USER MANUAL

PP1620, PP1621,
PP1660, PP1661,
PPCC1620, PPCC1621,
PPCC1660, PPCC1661
LED Lighting Controllers

Revision 13e

1　　　　　Disclaimer

Except as prohibited by law:

- All hardware, software and documentation is provided on an "as is" basis.

- It is essential that the user ensures that the operation of the product is suitable for their application.

- The user must ensure that incorrect functioning of this equipment cannot cause any dangerous situation or significant financial loss to occur.

- Gardasoft Vision Ltd and Gardasoft Products Ltd will not accept any liability for consequential loss of any kind.

All trademarks acknowledged.

Hardware, software and documentation are Copyright 2002 – 2013 Gardasoft Products Ltd. Hardware manufactured by Gardasoft Vision Ltd under licence.

2　　　　　Getting Started

Throughout this manual, references to the PP1620 refer to all products unless otherwise stated.

Read the sections on Safety and Specifications and check the PP1620 fulfils your requirements. Gardasoft Vision produces other controllers which are listed on our website.

Connect the PP1620 up to a supply and an LED lighting unit as described in "Connections".

Read the section on "Operation" and set up the controller to supply a small continuous current to the LED unit. Check that the LED unit illuminates. Refer to the Communications section and read how to send RS232 or Ethernet commands.

Mount the controller as described in "Mechanical Fixing" using the mounting holes. In particular read the notes on heat-sinking. Set up the controller for the desired operation and test.

Visit www.gardasoft.com for Application Notes on this product.

3   Safety

3.1.1   PP1620 – Safety

Please read this before using the PP1620 family of products. If in doubt, contact your distributor or Gardasoft Vision.

3.1.2   Heat

The controller can get very hot. It should be positioned where personnel cannot accidentally touch it and away from flammable materials.

Do not exceed the power ratings given in the manual. Note that at the maximum ratings the case temperature can reach 80°C.

If the output load is short circuited then the heat dissipated within the unit will greatly increase, resulting in a further rise in temperature.

3.1.3   Electrical

The user must ensure that the potential difference between any combinations of applied signals does not exceed the supply voltage. WARNING: Higher voltages may cause a danger to personal health.

The controller does not have complete tracking isolation of inputs and outputs.

Transients caused by inductive loads must be suppressed external to the controller.

When switched off, there is still energy stored in the controller for about 15 seconds. 10 seconds after the power LED goes off, the energy has been discharged.

The controller outputs high energy pulses. Care must be taken to connect the outputs correctly and protect the output wiring and load from inadvertent short-circuits.

3.1.4   General

The controller must not be used in an application where its failure could cause a danger to personal health or damage to other equipment.

4　　　　　General Description

The PP1620 current controller provides repeatable intensity control of LED lighting for machine vision applications. It includes the power supply, intensity control, timing and triggering functions required for machine vision systems.

LED lighting needs a constant current supply as small variations in voltage can cause large variations in light output. Currents can be specified as follows:

Product	Maximum current	Step size
PP1620, PP1660, PPCC1620, PPCC1660	20A	7mA
PP1621, PP1661, PPCC1621, PPCC1661	2A	0.5mA

Three modes of operation are provided separately for each channel:

▪ **Continuous:**

In continuous mode the output is a continuous current.

▪ **Pulsed:**

In this mode output is pulsed once per trigger. One input is used as a trigger. The pulse width can range from 1us to 300ms in 0.1us steps. The delay can range from 4us to 300ms in 0.1us steps.

▪ **Switched:**

In switched mode a trigger input is used to switch the output current on and off. The output is only enabled when the input has a voltage on it.

Configurations are saved in non-volatile memory allowing the controller to resume programmed operations after the power is cycled.

4.1　Triggering

The PP1620 has 8 trigger inputs. Any trigger input can be used to trigger any output. Each channel can use a trigger input active high or active low.

Which trigger input is used is set using the webpage or the RP command. The default is:

CH0 and CH1 are triggered by TRIG0
CH2 and CH3 are triggered by TRIG1
CH4 and CH5 are triggered by TRIG2
CH6 and CH7 are triggered by TRIG3
CH8 and CH9 are triggered by TRIG4
CH10 and CH11 are triggered by TRIG5
CH12 and CH13 are triggered by TRIG6
CH14 and CH15 are triggered by TRIG7

The P flag (set using the webpages or the RE command) sets whether a channel uses an input is used active high or active low. Two channels could trigger from different edges of the same input.

Mode	P Flag	Output
Continuous	Unused	Output is on.
Switched	P Flag = 1	Output is off when trigger is off Output is on when trigger is on
	P Flag = 0	Output is on when trigger is off Output is off when trigger is on
Pulsed	P Flag = 1	Pulse is triggered on rising edge
	P Flag = 0	Pulse is triggered on falling edge

Normally it is necessary to synchronise pulsing to an external camera signal. However there is an internal trigger which can be used to generate regular triggers. The period of the internal trigger can be set in steps of 100us from 200us upwards.

A command is available to individually trigger a channel.

4.2   Digital Outputs (PPCC16xx only)

The PPCC16xx controllers have 8 TTL level digital outputs. These can be used as general purpose outputs or can be used to synchronise camera triggers to lighting pulses.

These outputs and the commands to configure them are described in section 11.

GARDASOFT
Industrial LED technology

5 Mechanical Fixing

A 3D STEP file model of the PP1620 is available at www.gardasoft.com

The controller can be mounted onto a flat surface using the threaded holes in the base, see diagram.

The enclosure of the controller is used to dissipate power in the form of heat. For this reason the material to which the unit is attached must be suitable, preferably metallic with ability to dissipate the produced heat. This is particularly important if the power dissipation of the controller (as defined by P_D the section on Specifications) exceeds 16 Watts.
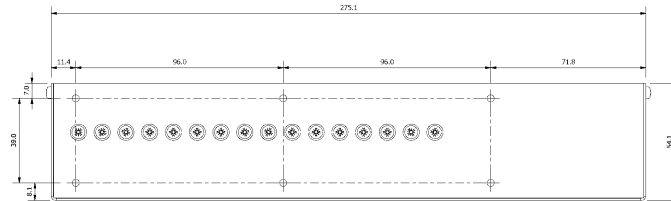
The controller enclosure is a fire enclosure as long as the following conditions are met. The unit must be mounted either with the mounting face horizontal or downwards or with the large face of the base horizontal and downwards. All downwards facing holes must have a screw in them.

 If a fire enclosure is used, the enclosure should be metal or plastic (with a flammability rating of UL94 V1 or better); with no holes below or to the sides of the controller when mounted. Cable entries below the controller should be via glands that have a flammability rating as before. The controller should be mounted at least 10mm from any other part of the enclosure.

The controller does not have an IP rating and should be mounted so that moisture and dirt cannot enter the unit.

Orientation of the controller as a fire enclosure is shown on the dimensions of the unit.

6   Heat Dissipation

⚠ The Controller has a linear circuit to produce the constant current output. This means that it generates heat which needs to be dissipated.

For more information on this and a spreadsheet to calculate the heat output, see application note APP941 at www.gardasoft.com.

6.1.1   Heat Output Per Channel

For a continuous output current the heat output is given by:

<heat output (W)> = <output current (A)> * (<supply voltage (V)> - <voltage across lighting (V)>)

where:

Output current   Set by the user

Supply voltage   Voltage across PSU+ and PSU-

Voltage across lighting   Voltage across LED+ and LED-

This is usually easy to calculate as the voltage across the lighting is usually the voltage rating of the light given in its specification or can be measured using a voltmeter.

For a pulsed output the heat output is given by:

<heat output (W)> = <output current (A)> * <duty cycle>

* (<supply voltage (V)> - <voltage across lighting when pulsing (V)>)

<duty cycle> = <pulse width in seconds> * <trigger frequency in Hertz>

When overdriving, the voltage across the LED is more difficult to measure. In most cases it is reasonable to use the voltage rating of the light.

6.1.2   Total Heat Output

The heat output for the controller is given by adding the heat output for all channels, as calculated above.

There are several ways to reduce the heat output from the controller:

• Use pulse mode. If the output is only on when you need it then you can dramatically reduce the heat output. Feed the camera trigger into the controller and pulse the lights.

• Turn the light off when not needed. If you don't have precise timing of when the camera will trigger, you can use Switched mode to

switch the output off or on depending on the trigger input (or use remote commands to turn the output on and off).

- Reduce the output current if possible

- Reduce the supply voltage. Most PSUs have some adjustment in their output voltage.

- Connect lights in series instead of parallel. If you have an array of lights or LEDs in parallel then changing the arrangement to serial will increase the voltage across them but reduce the overall current.

- Use two controllers and use less channels from each. For high power applications this may be the easiest solution.

If the heat output is no greater than 16W, then no heat sinking is required. If the heat output is between 16W and 24W then the controller needs to be bolted to a solid piece of metal to dissipate the heat. Above 24W, it is necessary to have a large heat sink with fan cooling.

7   Connections

7.1   External Cables

To prevent overload of output wiring, all power and output cabling must be rated for a continuous load current of 6.3A minimum. This does not however apply to the RS232 and Trigger input connections.

7.2   Power Supply

To avoid a fire hazard from the controller or the power supply consider the implications of overheating in the unlikely event of a fault in the controller. The power dissipation in the controller in a fault condition can be up to:

<Power supply voltage> * <max current delivered by Power supply>

Either limit the power supply output current so that not more than 30W can be dissipated in the controller, or mount the unit in a fire enclosure.

To limit the power, set the power supply output voltages to the minimum value required by the LED light and the controller together. Choose a PSU that limits its output current by design, by setting the current limit on the supply (if this feature exists) or use fuses. Remember to derate the fuse, if mounted in an enclosure, as the temperature will be higher than ambient. The external power supply will need to be able to supply at least the average output current for all channels.

The controller has 31mF of reservoir capacitance; so on power up there will be a large inrush current. It is therefore advisable that any power supply is able to limit this inrush current to safe and reasonable values.

The use of a regulated power supply with 100% short circuit protection is recommended. If however a non regulated power supply is used, then the maximum ripple voltage of this power supply must not exceed 10% of the actual DC value.

7.3   Connectors

The RS232 and trigger connections are made using D-type connectors. The power input and output connectors are arranged as follows:
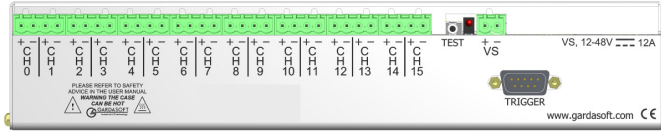
7.3.1   Power Input

The pinout of the power input connector is:

Pin	Function
1	Supply positive
2	Supply GND

⚠ **The case of the controller is not connected to the GND supply connection.**

7.3.2   Power Outputs

⚠ **Ensure that the output connections do not get shorted together by any metallic object as this can discharge a lot of energy and generate heat in the controller.**

Each power output connector has the connections for two output channels. The pin out is:

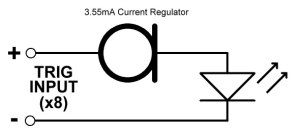| Pin	Function
1	First channel positive
2	First channel negative
3	Second channel positive
4	Second channel negative

7.3.3 Serial Connector (PP166x, PPCC166x only)

The RS232 connector is a standard 9-way female D-type connected as follows. A standard straight through cable can be used to connect the PP166x to a PC serial port. The communications port is set to 115Kbaud, no parity, 8 data bits and 1 stop bit.

Pin	Function
2	TX (output from PP166x)
3	RX (input to PP166x)
5	GND

7.3.4 Trigger Inputs

The trigger input connector is a 9-way D-type male. The trigger connector pinout is given below.

		Pin	Function
Opto-Coupled Trigger Input Details		**1**	Input 4 positive
		2	Input 3 positive
3.55mA Current Regulator		**3**	Input 2 positive
		4	Input 1 positive
+ TRIG INPUT (x8) **-**		**5**	Input 0 positive
Operating Conditions		**6**	Trigger negative (common for all inputs)
$3V <= V_{TRIG} <= 24V$ Logic 1		**7**	Input 7 positive
$V_{TRIG} < 1V$ Logic 0		**8**	Input 6 positive
V_F 1.5V typ		**9**	Input 5 positive

7.3.5 Ethernet Connection (PP162x, PPCC162x only)

The RJ45 Ethernet connector requires a straight through cable to connect into a network switch, hub or router. It runs at 10Mbits per second.

When connecting direct to a PC, as crossover Ethernet cable is needed.

7.3.6   Trigger Output Connector (PPCC16xx only)

The trigger output connector is a standard 15-way female D-type connected as shown below.

It provides eight 5V TTL level outputs. It also carries GND and 5V power output.

Each output can output up to 20mA.

The total current from all the outputs and the +5V output must not be more than 50mA.

Pin	Function
1	Output 101
2	Output 103
3	Output 105
4	Output 107
5	GND
6	NO CONNECT
7	NO CONNECT
8	NO CONNECT
9	Output 102
10	Output 104
11	Output 106
12	Output 108
13	+5V output (unfused)
14	NO CONNECT
15	NO CONNECT

8 Ethernet Setup (PP162x, PPCC162x only)

You may need to ask your network administrator for advice about setting up the Ethernet connection.

You will need to download GardasoftMaint from the PP1620 software downloads at www.gardasoft.com. This program allows the IP addresses of controllers to be managed.
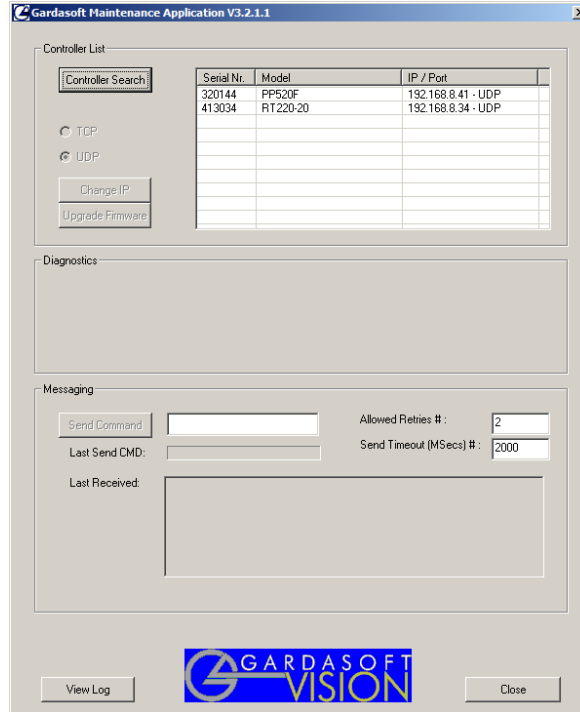
Application note "APP923 Troubleshooting Ethernet problems" is available on the Gardasoft website.

Ethernet set up is not affected by cold booting the PP162x.

8.1 Connection

The Ethernet link uses a 10BaseT connection on a RJ45 connector. The PP162x is usually connected to a network switch (or hub or router) but it is possible to connect the controller directly into the network port on a PC by using a swap over cable.

When connecting direct to a PC, see "APP923 Troubleshooting Ethernet problems" for information on how to set up the IP addresses.

8.2 IP Address

The PP162x needs an IP address to communicate over Ethernet. There are two ways to get an IP address; either programmed into the unit or using DHCP.

Most networks use a DHCP server. If there is a PC on the network, you may be able to find out whether a PC on the same network uses DCHP as follows:

• Go to Control Panel

• Select Network Connections

• Right click on Local Area Connection. Select Properties

• From the list, select Internet Protocol (TCP/IP), press Properties

If "Obtain an IP address automatically" is set, then DHCP is probably used. However, there may be an alternative fixed IP address on the "Alternative Configuration" tab.

You can find out what IP address is being used by a PC at any time by:

• Go to Control Panel

• Select Network Connections

• Right click on Local Area Connection. Select Status

• Select the Support tab. The IP address is displayed

When using a fixed IP address, you must ensure that you use an IP address that is not being used by any other device on the network. It is usual to keep the first three numbers of the IP address the same as other devices and to change only the last number. For example, if you have a network consisting of a PC (IP address 192.168.1.35) and two PP162xs, you might assign the addresses 192.168.1.201 and 192.168.1.202.

8.2.1 Programmed IP Address and DHCP

For DHCP mode, the PP162x acquires its IP address, subnet mask and gateway address from a DHCP server. Otherwise the controller has a fixed IP address, subnet mask and gateway address.

The PP162x is shipped with DHCP set by default.

To change the DHCP or fixed IP address setting, use the PP162x configuration program (downloadable from the controller page at www.gardasoft.com). This has a "Set Address" option which can be used to change the address of a PP162x even if it is wrongly set. To do this:

• Connect the PP162x to the network

• Run the controller configuration program

• Click on "Set Address"

• Enter the serial number of the PP162x

• Select DHCP or Fixed IP. Set the fixed IP addresses

• Press "Send"

Only the PP162x with the specified serial number will be changed.

The IP address of all the Gardasoft controllers can be found by clicking the Search button in the configuration program.

8.3 Communication

All the features below are implemented in sample C++ code available from www.gardasoft.com.

8.3.1 Automatic Sensing

The PP162x sends out a message on three events:

• On power up

• When an IP address is received or renewed by DHCP

• When an enquiry message is received

On the first two events, the message is broadcast. On the third it is a reply to a single IP address.

An enquiry message is a UDP packet from source port 30310, destination port 30311 with the message body "GardasoftSearch" (8-bit ASCII, 13 characters).

GARDASOFT
Industrial LED technology

The message output by the PP162x is a UDP packet from source port 30311, destination port 30310. It is formatted as:

Gardasoft,PP162x,000000,111111111111,22222222

(8-bit ASCII, 44 characters), where

000000	the serial number of the unit
111111111111	the MAC address in 6 HEX bytes
22222222	the IP address in 4 HEX bytes

For example for PP1621 serial number 12345, IP address 192.168.1.103, MAC address 00.0B.75.01.80.99 the packet comprises:

Gardasoft,PP1621,012345,000B75018099,C0A80167

9 Webpage Configuration (PP162x, PPCC162x only)

The PP162x has a webserver inside, so that it can be configured using a standard web browser, such as Internet Explorer.

The IP address of the PP162x must be known (it can be searched for or set using the Ethernet configuration program). Open a web browser window and type the IP address (for example 192.168.1.71) of the PP162x into the URL box at the top. The main page of the PP162x webserver should be shown.

All web-pages except the main page can be password protected. If the password is unknown, it can be reset from the Ethernet configuration program.

9.1 Main Page

The main page shows general information about the PP162x. Links are provided to the configuration pages.

9.2 General Setup Page

The general setup page allows various parameters to be set up and the webpage password to be set.

There is also a text box where any command (see section 13) can be entered.

9.3 Channel Configuration Pages

There is one Channel Configuration Page for each output channel. All the parameters for each output channel can be set up. Press the Submit button to update the PP162x and save the changes to non-volatile memory.

GARDASOFT
Industrial LED technology

10 RS232 and Ethernet Commands

A Configuration Program is available for download from www.gardasoft.com.

Sample C++ communication source code is available from Gardasoft Vision.

10.1 Ethernet Communication (PP162x, PPCC162x only)

Commands sent from a PC in UDP and TCP packets should be sent to destination port 30313. Replies will be sent back to the source port (so in the reply the source and destination ports will be swapped).

A TCP/IP connection timeouts and closes if it is idle for more than 10 seconds. The host must send regular commands or keepalive packets to keep the link open.

A carriage return (ASCII 13) character should be sent to terminate the command line, in case multiple TCP packets get joined together.

10.2 RS232 Communication (PP166x, PPCC166x only)

When using RS232 the COM port should be set to 115200baud, 8 data bits, no parity, 1 stop bit, no handshaking.

A carriage return character should be sent to terminate the command line.

Hyperterminal or other RS232 terminal programs can be used to send commands manually. The ">" reply character (see below) then acts as a prompt for the next command.

10.3 Configuration Program

A Configuration Program is available from www.gardasoft.com which allows the PP8 to be configured using the commands below.

10.4 Command Structure

The PP1620 can be configured using text commands. These commands can be sent by RS232 for the PP166x or by Ethernet for the PP162x. A configuration program is available at www.gardasoft.com.

The commands comprise a code of two letters followed by the parameters (several commands can be placed on a single command line by separating them with a semi-colon (";"). A carriage return character should be sent to terminate the command line. The PP1620 will send any replies to the commands followed by a '>' character to indicate that the command line has been completed.

Commands comprise a code of two letters followed by the parameters (if any) needed for the command. Spaces in the commands are ignored.

Numeric parameters are separated by a comma (","). For a parameter which is a time period the default units are microseconds. "s", "ms" or "us" can be added to the end of the number to indicate seconds, milliseconds or microseconds. For currents, "a" or "ma" can be added to indicate "amps" or milliamps". The default is amps. For example:

Parameter	Meaning
0.1ms	0.1 milliseconds
200	200 microseconds
0.1s	0.1 seconds
100ma	100mA
2.45A	2.45A
2.3	2300mA or 2.3A

Note that parameters are in "USA/UK" format so that a half is written "0.5" not "0,5"

The command codes and their meaning are described below. The upper case commands are shown, followed by lower case letters denoting the numeric argument.

Error number	Reason
Err 1	A parameter value is invalid
Err 2	Command not recognised
Err 3	Numeric value is wrong format
Err 4	Wrong number of parameters
Err 5	(Warning only) The command is accepted but a timing parameter was out of range and has been adjusted.

Any changes made using these commands are not saved permanently until the AW command has been issued.

10.5 Commands

The commands for the digital outputs are given in section 11.

Save the settings to memory.

> **AW**
> Once the settings are saved to memory they are then retained when the unit is switched off. If this is not done, changes to the settings are volatile, and if the unit is switched off they revert to those in force when the last AW command was issued.

Report the current settings for the outputs

When using Ethernet communications, the output of the ST command will not fit in a reply packet, so the STc form of the command should be used.

> **ST** Output the status of all channels
> **STc** Output the status for one channel
> c = output channel (0 to 15)

The status is output in the following format:

> **CH** f **M** 1 **V** a **D** d **P** p **R** r , T t, F f   For Pulsed Output Mode
> c **M** 2 **V** a   For Constant Mode
> c **M** 3 **V** a   For Switched Mode
> Where:
> > c   output channel
> > m is one of:
> > > 0   Not set up
> > > 1   Pulsed output

2   Continuous output
a   Output current (amps)
p   Pulse width (microseconds)
d   Delay before pulse (microseconds)
r   Retrigger delay
t   Trigger input (set by RP command)
f   Flags (set by RE command)

ST16
This command reports the internal trigger mode, period (TT command) and the trigger mode (FP command) settings. Typical output is:

   TT 1, TP 20.00ms FP 0

Report the firmware version

VR

This command returns the firmware version. For example:

   PP1620 (HW005) V034

Continuous Output Mode

The channel is set to continuous mode with the specified output current.

RSf**,a**
Where:
   f = Lighting output channel (0 to 15) or
     TTL Output channel (101 – 108)
   a = output current (A) only for lighting output channel

For example:

   Set a continuous current of 0.5A on Lighting output channel 3
     RS3,0.5
   Set a continuous mode on TTL output channel 102
     RS102,1

Switched Output Mode

The channel is set to switched mode with the specified output current.

RWf**,a**
Where:
f = output channel (0 to 15). TTL output channels has no switch output mode
   a = output current (A)

For example:

GARDASOFT
Industrial LED technology

Set channel 4 to output 1A whenever input 4 is active.

RW4,1.0

Pulsed Output Mode

Set the pulse parameters. This command sets a channel to pulsed output. Note that output channel 1 can only be triggered by INPUT1 and output channel 2 can only be triggered by INPUT2, etc.

The pulse delay can be from about 3us to 1 second. The pulse width can be any value from 1us to 1 second.

RTf,p,d,a
RTf,p,d,a,r
Where:
      f = Lighting output channel (0 to 15) or
          TTL Output channel (101 – 108)
      p = pulse width (microseconds)
      d = delay from trigger to pulse (microseconds)
      a = output current (A)
      r = retrigger delay (microseconds, optional)

For example to set channel 2 to pulsed output at 4A, pulse a continuous current of 0.5A on output channel 3 for 1ms after a delay of 500us:

RT2,1000,500,4

Set the Trigger Input

This command sets which input is used for pulse and switch output modes.

RPc,p
Where:
      c   which output channel (0 to 15)
      p   which input channel (0 to 15)
      c = output channel (1 to 2 or 4 or 8 [depending on model])
      p = trigger input (1 or 2)

Set the Trigger Flag

REc,m
Where:
      c   Lighting output channel (0 to 15)
      m = flag:
      m = 0   P flag set (positive triggers)
      m = 4   P flag cleared (negative triggers)

Internal Trigger Mode

This command enables or disables the internal trigger. When enabled, all outputs are triggered simultaneously using an internal trigger signal. This setting can be saved to non-volatile memory using the AW command.

TT0	Use external triggers
TT1	Use internal trigger (defaults to 25Hz)
TT1,p	Use internal trigger and set the period

Where:

p= period of the triggers in microseconds

For example:

TT1,200MS	Set the internal trigger to 200ms (5Hz)
TT1,100	Set the internal trigger to 100us (10KHz)

Clear Settings

Clear all output channel settings and TTL output channels. All output channel, TTL output channels and timer settings are cleared to default to 0.0A continuous. This does not clear any Ethernet settings.

CL

Trigger an Output

TRc

c   lighting channel (0 to 15)

Simulates a trigger pulse.

Enable Ethernet Messages

GTm

m   = 0 to disable Ethernet messages

= 1 to enable Ethernet messages

When Ethernet messages are enabled, any error reports are sent to the most recent UDP or TCP address from which a command has been received.

Read any error messages

GR

If Ethernet messages are disabled then the last error number can be read by this command. The reply is of the form "ErrN" where N is the error code, for example:

Err40   Error 40 was the last error.

If there are no outstanding errors then an empty reply is sent followed by the ">" character that normally terminates a reply message.

GARDASOFT
Industrial LED technology

Set/Clear the Webpage Password
EY
EY asc1, asc2, asc3, asc4, asc5, asc6

This command sets the password required to access the webpages. If EY is entered on its own then the password is cleared. There are six optional parameters, which are ASCII values for a password from one to six letters. A value of 65 is 'A', 66 is 'B', etc to 90 is 'Z'.

10.5.1　　　　　Command Summary

Command	Example	Effect
AW	AW	Save changes
ST	ST2	Show configuration for channel 2
VR	VR	Read the firmware version
RS	RS2,0.7	Set channel 2 to 0.7A continuous
RW	RW1,1.1	Set channel 1 to 1.1A, switched by input 1
RT	RT2,3,4,1.9	Set channel 2 to 3ms pulses, delayed by 4ms, with an output pulse current of 1.9A
FP	FP1	Trigger all channels from trigger input 0
RP	RP3,6	CH3 triggered from TRIG6
RE	RE2,4	Use the falling edge to trigger CH2
TT	TT1,1ms	Set test mode with pulses every 1ms
CL	CL	Clear all output settings.
TR	TR2	Trigger channel 2
EY	EY65,66	Set webpage password to "AB"
GR	GR	Read any error messages
GT	GT1	Enable Ethernet messages

GARDASOFT
Industrial LED technology

11 Digital Outputs
(PPCC16xx only)

The PPCC option has 8 digital outputs which can be used as general outputs or as camera triggers. The outputs are 5V TTL level. The outputs are numbered 101 to 108.

Each output can be set on, set off or pulsed with precise timing synchronized to lighting outputs.

These outputs can be used to synchronise lighting and cameras. The controller can ensure that there is a fixed delay between the lighting pulse and camera exposure. On some cameras the exposure time can be controlled through trigger pulse width.

When pulsing each output can be triggered from any trigger input or from the internal trigger timer.

Turn an output on or off

    RSc,v
    Where: c = channel (101 to 108)
               v = value (0 or 1)

Trigger an output from a trigger input

    RTc,p,d,v,r
    Where: c = channel (101 to 108)
               p = pulse width in microseconds
               d = delay from trigger in microseconds
               v = must be set to 1
               r = retrigger time

Select which input triggers the output

    RPc,i
    Where: c = channel (101 to 108)
               i = trigger input (0 to 7), or 255 for the internal timer

Select which edge triggers the output

Note that the f parameter is different from the PP520 and RT controllers.

    REc,f
    Where: c = channel (101 to 108)
               f = 0 to trigger from the rising edge of the trigger
               f = 4 to trigger from the falling edge of the trigger

A. Error Codes

Error codes may be sent by the PP1620 by Ethernet or RS232. These are shown as "Errnn", where nn gives the number of the error. The error codes are:

- E1

  One of the parameters to a command has an illegal value.

- E2

  Command not recognised.

- E3

  Failed to save parameters to non-volatile memory.

- E4

  The command has the wrong number of parameters.

- E5

  (Warning only) A timing parameter was out of range and has been adjusted.

- E18

  On power up, the stored configuration was invalid.

- E 40

  When the unit has powered up the non-volatile memory was corrupt and has been cleared. Set up the unit again.

- All other errors

  A hardware error has occurred. Try power cycling the unit and trying again to see if the fault clears. If not, make a note of the number and contact your distributor.

12   Specifications

Parameter	Value	Notes
Supply voltage (V_S)	12V (min) 48V (max)	The supply voltage must be at least 1V above the forward voltage of the lighting being driven. Ideally set this voltage as low as possible to reduce the total unit power dissipation.
Quiescent supply current (IS)	100mA (typ)	
Total allowed unit power dissipation in free air	P_D=16 Watts (max)	
Total unit power dissipation with heatsink	P_D=32 Watts (max)	
Total average output current	12A max	
Operating temperature range	5°c to 40°c	

Gardasoft LED Lighting Controllers

RT Range

- 2, 4 or 8 output channels
- 2A and 20A maximum current versions available
- 2, 4 or 8 trigger inputs
- SafePower™ and SafeSense™
- Front panel, RS232 or Ethernet configuration
- Fast pulsing option

RT200-20	Lighting controller: 2 channels up to 20A pulsing, front panel
RT220-20	Lighting controller: 2 channels up to 20A pulsing, Ethernet
RT260-20	Lighting controller: 2 channels up to 20A pulsing, RS232
RT200F-20	Lighting controller: 2 channels up to 20A fast pulsing, front panel
RT220F-20	Lighting controller: 2 channels up to 20A fast pulsing, Ethernet
RT260F-20	Lighting controller: 2 channels up to 20A fast pulsing, RS232
RT420-20	Lighting controller: 4 channels up to 20A pulsing, Ethernet
RT420F-20	Lighting controller: 4 channels up to 20A fast pulsing, Ethernet
RT820F-20	Lighting controller: 8 channels up to 20A fast pulsing, Ethernet
RT860F-20	Lighting controller: 8 channels up to 20A fast pulsing, RS232

PP706	DIN Rail mounting clip for RT range

PP Range

- 2, 4 or 8 output channels up to 20A each
- 2, 4 or 8 trigger inputs
- SafeSense™ option
- Front panel, RS232 or Ethernet configuration
- Fast pulsing option

Machine Vision Timing Controller

CC320 Controller

- 8 digital inputs
- 8 digital outputs
- 1 or 2 wire Encoder input
- Very flexible operation
- Ethernet control
- Front panel configuration

PP703	DIN Rail mounting clip for CC320