Appendix A – instructions on how to configure the ePix10k small for a specific gain mode.

To change the gain mode one operates in for the ePix10k small, we have to change one register setting (called trim_bit) and load one pixel configuration file. To change these settings you have to go into the experts mode in the detector configurations, as can be seen in figure A1. This is done by, in the DAQ control GUI, clicking the edit button, which opens the reconfigure window. In this window click options, and select expert mode. Once you have selected expert mode, select your detector in the reconfigure window and then press apply. This opens up the configurations window as can be seen in Figure A2.

DAQ Control _ D X detdaq18 Configuration Type BEAM O Edit	Co
Reconfigure	×
Options	
Device Component	
EVR [EVR] Control Epix01 Epix02 cspad Cspad2x2 OceanOptics Jungfrau0 Jungfrau1 • Edit O Restore	
Apply Close	1
Kun Statistics	
Duration 0:3:21	-
Damaged 0	M
Size 6568 MBytes	
Damage Stats	
10:23:01: Not recording. Transient data file: e0/e0-	
r1603992181-sNN-cNN.xtc	

Figure A1. Screenshot of the DAQ control gui showing how to get to the configurations window in expert mode.

EPIX10ka Configuration				×
Version	e2030002	EpixRunTrigDelay (0->2147483647) 6	adcStreamMode (0->1) 0	AsicMask (0x0->0xf)
DigitalCardId0 DigitalCardId1	3153025	DacSetting (0x0->0xffff)	testPatternEnable (0->1) 0	EnableAutomaticRunTrigger (0->1)
AnalogCardid0 AnalogCardid1	252889089 1342177304	asicGR (0->1)	R0Mode (0->1) 1 AcqToAsicR0Delay (0->2147483647) 14032	NumbClockTicksPerRunTrigger 833333
CarrierId0 CarrierId1	169813761 486539286	asicGRControl (0->1)	AsicR0ToAsicAcq (0->2147483647) 10000	ScopeEnable (0->1) 0
BaseClockFrequency	1048576	asicAcq (0->1) 0	AsicAcqWidth (0->2147483647) 10000	ScopeTrigEdge (0->1)
EvrDaqCode (0->255)	40	asicAcqControl (0->1) 0	AsicAcqLToPPmatL (0->2147483647) 200	ScopeTrigCh (0->15) 6
EvrRunTrigDelay (0->214 NumberOfAsicsPerRow (2-	7483647) <u>1</u> ->2) 2	asicR0Control (0->1)	AsicPPmatToReadout (0->2147483647) 0 AsicRoClkHalfT (0->2147483647) 5	ScopeArmMode (0->3) 2 ScopeAdcThresh (0x0->0xfff) 0
NumberOfAsicsPerColumn NumberOfRowsPerAsic (1)	(2->2) 2 76->176) 176	asicPpmat (0->1) 1	AdcReadsPerPixel (1->3)	ScopeHoldoff (0->8191)
NumberOfReadableRowsPe	erAsic (0->176) 176	asicPpmatControl (0->1)	AdcClkHalfT (1->400)	ScopeOffset (0->8191) 15
CalibrationRowCountPerAS	W (192->192) 192 SIC (2->2) 2	asicPpbe (0->1)	AsicROWidth (0->2147483647) 30	ScopeTraceLength (0x0->0x1ff) 1000
EnvironmentalRowCountPe ASICs	erASIC (1->1) 1	asicPpbeControl (0->1) 0	AdcPipelineDelay1 (0->2147483647) 32	ScopeSkipSamples (0->8191) 0
Pixel	<u>M</u> ap	asicRoClk (0->1)	AdcPipelineDelay2 (0->2147483647) 32	ScopeInputA (0->31)
<u>C</u> alib	Мар	asicRoClkControl (0->1) 0	AdcPipelineDelay3 (0->2147483647) 32	ScopeInputB (0->31) 4
	Save	2	Cance	1

Figure A2. The configuration window opened up in expert mode for the ePix10k small.

1		ASIC: 0			×	The Constant of the	2
1	EPIX10ka Configuration	CompTH_DAC (0x0->0x3f) 22] TPS_tcomp (0x0->0x1) 1	DelCCKreg (0x0->0x1) 0		×	
Reyelt	Version e2030002	CompEn_lowB (0x0->0x1)] TPS_MUX (0x0->0xf) 0	RO_rst_en (0x0->0x1)			-1.5
1	DigitalCardId0 1663404124	CompEn_midB (0x0->0x1)	RO_Monost (0x0->0x7) 3	SLVDSbit (0x0->0x1) 1			2 A
8	DigitalCardId1 1354881	CompEn_topB (0x0->0x1) 1] TPS_GR (0x0->0xf) 3	FELmode (0x0->0x1) 1		EnableAutomaticRunTrigger (0->1) 0	♀ Shar
	AnalogCardId0 853123073	PulserSync (0x0->0x1) 0	S2D0_GR (0x0->0xf) 3	CompEnOn (0x0->0x1)		NumbClackTicksParPupTriagar	Q
Acrol	AnalogCardId1 503316505	pixelDummy (0x0->0xff) 5a	PP_OCB_S2D (0x0->0x1) 1	RowStart (0x0->0x1ff) 0			liting
salelei	Carrierld0 [170007809	Pulser (0x0->0x3ff)	OCB (0x0->0x7) 3	RowStop (0x0->0x1ff) b1		ScopeEnable (0->1) 0	*
1	Carrierld1 1459617814	Pbit (0x0->0x1) 0	Monost (0x0->0x7) 3	ColumnStart (0x0->0x7f)	0	ScopeTrigEdge (0->1)	
	BaseClockFrequency 1048576	atest (0x0->0x1)	rastPP_en (0x0->0x1) 0	columnstop (0x0->0x7f)	21		
MATL	EvrRunCode (0->255) 40	Sab test (0x0->0x1)	Pixel CB $(0x0->0x7)$			ScopeTrigCh (0->15) 6	
REOR	EvrDaqCode (0->255) 40	Hrtest (0x0->0x1)	Vidi b (0x0->0x3)	L'TUG TUH	ŧι	ScopeArmMode (0->3)	
- Area	EvrRun IrigDelay (0->2147483647)	PulserR (0x0->0x1) 0	S2D tcomp (0x0->0x1) 0				
<u></u>	NumberOfAsicsPerColumn (2->2)	DM1 (0x0->0xf) 0	Filter_DAC (0x0->0x3f) 11	trbit (0x0->0x1) 0		ScopeAdcThresh (0x0->0xfff) 0	
AOM	NumberOfRowsPerAsic (176->176)	DM2 (0x0->0xf) 1	testLVDTx (0x0->0x1)	5200 tenac (0v00v3)	-	ScopeHoldoff (0->8191) 0	n = 1
ackup	NumberOfReadableRowsPerAsic (0->176)	Pulser_daq (0x0->0x7) 3] tc (0x0->0x3) 0	S2D0_DAC (0x0->0x3f)	.4		
	NumberOfPixelsPerAsicRow (192->192)	MonostPulser (0x0->0x7)] S2D (0x0->0x7) 3	S2D1_tcDAC (0x0->0x3) [1	J ScopeOffset (0->8191)	
	CalibrationRowCountPerASIC (2->2)	DM1en (0x0->0x1) 0	S2D_DAC_Bias (0x0->0x7) 3	S2D1_DAC (0x0->0x3f) 1	2	ScopeTraceLength (0x0->0x1fff) 1000	
		DM2en (0x0->0x1) 0	TPS_tcDAC (0x0->0x3) 0	S2D2_tcDAC (0x0->0x3) [1		
W IS	ASICs 0	emp_bd (0x0->0x7) 0] TPS_DAC (0x0->0x3f) 10	S2D2_DAC (0x0->0x3f) [1	2	ScopeSkipSamples (0->8191) 0	
	Pixel Man	emp_bc (0x0->0x7) 0	testBE (0x0->0x1) 0	S2D3_tcDAC (0x0->0x3)	1	ScopeInputA (0->31) 0	<u>n = 1</u>
		VicefLow (0x0->0x3t) 13] IS_en (0x0->0x1) [0	52D3_DAC (0x0->0x3t) [1	2		
	<u>Calib Map</u>	vreitow (0x0->0x3)		l.		ScopeinputB (0->31/	
Zoor			Copy this ASIC				
	100/100		Return				1
	State States with the states	W PORT AND					
1	Carl and the state of the state	as I have and	Slide 2 of 4	🚔 Notes 📕 O	ommen	vis 🔟 🖽 💷 🖵 🗕 🕂 🕂	47% E
T	O Type here to search	0 H C 📄	🔒 💼 🔞 🕄	😑 🎎 😰 🌆		8:50 AM	-
	•					8/22/2020	

Figure A3. Screenshot showing how to set the trim_bit option for when configuration the small epix10k for a specific gain mode.

In order to set the trim bit to the value required for the gain you want to go into you have to go into the ASICs section as can be seen in Figure A3. The location of the ASICs is indicated by the blue box in the back of the screenshot, which opens up the front window. The location of the tr_bit in the front window can be seen in blue box in the front window.

Once this value has been set to the desired value to get you into the right gain mode, you have to click the copy this ASIC and apply to all the other ASICs as well.

The second part is then to load the pixel configuration files which is done by going into the Pixel map option in the configurations window, as can be seen in figure A4.

EPIX10ka Configuration			Pixel Mask/Test	Array		××
Version DigitalCardId0	e2030002] EpixRunTrigDelay (0->2	147			
DigitalCardId1	1354881	DacSetting (0x0->0xffff	5			1) 0
AnalogCardId0 AnalogCardId1	853123073 503316505] asicGR (0->1)	0		I 5	33333
CarrierId0	170007809	asicGRControl (0->1)	0			
CarrierId1 BaseClockFrequency	1459617814 1048576	asicAcq (0->1)	Load	created file	with pixel b	its
EvrRunCode (0->255)	40	asicAcqControl (0->1)	d		Clear	
EvrDaqCode (0->255) EvrRunTrigDelay (0->214 NumberOfAsicsPerRow (NumberOfAsicsPerColum	40 47483647) 1 2->2) 2 in (2->2) 2] asicR0 (0->1) asicR0Control (0->1)	0		Export Text File for Pixel/Test M	lap 0
NumberOfRowsPerAsic (176->176) 176	_] asicPpmat (0->1)	1		Return	
Number Of Readable Rows Number Of Pixels Per Asic R	PerAsic (0->176) 176 ow (192->192) 192	asicPpmatControl (0->1	5			
CalibrationRowCountPerA	ASIC (2->2) 2	asicPpbe (0->1)	0		Job Scope in accelering of 10x0-21	1000
EnvironmentalRowCounti	PerASIC (1->1) 1	asicPpbeControl (0->1)	0	AdcPipelineDelay1 (0->2147483647)	32 ScopeSkipSamples (0->81	91) 0
Pixe	l <u>M</u> ap	a icRoClk (0->1)	0	AdcPipelineDelay2 (0->2147483647)	32 ScopeInputA (0->31) 0	1
Calit	ь Мар	asicRoClkControl (0->1)	0	AdcPipelineDelay3 (0->2147483647)	32 ScopeInputB (0->31) 4	
	Save	0	1		Cancol	1

Figure A4. Screenshoot showing how to load the pixel configuration file for the desired gain mode.

When clicking the import text file for pixel/test map you are prompted to select the corresponding file to what gain mode you want to run in. The file will either have the number 0, 8 or 12, and these files can be found as mode_0.txt, mode_8.txt, or mode_12.txt under:

/cds/home/c/conny-h

Alternatively they can be generated using Philips script (script located at: /cds/home/c/conny-h conny-h/small_10k_modes.py. For example to generate the FL gain we want 8, so run:

python small_10k_mode.py 8

This generates a file called mode_8.txt that you load in as described above. What trim bit and what pixel map configuration file to use for the different gain modes are stated in table A1.

Gain mode	Tr_bit value	Pixel config file
FH	1	12 (mode_12.txt - yellow)
FM	0	12 (mode_12.txt - yellow)
FL	Does not matter	8 (mode_8.txt - brown)
AHL	1	0 (mode_0.txt - red)
AML	0	0 (mode_0.txt - red)

Table A1. Tr bit and pixel config file combinations required to get soecific gain mode for the ePix10 small.

When the pixel config file has loaded the colormap changes in accordance to what was loaded in. For mode_0.txt the colormap becomes red – indicating the detector is in switching mode (Tr_bit sets switching point), for mode_8.txt the colormap is brown- indicating we are in fixed low, and mustard to identify that we are in fixed Medium or foxed High depending on the setting of the tr_bit. The colormaps can be seen in Figure A5-A7.



Figure A5. Screenshoot showing colormap indication Auto switching mode (mode_0.txt).



Figure A6. Screenshoot showing colormap indication Fixed High or Fixed low mode (mode_12.txt).

