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1. Document History

Date	Change List
20121104	Initial
20140528	Support new model of HDD: 1. Seagate 4T Surveillance (SV35) 2. Seagate Video 3.5 series of HDD(3T/4T) 3. WD Purple series of HDD (1T/2T/3T/4T)
20140825	Support new model of HDD: 1. Seagate Constellation CS (4T/3T/2T/1T) 2. WD RE(3T) Add the test list of graphic card.
20141114	Add Seagate SV35, Surveillance + SRS support
20141224	Add compatible hard drives: 1. Seagate: ST6000NM0024 (6TB) 2. Toshiba: MD03ACA400V (4TB) 3. Seagate: ST4000VM000 (4TB) Add supported keyboard/joystick: 1. Videotec: DCZ keyboard 2. CH Products: VM Desktop
20150121	Add appendix A and appendix B to introduce how to configure and use supported joystick and keyboards
20150420	Add compatible hard drives: Seagate: ST6000VN001; ST6000VX0001; ST4000NC001
20151022	Add compatible hard drives: Toshiba: MC04ACA400E; WD: WD60PURX
20160216	Add compatible hard deives: Seagate: ST8000VX0002; ST8000NM0055
20160503	Add notice of graphic card: Matrox 9188 and Matrox are not recommended
20161003	Seagate rebranding update for Surveillance and SkyHawk
20161226	Add Seagate: ST6000VX0003
20170710	Add Seagate: ST10000VX0004
20171026	Add Seagate: ST6000NM0115
20171101	Add APC Smart-UPS 750VA
20180112	Add Tripp Lite Smart1500LCD
	Renaming update for WD Purple Model Name from WDXXPURX to WDXXPURZ
20180807	Update appendix A for how to configure and use supported Axis joystick T8312
20200316	Add Seagate SkyHawk AI support: 1. ST8000VE000 2. ST10000VE0004 Support new model of HDD: 1. Seagate : ST4000VX005; ST6000VX001; ST8000VX004; ST14000VX0008 2. WD : WD101PURZ
20231122	Add Seagate SkyHawk AI support 1.ST20000VE002 2.ST18000VE000 3.ST16000VE000

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2. Hard Drives

There are several product segments in hard drive industry such as Enterprise grade, Surveillance grade, Green series and the other consumer desktop hard drives. NUUO recommends system designers choose Enterprise grade or Surveillance grade drives to ensure high storage stability and performance. 24 x 7 operational capabilities are also important because your surveillance system is running around the clock.

Enterprise grade drives are recommended when the configuration of RAID (Redundant Array of Independent Disks) is required. Furthermore, to avoid vibration issue, please consider the maximum HDD number per storage system for system vibration tolerance, for example, if there are more than 5 HDDs in this storage system, please choose Enterprise grade drives or any HDD that has built-in RV Sensor. Enterprise grade drives are also highly recommended for rack-mount storage system or any industrial environments where are always full of vibrations.

Green series hard drives should never be used with NUUO recorders to avoid data lost due to long wake up time from a sleeping drive. Consumer desktop series hard drives should be avoided with NUUO recorders because it's suitable for 8x5 environments only. It's different from your surveillance needs.

2.1 Enterprise

Vendor	Family	Model	Capacity	Interface	Firmware
Seagate	Constellation ES.3	ST6000NM0024	6TB	SATA 6Gb/s	SN02
		ST4000NM0033	4TB	SATA 6Gb/s	0001
		ST3000NM0033	3TB	SATA 6Gb/s	0001
		ST2000NM0033	2TB	SATA 6Gb/s	0001
		ST1000NM0033	1TB	SATA 6Gb/s	0001
	Constellation ES	ST3500514NS	500GB	SATA 3Gb/s	SN12
		ST31000524NS	1TB	SATA 3Gb/s	SN12
	Constellation CS	ST4000NC000	4TB	SATA 6Gb/s	CE02
		ST3000NC000	3TB	SATA 6Gb/s	CE02
		ST2000NC000	2TB	SATA 6Gb/s	CE02
		ST1000NC000	1TB	SATA 6Gb/s	CE02
		ST4000NC001	4TB	SATA 6Gb/s	CN03
	Enterprise NAS + SRS	ST6000VN0011	6TB	SATA 6Gb/s	AN02
	Enterprise NAS	ST6000VN0001	6TB	SATA 6Gb/s	AN02
	Enterprise	ST6000NM0115	6TB	SATA 6Gb/s	SN04
		ST8000NM0055	8TB	SATA 6Gb/s	PN01
WD	RE	WD4000FYYZ	4TB	SATA 6Gb/s	01.0
		WD3000FYYZ	3TB	SATA 6Gb/s	01.0
		WD2003FYYS	2TB	SATA 3Gb/s	01.0
		WD1003FBYX	1TB	SATA 3Gb/s	01.0
		WD5003ABYX	500GB	SATA 3Gb/s	01.0
	SE	WD4000F9YZ	4TB	SATA 6Gb/s	01.0
		WD3000F9YZ	3TB	SATA 6Gb/s	01.0
		WD2000F9YZ	2TB	SATA 6Gb/s	01.0
Toshiba	MD03ACAxxx	MD03ACA400V	4TB	SATA 6Gb/s	FL1V
	MG04ACAxxx	MG04ACA500E	5TB	SATA 6Gb/s	FP3B
	MG03ACAxxx	MG03ACA300	3TB	SATA 6Gb/s	FL1A
		MG03ACA200	2TB	SATA 6Gb/s	FL1A
		MG03ACA100	1TB	SATA 6Gb/s	FL0A
	MC04ACAxxx	MC04ACA400E	4TB	SATA 6Gb/s	FP2A

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2.2 Video Surveillance

Vendor	Family	Model	Capacity	Interface	Firmware
Seagate	SV35 + SRS	ST3000VX004	3TB	SATA 6Gb/s	CV26
		ST2000VX004	2TB	SATA 6Gb/s	CV26
		ST1000VX002	1TB	SATA 6Gb/s	CV26
	Video	ST4000VM000	4TB	SATA 6Gb/s	SC25
	SkyHawk	ST14000VX0008	14TB	SATA 6Gb/s	AV01
		ST10000VX0004	10TB	SATA 6Gb/s	AV01
		ST8000VX0022	8TB	SATA 6Gb/s	AV01
		ST8000VX010	8T	SATA 6Gb/s	CV10
		ST8000VX004	8TB	SATA 6Gb/s	AV01
		ST6000VX0023	6TB	SATA 6Gb/s	SC60
		ST6000VX001	6TB	SATA 6Gb/s	CV11
		ST4000VX007	4TB	SATA 6Gb/s	CV11
		ST4000VX005	4TB	SATA 6Gb/s	CV10
		ST2000VX008	2TB	SATA 6Gb/s	CV11
	SkyHawk AI	ST20000VE002 (*)	20TB	SATA 6Gb/s	EV01
		ST18000VE000(*)	18TB	SATA 6Gb/s	EV01
		ST16000VE000(*)	16TB	SATA 6Gb/s	EV02
		ST10000VE0004	10TB	SATA 6Gb/s	EV01
		ST8000VE000	8TB	SATA 6Gb/s	EV01
	Surveillance + SRS	ST4000VX0011	6TB	SATA 6Gb/s	VN02
		ST4000VX002	4TB	SATA 6Gb/s	CV13
	SV35	ST3000VX000	3TB	SATA 6Gb/s	CV12/CV26
		ST2000VX000	2TB	SATA 6Gb/s	CV12/CV26
		ST2000VX000	1TB	SATA 6Gb/s	CV12/CV26
		ST31000526SV	1TB	SATA 6Gb/s	CV12
		ST3500411SV	500 GB	SATA 6Gb/s	CV12
WD	Purple	WD101PURZ	10TB	SATA 6Gb/s	81.H0A80
		WD60PURZ	6TB	SATA 6Gb/s	80.00A80
		WD40PURZ	4TB	SATA 6Gb/s	80.00A80
		WD30PURZ	3TB	SATA 6Gb/s	80.00A80
		WD20PURZ	2TB	SATA 6Gb/s	80.00A80
		WD10PURZ	1TB	SATA 6Gb/s	01.01A01

(*) Newly tested compatible hard drive models

(!) Only compatible to NT-4040, NT-4040R, CT-4000, CT-4000R, TR-0404NT, TR-0400CT, R1-0404NT and R1-0400CT

(!!) Only compatible to NT-8040R, CT-8040RP, CT-8000R, CT-8000RP, CT-8000IP, CT-8000IP-RP, CT-8000EX and CT-8000EX-RP

**The maximum volume size of each volume is 16TB for non-all-in-one firmware.

***Some listed devices may go EOL, so we cannot promise the market availability.

3. iSCSI Support

Brand	Model	Infrastructure	HDD	Capacity*
EMC	IOMEGA px12-350r	SAN	SATA	36 TB
EMC	IOMEGA px12-450r	SAN	SATA	48 TB
EMC	VNX 5300	SAN	Nearline SAS	375 TB
HP	P2000 G3 MSA	SAN	SAS	36 TB
HP	P2000 G3 MSA	SAN	SATA	36 TB
Qsan	P600Q-DS316	SAN	SATA	48 TB

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Proware	EN-3166JS6H-NQX	SAN	SATA	48 TB

*Capacity is the volume size of each iSCSI model, not the supported volume size of NUUO Crystal™.
**NUUO Crystal™ and Titan NVR support up to 6 iSCSI target. Each iSCSI target has size limitation of 16TB. The total size for iSCSI is 96TB (16TB x 6 targets)

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4. DAS Support

Brand	Model	Host Interface	HDD	Capacity
Axus	FIT500	eSATA	SATA	15 TB

5. Graphic Card* tested

Brand	Series/Model
ATI	Radeon HD 4350
AMD	Radeon HD 5450
	Radeon HD 6670
	Radeon HD 6750M
NVIDA	GeForce GT 610
	GeForce GT 210
Intel HD	Graphics 3000
	Graphics 4000

*Matrox 9188 and Matrox are not recommended

6. Keyboard/Joystick Support

Vendor	Model
Videotec	DCZ Keyboard*
CH Products	VM Desktop*
Axis	295
Axis	T8311
Logitech	Attack 3

*Newly tested supported keyboard/joystick
**NUUO supports all the models of joysticks that are compatible with Windows.
***See appendix for introductions of configuring and using keyboard and joystick.

Supported function:

Type	Function
View and grid switching	Go to monitor # Next view Previous view Next grid Previous grid Go to grid #
Screen layout switching	Toggle single camera view Toggle full-screen
PTZ control	Digital / Optical switch Zoom in Zoom out Go to preset #

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7. UPnP Router (auto port-forwarding)

Vendor	Model
D-Link	DIR-300

Note: This is the model we tested for auto port-forwarding function. Basically, all router possess UPnP function should be compatible.

8. Web Browser support

OS \ Browser	IE 8 32-bit	IE 9 32-bit	IE 10 32-bit	IE 11 32-bit	Firefox 23 to 42
Windows XP-SP3 32-bit	PASS	N/A	N/A	PASS	PASS
Windows 7 32/64-bit	PASS	PASS	N/A	PASS	PASS
Windows 8 32/64-bit	N/A	N/A	PASS	PASS	PASS
Windows 8.1 32/64-bit	N/A	N/A	N/A	PASS	PASS
Windows 10 64bit	N/A	N/A	N/A	PASS	PASS
MAC OS X 10.9	N/A	N/A	N/A	N/A	N/A
MAC OS X 10.10	N/A	N/A	N/A	N/A	N/A

*Not support web browser on MAC

9. OS supported for NuClient AP

OS \ Application	Backup Player	Install Wizard	NuClient	Offline Tool	Verification Tool	Uninstall Toolkit
Windows XP	PASS	PASS	PASS	PASS	PASS	PASS
Windows 7 32/64-bit	PASS	PASS	PASS	PASS	PASS	PASS
Windows 8 32/64-bit	PASS	PASS	PASS	PASS*	PASS	PASS
Windows 8.1 32/64-bit	PASS	PASS	PASS	PASS*	PASS	PASS
Windows 10 64bit	PASS	PASS	PASS	PASS	PASS	PASS
MAC OS X 10.9	PASS	PASS	PASS	N/A	PASS	N/A
MAC OS X 10.10	PASS	PASS	PASS	N/A	PASS	N/A

* Please close UAC when operating Offline tool for license activation and transfer.

10. UPS Support

Vendor	Model
APC	APC Smart-UPS XL 3000VA (SUA3000XL)
APC	APC Smart-UPS 1500VA
APC	APC Smart-UPS 750VA
Tripp Lite	Tripp Lite Smart1500LCD

*The above list is based on what have been really tested. Crystal has appliedthe latest NUT driverfrom v3.9.0 to support multiple UPS brandsand models. Please refer to http://networkupstools.org/stable-hcl.html for the supported list.

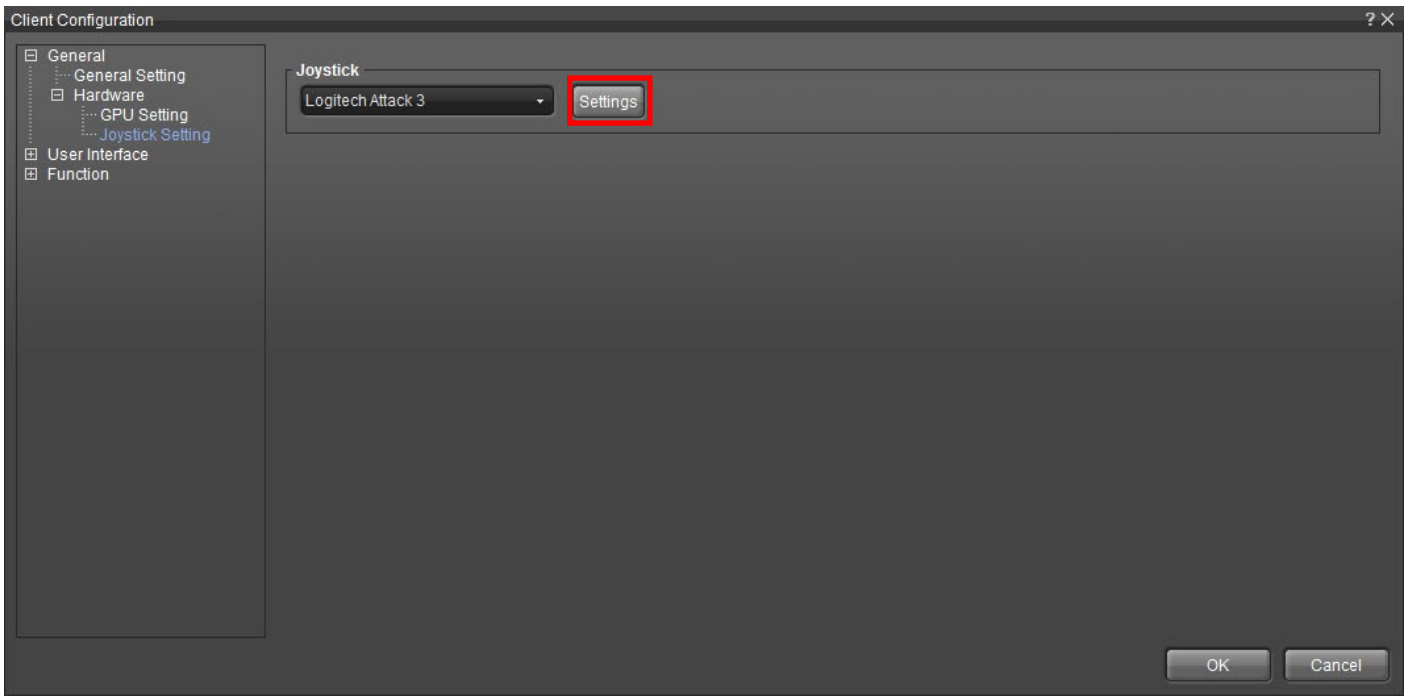
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Appendix A: Introductions of configuring generic USB keyboard and joystick

Supported generic USB keyboard/joystick:

Vendor	Model
CH Products	VM Desktop
Axis	295
Axis	T8311
Logitech	Attack 3

Click "**Client Configuration**" from the global menu, and then select "**General->Hardware->Joystick Settings**", and then click "**Setting**" button:



There are two types of keystroke:

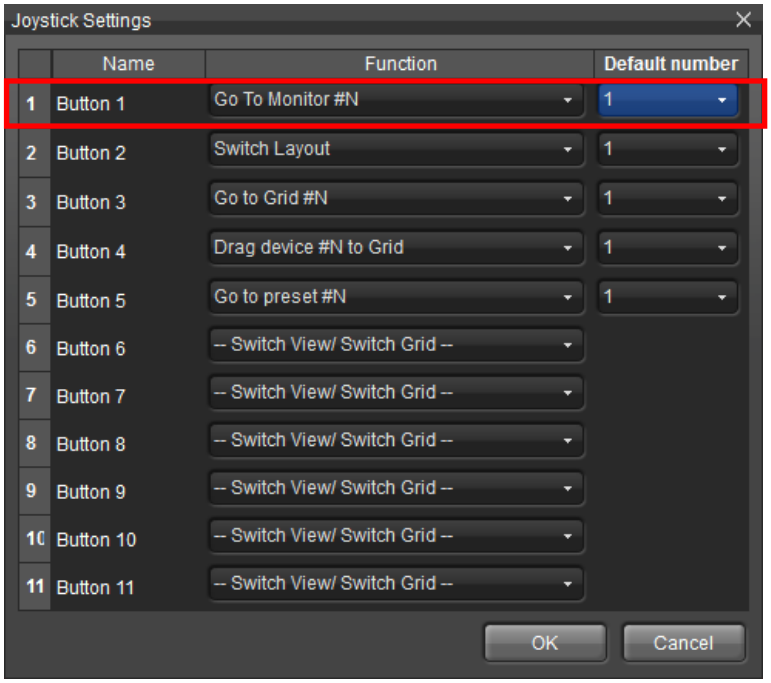
1. A **combo-keystroke** triggers a specific action with argument embedded. The variable argument is represented as **"#N"**. A default argument should be assigned for each **combo-keystroke**.
2. A **single-keystroke** triggers a specific action without any argument. No default argument is needed.

Currently there are 5 **combo-keystrokes** and 8 **single-keystrokes** supported.

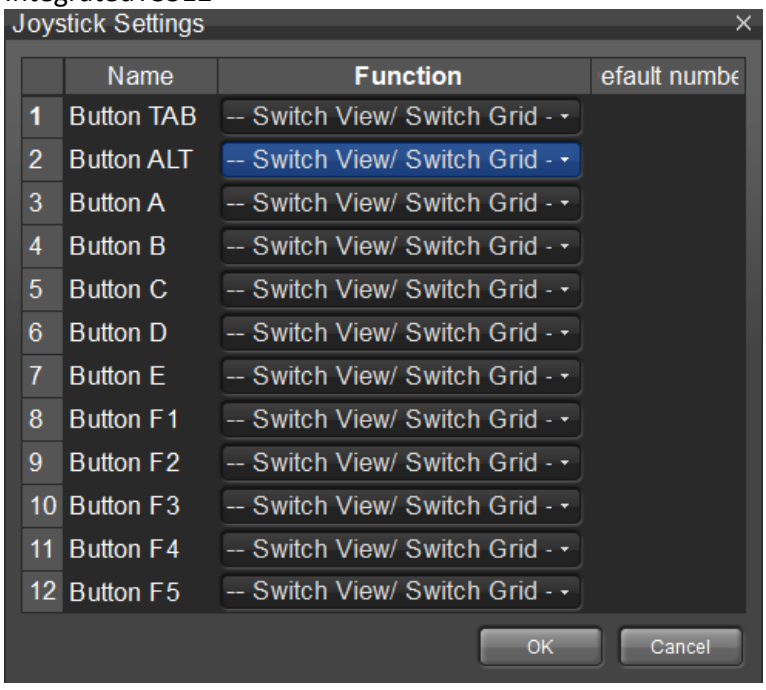
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Combo-keystroke:

General



IntegratedT8312





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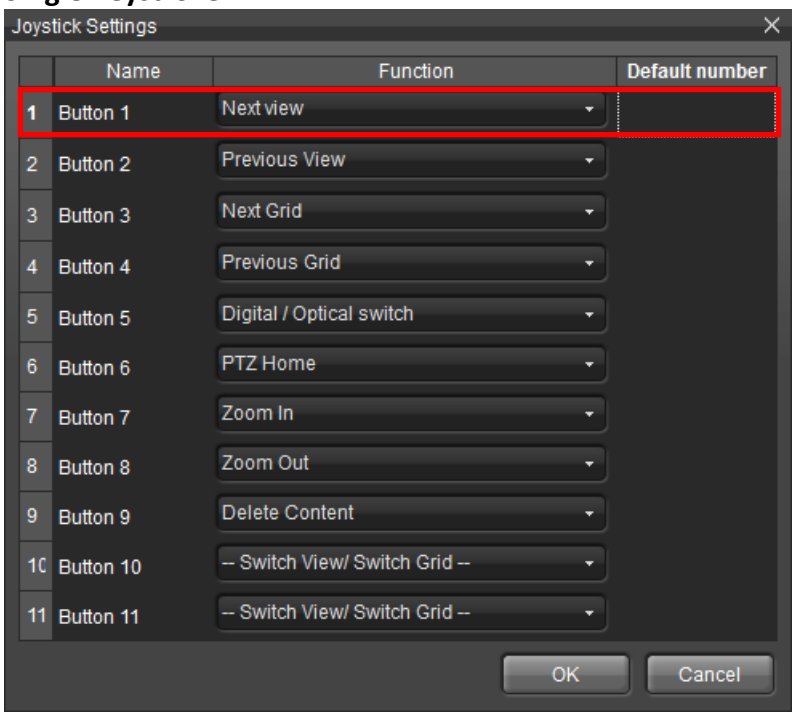
Function	Description	Default number (argument)
Go To Monitor #N	Move focus to the first grid of monitor #N For example: Go to 1st monitor: #N = 1 Go to 3rd monitor: #N = 3	1 – (number of monitors utilized by client application)
Switch Layout	Switch layout For example: Switch to 1x1 layout: #N = 1 Switch to 2x2 layout: #N = 2 Switch to 1+5 layout: #N = 3 Switch to 3x3 layout: #N = 4 Switch to 2+8 layout: #N = 5	1 – 5
Go to Grid #N	Go to specified grid by focusing it For example: Focus grid 101: #N = 101 Focus grid 204: #N = 204	1 – 100 (default number represents the grid number of the last focused monitor)
Drag device #N to Grid	Drag device #N to the focused grid For example: Recording Server A has 10 devices Recording Server B has 20 devices Drag 5th device of Server A to the focused grid: #N = 5 Drag 10th device of Server B to the focused grid: #N = 20	1 – (number of total devices of all recording servers)
Go to preset #N	Go to preset number #N For example: Go to preset point 6: #N = 6	1 – 64 (maximum count of preset points)

For example, **Button 1** is mapped with **Function** “Go To Monitor #N”, and its **Default number** is “1”

Key Strokes	Action
➢ Press **Button 1** and release it ➢ Press **3** ➢ Press **Button 1** and release it	Focus the first grid of monitor 3
➢ Press **Button 1** and hold it ➢ Press **3** ➢ Release **Button 1**	Focus the first grid of monitor 3
➢ Press **Button 1** and release it ➢ Press **Button 1** and release it	Focus the first grid of monitor 1 by default

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Single-keystroke:



Function	Description
Next view	Select next view
Previous view	Select previous view
Next Grid	Focus next grid
Previous Grid	Focus previous grid
Digital / Optical switch	Toggle digital PTZ / optical PTZ
PTZ Home	Move PTZ camera to home position
Zoom In	Zoom In a PTZ camera
Zoom Out	Zoom Out a PTZ camera
Delete Content	Delete displayed content of the focused grid. (displayed content may be video, I/O, or E-Map)

For example, pressing **Button 1** will trigger an action to select the next view.

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Appendix B: Introductions of using Videotec DCZ keyboard

DCZ keyboard has its own proprietary keystrokes to trigger following actions:

Function	Key Strokes Example	Action
Go To Monitor #N	**Monitor + 1 + Monitor**	Focus the first grid of monitor 1
Go to Grid #N	**Cam + 1 + 0 + 2 + Cam**	Focus Grid 102
Drag device #N to Grid	**Live + 1 + 0 + Live**	Drag 10th device to the focused grid
Go to preset #N	**Preset + 5 + Preset**	Go to preset point 5
Next view	**+NEXT**	Select next view
Previous view	**-PREV**	Select previous view

DCZ keyboard has a joystick upon it, and we can use the joystick to control camera's optical and digital PTZ motion with proportional speed.



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