SUZO HAPP®

GAMING, AMUSEMENT AND INDUSTRIAL COMPONENTS

Synchrone Topper

Project : Synchrone Topper (Preliminary manual)
Company : Suzo International (NL) BV

Revision History

Revision	Date	Comment	By
0.1	9 jan 2007	Initial Release	R.T.

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1. Introduction

Standalone running toppers have the disadvantage that the patterns shown do not run at exactly the same speed.
In order to make the displayed patterns exactly the same on a number of running toppers, the toppers clocks needs to be synchronized to each other. This is realized by connecting all toppers to each other. Standard ethernet patch cables are selected to do this.

One topper is now chosen to generate the clock for all other attached toppers.
But what pattern should each topper display at the clock signal?
This is solved by a master unit. The master unit tells each topper which pattern should be displayed on the next clock cycle.
The master unit can be one of the toppers in the network or a seperate control unit like a PC.
Making a topper the master topper in the network is done by simply shorting 3 jumpers on the control board inside the topper.

2. Physical network interface

Toppers are physically connected using standard UTP ethernet cables (straight).
These are cheap and good available.
Toppers are daisy chained to each other.

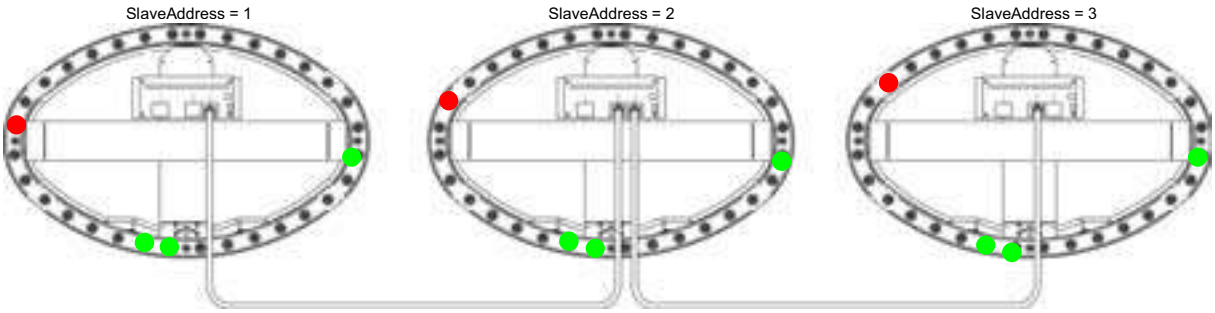


Figure 1: Toppers daisy chained

A topper is usually powered by a gaming machine. Coupling all toppers directly without opto-couplers could give unwanted gost currents and signal distorsions through the topper network interface.
That's why the topper network interface is opto-coupled to the topper electronics. Between the actual data lines and the opto-couplers is a RS485 line driver. This driver ensures good communication over long lines.
The physical network is powered by the master topper, by placing some jumpers on the master topper PCB.

2.1 Topper slave address

Each topper must have a unique slave address. The slave address is shown on the first 8 topper leds for 3 seconds just after the power is applied to a topper. See red dots in figure 1. This address can be changed by pressing the intensity button during power up. By pressing the intensity button again the slave address can be changed (from 1-8). After 3 seconds the topper starts again.

2.2 Master topper

In case all toppers are controlled by a master topper, the topper with the highest slave address must be set in master mode. This is done by placing 3 jumpers on the board. In figure 1 topper with slave address 3 should be configured as the master topper. See 6.1 Master topper jumpers.

2.3 Topper Software version

The topper software version is displayed on the lower half of the topper during power up: Major version on leds 24 to 31 and the minor version on leds 16 to 23. See green dots in Figure 1.
V2.1 is shown here.

3. Topper patterns

There are a few prebuild patterns inside the topper that are shown after each other.
Between each pattern the leds blink a few times to indicate the start of a new pattern.

Patternlist
1. Growing snake
2. Twinkling stars
3. Sweep
4. Moving snake
5. Rotating wheels

3.1 Fixing a pattern

A pattern can be fixed by pressing the intensity button for a period of 2 seconds.
Unfixing a pattern is done by pressing the intensity button again for 2 seconds.

3.2 Intensity control

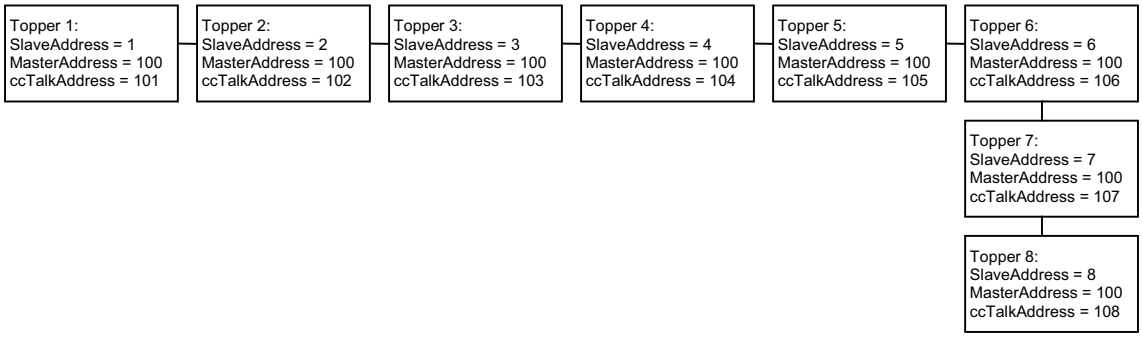
The intensity of the topper leds can be changed by pressing the intensity button during normal operation for less than a second. 8 levels of intensity are defined. The intensity is shown on the first 8 leds of the topper. If the intensity button is not pressed again for 1 second, the pattern show is displayed again.

4. Protocol network interface

4.1 Single Topper addressing

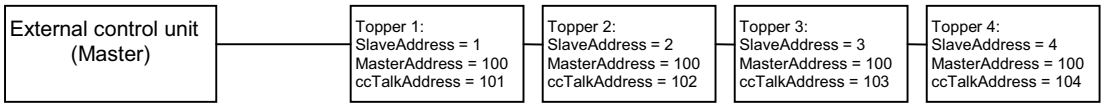
The network toppers can be controlled by sending cctalk command messages to the toppers.
The cctalk topper network address is equal to the topper master address + slave address.
Slave toppers must be connected to a master. The master can be a topper that is configured as a master, or an external control unit that serves as the master. The master address of a topper serves as a broadcast address.

Example topper network 1: 8 toppers



Topper 8 should be configured as a master topper (see section 6.1 Master topper jumpers), if no external master (PC) is attached.
The master topper expects 7 slave toppers with slave addresses 1 to 7 attached.
All toppers must have the same master address (broadcast address), in this example 100.
All slave toppers must have their slave address set properly during configuration.
(see section 2.1 Topper slave address for setting the topper slave address).
The cctalk topper address in this example of topper1 is 101, topper2 is 102 up to topper8 which is 108.
All toppers can be polled and controlled using their cctalk addresses.
Why using separate master and slave addresses? This is because some commands should be able to address several toppers at the same time. This is realized by sending the command to the master address and one of the data bytes in the message indicates which slaves are addressed.

Example 2: 4 toppers controlled by an external control unit



All toppers must be set as slaves with their master and slave addresses set properly.

4.2 Multiple topper addressing

If more (slave) toppers have to be addressed simultaneously, the cctalk command must be send to the toppers using the topper's master address, which serves as the broadcast address.
A topper that receives a message sent to the master address will respond with it's slave address byte address delayed by (4 * slave address) ms.

5. Commands

5.1 Generic Topper commands

The following table lists all generic topper commands

Header	Data bytes	Response (default)	Description
254	<none>	ACK	Simple poll
253	<none>	{variable delay} [slave address]	Address poll
252	<none>	{variable delay} [slave address]	Address clash
251	[new address]	ACK	Address change
250	<none>	ACK	Address random
246	<none>	“Suzo Int (NL)”	Request manufacture id
245	<none>	“Topper”	Request equipment category id
244	<none>		Request product code
242	<none>	[serial 1- LSB] [serial 2] [serial 3 – MSB]	Request serial number
241	<none>	“Topper V2.0”	Request software version
215	[block number]	[data 1] [data 2] … [data 8]	Read data block
214	[block nr] [data 1] … [data 8]	ACK	Write data block
004	<none>	[cctalk level] [major revision] [minor revision]	Request comms revision
003	<none>	ACK	Clear comms status variables
002	<none>	[rx timeouts] [rx bytes ignored] [rx bad checksums]	Request comms status variables
001	<none>	ACK	Reset device

Table 1: Generic cctalk Topper commands

5.2 Special Topper commands

The following table lists all special topper commands

Header	Data bytes	Response (default)	Description
60	[topper mask] [nrToppers] [led0 .. 7] [led8 ..15] [led16 .. 23] [led24 .. 31] [dir0 .. 7] [dir8 .. 15] [dir16 .. 23] [dir24 .. 31]	ACK	TOPPER_SET_PATTERN
61	[clock period ms]	ACK	TOPPER_SET_CLOCK
62	<none>	ACK	TOPPER_START_CLOCK
63	<none>	ACK	TOPPER_STOP_CLOCK
64	<none>	ACK	TOPPER_STEP_CLOCK
65	<none>	[intensity of the leds]	TOPPER_GET_INTENSITY
66	[topper mask] [intensity of the leds]	ACK	TOPPER_SET_INTENSITY
67	[intensity of the backlight]	ACK	TOPPER_SET_BACKLIGHT

Table 2: Topper cctalk commands

5.2.1 Set Pattern

This command transmits a pattern to a topper. The leds in the pattern are moved clockwise or anti-clockwise, depending on the direction data, at the next clock cycle.

Example:

```
Transmitted: 69 0A 01 3C 01 03 01 00 00 80 FF FF 00 00 CD
Received   : 01 00 69 00 96
```

In total 10 data bytes are transmitted.
The first data byte is the slave address mask. It is only used in combination with the topper broadcast address. If a bit is set, the corresponding topper must execute the command.
The second data byte holds the number of slavetoppers associated with this pattern, in case of complex pattern involving more than 1 slave.
The next 4 data bytes hold the actual led data for 32 leds: Led[0..7], Led[8..15], Led[16..23] and Led[24..31]. In the example only led[0] and led[31] are set.
The next 4 data bytes hold the direction when moved for all leds: Dir[0..7], Dir[8..15], Dir[16..23] and Dir[24..31]. In this example led[0..15] will move clockwise on the next clock cycle and led[16..31] counter clockwise. The pattern results in 2 leds moving on the topper from left to right, during 16 clock sysles.

5.2.2 Set Clock

Not implemented.

5.2.3 Start Clock

This command starts the clock signal on the clock generating topper.
Only one topper may generate the clock. This can be any topper, but prefferably the topper with the highest slave address (master topper). Note that this command may not be send using a broadcast address, since this would activate the clock on more than one topper.

Example:

```
Transmitted: 69 01 01 3E 0A 4D
Received: 01 00 69 00 96
```

The data byte contains the clock period: In this example the clock period is 10ms (100Hz).

5.2.4 Stop Clock

This command stops the clock signal on the clock generating topper.

Example:

```
Transmitted: 69 00 01 3F 57
Received: 01 00 69 00 96
```

5.2.5 Step Clock

This command generates 1 clock cycle on the clock generating topper.

Example:

```
Transmitted: 69 00 01 40 56
Received   : 01 00 69 00 96
```

5.2.6 Get Intensity (40H)

Example:

```
Transmitted: 65 00 01 40 5A
Received   : 01 01 65 00 02 97
```

This command gets the current intensity of the leds from a topper.
In this example topper with cctalk address 65 is commanded to return it's led intensity, which has a value of 2.

5.2.7 Set Intensity (41H)

Example1: Set intensity on 4 slave toppers (multiple topper addressing)

```
Transmitted: 64 02 01 42 0F 02 46
Received   : 01 02 03 04
```

The toppers master address is 64H (broadcast address).
The first data byte is the slave address mask. It is only used in combination with the topper broadcast address. If a bit is set, the corresponding topper must execute the command.
In this example toppers 65Hex, 66Hex, 67Hex and 68Hex are addressed to execute the set intensity command.
The second data byte holds the intensity: 0 is minimum and 6 is maximum. In this example the intensity is set to 2.

Example2: Set intensity on a specific topper (single topper addressing)

```
Transmitted: 67 02 01 42 0F 04 41
Received   : 01 00 67 00 98
```

The addressed topper has address 67Hex. Since this is not equal to the master address of the topper, it will respond with a normal ACK message, directed to the host with address 1.
Note that the first data byte (slave mask) is not used here. The second data byte holds the intensity value of 4.

5.2.8 Set BackLight Intensity

Not implemented.

6. Connectors

The figure below shows the connector layout.
Note that the text on the PCB may be different.

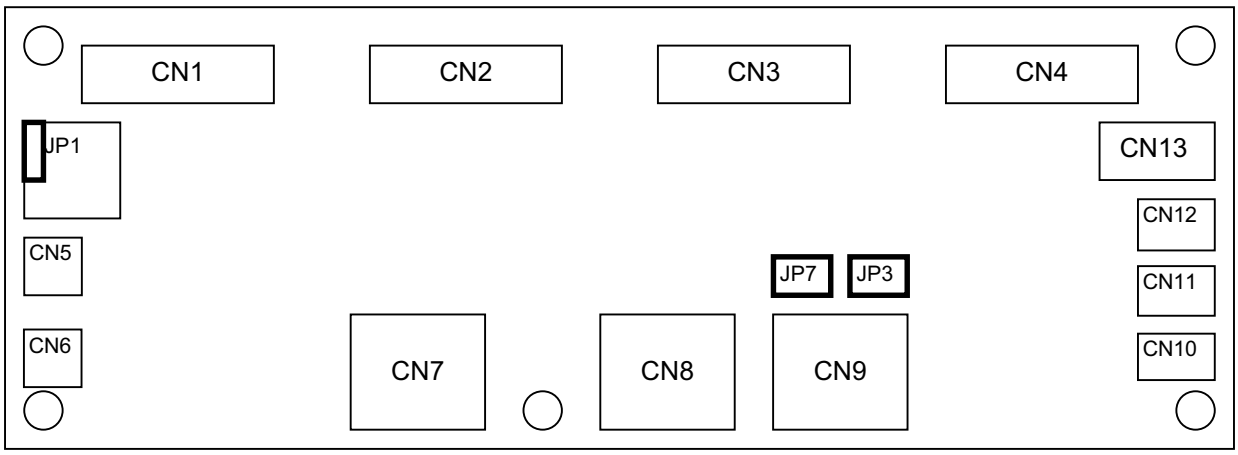


Figure 2: Connector layout

Connector	Description
CN1	Connector for Led 0 .. 7 (upper left)
CN2	Connector for Led 8 .. 15 (upper right)
CN3	Connector for Led 16 .. 23 (lower right)
CN4	Connector for Led 24 .. 31 (lower left)
JP1	uP program connector and also used as a jumper for the Master Topper
JP7	RS485 power plus
JP3	RS485 power gnd
CN5	Connector for external intensity button
CN6	Input for external control signal (example: win pattern control)
CN7	RS485 bus entry
CN8	RS485 bus entry
CN9	RS485 bus entry
CN10	Topper power supply output (pin1 is 12Vdc, pin2 is Gnd)
CN11	Topper power supply input (pin1 is 12Vdc, pin2 is Gnd)
CN12	Topper backligh supply output (pin1 is 12Vdc, pin2 is Gnd)
CN13	Backlight control output (open drain)

Table 3: Connector Description

6.1 Master topper jumpers

Short JP1, JP3 and JP7 to put a hopper in master mode

7. Topper Model options

Order numbers Ellipse models

Gold: 104-05490 (optional adaption kit)
Chrome: 104-05890 (default model)
Black Chrome: 104-05090 (optional adaption kit)

Figure 3: Ellipse model

Order numbers Ringo models

Gold: 104-03490 (optional adaption kit)
Chrome: 104-03890 (default model)
Black Chrome: 104-03090 (optional adaption kit)

Figure 4: Ringo model

Order numbers Shield models

Gold: 104-04490 (optional adaption kit)
Chrome: 104-04890 (default model)
Black Chrome: 104-04090 (optional adaption kit)

Figure 5: Shield model

8. Topper Base options

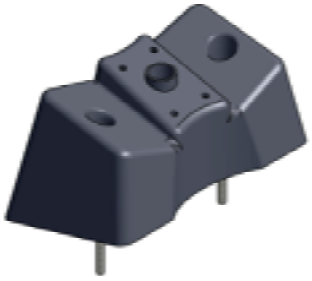


Figure 6: Base UniTopper 15 degrees slanting (104-0010-1)

See Section 12.1 for the exact dimensions.

Figure 7: Base UniTopper R260 curved (104-0015-1)

See Section 12.2 for the exact dimensions.

Figure 8: Base UniTopper flat mounting (104-0020-1)

See Section 12.3 for the exact dimensions.

9. Installation

***Important**: Shut-off the power from the host machine until any installation work is completed.*

Power supply must be 12VDC, 2Amp.

9.1 Connection

Wire color	Description	Pin	Topper connector type	Machine connector type
Orange	Power 12Vdc	1	03-09-2022	
Black	Power Ground	2		
Black	Common Towerlight	1	03-09-2049	
Yellow	Lamp 2nd from bottom	2		
White	Lamp bottom	3		
Blue	Lamp 3th from bottom	4		
Tinned Strap	Earth bonding strap	-	-	Ring Terminal 4mm

Table 4: Wire connection

10. Technical specifications

10.1 Electrical ratings

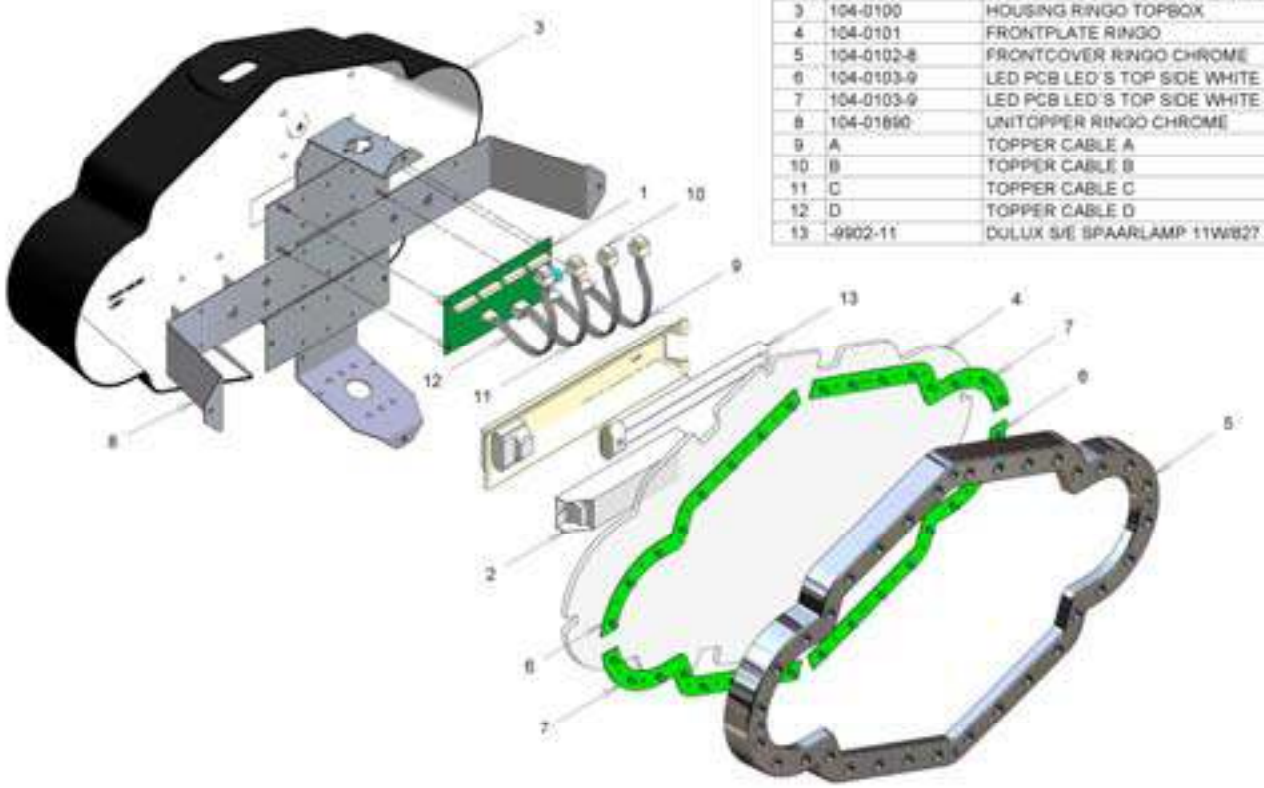
Parameter	Value	Units
Power Supply	12	Vdc
Current consumption	1.5	A
Intensity levels	8	

Table 5: Technical specifications

10.2 Lamp

The following lamp type is used in the topper unit: Dulux S/E Lamp 11W/827 (Art. nr. 9902-11).

11. Exploded View Ringo Topper

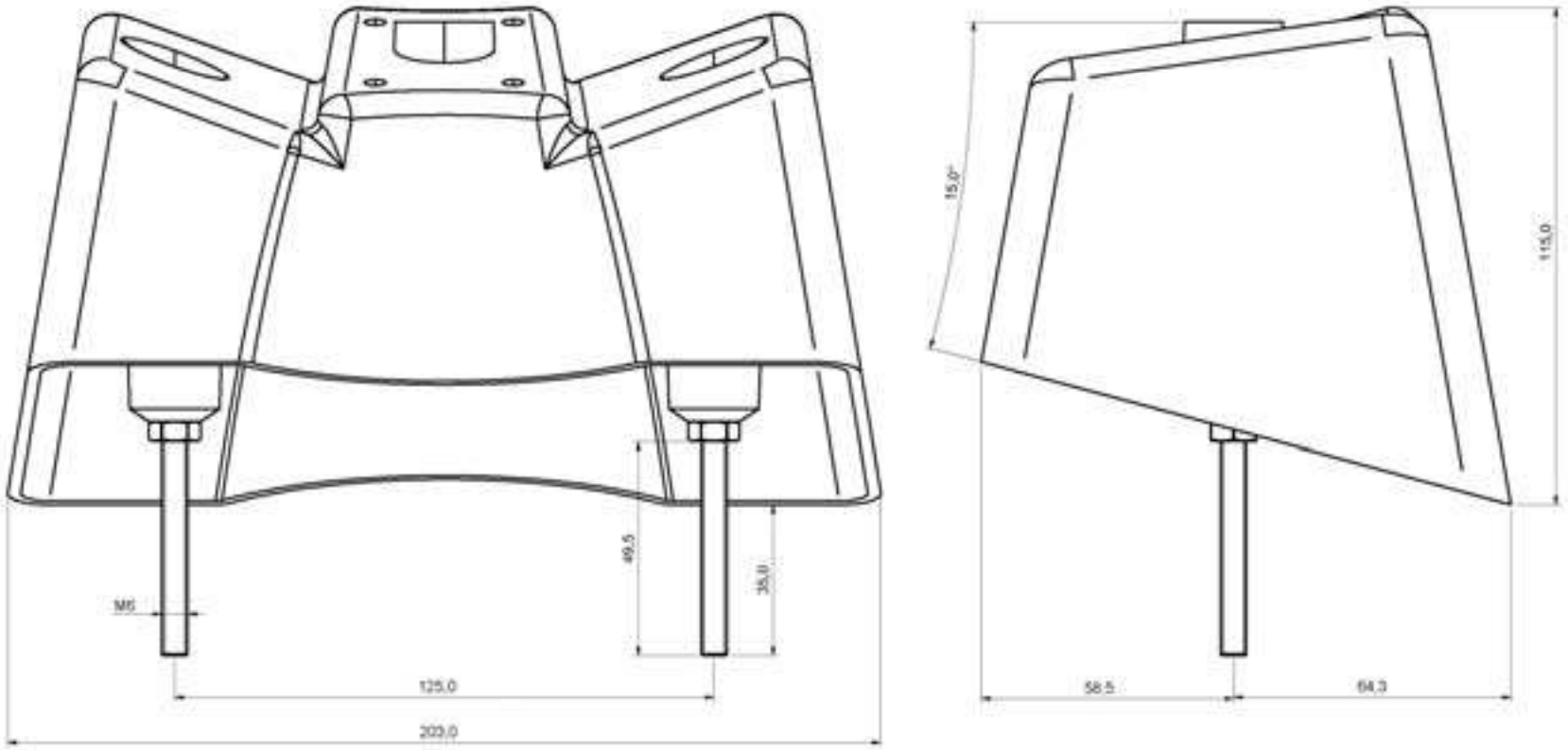


Parts List

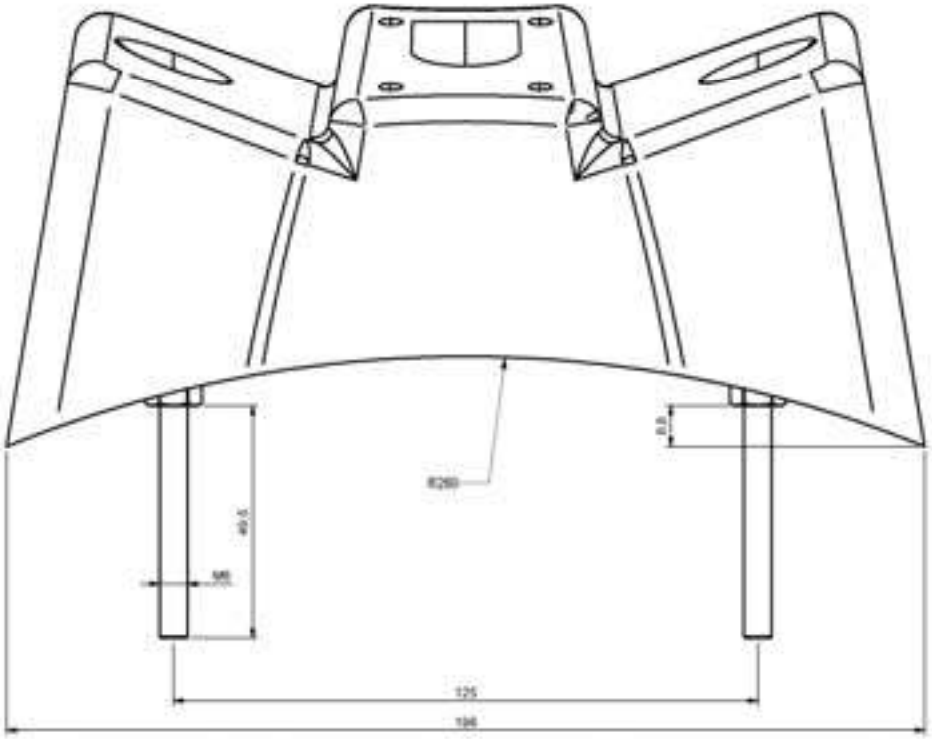
DRAW	PART NUMBER	DESCRIPTION	PC
1	104-0050	MAIN PCB UNITOPPER	1
2	104-0060	BALLAST 10-14VDC 11WATT 1AMP	1
3	104-0100	HOUSING RINGO TOPBOX	1
4	104-0101	FRONTPLATE RINGO	1
5	104-0102-8	FRONTCOVER RINGO CHROME	1
6	104-0103-9	LED PCB LED`S TOP SIDE WHITE	2
7	104-0103-9	LED PCB LED`S TOP SIDE WHITE	2
8	104-01660	UNITOPPER RINGO CHROME	1
9	A	TOPPER CABLE A	1
10	B	TOPPER CABLE B	1
11	C	TOPPER CABLE C	1
12	D	TOPPER CABLE D	1
13	-9902-11	DULUX S/E SPAARLAMP 11W/827	1

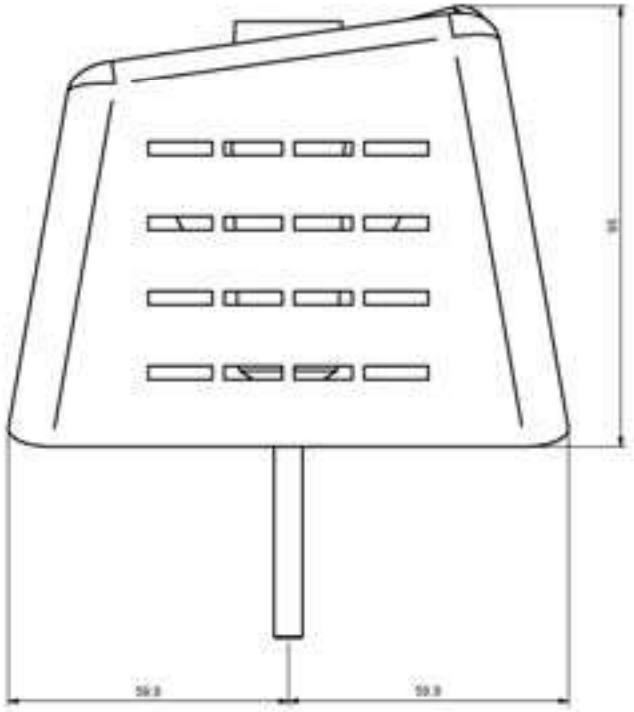
12. Topper Base dimensions

12.1 Base UniTopper 15 Degrees slanting (104-0010-1)



12.2 Base UniTopper R260 curved (104-0015-1)





12.3 Base UniTopper flat mounting (104-0020-1)