

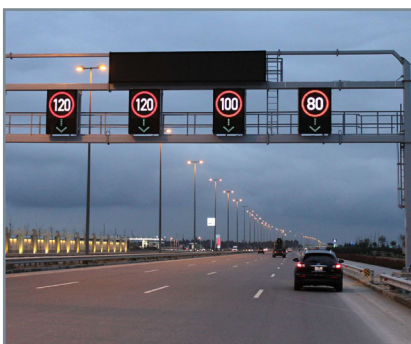
LED VARIABLE MESSAGE SIGN

PRECISION OPTIC LED SIGN TECHNOLOGY

SWARCO is the leading global supplier of high quality, full color LED variable message signs (VMS) for traffic guidance and information purposes. Over the last twenty years, SWARCO has developed the most reliable, energy efficient, and optically advanced sign technology. SWARCO has over 50,000 signs on the road today and over 100 million LEDs in the field. These signs are deployed in multiple countries and continents world wide, thriving in every weather extreme. The Precision Optic LED VMS is ready to excel in any of your transportation needs from your highways to your cities, guiding vehicles and warning drivers, enhancing mobility and keeping you safe.

THE SWARCO SOLUTION

SWARCO's Precision Optic LED VMS technology revolves around three main design standards: simplicity, quality, and efficiency. Precision Optic is simple because it has streamlined the VMS design, removing extraneous elements and creating internal systems that multi-task for maximum effectiveness. This simplicity in design leads to a quality and efficient VMS that out performs all other signs optically as well as sustainably, while still being cost competitive. Combining all three of these principles creates the most elegant VMS solution on the market today: a sign that displays the clearest image with a considerably low cost of ownership and exceptionally long life time for maximum utility.



Limited variable message sign, speed limit with integrated lane use signaling



Variable message sign, speed limit and warning signs



Combination limited / free programmable variable message sign, single color text lines with dual color graphical display

LED VARIABLE MESSAGE SIGNS

Key Benefits

Streamlined Innovation

- optics project, focus, and aim the LED light, while eliminating phantom light from low sun conditions at sunrise and sunset
- all three RGB diodes are mounted on to one Surface Mounted Diode (SMD) behind the Precision Optic lens
- LEDs run only at 6%-8%* of maximum current, achieving a 90% reduction of LED forward current
- With no front screen, SWARCO not only eliminates glare, but also energy consumption and maintenance costs associated with running defogging heaters and fans, without sacrificing protection or reliability

Quality Design

- targeted luminance, projecting light exactly where motorists need it, no wasted light where they don't
- photocell sensors adjust luminance, optimizing display quality in all ambient light conditions
- high definition capability with a pixel pitch as tight as 12mm (0.47")
- excellent color uniformity from any angle
- fabricated from light weight non-corrosive aluminum or stainless steel
- utilizing the highest quality SMD-LEDs from well established and trusted manufacturers
- attractive and modern design

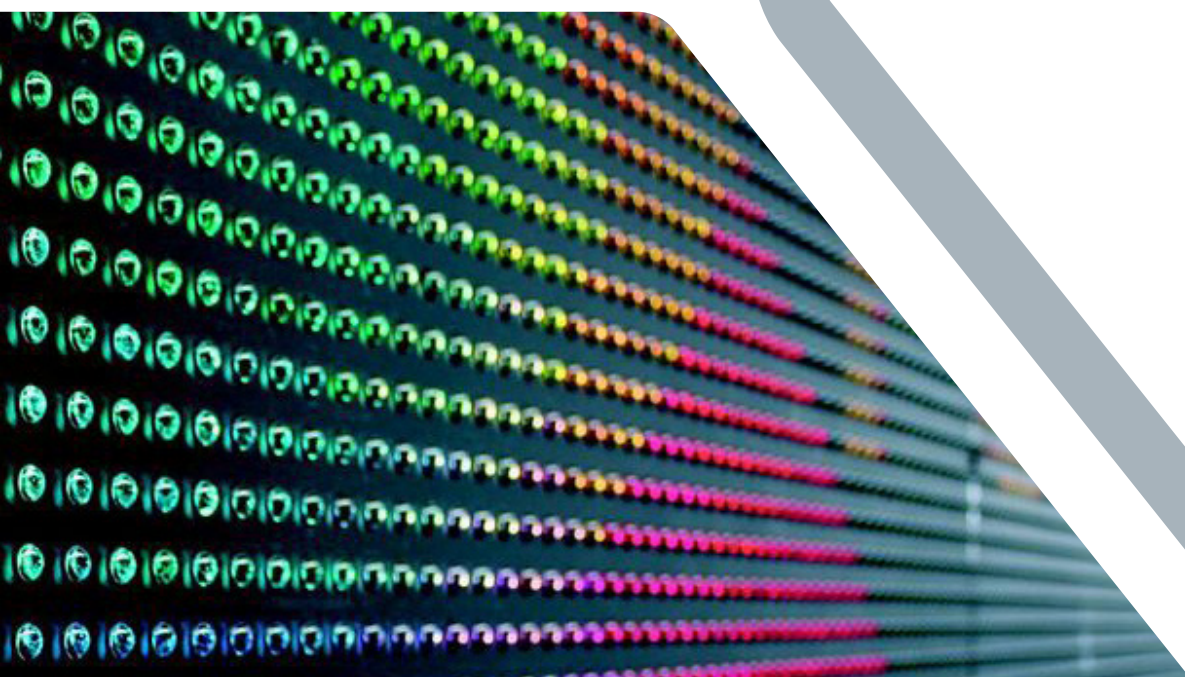
Reliability

- a pulse width modulated current, at a very low level, increases LED life time
- infrequent and easy maintenance, quickly replace most parts without tools
- negligible optical degradation during its 15 year plus life
- all LEDs are monitored continuously, even when off
- full traceability of all components in the internal data base
- top of the line power supplies for LED panels and controller

Custom Manufactured to Order

- full programmable/full matrix, line matrix, alphanumeric message, and limited (blank-out) signs available
- limited matrix and full programmable/full matrix

* based on a 20mm pp sign



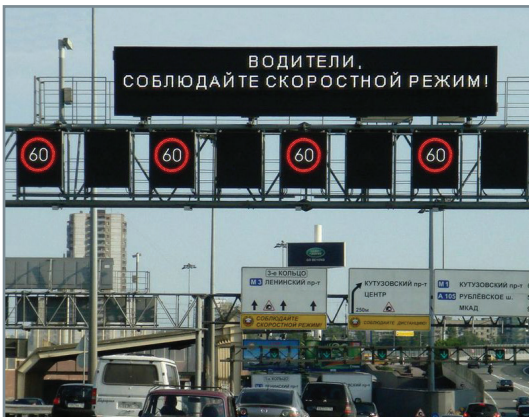
APPLICATION EXAMPLES



Free programmable amber walk-in sign
Pennsylvania, United States



Free programmable parking guidance display,
 full color RGB, 16 mm pixel pitch
United Kingdom



Free programmable variable message sign with
 variable speed limit signs
Russia



Variable message sign in tunnel, limited sign
 combination, "LIFE" lane control sign for mounting
 on tunnel ceiling (reduced total height)
Germany



Hybrid sign with limited and free programmable
 display in one housing
Sweden



Free programmable, full color RGB, walk-in sign,
 16 mm pixel pitch
The Netherlands

OUTSTANDING OPTICAL PERFORMANCE

SWARCO's Precision Optic technology is the next generation of full color VMS. These advancements feature cutting edge design, production, and performance, representing a new benchmark for LED VMS.

What Makes SWARCO Better?

- Integrated RGB-SMD technology, combined with SWARCO's Precision Optic lensing, creates the sharpest color on the market
 - Color palette mixes in the optics to create excellent uniformity
 - Balanced color across the entire display
 - Color stays vibrant and consistent from any angle
- Superior visibility and legibility for the highest definition VMS in North America
 - Highest contrast ratio on the market at 26.8*, over double the NEMA Standards at 10
 - Tightest pixel pitch available, ranging from 30mm to 12mm (the closest competitor only achieves 20mm)
- Unhindered legibility in direct sunlight
 - Precision Optics internally redirect low angle sunlight, eliminating phantom light
 - Front screen free design eliminates glare and dirt build-up without sacrificing durability
- The Precision Optics project light with a targeted luminance exactly where motorists need it
 - Downward and side angles at -10° vertical and $\pm 15^\circ$ horizontal
 - No wasted light projecting above street level, with only 5° above horizontal
 - 100% of the created light is harnessed by the Precision Optic, no light lost behind a front screen
- Robust lenses manufactured from only top quality material with UV inhibitors for best clarity and reliability

SWARCO Meets and Exceeds NEMA TS4 Standards

Precision Optic VMS

Luminance > 15,400 cd/m²*

Contrast Ratio: 26.8*

Cone of Vision:

Chromaticity:

Uniformity:

NEMA Standards

NEMA TS4: 12,400 cd/m²

NEMA TS4: 10

fully compliant

fully compliant

fully compliant

* based on a 20mm pp sign



Limited variable message sign, lane control signs



Free programmable variable message sign, full graphics, RGB, 16 mm pixel pitch

SUSTAINABILITY AND LONGEVITY

SWARCO's Precision Optic VMS features state of the art Eco-Design methods to craft a product that not only excels in optical performance, but also in energy efficiency and sustainability. The result is a longer lasting VMS with minimal degradation due to the low LED heat/stress.

INNOVATIVE ECO-DESIGN

- Precision Optic VMS uses exactly the energy that's needed
 - SWARCO signs' Surface Mounted Diodes (SMD-LEDs), which by design lower junction temperatures and increase heat dissipation, extend the life of the LEDs
 - Uses only ~6%-8%* of the specified maximum LED current
 - Uses only 20%-30% of the specified wattage of the power supply during normal operation and while under heightened power consumption never exceeds 50%
- The result: low LED heat and reduced system stress culminating in a longer lasting VMS

LONGEVITY BENEFITS

- Life time extends to 15 plus years
- Infrequent and easy routine maintenance
- Light output does not diminish over time
- SWARCO's VMS are successfully deployed in every weather extreme throughout the globe
- Top of the line power supplies from top of the line suppliers, never exceeding 50% of the rated capacity
- LEDs do not suffer from aging effects as a result of the very low LED forward current and low junction temps

SUSTAINABILITY BENEFITS

- Low total cost of ownership as a result of low energy consumption and low maintenance costs
- Up to 90% reduction in energy usage compared to competitors' signs
- Replacing a walkin sign with a SWARCO equivalent walkin VMS eliminates up to 25.5 tons of CO₂ in its lifetime
- Can operate in frigid climates as low as -40°F without requiring a heater
- Power optimization leads to low energy consumption in both operating and standby mode
- Can be powered by renewable energy sources (sun, wind, fuel cells)

* based on a 20mm pp sign



Limited variable message sign, dual color, integrated flashers
United Arab Emirates



Radar activated/limited variable message sign powered by a PV panel
Austria



Free programmable variable message sign, full graphics, RGB
Sweden

LED VARIABLE MESSAGE SIGNS

TECHNICAL DETAILS

Light source	High-Power-SMD-LEDs by renowned manufacturers
Housing	modular design principle, aluminum or stainless steel, Type 4 enclosure with optional powder coating
Humidity range	5% – 95% rel. humidity
Controller	<ul style="list-style-type: none"> ■ Embedded controller designed for industrial temperature range: -40 °F to 185 °F ■ Integrated fast access solid state data memory ■ High speed picture interface using latest type of Dual port RAM and FPGA technology ■ Number of colors: mono, bi-color, 3, 5, full color RGB
Interfaces	<ul style="list-style-type: none"> ■ RS485/RS422, Profibus, Profinet, Ethernet IP, WLAN, and others on request ■ TCP/IP connection via RJ45 ■ digital inputs ■ digital and analog sensors
Mounting options	"Z" bars, "C" channels, pipe clamps, other construction types on request
Protocols	NTCIP (latest version), FUTURITCOM 2, TLS 2002 / 2010, XDR/DAP, UTMIC, others on request
Optic	precision optical lens is sealed water tight into the front matrix
Pixel pitch (free programmable)	12 / 16 / 20 / 25 / 30 mm
Light distribution	horizontal ±15°; vertical +5° / - 10°
Matrix	anodized and coated aluminum
Power supply	80 - 265 VAC, 12 - 48 VDC, optional: photovoltaics, wind turbine, fuel cell
Maintenance access	easy maintenance access: walk in, rear access, or front access
Certification	UL, CSA, NEMA



UPCOMING VMS PROJECT?
 Ask your SWARCO Representative for a white paper or specifications to assist you in writing your bid documents.

Your local contact:

SWARCO TRAFFIC AMERICAS, LLC.

For over 30 years SWARCO has been a leading manufacturer of traffic safety products in America. Our continuous drive to provide excellent materials ensure that our products are always ranked as superior in the industry. The SWARCO Group offers a market-leading program in the fields of urban and interurban traffic management, including energy-saving LED traffic lights, intersection control, adaptive control of traffic flows, highway and tunnel guidance systems, and LED-based street lighting. Priority for public transport, parking guidance, state-of-the-art traffic telematics software and communication solutions as well as numerous services (installation, maintenance, project management) complement our portfolio. SWARCO is well known as a manufacturer and supplier of the full range of retroreflective road marking systems which include highly innovative and robust glass beads for perfect night time visibility of stripings. Road marking application know-how, consultancy, and on-site services are an integral part of our customer oriented partnership approach. **Talk to us first.**