Solution introduction

Features of DIANMING VMS

■ Low voltage, constant current driver chip, with high efficient power supplies, ensuring the best energy saving performance.
■ Prevent damage from over-voltage, transient surge and lightning.
■ Multiple smart design to achieve IP66 for VMS cabinet.
■ Patented secondary optical lens design reduce light reflection while offering high brightness output and high contrast ratio.
■ Built-in photosensors adjust and offer enough brightness during day and night, free of glare.
■ LED failure diagnosis, supporting visual online detection.
■ Multiple languages and variable sized fonts available.
■ Capable to detect operation temperature and ambient illumination to ensure safe operation.
■ Legibility > 200m.
■ Support RS232 / RS485, TCP/IP, GPRS and other communication interface.
■ The controller unit is capable to be installed at customer's roadside controlling cabinet, which is max. 100 meters away, connecting with CAT6 cable.
■ Support communication protocols including NTCIP, ModBus, Profibus DP, XML, DIANMING's and more others.
■ Certified with the EN12966 standard.

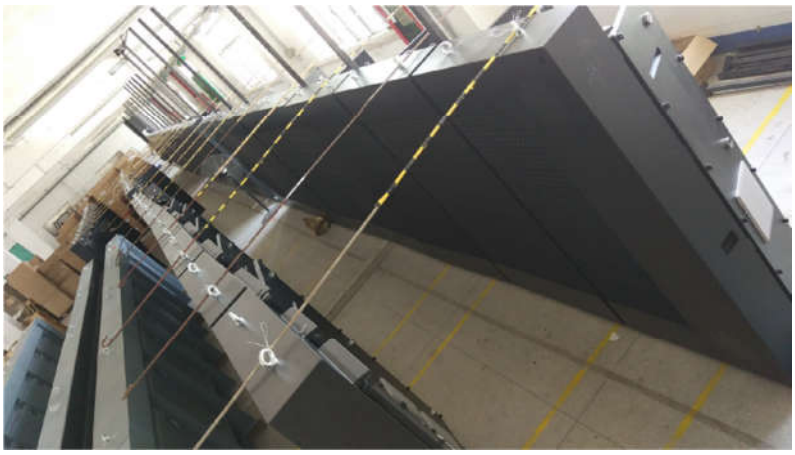
Designing Introductions （Sample VMS for Reference）

Construction of VMS Cabinet

VMS cabinet consists of display area, main cabinet body, rear doors, hood above rear doors, bolts, locks, gasket, and cable entrances.

The main cabinet body is made of Aluminum alloy which is corrosion-resistant, light weight, robust, and good for heat dissipation. The powder spraying coating on cabinet surface and the matte processing reduce VMS reflection and increase corrosion-resistance.

The hood above rear door stop rain slashing and prevent water leaking during heavy raining day.
Stainless steel M12 bolts in cabinet corners connect with gantry in site installation. The screw holes for hanging rings are blind holes. Ensure no water leaking.



Cable entrances for Power & Data

VMS cabinet has cable entrances for power cable and signal cable. The plug and socket are IP66.

Surge arrester for Over Voltage Protection

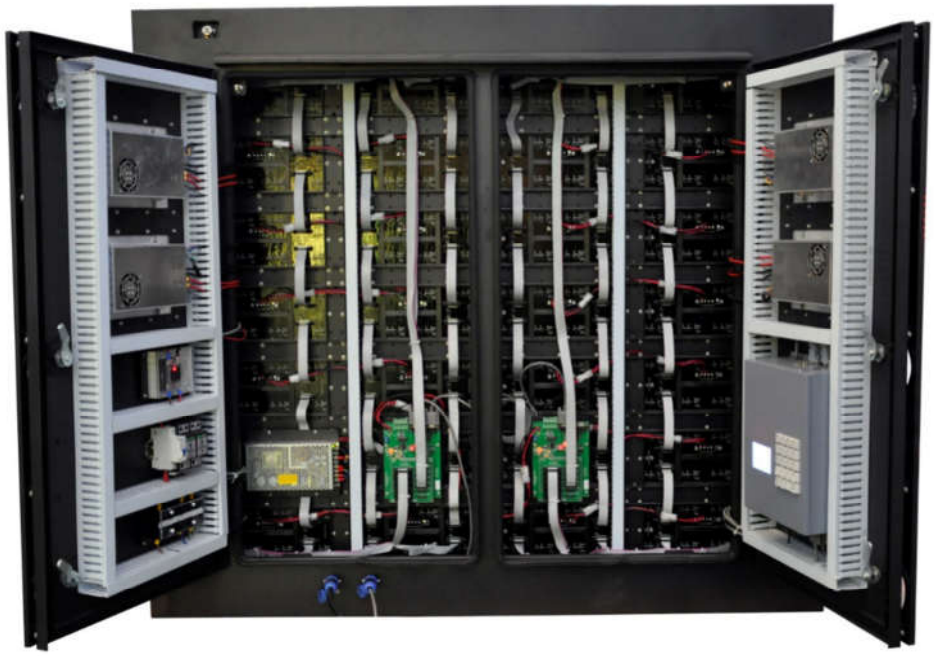
After power cable access into VMS cabinet, it is connected to surge arrester to keep the cables clean from surge pollution. Without it, the surge pollution may enter VMS cabinet and damage the electronic components. Of course, we require customer to connect the Ground cable to the Grounding terminal which is buried underground.

Switch Power Supplies

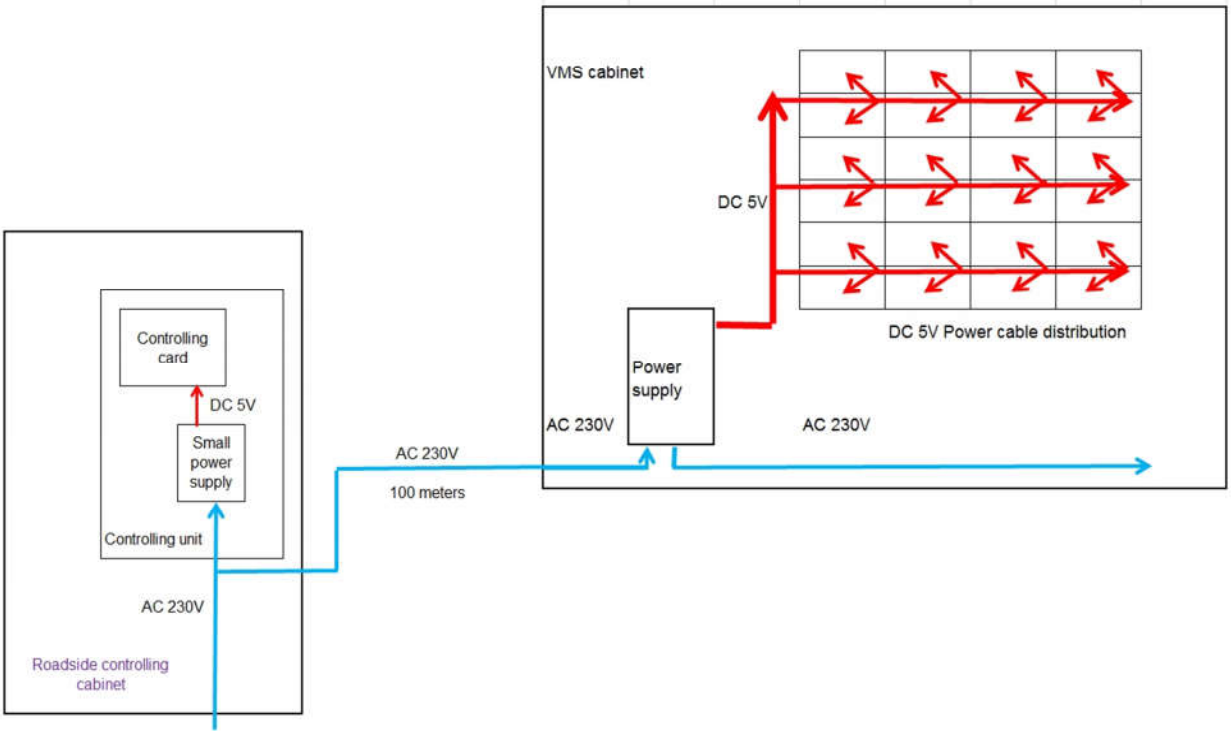
All power supplies (power adapters) in VMS are made by MEANWELL. It features with high power facter, wide input voltage range, stable constant current output. CE / UL certificated.

Input	VOLTAGE RANGE	88 ~ 264VAC
	FREQUENCY RANGE	47 ~ 63Hz
	POWER FACTOR (Typ.)	PF>0.95/230VAC PF>0.98/115VAC at full load
	EFFICIENCY (Typ.)	More than 79%
Output	DC VOLTAGE	5V
	CURRENT RANGE	0~55A
	RIPPLE & NOISE (max.) Note.2	150mVp-p
	VOLTAGE ADJ. RANGE	4.5 ~ 5.5V
	VOLTAGE TOLERANCE	±2.0%

Overall View of Electronic Design

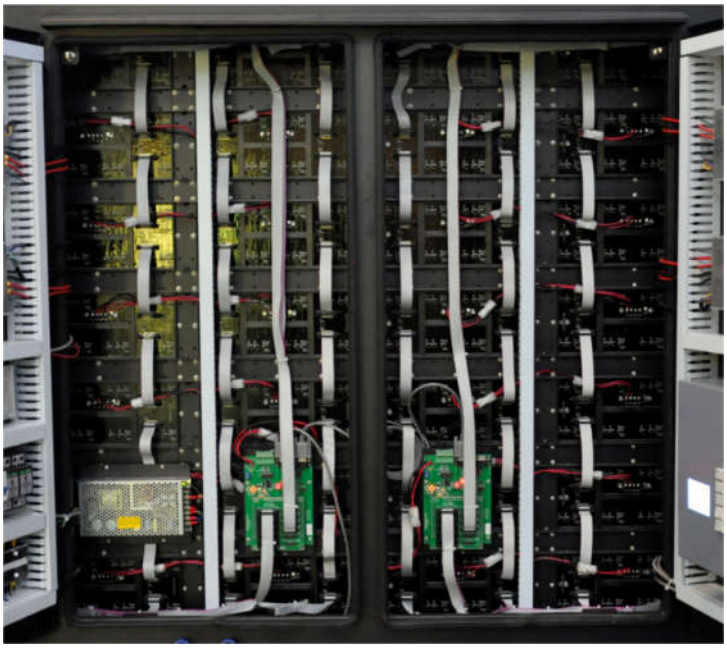


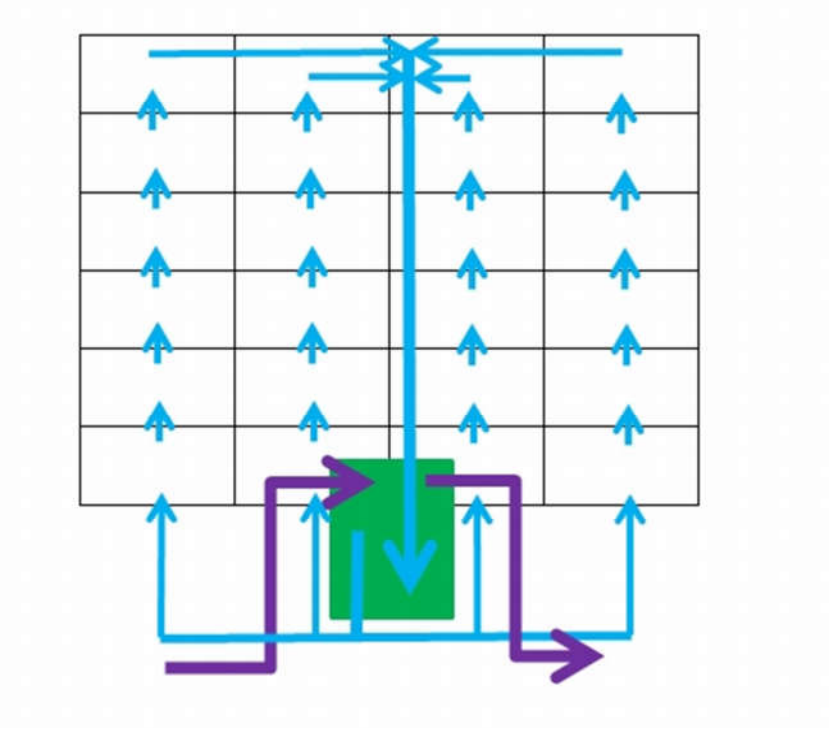
Interior Power Distribution



Interior Signal Distribution

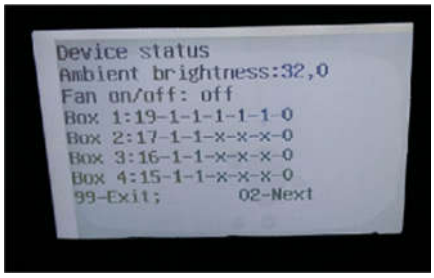
A CAT6 cable comes out from sending card (i.e. scanning card) in controlling box, connect into VMS cabinet, then to the receiving card inside VMS. Then ribbon cables come out from receiving card into each and every LED modules, and loop back to the receiving card in this VMS cabinet.

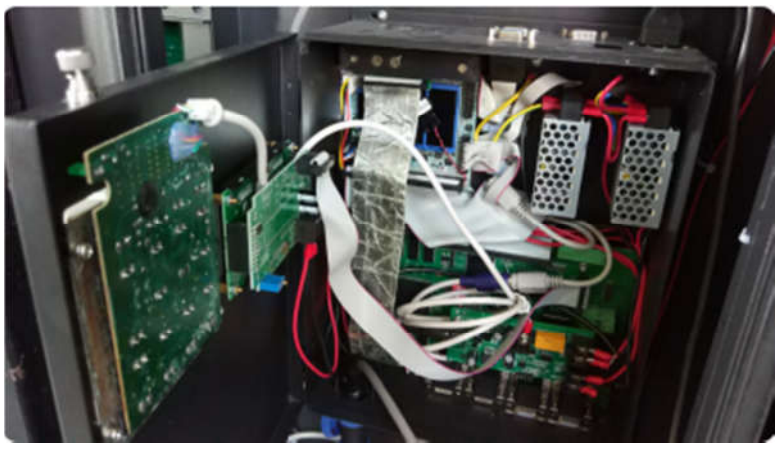




Data/signal cable distribution

Controller unit inside Controlling Box





The controller unit is an industrial grade PC (IPC).

The PCB is covered with conformal coating against humidity and corrosion as insulation layer to protect the PCB.

Communication ports: Ethernet (RJ45)

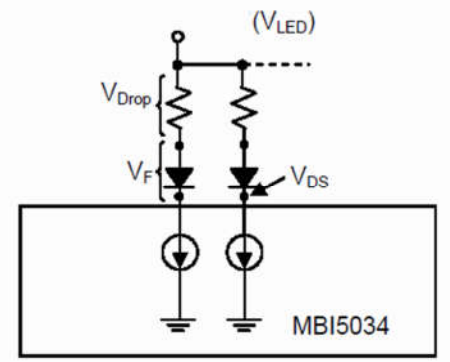
LED module Details

Inside the LED module, there are DIP LEDs mounted on FR-4 (Flam-resistant) grade double layer PCB, covered with polycarbonate cover. The heat from LED is dissipated from PCB and silicone during work, so it lowers the temperature inside LED, to ensure the lifespan of LED.

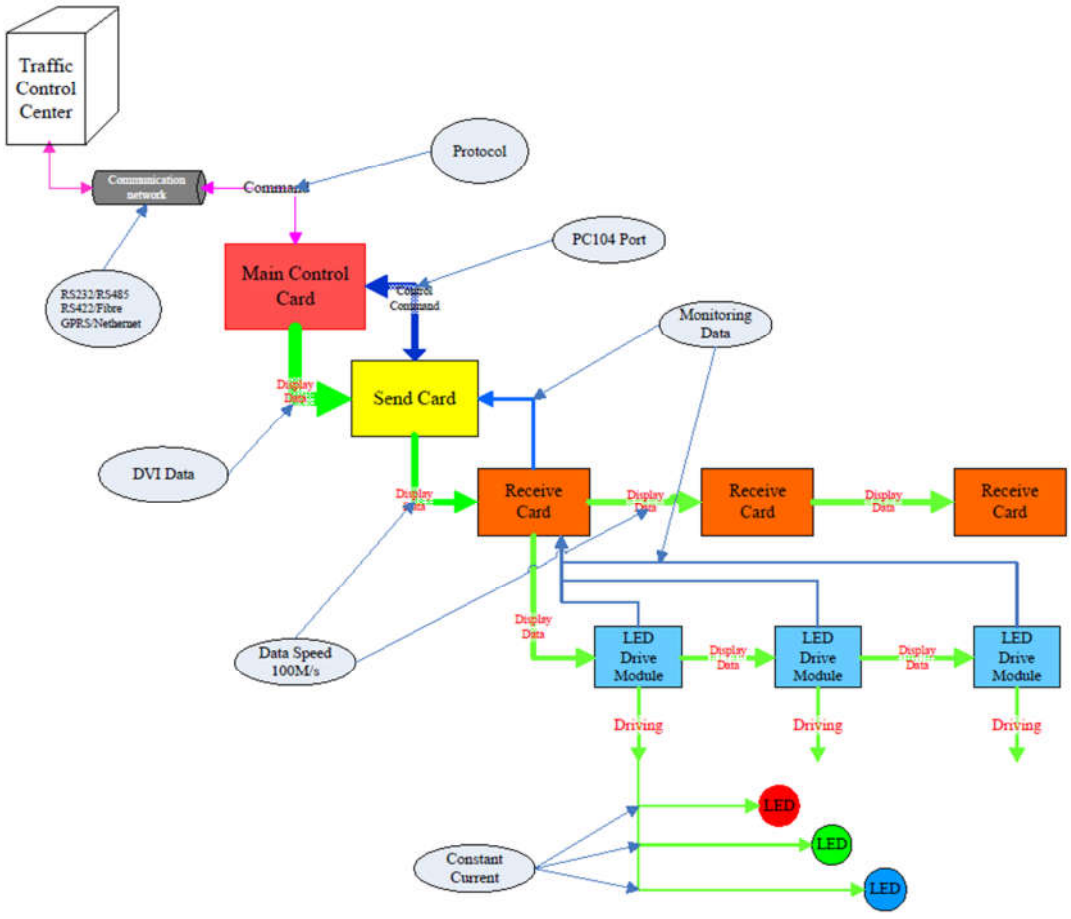
Driving Principle for LEDs

LED is driven by constant current IC on PCB of LED module, to ensure LED working on a constant condition so it would have long lifespan.

The constant current IC is made by Macroblock, model MBI5034.



Working Principle of Variable Message Signs



Storage Information

The VMS should be handled carefully during transportation and loading. Whether using crane or forklift, the VMS should not be crashed from any direction. While using crane to move the VMS, it is strongly suggested to put the hanging rings (i.e. lifting eyes) onto top of VMS cabient.

The VMS can be stored in -30℃~60℃, and it is suggested to stored in place of dry, without rain or corrosion substance. And the VMS should be placed as per the direction in label of upward.

Installation Information

Installation:

1. Preparation for the site:
1.1) The vehicle which carrying VMS and crane should be deployed on relevant positions near to where the VMS would be installed;
1.2) Before the installation begins, customer should close the involved lane(s) as per local laws and regulations;

2. Hanging and fixing:
2.1) Hang up the VMS cabinet(s) to gantry / cantilever / pole on site and fix them one by one with bolts, spring washer, flat washer and screw nuts.
2.2) In case of the VMS consists several cabinets, workers should adjust the cabinet's positions to ensure the flatness of display panel and the gap between cabinets should not affect the distance between pixel.
2.3) After fixing the VMS cabinets onto gantry / cantilever / pole, workers should prepare for connecting the wiring.

3. Connecting the wiring for power and data.
3.1) The power cable and data cable from outside should be connected into VMS cabinet via waterproof male/female plugs.
3.2) Connect the power cables and data cables between VMS cabinets (if any).
3.3) Check the wiring around power surge arrester and data surge arrester to see if the cable connection are fastened.
3.4) Clean the VMS cabinets after the above cables disconnected.

Cautions:

1) Worker should use the fasten parts/components as per design drawing to fix the bolts on VMS cabinets.
2) During installation, workers should handle the VMS cabinet carefully to prevent LED module or LED pixel on VMS front panel are crashed or damaged. In case of damage happens, workers should replace the damaged LED module after installation.
3) Workers should follow the local relevant regulations about safety during hanging up of VMS cabinet.
4) After installation, workers should clean the site and resume the traffic.

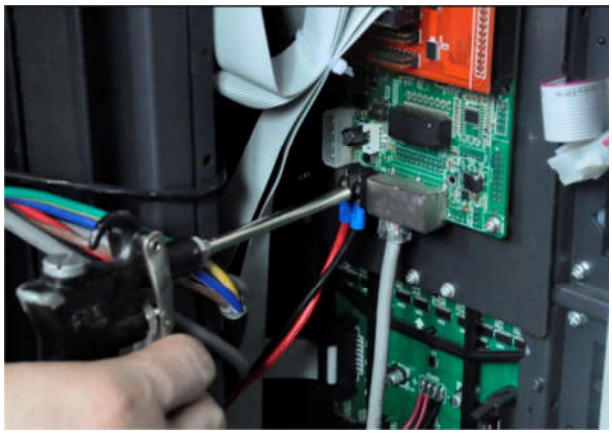
Maintenance Information

Routine maintenance is helpful to keep the VMS working in good condition and expend its lifespan:

1) Clean front panel of VMS cabinet.
When the VMS front panel (i.e. display area) is covered with heavy dirty dust or exhaust gas/oil from vehicles, worker can use high-pressure spray water and neutral abluent to wash the front panel until it is clean. This procedure can be carried out for every 6 months, depends on the site situation.

2) Clean rear side of VMS cabinet.
Worker can use high-pressure spray water to wash the rear side of VMS cabinet until it is clean. This procedure can be carried out for every year, depends on the site situation.

3) Clean dust inside VMS cabinet.
Worker can use dry high-pressure spray air to clean dust from electronic components and other parts inside VMS cabinet. This procedure can be carried out for every year, depends on the site situation. Especially for the controller unit, the terminal block, the power supplies and the LED modules.



Caution: The cleaning must be done only while the power is turned off for the VMS.

Procedures to replace LED modules

To replace LED modules or other parts inside VMS, first worker need to open the VMS cabinet from rear doors or front plate.

For receiving card, you just use screw driver to loose it out, then fix a new one onto same place after.

For LED module, you just need to use screw driver to loose the screws around that LED module (and keep the screws safely).

Then unplug the ribbon cables (i.e. signal cables) by hand, and push the LED module out to the front side.

Meanwhile, the power cables will keep connected with LED module as safety rope, so the LED module will not be dropped.

Then use hand to turn the LED module into a certain angle, then take it back from outfront side back into VMS cabinet, then unplug the power cable.

So you can take the LED module down.

Then you get the new module to connect/plug with power cable inside VMS cabinet.
Then push it out from the hole in VMS cabinet grid, to outfront side of VMS cabinet, then adjust its position by hand to fix back to the hole.

Then you fix the screws around LED module. Then plug the ribbon cables back to LED module.

And it is done.