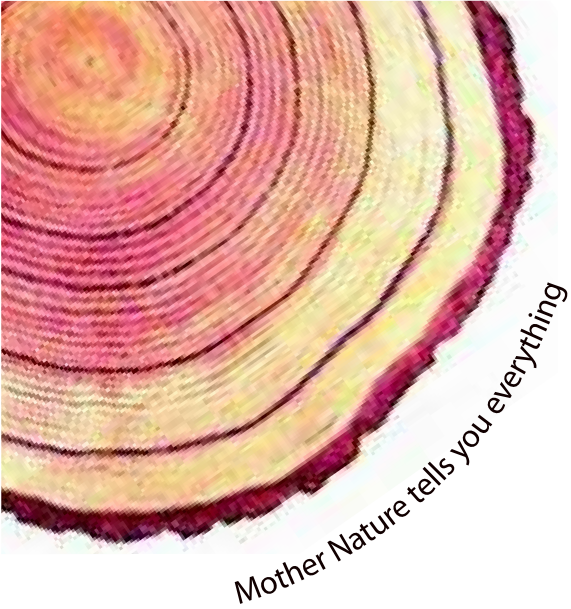

OPERATING MANUAL

ERC-800
Ethernet based remote Relay and Display
Model No.: 8xx-x0

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tel.: +91-98245 24140
e-mail: info@gtek-india.com
url: www.gtek-india.com

Contents

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2 LIST OF TABLES

3 INTRODUCTION

3.1 MANUAL LAYOUT

The objective of this manual is to make the user familiar with the fundamental concept of ERC-800 series Ethernet based remote Relay Controller, its features, installation and operation. The manual is divided into various sections for easy and quick reference.

Table 1 Manual Layout

Section 1 Introduction	This section provides brief description about the device, its features and its operation.
Section 2 System Architecture	It describes different internal modules of the system and how they are connected internally.
Section 3 Installation	It gives the details of the installation process of TCP/IP relay controller device.
Section 4 Operation	This section gives the details of operation TCP/IP relay controller device.
Section 5 Network Configuration	It describes how to add the device to GtekNet application and how to configure it.
Section 6 Troubleshooting Guide	It gives solutions to the problem occurred in the device, if any.
Section 7 Specification	It gives specification of the components used in the device.
Section 8 Ordering Code	It gives order code of the device; User can choose features of the device according to the order code.

3.2 DEVICE DESCRIPTION

TCP/IP relay controller is purely designed for controlling purpose. It takes commands from central PC application software and operates upon it. The central PC application software is G-Tek's networked software GtekNet.

The device mainly consists of three sections:

1. Relay module
2. Display module
3. GSM module

The relay module has maximum of 12 relays which, through PC application, are connected to remotely located controlling devices. Status LEDs are provided for each relay so as to notify activation or deactivation status of each relay. Whenever any of the channel/channels of the networked device (or multiple devices) goes out of preset input range, the relay/relays connected to it will be activated. User can send the information about alarm condition being generated from any device to this unit along with the message on the display through application. The messages and relays on/off are fully user configurable.

The display module consists of Twisted Nematic (TN) LCD display having four lines with each line having twenty characters. Colour of the display is blue over white. LCD strings to be displayed is user settable through application. The display string upon alarm generation notifies which device caused the alarm generation.

User can also choose the add-on GSM module. In case of predefined event (user configurable) this module will send voice or message to the user settable mobile numbers. Logs of successful sending or failure can also be downloaded for future reference. In case of back to back alarm generation, alerts will be processed priority wise. Priority is user settable (mostly device wise). GSM module is an optional feature.

A buzzer is provided and can be set or reset remotely to attract the attention of the nearby person. It can be turned off for the preset time with the help of keyboard.

TCP/IP protocol:

TCP/IP protocol has become almost default preference when it comes to networking of the devices. The biggest advantage of TCP/IP is relatively easy availability of network devices and trained work force. With MODBUS over TCP/IP, it has become very easy to connect, control and monitor devices through central software. The ERC-800 series of Ethernet based remote relay and display units is very helpful when you want to add remote alarm units on Ethernet network. Since it is Ethernet based, the device can be plugged in at any place and controlled easily from the control room. Device operates on MODBUS TCP/IP so you can easily integrate with your existing system also.

It makes very easy and fast to control devices with this device from remote place. This device also provides advantage of simple wiring.

3.3 KEY FEATURES *

- Avoids complicated wiring process.
- Maximum of 12,1 Form C (NC-C-NO) relay with rating of 230V AC, 2A resistive load
- On/off Status of each relay on individual LED.
- Integrated buzzer with user settable on/off time
- LCD (20X4 (20 characters by 4 line)) as display with TN reflective Blue over white.
- User settable Information on display
- Easy to operate
- TCP/IP based communication to connect with application.
- Auto reset of all relays after particular time (In event of communication failure)
- User can decide and set auto reset time from application
- Manual reset of buzzer from Keyboard
- GSM add-on for call and message alert (Optional)
- User settable mobile numbers for alerts and messages
- User settable SMS message with maximum length of 135 characters.
- User settable voice message
- Fully configurable, for mobile no to message and/or voice call
- Universal 90-265 VAC; 47-63 Hz Power supply.

*: Features depends on the product ordered. Please refer to the order code (Model No) of your product for exact features and capabilities.

3.4 UNPACKING AND INSPECTION

Device will be delivered in fully assembled condition from the factory. It will be delivered in metallic enclosure only.

Devices is dispatched in a recyclable, environment friendly package specially designed to give adequate protection during transportation. If the outer box shows any sign of damage, it should be opened immediately and the device should be examined properly. If there is evidence of damage, the device should not be operated and the local representative should be contacted for instructions. Ensure that all the accessories and documents are removed from the box. If device is for immediate use, you can start installing it now as per the instructions for Installation. **Please preserve the original packing along with all internal packing for future transport requirements.**

Figure 1 Front view of Relay Controller

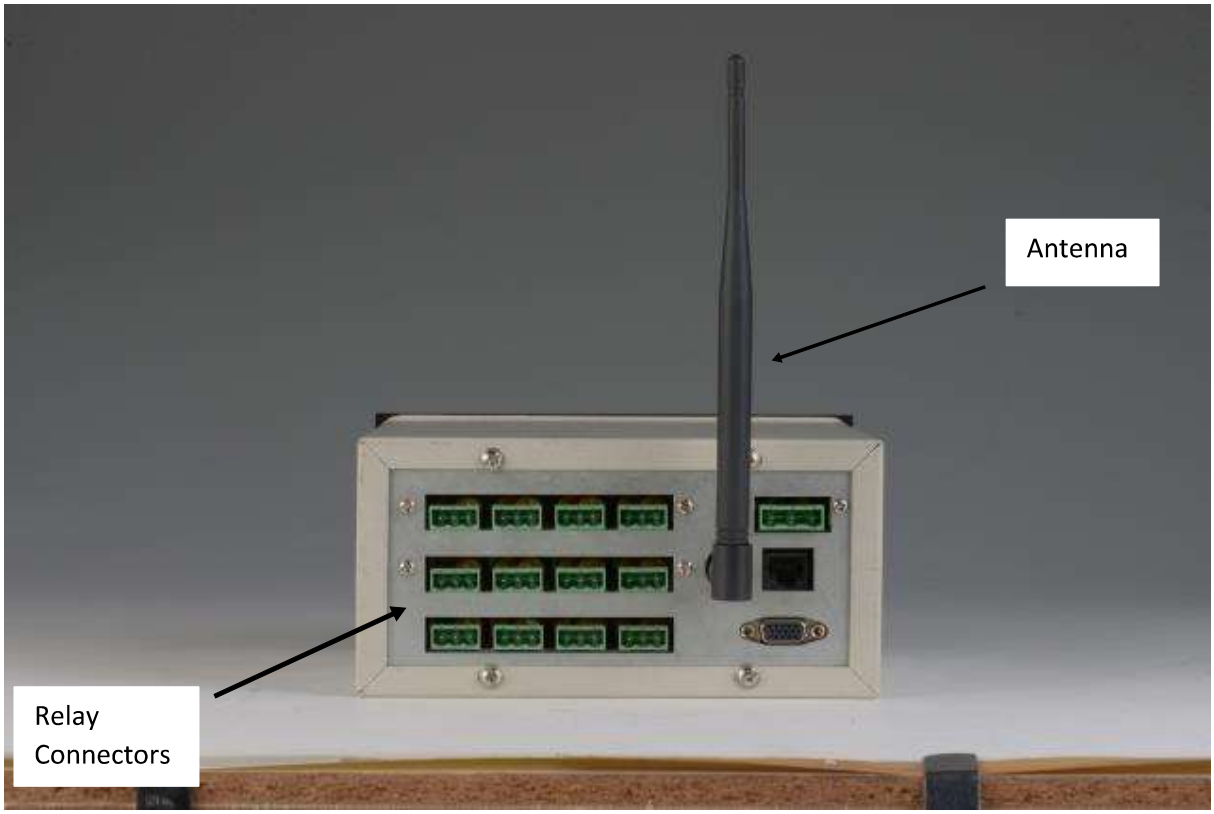


Figure 2 Back view of Relay Controller

4 SYSTEM ARCHITECTURE

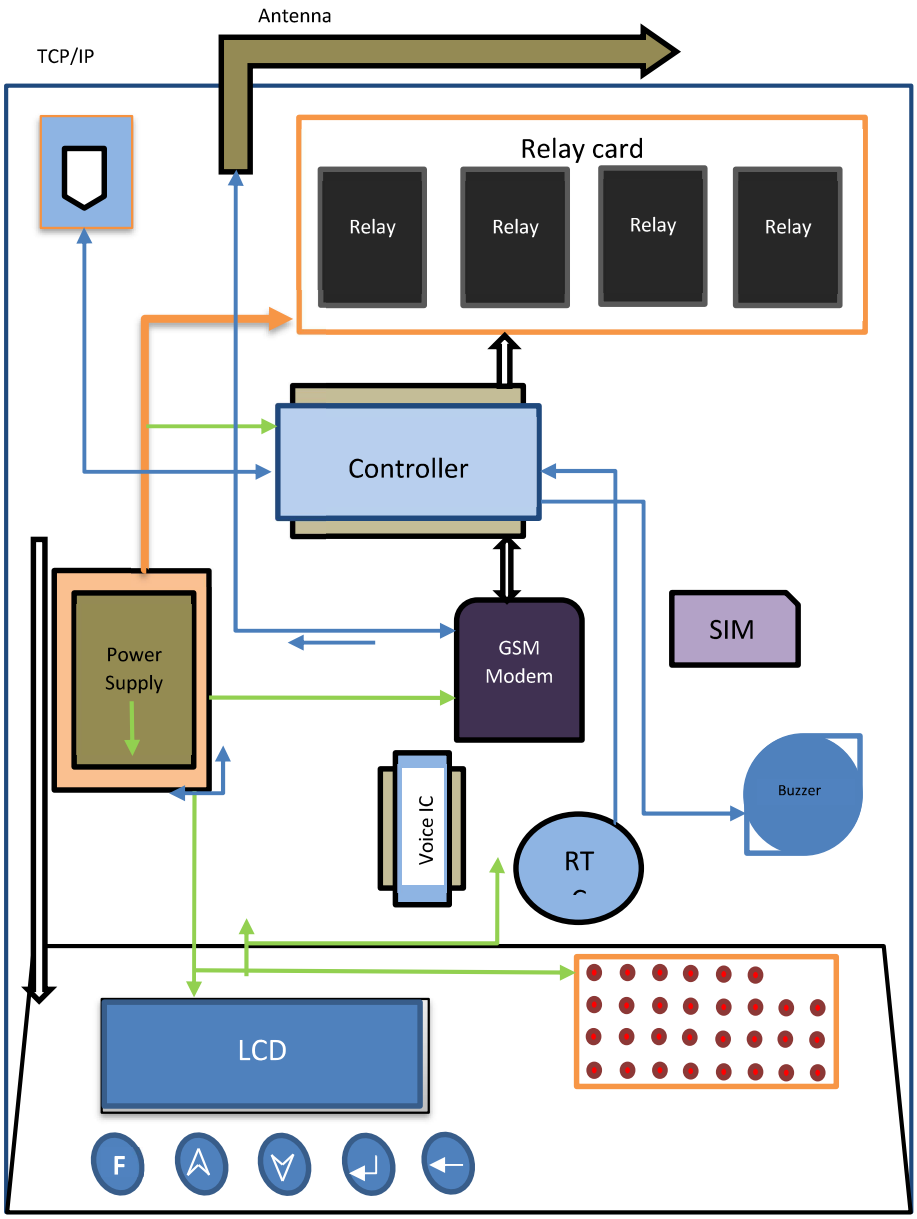


Figure 3 Balloon Diagram

The Balloon diagram shown above describes the typical system architecture of the Relay Controller Device.

5 INSTALLATION

5.1 GENERAL INSTALLATION

For Installation just connect the relay controller device to the mains using the power cord which is having the connector as shown in the figure below. The connection of the device is further explained in electrical installation section.

Connect Relay Controller with LAN cable to connect it with PC for communication using TCP/IP.

Figure 4 Relay and Ethernet Connection

Antenna with male SMA connector is provided along with the device, connect it with the female SMA connector located at the backside of the device

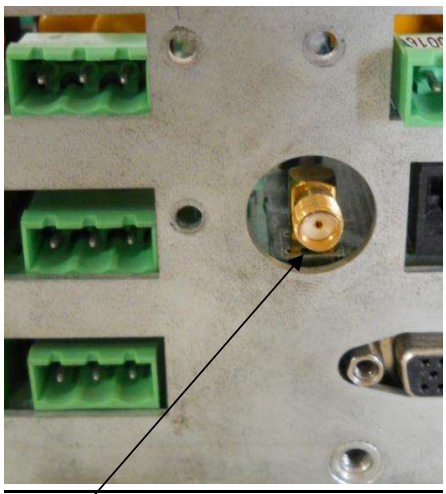
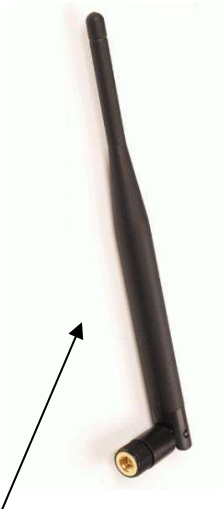


Figure 5Antenna connection

Antenna Connector



Antenna

5.2 ELECTRICAL INSTALLATION

General Information

Warnings

To comply with Underwriter Laboratories (UL) and Canadian Standards Association (CSA) certification, route signal leads and power cables in earthed (grounded), flexible metal conduit.

- Instruments not fitted with the optional internal on/off switch and fuse must have a disconnecting device such as a switch or circuit breaker conforming to local safety standards fitted to the final installation. It must be fitted in close proximity to the instrument within easy reach of the operator and must be marked clearly as the disconnection device for the instrument.
- Remove all power from supply, relay and any powered control circuits and high common mode voltages before accessing or making any connections.
- Use cable appropriate for the load currents. The terminals accept cables up to 14AWG (2.5mm1).
- The instrument and all inputs and outputs conform to Mains Power Input Insulation Category ll.
- All connections to secondary circuits must have basic insulation.
- After installation, there must be no access to live parts e.g. terminals.
- Terminals for external circuits are for use only with equipment with no accessible live parts.
- If the instrument is used in a manner not specified by the Company, the protection provided by the equipment may be impaired.
- All equipment connected to the instrument's terminals must comply with local safety standards (IEC 60950, EN601010-1).

NOTE:
In order to ensure maximum performance from the device, proper wiring installation practices must be followed. Failure to do so can result in a range of problems, from loss of configuration to component failure, caused by transmitted or radiated electrical noise. Proper consideration must be given to local noise sources and appropriate suppression steps taken to minimize any potential problems. Among the most common sources of noise are: Relays, SCRs, valve solenoids, electric motors, power line disturbance, wire-to-wire coupling, electrostatic discharge (ESD) and radio-frequency interference (RFI).

To achieve the best results, the following notes should be considered:

1. Signal input wiring should be twisted pairs/triplets etc. The conductors should be stranded rather than solid in construction. All signal wiring should use ground-shielded wires, or be routed through grounded conduit to minimize the effects of RFI and ESD.

2. Special care should be taken when wiring to relays, as large transients are produced when coils are switched. This problem can be eliminated by the use of suitable suppression devices across the relay. Relay transients can also be transmitted through the air, so the device itself should be mounted as far as possible from power control devices and/or wiring.

3. When line power is poorly regulated and / or subject to voltage surges or transients, consideration should be given to the use of a line conditioning/transient suppressing line power regulator. Process control motors, valves, relays and heaters should not be connected to the same power lines that are used for instrumentation.

4. All local electrical codes of practice must be followed when installing any instrumentation.

5.3 MAINS SUPPLY CONNECTION

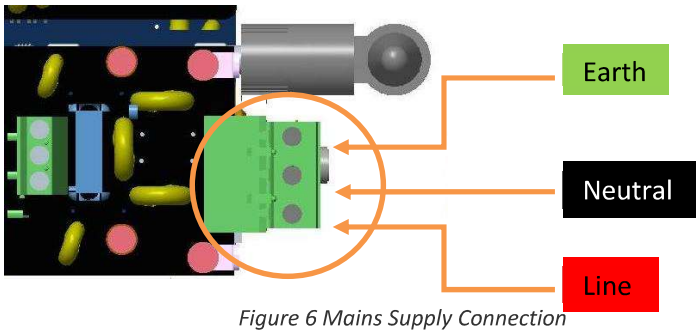


Figure 6 Mains Supply Connection

Note: The color of the text box resembles the color of the wire.

In the ERC-800 series Ethernet based remote Relay, power supply connector is on the supply add-on card, instead of direct on control board as shown in figure. Full protection is given to device using this add-on card.

The 3-wire is mounted on the supply add-on for power supply connection. The power cable should be inserted in the device as shown in figure 3. Proper earthing should be provided to the device and also a standard Power cable should be used. Make sure the Line, Neutral and Earth should be connected to their respective positions as shown in figure 6.

5.4 RELAY CONNECTION

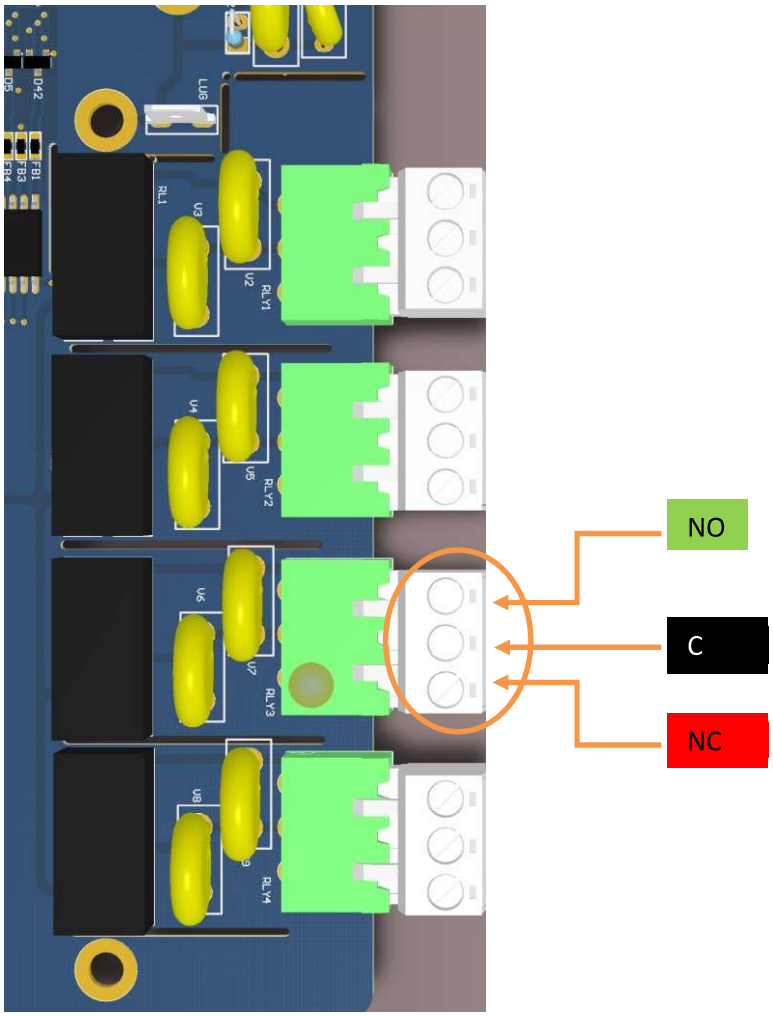


Figure 7 Relay Connection

The main function of this device is remote switching and controlling, which is possible with relay. Here 1 FORM-C type 12V DPDT (Double Pole Double Through) has been used, which will be operated from GtekNet software. Every device which connects through relay have to be properly wired, otherwise chances of damage of device as well as controller would be high. Generally, relay has three pins, No-C-NC. Connect controlling device with relay as shown in figure 7.

Note: The color of the text box resembles the color of the wire.

The color code for wires for respective pin on the connector is shown as the color of the text box.

It is highly recommended to follow color code for wiring for safe operation with device,

6 OPERATION

TCP/IP Relay controller is a device that lets the user control various networked parameter controlling devices from the control room itself, it enables the user to take action in terms of turning off or limiting the devices before any hazard occurs in critical situations. Whenever any of the channel/channels of the connected device (or multiple devices) goes out of preset input range, the relay/relays connected to it will be activated. User can send the information about alarm condition being generated from any device to this unit along with the message on the display. The messages and relays on/off are fully configurable from GtekNet software.

User can also choose the add-on GSM module. In case of predefined event (user configurable) this module will send voice or message to the user settable mobile numbers. Logs of successful sending or failure can also be downloaded for future reference. In case of back to back alarm generation, alerts will be processed priority wise. Priority is user settable (mostly device wise). GSM module is an optional feature.

The main operative functions of the device are explained below.

6.1 OPERATIVE FUNCTION

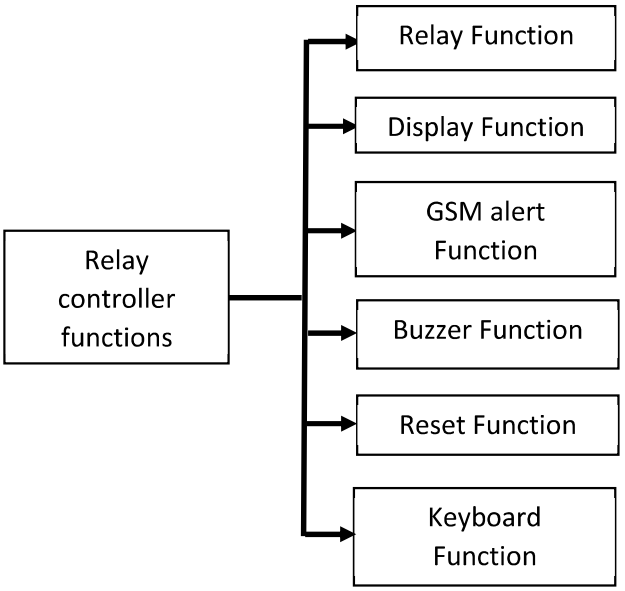


Figure 8 Functions

6.1.1 Relay functionality

Device has provision of maximum of 12 relays and all relays have the same specifications and same wiring configuration as shown in fig. 7. Specification of the relays are mentioned in the specification sheet

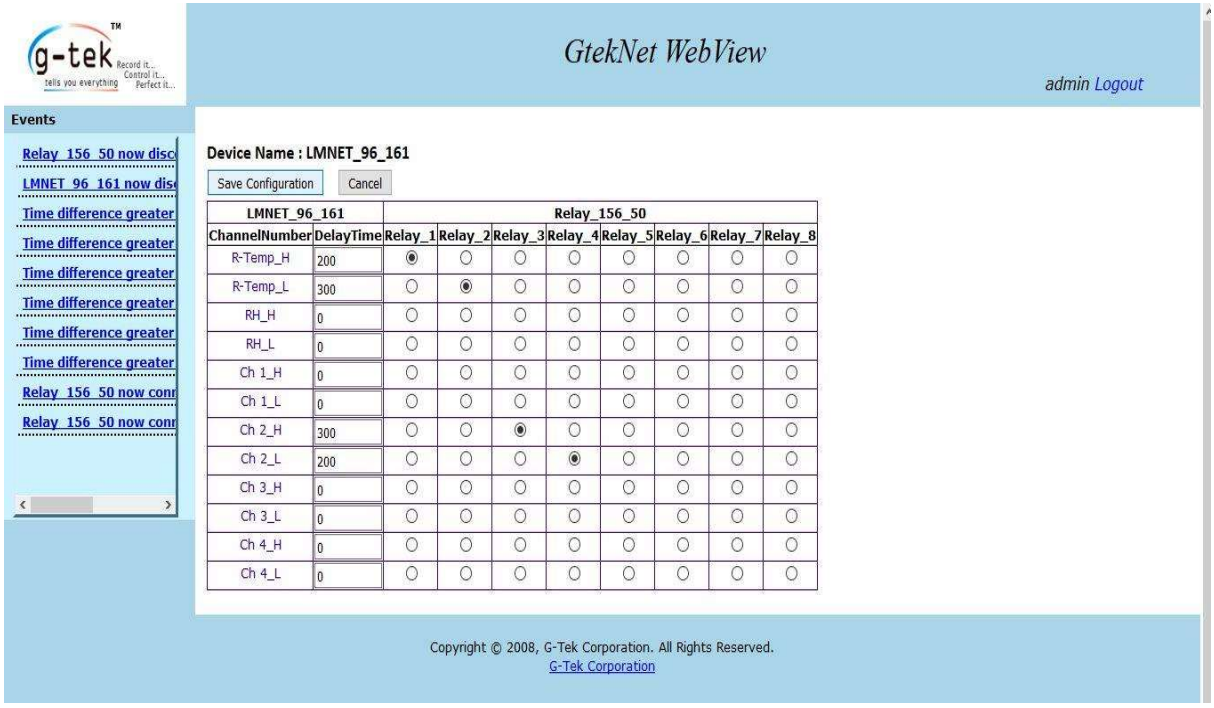


Figure 9 Relay Configuration through application

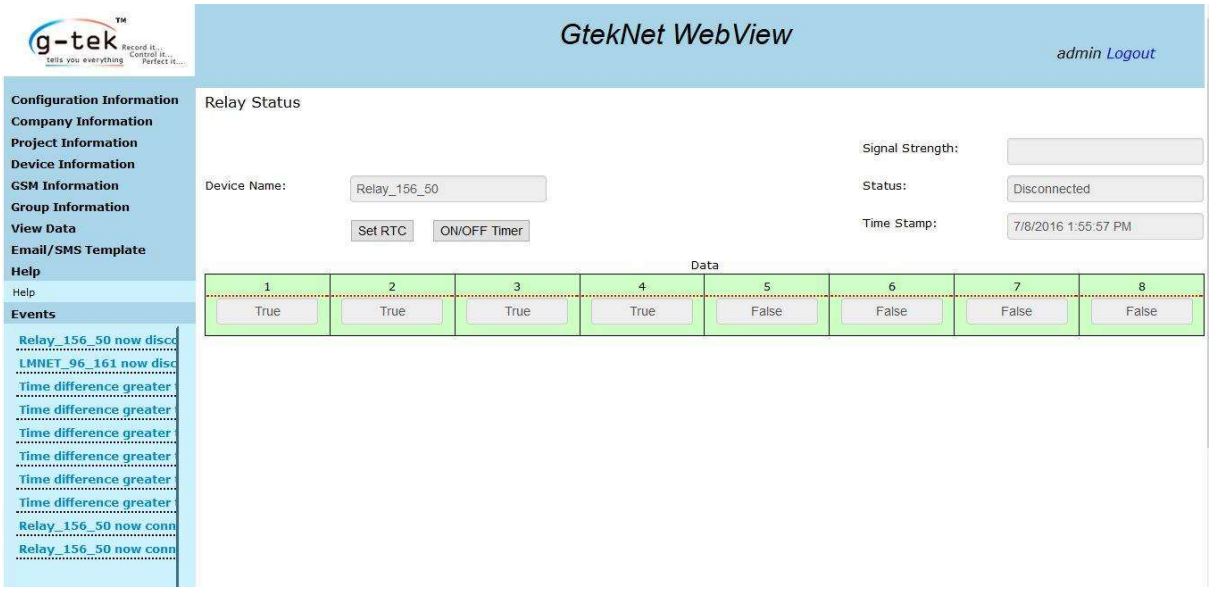


Figure 10 current relay status

Through GtekNet software configuration, any of the relay can be associated with any of the channel of any networked device as shown in the figure above. Now if, for example channel 2 of device LMNET_96_161 goes higher than its predefined temperature range, relay no. 3 will get activated as it is associated with channel 2 of device LMNET_96_161 by GtekNet configuration and accordingly the further limiting action can be done. One relay can be configured to multiple devices as well.

Status LEDs for each relays are provided in the front side of the device which gives indication about activation or deactivation state of the individual relay. The array of Status LEDs is shown in the figure below

Figure 11 Status LEDs

6.1.2 Display Functionality

Now besides activating the relay associated with the device's channel that is out of the preset range, massage will be appeared on the display mentioning about alarm condition generated in the specific channel of the specific device. The display massage format is user settable through application. The configuration of display message alongside the relay configuration.

Device Name : SCR_164

Save Configuration | Cancel

Display String : SCR 164 Relay On

SCR_164		Relay_40							
ChannelNumber	DelayTime	Relay_1	Relay_2	Relay_3	Relay_4	Relay_5	Relay_6	Relay_7	Relay_8
CH_1_H	10	◉	○	○	○	○	○	○	○
CH_1_L	20	○	◉	○	○	○	○	○	○
CH_2_H	15	○	○	◉	○	○	○	○	○
CH_2_L	0	○	○	○	○	○	○	○	○
CH_3_H	0	○	○	○	○	○	○	○	○
CH_3_L	0	○	○	○	○	○	○	○	○
CH_4_H	0	○	○	○	○	○	○	○	○
CH_4_L	0	○	○	○	○	○	○	○	○
CH_5_H	0	○	○	○	○	○	○	○	○
CH_5_L	0	○	○	○	○	○	○	○	○
CH_6_H	0	○	○	○	○	○	○	○	○
CH_6_L	0	○	○	○	○	○	○	○	○
CH_7_H	0	○	○	○	○	○	○	○	○
CH_7_L	0	○	○	○	○	○	○	○	○
CH_8_H	0	○	○	○	○	○	○	○	○
CH_8_L	0	○	○	○	○	○	○	○	○
CH_9_H	0	○	○	○	○	○	○	○	○
CH_9_L	0	○	○	○	○	○	○	○	○
CH_10_H	0	○	○	○	○	○	○	○	○
CH_10_L	0	○	○	○	○	○	○	○	○

Figure 12 Display String in Application

Message string that is sent by the application upon alert appears on the device display as shown in the figure below

Figure 13 Message On Device Display

The First line of the display is preserved and it will show current time and date.

6.1.3 GSM Functionality

User can also choose the add-on GSM module. In case of alarm generating condition, this module will send voice or message to the user settable mobile numbers. The format of message string and voice message (when call is received) are user settable, and basically they state which device went out of range. Logs of successful sending or failure can also be downloaded for future reference. In case of back to back alarm generation, alerts will be processed priority wise. Priority is user settable (mostly device wise). GSM module is an optional feature. To know how to include GSM module in your device, see the order code in the table 7.

GSM Configuration of GtekNet is as shown in the figure below

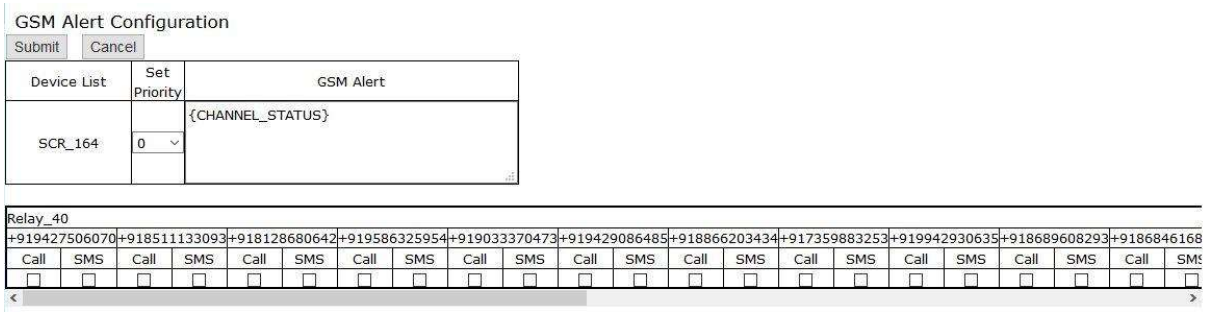


Figure 14 GSM configuration through application

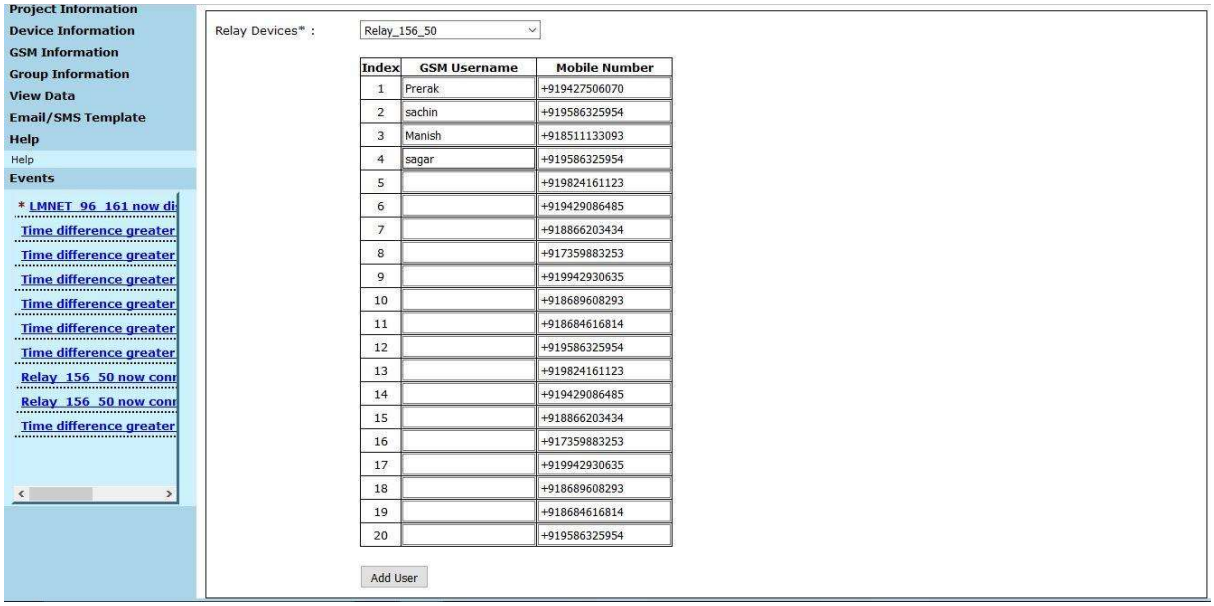


Figure 15 Contact numbers setting through application

Contacts numbers are user settable and maximum of 20 contacts are allocated to a user. Number of contacts are as per the order code. Logs can be downloaded for message and calls separately which states the success/failure report of alert for each contacts. It also states the status of the GSM module at the current instant, weather it is busy, free or terminated i.e. weather alerts are being generated, alerts have been generated or alert is terminated due to arrival of high priority alert respectively.

6.1.4 Buzzer Functionality

A buzzer is integrated in the device that activates instantly or after the user settable delay when any of the networked device goes out of range so as to gain the attention of the nearby person so that the further limiting action can be taken place. User can also set buzzer of time for which the buzzer will stop buzzing and after the pre-set time, if still the alarm condition exists, buzzer will be activated again.

Following Figure shows the Current status GUI of GtekNet which resides Buzzer on/off time (as shown by the circle) within it. User can set the buzzer on and off time (on/off time are in minutes)

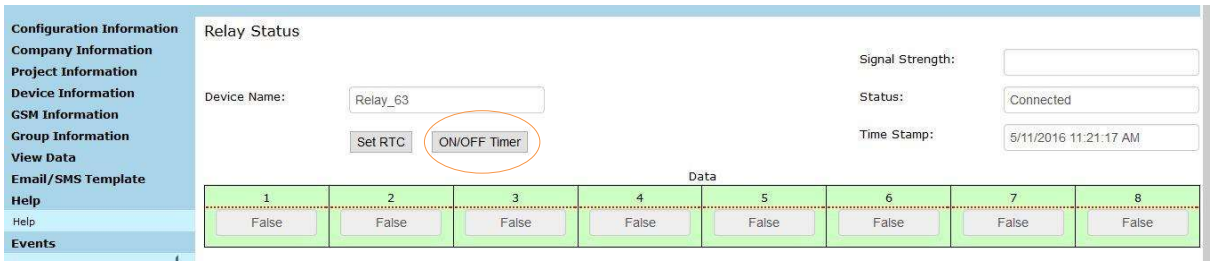


Figure 16 Buzzer On/Off time setting through application

6.1.5 Device Reset

If within the User settable time, no event is generated application will interpret it as network fault or network failure and it will send command to the device which will turn all the relays off and alert about reset will be generated and all the regarding contact persons (Set by the user through application) will get notified about reset in terms of GSM alert so that the further action can be taken. This feature is called auto reset function. Reset time is in minutes.

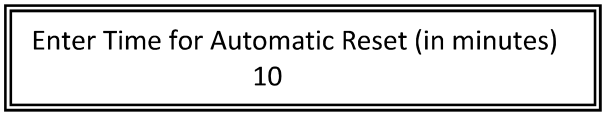


Figure 17 Reset time Setting Through Application

At any point of time, if user doesn't want to use this feature, he can make the reset time as zero and this feature will be nullified.

Another reset feature given is manual reset and that can be implemented by pressing a predefined sequence of key, this sequence is stated in detail in the next point.

6.1.6 Keyboard

.

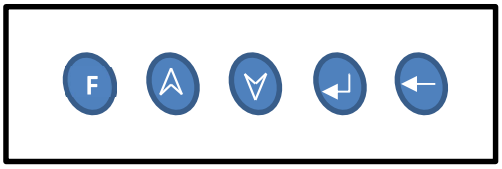


Figure 18 Keyboard

TCP/IP Relay controller has multifunctional Keyboard which has five keys as described in figure 18. The functionality of the keys is described below

Table 2 Key Sequence

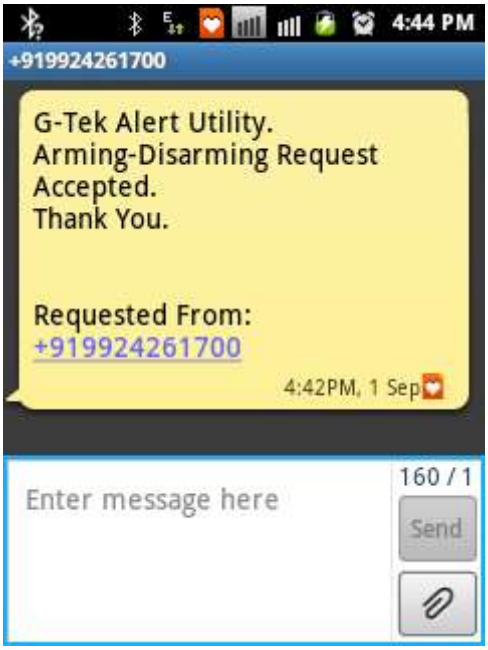
F	Press this key to OFF buzzer manually.
	Press continuously combination of these two keys to reset manually.

By pressing function key, buzzer can be turned off for the predefined time, after that time buzzer will turn on again.

6.1.7 Arming/Disarming Function

GSM add-on support arming, disarming, and partial disarming using special command sent by admin (First three contact number saved). That command is sent in text message whose command format is shown in table 3 that message GSM accepts if the command is sent by the admin only.

Figure 19 Arming - Disarming Request Message



If system is under disarming mode it stops accepting any upcoming alert until it gets arm command. If GSM accepts arming command it start accepting upcoming alerts and also starts servicing if pending any alert(s).

Partial disarming is one of the best remotely automated disarming feature. Admin send partial disarm command with defined time duration in minutes, system get disarm according to time request from admin then automatic it will arm. If any pending alerts remains before acceptation of partial disarm command it automatic starts services pending work once it come back in armed mode.

The important thing is it accept arming-disarming and partial disarming request only if request sent from selected three admin number and after acceptation of request it give response back through message string with specifying requested number.

Table 3 Definitions and Description of Commands used in GSM Module

Sr. No	Command for…	Code Start Character	Code Number	Command index start Char	Index No	Code End Character
1	**Arming**	#	**123**	*	**01*00**	#
2	**Disarming**	#	**123**	*	**02*00**	#
3	**Partial Disarming**	#	**123**	*	**03*MM**	#

Set Minutes for Partial Disarm

This feature is of much importance while servicing or troubleshooting so that no alerts are generated at that time and no confusion occurs, if disarmed. After arming device will start working normally again in terms of generating alerts.

6.2 NETWORK CONFIGURATION

To connect the device to the GtekNet Application the following procedure is to be followed:

1. Connect device and PC using Ethernet cable.

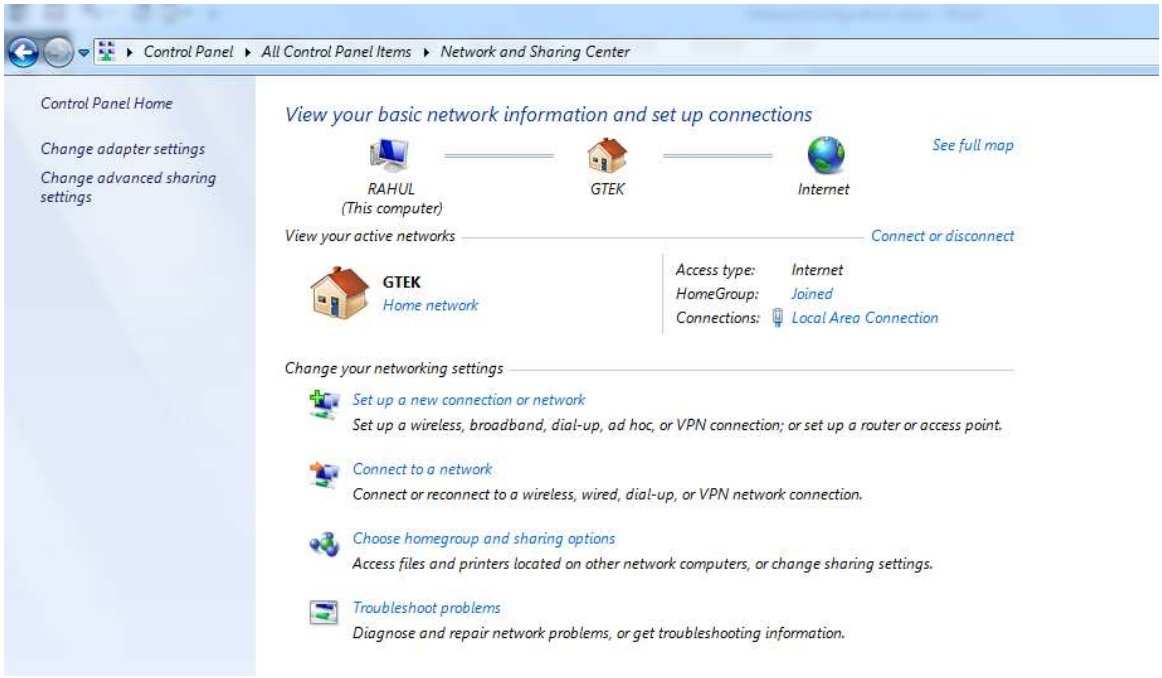
- Device's default network information is as below:

Table 4 Default network Configuration

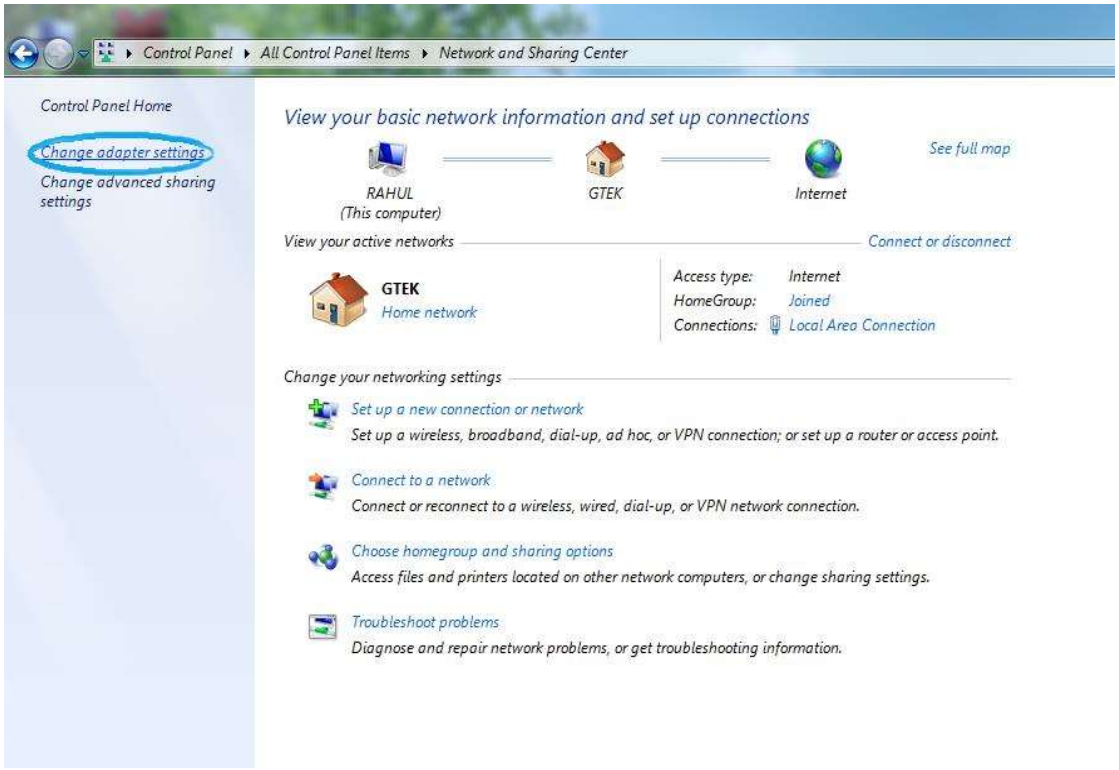
1	IP address	192.168.0.30
2	Default Gateway	192.168.0.90
3	Subnet Mask	255.255.255.0
4	Port no	502
5	Device Address	32

2. To add this device to the application first the user will need to change the IP setting of the connected PC and make it as per the above given table, to do such follow the below given step

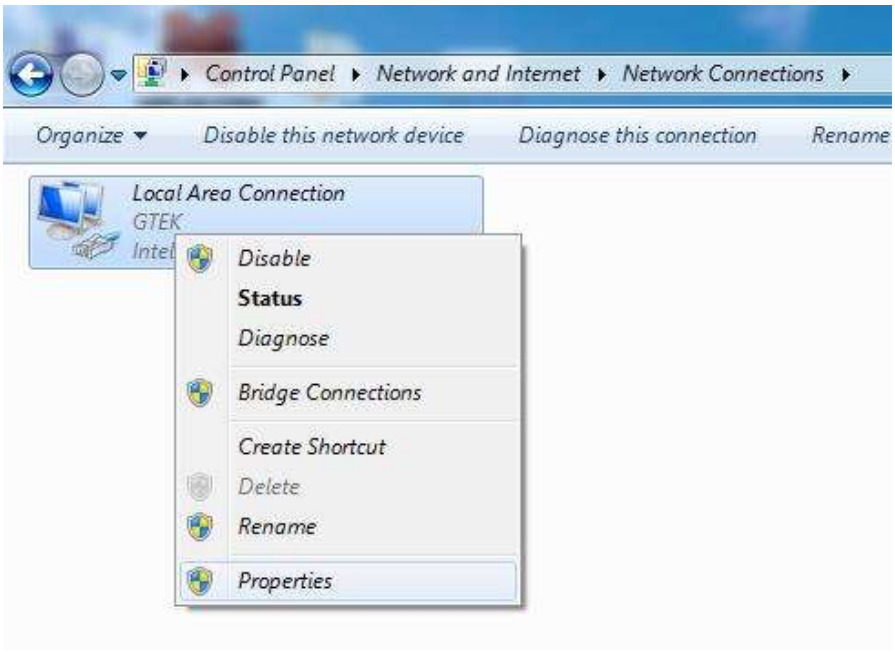
Open control panel and click on Network and Sharing Center.



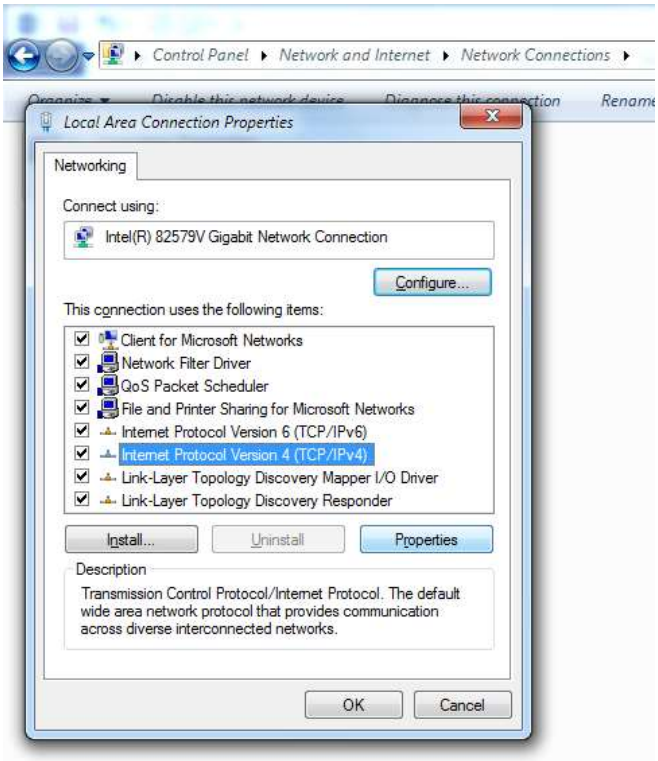
3. Click on change adaptor settings.



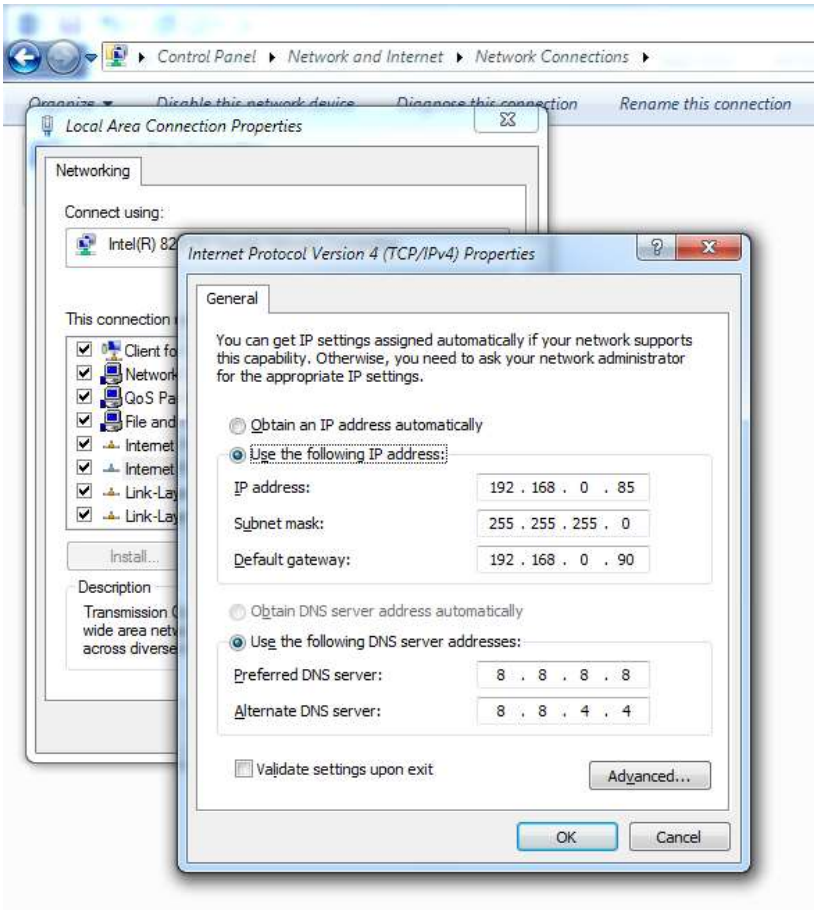
4. Right click on Local Area Connection and go in to property.



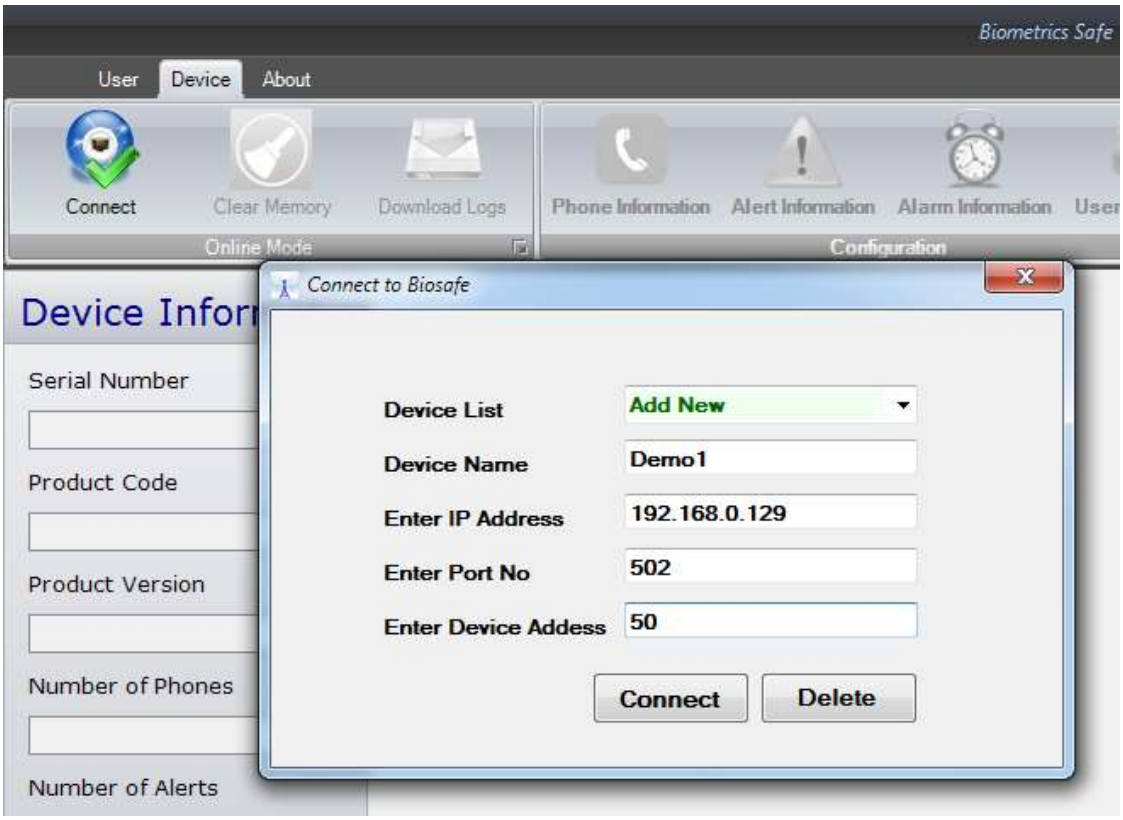
5. Open Property of Internet Protocol Version 4(TCP/IPv4).



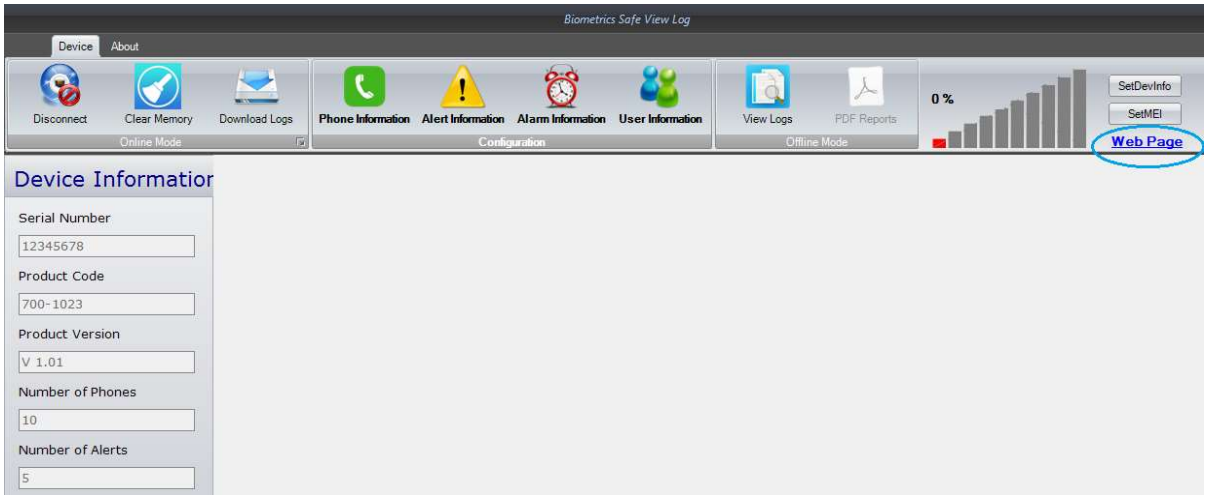
6. Make internet configuration as per below given in image.



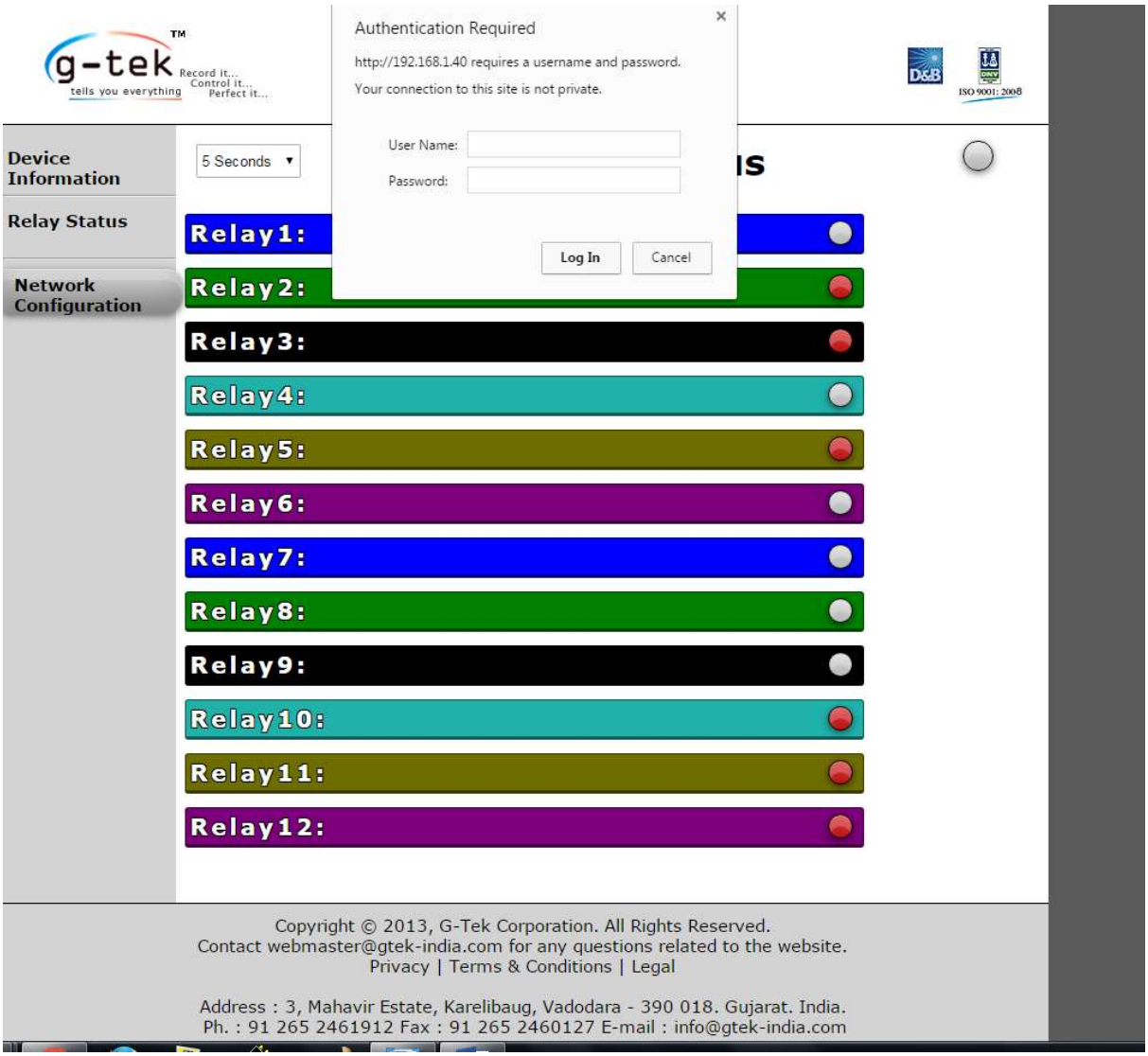
7. Open GtekNet application then click on the connect button and make network configuration as per below given image.



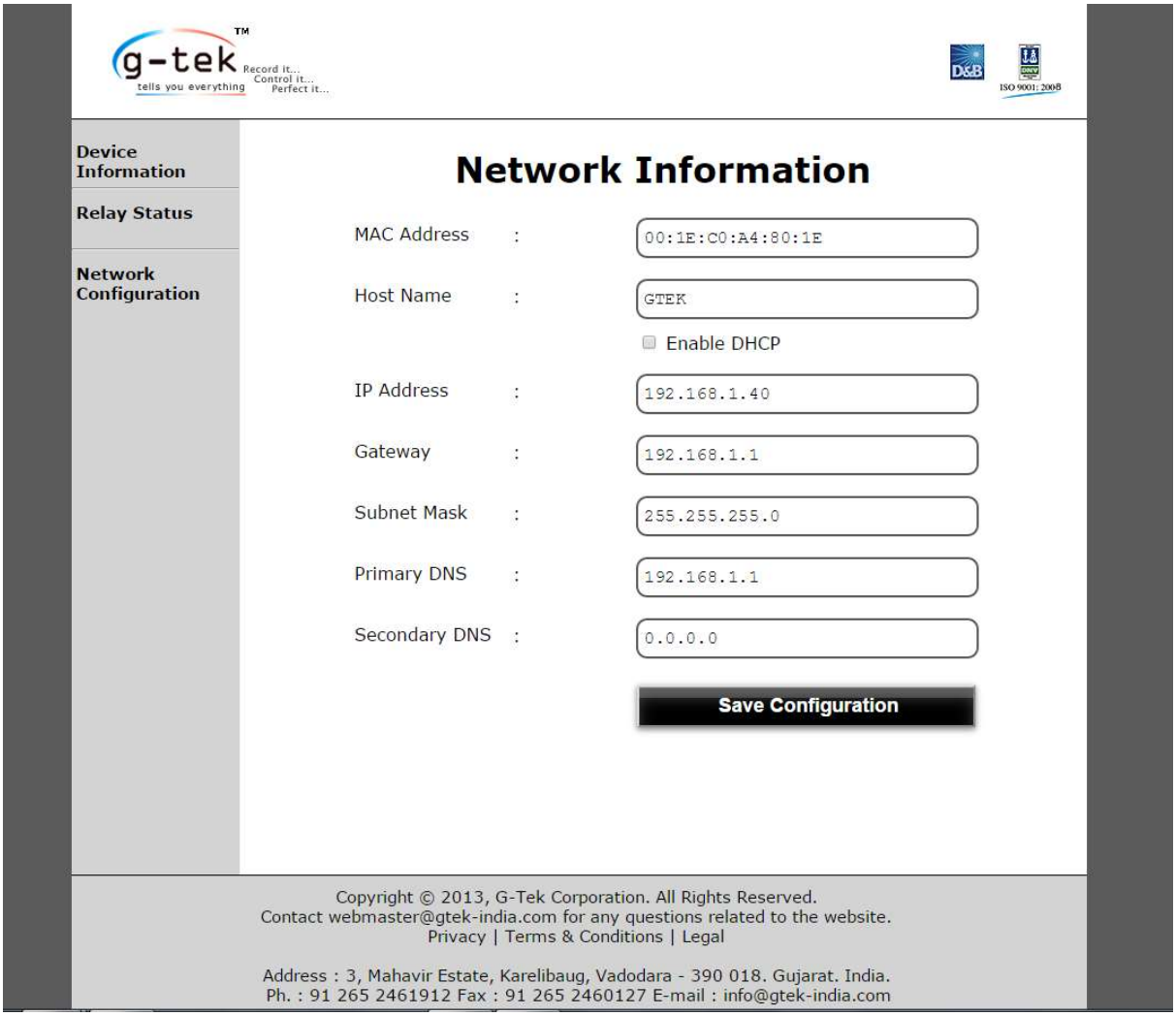
8. Now, device and application connection is made. You can configure the device.
9. If you want to run the device in your LAN connection than follow the below steps.
10. Click webpage button.



11. Click on network configuration and login with default user name: admin and password: admin.



12. Unmark DHCP button and make Network information as per your LAN configuration.



13. Reconnect application using changed IP address.

7 TROUBLESHOOTING GUIDE

Table 5 Troubleshooting Guide

Sr. No.	Observation	Possible Reason	Corrective action
1.	heartbeat LED and Display Do not change even after installing device properly and turning on	1. No mains AC supply on board. 2. SMPS may have damaged.	1. Check mains supply connection and the insert the connector properly. 2. Contact factory
2	Display is not on upon power up, the heart bit LED blinks though.	Heartbeat LED is blinking which means device is getting the supply it needs to turn on, improper connection of LCD module may be the case or Some internal component may be the cause of concern.	Contact factory
3	Relays do not change state even after giving command from the applications	1. Wrong command for particular relay. 2. Relay may have damaged.	1) Check and give appropriate command from the application. 2) If the problem persists contact factory.
4	String on display do not change even after giving command from application	Wrong command for display string.	Check and give appropriate command from the application.
5	Key press does not produce the desired result	1. Wrong set of keys are pressed. 2. One or more keys may have damaged	1. For different operations to be performed using Key press, refer section 6.1.6 of the device manual. 2. Contact Factory
6	display is not showing the proper date and time	1. Set RTC through PC application 2. If still RTC is not proper, RTC cell may get damaged or may be exhausted.	Replace the cell with new CR2032 cell.
7	Application does not get connected to the device	1) Wrong network configuration setting done 2) Faulty Ethernet cable	1) Configure the network setting as shown in section 6.2 of the device manual. 2) Change Ethernet cable 3) If the problem persists, contact factory
8	Date and Time are not maintained properly	Faulty RTC cell	Replace the cell with new CR2032 cell
9	GSM messages and/or calls are not generated	1) SIM card not inserted properly 2) Weak signal strength 3) Not sufficient balance in SIM card	1) Re-insert the SIM card 2)Connect the antenna properly

		4) SMS plan not activated	3) A SIM card with a Postpaid connection is recommended 4) If the problem persists contact factory
10	Relay is working properly but the Relay Status LED is not turning on/off according to the status of relay	LED may have damaged internally	Contact factory
11	buzzer is not working properly	Verify the preset buzzer on and off time from application still if the buzzer does not work properly, the internal connection may have got loose.	Contact factory.

8 SPECIFICATIONS

The specification table is as shown below

Table 6 Specification of TCP/IP Relay Controller

Model No	**ERC-800 series Ethernet based remote Relay and Display**
Product Code*	**8xx-x0**
Relay	
Contact form	Potential free Contract, 1 FORM C
Relay rating	230V AC, 1A, Resistive load
No. of relay availability	Maximum 12
Relay Status	Yes, LED for each individual Relay
Display and Operator Panels	
Display Type	LCD display with TN reflective Blue over white, 20X4 (20 characters by 4 line)
Display strings	User settable up to 20 character wide 4 strings
Type of strings	Normal
General	
Inputs	1. Relay and buzzer ON/OFF command 2. Data(string) to display on LCD 3. Command for GSM alert from gtekNet™ 4. Auto reset time
Outputs	1. Relay ON/OFF 2. Data(string) on LCD 3. GSM Alerts for different conditions* 4. Buzzer
Reset	1. After fixed time of reset 2. From keyboard with fixed key sequence
RTC	Yes (Format: - DD/MM/YY HR/MN/SC)
PC application	Yes, to give all commands (Inputs) to system, download logs, to set GSM alert related information.
Web page	Yes, to provide general Device Information and to change Network Configuration.
Power Requirement	
Supply Voltage (Mains Operated)	85-264VAC 47-63Hz
Battery backup	No
DC Adapter Operated	No
Buzzer	
Type	Single tone on alarm.
Buzzer tone ON/OFF time	Yes, User settable through application

Keyboard	
No. of Keys	Five
Function of Keys	1. To turn off the buzzer temporarily. 2. Test GSM Module
Alert over GSM	
Text Message	Yes, 135 characters long alerts, stored in memory.
Voice alert	Yes
No. of different voice message	One.
Voice recording	Yes, Recordable through RJ11 Connector.
Maximum no. of contacts	Up to 20* contacts Contact Nos are field programmable through gtekNet™ application.
Events for alert	Field programmable through gtekNet™ application.
Network status	Network signal status on web page and gtekNet™ application.
Communication	
Type	MODBUS over TCP/IP
Overall Dimension	
Dimension L x W x H (mm)	210 x 190 x 95 mm
Environmental	
Temperature	*(Operation)*5˚C to 45˚C
	(Limiting) 0˚C *to 50*˚C
	(Storage)-20˚C *to 60*˚C
Humidity	*(Operation)* 10 to 80 % RH Non Condensing
	(Storage) 5 to 90 % RH Non Condensing
Altitude	<2000 meter
Safety	
Pollution Degree	II
Installation Category	IV
Shock	NA
IP Rating	NA

***** = Actual Specification may vary according to the order code

9 ORDER CODE

Order code for the device is as shown:

Table 7 Order Code

Series(S)		Relay(R)		GSM(G)		-	Mobile Contacts(MC)		Memory(M)	
8	ERC 800 – Relay Controller	0	4	0	None	-	0	5	0	None
		1	8	1	Message		1	10		
		2	12	2	Call & Message		2	15		
							3	20		