GI Stage Procedure Manual 2023.01.10

For Users

1. adjusting sample position and angle

•The rotation direction of the stages is shown in the following pictures. The new GI stages are BL-6A, BL-10C and BL-15A2, with the Pih-axis motor on the BL-7, BL-11 and BL-16 side. The new GI stages should be used in the range of 0° to $\pm 175^{\circ}$ (-175° to 175°).



Old GI Stage@BL-6A

New GI Stage

•At the start of the experiment, use the laser to align the approximate position of the GI stage with the first sample.



• Select Automatic GI sample alignment from Option in PILARUS Measurement Control Software.

File Option Piletus PILATUS 1 PILATUS 1 and 2 Control program mode Piletus with shutter control File type Plot environment profiles to 1 file. Control program mode Plot environment profiles to 1 file. Control To Shutter Burst Mode ON OFF
Detector PILATUS 1 PILATUS 1 and 2 Control program mode Pilatus with shutter control File transmission Pile tr
Pliatus 1 Directory Z¥user¥test Directory Z¥user¥test Directory Directory Energy (eV) 52:00 Gain autog File prefix test001 File type (eV) File type (eV) Energy (eV) 52:00 Gain autog Monochrometer Energy (eV) May autog Integration Energy update Energy update No, images 5 Exp. time [sec] 5 Energy (eV) Energy update
Exp. period (sec) 501 Exp. period (sec) 501 Exp. period (sec) 501 Exp. period (sec) 501 Exp. period (sec) 501 Start wait (sec) 0.01 A: [Exp. Delay] B: [Exp. period] - [Exp. time] No. cycle 1 Cycle interval (sec) 0.001 + A + B + 0 Detector position © Fix Change Stage control © Auto Relative to Current © Auto Relative to Current Pos. 2 Ver 0 Hor 0 Pos. 2 Ver 0 Hor 0
Platus 2 Directory ZW File prefix File type () tif () obf No, images () Exp. time [sec] () Exp. delay [sec] A: [Exp. Delay] B: [Exp. period] - [Exp. time] No. cycle () () () () Images mode () ()
Ready to start.

🖳 Automati	c GI sample stage alig	Inment		×
Option				
Sample	stage			
	Present	Absolute	Relative	
ThetaY	Er: GI.ThetaY deg	Go		Go
Ver	0.21000 mm	Go		Go
Automa	tic GI sample sta	age alignment		
	Start	Stop		
Info				^
				Ŧ
				_
Click [x] but	ton to close this wind	ow.		.:

 $\bullet Automatic \ GI \ sample \ alignment \ is \ activated; \ select \ Option \rightarrow GI \ stage \ alignment \ configuration.$

GI stage alignment configuration is started.

• If the PD Ver. for adjusting the beam of B.S. is blank, please enter it. Usually, the person in charge of setting up the system puts it in.

💀 GI stage align	ment configura	ition				
PD Beam Stopper Ver Sample stage	9.482 mm			Reset		
Ver By use of cha	nnel CH4 🔻		ThetaY By use of cha	innel CH4 🔻		
Mode 🔘 A	BS 🔘 REL		Mode 💿 Al	BS 💿 REL		
Start (mm)	1		Start (mm)	0.8		
End (mm)	-1		End (mm)	-0.8		
Step (mm)	0.05		Step (mm)	0.02		
Integ (sec)	0.1		Integ (sec)	0.1		
Final position			Final position			
1st move to	Differentioal peak	-	Move to Pe	ak		
2nd move to	2nd move to Original position					
Update Close						
Input Ok. No cha	inged value.			.::		

•By use of channel is CH4, Mode is REL, Start is 1, End is -1, Step is 0.05, Integ is 0.1, and Final position is 1st as Differential peak and 2nd as Original position.

•By use of channel is CH4, Mode is REL, Start is 0.8, End is -0.8, Step is 0.02, Integ is 0.1, and Move to Peak is selected.

🖳 GI stage align	ment configura	ition					
PD Beam Stopper (Absolute) Ver 9.482 mm							
Sample stage							
Ver By use of cha	nnel CH4 🔻		Thetay By use of cha	annel CH4 🗸			
Mode 🔘 Al	3S 🧿 REL		Mode 🛛 🔘 A	BS 💿 REL			
Start (mm)	1		Start (mm)	0.8			
End (mm)	-1		End (mm)	-0.8			
Step (mm)	0.05		Step (mm)	0.02			
Integ (sec)	0.1		Integ (sec)	0.1			
Final position	Differentical peak		Final position				
2nd move to	2nd move to Original position Move to Gravity						
Update Close							
Input Ok. No cha	nged value.			.:!			

• Press Update.

🖳 GI stage alig	nment configura	tion		
PD Beam Stoppe Ver Sample stage	er (Absolute) 9.482 mm			Reset
Ver By use of ch	annel CH4 🔻		ThetaY By use of cha	innel CH4 🗸
Mode 🔘 A	BS 🧿 REL		Mode 💿 Al	BS 💿 REL
Start (mm)	1		Start (mm)	0.8
End (mm)	-1		End (mm)	-0.8
Step (mm)	0.05		Step (mm)	0.02
Integ (sec)	0.1		Integ (sec)	0.1
Final position			Final position	
1st move to	Differentioal peak	-	Move to Pe	ak
2nd move to	Original position	•	🔘 Move to Gr	avity
	Update		Close	
Input Ok. No ch	anged value.			.::

• Press Start in Automatic GI sample alignment; the PD will move to the X-ray position. Then Ver adjustment, ThetaY adjustment, and Ver adjustment will be performed automatically.

💀 Automat	ic GI sample stage ali <u>c</u>	Inment				3
Option						
Sample	stage					
	Present	Absolute	R	elative		
ThetaY	Er: GI.ThetaY deg		Go		Go	
Ver	0.21000 mm		Go		Go	
Automa	itic GI sample sta	age alignmer	rt			
	Start		op			
Info					^	
					-	
Click [x] but	tton to close this windo	ow.				.::

• After the auto-adjustment is finished, enter the value of the inflection point of Ver into Relative of Ver and press Go. This is what the user wants.

🖳 Automat	ic GI sample stage alig	gnment	
Option			
Sample	stage		
	Present	Absolute	Relative
ThetaY	Er: GI.ThetaY deg	Go	Go
Ver	0.21000 mm	Go	Go
Automa	ntic GI sample sta	age alignment	
	Start	Stop	
Info			*
			~
Click [y] but	ttop to close this wind		
Click [X] but	con to close this wind	JW.	

• Thereafter, you can press stat in Automatic GI Sample stage alignment to make the adjustment. After the automatic adjustment is completed, enter the value of the inflection point of Ver in the Relative field of Ver and press Go.

You may change the Ver and ThetaY values in the .GI stage alignment configuration.

- 2. measurement while changing ThetaY
 - Click on "Stage Control" in the PILATUS Measurement Control Software at Photon Factory.

PILATUS Measurement Control Software at Photon Factory			
File Option			
Detector PILATUS 1 PILATUS 1 and 2	Control program mode	Pilatus with shutter control	Energy Information
Pile Option Detector PILATUS 1 PILATUS 1 Directory Z#user#test#20170913 File prefix test001 File type tif cbf No. images 5 Start wait [sec] 5.1 Exp. period] = [Exp. time] No. cycle Start wait [sec] A: [Exp. Delay] B: [Exp. period] = [Exp. time] No. cycle Cycle interval [sec] 0.001 + A + B + 0 Detector position Manual Manual <th>Control program mode</th> <th>Pilatus with shutter control ● as to 1 file. ● Individual ● Individual ● ON ● OFF</th> <th>Energy Information Energy (eV) 9206 • Gain autog Energy update</th>	Control program mode	Pilatus with shutter control ● as to 1 file. ● Individual ● Individual ● ON ● OFF	Energy Information Energy (eV) 9206 • Gain autog Energy update
Run Stop			
Ready to start.			.:

•Select "Use gi thetay scan" under Select Stage type. The following screen shows an example of scanning from -0.1° to -1° every 0.01°. Enter the direction of scan, in this case minus, to three decimal places in per Step.

🖳 Stage contro	bl				
Select stage ty	ype O Unuse st O Use rota O Use sam O Use gi th O Use cust	tages ry sample ch ple stage sca netay scan tom scan	anger anning		
Please input	the absolute value	e to each p	osition.		
GI thetaY	deg	Start. -0.1	End. -1	per Step -þ.010	Count. 91
			Nun	nber of cycles	: 91
Input ok. 'Stage c	ontrol' enabled. Click 'C	O Dk' if change t	k the values		C

• Press Run to start measurement.

💀 PILATUS Measur	ement Control Software at Photon Factory	
File Option		
Detector	PILATUS 1 O PILATUS 1 and 2	Control program mode Pilatus with shutter control
Pilatus 1 Directory File prefix No, images Exp. time [sec] Exp. period [sec] Exp. delay [sec]	Z¥user¥test¥20170913 test001 File type ● tif O cbf 5 5.1	Optional Settings Clienty (ev) 0.000 = Plot environment profiles to 1 file. Gain autog Counter Output Integration Shutter Burst Mode ON
Start wait [sec] No. cvcle	0 A: [Exp. Delay] B: [Exp. period] - [Exp. time] 10 ♠ Cycle interval [sec] 0.001 + A + B + 0	
Detector position	Fix Ochange Stage control	
⊚ Auto ○ Manua ● Internal mode ○	Relative to Current I Pos. 1 Ver 0 Hor 0 Pos. 2 Ver 0 Hor 0 0 Single trigger mode Multi trigger mode External enable mode External	
Pilatus 2 Directory File prefix No, images	Z¥ III File type (e) tif (cbf	
Exp. time [sec] Exp. period [sec] Exp. delay [sec] Start wait [sec] No. cycle	A: [Exp. Delay] B: [Exp. period] - [Exp. time]	
) Internal mode	Single trigger mode 🔵 Multi trigger mode 🔵 External enable mode	
Ready to start.	Run Stop	

•The output file name will be test001_0 (cycles)_00000 (number of measurements).tif in the above case.

- 3. gradual change of GI stage scanning
 - •The GI stage scan can be changed in stages.
 - Press Stage control in PILARUS Measurement Control Software.

PILATUS Measurement Control Software at Photon Factory		
File Option		
Detector PILATUS 1 PILATUS 1 PILATUS 1 and 2	Control program mode Pilatus with shutter control	Energy Information
Detector PILATUS 1 PILATUS 1 and 2 Pilatus 1 Directory Z#user#test File prefix test001 File type ● tif ● cbf Monochrometer Energy ● Wavelength Change control 1.5 Å auto tune No, images 5 • Exp. time [sec] 5 • Start wait [sec] 0.01 A: [Exp. Delay] B: [Exp. period] - [Exp. time] No. cycle II Cycle interval [sec] 0.011 • A + B + 0 Detector position ● Fix Change Stage control ● Auto Relative to Current Manual Pos. 1 Ver 0 Hor 0 ● Onternal mode Single trigger mode Multi trigger mode External enable mode File prefix File type ● tif cbf No, images Exp. teilage A: [Exp. Delay] B: [Exp. period] - [Exp. time] No, images Exp. teilage A: [Exp. Delay] B: [Exp. period] - [Exp. time] No, cycle No. cycle Image: Cycle interval [sec] 0.001 + A + B + 0 Image: Cycle interval [sec] No. cycle Image: Cycle i	Control program mode Pilatus with shutter control	Energy Information Energy (eV) 8266 Gain autog Energy update
- Sup		
Ready to start.		.:

•Select Use custom scan. per Step enter the direction of scan, minus if less than or equal to, to 3 decimal places. close with OK.

Stage control							
Select stage type	 Unuse stages Use rotary samp Use sample stag Use gi thetay so Use custom sca 	ile chansi e scannir an n	er ng				
Custom scan Please input the Stepscan input:	e stagename and abs	olute va	i lue to eac Start.	h positic End.	on. per Step	Count.	
🔽 Pos. 1 🛛 🛛 🖓	ThetaY 👻	deg	-0.131	-0.231	-0.050	з	
V Pos. 2 GL	ThetaY 👻	deg	-0.232	-0.332	-0.020	6	
Pos. 3 GLT	ThetaY 🔹	deg	-0.337	-0.437	-0.100	2	
				Numb	er of cycles	11	
Quickscan input	:		Start.	End.	per Step	Div.	
Pos. 1 (Ple	ease select> *						
input ok. 'Stage cont	rol' enabled. Click 'Ok'	Ok if change	the values.	Numb	er of images Cancel		

•In the above example, ThetaY can be scanned in three different steps.

- 4. measurement in combination with the translation function
 - If the detectors are to be moved together, 2. perform the following operations following the measurement while changing ThetaY or 3. stepwise change of the GI stage scan.
 - •Select "change" from Detector position, then select Auto or Manual. If you select Manual, please enter the Ver. and Hor. for Pos.1 and 2.

PILATUS Measurement Control Software at Photon Factory		and so the local diversity			
File Option					
Detector PILATUS 1 PILATUS	1 and 2 Control program mod	e Pilatus with shutter control -	Energy Information		
Pilatus 1	Optional Settings		Gain autor		
Directory Z.¥user¥test¥20170913	🔛 📄 Plot environment pr	Plot environment profiles to 1 file.			
File prefix test001 File type () tif ()	cbf Counter Output	🖲 Individual 🛛 💿 Integration	Constant of the		
No, images 5 🔶	Shutter Burst Mode	💿 ON 💿 OFF	Energy update		
Exp. time [sec] 5	,		1		
Exp. period [sec] 5.1					
Exp. delay [sec]					
No cycle 10 A: [Exp. Delay] B: [Exp.	periouj - (c.xp. time)				
	Stage control				
Detector position					
Manual Pos. 1 Ver 0 Hor 0					
Pos. 2 Ver 0 Hor 0					
Internal mode Single trigger mode Multi trigger mode	xternal enable mode				
Pilatus 2					
Directory Z#	III				
No. images 1 1					
Exp. time [sec]					
Exp. period [sec]					
Exp. delay [sec]					
Start wait [sec] A: [Exp. Delay] B: [Exp.	period] - [Exp. time]				
No. cycle 1 🔄 Cycle interval [sec] 0.00	11 + A + B + 0				
📔 🕘 Internal mode 🔘 Single trigger mode 🔘 Multi trigger mode 🔵 E	xternal enable mode				
Run Stop					
Ready to start.					

• Press Run to start measurement.

• The file name is "test001_0(cycle)_d0(translation position)_00000(number of measurements).tif".

5. if it stops working during the process

·Close Manager on the measurement PC (MEAS PC) and the control PC (CONT PC) once.





•Start the Manager on the measurement PC (MEAS PC) and on the control PC (CONT PC).



For BL-6

💀 BL-6A Stage Controller											
Option Setting											
	Presen	nt (mm)	Absolute	Relative	Scan tool						
Pinhole	Ver	-0.39900	Go	Go	Select Axis	s Sample.Ver 💌	Present	0.79300	mm		
Stage	Hor	0.43350	Go	Go	Mode	○ ABS ④ REL	Start	2.5	mm		
Sample	Ver	0.79300	Go	Go	Plot		End	-2.5	mm		
Stage	Hor	0.34300	Go	Go	C Standard		Step	0.1	mm		
Beam	Ver	2.01950	Go	60	✓ Final position C Move to Peak Integ 0.2 (see		(sec)				
Stopper	Hor	1.07650	Go	Go	Move to Gravity Move to center of EWHM						
	Man	-49 20000 🗖			 Differential 						
Detector	Hor	-1 00000	Go	Go	By use of ch	annel CH4 💌					
					File Prefix						
	ThetaY	0.129	Go	Go	Comment						
GI	ThetaX	0.000	Go	Go	Start	Stop					
	Pm	0.00000	40	Go							
Rot	Presen	standby	0 60	Go							
Sampler	notx	otanuby [0_00								
				Stop							
CH1: 366	408. CH	2: 125. CH3·	0. CH4: 123. CH	5:0.CH6:0.CH7·	0. CH8: 0			Gr	et		

•On the control PC (CONT PC), actually move the axes of the GI stage from the GUI.

• If it still does not work, turn off the power to the driver in the case of the old GI stage for BL-6A and the pulse motor controller SC410 in the case of the new GI stage, wait 30 seconds, and turn it on again.

