POLAR

BY RAFAEL LOZANO-HEMMER

Version: 2025-02-10

TABLE OF CONTENTS

GENERAL IMPORTANT INFORMATION

This short section must be read for proper operation.

POLAR (2018)

BY RAFAEL LOZANO-HEMMER

Technique

Custom-circular display, computer, camera, custom software.

Description

"Polar" is a circular display that converts a camera's cartesian grid of photo sensors (XY) into a representation in polar coordinates (an angle and a distance). The piece has a radar-like rotation mapped to the baseline of the live camera to add an element of time, emphasized by a quiet ticking sound. The polar distortion produces an anamorphic representation of people in front of the work, with all of them sharing the same origin, like the arms of a clock.

Operation

Please refer to Appendix I - Installation for detailed system information and wiring diagram.

1. Connect the piece to power. The computer, which is integrated into the display, has a small rubber knob where the ON/OFF button is located. This button is situated behind the display, on the right side, near the camera.

2. Once you have turned the computer **ON**, the piece should start automatically after about three minutes.

3. To turn the piece **OFF**, press the same rubber button situated on the computer, and hold for five seconds.

4. Make sure to wait until the display and the computer have finished their shutdown routine, and have cooled down, before turning the piece on again. At minimum this should be 10 minutes.

General Artwork Behaviors

The piece has a radar-like rotation mapped to the baseline of the live camera to add an element of time, emphasized by a quiet ticking sound.

Interacting with the Artwork

When present in front of the artwork, people trigger the artwork's detection system and the system constantly zooms in and out of detected targets within the camera feed.

Maintenance

The screen has a glossy acrylic finish, so you may use a small amount of product such as Windex if ever it gets very dirty with smudges or fingerprints. However, it is preferable to use a static-free lint cloth (common computer cleaning cloths), to reduce static and to minimize the risk of creating reflective blotches.

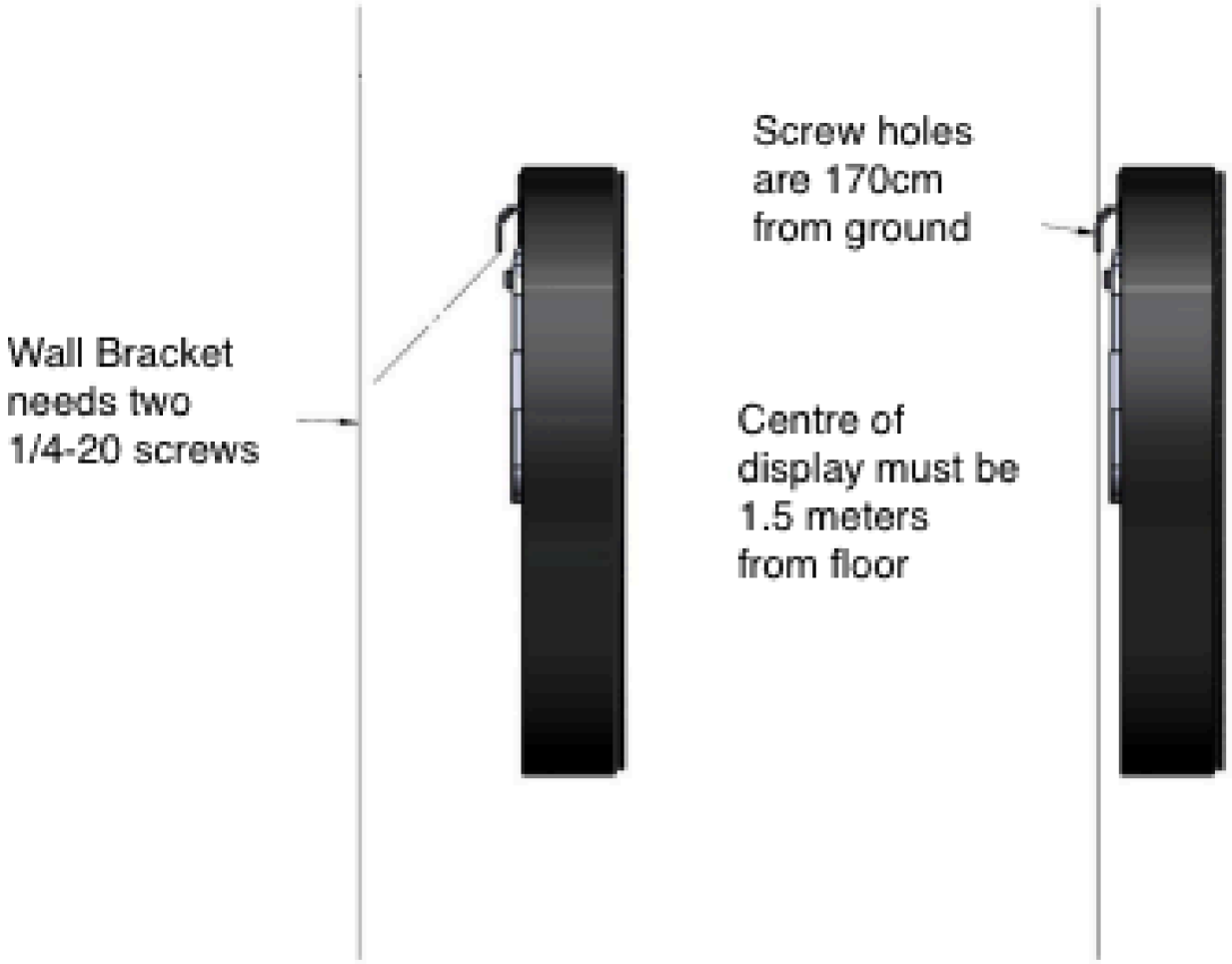
The metal outer casing can be cleaned with a regular all-purpose cleaner. Do not use harsh cleaners or rough sponges. Remove dust using a feather duster, such as those produced by Swiffer.

We recommend cleaning the piece at least every two months.

Placement Instructions

The screen's center should be positioned at 1.5 meters from the ground, which means that the bracket holes should be anchored to the wall at 1.7 meters from the ground (the bracket is offset from the display's center by 20 cm.)

Please note the reflective nature of the front of the display. Please do not position next to a mural light source (such as a sconce) that could reduce the visibility of the artwork. The image below may be used as a reference.



DETAILED TECHNICAL INFORMATION

Normal Software Operation

The custom software runs on **OpenFrameworks 0.10**. This software should start-up automatically when you turn on the computer.

Pressing key **g** will make the GUI appear. To quit press key **q**.

There are three other GUI sections visible when **g** is pressed are.

- General
- Flow
- Debug

There is another GUI section, camera controls, which can be accessed by pressing **c**.

Each of these separate GUI's will have their variables explained in detail in individual sections following this one.

Manual Software Calibration

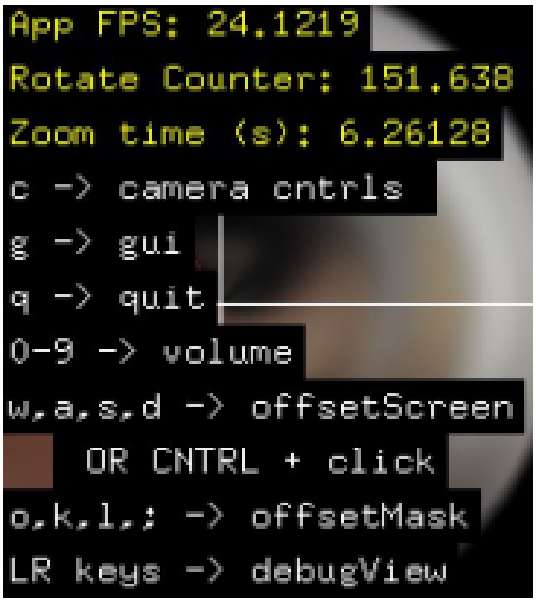
Using the wireless keyboard provided, adjust the image to the center using the key commands listed below. The mouse should appear with the GUI, but be careful not to lose it. If lost, lead the mouse towards the upper left side of your mousepad. If the piece is running and the background is either mostly gray or blue that means the piece is currently not centered.

Important Note: Usually, the circular display's playback default is a 256 x 256 window from the left side of the screen. If you are having a hard time finding the cursor, try moving it towards the left.

To position the window with the center of the screen, use

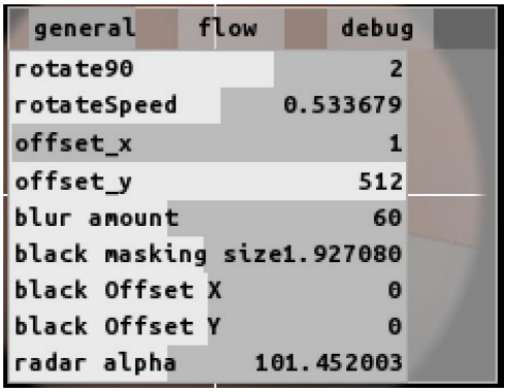
- key **w**: UP
- key **s**: DOWN
- key **a**: LEFT
- key **d**: RIGHT

An image of this section of the GUI can be seen below.



General

The table below shows the values for each GUI variable.

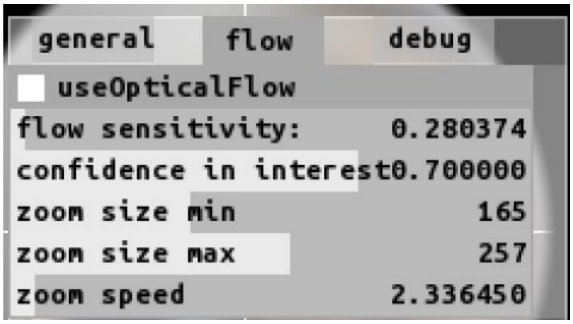


Screenshot of the General GUI Tab

Setting	Description
rotate90	Rotate the incoming image from the camera by 90 degrees.
rotateSpeed	The speed in which the piece rotates at.
offset_y	Where the piece sits within the screen along the Y access.
offset_x	Where the piece sits within the screen along the X access.
Blur amount	The amount of blur being applied to the image.
Black masking size	A black mask sits around the piece to create a smooth looking edge.
Black offset X	The offset of the black mask along the x access.
Black offset Y	The offset of the black mask along the y access.
Radar Alpha	The opacity of a sweeping radar image that sits above the polar image.

Flow

The table below shows the values for each GUI variable.

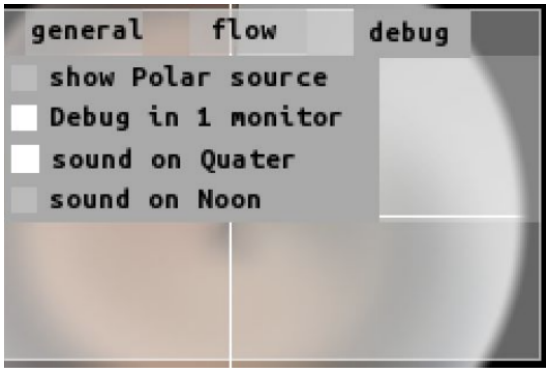


Screenshot of the Flow GUI Tab

Setting	Description
Use Optical Flow	If selected, the piece will zoom in and out to the area of most interest.
Flow Sensitivity	Determines what information the point of interest/algorithm accepts or ignores. A lower value allows for more sensitivity, meaning an easier possibility to select a new location for zooming.
Confidence in interest	How confident the algorithm is in the next point of interest for applying the zooming in/out effect.
Zoom size min	The minimum size of image the piece can select as a zoom target (ex. A 165x165 image). This image is chosen as a subsection of the larger incoming camera feed image.
Zoom size max	The maximum size of image the piece can select as a zoom target (ex. A 257x257 image). This image is chosen as a subsection of the larger incoming camera feed image.
Zoom Speed	The speed in which the zooming in/out of frame happens. A low number is faster.
Use Optical Flow	If selected, the piece will zoom in and out to the area of most interest.

Debug

The table below shows the values for each GUI variable.

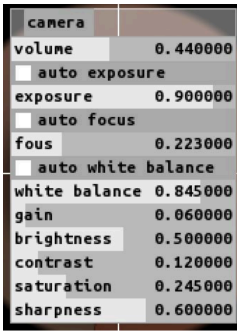


Screenshot of the Debug GUI Tab

Setting	Description
Show Polar Source	Shows three images as a debugging tool. One is the initial camera feed showing the current point of interest, another is the feed with the zooming in and out applied, and the final image has the polar conversion and the blur effect applied.
Debug in 1 monitor	If just using the circular display as the monitor, select Debug in 1 monitor. When Show Polar Source is also selected it will show the various debug images within the frame of the circular display. Image views can then be changed with using the left and right arrow keys. When unselected, it will appear outside of the circular display at a larger size.
Sound on Quarter	Plays the ticking sound effect at every quarter.
Sound on Noon	Where the piece sits within the screen along the X access.
Black offset Y	The offset of the black mask along the y access.
Radar Alpha	Plays the ticking sound effect only when the radial image is at noon.

Camera

The table below shows the values for each GUI variable.



Screenshot of the Debug GUI Tab

Setting	Description
Volume	Volume of the ticking sound effect.
Auto Exposure	When selected, the camera uses its own auto exposure feature.
Exposure	With auto exposure unselected, the exposure value can be manually changed.
Auto Focus	When selected, the camera uses its own auto focus feature.
Focus	With the auto focus unselected, the focus value can be manually changed.
Auto White Balance	When selected, the camera uses its own auto white balance feature.
White Balance	With auto white balance unselected, the white balance value can be manually changed.
Gain	Camera's gain value.
Brightness	Camera's brightness value.
Contrast	Camera's contrast value.
Saturation	Camera's saturation value.
Sharpness	Camera's sharpness value.

Remote Access to Artwork's Computer

There is a software installed on the computer running this artwork that allows the studio to connect remotely to the artwork. This feature is helpful when you require assistance from the studio, as we can remotely connect to it, do a quick inspection, and do a debugging session of your components, if needed. In order to enable this feature, the computer has to be connected to the internet at all times. Depending on the computer's operating system (Windows 8/10/11, OSX), the procedure to set the computer online will vary. Please look online for tutorials, if necessary.

Preliminary Troubleshooting Steps

After pressing the button, nothing seems to happen.

Do you hear any fan-like noise coming from the circular display? If so, the computer is running and the circular display should show the piece shortly. If not, check that the display is powered.

The piece does not react and the image is frozen.

Ensure that the computer is connected to the display. If the image is frozen, it might be because the connection has been disrupted. Restarting the piece may help with this issue.

The piece is on but the screen is black.

The image may be offscreen for whatever reason. Bringing the cursor to the center of the display, then click while pressing the CTRL key to reposition the window. For finer adjustments use the W,A,S,D keys. Where “W” is UP, “A” is LEFT, “S” is DOWN, and “D” is right.

Troubleshooting Assistance

Prior to contacting the Antimodular Studio with a problem about your artwork, please ensure that you went through the preliminary troubleshooting steps outlined in the previous section.

The troubleshooting process will vary depending on the problem. In order to make the process easier, it is recommended that you collect and send the following information to the studio:

- Date and time when the problem first happened;
- Description of the problem;
- Actions taken so far and conclusions;
- Detailed photographs (or videos) displaying the problem;
- Detailed photographs (or videos) of the suspected faulty component;
- Detailed photographs (or videos) of the whole artwork and its surroundings;
- Personnel involved.

Support (Contact Us)

If you would like support for the piece, please feel free to call Lozano-Hemmer's studio in Canada:

Antimodular Research
4462 rue Saint-Denis
Montréal, Québec, Canada
H2J 2L1
Tel 1-514-597-0917
info@antimodular.com
www.antimodular.com

APPENDIX I - INSTALLATION

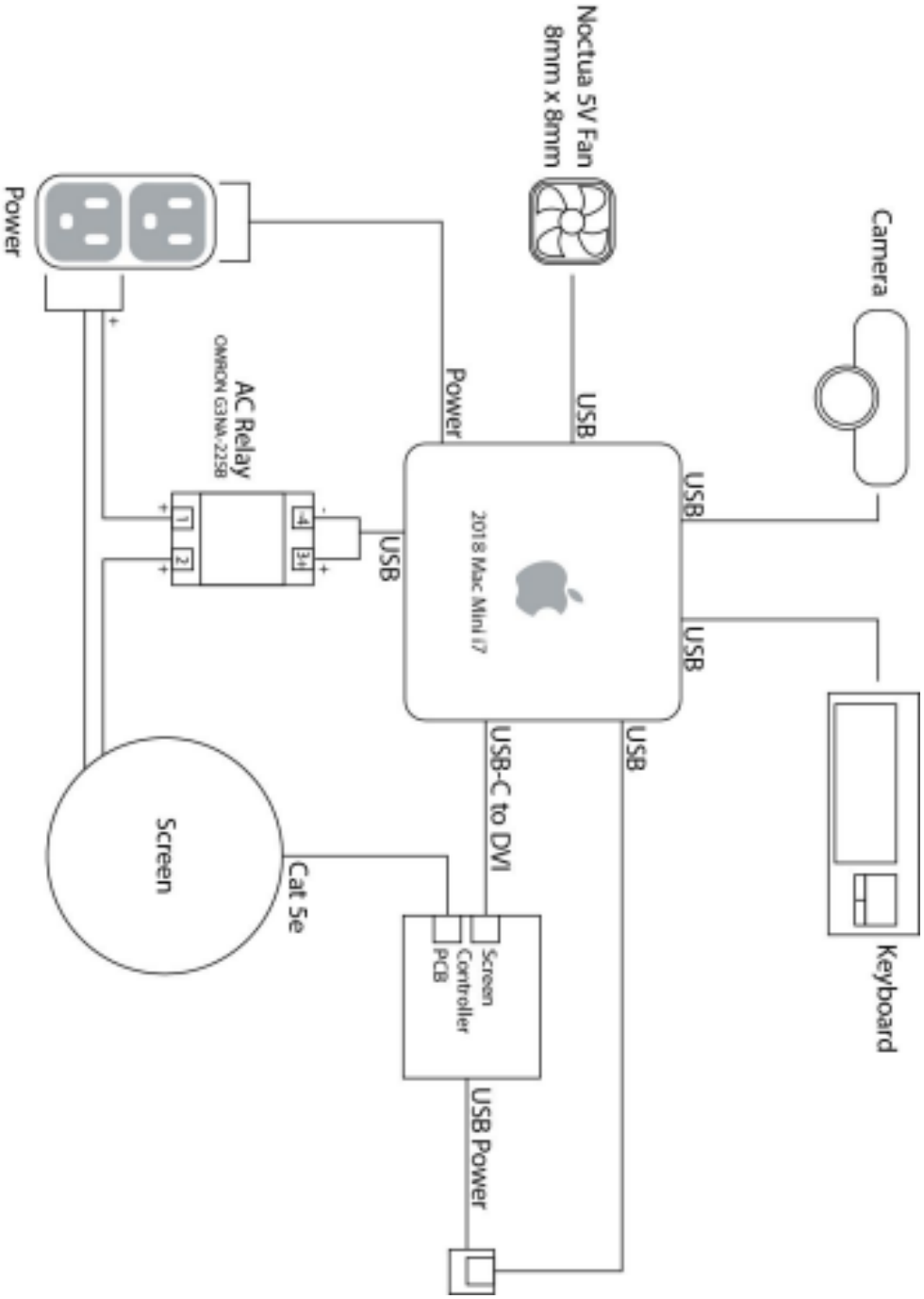
Description of Components

This artwork requires the following components:

Component	Description
Custom Circular Display	A 256x256 resolution circular display
Video Cable	Connects the computer to the custom display.
Computer	2018 i7 mac mini
Data Cable	Connects the camera to the computer. Typically a USB A to micro USB cable.
Camera	USB Camera
Camera Lens	Used by the camera to obtain the best field of view for this artwork.

Wiring Diagrams and Connections

In order for the piece to run properly, the computer should be connected according to the following diagrams.



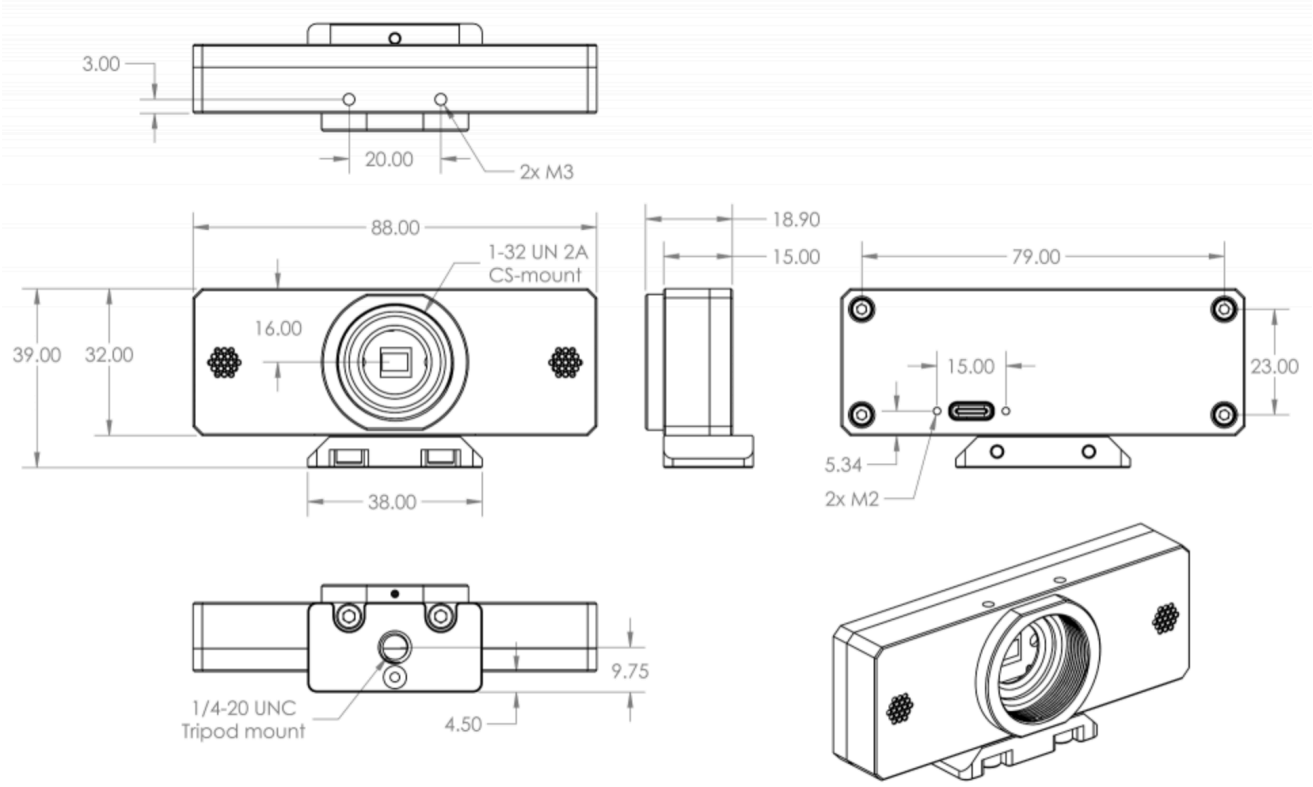
The actual assembly of the artwork would look like on the following image.

APPENDIX II - TECHNICAL DATA SHEETS

Circular Display

Specification	Details
Manufacturer	Charming LED
Model Number	COL.PA.194.0002
Dimension	533 x 583 (mm)
LED Standard	SMD1010
Resolution	256x256
Refresh Rate	2840Hz
Working Voltage	AC 220V/(110V) +- 15%
Viewing Angle	H/120 V/140

Camera



Specification	Details
Manufacturer	Kurokesu
Model Number	C920_REWORK_KIT2: includes a Logitech C920 Camera logic board
Resolution	1920 x 1080
Form Factor	Kurokesu enclosure case with ¼-20 female thread

Camera Lens

Computar CS-Mount 1.8-3.6mm Varifocal Lens

Fan

Specification	Details
Manufacturer	Noctura
Model Number	NF-A8 5V
Size	80x80x25 (mm)
Operating Voltage	5v
Rotational Speed	2200 RPM
Mounting Hole Space	71.5x71.5 (mm)

AC Relay

Used to supply power to the piece.

Specification	Details
Manufacturer	Omron Automation and Safety
Manufacturer Number	G3NA-225B-UTU DC5-24
Load Voltage Rating	24 VAC to 240 VAC
Load Current Rating	25 A
Dimensions	Length 58 mm x Width 4 mm x Height 30 mm