USER MANUAL

MODEL:

SL-280
Master / Room Controller
Kramer Control Brain
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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.
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](image)

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POWER LED</td>
<td>Lights green when powered on.</td>
</tr>
<tr>
<td>2</td>
<td>SERVICE Micro USB Connector</td>
<td>Connect to a PC to send P3K commands and perform a firmware upgrade.</td>
</tr>
<tr>
<td>3</td>
<td>IR Receiver and LED</td>
<td>Detects IR signals for IR learning. Lights blue when waiting to receive a signal.</td>
</tr>
<tr>
<td>4</td>
<td>LINK LED</td>
<td>Lights blue to indicate Ethernet activity:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• On – good connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing – no connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Off – before first connection</td>
</tr>
<tr>
<td>5</td>
<td>CONTROL LED</td>
<td>Lights to indicate control states of the control application (brain):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flashing – sending data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Green – ready and working</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• White – no devices are assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Blue – synchronizing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Yellow – one or more controlled devices are disconnected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Red – an error occurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Purple – Brain booting up</td>
</tr>
<tr>
<td>6</td>
<td>SERIAL LEDs (1–8)</td>
<td>White Tx LEDs and blue Rx LEDs flash to indicate activity on each channel.</td>
</tr>
<tr>
<td>7</td>
<td>IR LEDs (1–8)</td>
<td>Light blue to indicate IR activity on each channel (the associated LED lights when the relevant IR port transmits data).</td>
</tr>
<tr>
<td>8</td>
<td>I/O LEDs (1–8)</td>
<td>Light blue to indicate I/O activity on each channel (the associated LED lights on Digital Out HIGH, and when Digital In is triggered).</td>
</tr>
<tr>
<td>9</td>
<td>RELAY LEDs (1–8)</td>
<td>Light blue to indicate relay activity on each channel (the associated LED lights when the relay is closed).</td>
</tr>
<tr>
<td>#</td>
<td>Feature</td>
<td>Function</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10</td>
<td>SERIAL Ports (1–8) Terminal Block</td>
<td>Connect to up to 8 serial controlled devices, for Ethernet-to-RS232 bidirectional tunneling.</td>
</tr>
<tr>
<td>11</td>
<td>IR Ports (1–8) Terminal Block</td>
<td>Connect to up to 8 IR emitters or blasters.</td>
</tr>
<tr>
<td>12</td>
<td>I/O Ports (1–8) Terminal Block</td>
<td>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).</td>
</tr>
<tr>
<td>13</td>
<td>RELAY Ports (1–8) Terminal Block</td>
<td>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).</td>
</tr>
<tr>
<td>14</td>
<td>USB Connector</td>
<td>For future use.</td>
</tr>
<tr>
<td>15</td>
<td>ID Button</td>
<td>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.</td>
</tr>
<tr>
<td>16</td>
<td>RESET Button</td>
<td>Press while performing a factory default reset (see Resetting to Factory Default Settings on page 25).</td>
</tr>
<tr>
<td>17</td>
<td>LAN RJ-45 Connector</td>
<td>Connect to a local area network. Indications: LINK LED lights amber – 1000/100/10MB connection. DATA LED flashes green – Ethernet data link activity.</td>
</tr>
<tr>
<td>18</td>
<td>Power Socket with Fuse and Power Switch</td>
<td>Connect to the power cord and to the mains electricity. Switch for turning the unit ON or OFF.</td>
</tr>
</tbody>
</table>
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.

ℹ️ 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.
2. Connect up to eight IR emitters or blasters to the IR terminal block ports.
3. Connect up to eight GPIO (General Purpose I/O) devices to the I/O terminal block ports. No more than 30V can be connected.
4. Connect to a LAN through the LAN RJ-45 connector.
5. Connect the power cord to the power socket 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](image)

To connect a port 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](image)

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.

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.

![Device Settings Page](image)

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.

![Communication Page](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.

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.

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. 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.

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](image)

2. Click OK.
   The Digital OUT options appear.

   ![Figure 12: GPIO Ports Settings Page – Digital OUT Trigger Type](image)

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](image)

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:

   \[ \text{Voltage of one step} = \frac{30V}{\text{number of steps}} \]
Changing the State of a Relay Port

SL-280 web pages enable you to change the state of each of the relay ports. 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.

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 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.

![IR Command Learner Page](image)

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.

   ![Security Page](image)
   Figure 16: Security Page

2. Click ON.  
   A confirmation message appears.

   ![Security Confirmation Message](image)
   Figure 17: Security Confirmation Message
3. Click **OK**.
   The **Authentication Required** window appears.

![Authentication Required Window](image)

**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.

![Security Activated Page](image)

**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.

   ![Logs Page](image)

   **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.

![WEB VERSION 2.0.33](image)

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 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

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<tr>
<th>Inputs</th>
<th>1 IR</th>
<th>Built-in sensor (for learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>8 IR</td>
<td>On 2-pin terminal block connectors</td>
</tr>
<tr>
<td></td>
<td>8 Relays</td>
<td></td>
</tr>
<tr>
<td>Ports</td>
<td>8 RS-232 Serial</td>
<td>On 3-pin terminal blocks</td>
</tr>
<tr>
<td></td>
<td>8 GPI/O</td>
<td>On 2-pin terminal blocks</td>
</tr>
<tr>
<td></td>
<td>1 Ethernet</td>
<td>On an RJ-45 connector</td>
</tr>
<tr>
<td></td>
<td>1 P3K Serial Port</td>
<td>On a micro-USB connector</td>
</tr>
<tr>
<td>Processing</td>
<td>Processor Speed</td>
<td>1GHz</td>
</tr>
<tr>
<td></td>
<td>Memory</td>
<td>512MB RAM, 4GB Flash</td>
</tr>
<tr>
<td>Electrical</td>
<td>Power Consumption</td>
<td>100–240V AC, 200mA</td>
</tr>
<tr>
<td>Environmental Conditions</td>
<td>Operating Temperature</td>
<td>0° to +40°C (32° to 104°F)</td>
</tr>
<tr>
<td></td>
<td>Storage Temperature</td>
<td>-40° to +70°C (-40° to 158°F)</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
<td>10% to 90%, RHL non-condensing</td>
</tr>
<tr>
<td>Regulatory Compliance</td>
<td>Safety</td>
<td>CE</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Size</td>
<td>19&quot; 1U</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Aluminum</td>
</tr>
<tr>
<td>General</td>
<td>Net Dimensions (W, D, H)</td>
<td>43.64cm x 18.3 cm x 4.36cm (19&quot; x 7.2&quot; x 1.7&quot;)</td>
</tr>
<tr>
<td></td>
<td>Shipping Dimensions (W, D, H)</td>
<td>55cm x27.6cm x 10.7cm (21.7&quot; x 10.9&quot; x 4.2&quot;)</td>
</tr>
<tr>
<td></td>
<td>Net Weight</td>
<td>1.65kg (3.6lbs) approx.</td>
</tr>
<tr>
<td></td>
<td>Shipping Weight</td>
<td>2.6kg (5.7lbs) approx.</td>
</tr>
<tr>
<td>Accessories</td>
<td>Included</td>
<td>Power cord, rack ears</td>
</tr>
<tr>
<td></td>
<td>Optional</td>
<td>For optimum range and performance use the recommended USB, Ethernet, serial and IR Kramer cables available at <a href="http://www.kramerav.com/product/SL-280">www.kramerav.com/product/SL-280</a></td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice at [www.kramerav.com](http://www.kramerav.com)
Default Communication Parameters

<table>
<thead>
<tr>
<th>RS-232 over Micro USB</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate:</td>
<td>115200</td>
</tr>
<tr>
<td>Data Bits:</td>
<td>8</td>
</tr>
<tr>
<td>Stop Bits:</td>
<td>1</td>
</tr>
<tr>
<td>Parity:</td>
<td>None</td>
</tr>
<tr>
<td>Command Format:</td>
<td>ASCII</td>
</tr>
</tbody>
</table>

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.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address:</td>
<td>192.168.1.39</td>
</tr>
<tr>
<td>Subnet Mask:</td>
<td>255.255.0.0</td>
</tr>
<tr>
<td>Default Gateway:</td>
<td>192.168.0.1</td>
</tr>
<tr>
<td>TCP Port #:</td>
<td>5000</td>
</tr>
<tr>
<td>Concurrent TCP Connections:</td>
<td>500</td>
</tr>
</tbody>
</table>

**Full Factory Reset**

Press and hold the **RESET** button 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:

![Hercules SETUP utility by HW:group.com](image)

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:

- \( \text{CR} \) = Carriage return (ASCII 13 = 0x0D)
- \( \text{LF} \) = Line feed (ASCII 10 = 0x0A)
- \( \text{SP} \) = 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**:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Device_id@</td>
<td>Message</td>
<td>CR</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Start</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Command SP Parameter_1,Parameter_2,…</td>
<td>CR</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Start</th>
<th>Address</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Device_id@</td>
<td>Command_1 Parameter1_1,Parameter1_2,…</td>
<td>CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command_2 Parameter2_1,Parameter2_2,…</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command_3 Parameter3_1,Parameter3_2,…</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>…</td>
<td></td>
</tr>
</tbody>
</table>

- **Device Message Format**:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>Device_id@</td>
<td>Message</td>
<td>CR LF</td>
</tr>
</tbody>
</table>

- **Device Long Response** – Echoing command:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (optional)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>Device_id@</td>
<td>Command SP [Param1,Param2,… result]</td>
<td>CR LF</td>
</tr>
</tbody>
</table>
Protocol 3000 Commands

This section includes the following commands:

- System Commands (page 31)
- Communication Commands (page 38)
- I/O Gateway Commands (page 45)
- File System Commands (page 54)
- Authentication Commands (page 58)

System Commands

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

**BUILD-DATE**

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: BUILD-DATE?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
</tr>
<tr>
<td>Get: Get device build date</td>
<td>#BUILD-DATE?&lt;CR&gt;</td>
</tr>
</tbody>
</table>

**Response**

```
~nn@BUILD-DATESPdateSPtimeCRLF
```

**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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: FACTORY</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: Reset device to factory default configuration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
</tr>
</tbody>
</table>

**Response**

```
~nn@FACTORYSPCR
```

**Parameters**

**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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: HELP</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Syntax</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: Get command list or help for specific command</td>
<td></td>
</tr>
<tr>
<td>Get: 1. HELP CR</td>
<td></td>
</tr>
<tr>
<td>2. HELP SP command_name CR</td>
<td></td>
</tr>
</tbody>
</table>

**Response**

1. Multi-line: 

```
~nn@Device available protocol 3000 commands:CR
command, SP command...CR LF
```

2. Multi-line: 

```
```

**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

<table>
<thead>
<tr>
<th>Function</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Get:</td>
<td>LOG-TAIL?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

- **Set:**
  - 
- **Get:**
  - Get the last lines of message logs

**Response**

Multi-line:

```
~line_num@LOG-TAIL?\r\nLine #1 content \r\nLine #2 content \r\nEtc...
```

**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**

- 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td><code>MODEL?</code></td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

Syntax

**Set:**

**Get:**

<table>
<thead>
<tr>
<th>Function</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get device model</td>
<td><code>MODEL?</code></td>
<td></td>
</tr>
</tbody>
</table>

**Response**

```
~*nnMODEL [model_name]CR LF
```

**Parameters**

`model_name` – String of up to 19 printable ASCII chars

**Response Triggers**

**Notes**

Example

```
#MODEL?<CR>
```

### NAME

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td><code>NAME</code></td>
<td>Administrator</td>
</tr>
<tr>
<td>Get:</td>
<td><code>NAME?</code></td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

Syntax

**Set:**

**Get:**

<table>
<thead>
<tr>
<th>Function</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set machine (DNS) name</td>
<td><code>NAME [machine_name]CR</code></td>
<td></td>
</tr>
<tr>
<td>Get machine (DNS) name</td>
<td><code>NAME?</code></td>
<td></td>
</tr>
</tbody>
</table>

**Response**

```
~*nnNAME [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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: NAME-RST</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Description
Reset machine (DNS) name to factory default

### Syntax
Set: 
- NAME-RST
- #NAME-RST

### Response
~nn@NAME-RSTSPDOKCR LF

### Parameters

### Notes
Factory default of machine (DNS) name is “SL-280-XXXXXXXX”, 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: PROT-VER?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description
Get device protocol version

### Syntax
Set: -

### Response
~nn@PROT-VERSP3000:versionCR LF

### Parameters
- version–XX.XX where X is a digit

### Notes

### Example

```
#PROT-VER?<CR>
```
### RESET

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: RESET</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Description

**Syntax**

**Set:** Reset device

- #RESET[CR]

**Get:** -

#### Response

~~~nn@RESETSPOKCR LF~~~

#### Parameters

**serial_number** – 14 digits, factory assigned

### SN

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: SN?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

#### Description

**Syntax**

**Set:** Get device serial number

- #SN?[CR]

**Get:** -

#### Response

~~~nn@SNSPserial_numberCR LF~~~

#### Parameters

*serial_number* – 14 digits, factory assigned

#### Notes

This device has a 14 digit serial number.

#### Example

- #SN?[CR>
## TIME

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: TIME</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: TIME?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

**Set:** 
Set device time and date

\#TIME day_of_week, date, time

**Get:** 
Get device time and date

\#TIME?

### Response

- \~nn@TIME day_of_week, date, time

### Parameters

- **day_of_week** – options: SUN, MON, TUE, WED, THU, FRI, SAT
- **date** – format: DD-MM-YYYY
- **time** – format: hh:mm:ss

### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: TIME-LOC</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: TIME-LOC?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

**Set:** 
Set local time offset from UTC/GMT

\#TIME-LOC UTC_off, DayLight

**Get:** 
Get local time offset from UTC/GMT

\#TIME-LOC?

### Response

- \~nn@TIME-LOC UTC_off, DayLight

### 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.

### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: VERSION?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
</tr>
<tr>
<td>Get: Get firmware version number</td>
</tr>
</tbody>
</table>

**Response**

```
$\text{VERSION}\ SP \text{firmware\_version} \ CR \ LF
```

**Parameters**

`firmware\_version = \text{XX.XX.XXXX}` where the digit groups are: major.minor.build version

**Response Triggers**

**Notes**

**Example**

```
#\text{VERSION}\<CR>
```

### Communication Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Get beacon information, including IP address, UDP control port, TCP control port, MAC address, model, name</td>
</tr>
<tr>
<td>ETH-PORT</td>
<td>Set/get Ethernet port protocol</td>
</tr>
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<td>Set a network configuration</td>
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<td>Set/get DHCP mode</td>
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<td>NET-MASK</td>
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</table>
**BEACON-INFO**

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
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<td>–</td>
</tr>
<tr>
<td>Get:</td>
<td>BEACON-INFO?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

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<thead>
<tr>
<th>Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get:</td>
</tr>
</tbody>
</table>

Get beacon information, including IP address, UDP control port, TCP control port, MAC address, model, name

### #BEACON-INFO? [port_id]

**Response**

```
~nn@BEACON-INFO
port_id,ip_string,udp_port,tcp_port,mac_address,model,
name
```

**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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: ETH-PORT</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: ETH-PORT?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

**Set:** Set Ethernet port protocol

`#ETH-PORT<sp>portType,ETHPort<CR>`

**Get:** Get Ethernet port protocol

`#ETH-PORT<sp>portType<CR>`

### Response

`~<sp>nn<sp>@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

### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: NET-CONFIG</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: NET-CONFIG?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

**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>`

### Response

`~<sp>id,ip,net_mask,gateway<sp>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

### Notes

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

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
<th>Permission</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>NET-DHCP?</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>NET-DHCP</td>
<td>NET-DHCP?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

## Description

**Syntax**

- **Set:**
  
  ```
  Set DHCP mode
  ```
  
  `#NET-DHCP[CR]mode[CR]`

- **Get:**
  
  ```
  Get DHCP mode
  ```
  
  `#NET-DHCP?[CR]`

## 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

After execution, response is sent to the com port that sent the Get command

## 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

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<th>Set:</th>
<th>Get:</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>NET-DNS?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

## Description

**Syntax**

- **Set:**
  
  ```
  Get DNS name server
  ```
  
  `#NET-DNS[CR]dns_id[CR]`

## 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

<table>
<thead>
<tr>
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<td>NET-GATE?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

Set: Set gateway IP

Get: Get gateway IP

**Syntax**

Set: NET-GATE \(<ip\text{-}address>\)

Get: NET-GATE?

**Response**

~nn

\(<net\text{-}gate>SP\text{-}ip\_addressCR\)

**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

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</thead>
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<td>Get:</td>
<td>NET-IP?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

Set: Set IP address

Get: Get IP address

**Syntax**

Set: NET-IP \(<ip\text{-}address>\)

Get: NET-IP?

**Response**

~nn

\(<net\text{-}ip>SP\text{-}ip\_addressCR\)

**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

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<tr>
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</thead>
<tbody>
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</tr>
<tr>
<td>Get:</td>
<td>NET-MAC?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

Set:  
```plaintext
set NET-MAC mac_address CR LF
```

Get:  
```plaintext
Get MAC address
```

**Response**

```plaintext
~nn
```

**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

<table>
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<td>Get:</td>
<td>NET-MASK?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

Set:  
```plaintext
set NET-MASK net_mask CR
```

Get:  
```plaintext
Get subnet mask
```

**Response**

```plaintext
~nn
```

**Parameters**

- `net_mask` - Subnet mask address. Format: `xxx.xxx.xxx.xxx`

**Response Triggers**

**Notes**

**Example**

Set the subnet mask to 255.255.0.0:
```plaintext
#NET-MASK 255.255.000.000<CR>
```
## TIME-SRV

<table>
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</thead>
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<tr>
<td>Get:</td>
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<td>End User</td>
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### Description

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Set:</td>
</tr>
<tr>
<td>Get:</td>
</tr>
</tbody>
</table>

### Syntax

- `SET`: `#TIME-SRV [mode, time_server, time_server_sync_hour]`
- `GET`: `#TIME-SRV?`

### 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

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</thead>
<tbody>
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</tr>
<tr>
<td>Get: UART?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

#### 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

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<tr>
<td>COM-ROUTE-REMOVE</td>
<td>Remove communication route tunnel connection</td>
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<tr>
<td>ETH-TUNNEL</td>
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<tr>
<td>GPIO-CFG</td>
<td>Set/get HW GPIO configuration</td>
</tr>
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<td>Set/get HW GPIO step</td>
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<tr>
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</tr>
<tr>
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<td>Set/get relay state</td>
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</table>
### COM-ROUTE

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<th>Transparency</th>
</tr>
</thead>
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<td></td>
<td></td>
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<tr>
<td>Get: COM-ROUTE?</td>
<td>End User</td>
<td>Internal</td>
</tr>
</tbody>
</table>

### Description

**Get:** Get tunneling port routing

### Syntax

- **Set:**
  
- **Get:** #COM-ROUTE? [COM_Num]

### Response

- COM-ROUTE COM_Num,portType,ETHPort,ETH_rep_en,TCP_keep_alive_timing

### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: COM-ROUTE-ADD</td>
<td>Administrator</td>
<td>Internal</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

Add a communication route tunnel connection

**Syntax**

Set:

```
#COM-ROUTE-ADD[cr]
ComNum,PortType,EthPort,EthRepEn,Timeout[cr]
```

Get:

```
-
```

**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 1 and 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: COM-ROUTE-REMOVE</td>
<td>Administrator</td>
<td>Internal</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

Remove a communication route tunnel connection

**Syntax**

Set:

```
#COM-ROUTE-REMOVE[cr]ComNum[cr]
```

Get:

```
-
```

**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**

<table>
<thead>
<tr>
<th>Function</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>Administrator</td>
<td>Internal</td>
</tr>
<tr>
<td>Get: ETH-TUNNEL?</td>
<td>Administrator</td>
<td>Internal</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Set:</th>
<th>Syntax</th>
</tr>
</thead>
</table>
| Get: | Get parameters for open tunnels | #ETH-TUNNEL?TunnelId+

**Response**

```
#ETH-TUNNEL+TunnelId,ComNum,PortType,ETHPort,EthIp,RemotPort,
ETH_rep_en,Wired+\n```

**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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Set: GPIO-CFG</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: GPIO-CFG?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

#### Set:

Set I/O port configuration

```
#GPIO-CFG HwGpioNumber, HwGpioType, HwGpioDir, Pullup
```

#### Get:

Get I/O port configuration

```
#GPIO-CFG? HwGpioNumber
```

### Response

```
~nn @GPIO-CFG HwGpioNum, HwGpioType, HwGpioDir
```

### 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)

### Notes

- **Response Triggers**

### Example

Set configuration for I/O port number 1 to digital input with the pull-up enabled:

```
#GPIO-CFG 1, 1, 0, 1
```

## GPIO-STATE

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
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<td>Public</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

#### Set:

Set I/O port state

```
#GPIO-STATE HwGpioNumber, HwGpioState
```

#### Get:

Get I/O port state

```
#GPIO-STATE? HwGpioNumber
```

### Response

```
~nn @GPIO-STATE HwGpioNum, HwGpioState
```

### Parameters

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

### Notes

- **Response Triggers**

### Example

Set state for digital I/O port number 1 to high:

```
#GPIO-STATE 1, 1
```
## GPIO-STEP

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<tr>
<th>Functions</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Get:</td>
<td>GPIO-STEP?</td>
<td>End User</td>
</tr>
</tbody>
</table>

### Description

#### Syntax
- **Set:**
  ```
  Set I/O port maximum step
  #GPIO-STEP HwGpioNumber,NumOfStep
  ```
- **Get:**
  ```
  Get I/O port current step
  #GPIO-STEP? HwGpioNumber
  ```

### Response
- `~nn`  
  
  ```
  @GPIO-STEP HwGpioNumber,NumOfStep,CurrentStep
  ```

#### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>GPIO-THR</td>
<td>End User</td>
</tr>
<tr>
<td>Get:</td>
<td>GPIO-THR?</td>
<td>End User</td>
</tr>
</tbody>
</table>

### Description

#### Syntax
- **Set:**
  ```
  Set HW GPIO voltage levels
  #GPIO-THR HwGpioNumber,LowLevel,HighLevel
  ```
- **Get:**
  ```
  Get HW GPIO voltage levels that were set
  #GPIO-THR? HwGpioNumber
  ```

### Response
- `~nn`  
  
  ```
  @GPIO-THR HwGpioNumber,LowLevel,HighLevel
  ```

#### 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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td><code>GPIO-VOLT?</code></td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get active voltage levels of HW GPIO</td>
<td><code>#GPIO-VOLT? HwGpioNumber</code></td>
</tr>
</tbody>
</table>

**Syntax**

```
##GPIO-VOLT HwGpioNumber,Voltage
```

**Response**

```
~nn @ GPIO-VOLT HwGpioNumber,Voltage
```

**Parameters**

- `HwGpioNum` – hardware GPIO number: 1–8
- `Voltage` – voltage 0 to 30000 millivolts

**Notes**

This command is not available in digital out mode

**Example**

Get HW GPIO #1 active voltage level:

```
#GPIO-VOLT? 1<CR>
```

### IR-LEARN

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td><code>IR-LEARN</code></td>
<td>End User</td>
</tr>
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<td>Get:</td>
<td>-</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send IR learning command</td>
<td><code>#IR-LEARN CommandName,Timeout</code></td>
</tr>
</tbody>
</table>

**Syntax**

```
#IR-LEARN CommandName,Timeout
```

**Response**

```
~nn @ IR-LEARN CommandName,IR_Status
```

**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)

**Notes**

**Example**

Send IR learning command `PowerToggle`, with a 30 second timeout:

```
#IR-LEARN PowerToggle,30<CR>
```
## IR-SND

### Functions

| Set: | IR-SND |
| Get: | - |

### Permission

- End User

### Transparency

- Public

### Description

**Set:** Send IR command to port

**Get:** -

### Syntax

- **Set:** 
  
  `#IR-SND PortNum,Cmd_id,CmdName,Repeat,TotalPackets,PacketNum,<pronto command...>`

- **Get:** -

### 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 (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,1,1,0000,006e,0022,0002,0156,00ae,0016,0016,0016,0041,0016,0016,0016,0016
,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016
,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016
,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016
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,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016
,0016,0041,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016,0016
0e56<CR>
```
## IR-STOP

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: IR-STOP</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

**Set:** Send IR stop command to port

```
#IR-STOP [PortNum, Cmd_id, CmdName] <CR>
```

### 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)

### 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

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

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

## RELAY-STATE

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: RELAY-STATE</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get: RELAY-STATE?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

**Set:** Set relay state

```
#RELAY-STATE [RelayNumber, RelayState] <CR>
```

**Get:** Get relay state

```
#RELAY-STATE? [RelayNumber] <CR>
```

### Parameters

- **RelayNumber** – Relay port number: 1-8
- **RelayState** – relay state: 0 (open), 1 (closed), see note

### 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

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<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>DEL</td>
<td>Delete file</td>
</tr>
<tr>
<td>DIR</td>
<td>List files in device</td>
</tr>
<tr>
<td>FORMAT</td>
<td>Format file system</td>
</tr>
<tr>
<td>FS-FREE</td>
<td>Get file system free space</td>
</tr>
<tr>
<td>GET</td>
<td>Get file</td>
</tr>
</tbody>
</table>

## DEL

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: DEL</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Description Syntax

- **Set:**
  - Delete file
  
  Syntax: `#DEL [file_name]`

- **Get:**
  - 
  
  Response: `~ nn @ DEL [file_name] CR LF`

### Parameters

- **file_name:** name of file to delete

### Response Triggers

### Notes

- File names are case-sensitive.

### Example

Delete Setup file:

```bash
#DEL Setup<CR>
```
**DIR**

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: DIR</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
</tr>
</thead>
<tbody>
<tr>
<td>List files in device</td>
<td>-</td>
</tr>
</tbody>
</table>

**Syntax**

- **Set:** 
  - `#DIR`<br>

- **Get:** 
  - `-`<br>

**Response**

- Multi-line:
  - `~nn`<br>
  - `@DIR`<br>
  - `file_name TAB file_size bytes, ID file_id` <CR>
  - `TAB free_size bytes`. <CR>

**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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: FORMAT</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

Set: Format file system

Get: -

**Response**

```
~nn

```

**Parameters**

**Response Triggers**

**Notes**

Response could take several seconds until formatting completes.

**Example**

Format file system:

```
#FORMAT<CR>
```

### FS-FREE?

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get: FS-FREE?</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Set: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

Set: Get file system free space

Get: 

**Response**

```
~nn

```

**Parameters**

`free_size` - free size in device file system in bytes

**Response Triggers**

**Notes**

**Example**

Get file system free space:

```
#FS-FREE?<CR>
```
## GET

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td>GET</td>
<td>Administrator</td>
</tr>
</tbody>
</table>

### Description

#### Syntax

**Set:**

- **Get:**
  
  - Get file

  ```
  #GET file_name
  ```

### Response

#### Multi-line:

- `~nn @GET file_name,file_size READY CR LF contents`
- `~nn @GET file_name 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)

### Example

**Get file:**

```
#GET file_name<CR>
```
## Authentication Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Set/get protocol permission</td>
</tr>
<tr>
<td>LOGOUT</td>
<td>Cancel current permission level</td>
</tr>
<tr>
<td>PASS</td>
<td>Set/get password for login level</td>
</tr>
<tr>
<td>SECUR</td>
<td>Set/get current security state</td>
</tr>
</tbody>
</table>

### LOGIN

<table>
<thead>
<tr>
<th>Function</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>LOGIN</td>
<td>Not Secure</td>
</tr>
<tr>
<td>Get:</td>
<td>LOGIN?</td>
<td>Not Secure</td>
</tr>
</tbody>
</table>

### Syntax

**Set:**

```shell
#LOGIN login_level,password<CR>
```

**Get:**

```shell
~login_level@LOGIN<CR>
```

### Response

- Set:

```shell
~nn@LOGIN login_level,password<CR>OK<CR>
```

- Get:

```shell
~nn@LOGIN login_level<CR>
```

### Parameters

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

### 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):

```shell
#LOGIN Admin,33333<CR>
```
### LOGOUT

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: LOGOUT</td>
<td>Not Secure</td>
<td>Public</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Description

**Set:** Cancel current permission level

**Get:** -

#### Syntax

**Set:** #LOGOUT

**Get:** -

#### Response

~nn@LOGOUTSPOKCR LF

**Parameters**

**Response Triggers**

**Notes**

Logs out from User or Administrator permission levels

**Example**

#LOGOUT<CR>

### PASS

<table>
<thead>
<tr>
<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: PASS</td>
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<td>Public</td>
</tr>
<tr>
<td>Get: PASS?</td>
<td>Administrator</td>
<td>Public</td>
</tr>
</tbody>
</table>

#### Description

**Set:** Set password for login level

**Get:** Get password for login level

#### Syntax

**Set:** #PASS login_level,password

**Get:** #PASS? login_level

#### Response

~nn@PASSSPlogin_level,passwordCR 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

<table>
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<th>Functions</th>
<th>Permission</th>
<th>Transparency</th>
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<td>Not Secure</td>
<td>Public</td>
</tr>
</tbody>
</table>

### Description

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
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</thead>
<tbody>
<tr>
<td>Start/stop security</td>
<td>Get current security state</td>
</tr>
</tbody>
</table>

### Syntax

<table>
<thead>
<tr>
<th>Set:</th>
<th>Get:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#SECUR&lt;br&gt;security_mode&lt;br&gt;CR</td>
<td>#SECUR&lt;br&gt;CR</td>
</tr>
</tbody>
</table>

### Parameters

- **security_mode**: 1 (On / enable security), 0 (Off / disable security)

### Response Triggers

- \(~\)nn\@SECUR<br>security_mode<br>CR<br>LF

### 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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