Teknoray®

Railway Signalling System

Revised in march 2009

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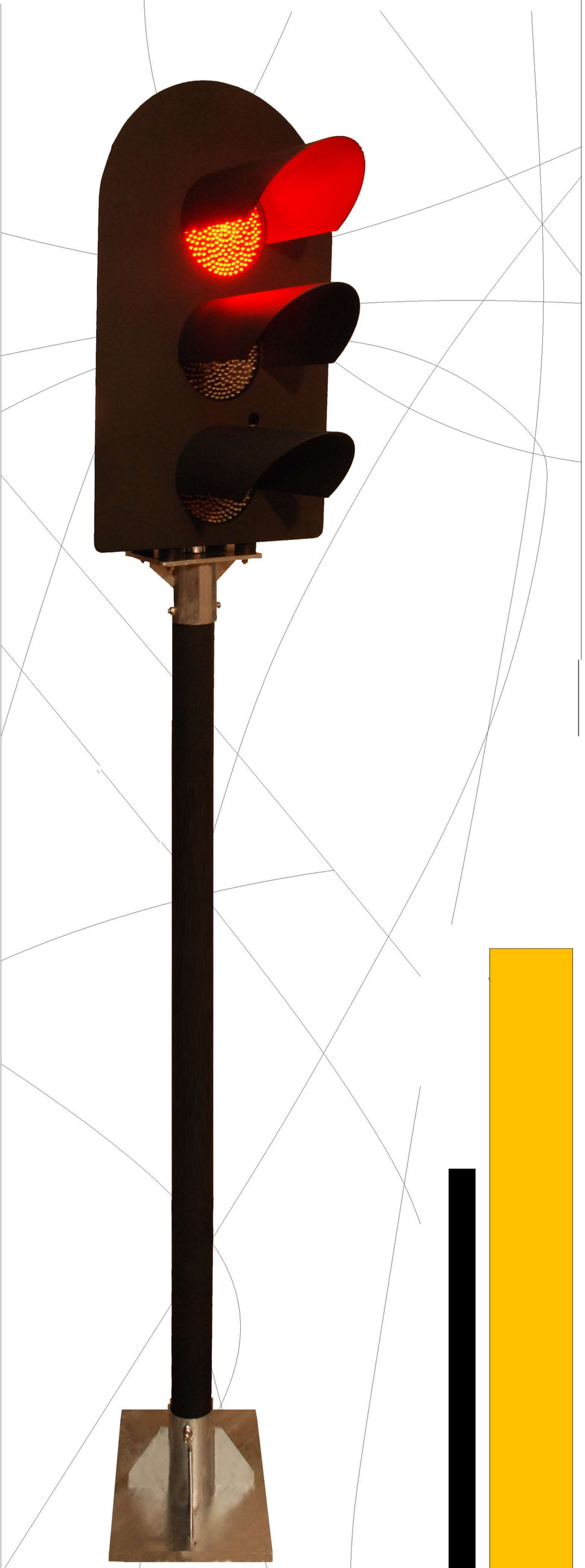
Railway Signalling System

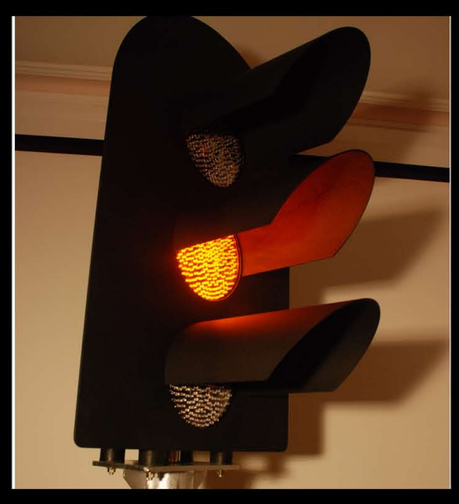


Main signal lamp, consisting of one piece of signal body and a junction apparatus which is coupling the signal body and signal post and a flange which provides can be installed of the same on the ground.

The purpose of designing of the signal lamps furnished with LED is to provide long life of normal low power consumption and higher degree of visibility for the same.

The signals with LED have been designed with the LED which furnishes the light with the angle of 25 degree.

The signal systems with LED have been formed as yellow, red, yellow or green, red, yellow colours.



Each of LED units consists of 245 LED and mounted on a copper pertinaks.

It has been working between 40 - 180 V/AC , 12 V/AC, 12V/DC or as requested

The life time of the LED lamps are minimum 70 000 hours (approximately 8 years).

Main signal body has been manufactured with 5 mm aluminium plate ISO (AlMg 0.5 si).

Dull black textured paint, AS3754 has been applied on the signal lamp.

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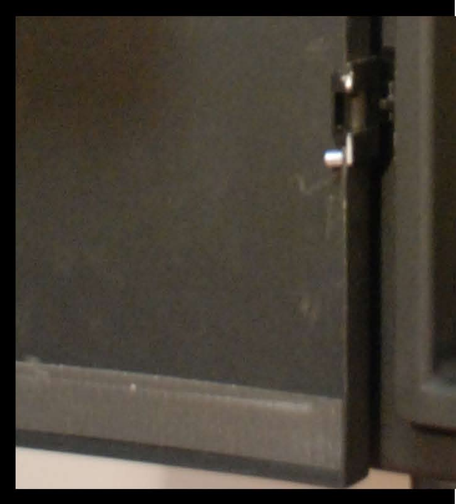
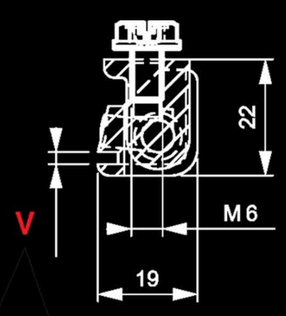
SIGNAL PANEL

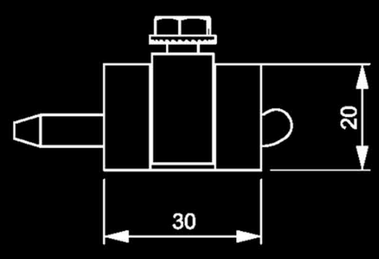
Cutting and bending process in the IP 65 standards has been applied on 03 mm aluminium plates in the ISO Standard (AlMg 0,5si) with the computer controlled (CNC) punch machines.

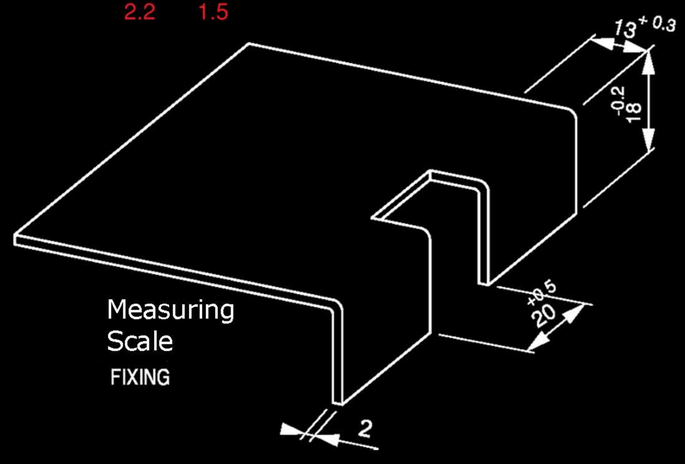
Cutting and bending process of signal panel cover plate has been performed in the computer controlled (CNC) punch machines in IP65 standards by means of using 2 mm Aluminium plates in the ISO (AlMg 0,5 si) standards.

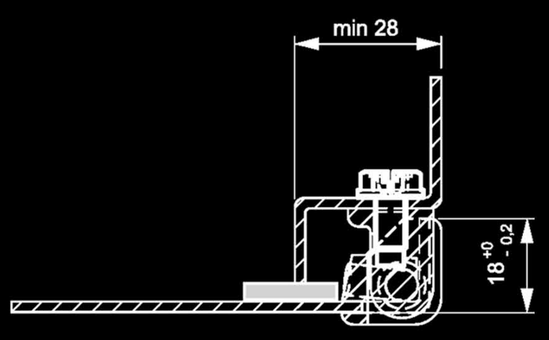
There are two hinges, on the signal panel in the standards mentioned here in below.











MATERIAL

TURNING AND FIXED PART: ZAMAK DIN-EN 1774-ZnAl4Cu1

PIM: Steel st 37 and polyacetal (POM)

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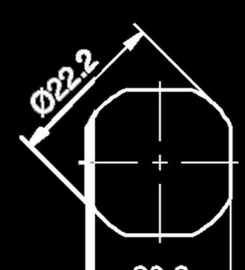
Quarter turning locks has been used for safety of the signal panel.

The properties of such two locks taking place on the signal panel cover have been indicated here in below.



Mounting measure
FIXING

MATERIAL

HUB: Zamak (Zinc Aluminium Copper Alloy) 1774-ZnAl4Cu1

COVER: Polyurethane

SURFACE: Chrome

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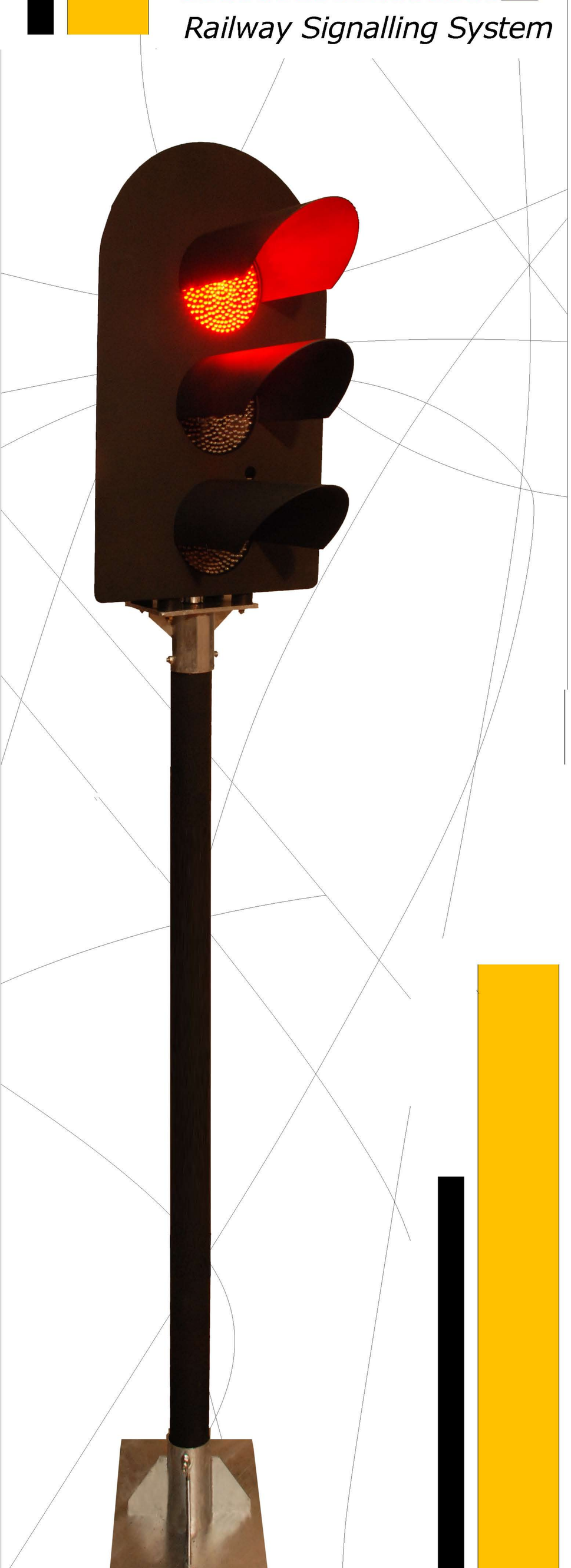


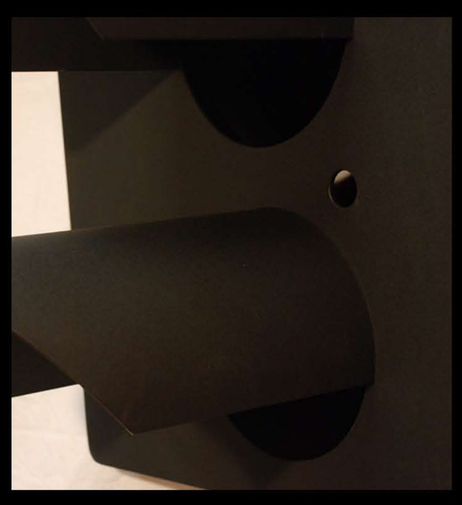
SUNSHIELD CAPS

3mm Aluminium in the ISO standards (ISO AlMg 0,5 si) has been bended on the cylinder in a manner to form a diameter of 21.7 cm and the canopies and the back boxes have been placed on the aluminium body of 5 mm. by means of electrical TIG welding.

PLEXYGLASS

It has been produced by means of moulding it, in a manner to form a convey in the diameter of 33.37 cm and in the depth of 4.7 cm respectively.

Its peculiarities are as follows:



Transmission of light: 92%

Index of refraction: 1,49

Striking endurance: 18 KJ / m2

Deformation temperature: 75°C

Dielectric Voltage: 40 V

Dielectric constant: 3.4

Solvent endurance: good

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LED UNIT

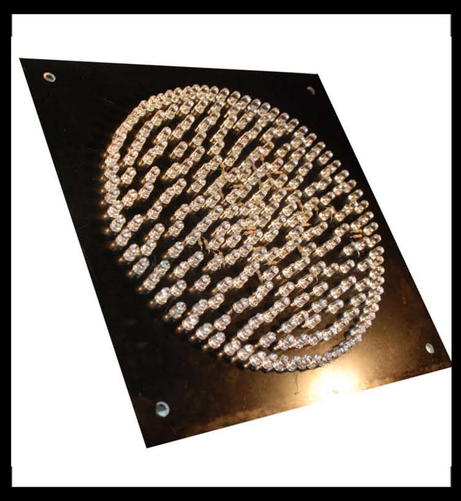
The LEDS used in the LED unit have been lined up on the cupper-clad printed circuit board of 2 mm symmetrically within the diameter of 205 mm.

The LEDS have been lined by means of automatic machines and then they had been soldered by the method of soldering pool. There are 248 LED on a signal card.

The LED has been designed as 35 zones for 24 Volt. (thus,35 separate lamps have been obtained and no radiation will be occurred in the signal when 35 failures are occurred one after another.).

PROPERTIES OF THE LED

It has been producing the light in the diameter of 5 mm, in the height of 8.7 mm and in intensity of light of 10.000 mcd, with the angle of 25°. 40-180 VAC working interval has been provided by means of SMPS, taken place on the LED unit and no visible change had occurred on the intensity of light respectively.



	RED	YELLOW	GREEN
180 V	11300 Lux	8000 Lux	19300 Lux
140 V	11300 Lux	8000 Lux	19300 Lux
110 V	11300 Lux	8000 Lux	19300 Lux
80 V	11300 Lux	8000 Lux	19300 Lux
40 V	8300 Lux	5500 Lux	12600 Lux
20 V	2730 Lux	1550 Lux	3400 Lux
12 V	700 Lux	300 Lux	1900 Lux

The measuring shown here in above has been performed by luxmeter from the distance of 10 cm

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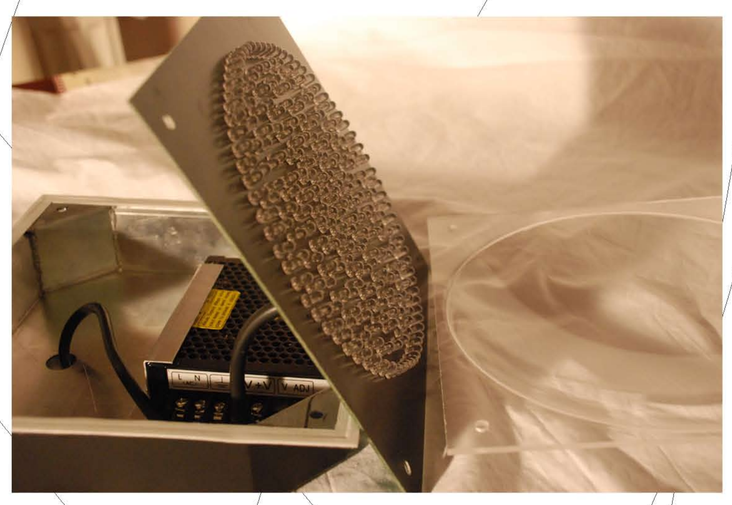
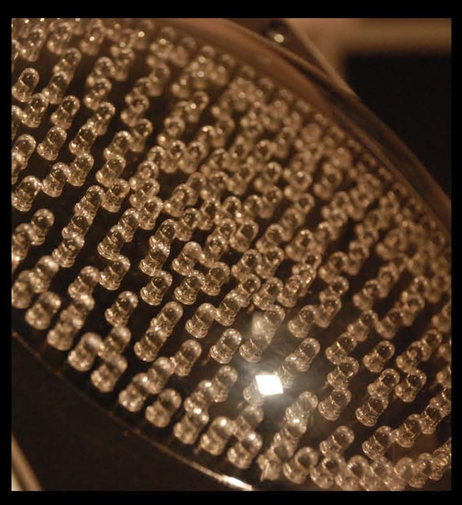
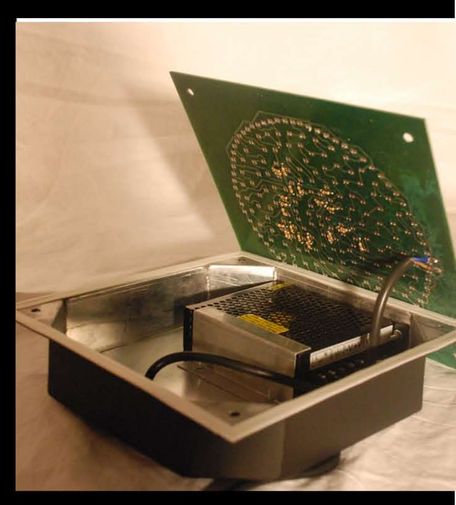
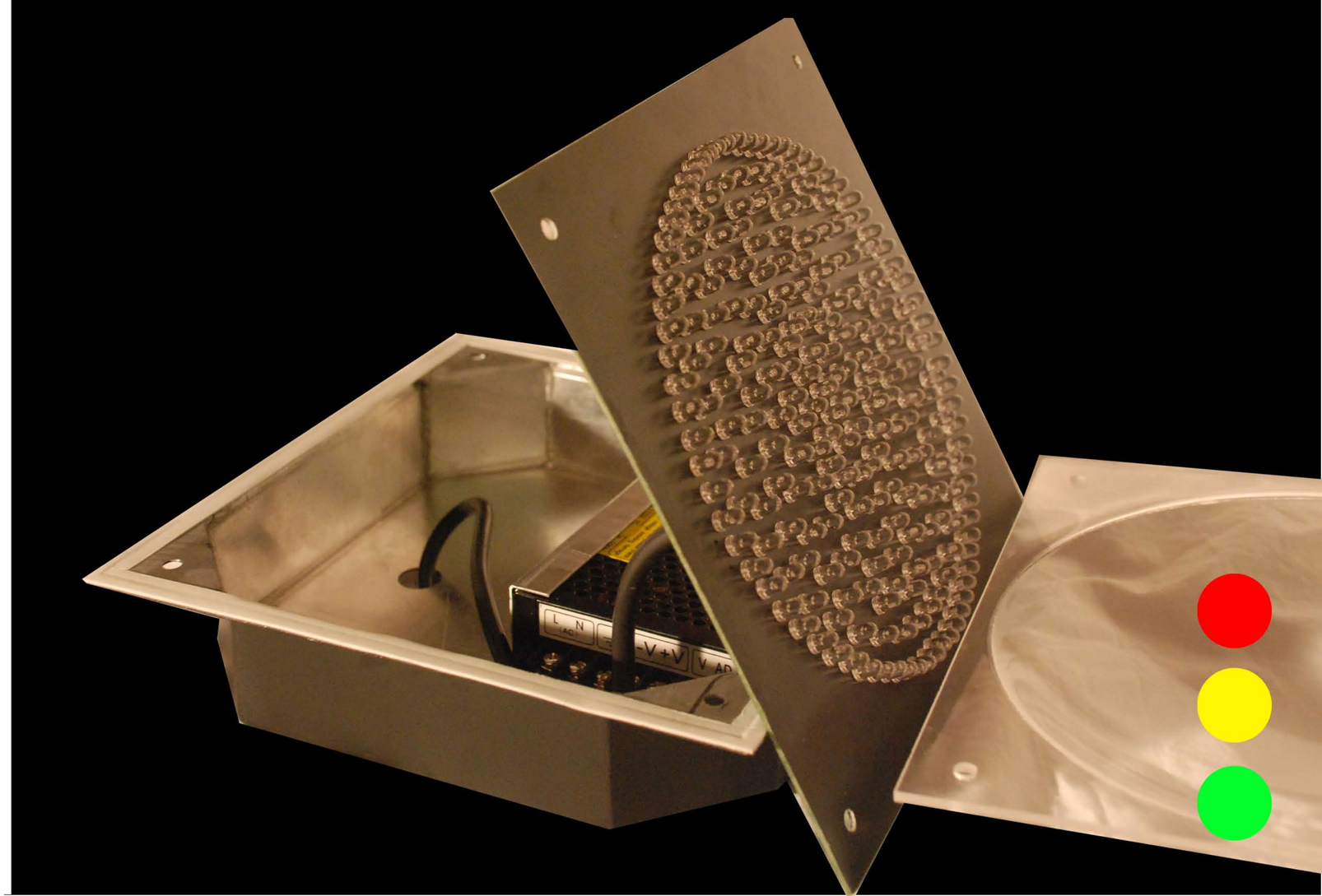
THE PECULIARITIES OF POWER AND CURRENT INTENSITY OF THE LED UNIT

	VOLTAGE	CURRENT	POWER CONSUMPTION
TLU 801	110 V	0.490 A	11.76 W
TLU 802	110 V	0.478 A	11.50 W
TLU 803	110 V	0.512 A	12.28 W









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Railway Signalisation System

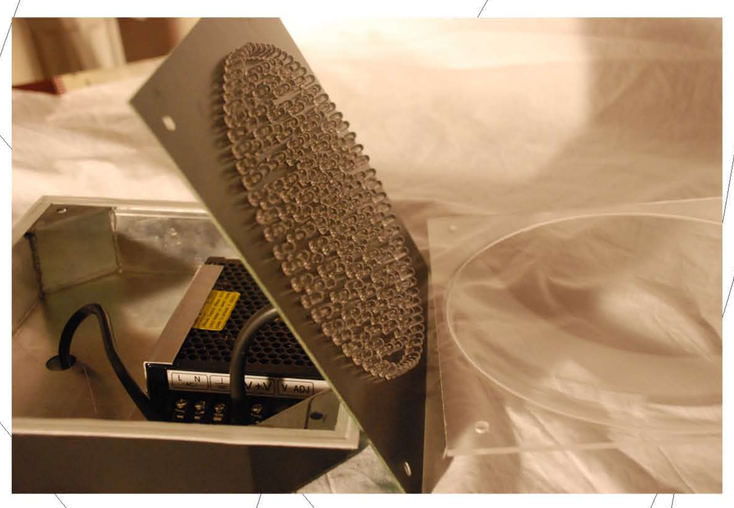
THE COVER OF LED UNIT

THE COVER OF LED UNIT has been produced with stain-less steel of 1 mm and it has been designed in comply with the IP 67 standards and the following standards, in order to be able to insulating the surface of pertenaks with cupper and the LED, from the conditions of exterior environment.

ASTM Standard	316
EN STANDARD	1,44D41
UNS STANDARD	531600
CLASS	Austenitic
(Mpa) 0,2 % flowing strength	Minimum21D (annealed) up to 500 (cold rolling)
Rolling strength (MPa)	510 (annealed) 610 (cold rolling)
Hardness (HRB)	160-200
Annealing Temperature (C°)	1030-1120
Hot moulding Temperature (C°)	1150/850
Cold moulding property	Excellent
Scrapping production property	With the suitable tools and cooling
Capability of welding	Excellent except gas melting methods
Corrosion strength	Its corrosion strength developed thanks to molybdenum additive. Point wise and interval corrosion is better in the tepid medium, and the medium which compris-es chloride. It can be used on the air, in the industrial atmo-sphere, and in the sea water easily.
In the high temperature	Adding of molibdenum ,will increase the tensile strength to high temperature. No…….. formation will be seen up to 1000 °C. When it used be-tween 425-860°C continu-ously. It can be seen inter…. respectively.
Fields of Use	It is suitable to most aggressive medium. It can be used, in the chemical petrochemical and food industry. It can be used in the steam boilers, kitchens food production and façade cladding.

Teknoray®

Rail Signalling System



Feedback circuit taking place in the Teknoray led unit TLU80X SF:this is a microprocessor circuit giving information about the signal lamp by processing the data taken from a serial resistor connected to the input of the signal circuit.

Due to the microprocessor used, the smallest voltage and current differences are being detected in milliseconds and data transmission to the centre is experienced accordingly.

Since security is the most significant factor in railways, two numbers of the feedback circuits have been used and while these circuits are working synchronously, two numbers of data of same value are being sent to the centre.

When the signals sent to the centre from such circuits working synchronously are identical, process can be made on the signalling system.

PIC12F629/675

12.0 ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings†

Ambient temperature under bias..... -40 to +125°C

Storage temperature .....-65°C to +150°C

Voltage on VDD with respect to VSS .....-0.3 to +6.5V

Voltage on MCLR with respect to Vss .....-0.3 to +13.5V

Voltage on all other pins with respect to VSS .....-0.3V to (VDD + 0.3V)

Total power dissipation(1) .....800 mW

Maximum current out of VSS pin .....300 mA

Maximum current into VDD pin ..... 250 mA

Input clamp current, IIK (VI < 0 or VI > VDD).....± 20 mA

Output clamp current, IOK (Vo < 0 or Vo >VDD).....± 20 mA

Maximum output current sunk by any I/O pin..... 25 mA

Maximum output current sourced by any I/O pin ..... 25 mA

Maximum current sunk by all GPIO ..... 125 mA

Maximum current sourced all GPIO..... 125 mA

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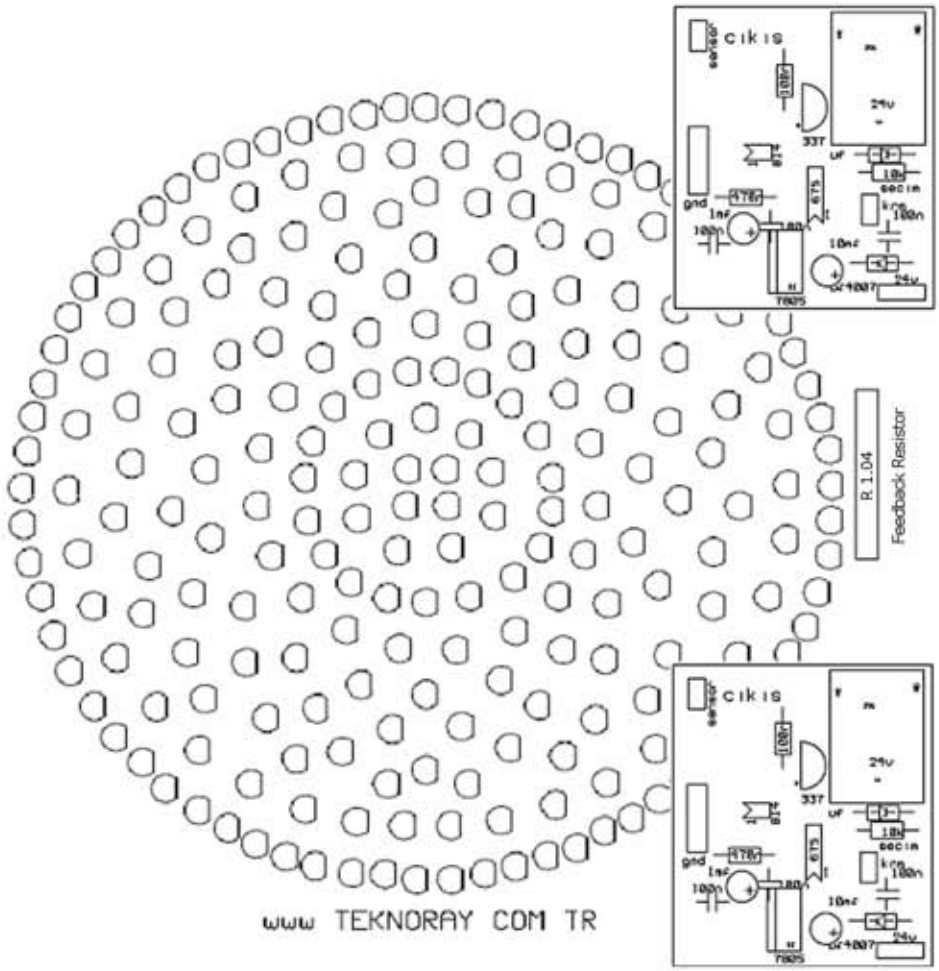
Redundant Microcomputer PCB Layout

TECHNICAL DETAILS



Teknoray Railway Signalization Systems			
	Name :	Signature :	Date :
Designed By :	Fatih EMREM		11.01.2009
Drawn By :	Fatih EMREM		11.01.2009
Checked By :	Ahmet H. IZGİ		12.01.2009

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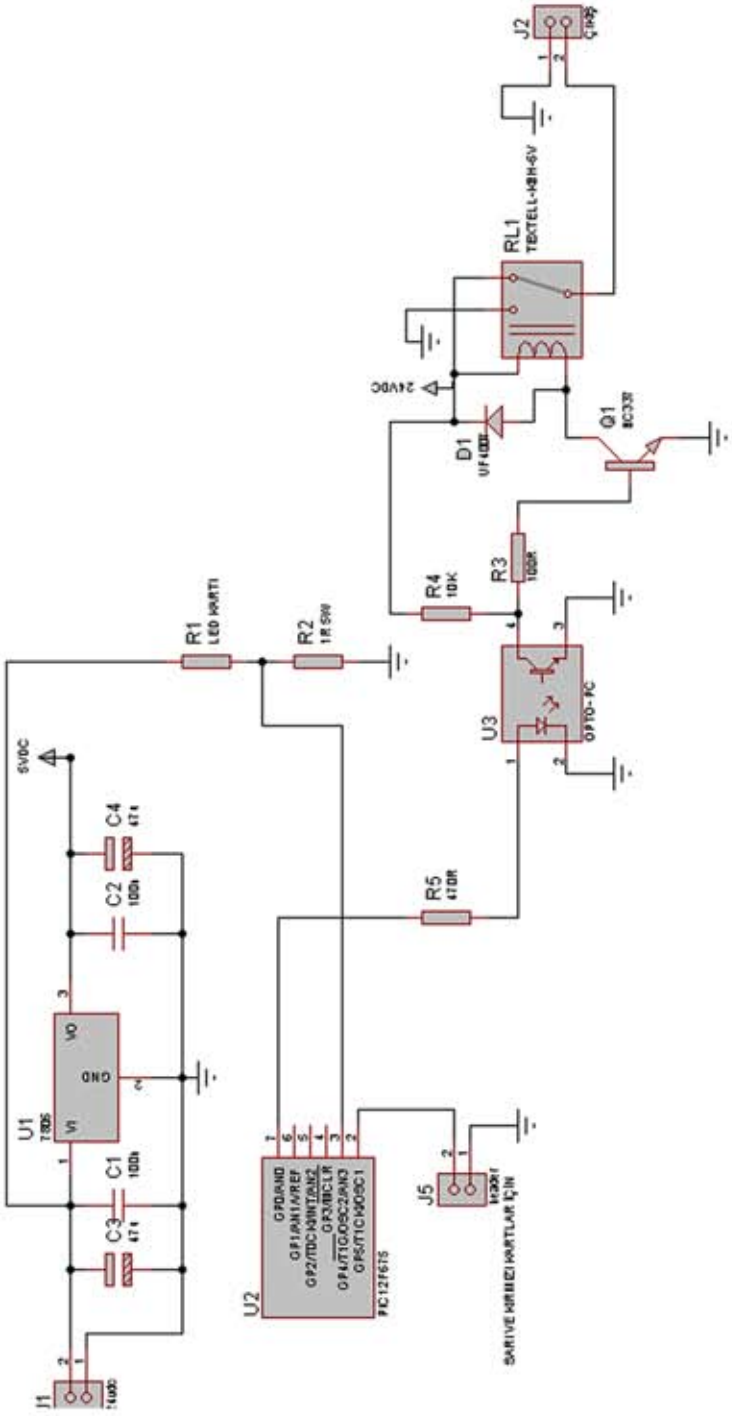
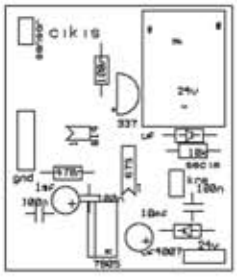
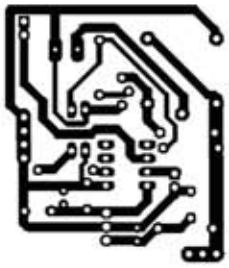
Railway Signalling System

TECHNICAL DETAILS

Feedback Circuit PCP Layout







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	Name :	Signature :	Date :
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Drawn By :	Fatih EMREM		11.01.2009
Checked By :	Ahmet H. IZGI		12.01.2009

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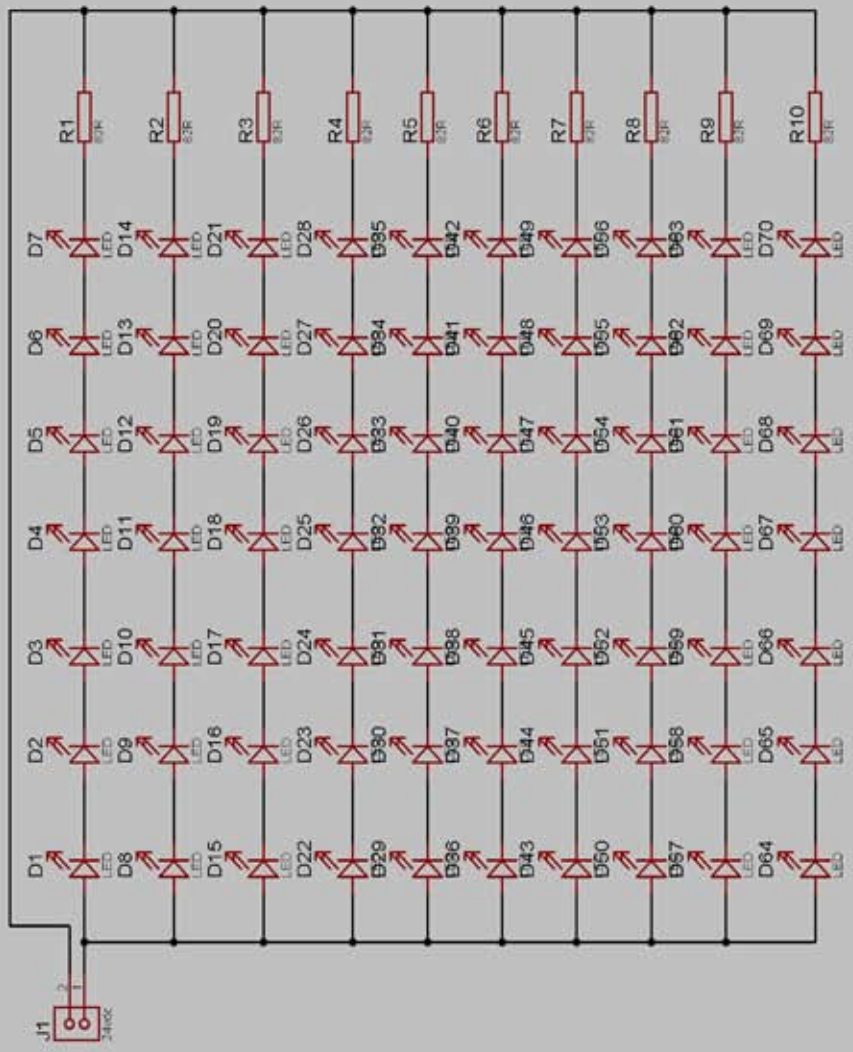
Railway Signalling System

TECHNICAL DETAILS



Teknoray Railway Signalization Systems			
	Name	Signature	Date
Designed By	Fatih EMREM		11.01.2009
Drawn By	Fatih EMREM		11.01.2009
Checked By	Ahmet H. IZGI		12.01.2009

Teknoray®
Railway Signalling System

TR5V

TECHNICAL DETAILS

Specifications

■ Coil Ratings

Standard Models

Rated voltage		3 VDC	5 VDC	6 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current		166.7 mA	100 mA	83.3 mA	55.6 mA	41.7 mA	20.8 mA	12 mA
Coil resistance		18 Ω	50 Ω	72 Ω	162 Ω	288 Ω	1,152 Ω	4,000 Ω
Coil inductance (H) (ref. value)	**Armature OFF**	0.04	0.09	0.16	0.31	0.47	1.98	7.23
	Armature ON	0.05	0.11	0.19	0.49	0.74	2.63	10.00
Must operate voltage		75% max. of rated voltage						
Must release voltage		5% min. of rated voltage						
Max. voltage		120% of rated voltage at 23°C						
Power consumption		Approx. 500 mW						Approx. 580 mW

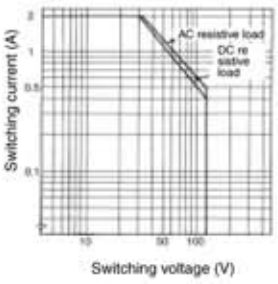
TR5V

Railway Signalling System

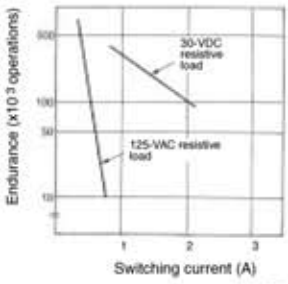
TECHNICAL DETAILS

Engineering Data

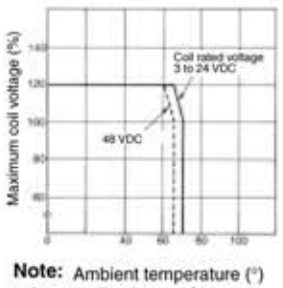
Maximum Switching Power
G5V-2



Endurance
G5V-2

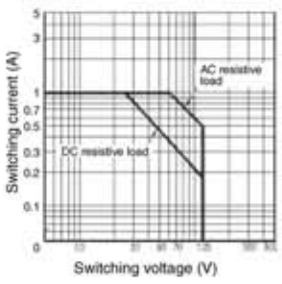


Ambient Temperature vs. Maximum Coil Voltage
G5V-2

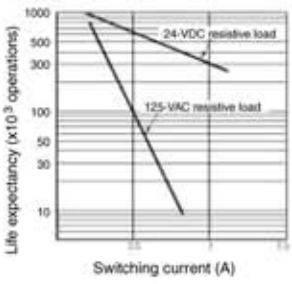


Note: Ambient temperature (°)
The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

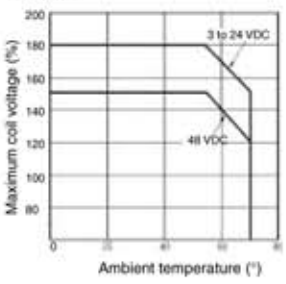
G5V-2-H1



G5V-2-H1



G5V-2-H1



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Teknoray®
Railway Signalling System

TR5V

TECHNICAL DETAILS

■ Contact Ratings

Item	Standard models	High sensitivity models
Load	Resistive load ($\cos\phi = 1$)	
Rated load	0.5 A at 125 VAC; 2 A at 30 VDC	0.5 A at 125 VAC; 1 A at 24 VDC
Contact material	Ag + Au-clad	
Rated carry current	2 A	
Max. switching voltage	125 VAC, 125 VDC	
Max. switching current	2 A	1 A
Max. switching power	62.5 VA, 60 W	62.5 VA, 24 W
Failure rate (reference value)	0.01 mA at 10 mVDC	

Note **Note:**P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Item	Standard models	High sensitivity models
Contact resistance	50 mΩ max.	100 mΩ max.
Operate time	7 ms max.	
Release time	3 ms max.	
Bounce time	Operate: approx. 0.3 ms Release: approx. 1.5 ms	
Max. operating frequency	Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 750 VAC, 50/60 Hz for 1 min between contacts of same polarity	1,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 500 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	1,500 V (10 x 160 μs) between coil and contacts (conforms to FCC Part 68)	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 200 m/s^2 (approx. 20G)	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Endurance	Mechanical: 15,000,000 operations min. (at 36,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr)	
Ambient temperature	Operating: −25°C to 65°C (with no icing)	Operating: −25°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 5 g	

TR5V

Teknoray®
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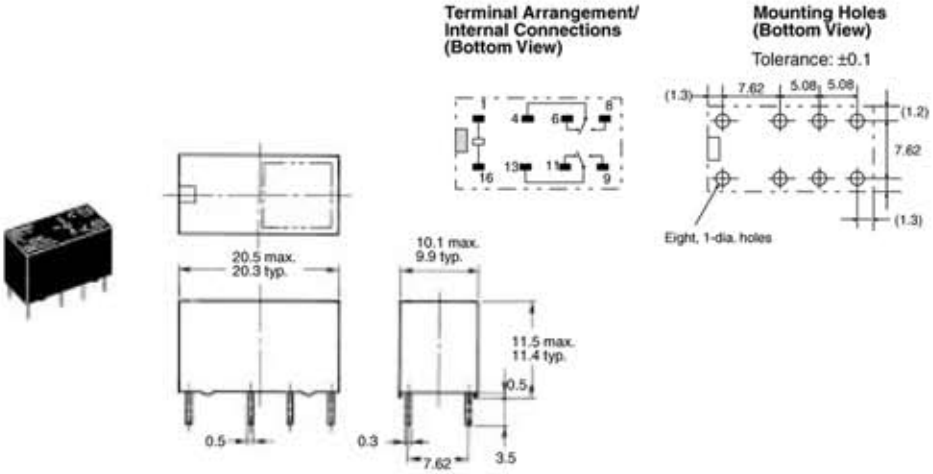
TECHNICAL DETAILS

Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Teknoray®
Railway Signalling System

TECHNICAL DETAILS

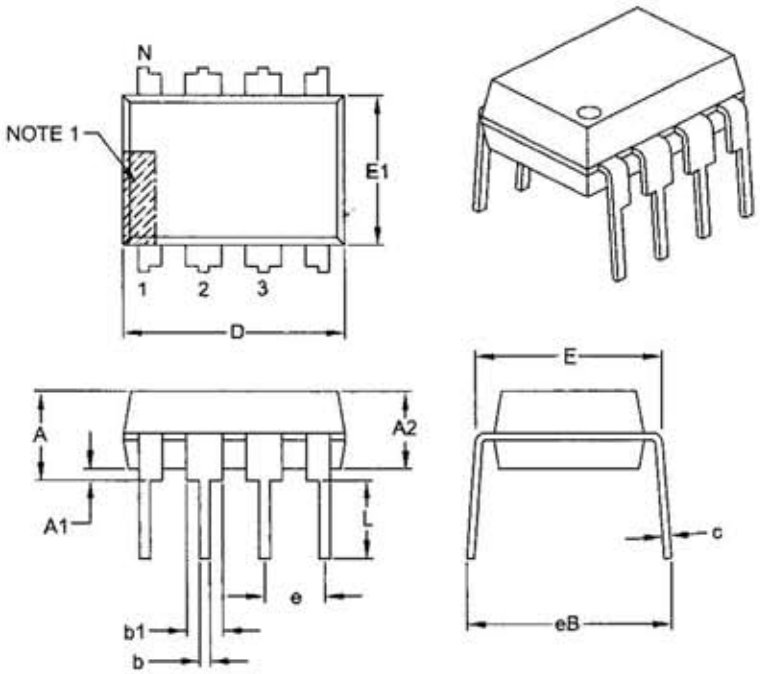
PIC12F629/675

14.2 Package Details

The following sections give the technical details of the packages.

8-Lead Plastic Dual In-Line (P or PA) – 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		.100 BSC	
Top to Seating Plane	A	–	–	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	–	–
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.348	.365	.400
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.040	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	–	–	.430

Notes:

1. Pin 1 visual index feature may vary, but must be located with the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-018B

Teknoray®
Railway Signalling System

TECHNICAL DETAILS

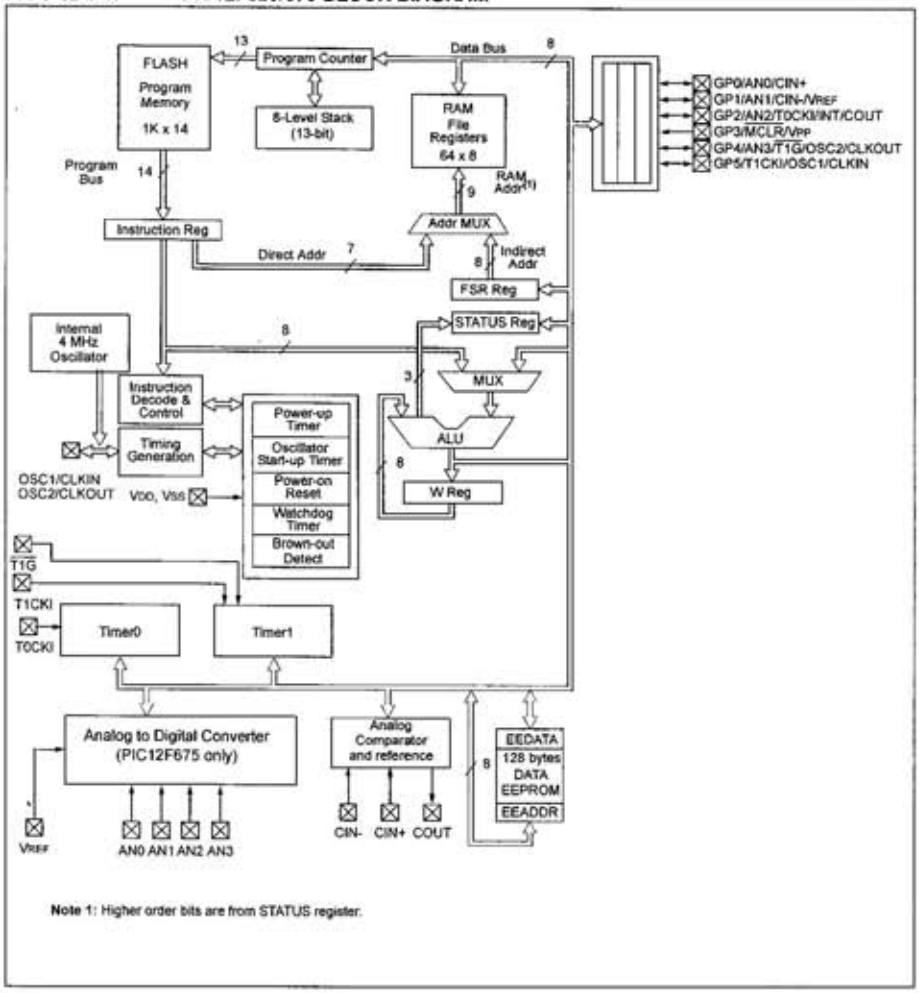
PIC12F629/675

1.0 DEVICE OVERVIEW

This document contains device specific information for the PIC12F629/675. Additional information may be found in the PIC® Mid-Range Reference Manual (DS33023), which may be obtained from your local Microchip Sales Representative or downloaded from the Microchip web site. The Reference Manual should be considered a complementary document to this Data Sheet, and is highly recommended reading for a better understanding of the device architecture and operation of the peripheral modules.

The PIC12F629 and PIC12F675 devices are covered by this Data Sheet. They are identical, except the PIC12F675 has a 10-bit A/D converter. They come in 8-pin PDIP, SOIC, and MLF-S packages. Figure 1-1 shows a block diagram of the PIC12F629/675 devices. Table 1-1 shows the Pinout Description.

FIGURE 1-1: PIC12F629/675 BLOCK DIAGRAM



Note 1: Higher order bits are from STATUS register.

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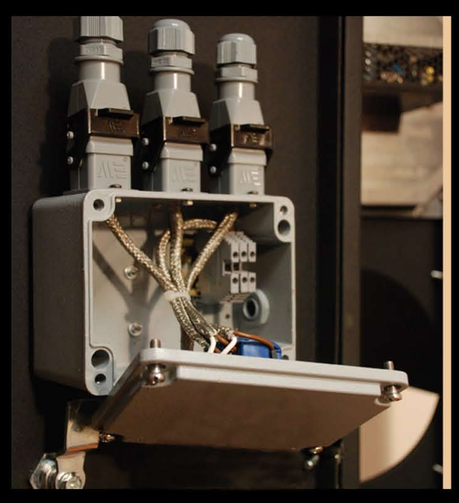
POWER DISTRIBUTION PANEL OF TRIPLE SIGNAL LAMP

This is a panel can be integrated to the infrastructure of existing signalling system easily.

There are three power jacks in the IP 67 standard, which can be installed easily.

The power connection can be performed in the aluminium case in IP 67 standard.



Inter panel power connections have been performed with the non flammable, rubber covered cable.

There are 3 or 4 cable connection clamps in the panel.

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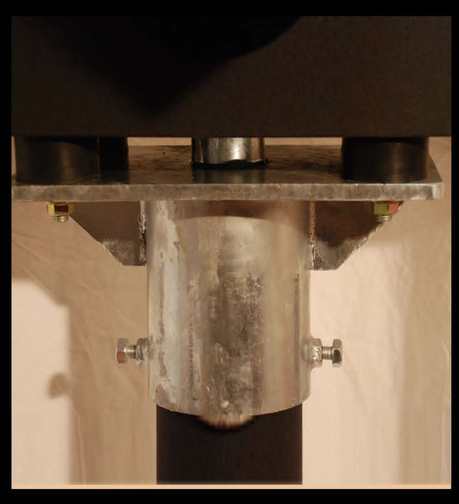
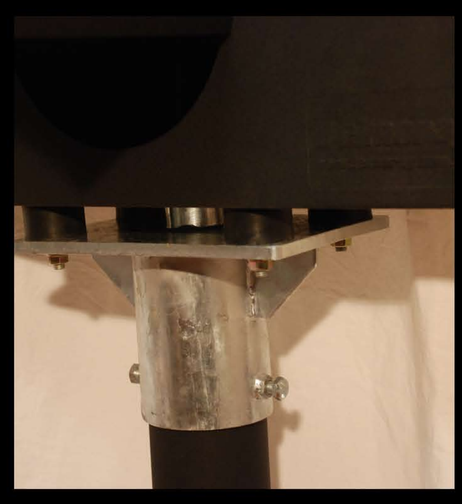
CONNECTION APPARATUS

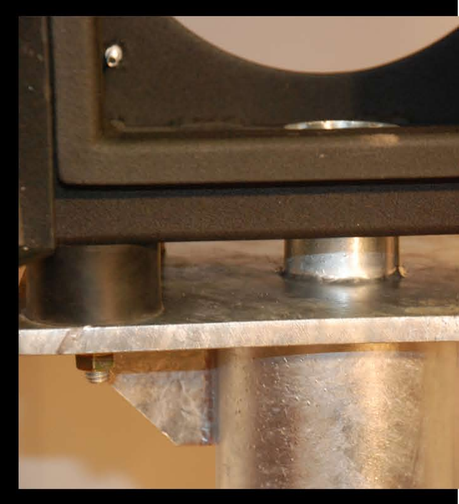
Signal body connection apparatus consists of a steel pipe, in the diameter of 125 mm, in the wall thickness of 4.9 mm, and a steel flange in the thickness of 6 mm, in the length of 180 mm x 250 mm, and a steel pipe to be installed on it in the diameter of 50 mm and in the wall thickness of 3.6 mm respectively.

All of parts on the body connection apparatus have been jointed each other by means of TIG welding.

Then, the connection apparatus has been coated with the hot dipping galvanise (80 micron).







Shock absorber made of 100% Rubber wedges have been placed between coupling surface of signal body and the connection apparatus accordingly.

Signal pool is in the diameter of 120 mm in the wall thickness of 4.9 mm and in the length of 4300 mm, and.

Bottom flange is made of steel material and , is in the thickness of 10 mm, in the size of 15x15 cm and it has been mounted on the signal pool by means of teak welding.

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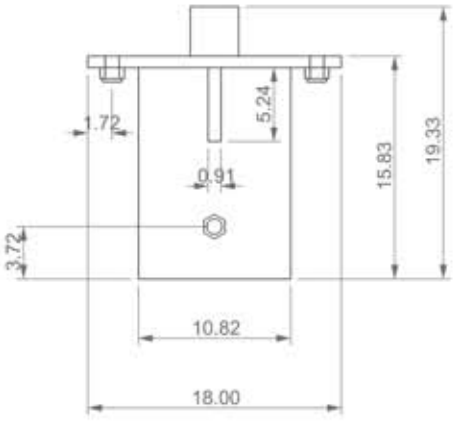
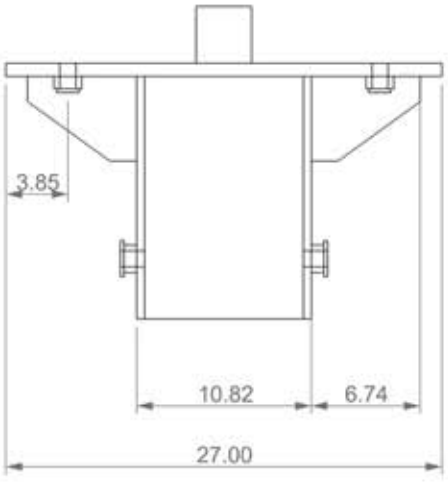
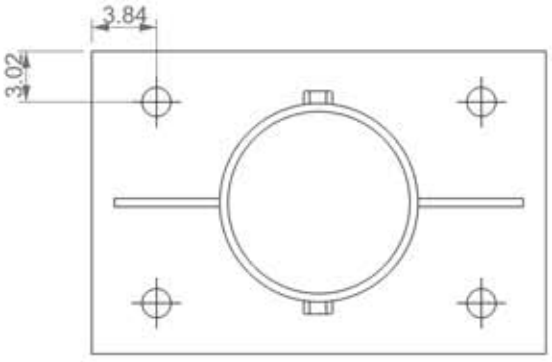
Signal – Post connecting apparatus.

TECHNICAL DETAILS







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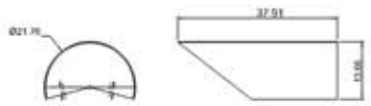
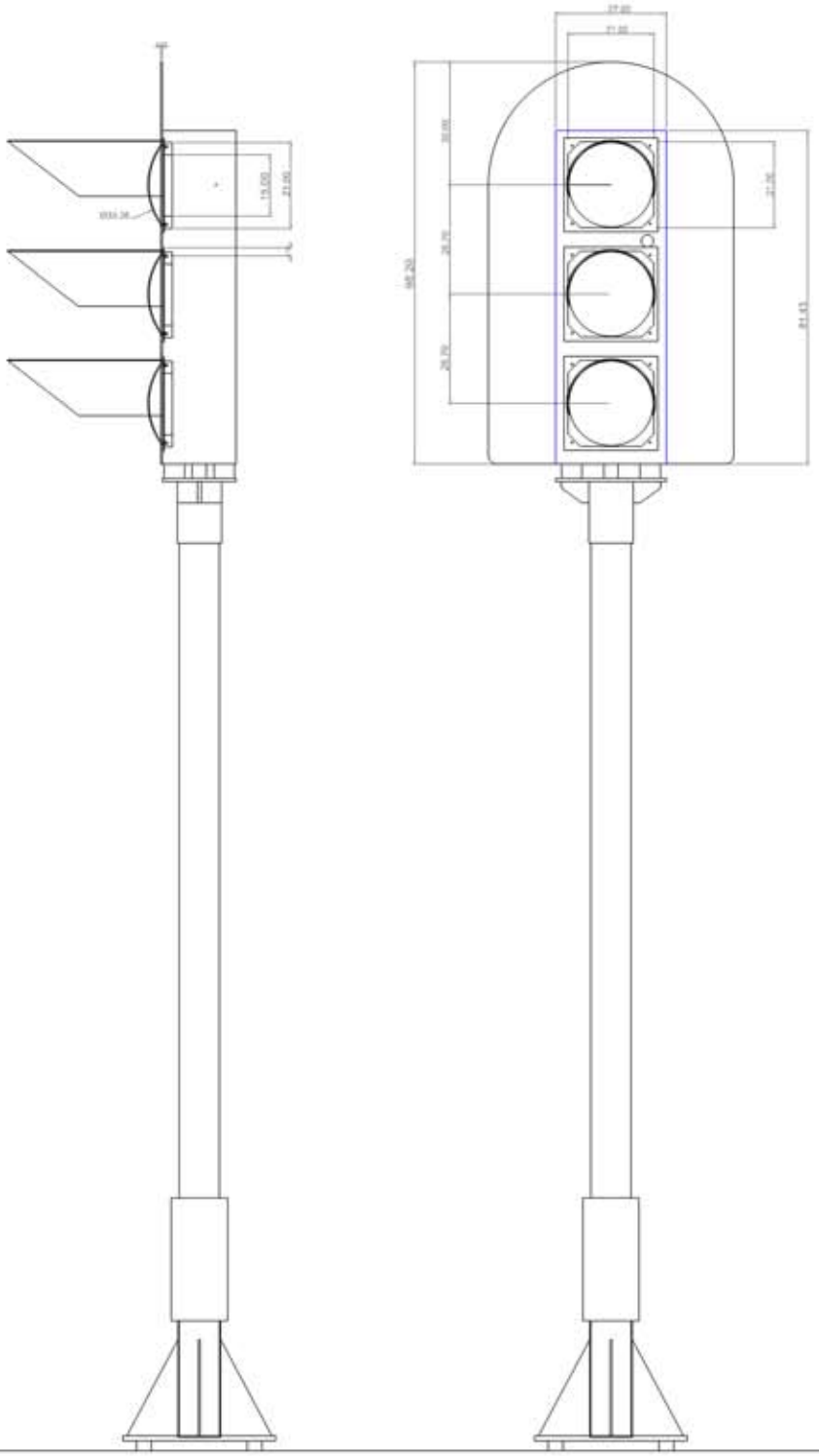
TECHNICAL DETAILS





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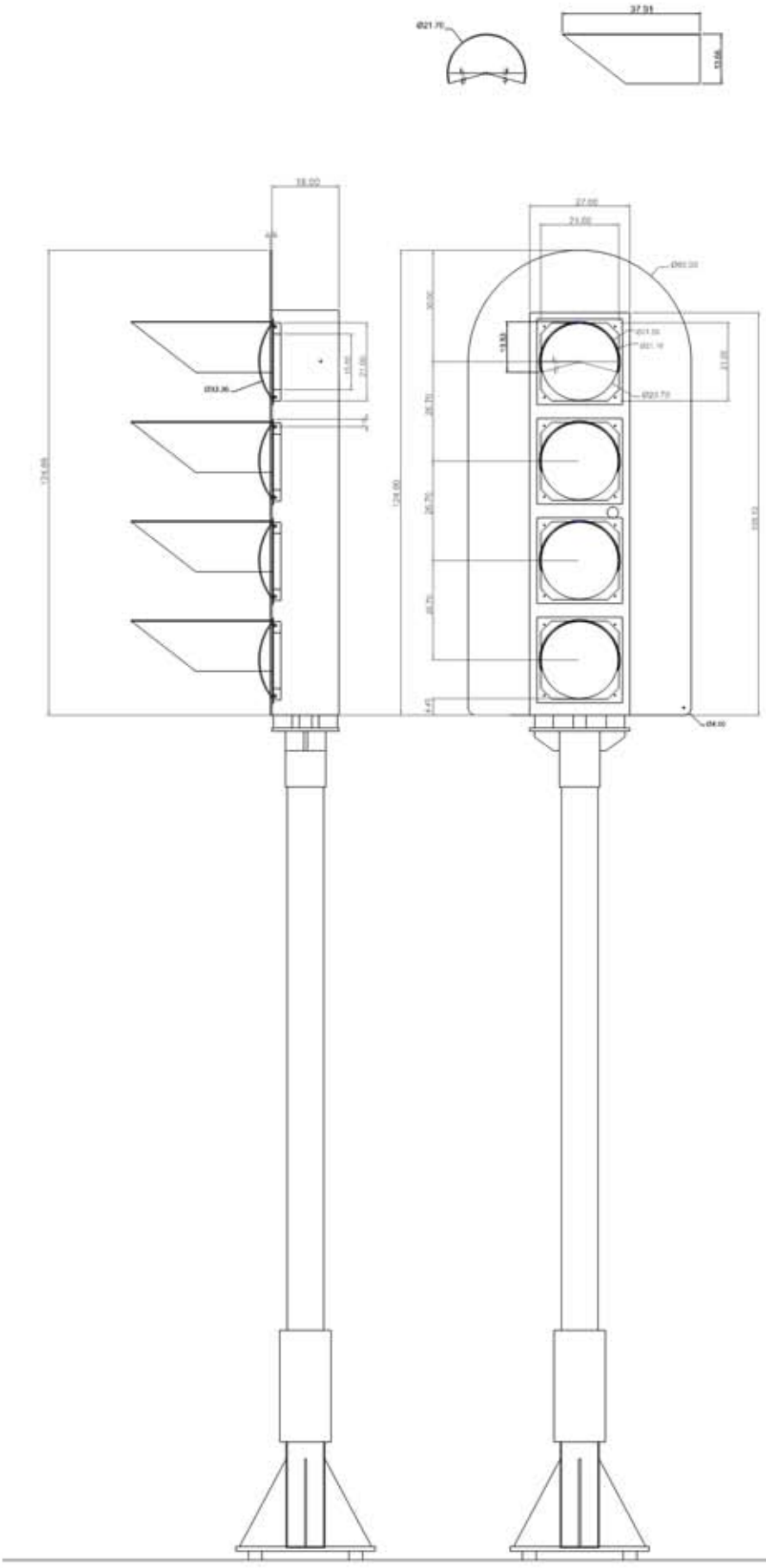
TECHNICAL DETAILS



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