SUSI2/EMMI 2001 version Templates User Manual : Acquisition, Observation, and Calibration

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This document is the new Template USER MANUAL for the NTT instruments SUSI2 and EMMI.

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1 Introduction

1.1 Purpose & Scope

This document is the user manual for the new version of EMMI and SUSI2 observation templates.

The following three types of templates are delt with by this manual:

- Observation Templates (_obs_ , ex OT) for science observations,
- Calibration Templates (_cal_, ex CT) for calibration exposures,
- Acquisition Templates (_acq_, ex AT) for target acquisition.

1.2 Intended Audience

NTT observers .

1.3 Reference documents

SUSI2/EMMI Observation Template 2000 Specifications : Acquisition, Observation, and Calibration

1.4 Abbreviations and Acronyms

EMMI: ESO Multi-Mode Instrument

NTT: New Technology Telescope

SuSI(2): Superb Seeing Imager (2)

tsf : Template Signature File

seq : Template sequence script

1.5 Conventions used in this document

1.6 Naming convention

Template name are built as follows:

1. - EMMI mode : BIMG, BLMD, RILD, REMD or DIMD
2. - frame type : _img_ , _spec_, _ech_ , _all_
3. - template type : type : acq_, obs_, cal_,
4. - template action : Dark, Preset, MoveToPixel, Arcs etc...

However renaming templates wast just a small part of this upgrade.

They have been almost completely rewritten using structures and facilities which were not available at the time the first generation templates were developped. The resulting product is much simpler to maintain and update and should result in a better use of the New Technology Telescope.

1.7 Acknowledgments

To all former and current NTT staff, but specially to those who, after reading thoroughly the previous Template Specification document have helped me to tune it and to test the resulting template scripts.

2 SUSI2 Templates:

The new version module is called `sutpl`.

TABLE 1 SUSI Template Quick Reference

Template	Old name	Short Description
SUSI_img_acq_Preset	SAT01	Preset to coordinates - no operator intervention
SUSI_img_acq_MoveToPixel	SAT02	Preset to coordinates - update position to specified pixel
SUSI_img_obs_Exposure	SOT01	Normal single exposure
SUSI_img_obs_Jitter	SOT02	Jitter mode exposures (combined offset)
SUSI_img_cal_Darks	SCT01	bias or dark frames
SUSI_img_cal_DomeFF	SCT02	flats (automatic exptime calculation)
SUSI_img_cal_SkyFF	SCT03	twilight sky flats (automatic exptime calculation)
SUSI_img_cal_TelFocus	SCT04	Acquire a SUSI focus frame,compute and set focus.
SUSI_img_obs_DoubleW		Read two non overlapping subwindows.

2.1 SUSI2 Acquisition Templates

Acquisition Templates *(_acq_)* determine how a target field is acquired by the telescope.

2.1.1 SUSI_img_acq_Preset (ex SAT01): Preset to coordinates - no operator intervention

This acquisition template

1. presets the telescope to the coordinates of the Target associated with this Observation Block
2. applies the requested rotator offset (the orientation of the CCD will differ from the default one by this offset).

- Differential tracking rates can be set.
- An appropriate guide star will be selected automatically. Operator intervention is optional.

TABLE 2 SUSI_img_acq_Preset (ex SAT01)

Label	Parameter	Default	Units	Notes
RA	TEL.TARG.ALPHA		h/ mn/ sec	
DEC	TEL.TARG.DELTA		deg/mn/ ”	
Coordinate equinox	TEL.TARG.EQUINOX	2000	years	
Name of the target	TEL.TARG.NAME			
Differential tracking in RA	TEL.TARG.ADDVELALPHA	0	arcsec/sec	
Differential tracking in DEC	TEL.TARG.ADDVELDELTA	0	arcsec/sec	
Rotator offset angle	TEL.ROT.OFFANGLE	0	degrees	

2.1.2 SUSI_img_acq_MoveToPixel (ex SAT02,SAT11,SAT111): Preset to coordinates, then place an interactively designated object on a specific pixel

The new version :

- May work on a subwindow.
- May bin CCD.
- offers the option to designate the target pixel interactively

The template sequence is as follows:

1. Initialize SUSI CCD window and binning
2. Set choosen filter.
3. Ask whether to use autoguider.
4. If the preset flag TEL(PRESET.NEW) is set to T (true),
   -first preset the telescope to the coordinates associated with this Observation Block,
   -apply the requested rotator offset
   -wait up to 1 minute for autoguiding to be active.
5. If TEL.PRESET is true and DET.USE.LAST is false or it is not the first iteration,
   - take an exposure of the field with the specified exposure time and through the selected filter. This image is displayed on a Real-Time Display
   - otherwise , the current RTD image is used whichever this image is: it is up to the observer to ensure that the last image left by a previous template is what s/he expects it to be.
6. Prompt the operator by a popup window to identify with the cursor the user-specified object (e.g. as marked on a finding chart).
   ... (*-if DET.CLICK.PIX is FALSE, graphically mark the target pixel on RTD window.*)
   ... -if DET.CLICK.PIX is TRUE, prompt the operator to designate the target pixel (at first iteration).
7. compute the telescope offset required to bring this object to the target CCD pixel coordinates,
   -prompt the operator to choose between:
   ... not applying it,
   ... applying it blindly <u>(open loop)</u>,
   ... or to apply it and take a new exposure (possibly of different duration) to check the outcome.
8. In the latter case, the resulting image is again displayed on the RTD and the operator can repeat the above procedure at will except if the computed offset is lower than 0.3” on both axis.

The preset flag TEL(PRESET.NEW) set to F (false) is generally used after long exposures on a given field, to check that the telescope is still at the correct position before starting new exposures of the same field.

When applied with differential tracking the template checks that autoguiding is not active.

TABLE 3 SUSI_img_acq_MoveToPixel (ex SAT02,SAT11,SAT111)

Label	Parameter	Default	Units	Notes
Exposure time	DET.EXPTIME			
Target pixel coordinates	DET.PIXELCOORD	rot. center	pixels	
Filter name	INS.FILT1.NAME			
Preset flag	TEL.PRESET.NEW	T		logical
RA	TEL.TARG.ALPHA		h/ mn/ sec	
DEC	TEL.TARG.DELTA		deg-mn-”	
Coordinate equinox	TEL.TARG.EQUINOX	2000	years	
Name ot the target	TEL.TARG.NAME			
Differential tracking in RA	TEL.TARG.ADDVELALPHA	0	“/sec	
Differential tracking in DEC	TEL.TARG.ADDVELDELTA	0	“/sec	
Rotator offset angle	TEL.ROT.OFFANGLE	0	degrees	
binning	DET.WIN1.BIN	2	pixels	
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window
First column of window	DET.WIN1.STRX	1	pixels	if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	if FLAG = T
Set target pixel with cursor	DET.CLICK.PIX	F		
Use current RTD umage first	DET.USE.LAST	F		

2.2 SUSI2 Observation Templates

Observing templates get images of the pointed field.

2.2.1 SUSI_img_obs_Exposure (ex S0T01): Single exposure

This template acquires one image through the filter INS.FILT1.NAME with the exposure time DET.EXPTIME.

TABLE 4 SUSI_img_obs_Exposure (ex S0T01)

Label	Parameter	Default	Units	Notes
Exposure time	DET.EXPTIME	(none)	seconds	
Filter	INS.FILT1.NAME	(none)		Menu
CCD readout speed	DET.READ.SPEED	fast		
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window; T = windowed
First column of window	DET.WIN1.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2	pixels	
Exposure type	SEQ.TYPE	science		STANDARD SCIENCE

2.2.2 SUSI_img_obs_DoubleW: Double subwindow exposure

This template acquires one image made of two ccd non overlapping subwindows through the filter INS.FILT1.NAME with the sam exposure time DET.EXPTIME and the same binning DET.WIN1.BIN. This template does not allow to work with full frame. It is up to the observer to make the windows not overlapping : indeed , if objects are too close, using this template is pointless.

It is meant to speed up photometry of a field with two objects several tens of ” apart.

TABLE 5 SUSI_img_obs_Exposure (ex S0T01)

Label	Parameter	Default	Units	Notes
Exposure time	DET.EXPTIME	(none)	seconds	
Filter	INS.FILT1.NAME	(none)		Menu
CCD readout speed	DET.READ.SPEED	fast		
First column of window	DET.WIN1.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2	pixels	
First column of window	DET.WIN2.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN2.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN2.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN2.NY	4096	pixels	Only used if FLAG = T
Exposure type	SEQ.NEXPO	1		Number of iterations
Exposure type	SEQ.TYPE	science		STANDARD SCIENCE

2.2.3 SUSI_img_obs_Jitter (ex SOT02): Jitter mode exposures (combined offset)

This template acquires SEQ.NEXPO exposures through the INS.FILT1.NAME.
If autoguiding is active at the beginning of this sequence, it remains active, i.e. the guide probe is moved to compensate for the telescope offsets.

TABLE 6 SUSI_img_obs_Jitter (ex SOT02)

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
List of exposure times	DET.EXPTIMES	(none)	seconds	
Return to first position	TEL.PRESET.RETURN	F		Default : do not return
List of telescope RA offsets	TELALPHA.OFFSETS	*0*	arcsec	
List of telescope DEC offsets	TEL.DELTA.OFFSETS	*0*	arcsec	
Filter	INS.FILT1.NAME	(none)		Menu
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window; T = windowed
First column of window	DET.WIN1.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2	pixels	
Exposure type	SEQ.TYPE	science		STANDARD SCIENCE

A sequence of exposures with individual offsets is generated by entering a sequence of values of telescope RA and DEC offsets TEL.ALPHA.OFFSETS & TELDELTA..OFFSETS, and of exposure times DET.EXPTIMES. Sequences in RA, DEC and exposure time are scanned cyclicaly until SEQ.NEXPO exposures are taken and may therefore have different lengths.
Offsets are applied to the current telescope position **before** the exposure begins. This is true even for the first exposure in a sequence, i.e. if the first offset in the sequence is non-zero, that offset will be applied to the current telescope position before acquiring the first dataset.[1]

- At end of sequence, Telescope may be preset back to start position of jittering path if the flag TEL.PRESET.RETURN is true : its default value is however false so that a next sequence will continue wherever the previous one has stopped.

1. This option is useful to move a target out of the gap between the two CCDs of the mosaic, e.g. setting the first offsets to 30 for RA and 0 for DEC (assuming that the rotator offset angle is 0).

2.3 SUSI2 Calibration Templates

2.3.1 SUSI_img_cal_Darks (ex SCT01): Bias or dark frames

This calibration template acquires SEQ.NEXPO bias or dark frames. Bias frames are acquired if the exposure DET.EXPTIME time is set to zero (0). Dark frames are acquired if the exposure time is non-zero.

TABLE 7 SUSI_img_cal_Darks (ex SCT01)

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Exposure time	DET.EXPTIME	0	seconds	
CCD readout speed	DET.READ.SPEED	fast		Not used
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window;T = windowed
First column of window	DET.WIN1.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2	pixels	

2.3.2 SUSI_img_cal_DomeFF (ex SCT02): Dome flats (automatic exposure time calculation)

This calibration template acquires SEQ.NEXPO dome flats through the INS.FILT1.NAME, with approximately DET.EXPLEVEL a.d.u's level.
In the execution of this template, the exposure time is computed automatically as follows:

1. INS.FILT1.NAME is put in the beam.
2. A windowed dome flat with a short exposure time is acquired.
3. The bias average value, hard coded in library, is subtracted from the windowed dome flat and the mean intensity is computed.
4. Based on mean intensity and requested level, exposure time is computed.
5. If this exposure time is reasonable , CCD configuration is set and SEQ.NEXPO dome flats are taken. In the case of SUSI, minimum exposure time can be decreased to 1 second thanks to the fast shutter. The maximum time is 1 minute.

TABLE 8 SUSI_img_cal_DomeFF (ex SCT02)

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Requested level	DET.EXPLEVEL	40000	ADU	
Filter	INS.FILT1.NAME	(none)		Menu
CCD readout speed	DET.READ.SPEED	fast		Not used
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window;T = windowed
First column of window	DET.WIN1.STRX	1	pixels	Only used if FLAG = T
First row of window	DET.WIN1.STRY	1	pixels	Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288	pixels	Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096	pixels	Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2	pixels	

2.3.3 SUSI_img_cal_SkyFF (ex SCT03) : Sky (twilight) flats (automatic exposure time calculation)

This calibration template acquires SEQ.NEXPO (twilight) flats through INS.FILT1.NAME, with approximately DET.EXPLEVEL a.d.u's level. Before each exposure, the telescope is offset by the specified RA TEL.TARG.OFFSETALPHA and DEC TEL.TARG.OFFSETDELTA offsets.

The exposure time is computed as follows:

1. A windowed sky flat with a short exposure time is acquired.
2. The bias average value, hard coded in library, is subtracted from the windowed dome flat and the mean intensity is computed.
3. Based on the mean intensity and the requested level, an exposure time sequence is computed using the Tyson & Gal algorithm.

- During the evening twilight, the sequence is started only if the exposure time of the first frame is 2 secs or greater. The sequence terminates when SEQ.NEXPO exposures have been acquired, or when the calculated exposure time exceeds 300 secs.
- During the morning twilight, the sequence is started only if the exposure time of the first frame is 300 secs or less. The sequence terminates when SEQ.NEXPO exposures have been taken, or when the calculated exposure time becomes shorter than 2 secs.

TABLE 9 SUSI_img_cal_SkyFF (ex SCT03)

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Requested level	DET.EXPLEVEL	30000	ADU	
Filter	INS.FILT1.NAME	(none)		Menu
CCD readout speed	DET.READ.SPEED	fast		Not used
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window;T = windowed
First column of window	DET.WIN1.STRX	1		Only used if FLAG = T
First row of window	DET.WIN1.STRY	1		Only used if FLAG = T
Number of columns	DET.WIN1.NX	4288		Only used if FLAG = T
Number of rows	DET.WIN1.NY	4096		Only used if FLAG = T
CCD binning	DET.WIN1.BIN	2		
Telescope RA offset	TEL.TARG.OFFSETALPHA	10	arcsec	offset between exposures
Telescope DEC offset	TEL.TARG.OFFSETDELTA	10	arcsec	offset between exposures

2.3.4 SUSI_img_cal_TelFocus (ex SCT04) : **Acquire a thru focus frame, compute best focus and move M2z accordinly**

This calibration template acquires a "thru focus" focus frame[1].

1. Telescope focus is shifted by
   (-TEL.FOCUSSSTEP x SEQ.NEXPO / 2)[2],
2. Telescope is offset in the specified direction TEL.OFFSETDIR by
   (- TEL.OFFSET x SEQ.NEXPO / 2).
3. An exposure is started, subdivided in SEQ.NEXPO subexposures, of duration approximately equal to DET.EXPTIME.
4. Between consecutive subexposures,
   - the exposure is paused:
   - the telescope focus M2z is adjusted by the indicated offset,
   - the telescope is offset by the specified amount in the specifed direction,
   - when this is completed, the shutter is reopened (the exposure is continued).
5. When all the subexposures have been acquired, the CCD is read out, the telescope is moved back to its original position, and the original focus is restored.
6. Operator is prompted to designate the first and last[3] image of the through focus sequence on RTD window : thru focus MIDAS routine takes over to find smallest image.
7. Best focus is then displayed and operator is prompted to set it or not.

TABLE 10 SUSI_img_cal_TelFocus (ex SCT04)

Label	Parameter	Default	Units	Notes
Filter	INS.FILT1.NAME	(none)		Menu
Subexposure time	DET.EXPTIME	20	seconds	
Number of subexposures	SEQ.NEXPO	9		
Telescope focus offset	TEL.FOCUSSSTEP	0.03	mm	
Telescope offset	TEL.OFFSET	10	arcsec	
Direction of telescope offset	TEL.OFFSETDIR	ALPHA		ALPHA = RA; DELTA = DEC

1. Note that the image analyzer is calibrated so as to keep the telescope in focus after an image analysis. Therfore, this template is used mostly to check the focus after the first image analysis.
2. To measure thru focus around the current position, the telescope and the mirror 2 are first shifted by half the number of total steps.
3. Last image is separated by twice the telescope offset from other images.

SUSI2 Templates:

3 EMMI Templates:

TABLE 11 EMMI modes

Mode	Description
BIMG	Blue IMaGing
BLMD	BLue Medium Dispersion spectroscopy
RILD	Red Imaging & Low Dispersion spectroscopy
REMD	REd Medium Dispersion spectroscopy
DIMD	DIchroic Medium Dispersion spectroscopy

3.1 BIMG Templates

TABLE 12 BIMG Template Quick Reference

Template	Old name	Short Description
BIMG_img_acq_Preset	BIMGAT01	Preset to coordinates - no operator intervention
BIMG_img_acq_MoveToPixel	BIMGAT02	Preset to coordinates - update position to specified pixel
BIMG_img_obs_Exposure	BIMGOT01	Normal single exposure
BIMG_img_obs_Jitter	BIMGOT02	Jitter mode exposures (combined offset)
BIMG_img_cal_Darks	BIMGCT01	bias or dark frames
BIMG_img_cal_DomeFF	BIMGCT02	flats (automatic exptime calculation)
BIMG_img_cal_SkyFF	BIMGCT03	twilight sky flats (automatic exptime calculation)
BIMG_img_cal_TelFocus	BIMGCT04	Acquire a BIMG focus frame,compute and set focus.

3.1.1 BIMG_img_acq_Preset (ex-BIMGAT01): Preset to coordinates - no operator intervention

This acquisition template is very similar to SUSI_img_acq_Preset (Section 2.1.1): it just sets INS.MODE BIMG and calls the same subroutine.

3.1.2 BIMG_img_acq_MoveToPixel (ex BIMGAT02): Preset to coordinates, then place an interactively designated object on a specific pixel

This template is similar to SUSI_img_acq_MoveToPixel

See Section 2.1.2 for detailed description.

3.1.3 BIMG_img_obs_Exposure (ex-BIMGOT01): Normal single exposure

This template acquires one image through INS.FILT4.NAME with DET.EXPTIME.

Similar to SUSI_img_obs_Exposure (Section 2.2.1).

3.1.4 BIMG_img_obs_Jitter (ex-BIMGOT02): Jitter mode exposures (combined offset)

See SUSI_img_obs_Jitter Section 2.2.3 for an explanation and example of jitter mode operation.

3.1.5 BIMG_img_cal_Darks (ex BIMGCT01): bias or dark frames

See SUSI_img_cal_Darks (Section 2.3.1).

3.1.6 BIMG_img_cal_DomeFF (ex BIMGCT02): flats (automatic exposure time calculation)

See SUSI_img_cal_DomeFF Section 2.3.2.
The possibility to take internal flats has been removed unlike in BIMGCT02.

3.1.7 BIMG_img_cal_SkyFF (ex BIMGCT03): Sky (twilight) flats (automatic exposure time calculation)

See SUSI_img_cal_SkyFF Section 2.3.2.

3.1.8 BIMG_img_cal_TelFocus (ex BIMGCT04): Acquire a focus frame

See SUSI_img_cal_TelFocus Section 2.3.4.

3.2 BLMD Templates

In this mode only medium dispersion spectra are taken: therefore all templates have the type _spec_ .

TABLE 13 BLMD Template Quick Reference

Template	Old name	Short Description
BLMD_spec_acq_Preset	BLMDAT01	Preset to coordinates - no operator intervention
BLMD_spec_acq_MoveToSlit	BLMDAT02	Interactive presetting to specific slit position
BLMD_spec_obs_Exposures	BLMDOT01	Normal spectroscopic exposures
BLMD_spec_cal_Darks	BLMDCT01	bias or dark frames
BLMD_spec_cal_Flats	BLMDCT02	sky or dome flats (automatic exptime calculation)
BLMD_spec_cal_Arcs	BLMDCT07	Wavelength calibration frames

3.2.1 BLMD_spec_acq_Preset (ex-BLMDAT01): Preset to coordinates

This acquisition template is similar to SUSI_img_acq_Preset (Section 2.1.1): however it allows to set the slit to parrallactic angle when the TEL.ROT.PARALLACTIC variable in the TSF is true. The scientific observation which follows should be paused to center the object in the slit manually on the slit viewer. Note that the parallactic angle is set before the exposure begins. After that the rotator compensates the image rotation drifting away from the parallactic value.

3.2.2 BLMD_spec_acq_MoveToSlit (ex BLMDAT02): Interactive presetting to Medium Dispersion slit position

This acquisition template allows the user to position an object on the medium-dispersion slit. It is used for acquiring objects too faint to be seen on the slit viewer. The location of the BLMD slit must have been determined beforehand in BIMG mode and is stored in the DET.PIXELCOORD parameter; it is passed to the template through the parameter *Pixel coordinates* (the BIMG X-coordinate is along the long direction of the BLMD slit, and accordingly, is in general less critical than the Y-coordinate).

In spite of its name this template runs in BIMG mode and is classified BLMD because it prepares a faint object BLMD_spec_obs_Exposures.

It is therefore very similar to BIMG_img_acq_MoveToPixel Section 3.1.2.
The two differences are:

- the parallactic angle case is processed like in BLMD_spec_acq_Preset Section 3.2.1.

- the interactive designation of target pixel is forbidden unlike in SUSI_img_acq_MoveToPixel Section 2.1.2 and BIMG_img_acq_MoveToPixel Section 3.1.2

3.2.3 BLMD_spec_obs_Exposures (ex BLMDOT01): Spectroscopic exposures

This template acquires SEQ.NEXPO spectroscopic exposures.
The medium-dispersion slit width and length are set.
The selected blue grating is tilted to obtain the requested central wavelength.
A blue color filter and a neutral density filter can be put in the beam.

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TABLE 14 BLMD_spec_obs_Exposures (ex BLMDOT01)

Label	Parameter	Default	Units	Notes
Blue neutral density	INS.FILT3.NAME	Free		Menu
Slit width	INS.SLIT1.WID	1	arcsec	
Slit length	INS.SLIT1.LEN	330	arcsec	
Blue grating	INS.GRAT2.NAME	(none)		Menu
Blue central wavelength	INS.GRAT2.WLEN	0	nm	
Blue color filter	INS.FILT4.NAME	Free		Menu
Number of exposures	SEQ.NEXPO	1		
Exposure time list	DET.EXPTIME	(none)	seconds	list of exposure times (cf jitter)
CCD readout speed	DET.READ.SPEED	normal		Menu
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window; T = windowed
First column of window	DET.WIN1.STRX	1		Only used if FLAG = T
First row of window	DET.WIN1.STRY	1		Only used if FLAG = T
Number of columns	DET.WIN1.NX	1124		Only used if FLAG = T
Number of rows	DET.WIN1.NY	1024		Only used if FLAG = T
CCD X binning	DET.WIN1.BINX	1		
CCD Y binning	DET.WIN1.BINY	1		

3.2.4 BLMD_spec_cal_Darks (ex BLMDCT01): Bias or dark frames

see SUSI_img_cal_Darks (Section 2.3.1).

3.2.5 BLMD_spec_cal_Flats (ex BLMDCT02 and BLMDCT03): Flats (automatic exposure time calculation)

This calibration template acquires SEQ.NEXPO spectroscopic flats with approximately the requested DET.EXPLEVEL on dome or sky,: a tsf parameter INS.FLAT.TYPE must indicate the type of flat field taking value LAMPFLAT or SKYFLAT accordingly..
In the execution of this template, the exposure time is computed automatically in Section 8 .

1. The medium-dispersion slit width and length are adjusted to the specified values.
2. The selected blue grating is tilted to obtain the requested central wavelength.
3. A blue color filter and a neutral density filter can be put in the beam.
4. A full window flat with a short exposure time is acquired in 4x4 binned mode.
5. A MIDAS routine averages spectrum rows, filters/median it, finds/maximum and defines a 40x20 window around it. This region is used to define the readout window of the CCD for the next exposure. If this region is saturated , template is aborted. Otherwise the operator is prompted to accept the position of the maximum.
6. A flat with a short exposure time is acquired.
7. The bias standard value is subtracted from the windowed dome flat and the mean intensity is computed.
8. Based on mean intensity and DET.EXPLEVEL, exposure time is computed.
9. If this exposure time is reasonable , CCD configuration is set and SEQ.NEXPO dome or sky flats are taken.

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TABLE 15 BLMD_spec_cal_Flats (ex BLMDCT02)

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Requested level	DET.EXPLEVEL	20000	ADU	
Slit width	INS.SLIT1.WID	1	arcsec	
Slit length	INS.SLIT1.LEN	330	arcsec	
Blue grating	INS.GRAT2.NAME	(none)		Menu
Blue central wavelength	INS.GRAT2.WLEN	0	nm	
Blue color filter	INS.FILT4.NAME	Free		Menu
CCD readout speed	DET.READ.SPEED	normal		Menu
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window; T = windowed
First column of window	DET.WIN1.STRX	1		Only used if FLAG = T
First row of window	DET.WIN1.STRY	1		Only used if FLAG = T
Number of columns	DET.WIN1.NX	1124		Only used if FLAG = T
Number of rows	DET.WIN1.NY	1024		Only used if FLAG = T
CCD X binning	DET.WIN1.BINX	1		
CCD Y binning	DET.WIN1.BINY	1		
Blue neutral density	INS.FILT3.NAME	Free		Menu
Type of Flat Field	INS.FLAT.TYPE	LAMP		LAMPFLAT or SKYFLAT

3.2.6 BLMD_spec_cal_Arcs (ex BLMDCT07): Wavelength calibration frame

This template acquires one spectroscopic wavelength calibration frame setting

- SLIT1 with width INS.SLIT1.WID and length INS.SLIT1.LEN,
- INS.GRAT2.NAME with a central wavelength of INS.GRAT2.WLEN nanometers (nm).
- Neutral filter INS.FILT3.NAME and order separating filter INS.FILT4.NAME.
- CCD configuration.
- INS.LAMP1.NAME, INS.LAMP2.NAME and INS.LAMP3.NAME
- Send exposure time for each lamp as fits keyword INS.LAMPi.TIME to header.

Quite similar to REMD_spec_cal_Arcs Section 3.4.8 and RILD_spec_cal_Arcs Section 3.3.14.

TABLE 16 BLMD_spec_cal_Arcs (ex BLMDCT07)

Label	Parameter	Default	Units	Notes
Lamp1 exposure time	INS.LAMP1.EXPTIME	1	seconds	
Calibration lamp1	INS.LAMP1.NAME	(no lamp)		Menu
Lamp2 exposure time	INS.LAMP2.EXPTIME	1		
Calibration lamp2	INS.LAMP2.NAME	(no lamp)		Menu
Slit width	INS.SLIT1.WID	1	arcsec	
Slit length	INS.SLIT1.LEN	330	arcsec	
Blue grating	INS.GRAT2.NAME	(none)		Menu
Blue central wavelength	INS.GRAT2.WLEN	0	nm	
Blue color filter	INS.FILT4.NAME	Free		Menu
Blue neutral density	INS.FILT3.NAME	Free		Menu
CCD windowing flag	DET.WINDOW.FLAG	F		F = no window; T = windowed
First column of window	DET.WIN1.STRX	1		Only used if FLAG = T
First row of window	DET.WIN1.STRY	1		Only used if FLAG = T
Number of columns	DET.WIN1.NX	1124		Only used if FLAG = T
Number of rows	DET.WIN1.NY	1024		Only used if FLAG = T
CCD X binning	DET.WIN1.BINX	1		
CCD Y binning	DET.WIN1.BINY	1		
CCD readout speed	DET.READ.SPEED	normal		Menu

3.3 RILD Templates

In this mode low dispersion spectra and images are taken: therefore templates have either the type `_spec_` or the type `_img_` : and templates usable in both cases have the type `_all_`.

TABLE 17 RILD Template Quick Reference

Template	Old name	Short Description
RILD_img_acq_Preset	RILDAT01	Preset to coordinates - no operator intervention
RILD_all_acq_Preset	RILDAT01	Preset to coordinates - no operator intervention - parallactic angle possible
RILD_img_acq_MoveToPixel	RILDAT02	Interactive presetting to specific PIXEL position (imaging)
RILD_spec_acq_MoveToSlit	RILDAT03	Interactive presetting to specific SLIT position (spectroscopy)
RILD_spec_acq_RotToSlit		Interactive presetting of 2 objects to specific SLIT position (spectroscopy)
RILD_spec_acq_MoveToMOS	RILDAT04	Interactive presetting of 3 objects for MOS mask alignment
RILD_img_obs_Exposure	RILDOT01	Normal single imaging exposure
RILD_img_obs_Jitter	RILDOT02	Jitter mode imaging exposure (combined offset)
RILD_spec_obs_Exposures	RILDOT03	Normal spectroscopic exposures
RILD_all_cal_Darks	RILDCT01	bias or dark frames
RILD_img_cal_DomeFF	RILDCT02	imaging flats (automatic exptime calculation)
RILD_img_cal_SkyFF	RILDCT03	imaging sky (twilight) flats (automatic exptime calculation)
RILD_img_cal_TelThruFocus	RILDCT04	Acquire an imaging focus frame (thru-focus mode)
RILD_img_cal_TelWdgFoc	RILDCT05	Acquire an imaging focus frame (focus wedge mode)
RILD_spec_cal_Arcs	RILDCT07	Acquire wavelength calibration frames (spectroscopy)
RILD_spec_cal_Flats	RILDCT12	Acquire spectroscopic sky or dome flat field frames

3.3.1 RILD_all_acq_Preset (ex-RILDAT01): Preset to coordinates - no operator intervention

This acquisition template is very similar to BLMD_spec_acq_Preset Section 3.2.1 and to BIMG_img_acq_Preset Section 3.1.1: in particular it allows rotation of the slit to parallactic angle.

3.3.2 RILD_img_acq_MoveToPixel (ex RILDAT02): Interactive presetting to specific PIXEL position (imaging)

This template is very similar to SUSI_img_acq_MoveToPixel (Section 2.1.2) and to BIMG_img_acq_MoveToPixel Section 3.1.2.

3.3.3 RILD_spec_acq_MoveToSlit (ex RILDAT03): Interactive presetting to specific SLIT position (spectroscopy)

This acquisition template allows the user to position an object at a given location on a specified long slit. The slit is referred to by its name INS.SLIT2.NAME. The place along the long dimension of the slit (Y direction) where the object should be located is defined by the parameter DET.PIXEL.Y The case of the parallactic angle is treated as in BLMD_spec_acq_Preset Section 3.2.1

Afterwards, the template is very similar to SUSI_img_acq_MoveToPixel (Section 2.1.2).

TABLE 18 RILD_spec_acq_MoveToSlit : specific keywords

Label	Parameter	Default	Units	Notes
Slit Y pixel coordinate	DET.PIXEL.Y	1024		
Starplate	INS.SLIT2.NAME	(none)		

3.3.4 RILD_spec_acq_RotToSlit (new): Interactive presetting of 2 objects to specific SLIT position (spectroscopy)

This acquisition template allows the user to position two objects on a specified long slit. The slit is referred to by its name INS.SLIT2.NAME. The two object will be set symetrically to the center of the image of the slit on the CCD. The parallactic angle can naturally not be set.

TABLE 19 RILD_spec_acq_RotToSlit : specific keywords

Label	Parameter	Default	Units	Notes
Starplate	INS.SLIT2.NAME	(none)		

3.3.5 RILD_spec_acq_MoveToMOS (ex RILDAT04): Interactive presetting for MOS mask alignment

This acquisition template allows the user to align a MOS mask on the sky. The X,Y coordinates of up to 3 slitlets are given through the parameters DET.PIXELCOORD1 , 2 and 3. They must have been determined before from a lamp exposure taken through the mask, without grism.

1. The telescope is preset : parallax angle positionning is naturally not possible.
2. The full image is acquired and displayed on a Real-Time Display where the operator is prompted to identify with the cursor the 3 reference objects to be brought to the coordinates of the 3 reference slitlets
3. *T*he telescope and rotator offsets required to bring each object to its desired location are computed, and their consistency is checked.
4. Telescope Offsets are applied.
5. For the time being, the Rotator offset has to be applied manually on Telescope control panel. The operator can repeat the above procedure at will.[1]

1. After completion of this acquisition procedure, it is strongly recommended to take an image of the field through the mask (using template RILDOT01) to verify that the alignment stars are indeed visible through the slitlets.

3.3.6 RILD_img_obs_Exposure (ex RILD0T01): Single imaging exposure

This template acquires one image through the specified red color filter with the given exposure time.

For normal imaging, parameter INS.SLIT2.NAME is set to free. However, one can also use this template to take an image of objects to be observed in spectroscopy (with template RILD_spec_obs_Exposures Section 3.3.8) through either the selected long slit or the MOS mask, or for coronographic observations. The value of parameter INS.SLIT2.NAME is then specified accordingly.

Similar to SUSI_img_obs_Exposure Section 2.1.1.

3.3.7 RILD_img_obs_Jitter (ex RILDOT02): Jitter mode exposures (combined offset)

Similar to SUSI_img_obs_Jitter Section 2.2.3 .

3.3.8 RILD_spec_obs_Exposures (ex RILD0T03): Multiple spectroscopic exposures

This template acquires SEQ.NEXPO spectroscopic exposures through the specified slit (parameter INS.SLIT2.NAME), red color filter (INS.FILT2.NAME), and grism (INS.GRIS1.NAME), with the given exposure time.

The differences with RILD_img_obs_Exposure Section 3.3.6 are the SEQ.NEXPO number of exposures and the INS.GRIS.NAME parameter.

3.3.9 RILD_all_cal_Darks (ex RILDCT01): Bias or dark frames

see SUSI_img_cal_Darks (Section 2.3.1).

3.3.10 RILD_img_cal_DomeFF (ex RILDCT02): imaging flats (automatic exposure time calculation)

Similar to BIMG_img_cal_DomeFF Section 3.1.6.

3.3.11 RILD_img_cal_SkyFF (ex RILDCT03): Imaging sky (twilight) flats (automatic exposure time calculation)

Similar to SUSI_img_cal_SkyFF Section 2.3.3.

3.3.12 RILD_img_cal_TelFocus (ex RILDCT04): Imaging focus frame (thru focus method)

Similar to SUSI_img_cal_TelFocus Section 2.3.4.

3.3.13 RILD_img_cal_TelWdgFoc (ex RILDCT05): Acquire imaging focus frame (focus wedge method)

This calibration template acquires one exposure through the specified red color filter and the focus wedge, with the given exposure time. Hence it measures defocussing and prompts the operator for correction.

Coordinates of left images must be clicked in midas display window.

TABLE 20 RILD_img_cal_TelWdgFoc

Label	Parameter	Default	Units	Notes
Red color filter	INS.FILT2.NAME	(none)		Menu
Exposure time	DET.EXPTIME	20	seconds	

3.3.14 RILD_spec_cal_Arcs (ex RILDCT07): Wavelength calibration frames (spectroscopy)

Quite similar to BLMD_spec_cal_Arcs Section 3.2.6 and REMD_spec_cal_Arcs Section 3.4.8.

3.3.15 RILD_spec_cal_Flats (ex RILDCT12 and RILDCT13): Acquire spectroscopic flat field frames

This template is very similar to BLMD_spec_cal_Flats Section 3.2.5.

As it can be used either for dome or for sky flats, it needs a FLAT.TYPE parameter telling whether SKYFLAT or LAMPFLAT (dome) is taken.

3.4 REMD Templates

For most of REMD templates a dialog box is presently active to set camera focus because no formula is available for all Gratings and Echelle.

In this mode medium dispersion spectra and echelle spectra are taken: therefore templates have either the type _spec_ or the type _ech_ : and templates usable in both cases have the type _all_.

TABLE 21 REMD Template Quick Reference

Template	Old name	Short Description
REMD_all_acq_Preset	REMDAT01	Preset to coordinates - no operator intervention
REMD_all_acq_MoveToSlit	REMDAT02	Interactive presetting to Medium Dispersion slit coordinates
REMD_spec_obs_Exposures	REMDOT01	Obtain medium dispersion spectroscopic exposures
REMD_ech_obs_Exposures	REMDOT02	Obtain echelle spectroscopic exposures
REMD_all_cal_Darks	REMDCT01	bias or dark frames
REMD_spec_cal_Flats	REMDCT02	medium dispersion sky or dome flats (automatic exptime calculation)
REMD_ech_cal_Flats	REMDCT03	echelle sky or dome flats (automatic exptime calculation)
REMD_spec_cal_Arcs	REMDCT07	Acquire medium dispersion wavelength calibration frames
REMD_ech_cal_Arcs	REMDCT08	Acquire echelle wavelength calibration frames

3.4.1 REMD_all_acq_Preset (ex REMDAT01): Preset to coordinates

This acquisition template is very similar to BLMD_spec_acq_Preset (Section 3.2.1): it just sets INS.MODE REMD and calls the same subroutine. In particular it allows to orient the slit along the parallactic angle.

3.4.2 REMD_all_acq_MoveToSlit (ex REMDAT02): Interactive presetting to specific slit position

This acquisition template allows the user to position an object on the medium-dispersion slit. It is used for acquiring objects too faint to be seen on the slit viewer. The location of the REMD slit must have been determined beforehand in RILD mode for instance at the beginning of the night; it is passed to the template through DET.PIXEL.COORD (the RILD X-coordinate is along the long direction of the REMD slit, and accordingly, is in general less critical than the Y-coordnate). In spite of its name this template runs in RILD mode and is classified REMD because it prepares a faint object REMD_spec_obs_Exposures. It is therefore very similar to BLMD_img_acq_MoveToSlit Section 3.2.2.

3.4.3 REMD_spec_obs_Exposures (ex REMDOT01): Medium dispersion spectroscopic exposures

Similar to BLMD_spec_obs_Exposures Section 3.2.3.

3.4.4 REMD_ech_obs_Exposures (ex REMDOT02): Echelle spectroscopic exposures

Differences with REMD_spec_obs_Exposures Section 3.4.3 is echelle processing:

- A X-dispersion grism can be set.
- No wavelength is set
- Or, if Echelle #9 is used, wavelength 0 is set.
- Only 7 of EMMI filters make sense and may be used in long slit mode.

3.4.5 REMD_all_cal_Darks (ex REMDCT01): Bias or dark frames

see SUSI_img_cal_Darks (Section 2.3.1).

3.4.6 REMD_spec_cal_Flats: (ex REMDCT02 and REMDCT12): Medium dispersion flats (automatic exptime calculation)

Sky or dome flats.

Similar to BLMD_spec_cal_Flats Section 3.2.5

3.4.7 REMD_ech_cal_Flats: (ex REMDCT03 and REMDCT13): Echelle flats (automatic exptime calculation)

Sky or dome flats.

Similar to REMD_spec_cal_Flats Section 3.4.6. + echelle processing.

3.4.8 REMD_spec_cal_Arcs (ex REMDCT07): Medium dispersion wavelength calibration frames

Quite similar to BLMD_spec_cal_Arcs Section 3.2.6.

3.4.9 REMD_ech_cal_Arcs (ex REMDCT08): Echelle wavelength calibration frames

Quite similar to REMD_spec_cal_Arcs Section 3.4.8 + echelle processing.

3.5 DIMD Templates

In this mode medium dispersion or echelle spectra are taken on red side while only medium dispersion ones on the blue side: respective templates will have either the type *_spec_* or the type *_ech_* according to the type of the **red** exposure: and templates usable for both cases will have the type *_all_*.

TABLE 22 DIMD Template Quick Reference

Template	Old Name	Short Description
DIMD_all_acq_Preset	DIMDAT01	Preset to coordinates - no operator intervention
DIMD_spec_obs_Exposures	DIMDOT01	Blue + red medium dispersion exposures
DIMD_ech_obs_Exposures	DIMDOT02	Blue medium dispersion + red echelle exposures
DIMD_all_cal_Darks	DIMDCT01	Blue + red bias or dark frames
DIMD_spec_cal_Flats	DIMDCT02	Blue + red medium dispersion flats (automatic exptime calculation)
DIMD_ech_cal_Flats	DIMDCT03	Blue medium dispersion + red echelle flats (automatic exptime calculation)
DIMD_spec_cal_Arcs	DIMDCT07	Blue + red medium dispersion wavelength calibration frames
DIMD_ech_cal_Arcs	DIMDCT08	Blue medium dispersion + red echelle wavelength calibration frames

3.5.1 DIMD_all_acq_Preset (ex DIMDAT01): Preset to coordinates - no operator intervention

Very similar to REMD_all_acq_Preset Section 3.4.1 and BLMD_all_acq_Preset Section 3.2.1

Note: there is no DIMD_all_acq_MoveToSlit acquisition template for objects too faint to be seen on the slit viewer. In such cases, the object can be acquired by blind offset using either REMDAT02 or BLMDAT02, according to whether the acquisition image should be taken in the red or in the blue arm. Because of the very large wavelength range, beware of the differential refraction. You may want to observe at parallactic angle.

3.5.2 DIMD_spec_obs_Exposures (ex DIMDOT01): Blue + red medium dispersion exposures

This template acquires SEQ.NEXPO medium-dispersion spectroscopic exposures in both arms simultaneously. Different exposure times can be requested in the blue and in the red arm, but a single value of the exposure time is used for all the exposures in a given arm, and the exposure starts are synchronized between both arms (that is, the first blue exposure and the first red exposure start simultaneously, as do the second blue exposure and the second red exposure, etc.). The medium-dispersion slit width and length are of course the same for both arms. The other parameters must be specified independently for the blue and the red arm. They are identical to those used for the templates BLMDOT01 and REMDOT01: see the description of those templates for details.

TABLE 23 DIMD_spec_obs_Exposures

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Exposure time of red side	DET1.WIN1.UIT1	(none)	seconds	
Exposure time of blue side	DET2.WIN1.UIT1	(none)	seconds	
Slit width	INS.SLIT1.WID	1	arcsec	
Slit length	INS.SLIT1.LEN	*330*	arcsec	
Red grating	INS.GRAT1.NAME	(none)		Menu
Red central wavelength	INS.GRAT1.WLEN	0	nm	
Red color filter	INS.FILT2.NAME	Free		Menu
Blue grating	INS.GRAT2.NAME	(none)		Menu
Blue central wavelength	INS.GRAT2.WLEN	0	nm	
Blue color filter	INS.FILT4.NAME	Free		Menu
Red CCD readout speed	DET1.READ.SPEED	normal		Menu
Red CCD windowing flag	DET1.WIN1.ST	F		F = no window; T = windowed
First column of red window	DET1.WIN1.STRX	1		Only used if FLAG = T
First row of red window	DET1.WIN1.STRY	1		Only used if FLAG = T
Number of red columns	DET1.WIN1.NX	2086		Only used if FLAG = T
Number of red rows	DET1.WIN1.NY	2046		Only used if FLAG = T
Red CCD X binning	DET1.WIN1.BINX	1		
Red CCD Y binning	DET1.WIN1.BINY	1		
Blue CCD readout speed	DET2.READ.SPEED	normal		Menu
Blue CCD windowing flag	DET2.WIN1.ST	F		F = no window; T = windowed
First column of blue window	DET2.WIN1.STRX	1		Only used if FLAG = T
First row of blue window	DET2.WIN1.STRY	1		Only used if FLAG = T
Number of blue columns	DET2.WIN1.NX	1124		Only used if FLAG = T
Number of blue rows	DET2.WIN1.NY	1024		Only used if FLAG = T
Blue CCD X binning	DET2.WIN1.BINX	1		
Blue CCD Y binning	DET2.WIN1.BINY	1		
Red neutral density	INS.FILT1.NAME	Free		Menu
Blue neutral density	INS.FILT3.NAME	Free		Menu

3.5.3 DIMD_ech_obs_Exposures (ex DIMDOT02): Blue medium dispersion + red echelle exposures

This template simulatneously acquires SEQ.NEXPO blue medium-dispersion and red echelle spectroscopic exposures.

Besides that, quite similar to DIMD_spec_obs_Exposures Section 3.5.2.

3.5.4 DIMD_all_cal_Darks (ex DIMDCT01): Blue + red bias or dark frames

This calibration template simultaneously acquires in both arms SEQ.NEXPO bias or dark frames.

Label	Parameter	Default	Units	Notes
Number of exposures	SEQ.NEXPO	1		
Exposure time of red side	DET1.WIN1.UIT1	(none)	seconds	
Red CCD readout speed	DET1.READ.SPEED	fast		Menu
Red CCD windowing flag	DET1.WIN1.ST	F		F = no window; T = windowed
First column of red window	DET1.WIN1.STRX	1		Only used if FLAG = T
First row of red window	DET1.WIN1.STRY	1		Only used if FLAG = T
Number of red columns	DET1.WIN1.NX	2086		Only used if FLAG = T
Number of red rows	DET1.WIN1.NY	2046		Only used if FLAG = T
Red CCD X binning	DET1.WIN1.BINX	1		
Red CCD Y binning	DET1.WIN1.BINY	1		
Exposure time of blue side	DET2.WIN1.UIT1	(none)	seconds	
Blue CCD readout speed	DET2.READ.SPEED	normal		Menu
Blue CCD windowing flag	DET2.WIN1.ST	F		F = no window; T = windowed
First column of blue window	DET2.WIN1.STRX	1		Only used if FLAG = T
First row of blue window	DET2.WIN1.STRY	1		Only used if FLAG = T
Number of blue columns	DET2.WIN1.NX	1124		Only used if FLAG = T
Number of blue rows	DET2.WIN1.NY	1024		Only used if FLAG = T
Blue CCD X binning	DET2.WIN1.BINX	1		
Blue CCD Y binning	DET2.WIN1.BINY	1		

3.5.5 DIMD_spec_cal_Flats(ex DIMDCT02): Blue + red medium dispersion flats

This calibration template acquires simultaneously in both arms SEQ.NEXPO spectroscopic flats, with approximately the DET1.EXPLEVEL and DET2.EXPLEVEL red and blue respective levels.
If the parameter INS.FLAT.TYPE is set to LAMPFLAT, dome flats supposed to be taken, otherwise sky flats..
The required exposure times to achieve the respective levels will be automatically determined independently for each arm.
The exposure starts are synchronized between both arms.
The entrance slit is naturally the same for both arms.
The other parameters must be specified independently for the blue and the red arm.They are identical to those used for the templates BLMD_spec_cal_DomeFF Section 3.2.5 and REMD_spec_cal_DomeFF Section 3.4.6: see the description of those templates for details.

3.5.6 DIMD_ech_cal_Flats (ex DIMDCT03): Blue medium dispersion + red echelle flats

This calibration template simultaneously acquires the requested number of blue medium-dispersion and red echelle spectroscopic flats, with approximately the specified exposure levels.

Very similar to DIMD_spec_cal_Flats Section 3.5.5 : differs only by echelle setup.

3.5.7 DIMD_spec_cal_Arcs (ex DIMDCT07): Blue + red medium dispersion wavelength calibration frames

This template simultaneously acquires one blue and one red medium-dispersion spectroscopic wavelength calibration exposure

Different exposure times can be used for each of the three calibration lamps: the whole exposure time for Red and blue CCDs is the longer lamp exposure time of the 3 LAMPx.EXPTIME.

As in all DIMD mode exposures, Red and blue exposure start together: but the setup (wipe out) phase which begins the exposure before the shutter is opened lasts 16 seconds on red side and 4 seconds on blue one. Therefore the red exposure integration phase will end 12 seconds after the blue one.
The Lamp exposure time begins when the first shutter is opened : The first shutter close switches off all calibration lamps. Therefore the 12 last seconds of red exposure integration phase will receive no Calibration Lamp Light.

On top of that, it will not be always possible to get a well exposed spectrum on both sides at the same time and it will often be necessary to execute this template twice with different exposure time combinations. As the CCD having the wrong exposure time must nevertheless be read out, you may set it to read only a very small (20x20 pix.) dummy image.

The entrance slit is the same for both arms. The other parameters must be specified independently for the blue and the red arm. They are identical to those used for the templates BLMD_spec_cal_Arcs and REMD_spec_cal_Arcs : see the description of those templates for details.

Label	Parameter	Default	Units	Notes
Lamp1 exposure time	LAMP1.EXPTIME	1	seconds	
Calibration lamp1	LAMP1.NAME	(no lamp)		Menu
Lamp2 exposure time	LAMP2.EXPTIME	1		
Calibration lamp2	LAMP2.NAME	(no lamp)		Menu
Lamp3 exposure time	LAMP3.EXPTIME	1		
Calibration lamp3	LAMP3.NAME	(no lamp)		Menu
Slit width	SLIT1.WID	1	arcsec	
Slit length	SLIT1.LEN	200	arcsec	
Red grating	GRAT1.NAME	(none)		Menu
Red central wavelength	GRAT1.WLEN	0	nm	
Red color filter	FILT2.NAME	Free		Menu
Blue grating	GRAT2.NAME	(none)		Menu
Blue central wavelength	GRAT2.WLEN	0	nm	
Blue color filter	FILT4.NAME	Free		Menu
Red requested level	DET1.EXPLEVEL	20000	ADU	
Red CCD readout speed	DET1.READ.SPEED	normal		Menu
Red CCD windowing flag	DET1.WIN1.ST	F		F = no window; T = windowed
First column of red window	DET1.WIN1.STRX	1		Only used if FLAG = T
First row of red window	DET1.WIN1.STRY	1		Only used if FLAG = T
Number of red columns	DET1.WIN1.NX	2086		Only used if FLAG = T
Number of red rows	DET1.WIN1.NY	2046		Only used if FLAG = T
Red CCD X binning	DET1.WIN1.BINX	1		
Red CCD Y binning	DET1.WIN1.BINY	1		
Blue requested level	DET2.EXPLEVEL	20000	ADU	
Blue CCD readout speed	DET2.READ.SPEED	normal		Menu
Blue CCD windowing flag	DET2.WIN1.ST	F		F = no window; T = windowed
First column of blue window	DET2.WIN1.STRX	1		Only used if FLAG = T
First row of blue window	DET2.WIN1.STRY	1		Only used if FLAG = T
Number of blue columns	DET2.WIN1.NX	1124		Only used if FLAG = T
Number of blue rows	DET2.WIN1.NY	1024		Only used if FLAG = T
Blue CCD X binning	DET2.WIN1.BINX	1		
Blue CCD Y binning	DET2.WIN1.BINY	1		
Red neutral density	FILT1.NAME	Free		Menu
Blue neutral density	FILT3.NAME	Free		Menu

3.5.8 DIMD_ech_cal_Arcs (ex DIMDCT08): Blue medium dispersion + red echelle wavelength calibration frames

This template simultaneously acquires one blue medium-dispersion and one red echelle spectroscopic wavelength calibration exposure.

Very similar to DIMD_spec_cal_Arcs .Section 3.5.7 : differs only by echelle setup : INS.GRAT1.WLEN is replaced by INS.GRIS1.NAME (cross dipsersion grism) .