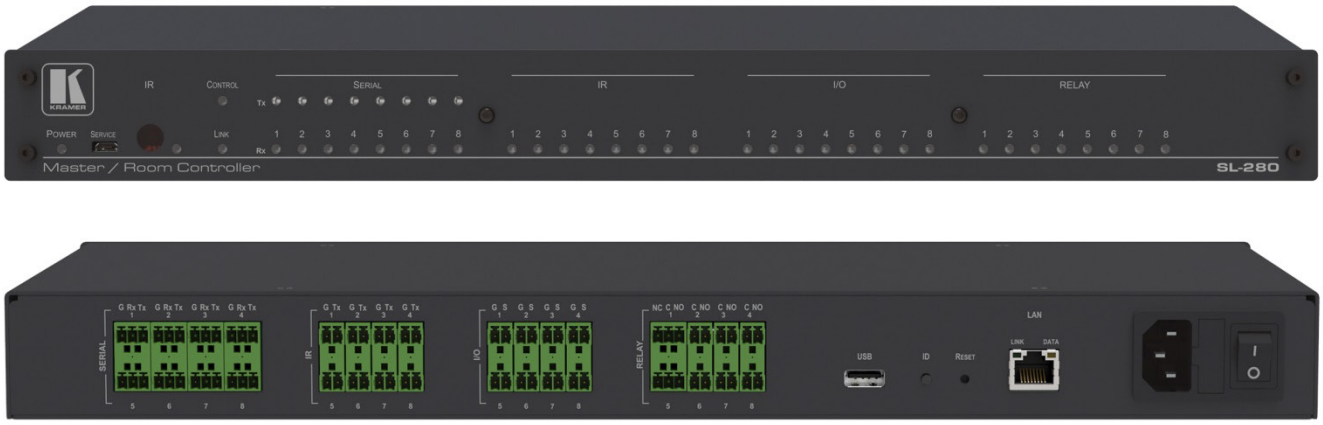
KRAMER

USER MANUAL

MODEL:

SL-280
Master / Room Controller
Kramer Control Brain



Contents

Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format & Standards Converters; GROUP 5: Range Extenders & Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Mounting and Rack Adapters; GROUP 11: Sierra Video; GROUP 12: Digital Signage; GROUP 13: Audio; GROUP 14: Collaboration; and GROUP 15: KM & KVM Switches.

Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment.
- Review the contents of this user manual.

Go to www.kramerav.com/downloads/SL-280 to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

Achieving the Best Performance

- Use only good quality connection cables (we recommend Kramer high-performance cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Do not secure the cables in tight bundles or roll the slack into tight coils.
- Avoid interference from neighbouring electrical appliances that may adversely influence signal quality.
- Position your Kramer **SL-280** away from moisture, excessive sunlight and dust.

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

Safety Instructions

Caution:	There are no operator serviceable parts inside the unit.
Warning:	Use only the power cord that is supplied with the unit.
Warning:	Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only.
Warning:	Disconnect the power and unplug the unit from the wall before installing.

Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at www.kramerav.com/support/recycling.

Overview

SL-280 is a master room (space) controller that can operate over Ethernet with control interfaces that include: eight bidirectional RS-232, eight IR, eight GPI/O, and eight relays. It controls devices such as scalers, video displays, audio amplifiers, Blu-ray players, sensors, screens, shades, door locks, lights, and more. Multiple Kramer Ethernet control gateways can be used to add remote I/O ports.

Main Features

- Kramer Control Space Controller – Controls any AV device/display with its corresponding logic.
- High Performance Architecture – Enables a scalable and flexible programming platform.
- 8 RS-232 Bidirectional Control Ports – For controlling devices via bi-directional serial control protocols.
- 8 IR Emitter & 1 IR Learning Control Port – Control devices via IR control protocols and learn commands from IR remotes.
- 8 GPI/O Control Ports – Control devices via general purpose I/O ports, program configured as digital input, digital output or analog input interface for controlling sensors, door locks, and lighting control devices.
- 8 Relay Control Ports – Control devices via low voltage relay contact closure, such as opening and closing drapes, shades, blinds, and projection screen scrolling.
- Network Support – 10/100/1000Mbps Ethernet.
- LED Indicators – I/O port state, link and system status.
- Software Management Support – Kramer Control, API, K-Upload.

Typical Applications

SL-280 is ideal for the following typical applications:

- Small to large spaces
- Retail stores
- Class rooms and lecture halls
- Auditoriums
- Government meeting rooms
- Court rooms
- Command and control applications

Controlling your SL-280

Control your **SL-280** directly via one of the following:

- Ethernet using built-in, user-friendly web pages (see Remote Operation via the Web Pages on page 9).
- Kramer Control Builder
- Kramer Control Client App

Defining the SL-280 Master / Room Controller Kramer Control Brain

This section defines **SL-280**.

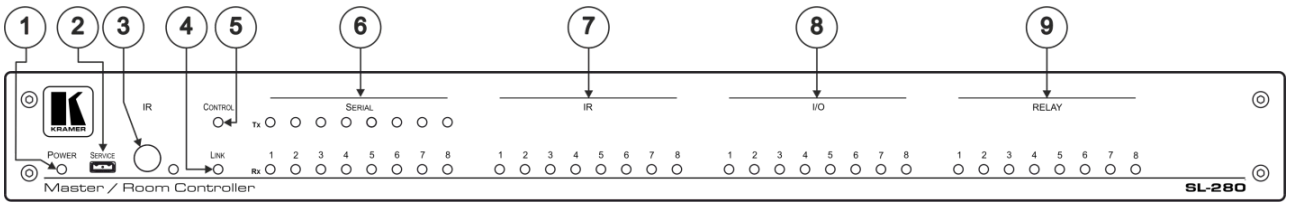


Figure 1: SL-280 Master / Room Controller Kramer Control Brain Front Panel

#	Feature	Function
1	*POWER LED*	Lights green when powered on.
2	*SERVICE* Micro USB Connector	Connect to a PC to send P3K commands and perform a firmware upgrade.
3	*IR* Receiver and LED	Detects IR signals for IR learning. Lights blue when waiting to receive a signal.
4	*LINK* LED	Lights blue to indicate Ethernet activity: • On – good connection • Flashing – no connection • Off – before first connection
5	*CONTROL* LED	Lights to indicate control states of the control application (brain): • Flashing – sending data • Green – ready and working • White – no devices are assigned • Blue – synchronizing • Yellow – one or more controlled devices are disconnected • Red – an error occurred • Purple – Brain booting up
6	*SERIAL* LEDs (1–8)	White Tx LEDs and blue Rx LEDs flash to indicate activity on each channel.
7	*IR* LEDs (1–8)	Light blue to indicate IR activity on each channel (the associated LED lights when the relevant IR port transmits data).
8	*I/O* LEDs (1–8)	Light blue to indicate I/O activity on each channel (the associated LED lights on Digital Out HIGH, and when Digital In is triggered).
9	*RELAY* LEDs (1–8)	Light blue to indicate relay activity on each channel (the associated LED lights when the relay is closed).

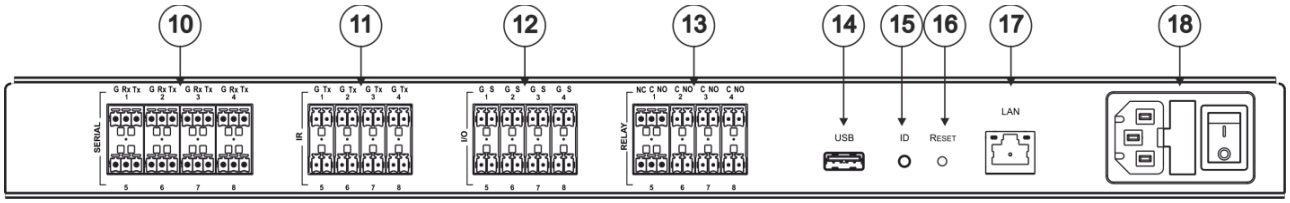


Figure 2: SL-280 Master / Room Controller Kramer Control Brain Rear Panel

#	Feature	Function
10	*SERIAL* Ports (1–8) Terminal Block	Connect to up to 8 serial controlled devices, for Ethernet-to-RS232 bidirectional tunneling.
11	*IR* Ports (1–8) Terminal Block	Connect to up to 8 IR emitters or blasters.
12	*I/O* Ports (1–8) Terminal Block	Connect to up to 8 sensors or devices to be controlled, for example, a motion sensor. Port may be configured as a digital input, digital output, or analog input (see Configuring I/O Ports on page 15).
13	RELAY Ports (1–8) Terminal Block	Connect to up to 8 devices to be controlled by relay for example, a motorized projection screen. Six of the ports are NO and ports 1 and 5 can be connected as NO or NC (see Connecting the Relay Ports on page 8).
14	USB Connector	For future use.
15	ID Button	For self-identification over the network. Press the button to send (broadcast) the Beacon P3K command. Reply includes: IP address, UDP port number, TCP port number, MAC address, and Model Name.
16	RESET Button	Press while performing a factory default reset (see Resetting to Factory Default Settings on page 25.
17	LAN RJ-45 Connector	Connect to a local area network. Indications: LINK LED lights amber – 1000/100/10MB connection. DATA LED flashes green – Ethernet data link activity.
18	Power Socket with Fuse and Power Switch	Connect to the power cord and to the mains electricity. Switch for turning the unit ON or OFF.

Installing in a Rack

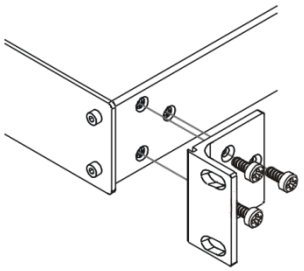
This section provides instructions for rack mounting **SL-280**. Before installing in a rack, verify that the environment is within the recommended range:

- Operation temperature – 0° to 40°C (32 to 104°F).
- Storage temperature – -40° to +70°C (-40 to +158°F).
- Humidity – 10% to 90%, RHL non-condensing.

When installing on a 19" rack, avoid hazards by taking care that:

- It is located within recommended environmental conditions. Operating ambient temperature of a closed or multi-unit rack assembly may exceed ambient room temperature.
- Once rack mounted, there is enough air still flow around **SL-280**.
- **SL-280** is placed upright in the correct horizontal position.
- You do not overload the circuit(s). When connecting **SL-280** to the supply circuit, overloading the circuits may have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
- **SL-280** is earthed (grounded) and connected only to an electricity socket with grounding. Pay particular attention when electricity is supplied indirectly (for example, when the power cord is not plugged directly into the wall socket but to an extension cable or power strip). Use only the supplied power cord.

To rack-mount SL-280:



1. Attach both rack ears to **SL-280**:
   Remove the screws from each side of **SL-280** (3 on each side), and replace them through the rack ears.
2. Place the rack ears of **SL-280** against the rack rails and insert the appropriate screws (not provided) through each of the four holes in the rack ears.

Some models, may feature built-in rack ears:

- Detachable rack ears can be removed for desktop use.
- Always mount **SL-280** in the rack before connecting any cables or power.

Connecting SL-280

Always switch off the power to each device before connecting it to your **SL-280**. After connecting your **SL-280**, connect its power and then switch on the power to each device.

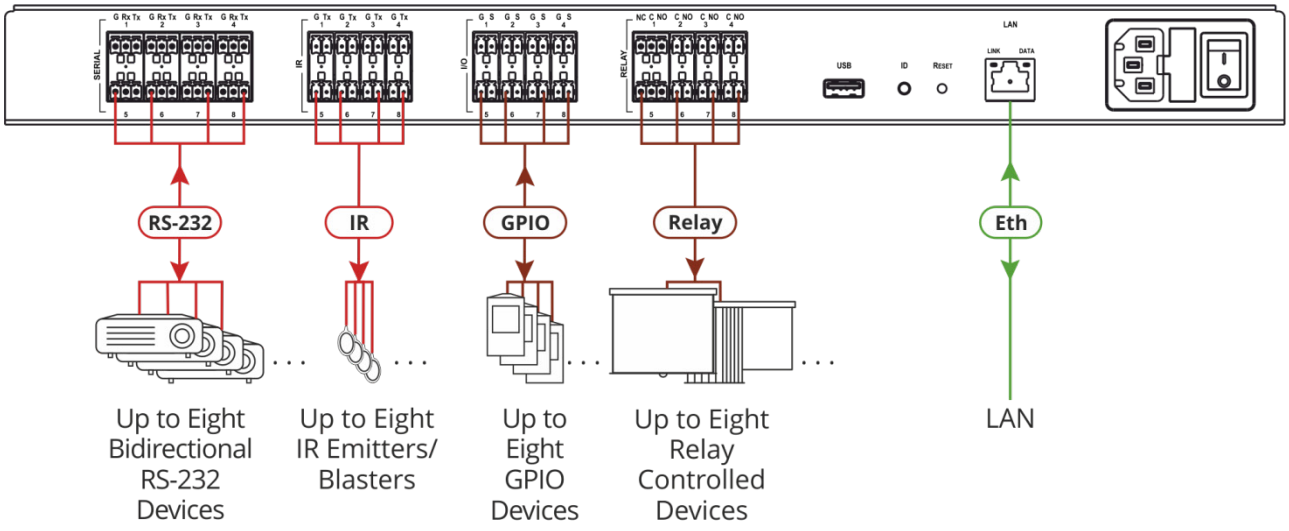


Figure 3: Connecting SL-280

To connect SL-280 as illustrated in the example in Figure 3, do the following:

1. Connect up to eight bidirectional RS-232 devices to the Serial terminal block ports (10).
2. Connect up to eight IR emitters or blasters to the IR terminal block ports (11).
3. Connect up to eight GPIO (General Purpose I/O) devices to the I/O terminal block ports (12). No more than 30V can be connected.
4. Connect to a LAN through the LAN RJ-45 connector (17).
5. Connect the power cord to the power socket (18) and to the mains electricity.

Connecting the Relay Ports

The normal state of the relay ports is as follows:

- Ports 2–4, 6–8 – NO (Normally Open)
- Ports 1 and 5 – can be connected as NO or NC (Normally Closed)

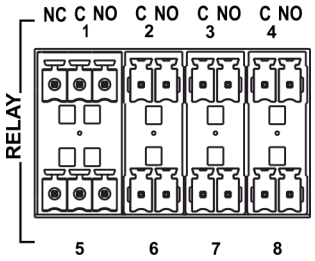


Figure 4: Relay Ports

To connect a ports as NO:

- Connect the device to the C (Common) and NO terminals of the relevant port.

To connect ports 1 and 5 as NC:

- Connect the device to the C and NC terminals of the relevant port.

Remote Operation via the Web Pages

SL-280 embedded webpages enable you to define device settings, configure communication parameters, configure port settings, define security parameters, and view activity logs.

The specific parameter values shown in screenshots of this manual are merely representative.

To access the web pages:

1. Enter the IP address of the device (see Default Communication Parameters on page 27) in the address bar of your browser.
   The Loading page appears followed shortly by the General Info page.

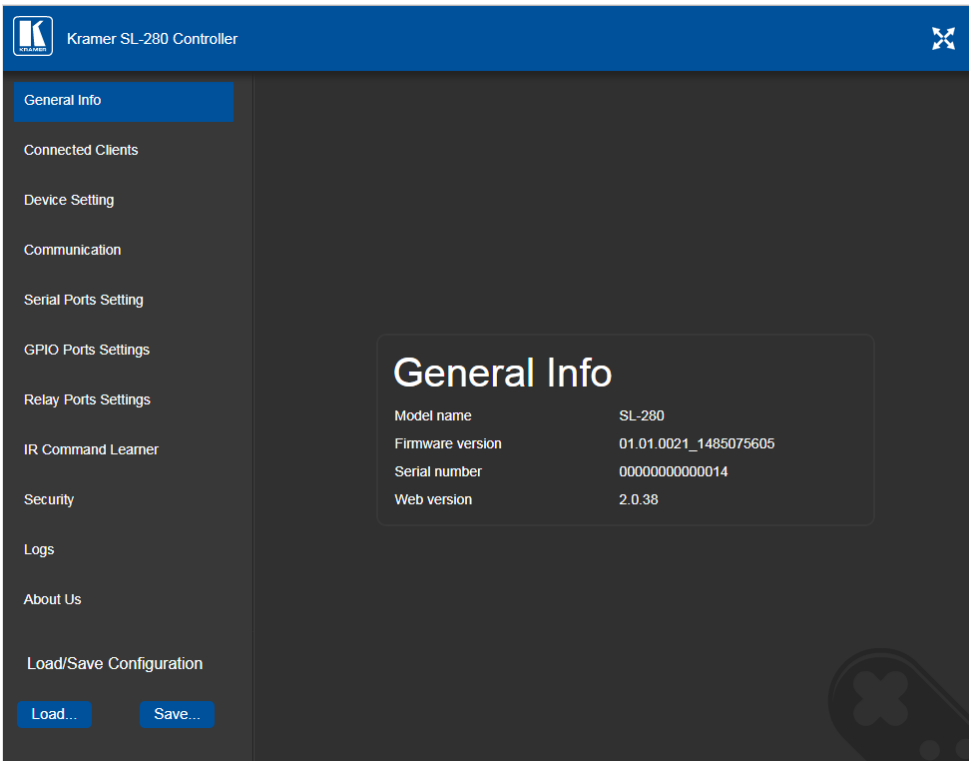


Figure 5: Embedded Web Pages – General Info Page

The General Info page displays the following:

- Model name
- Firmware version
- Serial number
- Web pages version

2. Click the tabs on the left side of the screen to access the relevant web page.

Loading and Saving Configurations

You can save a configuration for easy recall in the future.

At the bottom left hand side of all web pages there is a Load and a Save button. These enable you to save the current configuration and load any pre-saved configurations.

To load a configuration:

1. Click **Load**.
   An Explorer window opens.
2. Select the required file and click **Open**.
   The device is configured according to the saved preset.

To save the current configuration:

1. Configure the device as required.
2. Click **Save**.
   The Save File window opens.
3. Browse to the required location to which to save the file.
4. Enter the required name for the saved preset.
5. Click **OK**.
   The current configuration is saved.

When using Chrome, the file is automatically saved in the Downloads folder.

Viewing Connected Clients Information

SL-280 web pages enable you to view information for client devices that are connected to **SL-280** via Ethernet.

To view connected clients information:

1. Click **Connected Clients** on the left side of the web page (Figure 5).
   The Connected Clients page appears.

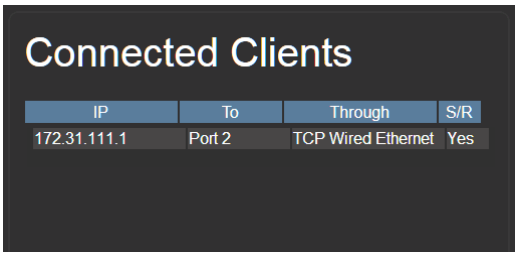


Figure 6: Connected Clients Page

2. View the following connected clients information:
   - IP – IP address
   - To – The RS-232 port to which it is connected
   - Through – Method of connection
   - S/R – Whether or not Send Replies is enabled for the port (see Configuring the Serial Ports on page 14).

Modifying Device Settings

SL-280 web pages enable you to modify the following device settings:

- Device Name
- Time and Date Settings

Changing the Device Name

SL-280 device name is used by DNS when addressing the device and is necessary for accessing the device for the first time using a Web browser.

To change the name of your device:

1. Click **Device Settings** on the left side of the web page (Figure 5).
   The Device Settings page appears.

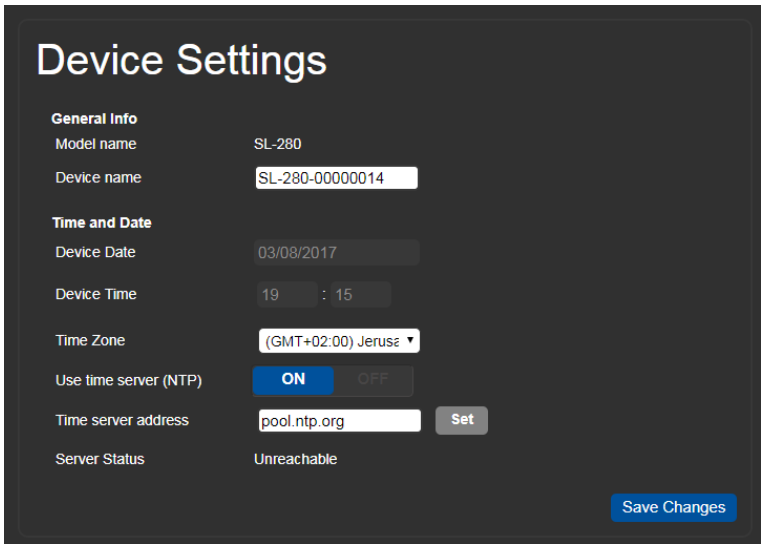


Figure 7: Device Settings Page

2. In the General info area, enter a new name in the Device name field.
   The device name cannot include any spaces, can be up to 14 characters and can include letters, numbers, hyphens and underscores only.

3. Click **Save Changes**.

Setting the Date and Time

SL-280 web pages enable you to manually set the date and time for your **SL-280** device or to use a time server to automatically set the date and time. Date and time settings are used by the device for logging purposes (see Using the Log on page 23), and for time driven events as defined through Kramer Control Builder.

To set the date and time for your device:

1. Click **Device Settings** on the left side of the web page (Figure 5).
   The Device Settings page appears (Figure 7).

2. In the Time and Date area, if Use time server (NTP) is set to ON, click **OFF** and click in the relevant fields to define the date, time and time zone.

–OR–

3. Click the **ON** button, enter the time server address in the Time server address field, and click **Set**.

4. Click **Save Changes**.

Defining IP Settings

The default IP address setting for the device is DHCP ON.

To define static IP settings:

1. Click **Communication** on the left side of the web page (Figure 5).
   The Communication page appears.

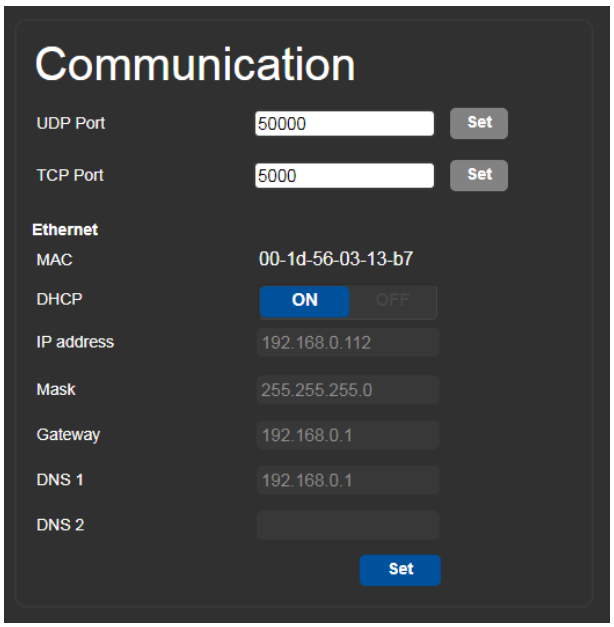


Figure 8: Communication Page

2. In the Ethernet section, view the MAC address.
3. Click the DHCP **OFF** button.
4. Enter the required IP settings in the relevant fields.
5. Click **Set**.

Configuring the Serial Ports

SL-280 web pages enable you to configure each of the serial ports (10).

To configure a serial port:

1. Click **Serial Ports Setting** on the left side of the web page (Figure 5).
   The Serial Ports Setting page appears.

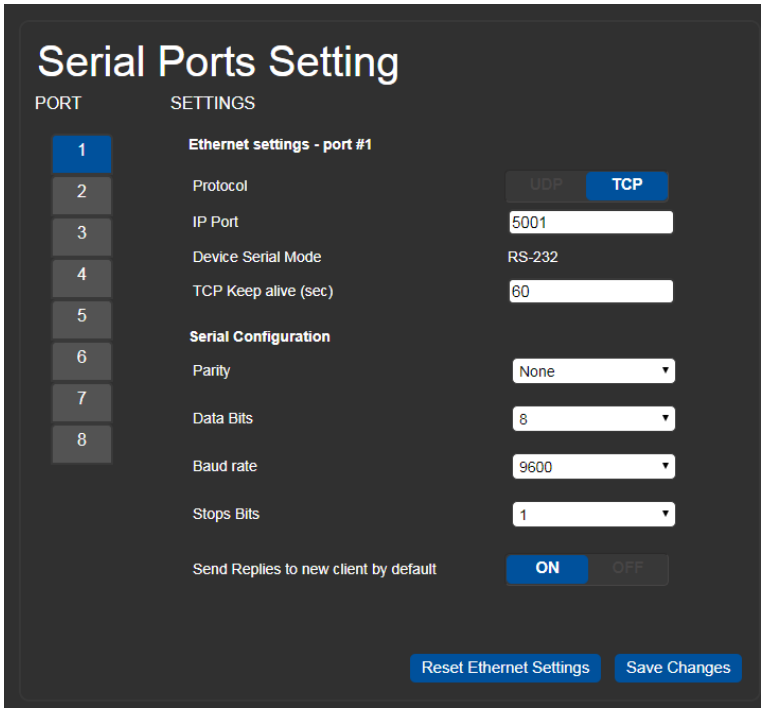


Figure 9: Serial Ports Setting Page

2. In the Port area, click a port number (1–8).
3. In the Settings area, click **UDP** or **TCP**.
4. Enter the IP Port number.
5. Enter a TCP Keepalive value between 0 and 3600 seconds.
   This value defines how often the unit sends a “keep alive” signal to the client. The default value is 60 seconds.
6. Define the serial settings as necessary (see Default Communication Parameters on page 27).
7. Select whether or not to send replies on the port to a new connected client by default, (see Viewing Connected Clients Information on page 11).
8. Click **Save Changes**.

Configuring I/O Ports

SL-280 web pages enable you to configure each of the I/O ports (12). The I/O ports control devices such as sensors, door locks, audio volume and lighting control devices.

To configure an I/O port:

1. Click **GPIO Ports Settings** on the left side of the web page (Figure 5).
   The GPIO Ports Settings page appears.

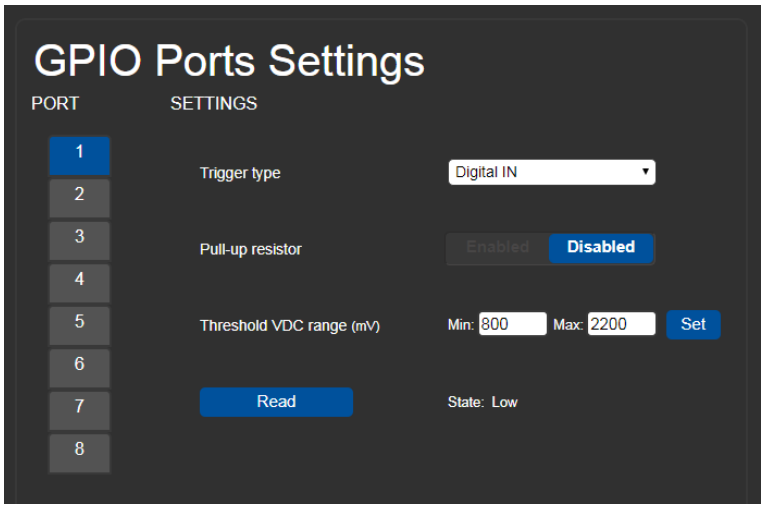


Figure 10: GPIO Ports Settings Page – Digital IN Trigger Type

2. In the Port area, click the number (1–8) of the port to be configured.
3. In the Settings area, select one of the following from the Trigger type option box:
   - **Digital Input** (see Configuring a Digital Input Trigger Type on page 16)
   - **Digital Output** (see Configuring a Digital Out Trigger Type on page 17)
   - **Analog Input** (see Configuring an Analog In Trigger Type on page 18)

The settings available on the page, change depend on which trigger type is selected.

Configuring a Digital Input Trigger Type

Digital Input trigger mode reads the digital input of an external sensor device that is connected to the GPIO port, and detects High (upon passing Max threshold from Low state) or Low (upon passing Min threshold from High state) port states according to the user defined voltage threshold levels.

To configure a digital input trigger type:

1. On the GPIO Ports Settings page, select Digital IN from the Trigger type option box (Figure 10).
   The Digital IN options appear (Figure 10).

2. Select one of the following for the Pull-up resistor setting:
   - **Enabled**
     Detection of an open circuit as High, or a short to ground as Low. This is suitable for example, for a pushbutton switch (connecting one terminal of the switch to ground, and the other to the input) or for an alarm closing a circuit that activates a series of actions. When the pull-up resistor is enabled, the port state is high and to be triggered it must be pulled low by the externally connected sensor.
   - **Disabled**
     Suitable, for example, for a high temperature alarm that exceeds the maximum voltage threshold.
     When the pull-up resistor is disabled, the port state is low and to be triggered it must be pulled high by the externally connected sensor.

3. Define the Min and Max for the Threshold VDC range (threshold voltage at which the port changes state) and click **Set**.

Configuring a Digital Out Trigger Type

To configure a digital output trigger type:

1. On the GPIO Ports Settings page, select Digital OUT from the Trigger type option box (Figure 10).
   A Warning message appears.

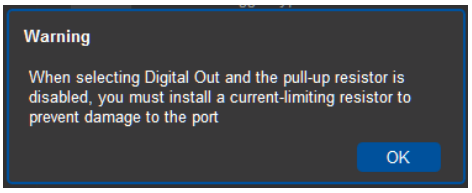


Figure 11: Digital Out Selection Warning

2. Click **OK**.
   The Digital OUT options appear.

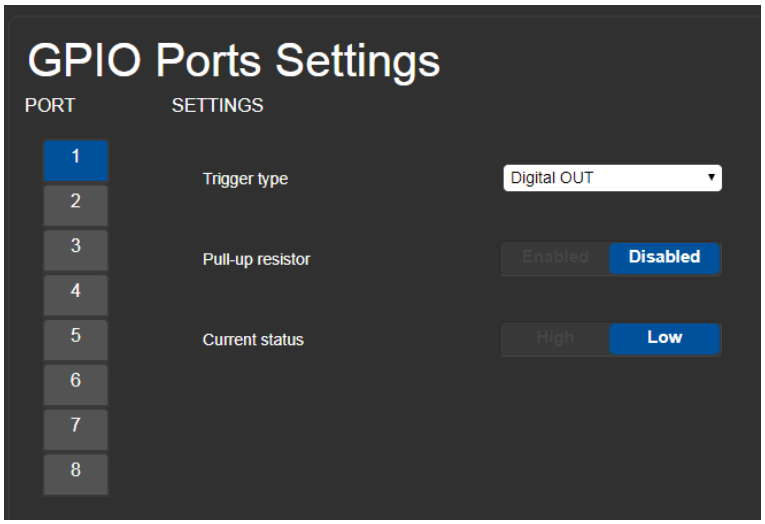


Figure 12: GPIO Ports Settings Page – Digital OUT Trigger Type

3. Select one of the following for the Pull-up resistor setting:

   - Pullup resistor enabled:
     The port can be used for controlling devices that accept a TTL signal such as for powering LEDs. The voltage output is TTL positive logic: open: ~ 3.5V; closed: ~ 0.3V.
     When the pull-up resistor is enabled, the port state is high. For the state to be low, you must click **Low** for the Current Status.

   - Pullup resistor disabled:
     The port is used for controlling external devices such as room or light switches. The external source device determines the voltage output; the maximum voltage is 30V DC and the maximum current is 100mA.
     When the pull-up resistor is disabled, the port state is low and to set it high, you must click **High** for the Current Status.

Make sure that the current in this configuration does not exceed 100mA.

Configuring an Analog In Trigger Type

When you select the Analog IN trigger type, the port is triggered by an external analog device, such as a volume control device. The trigger is activated once when the detected voltage is within the 0 to 30V DC voltage range.

When the Analog IN trigger type is selected, the Pullup resistor and Threshold settings are disabled.

To configure an analog input trigger type:

1. On the GPIO Ports Settings page, select **Analog IN** from the Trigger type option box (Figure 10).
   The Analog IN options appear.

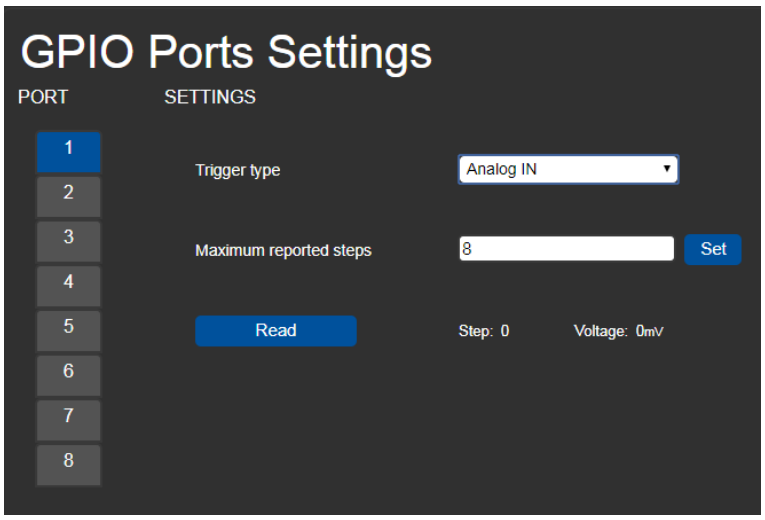


Figure 13: GPIO Port Settings Page Analog IN

2. Enter or use the arrows to scroll to a value (1–100) for the Maximum reported steps. This value is the number of steps that the analog input signal is divided into. To calculate the voltage of each step, use the following formula:
   Voltage of one step = 30V / number of steps

Changing the State of a Relay Port

SL-280 web pages enable you to change the state of each of the relay ports (13).
The **SL-280** relay ports have the following characteristics:

- Default state of relays 2–4 and 6–8 is NO (normally open)
- Default state of relays 1 and 5 can be NO or NC (normally closed), depending on how they are connected to the device (see Connecting the Relay Ports on page 8)
- Rated at 30V DC and 1A
- A non-latching relay function – the contact is left in its default state when unpowered or in power up state. This means that if a relay is in its non-default state and power is lost, the relay returns to its default state. To return it to its pre-power loss state, the setting must be changed using either the web pages or a Protocol 3000 command.

To change the state of a relay, (for example, relay 2):

1. Click **Relay Ports Settings** on the left side of the web page (Figure 5).
   The Relay Ports Settings page appears.

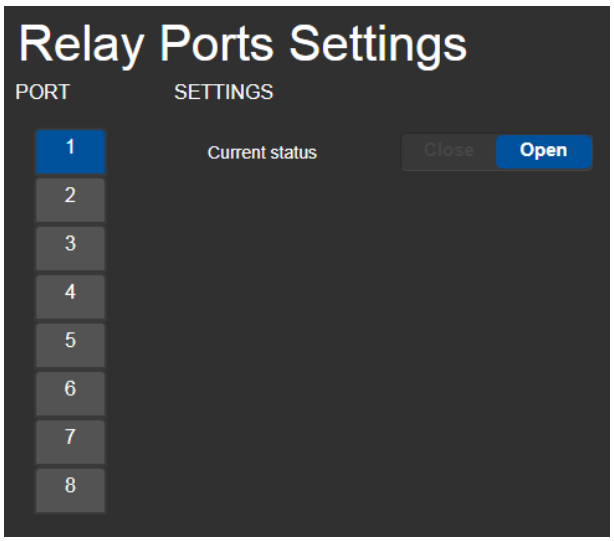


Figure 14: Relay Ports Settings Page

2. In the Port section, click the number (1–8) of the relay port to be changed.
   The current status of the selected relay appears.

3. Click **Close/Open**.
   The relay changes to the selected state.

When relays 1 and 5 are connected as NC (see Connecting the Relay Ports on page 8), the Current status buttons are reversed.
Clicking Open closes the relay and clicking Close opens the relay.

Teaching IR Commands

SL-280 web pages enable you to teach **SL-280** IR commands. These can be saved for later use. The IR learning commands are in Pronto format.

While learning is in progress, the relevant *IR* LED (7) on the front panel lights and **SL-280** is not available for normal operation.

At the start and end of learning a message is sent to all attached clients.

To teach a command to SL-280:

1. Click **IR Command Learner** on the left side of the web page (Figure 5).
   The IR Command Learner page appears.

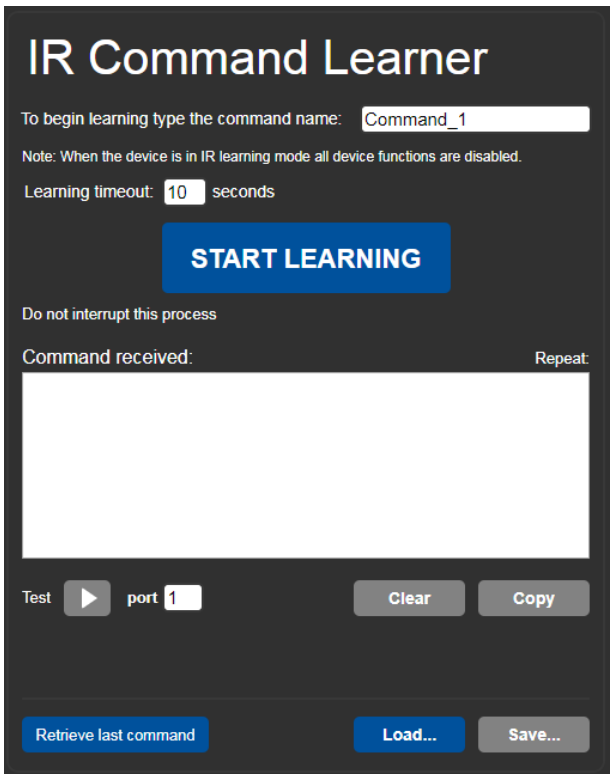


Figure 15: IR Command Learner Page

2. Enter a name for the command in the first field.

3. Enter a value in the Learning timeout field.
   This value defines how long the system waits to receive a command before exiting learning mode.

4. Click **Start Learning**.

5. Position the IR remote control approximately 5cm to 7cm (2in to 2.7in) from the **SL-280** front panel.

6. Send a command with the remote control.
   The command string received during the process appears in the Command received box.

7. Click **Copy**.
   The command string is copied to the clip board.

8. Paste the command string into a control application.

Depending on the application, the format of the command string may have to be modified.

9. (Optional) Select the port on which to test the learned command and press the Test **play** button.
   The command runs on the selected port.

10. Click **Save** to save the new command.

11. To delete the current command, click **Clear**.

12. To retrieve a previously saved command, click **Load**.

Activating Device Security

SL-280 web pages enable you to turn logon security (authentication) on or off. When security is on, access to the Web pages is granted only on submission of a valid user name and password. For default logon credentials see Default Security Parameters on page 27.

To activate Web page security:

1. Click **Security** on the left side of the web page (Figure 5).
   The **Security** page appears.

Figure 16: Security Page

2. Click **ON**.
   A confirmation message appears.

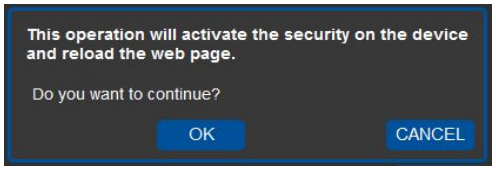


Figure 17: Security Confirmation Message

3. Click **OK**.
   The **Authentication Required** window appears.

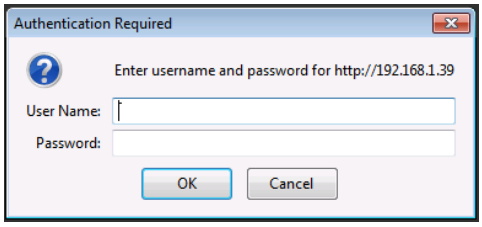


Figure 18: Authentication Required Window

4. Enter the default username and password (see Default Security Parameters on page 27).

5. Click **OK**.
   The web pages reload and the General Info page (Figure 5) appears.

6. Click **Security** on the left side of the web page.
   The **Security** page appears with the Change Password settings.

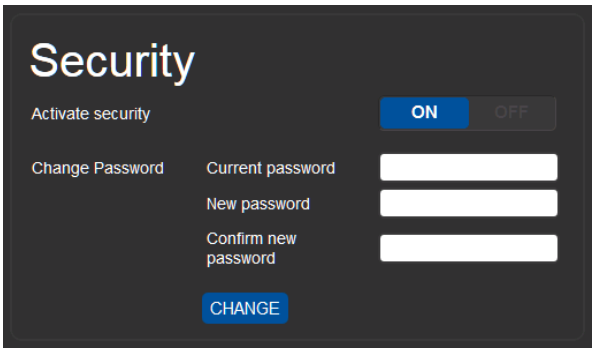


Figure 19: Security Activated Page

7. If required, change the password and click **Change**.

Using the Log

This feature is for future use and is not yet available.

SL-280 web pages enable you to view the current log entries, search log entries with filters and configure the types of events the log records.
The log file is updated once per minute.

To use the log:

1. Click **Logs** on the left side of the web page (Figure 5).
   The **Logs** page appears.

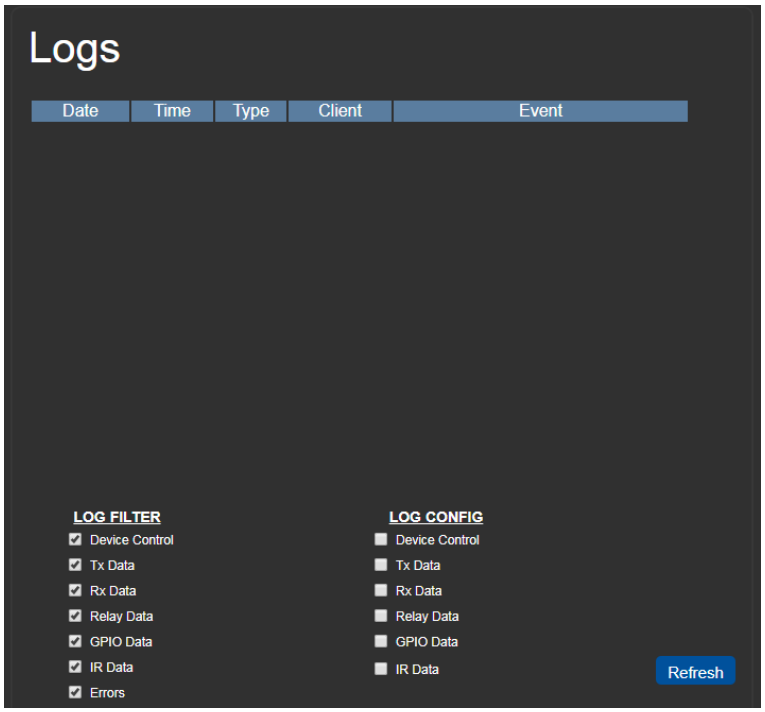


Figure 20: Logs Page

2. Select any of the options in the Log Filter list to define which types of events are displayed.

3. Select any of the options in the Log Config list to define which types of events are recorded.

The display may not update automatically. Click **Refresh** to update the display.

About Us Page

Click **About** on the left side of the web page (Figure 5).to display the web page version and Kramer company information.

Figure 21: About Us Page

Resetting and Upgrading Firmware

Resetting to Factory Default Settings

To reset the device to its factory default settings:

1. Press and hold the *RESET* button (16) on the rear panel for 6 seconds.
2. Release the *RESET* button.
   Wait for the reset process to complete.
   The device is reset to the factory default settings.

Upgrading the Firmware

For instructions on upgrading the firmware see the “Kramer K-Upload User Manual”.

Technical Specifications

Inputs	1 IR	Built-in sensor (for learning)
Outputs	8 IR	On 2-pin terminal block connectors
	8 Relays	
Ports	8 RS-232 Serial	On 3-pin terminal blocks
	8 GPI/O	On 2-pin terminal blocks
	1 Ethernet	On an RJ-45 connector
	1 P3K Serial Port	On a micro-USB connector
Processing	Processor Speed	1GHz
	Memory	512MB RAM, 4GB Flash
Electrical	Power Consumption	100–240V AC, 200mA
Environmental Conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	-40° to +70°C (-40° to 158°F)
	Humidity	10% to 90%, RHL non-condensing
Regulatory Compliance	Safety	CE
Enclosure	Size	19” 1U
	Type	Aluminum
General	Net Dimensions (W, D, H)	43.64cm x 18.3 cm x 4.36cm (19" x 7.2" x 1.7")
	Shipping Dimensions (W, D, H)	55cm x27.6cm x 10.7cm (21.7" x 10.9" x 4.2")
	Net Weight	1.65kg (3.6lbs) approx.
	Shipping Weight	2.6kg (5.7lbs) approx.
Accessories	Included	Power cord, rack ears
	Optional	For optimum range and performance use the recommended USB, Ethernet, serial and IR Kramer cables available at www.kramerav.com/product/SL-280
Specifications are subject to change without notice at www.kramerav.com		

Default Communication Parameters

RS-232 over Micro USB	
Baud Rate:	115200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Example (Set configuration for *I/O* port number 1 to digital input with the pull-up enabled): `#GPIO-CFG 1,1,0,1<CR>`	
Ethernet	
DHCP is enabled by factory default, the following are the default addresses if no DHCP server is found.	
IP Address:	192.168.1.39
Subnet Mask:	255.255.0.0
Default Gateway:	192.168.0.1
TCP Port #:	5000
Concurrent TCP Connections:	500
Full Factory Reset	
Front panel buttons	Press and hold the *RESET* button (16) on the rear panel for 6 seconds. See Resetting to Factory Default Settings on page 25.

Default Security Parameters

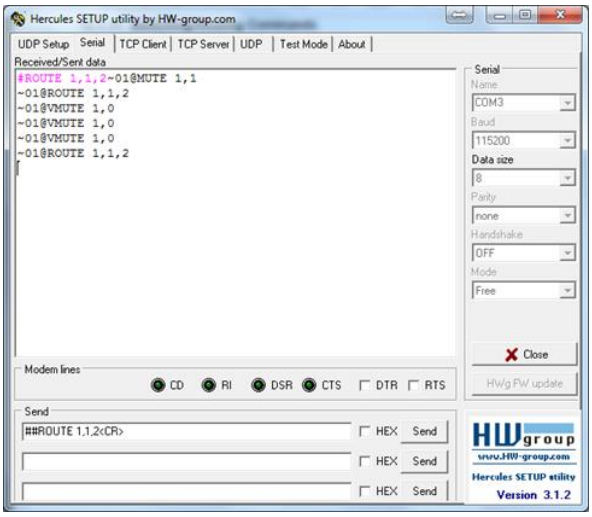
- Default User Name: Admin
- Default Password: adminpw

Protocol 3000

The **SL-280** Master / Room Controller Kramer Control Brain can be operated using the Kramer Protocol 3000 serial commands.

The command framing varies according to how you interface with a device. For example, a basic video input switching command that routes a layer 1 video signal to HDMI out 1 from HDMI input 2 (`ROUTE 1,1,2`), is entered as follows:

- Terminal communication software, such as Hercules:



The above image is for illustration purposes only.

The framing of the command varies according to the terminal communication software.

You can enter commands directly using terminal communication software (e.g., Hercules) by connecting a PC to the serial or Ethernet port on **SL-280**. To enter `CR` press the Enter key (`LF` is also sent but is ignored by the command parser).

Commands sent from various non-Kramer controllers (e.g., Crestron) may require special coding for some characters (such as, `/X##`). For more information, refer to your controller's documentation.

For more information about:

- Using Protocol 3000 commands, see Understanding Protocol 3000 on page 29
- General syntax used for Protocol 3000 commands, see Kramer Protocol 3000 Syntax on page 30
- Protocol 3000 commands available for **SL-280**, see Protocol 3000 Commands on page 31

Understanding Protocol 3000

Protocol 3000 commands are structured according to the following:

- **Command –** A sequence of ASCII letters (A–Z, a–z and –). A command and its parameters must be separated by at least one space.
- **Parameters –** A sequence of alphanumeric ASCII characters (0–9, A–Z, a–z and some special characters for specific commands). Parameters are separated by commas.
- **Message string –** Every command entered as part of a message string begins with a message starting character and ends with a message closing character.

A string can contain more than one command. Commands are separated by a pipe (|) character. The maximum string length is 64 characters.

- **Message starting character:**
  - # – For host command/query
  - ~ – For device response
- **Query sign** –? follows some commands to define a query request
- **Message closing character:**
  - CR – Carriage return for host messages (ASCII 13)
  - CR LF – Carriage return for device messages (ASCII 13) and line-feed (ASCII 10)
- **Command chain separator character –** Multiple commands can be chained in the same string. Each command is delimited by a pipe character (|). When chaining commands, enter the message starting character and the message closing character only at the beginning and end of the string.

Spaces between parameters or command terms are ignored. Commands in the string do not execute until the closing character is entered. A separate response is sent for every command in the chain.

Kramer Protocol 3000 Syntax

The Kramer Protocol 3000 syntax uses the following delimiters:

- CR = Carriage return (ASCII 13 = 0x0D)
- LF = Line feed (ASCII 10 = 0x0A)
- SP = Space (ASCII 32 = 0x20)

Some commands have short name syntax in addition to long name syntax to enable faster typing. The response is always in long syntax.

The Protocol 3000 syntax is in the following format:

- Host Message Format:

Start	Address (optional)	Body	Delimiter
#	*Device_id@*	**Message**	**CR**

- **Simple Command** – Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** **SP** *Parameter_1,Parameter_2,…*	**CR**

- **Command String** – Formal syntax with command concatenation and addressing:

Start	Address	Body	Delimiter
#	*Device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	**CR**

- Device Message Format:

Start	Address (optional)	Body	Delimiter
~	*Device_id@*	**Message**	**CR** **LF**

- Device Long Response – Echoing command:

Start	Address (optional)	Body	Delimiter
~	*Device_id@*	**Command** **SP** **[***Param1 ,Param2 …***]** **result**	**CR** **LF**

Protocol 3000 Commands

This section includes the following commands:

System Commands

Command	Description
#	Protocol handshaking
BUILD-DATE	Get device build date
FACTORY	Reset to factory default configuration
HELP	Get command list
LOG-TAIL	Get the last lines of message logs
MODEL	Get device model
NAME	Set/get machine (DNS) name
NAME-RST	Reset machine (DNS) name to factory default
PROT-VER	Get device protocol version
RESET	Reset device
SN	Get device serial number
TIME	Get/set device time and date
TIME-LOC	Get/set local time offset from UTC/GMT
VERSION	Get device firmware version

BUILD-DATE

Functions		Permission	Transparency
Set:	-	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device build date	#**BUILD-DATE?**CR	
Response			
~nn@**BUILD-DATE**SP*date*SP*time*CR LF			
Parameters			
date – Format: *YYYY/MM/DD* where *YYYY* = Year, *MM* = Month, *DD* = Day *time* – Format: *hh:mm:ss* where *hh* = hours, *mm* = minutes, *ss* = seconds			
Response Triggers			
Notes			
Example			
#BUILD-DATE?<CR>			

FACTORY

Functions		Permission	Transparency
Set:	**FACTORY**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Reset device to factory default configuration	#**FACTORY**CR	
Get:	-	-	
Response			
~nn@**FACTORY**SPOKCR LF			
Parameters			
Response Triggers			
Notes			
This command deletes all user data from the device. The deletion can take some time. Power cycle the device after performing the reset to apply the changes.			
Example			
#FACTORY<CR>			

HELP

Functions		Permission	Transparency
Set:	-	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	1. #**HELP**CR 2. #**HELP**SP*command_name*CR	
Response			
1. Multi-line: ~nn@Device available protocol 3000 commands:CRLF *command*,SP*command...*CR LF 2. Multi-line: ~nn@HELPSP*command*:CR LF*description*CR LFUSAGE:*usage*CR LF			
Parameters			
command_name – name of a specific command			
Response Triggers			
Notes			
Example			
1. Get a list of all SL-280 commands: #HELP<CR> 2. Get help for the ETH-PORT command: #HELP ETH-PORT<CR>			

LOG-TAIL

Function		Permission	Transparency
Set:	–	–	–
Get:	**LOG-TAIL?**	End User	Public

Description		Syntax
Set:	–	–
Get:	Get the last lines of message logs	#**LOG-TAIL?**SP*line_num*CR LF

Response

Multi-line:

~nn@**LOG-TAIL?**CR LF

Line #1 content CR LF

Line #2 content CR LF

Etc...

Parameters

line_num: the number of lines to display 1–n (n = the number of lines in the entire log). If this parameter is omitted, it returns the last 20 lines of the log by default.

Response Triggers

Notes

Used for advanced troubleshooting. Helps find error root causes and gets details not displayed in the error code number.

Example

Get the last 20 lines of message logs:

```
#LOG-TAIL?<CR>
```

Get the last 50 lines of message logs:

```
#LOG-TAIL? 50<CR>
```

MODEL

Functions		Permission	Transparency
Set:	-	-	-
Get:	**MODEL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device model	#**MODEL?**CR	
Response			
~nn@**MODEL** SP *model_name* CR LF			
Parameters			
model_name – String of up to 19 printable ASCII chars			
Response Triggers			
Notes			
Example			
#MODEL?<CR>			

NAME

Functions		Permission	Transparency
Set:	**NAME**	Administrator	Public
Get:	**NAME?**	End User	Public
Description		**Syntax**	
Set:	Set machine (DNS) name	#**NAME** SP *machine_name* CR	
Get:	Get machine (DNS) name	#**NAME?** CR	
Response			
~nn@**NAME?** SP *machine_name* CR LF			
Parameters			
machine_name–String of up to 14 alpha-numeric characters (can include hyphens but not at the beginning or end)			
Response Triggers			
Notes			
The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on).			
Example			
Set the DNS name of the device to “room-442”: #NAME room-442<CR>			

NAME-RST

Functions		Permission	Transparency
Set:	**NAME-RST**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset machine (DNS) name to factory default	#**NAME-RST**CR	
Get:	-	-	
Response			
~nn@**NAME-RST**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
Factory default of machine (DNS) name is “SL-280-XXXXXXX”, where XXXXXXX = the last 7 digits of the serial number.			
Example			
Reset the DNS name of the device to the factory default: #NAME-RST<CR>			

PROT-VER

Functions		Permission	Transparency
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?**CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
version–XX.XX where X is a digit			
Response Triggers			
Notes			
Example			
#PROT-VER?<CR>			

RESET

Functions		Permission	Transparency
Set:	**RESET**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**CR	
Get:	-	-	
Response			
~nn@**RESET**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
Example			
#RESET<CR>			

SN

Functions		Permission	Transparency
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#**SN?**CR	
Response			
~nn@**SN**SP*serial_number*CR LF			
Parameters			
serial_number–14 digits, factory assigned			
Response Triggers			
Notes			
This device has a 14 digit serial number.			
Example			
#SN?<CR>			

TIME

Functions		Permission	Transparency
Set:	**TIME**	Administrator	Public
Get:	**TIME?**	End User	Public
Description		**Syntax**	
Set:	Set device time and date	#**TIME** SP *day_of_week*,*date*,*time* CR	
Get:	Get device time and date	#**TIME?** CR	
Response			
~nn@**TIME** SP *day_of_week*,*date*,*time* CR LF			
Parameters			
day_of_week – options: SUN,MON,TUE,WED,THU,FRI,SAT *date* – format: *DD-MM-YYYY* *time* – format: *hh:mm:ss*			
Response Triggers			
Notes			
The year must be 4 digits The device does not validate the day of week from the date Time format – 24 hours Date format – Day, Month, Year			
Example			
Set device time to Monday, August 8, 2017 at 3:00pm: #TIME MON,29-08-2017,15:00:00<CR>			

TIME-LOC

Functions		Permission	Transparency
Set:	**TIME-LOC**	End User	Public
Get:	**TIME-LOC?**	End User	Public
Description		**Syntax**	
Set:	Set local time offset from UTC/GMT	#**TIME-LOC** SP *UTC_off*,*DayLight* CR	
Get:	Get local time offset from UTC/GMT	#**TIME-LOC?** CR	
Response			
~nn@**TIME-LOC** SP *UTC_off*,*DayLight* CR LF			
Parameters			
UTC_off – offset of device local time from UTC/GMT (without daylight time correction): -12 (subtract 12 hours from UTC/GMT) – 14 (add 14 hours to UTC/GMT) *DayLight* – use 0, see notes.			
Response Triggers			
Notes			
This command is relevant only if the time server is configured. Device time calculates by adding UTC_off to UTC time (that it got from the time server) + 1 hour if daylight savings time is in effect. The *DayLight* parameter is no longer in use, because daylight savings time information is received from the time server. This parameter is maintained only for backward compatibility. The **TIME** command sets the device time without considering these settings.			
Example			
Set device local time to US EST (Eastern Standard Time = -5 UTC/GMT): #TIME-LOC -5,0<CR>			

VERSION

Functions		Permission	Transparency
Set:	**-**	-	-
Get:	**VERSION?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get firmware version number	#**VERSION?**CR	
Response			
~nn@**VERSION**SP*firmware_version*CR LF			
Parameters			
firmware_version – XX.XX.XXXX where the digit groups are: major.minor.build version			
Response Triggers			
Notes			
Example			
#VERSION?<CR>			

Communication Commands

Command	Description
BEACON-INFO	Get beacon information, including IP address, UDP control port, TCP control port, MAC address, model, name
ETH-PORT	Set/get Ethernet port protocol
NET-CONFIG	Set a network configuration
NET-DHCP	Set/get DHCP mode
NET-DNS	Get DNS name server
NET-GATE	Set/get gateway IP
NET-IP	Set/get IP address
NET-MAC	Get MAC address
NET-MASK	Set/get subnet mask
TIME-SRV	Get/set time server
UART	Get/set com port configuration

BEACON-INFO

Functions		Permission	Transparency
Set:	–	–	–
Get:	**BEACON-INFO?**	End User	Public

Description		Syntax
Set:	–	–
Get:	Get beacon information, including IP address, UDP control port, TCP control port, MAC address, model, name	#**BEACON-INFO?**SP*port_id*CR

Response

~nn@BEACON-INFOSP*port_id*,*ip_string*,*udp_port*,*tcp_port*,*mac_address*,*model*,*name*CR LF

Parameters

port_id – ID of the Ethernet port, 0 (wired Ethernet connection). 1 and higher (for future use).
ip_string – dot-separated representation of the IP address
udp_port – UDP control port
tcp_port – TCP control port
mac_address – dash-separated MAC address
model – device model
name – device name

Response Triggers

After execution, notification is sent containing beacon information.

Notes

There is no Set command.
The *port_id* parameter is not necessary and can be omitted.

Example

Get beacon information for port 0:
#BEACON-INFO? *0*<CR>

ETH-PORT

Functions		Permission	Transparency
Set:	**ETH-PORT**	Administrator	Public
Get:	**ETH-PORT?**	End User	Public
Description		**Syntax**	
Set:	Set Ethernet port protocol	#**ETH-PORT** SP *portType*,*ETHPort* CR	
Get:	Get Ethernet port protocol	#**ETH-PORT?** SP *portType* CR	
Response			
~nn@**ETH-PORT** SP *portType*,*ETHPort* CR LF			
Parameters			
portType – string of 3 letters indicating the port type: TCP, UDP *ETHPort* – TCP / UDP port number: 0–65535			
Response Triggers			
Notes			
If the port number you enter is already in use, an error is returned The port number must be within the following range: 0–(2^16-1)			
Example			
Set the Ethernet port protocol for TCP to port 12457: #ETH-PORT TCP,12457<CR>			

NET-CONFIG

Functions		Permission	Transparency
Set:	**NET-CONFIG**	End User	Public
Get:	**NET-CONFIG?**	End User	Public
Description		**Syntax**	
Set:	Set a network configuration.	#**NET-CONFIG** SP *id*,*ip*,*net_mask*,*gateway* CR LF	
Get:	Get a network configuration.	#**NET-CONFIG?** SP *id* CR LF	
Response			
Get: ~nn@**NET-CONFIG** SP SP *id*,*ip*,*net_mask*,*gateway* CR LF			
Parameters			
id – Ethernet connection ID number: 0 *ip* – network IP address, in the following format: xxx.xxx.xxx.xxx *net_mask* – network mask, in the following format: xxx.xxx.xxx.xxx *gateway* – network gateway, in the following format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
Example			
Set the device network parameters to IP address 192.168.113.10, net mask 255.255.0.0, and gateway 192.168.0.1: #NET-CONFIG 0,192.168.113.10,255.255.0.0,192.168.0.1<CR>			

NET-DHCP

Functions		Permission	Transparency
Set:	**NET-DHCP**	Administrator	Public
Get:	**NET-DHCP?**	End User	Public
Description		**Syntax**	
Set:	Set DHCP mode	#**NET-DHCP**SP*mode*CR	
Get:	Get DHCP mode	#**NET-DHCP?**CR	
Response			
~nn@**NET-DHCP**SP*mode*CR LF			
Parameters			
mode – 0 (do not use DHCP. Use the IP address set by the factory or the NET-IP command), 1 (try to use DHCP. If unavailable, use the IP address set by the factory or the NET-IP command)			
Response Triggers			
Notes			
To connect with an assigned IP by DHCP, specify the device DNS name (if available) using the NAME command. You can also get an assigned IP by direct connection to RS-232 protocol port if available.			
Example			
Enable DHCP mode, if available: #NET-DHCP 1<CR>			

NET-DNS

Functions		Permission	Transparency
Set:	-	-	-
Get:	**NET-DNS?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get DNS name server	#**NET-DNS?**SP*dns_id*CR	
Response			
~nn@**NET-DNS**SP dns_id,ip CR LF			
Parameters			
dns_id – ID of the DNS name server to retrieve: 0 (DNS server 1), 1 (DNS server 2) *ip* – IP address of the DNS server			
Response Triggers			
After execution, response is sent to the com port that sent the Get command			
Notes			
There is no “Set” command. Use the NET-CONFIG command to setup the network, including DNS name servers. If *dns_id* is out of the defined DNS range, Error Code #3 (ERR_PARAMETER_OUT_OF_RANGE) is returned. If no *dns_id* is defined, Error Code #3 is returned for any *dns_id*.			
Example			
Get the IP address of DNS name server 1: #NET-DNS? *0*<CR>			

NET-GATE

Functions		Permission	Transparency
Set:	**NET-GATE**	Administrator	Public
Get:	**NET-GATE?**	End User	Public
Description		**Syntax**	
Set:	Set gateway IP	#**NET-GATE**SP*ip_address*CR	
Get:	Get gateway IP	#**NET-GATE?**CR	
Response			
~nn@**NET-GATE**SP*ip_address*CR LF			
Parameters			
ip_address – gateway IP address, in the following format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
A network gateway connects the device via another network, possibly over the Internet. Be aware of security issues. Consult your network administrator for correct settings.			
Example			
Set the gateway IP address to 192.168.0.1: #NET-GATE 192.168.000.001<CR>			

NET-IP

Functions		Permission	Transparency
Set:	**NET-IP**	Administrator	Public
Get:	**NET-IP?**	End User	Public
Description		**Syntax**	
Set:	Set IP address	#**NET-IP**SP*ip_address*CR	
Get:	Get IP address	#**NET-IP?**CR	
Response			
~nn@**NET-IP**SP*ip_address*CR LF			
Parameters			
ip_address – IP address, in the following format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
Consult your network administrator for correct settings.			
Example			
Set the IP address to 192.168.1.39: #NET-IP 192.168.001.039<CR>			

NET-MAC

Functions		Permission	Transparency
Set:	**-**	-	-
Get:	**NET-MAC?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get MAC address	#**NET-MAC?**CR	
Response			
~nn@**NET-MAC**SP*mac_address*CR LF			
Parameters			
mac_address – unique MAC address. Format: xx-xx-xx-xx-xx-xx where x is hex digit			
Response Triggers			
Notes			
Example			
#NET-MAC?<CR>			

NET-MASK

Functions		Permission	Transparency
Set:	**NET-MASK**	Administrator	Public
Get:	**NET-MASK?**	End User	Public
Description		**Syntax**	
Set:	Set subnet mask	#**NET-MASK**SP*net_mask*CR	
Get:	Get subnet mask	#**NET-MASK?**CR	
Response			
~nn@**NET-MASK**SP*net_mask*CR LF			
Parameters			
net_mask – Subnet mask address. Format: xxx.xxx.xxx.xxx			
Response Triggers			
The subnet mask limits the Ethernet connection within the local network. Consult your network administrator for correct settings.			
Notes			
Example			
Set the subnet mask to 255.255.0.0: #NET-MASK 255.255.000.000<CR>			

TIME-SRV

Functions		Permission	Transparency
Set:	**TIME-SRV**	Administrator	Public
Get:	**TIME-SRV?**	End User	Public

Description		Syntax
Set:	Set time server	#**TIME-SRV**SP*mode,time_server,time_server_sync_hour*CR
Get:	Get time server	#**TIME-SRV?**CR

Response

~nn@**TIME-SRV**SP*mode,time_server,time_server_sync_hour,server_status*CR LF

Parameters

mode – 0 (OFF), 1 (ON)

time_server – time server IP address or hostname. IP must be, in the following format: xxx.xxx.xxx.xxx

time_server_sync_hour – not in use: 0

server_status – ON/OFF

Response Triggers

Notes

This command sets up the NTP server.

Example

Set time server with IP address of 128.138.140.44 to ON:

#TIME-SRV *1, 128.138.140.44,0*<CR>

UART

Functions		Permission	Transparency
Set:	**UART**	Administrator	Public
Get:	**UART?**	End User	Public
Description		**Syntax**	
Set:	Set *SERIAL* port configuration	#**UART**SP *COM_Num*,*baud_rate*,*data_bits*,*parity*,*stop_bits*CR	
Get:	Get *SERIAL* port configuration	#**UART?**SP*COM_Num*CR	

Response

Set: ~nn@**UART**SP*COM_Num*,*baud_rate*,*data_bits*,*parity*,*stop_bits*CR LF

Get: ~nn@**UART?**SP*COM_Num*,*baud_rate*,*data_bits*,*parity*,*stop_bits*CR LF

Parameters

COM_Num – The number of the relevant *SERIAL* port: 1–8

baud_rate – 300–115200 (default: 9600)

data_bits – 5–8

parity – 0 (no parity), 1 (Odd), 2 (Even), 3 (Mark), or 4 (Space)

stop_bits – 1, 1.5, 2

Response Triggers

Notes

Stop_bits = 1.5 only when *data_bits* = 5.

Example

Set *SERIAL* port number 1 configuration to baud rate 9600, data bits 8, parity 'None', stop bits 1:

#UART *1,9600,8,0,1*<CR>

I/O Gateway Commands

Command	Description
COM-ROUTE	Get tunneling port routing
COM-ROUTE-ADD	Add communication route tunnel connection
COM-ROUTE-REMOVE	Remove communication route tunnel connection
ETH-TUNNEL	Get opened tunnel parameters
GPIO-CFG	Set/get HW GPIO configuration
GPIO-STATE	Set/get HW GPIO state
GPIO-STEP	Set/get HW GPIO step
GPIO-THR	Set/get HW GPIO threshold voltage
GPIO-VOLT	Get HW GPIO voltage level
IR-LEARN	Send IR learning command
IR-SND	Send IR command to port
IR-STOP	Send IR stop command to port
RELAY-STATE	Set/get relay state

COM-ROUTE

Functions		Permission	Transparency
Set:			
Get:	**COM-ROUTE?**	End User	Internal

Description		Syntax
Set:		
Get:	Get tunneling port routing	#**COM-ROUTE?**SP*COM_Num*CR

Response

~nn@**COM-ROUTE**SP*COM_Num*,*portType*,*ETHPort*,*ETH_rep_en*,*TCP_keep_alive_timing*CR LF

Parameters

COM_Num – *SERIAL* port number: 1–8, * (get all route tunnels)

portType – 1 (UDP), 2 (TCP)

ETHPort – TCP/UDP port number: default = 5001–5008

ETH_rep_en – 1 (COM port sends replies to new clients) 0 (COM port does not send replies to new clients)

TCP_keep_alive_timing – every x seconds the device sends an empty string to TCP client ("/0"): 0–3600 seconds

Response Triggers

Notes

This command gets tunneling port routing. Every *SERIAL* port can send or receive data from the ETH port.

Example

Get tunneling port routing through *SERIAL* port number 1:

#COM-ROUTE? *1*<CR>

COM-ROUTE-ADD

Functions		Permission	Transparency
Set:	**COM-ROUTE-ADD**	Administrator	Internal
Get:	-	-	-
Description		**Syntax**	
Set:	Add a communication route tunnel connection	#**COM-ROUTE-ADD**SP *ComNum,PortType,EthPort,EthRepEn,Timeout*CR	
Get:	-	-	

Response

~nn@**COM-ROUTE-ADD**SP*ComNum,PortType,EthPort,EthRepEn,TCP_keep_alive_timing*CR LF

Parameters

COM_Num – *SERIAL* port number: 1–8
portType – 1 (UDP), 2 (TCP)
ETHPort – TCP/UDP port number: default = 5001–5008
ETH_rep_en – 1 (COM port sends replies to new clients) 0 (COM port does not send replies to new clients)
TCP_keep_alive_timing – every x seconds the device sends an empty string to TCP client ("/0"): 0–3600 seconds

Response Triggers

Notes

Example

Add a communication route tunnel connection through *SERIAL* port number 1and TCP port number 5025, COM port sends replies to new clients and the device sends a keep alive signal every 10 minutes (600 seconds):
#COM-ROUTE-ADD *1,TCP,5025,1,600*<CR>

COM-ROUTE-REMOVE

Functions		Permission	Transparency
Set:	**COM-ROUTE-REMOVE**	Administrator	Internal
Get:	-	-	-
Description		**Syntax**	
Set:	Remove a communication route tunnel connection	#**COM-ROUTE-REMOVE**SP*ComNum*CR	
Get:	-	-	

Response

~nn@**COM-ROUTE-REMOVE**SP*Com_Num*CR LF

Parameters

Com_Num – *SERIAL* port number: 1–8

Response Triggers

Notes

Example

Remove communication route tunnel connection from *SERIAL* port number 3:
#COM-ROUTE-REMOVE *3*<CR>

ETH-TUNNEL

Functions		Permission	Transparency
Set:	-	-	-
Get:	**ETH-TUNNEL?**	Administrator	Internal

Description		Syntax
Set:		
Get:	Get parameters for open tunnels	#**ETH-TUNNEL?**SP*TunnelId*CR

Response

~nn@**ETH-TUNNEL**SP*TunnelId*,*ComNum*,*PortType*,*EthPort*,*EthIp*,*RemotPort*,*ETH_rep_en*,*Wired*CR LF

Parameters

TunnelId – tunnel ID number :* (get all open tunnels), or type a number corresponding to one of the existing tunnels
ComNum – *SERIAL* port number: 1–8
PortType – 1 (UDP), 2 (TCP)
ETHPort – TCP/UDP port number: default = 5001–5008
EthIp – client IP address in the following format: xxx.xxx.xxx.xxx
RemotPort – remote port number
ETH_rep_en – 1 (COM port sends replies to new clients) 0 (COM port does not send replies to new clients)
Wired – 1 (wired connection), 0 (not wired connection)

Response Triggers

Notes

Example

Get parameters for all open tunnels:
#ETH-TUNNEL? *<CR>
Get parameters for tunnel 1:
#ETH-TUNNEL? *1*<CR>

GPIO-CFG

Functions		Permission	Transparency
Set:	**GPIO-CFG**	End User	Public
Get:	**GPIO-CFG?**	End User	Public
Description		**Syntax**	
Set:	Set *I/O* port configuration	#**GPIO-CFG**SP*HwGpioNumber,HwGpioType,HwGpioDir,Pullup*CR	
Get:	Get *I/O* port configuration	#**GPIO-CFG?**SP*HwGpioNumber*CR	

Response

~nn@GPIO-CFGSP*HwGpioNum,HwGpioType,HwGpioDir*CR LF

Parameters

HwGpioNum – *I/O* port number: 1–8
HwGpioType – *I/O* port type: 0 (analog), 1 (digital)
HwGpioDir – *I/O* port direction: 0 (input), 1 (output)
Pullup – 0 (disable), 1 (enable)

Response Triggers

Notes

Example

Set configuration for *I/O* port number 1 to digital input with the pull-up enabled:
#GPIO-CFG 1,1,0,1<CR>

GPIO-STATE

Functions		Permission	Transparency
Set:	**GPIO-STATE**	End User	Public
Get:	**GPIO-STATE?**	End User	Public
Description		**Syntax**	
Set:	Set *I/O* port state	#**GPIO-STATE**SP*HwGpioNumber,HwGpioState*CR	
Get:	Get *I/O* port state	#**GPIO-STATE**SP*HwGpioNumber*CR	

Response

~nn@**GPIO-STATE**SP*HwGpioNum,HwGpioState*CR LF

Parameters

HwGpioNum – *I/O* port number (1–8)
HwGpioState – *I/O* port state – See note below

Response Triggers

Notes

GPIO-STATE? can only be sent in digital mode and the answer is 0=Low, 1=High. In analog mode an error message is sent.
GPIO-STATE can only be sent in digital out mode and the parameter is 0=Low, 1=High. In all other modes an error message is sent.
The device uses this command to notify the user of whenever there is a change regarding the state.

Example

Set state for digital *I/O* port number 1 to high:
#GPIO-STATE 1,1<CR>

GPIO-STEP

Functions		Permission	Transparency
Set:	**GPIO-STEP**	End User	Public
Get:	**GPIO-STEP?**	End User	Public
Description		**Syntax**	
Set:	Set *I/O* port maximum step	#**GPIO-STEP**SP*HwGpioNumber,NumOfStep*CR	
Get:	Get *I/O* port current step	#**GPIO-STEP?**SP*HwGpioNumber*CR	

Response

~nn@**GPIO-STEP**SP*HwGpioNumber,NumOfStep,CurrentStep*CR LF

Parameters

HwGpioNum – *I/O* port number: 1–8
NumOfStep – the maximum number of steps: for analog = 0–255, for digital= 2 (see notes)
CurrentStep – the actual step depending on the measured voltage

Response Triggers

Notes

The Set command can only be used for analog.
In digital in mode the response is 2 and the current state: 0, 1
In analog mode the response is 0 to [*NumOfStep* minus 1].
In digital out mode an error is returned.

Example

Set *I/O* port number 1 number of steps to 5:
#GPIO-STEP 1,5<CR>

GPIO-THR

Functions		Permission	Transparency
Set:	**GPIO-THR**	End User	Public
Get:	**GPIO-THR?**	End User	Public
Description		**Syntax**	
Set:	Set HW GPIO voltage levels	#**GPIO-THR**SP*HwGpioNumber,LowLevel,HighLevel*CR	
Get:	Get HW GPIO voltage levels that were set	#**GPIO-THR?**SP*HwGpioNumber*CR	

Response

~nn@**GPIO-THR**SP*HwGpioNumber,LowLevel,HighLevel*CR LF

Parameters

HwGpioNum – *I/O* port number: 1–8
LowLevel – voltage: 500 to 28000 millivolts
HighLevel – voltage: 2000 to 30000 millivolts or 2000 to 4000 when pullup is enabled.

Response Triggers

Notes

This command is only relevant for digital input. There must be a minimum of 800 millivolts between the low and the high levels.

Example

Set *I/O* port number 1 voltage low level to 500 millivolts and high level to 2000 millivolts:
#GPIO-THR 1,500,2000<CR>

GPIO-VOLT

Functions		Permission	Transparency
Set:	-	-	-
Get:	**GPIO-VOLT?**	End User	Public
Description		**Syntax**	
Set:			
Get:	Get active voltage levels of HW GPIO	#**GPIO-VOLT?**SP*HwGpioNumber*CR	
Response			
~nn@**GPIO-VOLT**SP*HwGpioNumber,Voltage*CR LF			
Parameters			
HwGpioNum – hardware GPIO number: 1–8 *Voltage* – voltage 0 to 30000 millivolts			
Response Triggers			
Notes			
This command is not available in digital out mode			
Example			
Get HW GPIO #1 active voltage level: #GPIO-VOLT? 1<CR>			

IR-LEARN

Functions		Permission	Transparency
Set:	**IR-LEARN**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Send IR learning command	#**IR-LEARN**SP*CommandName,Timeout*CR	
Get:	-	-	
Response			
~nn@**IR-LEARN**SP*CommandName,IR_Status*CR LF			
Parameters			
CommandName – String: IR command name limited to 15 chars (white space or commas not allowed). *Timeout* – Timeout in seconds: 1–60 *IR_Status* – 0 (Sent), 1 (Stop), 2 (Done), 3 (Busy), 4 (Wrong Parameter), 5 (Nothing to Stop), 6 (Start), 7 (Timeout), 8 (Error)			
Response Triggers			
Notes			
Example			
Send IR learning command PowerToggle, with a 30 second timeout: #IR-LEARN PowerToggle,30<CR>			

IR-SND

Functions		Permission	Transparency
Set:	**IR-SND**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Send IR command to port	#**IR-SND**SP*PortNum,Cmd_id,CmdName,Repeat,* *TotalPackets,PacketNum,<pronto command…>*CR	
Get:	-	-	

Response

~nn@**IR-SND**SP*PortNum,Cmd_id,CmdName,Status*CR LF

Parameters

PortNum – IR port transmitting the command: *1–8*, * (broadcast to all ports)

Cmd_id – command ID, numeric string of up to 9 digits for flow control and response commands from device

CmdName – command name, string of up to 15 alpha-numeric characters

Repeat – number of times the IR repeat command is transmitted 1 (default) – 50 (repeats > 50 are truncated to 50)

TotalPackets – number of messages the original command was divided into, default = 1

PacketNum – chunk serial number (only valid when *Total_packets* > 1), *PacketNum* must be <= *TotalPackets*.

Pronto command – Pronto format command (in HEX format, no leading zeros, no '0x' prefix, values must be separated by commas)

Status – 0 (no error)

Response Triggers

Notes

Example

Transmit IR Power button command with ID of 25 and name PowerTog from port 1; command is repeated 1 time, the total packets is 1,packet/chunk serial number is 1:

#IR-SND
1,25,PowerTog,1,1,1,0000,006e,0022,0002,0156,00ae,0016,0016,0016,0041,0016,0016,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0041,0016,0016,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0041,0016,0016,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0041,0016,0016,0016,0041,0016,0041,0016,0041,0016,0041,0016,069c,0156,0057,0016,0e56<CR>

IR-STOP

Functions		Permission	Transparency
Set:	**IR-STOP**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Send IR stop command to port	**#IR-STOP**SP*PortNum,Cmd_id,CmdName*CR	
Get:	-	-	

Response

~nn@**IR-STOP**SP*PortNum,Cmd_id,CmdName,Status*CR LF

Parameters

PortNum – IR port transmitting the command: *1–8*, * (broadcast to all ports)

Cmd_id – command ID, numeric string of up to 9 digits for flow control and response commands from device

CmdName – command name, string of up to 15 alpha-numeric characters

Status – 0 (no error)

Response Triggers

Notes

Example

Send IR stop command for IR port number 1, for PowerTog command with ID of 25:

```
#IR-STOP 1,25,PowerTog<CR>
```

RELAY-STATE

Functions		Permission	Transparency
Set:	**RELAY-STATE**	End User	Public
Get:	**RELAY-STATE?**	End User	Public
Description		**Syntax**	
Set:	Set relay state	#**RELAY-STATE**SP*RelayNumber,RelayState*CR	
Get:	Get relay state	#**RELAY-STATE?**SP*RelayNumber*CR	

Response

~nn@**RELAY-STATE**SP*RelayNum,RelayState*CR LF

Parameters

RelayNumber – Relay port number: 1–8

RelayState – relay state: 0 (open), 1 (closed), see note

Response Triggers

Notes

When relays 1 and 5 are connected as NC (Normally Closed) (see Connecting the Relay Ports on page 8), the *RelayState* parameter is reversed: 0 (closed), 1 (open).

Example

Set Relay port number 2 state to closed:

```
#RELAY-STATE 2,1<CR>
```

File System Commands

Command	Description
DEL	Delete file
DIR	List files in device
FORMAT	Format file system
FS-FREE	Get file system free space
GET	Get file

DEL

Functions		Permission	Transparency
Set:	**DEL**	Administrator	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Delete file	#**DEL**SP*file_name*CR	
Get:			

Response

~nn@**DEL**SP*file_name*CR LF

Parameters

file_name – name of file to delete

Response Triggers

Notes

File names are case-sensitive.

Example

Delete Setup file:
#DEL Setup<CR>

DIR

Functions		Permission	Transparency
Set:	**DIR**	Administrator	Public
Get:	-	-	-

Description		Syntax
Set:	List files in device	#**DIR**CR
Get:	-	-

Response

Multi-line:

~nn@**DIR**CR LF

file_name TAB *file_size* SP bytes, SP *ID*: SP *file_id* CR LF

TAB *free_size* SP bytes. CR LF

Parameters

file_name – name of file

file_size – file size in bytes. A file can take more space on device memory

file_id – internal ID for file in file system

free_size – free space in bytes in device file system

Response Triggers

Notes

Example

List files in device:

#DIR<CR>

FORMAT

Functions		Permission	Transparency
Set:	**FORMAT**	Administrator	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Format file system	#**FORMAT**CR	
Get:	-	-	
Response			
~nn@**FORMAT**SP OK CR LF			
Parameters			
Response Triggers			
Notes			
Response could take several seconds until formatting completes.			
Example			
Format file system: #FORMAT<CR>			

FS-FREE?

Functions		Permission	Transparency
Set:	-	-	-
Get:	**FS-FREE?**	Administrator	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get file system free space	#**FS-FREE?**CR	
Response			
~nn@**FS_FREE**SP *free_size* CR LF			
Parameters			
free_size – free size in device file system in bytes			
Response Triggers			
Notes			
Example			
Get file system free space: #FS-FREE?<CR>			

GET

Functions		Permission	Transparency
Set:	-	-	-
Get:	**GET**	Administrator	Public
Description		**Syntax**	
Set:	-	-	
Get:	**Get file**	#**GET** SP *file_name* CR	

Response

Multi-line:

~nn@**GET** SP *file_name*,*file_size* SP READY CR LF *contents*

~nn@**GET** SP *file_name* SP OK CR LF

Parameters

file_name – name of file to get contents

contents – byte stream of file contents

file_size – size of file (device sends it in response to give user a chance to get ready)

Response Triggers

Notes

Example

Get file:

```
#GET file_name<CR>
```

Authentication Commands

Command	Description
LOGIN	Set/get protocol permission
LOGOUT	Cancel current permission level
PASS	Set/get password for login level
SECUR	Set/get current security state

LOGIN

Functions		Permission	Transparency
Set:	**LOGIN**	Not Secure	Public
Get:	**LOGIN?**	Not Secure	Public
Description		**Syntax**	
Set:	Set protocol permission	#**LOGIN** SP *login_level,password* CR	
Get:	Get current protocol permission level	#**LOGIN?** CR	

Response

Set: ~nn**@LOGIN** SP *login_level,password* SP **OK** CR LF
or
~nn**@LOGIN** SP ERR SP 004 CR LF (if bad password entered)
Get: ~nn**@LOGIN** SP *login_level* CR LF

Parameters

login_level – level of permissions required: User, Admin
password – predefined password (by PASS command). Default password is an empty string.

Response Triggers

Notes

When the permission system is enabled, LOGIN enables running commands with the User or Administrator permission level.
When set, login must be performed upon each connection.
The permission system works only if security is enabled with the SECUR command. It is not mandatory to enable the permission system in order to use the device.

Example

Set the protocol permission level to Admin (when the password defined in the PASS command is 33333):
#LOGIN Admin,33333<CR>

LOGOUT

Functions		Permission	Transparency
Set:	**LOGOUT**	Not Secure	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Cancel current permission level	#**LOGOUT**CR	
Get:	-	-	
Response			
~nn@**LOGOUT**SP**OK**CR LF			
Parameters			
Response Triggers			
Notes			
Logs out from User or Administrator permission levels			
Example			
#LOGOUT<CR>			

PASS

Functions		Permission	Transparency
Set:	**PASS**	Administrator	Public
Get:	**PASS?**	Administrator	Public
Description		**Syntax**	
Set:	Set password for login level	#**PASS**SP*login_level*,*password*CR	
Get:	Get password for login level	#**PASS?**SP*login_level*CR	
Response			
~nn@**PASS**SP*login_level*,*password*CR LF			
Parameters			
login_level – level of login to set: User, Admin *password* – password for the *login_level*. Up to 15 printable ASCII chars.			
Response Triggers			
Notes			
The default password is an empty string			
Example			
Set the password for the Admin protocol permission level to 33333: #PASS Admin,33333<CR>			

SECUR

Functions		Permission	Transparency
Set:	**SECUR**	Administrator	Public
Get:	**SECUR?**	Not Secure	Public
Description		**Syntax**	
Set:	Start/stop security	#**SECUR**SP*security_mode*CR	
Get:	Get current security state	#**SECUR?**CR	
Response			
~nn@**SECUR**SP*security_mode*CR LF			
Parameters			
security_mode – 1 (On / enable security), 0 (Off / disable security)			
Response Triggers			
Notes			
The permission system works only if security is enabled with the SECUR command.			
Example			
Enable the permission system: #SECUR 0<CR>			

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Disconnect the unit from the power supply before opening and servicing

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