

Manual

ez-Caster EN3 (Encoder/ATSC Modulator)

MPEG2/H.264 HD Encoder (for IP/ATSC/8VSB)



EN3 - Encoder + Modulator Manual

Revision Number: **1.0.1**

Distribution Date: **August. 2016**

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Contents

1. Introduction	4
2. Specifications	5
3. Product Description	6
3.1. Product Parts Name	6
3.2. Components	6
3.3. Installation Precaution	7
4. Product Operation	8
4.1. Status LED	8
4.2. Front Control Panel	9
4.2.1. Category Structure Summary	10
4.2.2. Setting category Summary	11
4.2.3. Location and Operation Description	12
Appendix A. PC GUI Control S/W	19
Appendix B. Frequency Table	23

EN3 - Encoder + Modulator

MPEG2/H.264 HD Encoder (for IP/ATSC/8VSB)

1. Introduction

The 'ez-Liveshow' is a new Audio/Video system brand with AV encoding and multiplexing technology from Lumantek designed for small studio applications. EN3 is one of the 'ez-Liveshow' series enabling a simultaneous video/audio encoding technology and modulation in a single device once. Optimized for Korean terrestrial TV environment, supporting Mpeg-2 Video and AC3 Audio technology as well as the 8VSB modulation. System supports HDMI, HD-SDI, Component and Composite inputs with HDMI, HD-SDI, Analog Stereo Audio(L/R) for audio inputs.



HD HDMI HD-SDI Component Composite 

HD Encoder *ez-Caster EN3*

Latency
150ms →

ez-Caster
HD Modulator

TS Over IP ASI OUT MPEG2/H.264 HD Encoder

HD

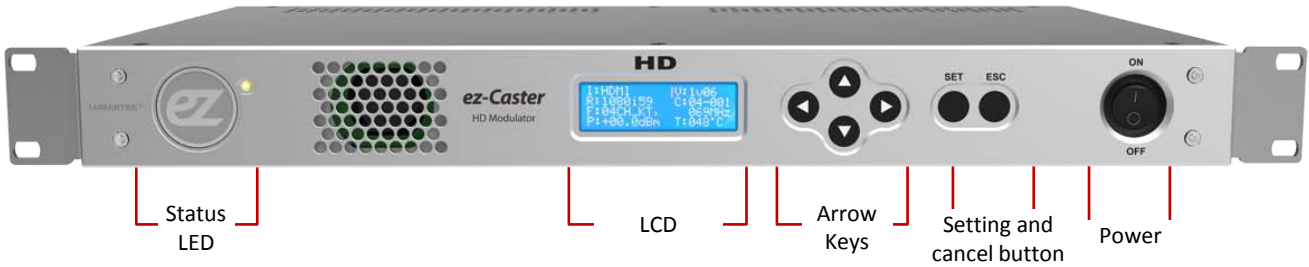
2. System Specifications

Type	HD Encoder + 8VSB Modulator
Inputs	SD/HD-SDI, BNC 75Ω 1ea
	HDMI 1.4a 1ea (HDCP not supported)
	Component, YCbCr, 170MHz 12bit ADC, RCA 3ea
	Composite, CVBS, 3D Comb Filter, RCA 1ea
	Analog Stereo Audio (Left/Right), RCA 2ea
Video Resolutions	1920x1080 @ 60p, 59.94p Automatic Convert to interlaced format
	1920x1080 @ 60i, 59.94i
	1280x720 @ 60p, 59.94p
	720x480 @ 59.94i (NTSC)
	Resolution detect and automatic/manual change support
TS Mux & System	System Delay: 150ms, 200ms, 350ms, 650ms
	TS Bit-rate: 4.5~25 Mbps
	Editable TS ID, PMT/PCR/Video/Audio PID
Video Encoder	MPEG2, H.264
	MPEG2 HD/SD (MP@HL/MP@ML), H.264 HD/SD (HP@L4/HP@L3)
	Bit Rate: (MPEG2) 5Mbps ~ 22 Mbps, (H.264) 3.5Mbps ~ 22Mbps
	Closed Caption Support
Audio Encoder	MP1L2, Dolby AC3, AAC-LC, HE-AACv2 (Stereo)
	Bit-rate: 192~384 Kbps (HE-AACv2는 32~96Kbps)
	Sample Rate: 48KHz
	Audio Delay: 0~400ms
	Volume Control: 100%~500%
PSIP Generator	MGT, TVCT Generation Enable/Disable
	Short name, major and minor channel number setting
ASI Output	Connector: BNC 75Ω 1ea
	Packet Size: 188 Bytes
	TS Bit Rate: 19.392Mbps
RF Output	Modulation: ATSC(8VSB)
	Connector: F-Type 75Ω 1ea
	Output Level : +2~-18dBm (0.5dB Step)
	Center Frequency Range: 40~999 MHz
	MER: >36dB
	Spurious: 60dBc (Relative to Output Level)
	Phase Noise: VHF 110dBc@20kHz, UHF 95dBc@20kHz
IP Output (*Option)	Ethernet : 10/100Bast-T, half/full duplex
	Maximum Transmission Unit : 1464~1472 MTU
	Streaming Protocol : MPEG2-TS/UDP
	Transport Protocol : UDP, Unicast or Multicast
	IGMPv1, IGMPv2 support
Management	Front Panel: 4-line text LCD, 6 buttons, Status LED(RGB)
	Rear USB Port: GUI, Firmware Update
Physical	Dimension: 44(H) X 483(W) X 240(D) (excluding connectors)
	Operation Temperature: 0~45°C
	Weight: 2 Kg
	Power Consumption: 25W(max.)

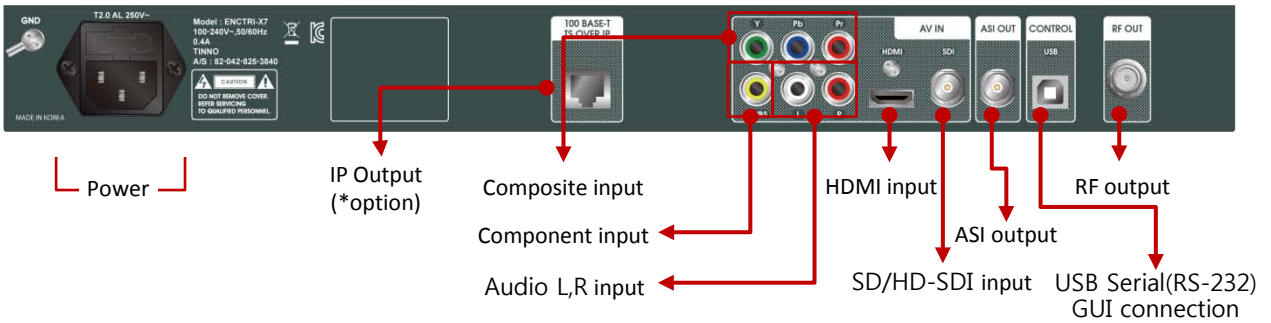
3. Product Description

3.1. Product Part Name

< EN3 Main frame – Front >



<EN3 main frame – Rear >



3.2. Components

This system package includes:

- ① EN3 Main Frame
- ② AC Power Cord :110V AC or 220V AC input Power Cord



EN3 Main frame



AC power cord

3.3. Installation Precautions

This page states the safety measures the users must take to avoid circumstances where the system may occur physical damages or injuries. Please THOROUGHLY go over this page before the system installation/operation.

General Precautions

- Maintain dust FREE condition during and after System Installation/Operation.
- Please place the system cover in a safe location when opened.
- Securely stow tools and cables away from the passages.
- Avoid wearing loosened clothes or accessories during installation/Operation.
- Avoid any unnecessary actions that may damage/harm system or personnel.
- Do NOT open the system unless advised by Lumantek representative. Lumantek takes no responsibility on units with broken RMA seals.

Power Precautions

- Please check cable overload before connecting the system to the power supply.
- Avoid wearing metal accessories (Rings, Earrings) connecting system to the power source.
- Avoid operating on wet floors. Make sure power extension cables, floors, and instruments are grounded and in a safe operating condition.



- Please discharge static electricity by touching grounding metals before starting hardware installation.
- The grounding parts must be disassembled last.
- Manufacture takes no responsibilities on Direct/Indirect losses or damages due to use of inappropriate parts or services by unauthorized service provider
- Supplying power during the system installation may cause damages to the system and personnel.

AC Power Precautions

- This unit utilizes AC power, the cord comes with a grounding function.
- Please connect the system to the power socket with groundings.
- Use Green/Yellow 0.75mm² (18AWG) or higher grade grounding cables.
- Do NOT block power sockets with tools or boxes. Please keep it clear at all times.

4. Product Operation

4.1. Status LED

Status LED- blue, green and red, total of three colors available.
Each color indicates the following status.



- System Booting
- Applying setting value
- Changing resolution



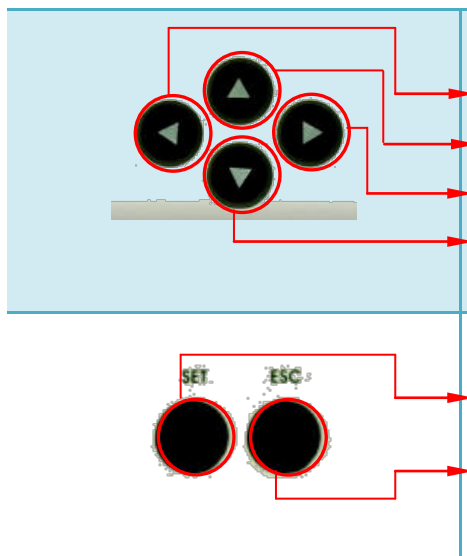
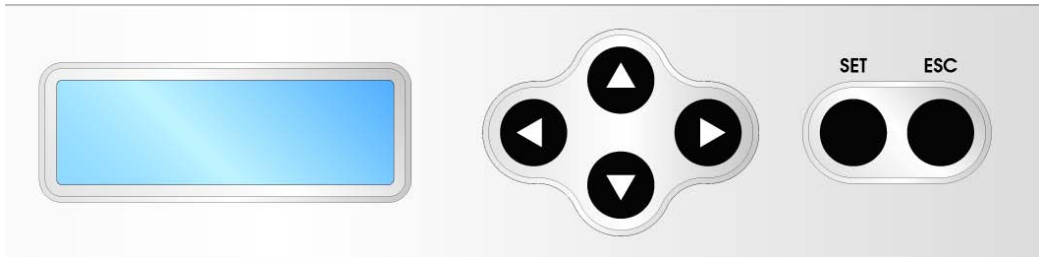
- Normal operation (Data input detected)



- No input
- Resolution not supported
- Internal operation error

4.2. Front Control Panel

Control and configure system settings with LCD screen, Arrow, settings and ESC keys at Front Control Panel



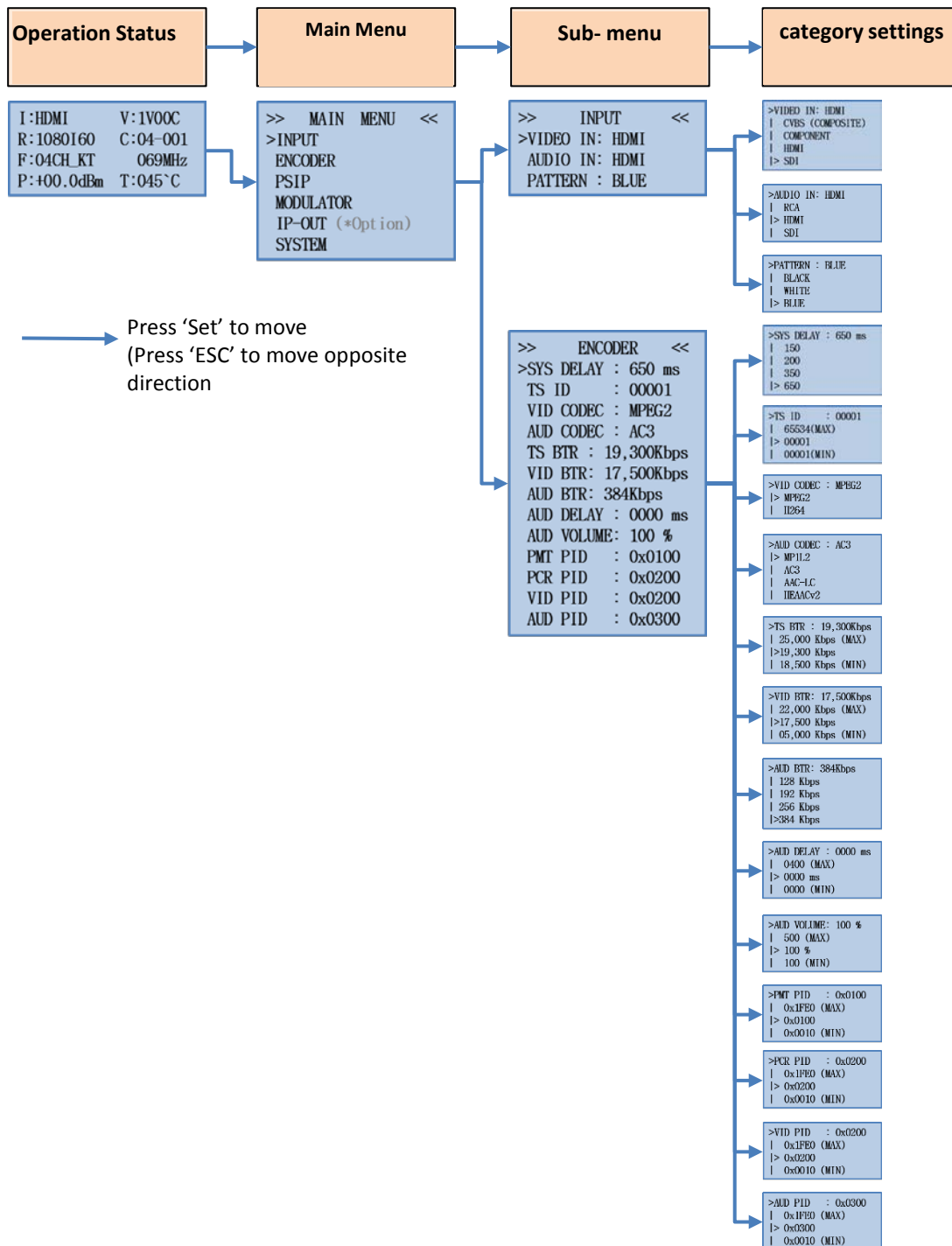
** Move cursors / Change settings

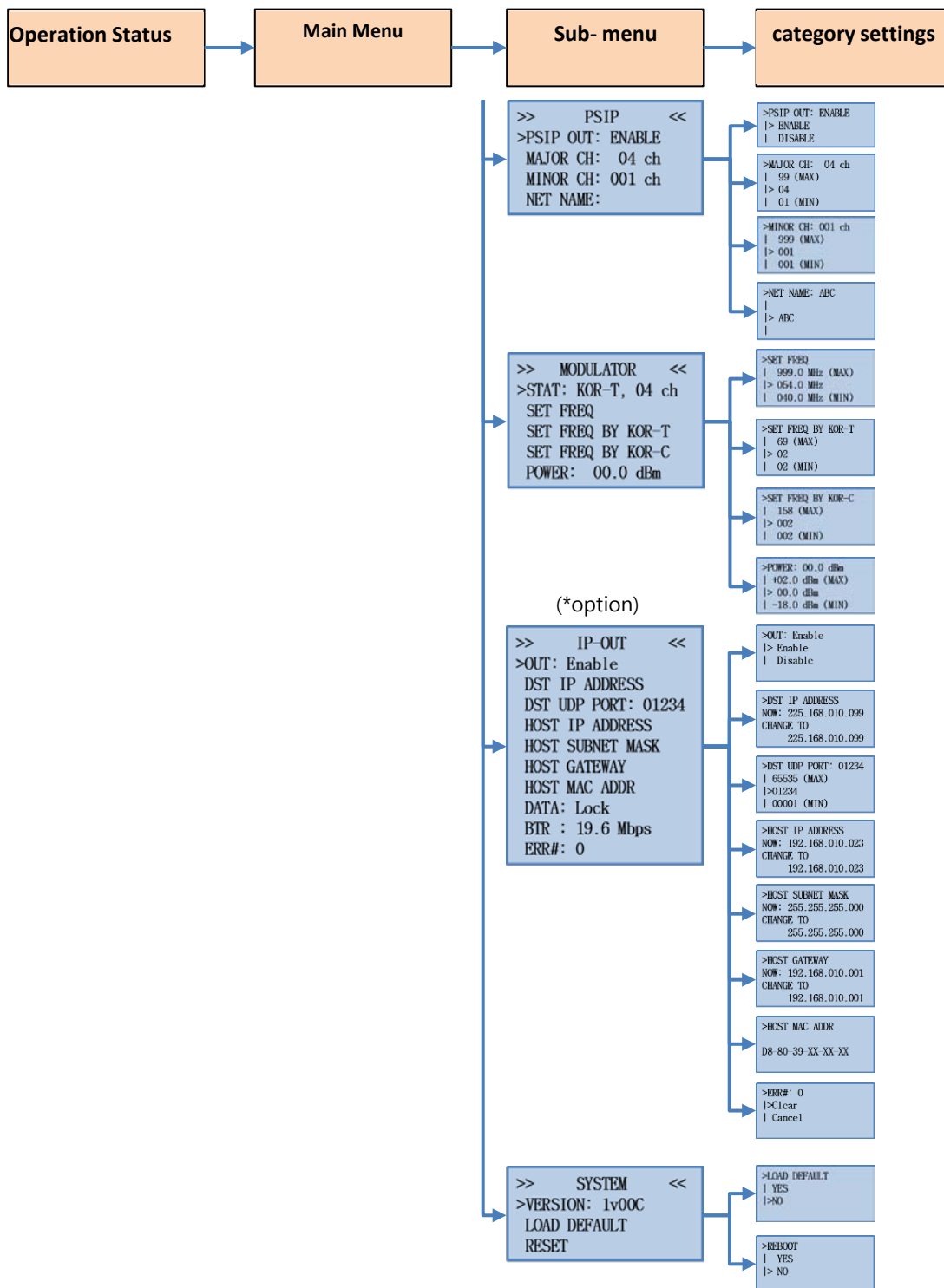
- Settings value (Number)
- Increase settings value (Number)
- Setting value (Number)
- Decrease setting value(Number)

Confirm current setting

Exit menu

4.2.1. Category Structure Summary





4.2.2. Setting Category Summary

Sub Menu Location	Setting Categories	Value, range	Features
INPUT	VIDEO IN	CVBS COMPONENT HDMI SDI SDIcc	Select video input port (*when selected, the audio input port is automatically changed to appropriate input port.) (*SDIcc is SDI input mode supporting closed caption)
	AUDIO IN	RCA HDMI SDI	Select audio input port
	RESOLUTION	AUTO 1080p 1080i 720p 480i	Choose either Automatically detecting the input resolution, or allowing specific resolutions only.
	PATTERN	BLACK WHITE BLUE	Select a color pattern displayed when no input signal detected.
ENC	SYS DELAY	150,200,350,650 (ms)	Encoder delay Configuration
	TS ID	1 ~ 65534	TS ID Settings
	AUDIO DELAY	0 ~ 400 (ms)	Audio Delay Settings
PSIP	PSIP OUT	ENABLE, DISABLE	PSIP output On/Off
	MAJOR CH	1 ~ 99	Major channel Settings
	MINOR CH	1 ~ 999	Minor channel Settings
	NET NAME	Maximum 7 letters	Channel name Settings
MODULAT OR	SET FREQ	40.0 ~ 999.0 MHz	Output frequency Settings - Frequency input
	SET FREQ BY KOR-T	2 ~ 69	Output frequency Settings - Terrestrial channel number input
	SET FREQ BY KOR-C	2~158	Output frequency Settings - Cable channel number input
	POWER	-18.0 ~ +2.0 (dBm)	Output power Settings

Sub Menu Location	Setting Categories	Value, range	Features
IP-OUT (*option)	OUT	Enable Disable	IP Output Enable/Disable
	DSI IP ADDRESS	XXX.XXX.XXX.XXX	Output destination IP address setting
	DST UDP PORT	1 ~ 65535	Output destination UDP port number setting
	HOST IP ADDRESS	XXX.XXX.XXX.XXX	Select Host IP Address
	HOST SUBNET MASK	XXX.XXX.XXX.XXX	Select Host Subnet Mask
	HOST GATEWAY	XXX.XXX.XXX.XXX	Select Host Gateway Address
	HOST MAC ADDR	XX-XX-XX-XX-XX-XX	Check the MAC Address of the equipment (Modification is not possible)
	ERR#	CLEAR CANCEL	When 'CLEAR' is selected, Output error counter for monitoring will be initialized.
System	LOAD DEFAULT	YES NO	Reset 'Setting values'
	REBOOT	YES NO	Reset

4.2.3. Location and Operation Description

1) Operation Status

```

I:HDMI      V:1V00C
R:1080I60   C:04-001
F:04CH_KT   069MHz
P:+00.0dBm  T:045`C
    
```

Left: Input port
Right: Version

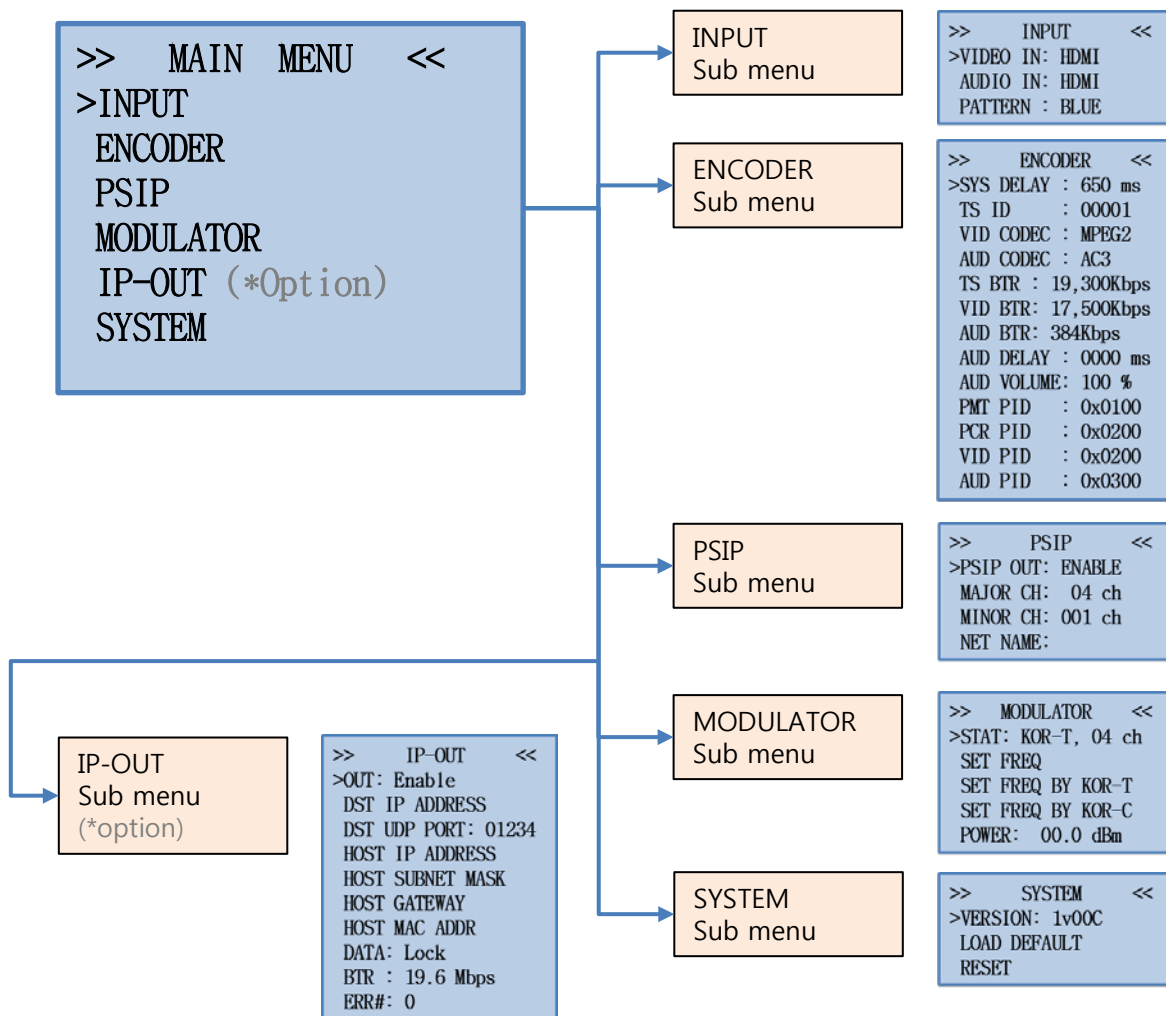
Left : Input resolution
Right : Virtual channel number

Output frequency setting status

Left: Output power(dBm)
Right : Internal system temperature

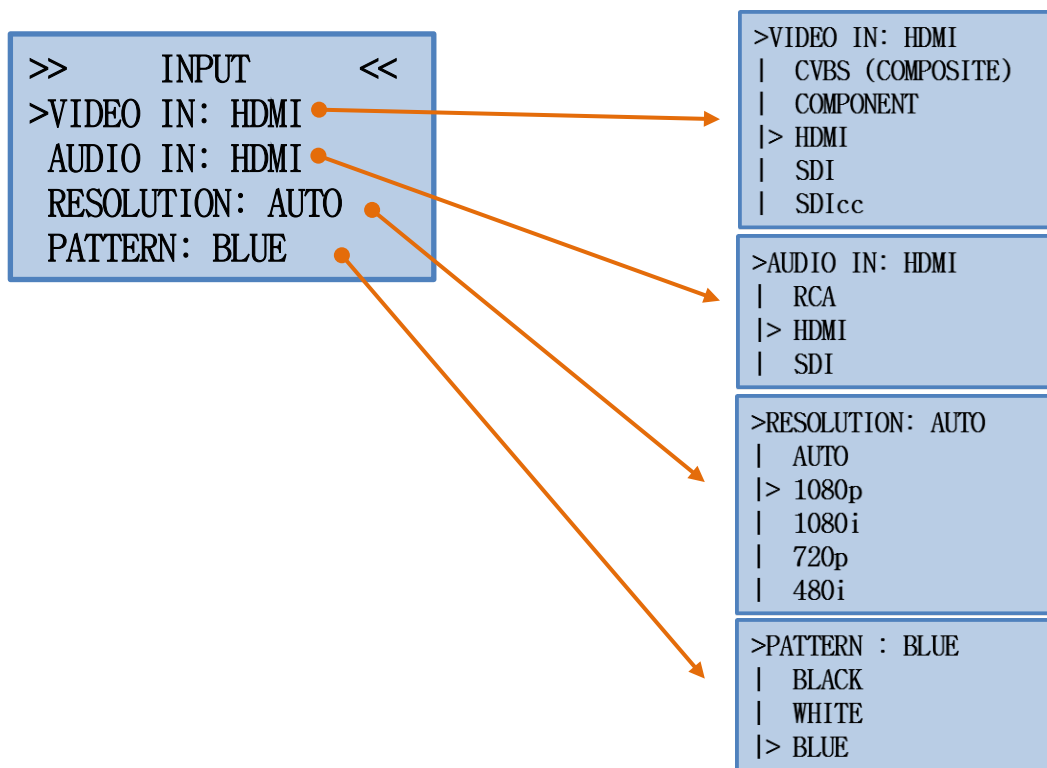
Setting location	◀,▶	▲,▼	SET	ESC	Features
operation status	n/a	n/a	Move to main menu	n/a	Display settings and input status

2) Main Menu



Setting location	◀, ▶	▲, ▼	SET	ESC	Features
Main menu	n/a	Move to category	Move to the sub menu of the selected category	Move to the operation status	When you select sub menu from the category, it moves to appropriate sub menu

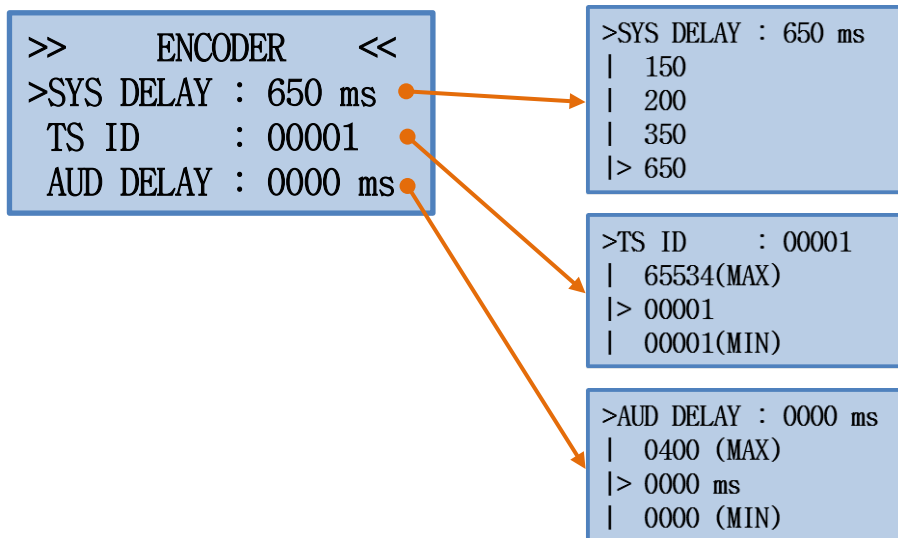
3) INPUT Menu and Setting Categories



Setting location	◀, ▶	▲, ▼	SET	ESC	Features
INPUT Sub menu	n/a	Move to category	Move to the selected category	Move to main menu	
VIDEO IN	n/a	Move to category	Confirm	Move to sub menu	Select video input port
AUDIO IN	n/a	Move to category	Confirm	Move to sub menu	Select audio input port
RESOLUTION	n/a	Move to category	Confirm	Move to sub menu	Select Resolution mode
PATTERN	n/a	Move to category	Confirm	Move to sub menu	Select a color pattern when input is not detected

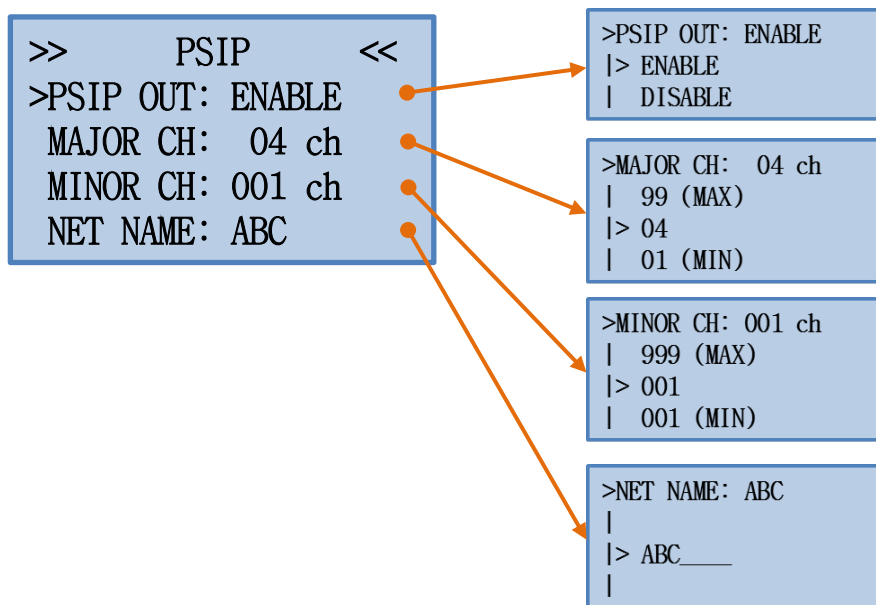
*Video – SDIcc setting is specifically designed mode for Closed Caption service and some features may not be supported. (1080P input resolution and pattern image setting)

4) ENCODER Sub Menu and Setting Categories



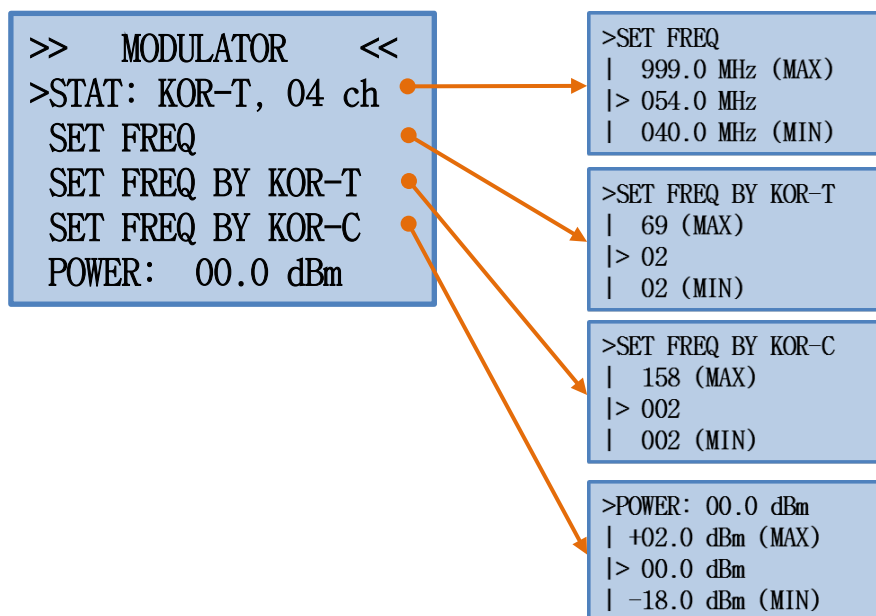
Setting location	◀, ▶	▲, ▼	SET	ESC	Features
ENCODER Sub menu	n/a	Move to category	Move to the selected category	Move to main menu	
SYS DELAY	n/a	Move to category	Confirm	Move to sub menu	Encoder system delay setting. (*License required) (*without license, fixed at 650)
TS ID	Move digit	Increase/ decrease the value	Apply settings	Move to sub menu	TS ID Value setting.
AUD DELAY	Move digit	Increase/ decrease the value	Apply settings	Move to sub menu	Audio Delay Value setting

5) PSIP Sub Menu and Setting Categories



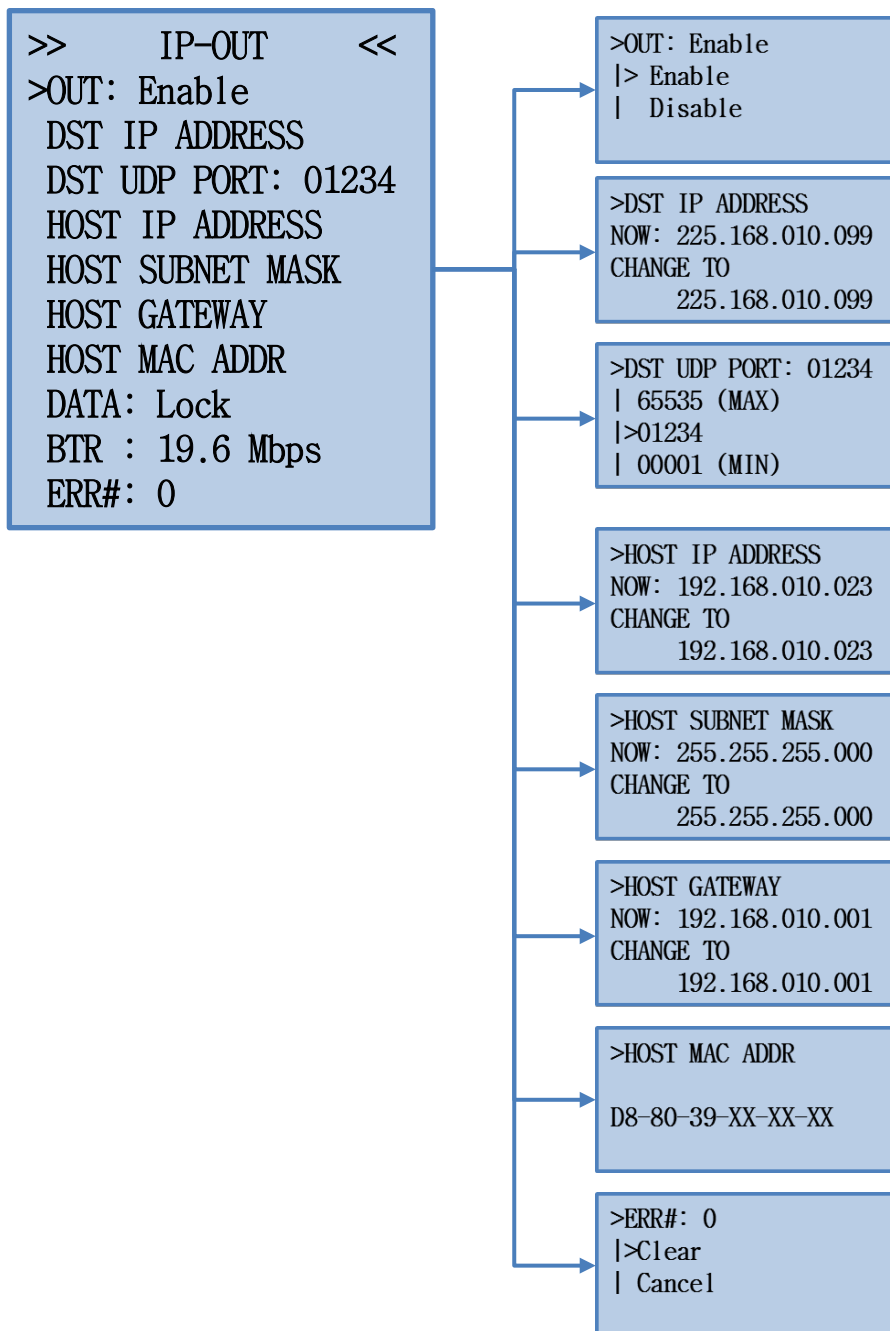
Setting location	◀,▶	▲,▼	SET	ESC	Features
PSIP Sub menu	n/a	Move to category	Move to the selected category	Move to main menu	
PSIP OUT	n/a	Move to category	Confirm	Move to sub menu	PSIP output on/off.
MAJOR CH	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Main channel number value setting.
MINOR CH	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Minor channel number value setting.
NET NAME	Move digit	Change letter	Apply settings	Move to sub menu	Channel name setting. (* Korean letter setting is available on PC S/W)

6) MODULATOR Sub Menu and Setting Categories



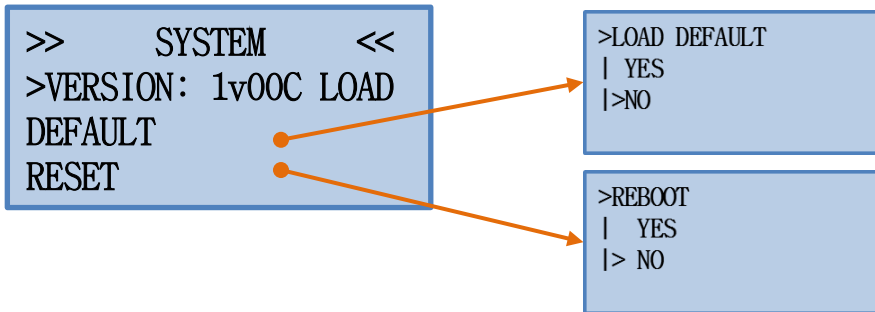
Setting location	◀,▶	▲,▼	SET	ESC	Features
MODULATOR Sub Menu	n/a	Move to category	Move to the selected category	Move to main menu	
STAT	n/a	n/a	n/a	n/a	Frequency setting mode and displays the currently set value
SET FREQ	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Output frequency setting - Frequency input
SET FREQ BY KOR-T	Move digit	Increase/decrease the value	Confirm	Move to sub menu	Output frequency setting - Terrestrial channel number input
SET FREQ BY KOR-C	Move digit	Increase/decrease the value	Confirm	Move to sub menu	Output frequency setting - Cable channel number
POWER	Increase/decrease the value	Increase/decrease the value	Apply settings	Move to sub menu	Output power setting

7) IP-OUT Sub Menu & Setting Categories (*option)



Setting location	◀,▶	▲,▼	SET	ESC	Features
IP-OUT Sub menu	n/a	Move to category	Move to the selected category	Move to main menu	
OUT	n/a	Change selection	Apply selection	Move to sub menu	IP Output Enable/Disable
DST IP ADDRESS	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Output destination IP address setting
DST UDP PORT	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Output destination UDP port number setting
HOST IP ADDRESS	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Select Host IP Address
HOST SUBNET MASK	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Select Host Subnet Mask
HOST GATEWAY	Move digit	Increase/decrease the value	Apply settings	Move to sub menu	Select Host Gateway Address
HOST MAC ADDR	n/a	n/a	Move to sub menu	Move to sub menu	Check the MAC Address of the equipment (Modification is not possible)
ERR#	n/a	Change selection	Apply selection	Move to sub menu	When 'CLEAR' is selected, Output error counter for monitoring will be initialized

8) SYSTEM Sub Menu and Setting Categories

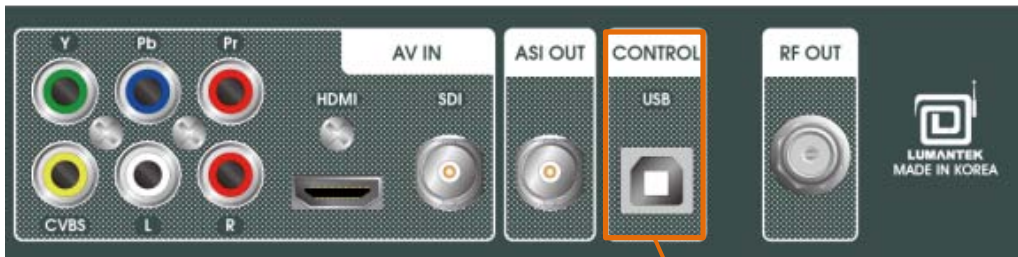


Setting location	◀,▶	▲,▼	SET	ESC	Features
SYSTEM Sub menu	n/a	Move to category	Move to the selected category	Move to main menu	
VERSION	n/a	n/a	n/a	n/a	Display device's version
LOAD DEFAULT	n/a	Move to category	Confirm	Move to sub menu	Output power frequency setting - Cable channel number input
RESET	n/a	Move to category	Confirm	Move to sub menu	Output power setting

Appendix A. PC GUI Control S/W

A.1. Connect EN3 with PC GUI S/W

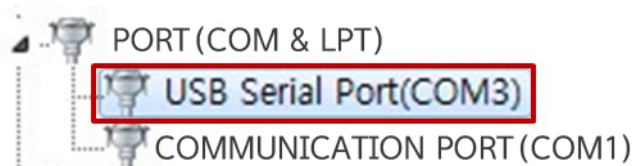
PC GUI S/W is connected via USB Port.



Connect with
control PC via USB

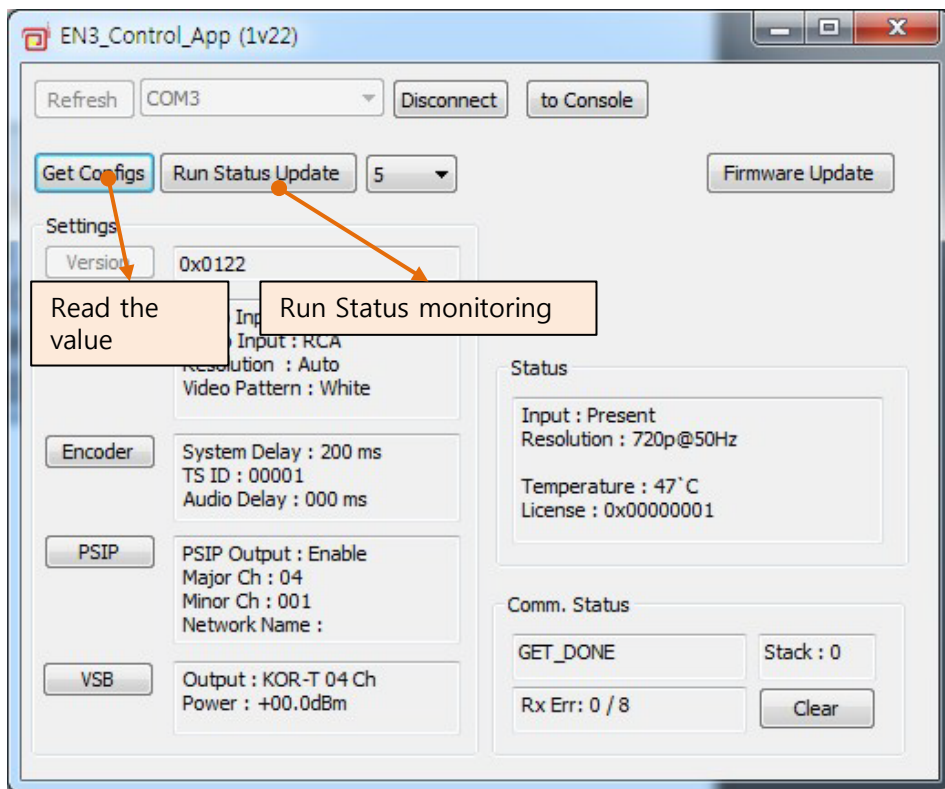
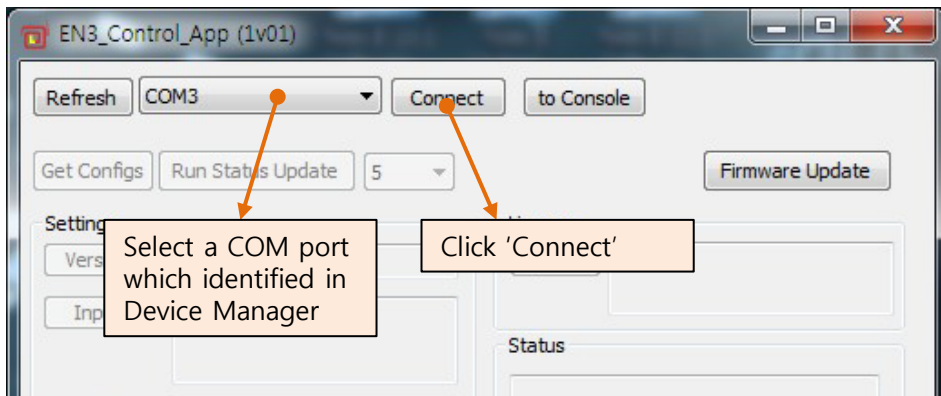
A.2. PC GUI S/W Driver installation and verification

When PC and EN3 is connected, make sure that following driver is created PC. (COM number may differ from ours)



(*if driver is not installed automatically, install CypressDriverinstaller.exe which comes with PC GUI S/W.)

A.3. PC GUI S/W Connection and Control



You can change settings by clicking specific buttons.

Settings

Version: 0x0122

Input
Video Input : SDIcc
Audio Input : RCA
Resolution : Auto
Video Pattern : White

Encoder
System Delay : 200 ms
TS ID : 00001
Audio Delay : 000 ms

PSIP
PSIP Output : Enable
Major Ch : 04
Minor Ch : 001
Network Name :

VSB
Output : KOR-T 04 Ch
Power : +00.0dBm

EN3 Input Setting

Video Input: SDIcc

Audio Input: RCA

Resolution: Auto

Video Pattern: White

Apply Cancel

EN3 Encoder Setting

System Delay: 200 ms

TS ID: 1 (1~65534)

Audio Delay: 0 ms (0ms~400ms)

Apply Cancel

EN3 PSIP Setting

PISP Output: Enable

Major Ch.: 4 (1~99)

Minor Ch.: 1 (1~999)

Network Name: 7 Characters

Apply Cancel

EN3 VSB Setting

VSB Output: KOR-Terrestrial 4

69000 KHz (40 MHz ~ 999 MHz)

Power: +00.0 dBm

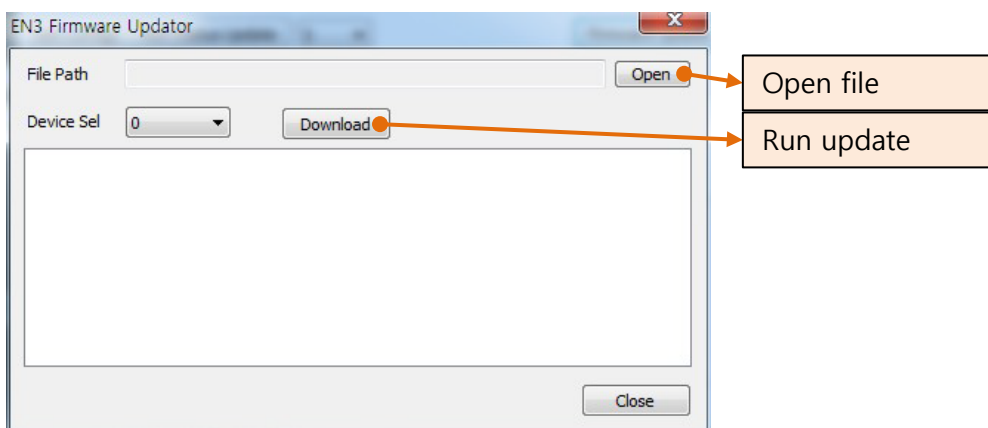
Apply Cancel

A.4. PC GUI S/W Firmware Update

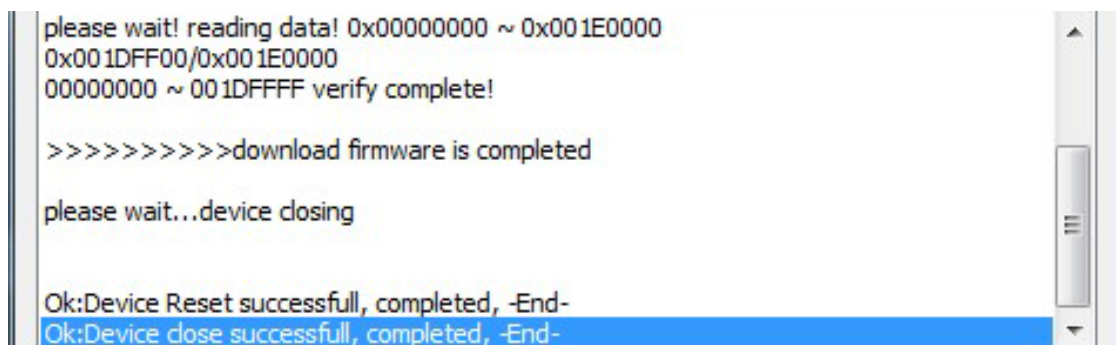
Click following button to open firmware update window..



Click 'Open' and choose specific file and click 'Download' to start the firmware update.



Make sure update is completed by checking the following message.



Appendix B. Frequency Table

	Korea Terrestrial			Korea Cable		
	Channel Number	Center Frequency (MHz)	Frequency Range (MHz)	Channel Number	Center Frequency (MHz)	Frequency Range (MHz)
VHF LOW BAND	2	57	54-60	2	57	54-60
	3	63	60-66	3	63	60-66
	4	69	66-72	4	69	66-72
	5	79	76-82	5	79	76-82
	6	85	82-88	6	85	82-88
FM BAND 88~108MHz				95	93	90~96
				96	99	96~102
				97	105	102~108
MID BAND				98	111	108~114
				99	117	114~120
				14	123	120-126
				15	129	126-132
				16	135	132-138
				17	141	138-144
				18	147	144-150
				19	153	150-156
				20	159	156-162
				21	165	162-168
VHF HIGH BAND				22	171	168-174
	7	177	174-180	7	177	174-180
	8	183	180-186	8	183	180-186
	9	189	186-192	9	189	186-192
	10	195	192-198	10	195	192-198
	11	201	198-204	11	201	198-204
	12	207	204-210	12	207	204-210
SUPER BAND				13	213	210-216
				23	219	216-222
				24	225	222-228
				25	231	228-234
				26	237	234-240
				27	243	240-246
				28	249	246-252
				29	255	252-258
				30	261	258-264
				31	267	264-270
				32	273	270-276
				33	279	276-282
				34	285	282-288
				35	291	288-294
			36	297	294-300	

	Korea Terrestrial			Korea Cable		
HYPER BAND				37	303	300-306
				38	309	306-312
				39	315	312-318
				40	321	318-324
				41	327	324-330
				42	333	330-336
				43	339	336-342
				44	345	342-348
				45	351	348-354
				46	357	354-360
				47	363	360-366
				48	369	366-372
				49	375	372-378
				50	381	378-384
				51	387	384-390
				52	393	390-396
				53	399	396-402
				54	405	402-408
				55	411	408-414
				56	417	414-420
				57	423	420-426
				58	429	426-432
				59	435	432-438
				60	441	438-444
				61	447	444-450
			62	453	450-456	
			63	459	456-462	
			64	465	462-468	
			65	471	468-474	
UHF BAND	14	473	470-476	66	477	474-480
	15	479	476-482	67	483	480-486
	16	485	482-488	68	489	486-492
	17	491	488-494	69	495	492-498
	18	497	494-500	70	501	498-504
	19	503	500-506	71	507	504-510
	20	509	506-512	72	513	510-516
	21	515	512-518	73	519	516-522
	22	521	518-524	74	525	522-528
	23	527	524-530	75	531	528-534
	24	533	530-536	76	537	534-540
	25	539	536-542	77	543	540-546
	26	545	542-548	78	549	546-552
	27	551	548-554	79	555	552-558
	28	557	554-560	80	561	558-564
	29	563	560-566	81	567	564-570
	30	569	566-572	82	573	570-576
	31	575	572-578	83	579	576-582
	32	581	578-584	84	585	582-88
	33	587	584-590	85	591	588-594
	34	593	590-596	86	597	594-600
	35	599	596-603	87	603	600-606
	36	605	602-608	88	609	606-612
	37	611	608-614	89	615	612-618
	38	617	614-620	90	621	618-624
	39	623	620-626	91	627	624-630
	40	629	626-632	92	633	630-636
	41	635	632-638	93	639	636-642
	42	641	638-644	94	645	642-648
43	647	644-650	100	651	648-654	
44	653	650-656	101	657	654-660	

	Korea Terrestrial		Korea Cable			
	45	659	656-662	102	663	660-666
	46	665	662-668	103	669	666-672
	47	671	668-674	104	675	672-678
	48	677	674-680	105	681	678-684
	49	683	680-686	106	687	684-690
	50	689	686-692	107	693	690-696
	51	695	692-698	108	699	696-702
	52	701	698-704	109	705	702-708
	53	707	704-710	110	711	708-714
	54	713	710-716	111	717	714-720
	55	719	716-722	112	723	720-726
	56	725	722-728	113	729	726-732
	57	731	728-734	114	735	732-738
	58	737	734-740	115	741	738-744
	59	743	740-746	116	747	744-750
	60	749	746-752	117	753	750-756
	61	755	752-758	118	759	756-762
	62	761	758-764	119	765	762-768
	63	767	764-770	120	771	768-774
	64	773	770-776	121	777	774-780
	65	779	776-782	122	783	780-786
	66	785	782-788	123	789	786-792
	67	791	788-794	124	795	792-798
	68	797	794-800	125	801	798-804
	69	803	800-806	126	807	804-810
				127	813	810-816
				128	819	816-822
				129	825	822-828
				130	831	828-834
				131	837	834-840
				132	843	840-846
				133	849	846-852
				134	855	852-858
				135	861	858-864
				136	867	864-870
				137	873	870-876
				138	879	876-882
				139	885	882-888
				140	891	888-894
				141	897	894-900
				142	903	900-906
				143	909	906-912
				144	915	912-918
				145	921	918-924
				146	927	924-930
				147	933	930-936
				148	939	936-942
				149	945	942-948
				150	951	948-954
				151	957	954-960
				152	963	960-966
				153	969	966-972
				154	975	972-978
				155	981	978-984
				156	987	984-990
				157	993	990-996
				158	999	996-1002

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