6. External Control

In addition to using the display keypad or remote control unit, you can control the display using a serial (RS232) link to send Hexadecimal commands and receive responses to those commands. **(ASCII is not accepted/used)**

You also use discrete infrared (IR) control codes to program a third-party remote control unit. For more information, refer to Using Discrete IR Codes on page 57.

Serial Communications

The display uses a simple text-based control protocol to take requests from control devices and to provide responses to such devices. This section describes how to send control messages over a serial link between the display and an automation/control system or a PC running a terminal emulation program such as Windows® HyperTerminal or Tera Term.

RS232 Connection and Port Configuration

Connect your control system or PC to the RS232 input of the display as shown in Figure 3-2.

Configure the RS232 controller or PC serial port as follows: no parity, 8 data bits, 1 stop bit and no flow control. Set the baud rate to 115200, to match that of the display RS232 port.

Command and Response Format

Commands sent from an automation/control system or PC to the display must have the following format:

[STX] [IDT] [TYPE] [CMD] ([VALUE] or [REPLY]) [ETX] [CR]

Where:

- [STX] indicates the start of the command data (always 07).
- [IDT] is the display ID (always 01).
- [TYPE] is the command type:

  00 = return to host (response from the LCD panel)

  01 = read / action

  02 = write
- [VALUE] is the parameter setting for the command.
- [REPLY] is the parameter setting for the command, acknowledged by the display in its response to a command.
- [ETX] indicates the end of the command data (always 08).
- [CR] is the ASCII carriage return key (0x0D).

Command and Response Examples

Here are some examples of Hexadecimal serial commands and their responses:

Table 6-1. Serial Command/ Response Examples

Description	Command sent to LCD Panel	Response Received from LCD Panel
Turn LCD panel power off.	07 01 02 50 4F 57 00 08	07 01 00 50 4F 57 00 08
Turn LCD panel power on.	07 01 02 50 4F 57 01 08	07 01 00 50 4F 57 01 08
Request LCD panel power status.	07 01 01 50 4F 57 08	07 01 00 50 4F 57 XX 08 (XX = 0 when off or 1 when on)
Set the LCD panel contrast to 30 (1E hex).	07 01 02 43 4F 4E 1E 08	07 01 00 43 4F 4E 1E 08
Reset the LCD panel display settings.	07 01 02 41 4C 4C 00 08	07 01 00 41 4C 4C 00 08
Request LCD panel serial number.	07 01 01 53 45 52 08	07 01 00 53 45 52 S(0)…S(12) 08 S(0) …S(12) = the serial number in ASCII
Request LCD panel firmware version.	07 01 01 47 56 45 08	07 01 00 47 56 45 S(0)…S(5) 08 S(0)…S(5) = the firmware version in ASCII

Serial Command List

Table 6-2 lists all supported commands.

Table 6-2. Serial Commands

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Power Control and Input Source	Power Control	W/R	50 4F 57	0	0	Off (soft power)	POW
				1	1	On (soft power)	
	Signal State	R	50 4F 53	-	0	Signal	POS
				-	1	No signal	
	IPC Control	W/R	49 50 43	0	0	Off	IPC
				1	1	On	
	OPS Power State	W/R	4F 41 50	0	0	Follows display	OAP
				1	1	Always on	
	Input Source	W/R	4D 49 4E	0	0	VGA	MIN
				9	9	HDMI 1	
				0A	0A	HDMI 2	
				0B	0B	HDMI 3	
				0C	0C	HDMI 4	
				0D	0D	DisplayPort	
				0E	0E	IPC/OPS	
				13	13	WPS	
Display Adjustment	Display Adjustment	W/R	42 52 49	00~64	00~64	Back Light Brightness	BRI
		W/R	42 52 4C	00~64	00~64	Digital Brightness Level	BRL
		W/R	42 4C 43	0	0	Off (Back Light)	BLC
				1	1	On (Back Light)	
		W/R	43 4F 4E	00~64	00~64	Contrast	CON
		W/R	48 55 45	00~64	00~64	Hue	HUE
		W/R	53 41 54	00~64	00~64	Saturation	SAT
		W/R	4E 4F 52	0	0	Noise Reduction: Off	NOR
				1	1	Noise Reduction: Low	
				2	2	Noise Reduction: Medium	
				3	3	Noise Reduction: High	
		W/R	55 53 52	00~64	00~64	Red Gain (mapping 0~100)	USR

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Display Adjustment	Display Adjustment	W/R	55 53 47	00~64	00~64	Green Gain (mapping 0~100)	USG
		W/R	55 53 42	00~64	00~64	Blue Gain (mapping 0~100)	USB
		W/R	55 4F 52	00~64	00~64	Red Offset (mapping 0~100)	UOR
		W/R	55 4F 47	00~64	00~64	Green Offset (mapping 0~100)	UOG
		W/R	55 4F 42	00~64	00~64	Blue Offset (mapping 0~100)	UOB
		W/R	43 4F 54	0	0	User	COT
				1	1	6500K	
				2	2	9300K	
				6	6	5000K	
				7	7	7500K	
		W/R	47 41 43	0	0	Gamma Off	GAC
				1	1	Gamma 2.2	
	VGA Adjustment	W/R	50 48 41	00~FF	00~FF	Phase	PHA
		W/R	43 4C 4F	00~64	00~64	Clock	CLO
		R/W	48 4F 52	00~64	00~64	Horizontal Position	HOR
		R/W	56 45 52	00~64	00~64	Vertical Position	VER
		W	41 44 4A	0	0	Auto Adjust	ADJ
	Sharpness	W/R	53 48 41	00~64	00~64	Sharpness	SHA
Other Control	Scaling	W/R	41 53 50	0	0	Main Window Aspect Ratio Native (PointToPoint)	ASP
				1	1	Full Screen (16:9)	
				2	2	Pillarbox (4:3)	
				3	3	Letterbox	
				4	4	Auto	
		W/R	5A 4F 4D	00~0A	00~0A	Adjust overscan ratio	ZOM
	Baudrate Adjustment	W/R	42 52 41	0	0	115200	BRA
				1	1	38400	
				2	2	19200	
				3	3	9600	
	Other Control	W	52 43 55	0	0	MENU Key	RCU
				1	1	INFO Key	
				2	2	UP Key	
				3	3	DOWN Key	
				4	4	LEFT Key	
				5	5	RIGHT Key	
				6	6	OK Key	
				7	7	EXIT Key	
				8	8	VGA Key	
				0A	0A	HDMI1 Key	
				0B	0B	HDMI2 Key	
				17	17	SCALING Key	
				18	18	FREEZE Key	
				19	19	MUTE Key	
				1A	1A	BRIGHT Key	
				1B	1B	CONTRAST Key	
				1C	1C	AUTO Key	
				1D	1D	VOLUME+ Key	
				1E	1E	VOLUME- Key	

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Other Control	Other Control	W	52 43 55	1F	1F	HDMI3 Key	RCU
				21	21	OPS Key	
		W	41 4C 4C	0	0	Reset all	ALL
				1	1	Reset all but communication (RS232, LAN)	
		W/R	4B 4C 43	0	0	Un-lock keys	KLC
				1	1	Lock keys	
		R	53 45 52		13 bytes	Read Serial Number	SER
		R	4D 4E 41		13 bytes	Read Model Name	MNA
		R	47 56 45		6 bytes	Read Firmware Version	GVE
		R	52 54 56		Current value	Read RS232 table Version	RTV
		W	47 56 53	0	[00]+5 byte	Querying main scaler version	GVS
				1	[00]+5 byte	Querying sub mcu version	
				2	[00]+5 byte	Querying network module version	
	Audio	W/R	56 4F 4C	00~64	00~64	volume	VOL
		W/R	42 41 53	00~14	00~14	Bass (-10~10)	BAS
		W/R	54 52 45	00~14	00~14	Treble (-10~10)	TRE
		W/R	42 41 4C	00~14	00~14	Bass (-10~10)	BAL
		W/R	49 4E 53	0	0	Internal Speaker Off	INS
				1	1	Internal Speaker On	
		W/R	4D 55 54	0	0	Mute Off	MUT
				1	1	Mute On	
		W/R	56 4F 49	05~1E	-	VOLUME + Value	VOI
		W/R	56 4F 44	05~1E	-	VOLUME - Value	VOD
	Scheme selection	W/R	53 43 4D	0	0	User	SCM
				1	1	Sport	
				2	2	Game	
				3	3	Cinema	
				4	4	Vivid	
Other Control	EcoMode WakeUpFromSleep	W/R	57 46 53	0	0	Set VGA_ONLY	WFS
				1	1	Set DIGITAL, RS232, Ethernet	
				2	2	Set Never Sleep	
	RTC	W/R	52 54 59	00~63	00~63	Set Real time Year	RTY
		W/R	52 54 4D	01~0C	01~0C	Set Real time Month	RTM
		W/R	52 54 44	01~1F	01~1F	Set Real time Day	RTD
		W/R	52 54 48	00~17	00~17	Set Real time Hour	RTH
		W/R	52 54 4E	00~3B	00~3B	Set Real time Minute	RTN
		W/R	54 4D 53	0	0	Same Settings on All (Everyday)	TMS
				1	1	Same Settings on Work Days (Workday)	
				2	2	User	
		W/R	41 45 4E	1	1	Sunday Alarm Enable (Note 14)	AEN
				2	2	Monday Alarm Enable (Note 14)	
				4	4	Tuesday Alarm Enable (Note 14)	

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Other Control	RTC	W/R	41 45 4E	8	8	Wednesday Alarm Enable (Note 14)	AEN
				10	10	Thursday Alarm Enable (Note 14)	
				20	20	Friday Alarm Enable (Note 14)	
				40	40	Saturday Alarm Enable (Note 14)	
		W/R	41 45 46	1	1	Sunday Alarm Disable (Note 14)	AEF
				2	2	Monday Alarm Disable (Note 14)	
				4	4	Tuesday Alarm Disable (Note 14)	
				8	8	Wednesday Alarm Disable (Note 14)	
				10	10	Thursday Alarm Disable (Note 14)	
				20	20	Friday Alarm Disable (Note 14)	
				40	40	Saturday Alarm Disable (Note 14)	
		W/R	4E 4E 48	00~17	00~17	Monday On Hour	NNH
		W/R	4E 4E 4D	00~3B	00~3B	Monday On Minute	NNM
		W/R	4E 46 48	00~17	00~17	Monday Off Hour	NFH
		W/R	4E 46 4D	00~3B	00~3B	Monday Off Minute	NFM
		W/R	45 4E 48	00~17	00~17	Tuesday On Hour	ENH
		W/R	45 4E 4D	00~3B	00~3B	Tuesday On Minute	ENM
		W/R	45 46 48	00~17	00~17	Tuesday Off Hour	EFH
		W/R	45 46 4D	00~3B	00~3B	Tuesday Off Minute	EFM
		W/R	44 4E 48	00~17	00~17	Wednesday On Hour	DNH
		W/R	44 4E 4D	00~3B	00~3B	Wednesday On Minute	DNM
		W/R	44 46 48	00~17	00~17	Wednesday Off Hour	DFH
		W/R	44 46 4D	00~3B	00~3B	Wednesday Off Minute	DFM
		W/R	55 4E 48	00~17	00~17	Thursday On Hour	UNH
		W/R	55 4E 4D	00~3B	00~3B	Thursday On Minute	UNM
		W/R	55 46 48	00~17	00~17	Thursday Off Hour	UFH
		W/R	55 46 4D	00~3B	00~3B	Thursday Off Minute	UFM
		W/R	49 4E 48	00~17	00~17	Friday On Hour	INH
		W/R	49 4E 4D	00~3B	00~3B	Friday On Minute	INM
		W/R	49 46 48	00~17	00~17	Friday Off Hour	IFH
		W/R	49 46 4D	00~3B	00~3B	Friday Off Minute	IFM
		W/R	54 4E 48	00~17	00~17	Saturday On Hour	TNH
		W/R	54 4E 4D	00~3B	00~3B	Saturday On Minute	TNM
		W/R	54 46 48	00~17	00~17	Saturday Off Hour	TFH
		W/R	54 46 4D	00~3B	00~3B	Saturday Off Minute	TFM
		W/R	53 4E 48	00~17	00~17	Sunday On Hour	SNH
		W/R	53 4E 4D	00~3B	00~3B	Sunday On Minute	SNM
		W/R	53 46 48	00~17	00~17	Sunday Off Hour	SFH
		W/R	53 46 4D	00~3B	00~3B	Sunday Off Minute	SFM
	Auto Scan	W/R	41 54 53	0	0	Off	ATS
				1	1	Main	
	IRFM	W/R	49 52 46	0	0	Off	IRF
				1	1	On	

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Other Control	Smart Light Control	W/R	53 4C 43	0	0	Off	SLC
				1	1	DCR	
				3	3	By time	
	Power LED	W/R	4C 45 44	0	0	Off	LED
				1	1	On	
	HDMI EDID	W/R	45 44 48	0	0	4Kx2K	EDH
				1	1	1080P	
	DisplayPort EDID	W/R	45 44 50	0	0	4Kx2K	EDP
				1	1	1080P	
	HDMI RGB Color Range	W/R	48 43 52	0	0	Auto Detect	HCR
				1	1	0-255	
				2	2	16-235	
	HDMI HDCP	W/R	48 44 43	0	0	Enable All	HDC
				1	1	Disable HDMI 1 & 2	
				2	2	Disable HDMI1	
				3	3	Disable HDMI2	
	Touch Control	W/R	54 4F 43	0	0	Auto (Read Only)	TOC
				1	1	OPS	
				2	2	External Touch1 (HDMI3)	
				3	3	External Touch 2 (Rear USB)	
				4	4	MiniPC(HDMI4)	
				5	3	WPS	
OSD Control	Transparency	W/R	4F 53 54	00~04	00~04	OSD Transparency	OST
	H Position	W/R	4F 53 48	00~64	00~64	OSD H Position	OSH
	V Position	W/R	4F 53 56	00~64	00~64	OSD V Position	OSV
	OSD Language	W/R	4F 53 4C	0	0	English	OSL
				1	1	French	
				2	2	German	
				3	3	Dutch	
				08	08	Danish	
				0D	0D	Italian	
				0E	0E	Swedish	
				0F	0F	Portuguese	
				10	10	Spanish	
	OSD Timeout	W/R	4F 53 4F	05~3C	05~3C	OSD Timeout (5, 10, 20, 30, 60 sec)	OSO
Ethernet Setup	Network Enable	W/R	4E 57 45	0	0	No	NWE
				1	1	Yes	
	Dynamic IP	W/R	44 49 50	0	0	Disable	DIP
				1	1	Enable	
	Default	W	4C 44 53	0	0	Load network default settings (It will take about 15 seconds.)	LDS
	E-Mail Alert	W/R	50 53 41	0	0	Off (Power Status Alert)	PSA
				1	1	On (Power Status Alert)	
		W/R	53 53 41	0	0	Off (Source Status Alert)	SSA
				1	1	On (Source Status Alert)	
		W/R	53 4C 41	0	0	Off (Signal Lost Alert)	SLA
				1	1	On (Signal Lost Alert)	

Main Item	Control Item	Type	CMD (HEX)	Value (HEX)	Reply (HEX)	Content	CMD (ASCII)
Ethernet Setup	Static IP Settings	W/R	49 50 31	00~FF	00~FF	Static IP Address 1	IP1
		W/R	49 50 32	00~FF	00~FF	Static IP Address 2	IP2
		W/R	49 50 33	00~FF	00~FF	Static IP Address 3	IP3
		W/R	49 50 34	00~FF	00~FF	Static IP Address 4	IP4
		W/R	4D 4B 31	00~FF	00~FF	Subnet Mask 1	MK1
		W/R	4D 4B 32	00~FF	00~FF	Subnet Mask 2	MK2
		W/R	4D 4B 33	00~FF	00~FF	Subnet Mask 3	MK3
		W/R	4D 4B 34	00~FF	00~FF	Subnet Mask 4	MK4
		W/R	47 57 31	00~FF	00~FF	Gateway 1	GW1
		W/R	47 57 32	00~FF	00~FF	Gateway 2	GW2
		W/R	47 57 33	00~FF	00~FF	Gateway 3	GW3
		W/R	47 57 34	00~FF	00~FF	Gateway 4	GW4
		W/R	46 44 31	00~FF	00~FF	DNS Address 1	FD1
		W/R	46 44 32	00~FF	00~FF	DNS Address 2	FD2
		W/R	46 44 33	00~FF	00~FF	DNS Address 3	FD3
		W/R	46 44 34	00~FF	00~FF	DNS Address 4	FD4
		W	53 4E 53	0	0	Save Network Settings	SNS
		W	4D 41 43	00~05	00~FF	Querying MAC ID #0~#5	MAC