed as described in GEN-SPE-ESO-00000-0794.

Parameter Name: DATE  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Date this file was written  
 Description: UTC date on which this file was written.  
 The following format shall be used:  
 YYYY-MM-DDThh:mm:ss.sss

Parameter Name: DATE-OBS  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: UTC date at start of exposure.  
 Description: UTC date of the start of the exposure.  
 The format used is YYYY-MM-DDThh:mm:ss.sss

Parameter Name: UTC  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: seconds  
 Comment Format: %TIME UTC s at start since midnight  
 Description: Universal Coordinated Time at start of the exposure in  
 seconds  
 elapsed since (UTC) midnight.  
 The comment includes a civil representation of the value.

Parameter Name: REQTIME  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: seconds  
 Comment Format: Requested integration time  
 Description: The requested integration time, from the observing  
 system.  
 The actual time will differ due to timing errors or use of  
 an early END command.

Parameter Name: EXPTIME

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Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: seconds  
 Comment Format: Actual integration time  
 Description: The integration time for a single observation (in the infrared this corresponds to DIT. Note that this does not represent the photon statistics).  
 It may not match the requested integration time.

Parameter Name: LST  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: sidereal seconds  
 Comment Format: %TIME LST seconds since midnight  
 Description: Local Sidereal Time at start of the exposure in seconds elapsed since sidereal midnight.  
 The comment includes a civil representation of the value.

Parameter Name: MJD-OBS  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.8f  
 Unit: days  
 Comment Format: Modified Julian Date at start  
 Description: Modified Julian Day of the start of the exposure.  
 The MJD is related to the Julian Day (JD) via the formula:  $MJD = JD - 2400000.5$   
 The comment includes a civil representation of the date and time. 8 decimals are required for a precision of one millisecond, 5 decimals for a precision of one second.

Parameter Name: OBSERVER  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Name of observer  
 Description: Given name, initial(s), family name of observer

Parameter Name: PI-COI  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Name(s) of proposer(s)  
 Description: Name(s) of proposer(s) (as opposed to observer)

Parameter Name: COMMENT

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Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format:  
 Description: This keyword is used to include comments in the header.

Parameter Name: HISTORY  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format:  
 Description: This keyword is used to include history information in the header.

Parameter Name: ESO-LOG  
 Class: ext-header  
 Context: FITS  
 Type:  
 Value Format:  
 Unit:  
 Comment Format:  
 Description: This keyword is used to include operations log entries in the header. Normally, log records that are written during the exposure are also repeated for information purposes in the header. Only the leftmost 71 characters of the log records are reproduced in this keyword. The equal sign "=" is not allowed as the first character in the comment.

Parameter Name: ORIGFILE  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Original File Name  
 Description: Original file name delivered by data=acquisition system.

Parameter Name: ARCFILE  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %40s  
 Unit:  
 Comment Format: Archive File name  
 Description: Unique Data Product ID within the ESO Data Flow System. It is composed of <source>.YYYY-MM-DDTHH:MM::SS.sss.fits where <source> is a unique data producer identifier (typically the name of instrument) and the date and time is set by the time of start of the exposure as

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as given through the MJD-OBS keyword in the FITS header.

Parameter Name: CHECKSUM  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ASCII 1s-complement checksum  
Description: 32 bit Cyclic Redundant Check (CRC)  
calculation of the frame. It uses the CCITT  
standard CRC polynomials.  
A description and C code can be found at  
<http://archive.eso.org/DICB/checksum>

Parameter Name: RECIPE  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Data-reduction recipe to be used  
Description: Name of data-reduction procedure expected to be used  
with this exposure.

Parameter Name: OFFSTNUM  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Value of first OBSNUM in current tile sequence  
Description: Value of first OBSNUM in current tile sequence

Parameter Name: OBSNUM  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Observation Number  
Description: An incremental count of observations starting from  
day 1. A co-add performed in the data-acquisition system  
counts as a single observation.

Parameter Name: GRPNUM  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Group number applied to all members  
Description: Group number applied to all members

Parameter Name: GRPMEM  
Class: ext-header

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Context: FITS  
Type: logical  
Value Format: %c  
Unit:  
Comment Format: Group membership  
Description: Group membership truth value.

Parameter Name: STANDARD  
Class: ext-header  
Context: FITS  
Type: logical  
Value Format: %c  
Unit:  
Comment Format: Standard-star observation  
Description: True if observation is of a standard star, or  
standard field.

Parameter Name: NOFFSETS  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Number of offset positions in a field  
Description: Number of offset positions in a field

Parameter Name: OFFSET\_I  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Serial Number of offset  
Description: To keep track of which part of a pointing we are on.

Parameter Name: NDITHER  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Number of positions in a tel dither pattern  
Description: Number of positions in a telescope dither pattern

Parameter Name: DITHRNUM  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Value of first OBSNUM in current dither sequence  
Description: Value of first OBSNUM in current dither sequence

Parameter Name: DITHER\_I  
Class: ext-header  
Context: FITS

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Type: integer  
Value Format: %d  
Unit:  
Comment Format: Serial number of this tel dither pattern  
Description: Serial number of this telescope dither pattern.

Parameter Name: DITHER\_X  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: arcsec  
Comment Format: X offset in dither pattern  
Description: X offset in dither is approximately aligned with RA  
and measured east along a great circle from the starting point.

Parameter Name: DITHER\_Y  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: arcsec  
Comment Format: Y offset in dither pattern  
Description: Y offset in dither is approximately aligned North  
(but there is no reason why one might dither through  
the South Celestial Pole) and measured along a great  
circle from the starting point.

Parameter Name: NUSTEP  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Number of positions in microstep pattern  
Description: Number of positions in microstep pattern

Parameter Name: USTEPNUM  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Value of first OBSNUM in current microstep sequence  
Description: Value of first OBSNUM in current microstep sequence

Parameter Name: USTEP\_I  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit:  
Comment Format: Serial number of microstep pattern  
Description: Serial number of microstep pattern

Parameter Name: USTEP\_X

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Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: arcsec  
 Comment Format: X offset in microstep pattern  
 Description: X offset in microstep is approximately aligned with RA  
 and measured east along a great circle from the starting point.

Parameter Name: USTEP\_Y  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: arcsec  
 Comment Format: Y offset in microstep pattern  
 Description: X offset in microstep is approximately aligned North  
 and measured along a great circle from the starting point.

Parameter Name: INS.FILT1.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Filter identification device code  
 Description: The Filter identification device code.

Parameter Name: INS.FILT.NAME1  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Filter Name  
 Description: VISTAIR only has one filter wheel and each filter only  
 has one name.

Parameter Name: INS.FILT1.NO  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: cardinal  
 Comment Format: Filter wheel slot number  
 Description: Filter wheel slot number

Parameter Name: INS.FILT1.ENC  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: cardinal  
 Comment Format: Filter wheel encoder position  
 Description: Filter wheel encoder position

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Parameter Name: INS.PRES1.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of pressure sensor 1  
 Description: Identification string for pressure sensor 1

Parameter Name: INS.PRES1.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of pressure sensor 1  
 Description: Name, or location, of pressure sensor 1

Parameter Name: INS.PRES1.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %E  
 Unit: pascals  
 Comment Format: Pressure sensor 1 reading  
 Description: Pressure sensor 1 reading in pascals.

Parameter Name: INS.PRES2.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of pressure sensor 2  
 Description: Name, or location, of pressure sensor 2

Parameter Name: INS.PRES2.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %E  
 Unit: pascals  
 Comment Format: Pressure sensor 2 reading  
 Description: Pressure sensor 2 reading in pascals.

Parameter Name: INS.PRES2.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of pressure sensor 2  
 Description: Identification string for pressure sensor 1

Parameter Name: INS.LAMP1.ID  
 Class: ext-header

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Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Hardware identification of lamp bulb unit 1  
Description: Hardware identification of lamp bulb unit 1 (if any).

Parameter Name: INS.LAMP1.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Name of lamp unit 1  
Description: Name of lamp unit 1 (if any).

Parameter Name: INS.LAMP1.STATE  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Lamp 1 state on/off  
Description: Lamp 1 state, may be 'ON' or 'OFF'

Parameter Name: INS.WHEEL.INPOS  
Class: ext-header  
Context: FITS  
Type: logical  
Value Format: %c  
Unit: bool  
Comment Format: filter in-position switch state  
Description: When a primary filter is in position, the in-position switch should be closed.

Parameter Name: INS.WHEEL.TIME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit: ISO date-time string  
Comment Format: Last filter wheel index cancel  
Description: The time that the filter-wheel mechanism last checked its (accurate) index mark.

Parameter Name: INS.WHEEL.ERROR  
Class: ext-header  
Context: FITS  
Type: integer  
Value Format: %d  
Unit: steps  
Comment Format: Last filter wheel index error  
Description: The difference between the expected and the actual step count  
last time the filter-wheel checked the index mark

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Parameter Name: INS.TEMP29.TARGET  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: degrees K  
 Comment Format: Sensor 29 target  
 Description: Temperature target for sensor 29 in degrees Kelvin.

Parameter Name: INS.TEMP30.TARGET  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: degrees K  
 Comment Format: Sensor 2 target  
 Description: Temperature target for sensor 30 in degrees Kelvin.

Parameter Name: INS.TEMP1.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 1  
 Description: ID of temperature sensor 1

Parameter Name: INS.TEMP1.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 1  
 Description: Cryostat window cell

Parameter Name: INS.TEMP1.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 1 reading  
 Description: Temperature reading of sensor 1 in degrees Kelvin.

Parameter Name: INS.TEMP2.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 2  
 Description: ID of temperature sensor 2

Parameter Name: INS.TEMP2.NAME

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Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 2  
 Description: Ambient air temperature

Parameter Name: INS.TEMP2.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 2 reading  
 Description: Temperature reading of sensor 2 in degrees Kelvin.

Parameter Name: INS.TEMP3.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 3  
 Description: ID of temperature sensor 3

Parameter Name: INS.TEMP3.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 3  
 Description: Baffle 7

Parameter Name: INS.TEMP3.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 3 reading  
 Description: Temperature reading of sensor 3 in degrees Kelvin.

Parameter Name: INS.TEMP4.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 4  
 Description: ID of temperature sensor 4

Parameter Name: INS.TEMP4.NAME  
 Class: ext-header  
 Context: FITS

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Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 4  
Description: Lens Barrel

Parameter Name: INS.TEMP4.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 4 reading  
Description: Temperature reading of sensor 4 in degrees Kelvin.

Parameter Name: INS.TEMP5.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 5  
Description: ID of temperature sensor 5

Parameter Name: INS.TEMP5.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 5  
Description: Liquid Nitrogen Tank

Parameter Name: INS.TEMP5.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 5 reading  
Description: Temperature reading of sensor 5 in degrees Kelvin.

Parameter Name: INS.TEMP6.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 6  
Description: ID of temperature sensor 6

Parameter Name: INS.TEMP6.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s

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Unit:  
Comment Format: Location of sensor 6  
Description: Cold head 1 1st stage

Parameter Name: INS.TEMP6.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 6 reading  
Description: Temperature reading of sensor 6 in degrees Kelvin.

Parameter Name: INS.TEMP7.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 7  
Description: ID of temperature sensor 7

Parameter Name: INS.TEMP7.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 7  
Description: Cold head 1 2st stage

Parameter Name: INS.TEMP7.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 7 reading  
Description: Temperature reading of sensor 7 in degrees Kelvin.

Parameter Name: INS.TEMP8.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 8  
Description: ID of temperature sensor 8

Parameter Name: INS.TEMP8.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 8

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Description: Cold head 2 1st stage

Parameter Name: INS.TEMP8.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 8 reading  
Description: Temperature reading of sensor 8 in degrees Kelvin.

Parameter Name: INS.TEMP9.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 9  
Description: ID of temperature sensor 9

Parameter Name: INS.TEMP9.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 9  
Description: Cold head 2 2st stage

Parameter Name: INS.TEMP9.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 9 reading  
Description: Temperature reading of sensor 9 in degrees Kelvin.

Parameter Name: INS.TEMP10.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 10  
Description: ID of temperature sensor 10

Parameter Name: INS.TEMP10.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 10  
Description: Cold head 3 1st stage

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Parameter Name: INS.TEMP10.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 10 reading  
 Description: Temperature reading of sensor 10 in degrees Kelvin.

Parameter Name: INS.TEMP11.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 11  
 Description: ID of temperature sensor 11

Parameter Name: INS.TEMP11.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 11  
 Description: Cold head 3 2st stage

Parameter Name: INS.TEMP11.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 11 reading  
 Description: Temperature reading of sensor 11 in degrees Kelvin.

Parameter Name: INS.TEMP12.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 12  
 Description: ID of temperature sensor 12

Parameter Name: INS.TEMP12.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 12  
 Description: Cryopump 1

Parameter Name: INS.TEMP12.VAL  
 Class: ext-header

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Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 12 reading  
Description: Temperature reading of sensor 12 in degrees Kelvin.

Parameter Name: INS.TEMP13.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 13  
Description: ID of temperature sensor 13

Parameter Name: INS.TEMP13.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 13  
Description: Cryopump 2

Parameter Name: INS.TEMP13.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 13 reading  
Description: Temperature reading of sensor 13 in degrees Kelvin.

Parameter Name: INS.TEMP14.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 14  
Description: ID of temperature sensor 14

Parameter Name: INS.TEMP14.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 14  
Description: WFS Plate

Parameter Name: INS.TEMP14.VAL  
Class: ext-header  
Context: FITS  
Type: double

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Value Format:       %.2f  
Unit:               K  
Comment Format:     Temperature sensor 14 reading  
Description:        Temperature reading of sensor 14 in degrees Kelvin.

Parameter Name:    INS.TEMP15.ID  
Class:              ext-header  
Context:            FITS  
Type:               string  
Value Format:        %s  
Unit:                 
Comment Format:     ID of sensor 15  
Description:        ID of temperature sensor 15

Parameter Name:    INS.TEMP15.NAME  
Class:              ext-header  
Context:            FITS  
Type:               string  
Value Format:        %s  
Unit:                 
Comment Format:     Location of sensor 15  
Description:        WFS CCD 1

Parameter Name:    INS.TEMP15.VAL  
Class:              ext-header  
Context:            FITS  
Type:               double  
Value Format:        %.2f  
Unit:               K  
Comment Format:     Temperature sensor 15 reading  
Description:        Temperature reading of sensor 15 in degrees Kelvin.

Parameter Name:    INS.TEMP16.ID  
Class:              ext-header  
Context:            FITS  
Type:               string  
Value Format:        %s  
Unit:                 
Comment Format:     ID of sensor 16  
Description:        ID of temperature sensor 16

Parameter Name:    INS.TEMP16.NAME  
Class:              ext-header  
Context:            FITS  
Type:               string  
Value Format:        %s  
Unit:                 
Comment Format:     Location of sensor 16  
Description:        WFS CCD 2

Parameter Name:    INS.TEMP16.VAL  
Class:              ext-header  
Context:            FITS  
Type:               double  
Value Format:        %.2f  
Unit:               K

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Comment Format: Temperature sensor 16 reading  
Description: Temperature reading of sensor 16 in degrees Kelvin.

Parameter Name: INS.TEMP17.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 17  
Description: ID of temperature sensor 17

Parameter Name: INS.TEMP17.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 17  
Description: WFS CCD 3

Parameter Name: INS.TEMP17.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 17 reading  
Description: Temperature reading of sensor 17 in degrees Kelvin.

Parameter Name: INS.TEMP18.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 18  
Description: ID of temperature sensor 18

Parameter Name: INS.TEMP18.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 18  
Description: WFS CCD 4

Parameter Name: INS.TEMP18.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 18 reading  
Description: Temperature reading of sensor 18 in degrees Kelvin.

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Parameter Name: INS.TEMP19.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 19  
 Description: ID of temperature sensor 19

Parameter Name: INS.TEMP19.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 19  
 Description: Filter wheel shield

Parameter Name: INS.TEMP19.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 19 reading  
 Description: Temperature reading of sensor 19 in degrees Kelvin.

Parameter Name: INS.TEMP20.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 20  
 Description: ID of temperature sensor 20

Parameter Name: INS.TEMP20.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 20  
 Description: Filter wheel hub

Parameter Name: INS.TEMP20.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 20 reading  
 Description: Temperature reading of sensor 20 in degrees Kelvin.

Parameter Name: INS.TEMP21.ID

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Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 21  
 Description: ID of temperature sensor 21

Parameter Name: INS.TEMP21.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 21  
 Description: Science detector 1

Parameter Name: INS.TEMP21.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 21 reading  
 Description: Temperature reading of sensor 21 in degrees Kelvin.

Parameter Name: INS.TEMP22.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 22  
 Description: ID of temperature sensor 22

Parameter Name: INS.TEMP22.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 22  
 Description: Science detector 2

Parameter Name: INS.TEMP22.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 22 reading  
 Description: Temperature reading of sensor 22 in degrees Kelvin.

Parameter Name: INS.TEMP23.ID  
 Class: ext-header  
 Context: FITS

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Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 23  
Description: ID of temperature sensor 23

Parameter Name: INS.TEMP23.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 23  
Description: Science detector 3

Parameter Name: INS.TEMP23.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 23 reading  
Description: Temperature reading of sensor 23 in degrees Kelvin.

Parameter Name: INS.TEMP24.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 24  
Description: ID of temperature sensor 24

Parameter Name: INS.TEMP24.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 24  
Description: Science detector 4

Parameter Name: INS.TEMP24.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 24 reading  
Description: Temperature reading of sensor 24 in degrees Kelvin.

Parameter Name: INS.TEMP25.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s

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Unit:  
Comment Format: ID of sensor 25  
Description: ID of temperature sensor 25

Parameter Name: INS.TEMP25.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 25  
Description: Science detector 5

Parameter Name: INS.TEMP25.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 25 reading  
Description: Temperature reading of sensor 25 in degrees Kelvin.

Parameter Name: INS.TEMP26.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 26  
Description: ID of temperature sensor 26

Parameter Name: INS.TEMP26.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 26  
Description: Science detector 6

Parameter Name: INS.TEMP26.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 26 reading  
Description: Temperature reading of sensor 26 in degrees Kelvin.

Parameter Name: INS.TEMP27.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 27

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Description: ID of temperature sensor 27

Parameter Name: INS.TEMP27.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 27  
Description: Science detector 7

Parameter Name: INS.TEMP27.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 27 reading  
Description: Temperature reading of sensor 27 in degrees Kelvin.

Parameter Name: INS.TEMP28.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 28  
Description: ID of temperature sensor 28

Parameter Name: INS.TEMP28.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 28  
Description: Science detector 8

Parameter Name: INS.TEMP28.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 28 reading  
Description: Temperature reading of sensor 28 in degrees Kelvin.

Parameter Name: INS.TEMP29.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 29  
Description: ID of temperature sensor 29

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Parameter Name: INS.TEMP29.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 29  
 Description: FPA thermal plate (actual)

Parameter Name: INS.TEMP29.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 29 reading  
 Description: Temperature reading of sensor 29 in degrees Kelvin.

Parameter Name: INS.TEMP30.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 30  
 Description: ID of temperature sensor 30

Parameter Name: INS.TEMP30.NAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Location of sensor 30  
 Description: Cryostat tube outside (actual)

Parameter Name: INS.TEMP30.VAL  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: K  
 Comment Format: Temperature sensor 30 reading  
 Description: Temperature reading of sensor 30 in degrees Kelvin.

Parameter Name: INS.TEMP31.ID  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: ID of sensor 31  
 Description: ID of temperature sensor 31

Parameter Name: INS.TEMP31.NAME  
 Class: ext-header

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Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 31  
Description: undecided temperature sensor

Parameter Name: INS.TEMP31.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 31 reading  
Description: Temperature reading of sensor 31 in degrees Kelvin.

Parameter Name: INS.TEMP32.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: ID of sensor 32  
Description: ID of temperature sensor 32

Parameter Name: INS.TEMP32.NAME  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Location of sensor 32  
Description: undecided temperature sensor

Parameter Name: INS.TEMP32.VAL  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: K  
Comment Format: Temperature sensor 32 reading  
Description: Temperature reading of sensor 32 in degrees Kelvin.

Parameter Name: END  
Class: ext-header  
Context: FITS  
Type:  
Value Format:  
Unit:  
Comment Format:  
Description: This keyword signals the end of the header unit. It has to be last keyword in the header and has no value associated with it.  
Columns 9 to 80 shall be filled with ASCII blanks.

Parameter Name: XTENSION

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Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Extension first keyword  
 Description: Standard FITS first keyword in an extension header.

Parameter Name: NAXIS  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: cardinal  
 Comment Format: number of axes of data array  
 Description: VISTA data stored in multi-extension FITS, hence NAXIS=0 in  
                     primary header, NAXIS=2 in extension headers.

Parameter Name: NAXIS1  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: pixels  
 Comment Format: Size of first axis  
 Description: Standard FITS size of first axis

Parameter Name: NAXIS2  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit: pixels  
 Comment Format: Size of second axis  
 Description: Standard FITS size of second axis

Parameter Name: BITPIX  
 Class: ext-header  
 Context: FITS  
 Type: integer  
 Value Format: %d  
 Unit:  
 Comment Format: number of bits per pixel value  
 Description: Number of bits used to store pixel values  
                     Standard values are defined in NOST-100.0  
                     The value for VISTA IR will be  
                     32 32-bit twos-complement binary integer  
                     Value used to specify the undefined pixel values.

Parameter Name: EXTNAME  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:

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Comment Format: FITS extension name  
Description: Used to distinguish different extensions of the same type in the FITS file.

Parameter Name: INHERIT  
Class: ext-header  
Context: FITS  
Type: logical  
Value Format: %c  
Unit: truth  
Comment Format: Extension inherits primary header  
Description: Inheritance massively cuts down on extension-header size by removing unnecessary multiplication of header records.

Parameter Name: DET\_LIVE  
Class: ext-header  
Context: FITS  
Type: logical  
Value Format: %c  
Unit: boolean  
Comment Format: This detector is alive  
Description: A broken detector outputs its data anyway, this keyword flags the fact it is useless.

Parameter Name: RADECSYS  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Name of celestial reference frame  
Description: Standard reference-frame name, will normally be 'ICRS'.  
Note, this implies the EQUINOX keyword is absent.

Parameter Name: EQUINOX  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.1f  
Unit: Year  
Comment Format: Equinox of celestial reference frame.  
Description: Equinox of reference frame, required for precessed reference frames, but obsolete for International Coordinate Reference System.

Parameter Name: CTYPE1  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %s  
Unit:  
Comment Format: Type of celestial axis 1  
Description: WCS first coordinate type, will be 'RA---ZPN' for VISTA optical projection.

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Parameter Name: CTYPE2  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %s  
 Unit:  
 Comment Format: Type of celestial axis 2  
 Description: WCS first coordinate type, will be 'DEC--ZPN' for VISTA optical projection.

Parameter Name: CRPIX1  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: pixel  
 Comment Format: Pixel coordinate of reference in axis 1  
 Description: Position in pixel space along image-frame axis 1, in theory would be refer to the optical centre, but for practical reasons will be the rotator centre.

Parameter Name: CRPIX2  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.2f  
 Unit: pixel  
 Comment Format: Pixel coordinate of reference in axis 2  
 Description: Position in pixel space along image-frame axis 2, in theory would be refer to the optical centre, but for practical reasons will be the rotator centre.

Parameter Name: CRVAL1  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.12f  
 Unit: degree  
 Comment Format: RA of reference point  
 Description: Right Ascension of reference point, will be referred to the rotation centre.

Parameter Name: CRVAL2  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.12f  
 Unit: degree  
 Comment Format: Dec of reference point  
 Description: Declination of reference point, will be referred to the rotation centre.

Parameter Name: CD1\_1  
 Class: ext-header  
 Context: FITS  
 Type: double

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Value Format: %12E  
Unit:  
Comment Format: Transformation matrix element  
Description: Near unit-matrix used for rotation and shear.

Parameter Name: CD1\_2  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit:  
Comment Format: Transformation matrix element  
Description: Near unit-matrix used for rotation and shear.

Parameter Name: CD2\_1  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit:  
Comment Format: Transformation matrix element  
Description: Near unit-matrix used for rotation and shear.

Parameter Name: CD2\_2  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit:  
Comment Format: Transformation matrix element  
Description: Near unit-matrix used for rotation and shear.

Parameter Name: PV2\_1  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit: dimensionless  
Comment Format: linear term in ZPN  
Description: The Zenithal Polynomial (ZPN) projection requires  $PV_i_j$  attached to the latitude coordinate (2). All default to zero so need  $PV2_1 = 1.0$

Parameter Name: PV2\_2  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit: dimensionless  
Comment Format: quadratic term in ZPN  
Description: The Zenithal Polynomial (ZPN) projection requires  $PV_i_j$  attached to the latitude coordinate (2). All default to zero so probably won't need  $PV2_2 = 1.0$

Parameter Name: PV2\_3  
Class: ext-header

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Context: FITS  
Type: double  
Value Format: %12E  
Unit: dimensionless  
Comment Format: cubic term in ZPN  
Description: The ZPN projection requires PVi\_j attached to the latitude coordinate (2). PV2\_3 is the cubic term (arising from the wide-field corrector).

Parameter Name: PV2\_4  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit: dimensionless  
Comment Format: forth-order term in ZPN  
Description: The Zenithal Polynomial (ZPN) projection requires PVi\_j attached to the latitude coordinate (2). All default to zero so probably won't need PV2\_4.

Parameter Name: PV2\_5  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %12E  
Unit: dimensionless  
Comment Format: fifth-order term in ZPN  
Description: The Zenithal Polynomial (ZPN) projection requires PVi\_j attached to the latitude coordinate (2). All default to zero so probably won't need PV2\_5.

Parameter Name: TEL.FOCU.LEN  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: m  
Comment Format: Focal length (m)  
Description:

Parameter Name: TEL.FOCU.SCALE  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: arcsec/m  
Comment Format: Focal scale (arcsec/mm)  
Description:

Parameter Name: TEL.FOCU.VALUE  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: mm

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Comment Format: M2 setting (mm)  
Description:

Parameter Name: TEL.PARANG.END  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: deg  
Comment Format: Parallaxtic angle at end (deg)  
Description:

Parameter Name: TEL.PARANG.START  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: deg  
Comment Format: Parallaxtic angle at start (deg)  
Description:

Parameter Name: TEL.AIRM.END  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit:  
Comment Format: Airmass at end  
Description:

Parameter Name: TEL.AIRM.START  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit:  
Comment Format: Airmass at start  
Description:

Parameter Name: TEL.TRAK.STATUS  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %10s  
Unit:  
Comment Format: Tracking status  
Description:

Parameter Name: TEL.TRAK.RATEA  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.6f  
Unit: arcsec/sec  
Comment Format: Tracking rate in RA (arcsec/sec)  
Description:

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Parameter Name: TEL.TRAK.RATED  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: arcsec/sec  
 Comment Format: Tracking rate in DEC (arcsec/sec)  
 Description:

Parameter Name: TEL.DOME.STATUS  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %10s  
 Unit:  
 Comment Format: Dome status  
 Description:

Parameter Name: ADA.GUID.STATUS  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %10s  
 Unit:  
 Comment Format: Status of autoguider  
 Description:

Parameter Name: ADA.GUID.RA  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: deg  
 Comment Format: %HOURANG Guide star RA J2000  
 Description:

Parameter Name: ADA.GUID.DEC  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.5f  
 Unit: deg  
 Comment Format: %DEGREE Guide star DEC J2000  
 Description:

Parameter Name: ADA.POSANG  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.5f  
 Unit: deg  
 Comment Format: Position angle at start  
 Description:

Position angle of the adapter on the sky at  
 exposure start. This angle, often called adapter offset,

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is measured counter clockwise (N=0, E=90)

Parameter Name: ADA.ABSROT.START  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.5f  
Unit: deg  
Comment Format: Abs rot angle at exp start (deg)  
Description: Absolute rotator angle of rotator at exposure start. The reference frame is given in VLT-SPE-ESO-11400-0798

Parameter Name: TEL.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %30s  
Unit:  
Comment Format: TCS version number  
Description: cmm version number of the integration module (tcsBUILD/ntt), which defines the version of all TCS modules.

Parameter Name: TEL.DID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %30s  
Unit:  
Comment Format: Data dictionary for TEL  
Description:

Parameter Name: TEL.DATE  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %10s  
Unit:  
Comment Format: TCS installation date  
Description: Date when installation script was executed

Parameter Name: ADA.ABSROT.END  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.5f  
Unit: deg  
Comment Format: Abs rot angle at exp end (deg)  
Description: Absolute rotator angle of rotator at exposure end. The reference frame is given in VLT-SPE-ESO-11400-0798

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Parameter Name: ADA.ABSROT.PPOS  
 Class: ext-header  
 Context: FITS  
 Type: string  
 Value Format: %.5s  
 Unit:  
 Comment Format: sign of probe position  
 Description: sign of probe position (POS, NEG)

Parameter Name: ADA.WFS1.RA  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: degree  
 Comment Format: RA of WFS star 1  
 Description: The RA of the star used on the first wave-front sensor.

Parameter Name: ADA.WFS1.DEC  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: degree  
 Comment Format: Dec of WFS star 1  
 Description: The Declination of the star used on the first wave-front sensor.

Parameter Name: ADA.WFS2.RA  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: degree  
 Comment Format: RA of WFS star 2  
 Description: The RA of the star used on the first wave-front sensor.

Parameter Name: ADA.WFS2.DEC  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.6f  
 Unit: degree  
 Comment Format: Dec of WFS star 2  
 Description: The Declination of the star used on the first wave-front sensor.

Parameter Name: TEL.ALT  
 Class: ext-header  
 Context: FITS  
 Type: double  
 Value Format: %.3f  
 Unit: deg  
 Comment Format: Alt angle at start (deg)

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Description:

Parameter Name: TEL.AZ  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.3f  
Unit: deg  
Comment Format: Az angle at start (deg) S=0,W=90  
Description:

Parameter Name: TEL.GEOELEV  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.0f  
Unit: m  
Comment Format: Elevation above sea level (m)  
Description:

Parameter Name: TEL.GEOLAT  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.4f  
Unit: deg.  
Comment Format: Tel geo latitude (+=North) (deg)  
Description:

Parameter Name: TEL.GEOLON  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.4f  
Unit: deg.  
Comment Format: Tel geo longitude (+=East) (deg)  
Description:

Parameter Name: TEL.OPER  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %30s  
Unit:  
Comment Format: Telescope Operator  
Description:

Parameter Name: TEL.FOCU.ID  
Class: ext-header  
Context: FITS  
Type: string  
Value Format: %10s  
Unit:  
Comment Format: Telescope focus station ID  
Description:

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Parameter Name: TEL.TH.M1.TEMP  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: C  
Comment Format: M1 superficial temperature  
Description:  
(th)

Parameter Name: TEL.MOON.RA  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.6f  
Unit: deg  
Comment Format: %HOURANG RA (J2000) (deg)  
Description:  
Coordinates are given in J2000 mean places and reflect the actual moon position at the time of exposure start

Parameter Name: TEL.AMBI.FWHM.START  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: arcsec  
Comment Format: Observatory Seeing queried from ASM  
Description:  
Site seeing at start as queried periodically from the ASM, full width half maximum at 0.5 um wavelength.

Parameter Name: TEL.AMBI.FWHM.END  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: arcsec  
Comment Format: Observatory Seeing queried from ASM  
Description:  
Site seeing at end as queried periodically from the ASM, full width half maximum at 0.5 um wavelength.

Parameter Name: TEL.AMBI.TEMP  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: C  
Comment Format: Observatory ambient temperature queried from ASM  
Description:  
Average site ambient temperature, as queried periodically from the ASM.

Parameter Name: TEL.AMBI.RHUM  
Class: ext-header

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Context: FITS  
Type: double  
Value Format: %.f  
Unit: percent  
Comment Format: Observatory ambient relative humidity queried from ASM  
Description:

Average site ambient relative humidity  
as queried periodically from the ASM.

Parameter Name: TEL.AMBI.WINDDIR  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.f  
Unit: deg  
Comment Format: Observatory ambient wind direction queried from ASM (N=0  
E=90)  
Description:

Average site ambient wind direction  
as queried periodically from the ASM.

Parameter Name: TEL.AMBI.WINDSP  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.2f  
Unit: m/s  
Comment Format: Observatory ambient wind speed queried from ASM  
Description:

Average site ambient wind speed measured  
as queried periodically from the ASM.

Parameter Name: TEL.MOON.DEC  
Class: ext-header  
Context: FITS  
Type: double  
Value Format: %.5f  
Unit: deg  
Comment Format: %DEGREE DEC (J2000) (deg)  
Description:

Coordinates are given in J2000 mean places and reflect the  
actual moon position at the time of exposure start

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## 5 Example FITS header

Whilst not a part of the DID it may be useful to read an example FITS file which is constructed using the keywords in the DID.

Filename VISTA.FITS

```

SIMPLE      =                               T / Standard FITS (NOST-100-2.0)
NAXIS       =                               0 / number of axes of data array
BITPIX      =                               8 / number of bits per pixel value
EXTEND      =                               T / FITS file extension may be present
RA          =          123.123457 / 00:00:00.123 RA of telescope
DEC         =         -12.123457 / -00:00:00.12 Dec of telescope
RADECSYS= 'ICRS' / Name of celestial reference frame
EQUINOX    =          2000.0 / Equinox of celestial reference frame.
ORIGIN     = 'ESO' / European Southern Observatory
TELESCOP= 'VISTA' / ESO <TEL>
INSTRUME= 'VCAM' / Instrument used
OBJECT     = 'Sirius' / Target description
IMAGETYP= 'OBJECT' / Exposure type
AIRMASS    =          1.12346 / Averaged airmass
DATE       = '2003-11-11T14:35:34.000' / Date this file was written
DATE-OBS= '2004-12-25T09:00:00.123' / UTC date at start of exposure.
UTC        =          86399.123 / 00:00:00.123 UTC s at start since midnight
REQTIME    =          5.000 / Requested integration time
EXPTIME    =          5.123 / Actual integration time
LST        =          80000.123 / 00:00:00.123 LST seconds since midnight
MJD-OBS    =          54321.12345678 / Modified Julian Date at start
OBSERVER= 'P Bunclark' / Name of observer
PI-COI    = 'J Lewis' / Name(s) of proposer(s)
COMMENT General comment
HISTORY Historical Fact
ESO-LOG
ORIGFILE= 'VIS_Ima.1.fits' / Original File Name
ARCFILE = '/dev/null' / Archive File name
CHECKSUM= 'Pd3jPc3hPc3h' / ASCII 1s-complement checksum
RECIPE   = 'QUICK_LOOK' / Data-reduction recipe to be used
OFFSTNUM=          1234 / Value of first OBSNUM in current tile sequence
OBSNUM   =          12345678 / Observation Number
GRPNUM   =          666 / Group number applied to all members
GRPMEM   =          T / Group membership
STANDARD=          F / Standard-star observation
NOFFSETS=          6 / Number of offset positions in a field
OFFSET_I=          2 / Serial Number of offset
NDITHER =          6 / Number of positions in a tel dither pattern
DITHRNUM=          1236 / Value of first OBSNUM in current dither sequenc
DITHER_I=          3 / Serial number of this tel dither pattern
DITHER_X=          3.330 / X offset in dither pattern
DITHER_Y=          0.000 / Y offset in dither pattern
NUSTEP   =          4 / Number of positions in microstep pattern
USTEPNUM=          1237 / Value of first OBSNUM in current microstep sequ
USTEP_I  =          1 / Serial number of microstep pattern
USTEP_X  =          1.123 / X offset in microstep pattern
USTEP_Y  =          1.123 / Y offset in microstep pattern
HIERARC ESO INS FILT1 ID = 'J' / Filter identification device co
HIERARC ESO INS FILT NAME1 = 'VIS#J/04_ES0843' / Filter Name
HIERARC ESO INS FILT1 NO =          2 / Filter wheel slot number

```

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```

HIERARC ESO INS FILT1 ENC      =      1234 / Filter wheel encoder position
HIERARC ESO INS PRES1 ID      = 'P1      ' / ID of pressure sensor 1
HIERARC ESO INS PRES1 NAME    = 'Cryostat' / Location of pressure sensor 1
HIERARC ESO INS PRES1 VAL     = 1.000000E-04 / Pressure sensor 1 reading
HIERARC ESO INS PRES2 NAME    = 'Ambient ' / Location of pressure sensor 2
HIERARC ESO INS PRES2 VAL     = 1.000100E+00 / Pressure sensor 2 reading
HIERARC ESO INS PRES2 ID      = 'P2      ' / ID of pressure sensor 2
HIERARC ESO INS LAMP1 ID      = 'L1      ' / Hardware identification of lamp
HIERARC ESO INS LAMP1 NAME    = 'Bluebell' / Name of lamp unit 1
HIERARC ESO INS LAMP1 STATE   = 'OFF     ' / Lamp 1 state on/off
HIERARC ESO INS WHEEL INPOS   =      T   / filter in-position switch state
HIERARC ESO INS WHEEL TIME    = '2006-03-05T16:17:18.123' / Last filt wheel ind
HIERARC ESO INS WHEEL ERROR   =      -6   / Last fil wheel index error
HIERARC ESO INS TEMP29 TARGET =      160.00 / Sensor 29 target
HIERARC ESO INS TEMP30 TARGET =      160.00 / Sensor 2 target
HIERARC ESO INS TEMP1 ID      = 'ID1     ' / ID of sensor 1
HIERARC ESO INS TEMP1 NAME    = 'Cryostat window cell ' / Location of sensor 1
HIERARC ESO INS TEMP1 VAL     =      260.10 / Temperature sensor 1 reading
HIERARC ESO INS TEMP2 ID      = 'ID2     ' / ID of sensor 2
HIERARC ESO INS TEMP2 NAME    = 'Ambient air temperature ' / Location of sensor
HIERARC ESO INS TEMP2 VAL     =      260.10 / Temperature sensor 2 reading
HIERARC ESO INS TEMP3 ID      = 'ID3     ' / ID of sensor 3
HIERARC ESO INS TEMP3 NAME    = 'Baffle 7 ' / Location of sensor 3
HIERARC ESO INS TEMP3 VAL     =      260.10 / Temperature sensor 3 reading
HIERARC ESO INS TEMP4 ID      = 'ID4     ' / ID of sensor 4
HIERARC ESO INS TEMP4 NAME    = 'Lens Barrel ' / Location of sensor 4
HIERARC ESO INS TEMP4 VAL     =      260.10 / Temperature sensor 4 reading
HIERARC ESO INS TEMP5 ID      = 'ID5     ' / ID of sensor 5
HIERARC ESO INS TEMP5 NAME    = 'Liquid Nitrogen Tank ' / Location of sensor 5
HIERARC ESO INS TEMP5 VAL     =      260.10 / Temperature sensor 5 reading
HIERARC ESO INS TEMP6 ID      = 'ID6     ' / ID of sensor 6
HIERARC ESO INS TEMP6 NAME    = 'Cold head 1 1st stage ' / Location of sensor 6
HIERARC ESO INS TEMP6 VAL     =      260.10 / Temperature sensor 6 reading
HIERARC ESO INS TEMP7 ID      = 'ID7     ' / ID of sensor 7
HIERARC ESO INS TEMP7 NAME    = 'Cold head 1 2st stage ' / Location of sensor 7
HIERARC ESO INS TEMP7 VAL     =      260.10 / Temperature sensor 7 reading
HIERARC ESO INS TEMP8 ID      = 'ID8     ' / ID of sensor 8
HIERARC ESO INS TEMP8 NAME    = 'Cold head 2 1st stage ' / Location of sensor 8
HIERARC ESO INS TEMP8 VAL     =      260.10 / Temperature sensor 8 reading
HIERARC ESO INS TEMP9 ID      = 'ID9     ' / ID of sensor 9
HIERARC ESO INS TEMP9 NAME    = 'Cold head 2 2st stage ' / Location of sensor 9
HIERARC ESO INS TEMP9 VAL     =      260.10 / Temperature sensor 9 reading
HIERARC ESO INS TEMP10 ID     = 'ID10    ' / ID of sensor 10
HIERARC ESO INS TEMP10 NAME   = 'Cold head 3 1st stage ' / Location of sensor 1
HIERARC ESO INS TEMP10 VAL    =      260.10 / Temperature sensor 10 reading
HIERARC ESO INS TEMP11 ID     = 'ID11    ' / ID of sensor 11
HIERARC ESO INS TEMP11 NAME   = 'Cold head 3 2st stage ' / Location of sensor 1
HIERARC ESO INS TEMP11 VAL    =      260.10 / Temperature sensor 11 reading
HIERARC ESO INS TEMP12 ID     = 'ID12    ' / ID of sensor 12
HIERARC ESO INS TEMP12 NAME   = 'Cryopump 1 ' / Location of sensor 12
HIERARC ESO INS TEMP12 VAL    =      260.10 / Temperature sensor 12 reading
HIERARC ESO INS TEMP13 ID     = 'ID13    ' / ID of sensor 13
HIERARC ESO INS TEMP13 NAME   = 'Cryopump 2 ' / Location of sensor 13
HIERARC ESO INS TEMP13 VAL    =      260.10 / Temperature sensor 13 reading
HIERARC ESO INS TEMP14 ID     = 'ID14    ' / ID of sensor 14
HIERARC ESO INS TEMP14 NAME   = 'WFS Plate ' / Location of sensor 14
HIERARC ESO INS TEMP14 VAL    =      260.10 / Temperature sensor 14 reading
HIERARC ESO INS TEMP15 ID     = 'ID15    ' / ID of sensor 15
HIERARC ESO INS TEMP15 NAME   = 'WFS CCD 1 ' / Location of sensor 15
HIERARC ESO INS TEMP15 VAL    =      260.10 / Temperature sensor 15 reading
HIERARC ESO INS TEMP16 ID     = 'ID16    ' / ID of sensor 16
HIERARC ESO INS TEMP16 NAME   = 'WFS CCD 2 ' / Location of sensor 16

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HIERARC ESO INS TEMP16 VAL = 260.10 / Temperature sensor 16 reading
HIERARC ESO INS TEMP17 ID = 'ID17 ' / ID of sensor 17
HIERARC ESO INS TEMP17 NAME = 'WFS CCD 3 ' / Location of sensor 17
HIERARC ESO INS TEMP17 VAL = 260.10 / Temperature sensor 17 reading
HIERARC ESO INS TEMP18 ID = 'ID18 ' / ID of sensor 18
HIERARC ESO INS TEMP18 NAME = 'WFS CCD 4 ' / Location of sensor 18
HIERARC ESO INS TEMP18 VAL = 260.10 / Temperature sensor 18 reading
HIERARC ESO INS TEMP19 ID = 'ID19 ' / ID of sensor 19
HIERARC ESO INS TEMP19 NAME = 'Filter wheel shield ' / Location of sensor 19
HIERARC ESO INS TEMP19 VAL = 260.10 / Temperature sensor 19 reading
HIERARC ESO INS TEMP20 ID = 'ID20 ' / ID of sensor 20
HIERARC ESO INS TEMP20 NAME = 'Filter wheel hub ' / Location of sensor 20
HIERARC ESO INS TEMP20 VAL = 260.10 / Temperature sensor 20 reading
HIERARC ESO INS TEMP21 ID = 'ID21 ' / ID of sensor 21
HIERARC ESO INS TEMP21 NAME = 'Science detector 1 ' / Location of sensor 21
HIERARC ESO INS TEMP21 VAL = 260.10 / Temperature sensor 21 reading
HIERARC ESO INS TEMP22 ID = 'ID22 ' / ID of sensor 22
HIERARC ESO INS TEMP22 NAME = 'Science detector 2 ' / Location of sensor 22
HIERARC ESO INS TEMP22 VAL = 260.10 / Temperature sensor 22 reading
HIERARC ESO INS TEMP23 ID = 'ID23 ' / ID of sensor 23
HIERARC ESO INS TEMP23 NAME = 'Science detector 3 ' / Location of sensor 23
HIERARC ESO INS TEMP23 VAL = 260.10 / Temperature sensor 23 reading
HIERARC ESO INS TEMP24 ID = 'ID24 ' / ID of sensor 24
HIERARC ESO INS TEMP24 NAME = 'Science detector 4 ' / Location of sensor 24
HIERARC ESO INS TEMP24 VAL = 260.10 / Temperature sensor 24 reading
HIERARC ESO INS TEMP25 ID = 'ID25 ' / ID of sensor 25
HIERARC ESO INS TEMP25 NAME = 'Science detector 5 ' / Location of sensor 25
HIERARC ESO INS TEMP25 VAL = 260.10 / Temperature sensor 25 reading
HIERARC ESO INS TEMP26 ID = 'ID26 ' / ID of sensor 26
HIERARC ESO INS TEMP26 NAME = 'Science detector 6 ' / Location of sensor 26
HIERARC ESO INS TEMP26 VAL = 260.10 / Temperature sensor 26 reading
HIERARC ESO INS TEMP27 ID = 'ID27 ' / ID of sensor 27
HIERARC ESO INS TEMP27 NAME = 'Science detector 7 ' / Location of sensor 27
HIERARC ESO INS TEMP27 VAL = 260.10 / Temperature sensor 27 reading
HIERARC ESO INS TEMP28 ID = 'ID28 ' / ID of sensor 28
HIERARC ESO INS TEMP28 NAME = 'Science detector 8 ' / Location of sensor 28
HIERARC ESO INS TEMP28 VAL = 260.10 / Temperature sensor 28 reading
HIERARC ESO INS TEMP29 ID = 'ID29 ' / ID of sensor 29
HIERARC ESO INS TEMP29 NAME = 'FPA thermal plate (actual) ' / Location of sen
HIERARC ESO INS TEMP29 VAL = 260.10 / Temperature sensor 29 reading
HIERARC ESO INS TEMP30 ID = 'ID30 ' / ID of sensor 30
HIERARC ESO INS TEMP30 NAME = 'Cryostat tube outside (actual) ' / Location of
HIERARC ESO INS TEMP30 VAL = 260.10 / Temperature sensor 30 reading
HIERARC ESO INS TEMP31 ID = 'ID31 ' / ID of sensor 31
HIERARC ESO INS TEMP31 NAME = 'undecided temperature sensor ' / Location of s
HIERARC ESO INS TEMP31 VAL = 260.10 / Temperature sensor 31 reading
HIERARC ESO INS TEMP32 ID = 'ID32 ' / ID of sensor 32
HIERARC ESO INS TEMP32 NAME = 'undecided temperature sensor ' / Location of s
HIERARC ESO INS TEMP32 VAL = 260.10 / Temperature sensor 32 reading
HIERARC ESO OBS DID = 'ESO-VLT-DIC.OBS' / OBS Dictionary
HIERARC ESO OBS ID = 666 / Observation block ID
HIERARC ESO OBS NAME = 'DITHER ' / OB name
HIERARC ESO OBS GRP = 'ABCD ' / linked blocks
HIERARC ESO OBS OBSERVER = 'Bunclark ' / Observer Name
HIERARC ESO OBS PI-COI ID = 162 / ESO internal PI-COI ID
HIERARC ESO OBS PI-COI NAME = 'Lewis ' / PI-COI name
HIERARC ESO OBS PROG ID = '68.A-0281(A) ' / ESO program identificatio
HIERARC ESO OBS TPLNO = 2 / Template number within OB
HIERARC ESO OBS TARG NAME = 'South Pole ' / OB target nam
HIERARC ESO OBS START = '2006-03-05T07:20:00.123' / OB start time
HIERARC ESO OBS EXECTIME = 0 / Expected execution time
HIERARC ESO TPL PRESEQ = 'VIS_img_obs_Dither.seq' / Sequencer script

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HIERARC ESO TPL START      = '2006-03-05T07:20:00.123' / TPL start time
HIERARC ESO TPL DID        = 'ESO-VLT-DIC.TPL-1.9' / Data dictionary
HIERARC ESO TPL ID         = 'VIS_img_obs_Dither'
HIERARC ESO TPL NAME       = 'VIS Dithered mode sequence'
HIERARC ESO TPL NEXP        = 6 / Number of exposures within temp
HIERARC ESO TPL EXPNO       = 2 / Exposure number within template
HIERARC ESO TPL VERSION     = '1.1' / Version of the template
HIERARC ESO DPR DID         = 'ESO-VLT-DIC.DPR-1.8' / DPR Dictionary
HIERARC ESO DPR CATG        = 'SCIENCE' / Observation cat
HIERARC ESO DPR TYPE        = 'OBJECT' / Observation typ
HIERARC ESO DPR TECH        = 'IMAGE' / Observation tec
HIERARC ESO TEL FOCU LEN    = 4.120 / Focal length (m)
HIERARC ESO TEL FOCU SCALE  = 24.000 / Focal scale (arcsec/mm)
HIERARC ESO TEL FOCU VALUE  = 12345.120 / M2 setting (mm)
HIERARC ESO TEL PARANG END  = 45.000 / Parallactic angle at end (deg)
HIERARC ESO TEL PARANG START = 47.000 / Parallactic angle at start (deg)
HIERARC ESO TEL AIRM END    = 1.001 / Airmass at end
HIERARC ESO TEL AIRM START  = 1.002 / Airmass at start
HIERARC ESO TEL TRAK STATUS = 'ON' / Tracking status
HIERARC ESO TEL TRAK RATEA  = 0.000000 / Tracking rate in RA (arcsec/sec)
HIERARC ESO TEL TRAK RATED  = 0.000000 / Tracking rate in DEC (arcsec/se
HIERARC ESO TEL DOME STATUS = 'FULLY-OPEN' / Dome status
HIERARC ESO ADA GUID STATUS = 'ON' / Status of autoguider
HIERARC ESO ADA GUID RA     = 180.000000 / 00:00:00.123 Guide star RA J200
HIERARC ESO ADA GUID DEC    = -45.000000 / %DEGREE Guide star DEC J2000
HIERARC ESO ADA POSANG      = 33.000000 / Position angle at start
HIERARC ESO ADA ABSROT START = 2.00000 / Abs rot angle at exp start (deg)
HIERARC ESO TEL ID         = 'v 3.45' / TCS version
HIERARC ESO TEL DID        = 'ESO-VLT-DIC.TCS-1.33' / Data diction
HIERARC ESO TEL DATE       = '2006-05-03' / TCS installation date
HIERARC ESO ADA ABSROT END  = 3.00000 / Abs rot angle at exp end (deg)
HIERARC ESO ADA ABSROT PPOS = posit / sign of probe position
HIERARC ESO ADA WFS1 RA     = 12.123457 / RA of WFS star 1
HIERARC ESO ADA WFS1 DEC    = -75.987654 / Dec of WFS star 1
HIERARC ESO ADA WFS2 RA     = 12.123457 / RA of WFS star 2
HIERARC ESO ADA WFS2 DEC    = -75.987654 / Dec of WFS star 2
HIERARC ESO TEL ALT         = 80.000 / Alt angle at start (deg)
HIERARC ESO TEL AZ          = 10.000 / Az angle at start (deg) S=0,W=9
HIERARC ESO TEL GEOELEV     = 2335 / Elevation above sea level (m)
HIERARC ESO TEL GEOLAT      = -29.2543 / Tel geo latitude (+=North) (deg)
HIERARC ESO TEL GEOLON      = -70.7346 / Tel geo longitude (+=East) (deg)
HIERARC ESO TEL OPER        = 'Che Guevara' / Telescope Op
HIERARC ESO TEL FOCU ID     = 'CA' / Telescope focus station ID
HIERARC ESO TEL TH M1 TEMP  = 8.12 / M1 superficial temperature
HIERARC ESO TEL MOON RA     = 10.000000 / 00:00:00.123 RA (J2000) (deg)
HIERARC ESO TEL AMBI FWHM START= 0.50 / Observatory Seeing queried from
HIERARC ESO TEL AMBI FWHM END = 0.70 / Observatory Seeing queried from
HIERARC ESO TEL AMBI TEMP    = 4.20 / Observatory ambient temperature
HIERARC ESO TEL AMBI RHUM    = 5 / Observatory ambient relative hu
HIERARC ESO TEL AMBI WINDDIR = 340 / Observatory ambient wind direct
HIERARC ESO TEL AMBI WINDSP  = 15.00 / Observatory ambient wind speed
HIERARC ESO TEL MOON DEC    = 20.00000 / %DEGREE DEC (J2000) (deg)
END
XTENSION= 'IMAGE' / Extension first keyword
NAXIS = 2 / number of axes of data array
NAXIS1 = 2048 / Size of first axis
NAXIS2 = 2048 / Size of second axis
BITPIX = 32 / number of bits per pixel value
EXTNAME = 'WIN1.CHIP1.OUT1' / FITS extension name
INHERIT = T / Extension inherits primary header
DET_LIVE= T / This detector is alive
RADECSYS= 'ICRS' / Name of celestial reference frame

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EQUINOX =                2000.0 / Equinox of celestial reference frame.
CTYPE1  = 'RA---ZPN'        / Type of celestial axis 1
CTYPE2  = 'DEC--ZPN'        / Type of celestial axis 2
CRPIX1  =                12345678.12 / Pixel coordinate of reference in axis 1
CRPIX2  =               -12345678.12 / Pixel coordinate of reference in axis 2
CRVAL1  =                270.123456780000 / RA of reference point
CRVAL2  =               -75.123456780000 / Dec of reference point
CD1_1   = 1.000000E-02        / Transformation matrix element
CD1_2   = 1.000000E-04        / Transformation matrix element
CD2_1   = -1.000000E-05        / Transformation matrix element
CD2_2   = -1.000000E-02        / Transformation matrix element
PV2_1   = 1.000000E+00        / linear term in ZPN
PV2_2   = 0.000000E+00        / quadratic term in ZPN
PV2_3   = 4.200000E+01        / cubic term in ZPN
PV2_4   = 0.000000E+00        / forth-order term in ZPN
PV2_5   = 0.000000E+00        / fifth-order term in ZPN
HIERARC ESO DET16 MINDIT    =                1.2345678 / Minimum DIT
HIERARC ESO DET16 MODE NAME = 'UNKNOWN '          / DCS Detector Mode
HIERARC ESO DET16 MODEi NAME= 'UNKNOWN '          / DCS Detector Mode
HIERARC ESO DET16 NC IDIV   =                    0 / # of Sub-Divs for R-0
HIERARC ESO DET16 NC NSAMPPIX=                    0 / # of Samples/Pixel
HIERARC ESO DET16 NCORRS   =                    0 / Read-Out Mode
HIERARC ESO DET16 RSPEED   =                    0 / Read-Speed Factor
HIERARC ESO DET16 IRACE ADCi NAME= 'UNKNOWN '      / Name for ADC Board
HIERARC ESO DET16 IRACE ADCi HEADER=                0 / Header of ADC Board
HIERARC ESO DET16 IRACE ADCi ENABLE=                0 / Enable ADC Board (0/1)
HIERARC ESO DET16 IRACE ADCi FILTERi=                0 / ADC Filter Adjustment
HIERARC ESO DET16 IRACE ADCi DELAY=                0 / ADC Delay Adjustment
HIERARC ESO DET16 NCORRS NAME= 'UNKNOWN '          / Read-Out Mode Name
HIERARC ESO DET16 NDIT     =                    0 / # of Sub-Integrations
HIERARC ESO DET16 NDITSKIP =                    0 / DITs skipped at 1st.INT
HIERARC ESO DET16 NDSAMPLES =                    0 / # of Non-Dest. Samples
HIERARC ESO DET16 NDSKIP   =                    0 / Samples skipped per DIT
HIERARC ESO DET16 RSPEEDADD =                    0 / Read-Speed Add
HIERARC ESO DET16 VOLTi CLKHINMi= 'UNKNOWN '       / Name of High Clock
HIERARC ESO DET16 VOLTi CLKHITi=                1.2346 / Tel Value High Clock
HIERARC ESO DET16 VOLTi CLKHIi=                1.2346 / Set Value High Clock
HIERARC ESO DET16 VOLTi CLKLONMi= 'UNKNOWN '       / Name of Low Clock
HIERARC ESO DET16 IRACE SEQCONT=                UNKNOWN / Sequencer Cont. Mode
HIERARC ESO DET16 IRACE SEQINT=                UNKNOWN / Sequencer Intr. at Stop
HIERARC ESO DET16 VOLTi CLKLOTi=                1.2346 / Tel Value Low Clock
HIERARC ESO DET16 VOLTi DCNMi= 'UNKNOWN '          / Name of DC Voltage
HIERARC ESO DET16 VOLTi DCTAi=                1.2346 / Tel Value 1 for DC
HIERARC ESO DET16 VOLTi CLKLOi=                1.2346 / Set Value Low Clock
HIERARC ESO DET16 VOLTi DCi =                1.2346 / Set Value DC Voltage
HIERARC ESO DET16 CHIP TYPE = 'UNKNOWN '          / The Type of Det Chip
HIERARC ESO DET16 CON OPMODE= 'UNKNOWN '          / Operational Mode
HIERARC ESO DET16 FRAM TYPE = 'UNKNOWN '          / Frame type
HIERARC ESO DET16 CHOP CYCSKIP=                    0 / # of Chop Cycles to Skip
HIERARC ESO DET16 CHOP NCYCLES=                    0 / # of Chop Cycles
HIERARC ESO DET16 CHOP ST   =                UNKNOWN / Chopping On/Off
HIERARC ESO DET16 CHOP FREQ = 0.000000          / Chopping Frequency
HIERARC ESO DET16 CHIP ID   = 'UNKNOWN '          / Detector ID
HIERARC ESO DET16 CHIP NAME = 'UNKNOWN '          / Detector name
HIERARC ESO DET16 CHIP NX   =                    0 / Pixels in X
HIERARC ESO DET16 CHIP NY   =                    0 / Pixels in Y
HIERARC ESO DET16 CHIP PXSPACE= 0.000e+00        / Pixel-Pixel Spacing
HIERARC ESO DET16 EXP NO    =                    0 / Exposure Number
HIERARC ESO DET16 FRAM UTC  = 'UNKNOWN '          / Time Recv Frame
HIERARC ESO DET16 FRAM NO   =                    0 / Frame number
HIERARC ESO DET16 VOLTi DCTBi=                1.2346 / Tel Value 2 for DC
HIERARC ESO DET16 WIN NX    =                    0 / # of Pixels in X

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HIERARC ESO DET16 DID = 'UNKNOWN ' / Dictionary Name and Revision  
HIERARC ESO DET16 DIT = 1.2345678 / Integration Time  
HIERARC ESO DET16 DITDELAY = 1.235 / Pause Between DITs  
HIERARC ESO DET16 EXP UTC = 'UNKNOWN ' / File Creation Time  
HIERARC ESO DET16 EXP NAME = 'UNKNOWN ' / Exposure Name  
HIERARC ESO DET16 WIN NY = 0 / # of Pixels in Y  
HIERARC ESO DET16 WIN STARTX= 0.000000 / Lower Left X Ref  
HIERARC ESO DET16 WIN STARTY= 0.000000 / Lower left Y Ref  
HIERARC ESO DET16 WIN TYPE = 0 / Win-Type  
END

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