

# NIRCam Wide Field Slitless Spectroscopy (WFSS) Template Parameters

JWST's NIRCam Wide Field Slitless Spectroscopy (WFSS) imaging template, available in the Astronomer's Proposal Tool ([APT](#)), has parameters for specifying and scheduling observations.

## Introduction

The NIRCam Wide Field Slitless Spectroscopy (WFSS) template is used for the WFSS mode of NIRCam, and this article describes allowed values for all parameters. Advice on how to choose values which optimize your science can be found in the [NIRCam Wide Field Slitless Spectroscopy APT Template](#).

The NIRCam WFSS template consists of the following parameters:

Field	Details	Values	Notes
<i>General Information</i>			
<a href="#">Observation Number</a>	assign observation number	number	
<a href="#">Observation Label</a>	provide observation label	text	optional
<a href="#">Observation Comments</a>	provide observation comments	text	optional
<a href="#">Target Name</a>	select Target Name	choose from list	from Target List
<a href="#">ETC Wkbk. Calc. ID</a>	specify ETC Workbook Calculation ID	number	for science exposures (optional) and target acquisition exposures
<a href="#">Mosaic Properties</a>	specify mosaic parameters	number	if needed
<a href="#">Special Requirements</a>	specify special requirements	choose from list	if needed
<i>Template Specific Information</i>			

Modules	select module	ALL, A	
Subarray	default value	FULL	
Grism	select grism	choose from list	
<b>Dither Patterns</b>			
Primary Dither Type	select dither type	choose from list	
Primary Dithers	specify number of primary dither points	number	for INTRAMODULE only
Primary Dithers	specify number of primary dither points	number	for INTRAMODULEBOX only
Primary Dithers	specify number of primary dither points	number	for INTRAMODULEX only
Subpixel Positions	specify number of secondary dither points	choose from list	
<b>Science (Grism) Exposure</b>			
Long Wavelength Filter	select long wavelength filter	choose from list	
Short Wavelength Filter	select short wavelength filter	choose from list	
Readout Pattern	select readout pattern	choose from list	
Number of Groups /Integration	specify number of groups per integration	number	
Number of Integrations /Exposure	specify number of integrations per exposure	number	
<b>Direct Image Exposures</b>			
Direct Image	specify if a direct image is needed	checkbox	
Long Wavelength Filter	select long wavelength filter	choose from list	if DIRECT IMAGE = YES

Short Wavelength Filter	select short wavelength filter	choose from list	if DIRECT IMAGE = YES
Readout Pattern	select readout pattern	choose from list	if DIRECT IMAGE = YES
Number of Groups /Integration	specify number of groups per integration	number	if DIRECT IMAGE = YES
Number of Integrations /Exposure	specify number of integrations per exposure	number	if DIRECT IMAGE = YES

## General Information

The following parameters are generic to all templates, and are not discussed in this article: [Observation Number](#), [Observation Label](#), [Observation Comments](#), [Target Name](#), [ETC Wkbk. Calc. ID](#), [Mosaic Properties](#), and [Special Requirements](#).

## Modules

**MODULES** [MODULES] = ALL, A

This field specifies the module(s) to be used for **both** the WFSS grism exposures **and** the direct image exposures. For **MODULES=ALL**, grism and direct image exposures will be taken simultaneously with Module A and with Module B. Module B cannot be used alone.

## Subarray

The **SUBARRAY** [SUBARRAY] parameter specifies the region of the SCA detector that is to be read out. **FULL** is the only allowed value.

## Grism

**GRISM (LONG WAVELENGTH)** [GRISM] = GRISMR, GRISMC, BOTH

This field specifies the long wavelength grism(s) to be used for the exposures. If **GRISM=BOTH** is specified, then two sets of science grism exposures will be acquired - once using **GRISMR** (the row grism), then using **GRISMC** (the column grism).

Note for developers: If only GRISMR or GRISMC is selected, provide the following warning: "Use of only one of GRISMR or GRISMC may result in spectral overlap from multiple sources that can't be corrected. Users should address this issue in their proposal text."

## Dither Patterns

Most NIRCcam WFSS imaging observations will require dithering; see [Dither Parameters](#) for details.

### Primary Dither Type

*PRIMARY DITHER TYPE [DITHER\_FOV] = NONE, INTRAMODULE, INTRAMODULEBOX, INTRAMODULEX*

This parameter specifies the type of primary dither pattern.

Note for developers: *PRIMARY DITHER TYPE* should be a required field, and there should be no default value (i.e. do not make *NONE* the default).

#### None

This value indicates no dithering will be performed.

#### Intramodule

The following parameter is needed to specify the *INTRAMODULE* dither.

### Primary Dithers

*PRIMARY DITHERS [PRIMARY\_DITHERS] = 3, 4, 6, 8, 12, 16*

This parameter specifies the number of primary dither points.

#### Intramodulebox

The following parameter is needed to specify the *INTRAMODULEBOX* dither.

### Primary Dithers

*PRIMARY DITHERS [PRIMARY\_DITHERS] = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16*

This parameter specifies the number of primary dither points.

## Intramodulex

The following parameter is needed to specify the *INTRAMODULEX* dither.

## Primary Dithers

*PRIMARY DITHERS* [PRIMARY\_DITHERS] = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

This parameter specifies the number of primary dither points.

## Subpixel Positions

*SUBPIXEL POSITIONS* [SUBPIXEL\_POSITIONS] = 4-point, 9-point, NONE

This parameter specifies the secondary dither points used for every primary dither point and is required for all *PRIMARY DITHER TYPE* values, including *NONE*.

Note for developers: see [NIRCam Dither Details](#) for dithering details.

## Science (Grism) Exposure

For each grism science exposure the following exposure parameters will be required. If *GRISM=BOTH* was chosen, all the specified exposures using/supporting *GRISMR* will be executed, then all the same specified exposures using/supporting *GRISMC* will be executed. Each complete set of exposures for a requested grism includes requested dithers, and (optionally) direct images.

Note for developers: The GRISM(s) chosen will be populated into the long wavelength pupil.

## Long Wavelength Filter

*LONG FILTER* [FILTLONG] = F277W, F322W2, F356W, F444W, F250M, F300M, F335M, F360M, F410M, F430M, F460M, F480M

This field specifies the filter to be used for the long wavelength science grism exposures. For more details on the Filters, see [Science](#).

## Short Wavelength Filter

**SHORT FILTER [FILTSHORT] = F140M, F162M+F150W2, F164N+F150W2, F182M, F187N, F210M, F212N, F070W, F090W, F115W, F150W, F200W**

This field specifies the filter to be used for the short wavelength science imaging exposures.

Note for developers: The filters **F162M** and **F164N** are actually on the pupil wheel so they are paired with filter **F150W2**; the pupil wheel is **CLEAR** for all other values.

## Exposure Duration

For each exposure specification, choose the **READOUT PATTERN**, **NUMBER OF GROUPS/INTEGRATION**, and the **NUMBER OF INTEGRATIONS/EXPOSURE**. For more information on defining an exposure specification, see [Science](#).

## Readout Pattern

**READOUT PATTERN [READOUT PATTERN] = RAPID, BRIGHT1, BRIGHT2, SHALLOW2, SHALLOW4, MEDIUM2, MEDIUM8, DEEP2, DEEP8**

This field specifies the readout pattern to be used to obtain the science grism data.

## Number of Groups/Integration

**NUMBER OF GROUPS/INTEGRATION [NGROUPS]** specifies the number of groups in each integration. ⚠️ If **MODULES=ALL**, see [Table 1](#). If **MODULES=A**, the range is 1-10 for all patterns.

Table 1. Number of Groups/Integration for WFSS Observations (**MODULES=ALL**)

Readout Pattern	Number of Groups /Integration	Number of Integrations /Exposure
RAPID	2	1-2
	1	1-20
BRIGHT1	1-10	1-10
BRIGHT2	2-10	1-10
SHALLOW2	1-10	1-10
SHALLOW4	1-10	1-10
MEDIUM2	1-10	1-10
MEDIUM8	1-10	1-10
DEEP2	1-10	1-10
DEEP8	1-10	1-10

## Number of Integrations/Exposure

**NUMBER OF INTEGRATIONS/EXPOSURE [NINTS]** field specifies the number of times the integration is repeated within an exposure. - ⚠️ If **MODULES=ALL**, see [Table 1](#). If **MODULES=A**, the range is 1-10 for all patterns. -

## Direct Image Exposures

For each science exposure (except the last one, for which it is required) an optional Direct Image Exposure may be selected.

Note for developers: The Direct Images are not dithered.

## Acquire Direct Image

If checked, this field indicates that a direct image (no grism) is requested after this science exposure. The last science exposure specification must have this field checked. See [Direct Images](#) for details.

For each science image with Direct Image checked, the following direct image exposure parameters will be required.

## Long Wavelength Filter

**LONG FILTER [FILTLONG]** = F277W, F322W2, F356W, F444W, F250M, F300M, F335M, F360M, F410M, F430M, F460M, F480M

This field specifies the filter to be used for the direct long wavelength image exposures.

## Short Wavelength Filter

**SHORT FILTER [FILTSHORT]** = F140M, F162M+F150W2, F164N+F150W2, F182M, F187N, F210M, F212N, F070W, F090W, F115W, F150W, F200W

This field specifies the filter to be used for the direct short wavelength image exposures.

Note to developers: The filters **F162M** and **F164N** are actually on the pupil wheel so they are paired with filter **F150W2**; the pupil wheel is **CLEAR** for all other values.

## Direct Image Exposure Duration

For each direct image exposure specification, choose the **READOUT PATTERN**, **NUMBER OF GROUPS /INTEGRATION**, and the **NUMBER OF INTEGRATIONS/EXPOSURE**. For more information on defining an exposure specification, see [Direct Images](#).

## Direct Image Readout Pattern

**DIRECT IMAGE READOUT PATTERN [READOUT PATTERN]** = RAPID, BRIGHT1, BRIGHT2, SHALLOW4, SHALLOW2, MEDIUM2, MEDIUM8, DEEP2, DEEP8

This field specifies the readout pattern to be used to obtain the direct image data.

## Direct Image Number of Groups/Integration

**DIRECT IMAGE NUMBER OF GROUPS/INTEGRATION [NGROUPS]** specifies the number of groups in a direct image integration. ⚠ If **MODULES=ALL**, see [Table 1](#). If **MODULES=A**, the range is 1-10 for all patterns.

## Direct Image Number of Integrations /Exposure

**DIRECT IMAGE NUMBER OF INTEGRATIONS/EXPOSURE [NINTS]** field specifies the number of times the direct image integration is repeated within an exposure. ⚠ If **MODULES=A**, the range is 1-10 for all patterns.

# Out-of-Field Source Images

After all of the requested Science and Direct Image Exposures are obtained for one of the grisms, two additional “Out-of-Field Source” direct images are taken using a predefined pattern of offsets. These images are required. The exposure specification is identical to the final Direct Image Exposure exposure specification. One pre-defined pattern is used at the end of a *GRISMR* sequence and a different pattern is used at the end of a *GRISMC* sequence.

Note for developers: *GRISMR* exposures use pattern *GRISMR\_SID* and *GRISMC* exposures use pattern *GRISMC\_SID*.

## Change log

### General Notes

None.

## Change Log

Version 7 (April 17, 2019)

1. Editorial change (moved change log to main article).

Version 6 (October 2, 2018)

1. [PR 88363](#) - added developer note to Grism section

Version 5 (April 9, 2018)

1. [PR 89484](#) - updated exposure constraints for RAPID, BRIGHT2

Version 4 (October 9, 2017)

1. [PR 88124](#) - added dither patterns
2. [PR 89047](#) - correction to 88124
3. [PR 87895](#) - updated Exposure field labels to Groups/Integration and Integrations/Exposure
4. [PR 87126](#) - added NONE for subpixel dithers

Version 3 (May 12, 2017)

1. [PR 86995](#) - updated dithers

Version 2 (February 21, 2017)

Removed FULL from Primary Dithers parameters (corrected error in initial implementation)

Version 1 (October 11, 2016)

1. [PR 83641](#) - initial version

## Related links

## Other NIRCам Science Templates:

[NIRCам Imaging Template Parameters](#)

[NIRCам Coronagraphic Imaging Template Parameters](#)

[NIRCам Time Series Imaging Template Parameters](#)

[NIRCам Grism Time Series Imaging Template Parameters](#)

## Other Spectroscopic Templates:

[MIRI Low Resolution Spectroscopy Template Parameters](#)

[MIRI Medium Resolution \(Integral Field Unit\) Spectroscopy Template Parameters](#)

[NIRISS Single-Object Slitless Spectroscopy \(SOSS\) Template Parameters](#)

[NIRISS Wide Field Slitless Spectroscopy \(WFSS\) Template Parameters](#)

[NIRSpec Fixed Slit Spectroscopy Template Parameters](#)

[NIRSpec Integral Field Unit \(IFU\) Spectroscopy Template Parameters](#)

[NIRSpec Multi-Object Spectroscopy Template Parameters](#)

[NIRSpec Bright Object Time Series Template Parameters](#)

# NIRCam Engineering Templates:

[NIRCam Dark Template Parameters](#)

[NIRCam Engineering Imaging Template Parameters](#)

[NIRCam External Flat Template Parameters](#)

[NIRCam Focus Template Parameters](#)

[NIRCam IPR Imaging Template Parameters](#)

[NIRCam PIL Template Parameters](#)

[NIRCam Wheel Exercise Template Parameters](#)

## Keywords

*JWST NIRCam Wide Field Slitless Spectroscopy (WFSS) Template*

*JWST NIRCam Wide Field Slitless Spectroscopy (WFSS) template parameters*

Format definitions

***Boldface italics*** type indicates the name of an APT parameter or a value for a parameter.

**⚠ Red** text indicates restrictions on a parameter.

**Brown** text indicates notes for the developers.

**Green** text indicates the name of the parameter used by Commanding.

### On this page

- [Introduction](#)
- [General Information](#)
- [Modules](#)
- [Subarray](#)
- [Grism](#)
- [Dither Patterns](#)
  - [Primary Dither Type](#)
  - [Subpixel Positions](#)
- [Science \(Grism\) Exposure](#)
  - [Long Wavelength Filter](#)

- [Short Wavelength Filter](#)
- [Exposure Duration](#)
- [Direct Image Exposures](#)
  - [Acquire Direct Image](#)
  - [Long Wavelength Filter](#)
  - [Short Wavelength Filter](#)
  - [Direct Image Exposure Duration](#)
- [Out-of-Field Source Images](#)
- [Change log](#)
- [Related links](#)
- [Keywords](#)

## JWST Proposal Parameters

[Change log](#)

[Change log](#)