VF-2360 VARIABLE MESSAGE SIGNS
APPLICATION GUIDE & DISPLAY CATALOG

DAKTRONICS

CONTENTS

OUR COMMITMENT

Increasing the efficiency, intelligent mobility and safety of roadways is at the top of everyone's list. We're here to help you do just that. We're committed to delivering the most cutting-edge, reliable products and services we can offer to the Intelligent Transportation System (ITS) industry.

We always want your drivers to be informed, making their commute safer and simpler. We do this by providing you with high resolution, full-colour variable message signs that meet EN12966 standards. Our signs are designed with maintenance and reliability in mind and feature front and rear access, allowing for flexible installation access and service. They feature IP67 components to withstand harsh environments for the lifetime of the product.

Experience it for yourself! Daktronics Ireland is delighted to extend an invitation to you to visit our transportation development and production facility in Ennistymon in Ireland. The visit is an opportunity to learn about evolving technologies in the transportation display market with a particular focus on Intelligent Transportation Systems (ITS). We'll introduce you to the Daktronics organisation through presentations by our technical teams and demonstrations of various Intelligent Transportation System (ITS) displays. For more information on Daktronics, please visit **daktronics.com/Ireland** or call us at +353 65 7072600 to schedule a visit.

Paul Neville
General Manager
Daktronics Ireland

GLOBAL

Global means more than shipping product to countries around the world or opening offices in Europe, Asia or South America. Our customers are our neighbors. We succeed in the global marketplace because our customer focus is applied universally, across countries and cultures.

IMPACTFUL

Throughout the world, audiences of every type are impacted through Daktronics diverse product lineup. Every day our products improve travel, entertain audiences, drive revenues and influence customers. No matter the stage, our commitment to creating solutions that leave a lasting impression is unwavering.

INNOVATIVE

Through conversations with our customers and an understanding of the markets we serve, Daktronics technology is designed and advanced to suit our customer needs. In fact, our first scoreboard was the result of a coach's idea to improve his sport. We continuously innovate and improve our products to stay on top of our game.

TECHNICAL

To provide our customers with great products and services, we employ a team of smart, gifted and talented people. We are experts in our industry with a technical specialty that helps us strive to continually provide better solutions for our customers. For that reason, we celebrate our techiness.

Daktronics was founded in 1968 as a USA based manufacturing company and has grown into the world leader in audio-visual systems and implementation with offices around the globe.

★ Sales Office

★ Manufacturing Facility

100,000
Square meters of manufacturing space

65,000+
Transportation displays worldwide

21,000+
VMS/DMS installation base

550+
Engineers on staff, out of nearly 2,700 employees around the globe

120
Countries with products installed

50
Years of experience

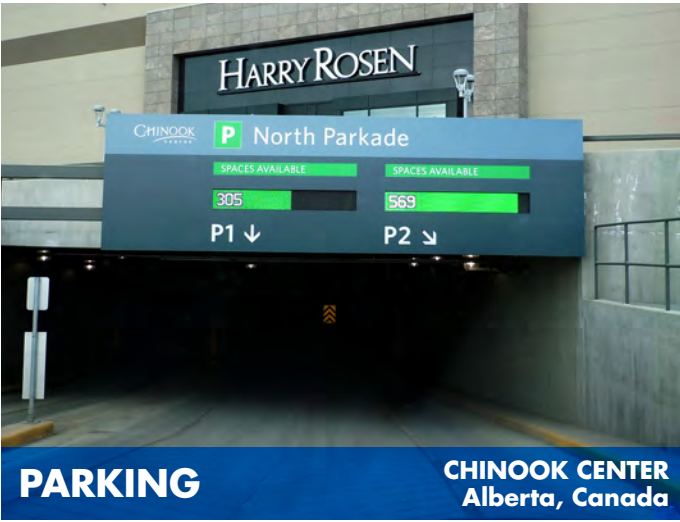## 4%
Annual revenue dedicated to research and development

AIRPORTS — LAX, California, USA

PUBLIC TRANSPORT — SEPTA, Pennsylvania, USA

PARKING — CHINOOK CENTER, Alberta, Canada

SPORT — WEMBLEY STADIUM, United Kingdom

COMMERCIAL — PICCADILLY CIRCUS, United Kingdom

ADVERTISING — JC DECAUX, United Kingdom

KING FAHD CAUSEWAY AUTHORITY
Bahrain

EUROTUNNEL
United Kingdom & France

ALMERE
Netherlands

BAHRAIN

The King Fahd Causeway displays are installed on the Highway between Saudi Arabia and Bahrain. The Causeway is 25km long and was built to foster closer relations between the neighbouring Kingdoms. This thoroughfare is managed by the King Fahd Causeway Authority and the signs are used to provide information for travelers entering the state of Bahrain or returning to Saudi Arabia. The displays are based on 12 mm pitch RGB LEDs and are capable of displaying video, images as well as service messages. The displays are also capable of displaying RSS feeds.

RIYADH
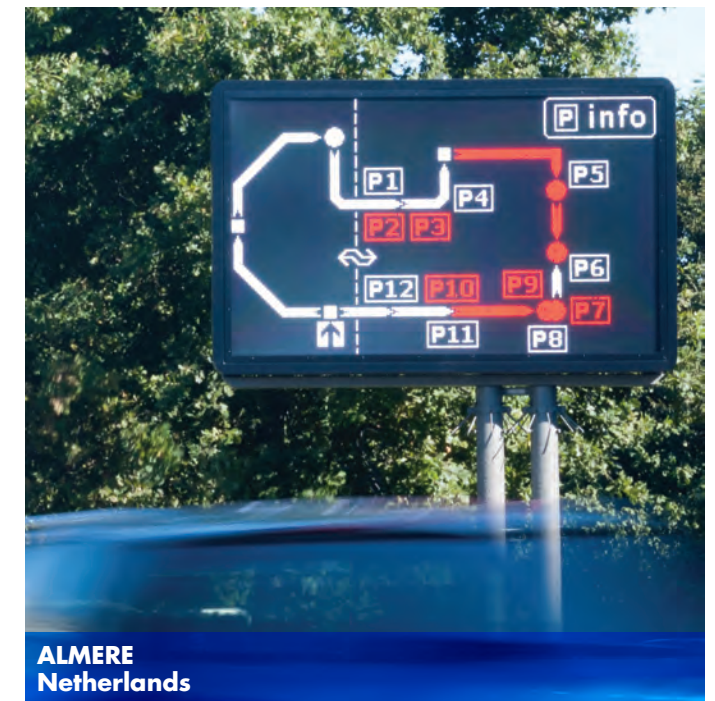**Saudi Arabia**

LIMERICK TUNNEL
Ireland

SAUDI ARABIA

These displays were provided to the Ministry of Transport in Saudi Arabia and they are used through the road network of the city of Riyadh.

They are used mainly as lane indicators to enable commuters take up correct road positions for their chosen destinations and are controlled by Daktronics Vanguard software. The displays are RGB and operate consistently in the demanding temperatures of the Saudi Arabia capital.

CITY OF NIJMEGEN
The Netherlands

E-470 PUBLIC HIGHWAY AUTHORITY
Colorado, USA

INTERURBAN TRAFFIC MANAGEMENT

Managing interurban networks spanning many hundreds of kilometers can be challenging. Intelligent Transportation Systems help eliminate this challenge by giving motorists timely travel information.

HIGHWAYS ENGLAND
United Kingdom

URBAN TRAFFIC MANAGEMENT

Managing traffic as it flows into your city's core is more important than ever with the increasing volume of traffic on our roads. It is important for motorists to receive real time information to allow them to make informed decisions.

Intelligent Transportation Systems increase the efficiency of the road network resulting in improved traffic flow and reduced commuter frustration.

TILBURG
Netherlands

DUBLIN CITY COUNCIL
Ireland

VARIABLE SPEED LIMIT

As traffic congestion increases—especially during rush hours—ATM systems communicate a reduced, variable speed limit on lane control signs. This practice provides a consistent traffic flow and reduces the shockwave effect and panic braking.

LANE MANAGEMENT

Using recognizable symbols and text over assigned lanes, agencies can divert traffic around construction zones or traffic incidents. In addition, these displays can effectively organize traffic by assigning speed limits to each lane.
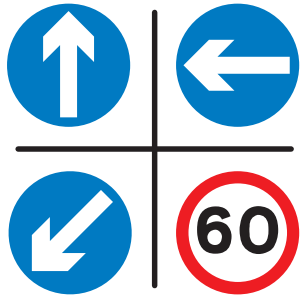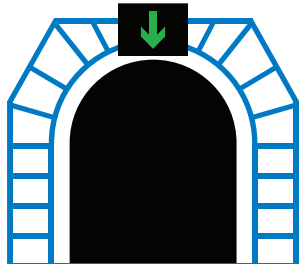
TRAVEL TIME

Utilizing the same sensor data applied for speed harmonizing, agencies can also provide convenient travel times to popular intersections or destinations—allowing motorists to make informed decisions.

WEATHER CONDITIONS

Weather can change in an instant. Prepare motorists for constantly changing weather and provide locations of shelter or places to pull over. Travel alerts provide valuable information, helping motorists make the best decisions for a safe journey.

INCIDENT MANAGEMENT

Typically applied to divert traffic around construction zones, major congestion or accidents, queue warnings quickly and clearly communicate actionable instructions and lane statuses as conditions change.

TUNNEL MANAGEMENT

When height and width restrictions apply, alert traffic to upcoming tunnels for easy exiting departures or route planning. Roads need constant maintenance. Share upcoming construction information to keep workers and travelers safe.
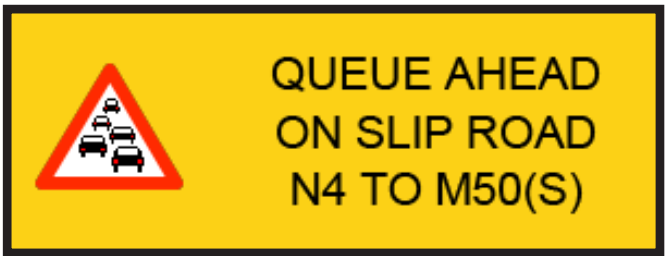
AIDED COMPREHENSION

Colour can be used to indicate warnings and changes in road conditions, and to differentiate between roads. Many different types of messages are reinforced using recognizable colours and road signs. See the comparison to traditional amber LED VMS below.

"To be effective, a VMS must communicate a meaningful message that can be read and comprehended by motorists within a very short period of time."

Texas Transportation Institute

REDUCED FRAMES

High resolution full colour VMS can also help reduce the number of frames required to convey an important message. Combining text and graphics can shorten a message to one easy-to-read graphical frame.

BENEFITS OF GRAPHICS

When using graphics on your VMS, full colour improves reaction time even farther. Comprehension time for messages with graphics improves and recognition increases among non-native English speakers and older drivers. Due to this and enhanced legibility, full-color VMS have the potential to make roads safer. These signs display more than 32,000 colours using high-quality LEDs, while the full-colour technology reduces the time required for motorists to recognize a message. See the reproduced traffic symbols below.

"Compared with text-only messages, the graphic-aided messages could be identified easier, quicker and from a further distance; seen better under adverse viewing conditions; and understood better by people who cannot understand the language in the text."

Hesar, Wang and Collyer
University of Rhode Island Study on Adding Graphics to Dynamic Message Sign Messages
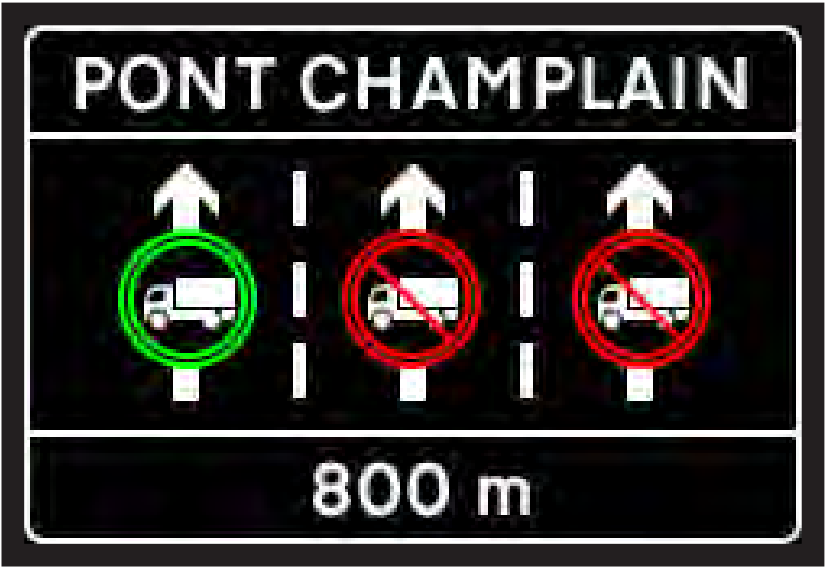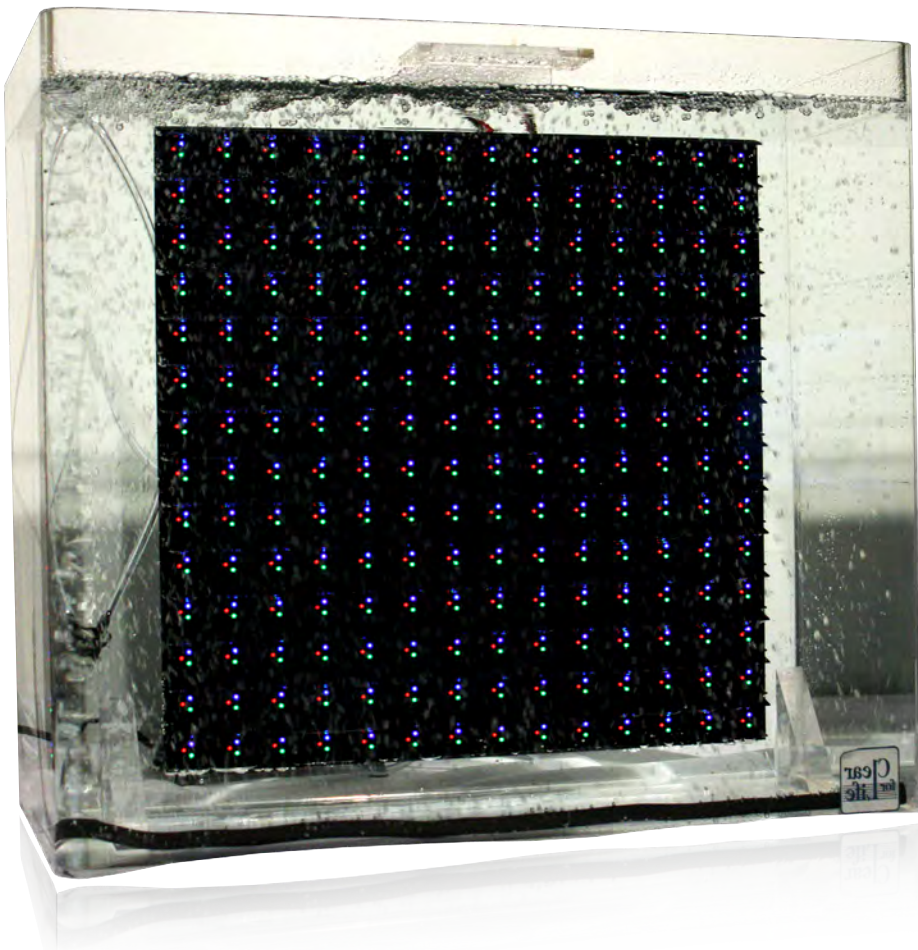
TEXT SIZE

The table to the left will help determine the appropriate character size for a display based on viewing distance or the speed at which viewers may be traveling. Viewing times are in seconds. Contact a Daktronics representative for help in determining what text size best fits your needs.

MAX. VIEWING DISTANCE	MIN. TEXT HEIGHT	KPH						
		25	40	55	70	90	105	120
91 m	152 mm	13.7	8.2					
137 m	229 mm	20.5	12.3	8.8				
198 m	305 mm	29.7	17.8	12.7	9.9			
335 m	457 mm	41.1	24.6	17.5	13.7	11.2	9.5	8.2

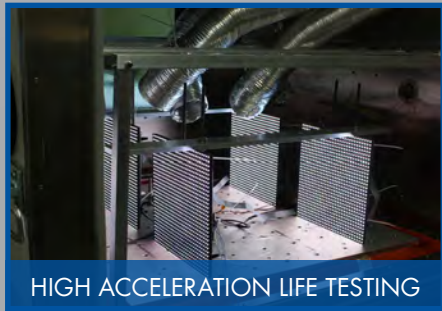Shaded areas indicate adequate viewing time (seconds).

ENVIRONMENTAL TESTING TO BOLD NEW HEIGHTS

With some of the longest lasting displays still surviving the environment today, Daktronics engineers put as much craft and effort into testing the products as they do in designing them. Our team uses a state-of-the-art product reliability laboratory to test products past the point of failure. The testing includes punishing salt and fog chambers that exaggerate the corrosive effects of coastal precipitation to blistering environmental simulators that mimic extreme climate changes. The results are used to make product improvements that ultimately lead to superior products that are built for years to come.
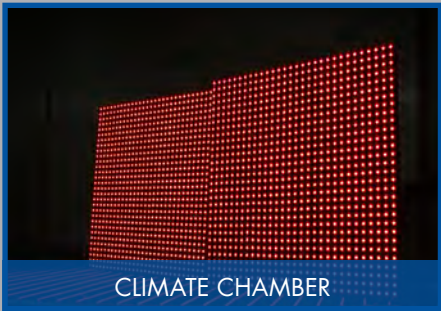
IP VALIDATION

To assure that Daktronics products can hold tough against even the harshest weather, reliability lab technicians perform IP (Ingress Protection) testing to assure proper defense against water and dust intrusion. Using high-pressure water jets, reliability lab technicians drench entire display enclosures with up to 100 liters (26 gallons) of water per minute from multiple angles to make sure that moisture cannot and will not interfere with critical components.

HIGH ACCELERATION LIFE TESTING

CLIMATE CHAMBER

ENVIRONMENTAL SIMULATION

LED BRIGHTNESS TESTING

THERMAL SHOCK CHAMBER

SALT FOG CHAMBER

1 THE NEXT GENERATION IN ENVIRONMENTAL TESTING
A punishing combination of extreme temperature changes and intense mechanical vibrations to stress a product to complete failure, providing valuable insight into a product's estimated lifetime.

2 TESTING COMPONENTS AGAINST COLD, HEAT AND HUMIDITY
For component-level environmental testing, our climate chamber analyzes component performance levels under a variety of extreme climatic conditions.

3 DISPLAY-LEVEL ENVIRONMENTAL TESTING
While module-level testing provides crucial information on individual component performance, Daktronics technicians use a massive environmental chamber to put entire video boards through a variety of stress tests before product release.

4 MEASURING LIGHT OUTPUT
Our integrating sphere measures the light output of LEDs. The machine is designed in a sphere shape to gather data on LED light output from all angles, giving us a complete picture of LED performance.

5 PROLONGED EXPOSURE TO EXTREME TEMPERATURES
While exaggerated climate testing provides valuable data on product performance, Daktronics technicians do not overlook the grueling effects of long-term temperature shock.

6 MEASURING THE CORROSIVE EFFECTS OF SALTY PRECIPITATION
While extreme temperature shifts and intense humidity can meddle with a product's long-term performance, prolonged exposure to salty coastal air can cause just as much trouble, promoting corrosion within unprotected components.
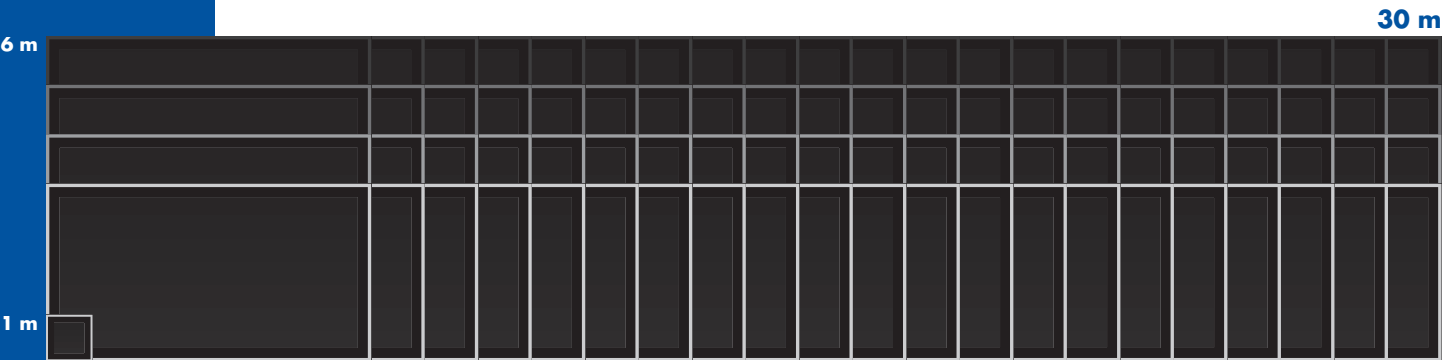
FRONT/REAR ACCESS VARIABLE MESSAGE SIGN
16 mm and 20 mm HIGH RESOLUTION

Engineered and manufactured by the worldwide leader of high quality LED dynamic signage for a wide variety of transportation applications, this modular design concept features IP67 encapsulated high contrast technology allowing the reduction of the "greenhouse effect" traditional in most lens technology, along with benefits of eliminating the need for internal defog systems. The innovative display housing allows quick and simple access with the ability to remove components from either the front or rear during maintenance activities.

The VMS is supported with a wide range of highly redundant systems that provide the agency with superior up time, high reliability, while minimizing costly reactive service events. The VMS has several monitoring features including the ability to remotely report, diagnose, and communicate component failures to service personnel for routinely planned maintenance activities.

✓ EN-12966

These displays are available in a range of sizes from 1x1 m to 6x30 m in both 16 mm and 20 mm.

LANE CONTROL SIGN
16 mm and 20 mm HIGH RESOLUTION

Daktronics lane control signs advise and direct specific lanes of traffic in an ATM system. The modular design concept features IP67 encapsulated high contrast technology allowing the reduction of the "greenhouse effect" traditional in most lens technology, along with benefits of eliminating the need for internal defog systems.

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✓ EN-12966

*Images not to scale

Recommended lane control signs range from 1x1 m to 2x3 m as shown.

THE DIFFERENCE

Daktronics creates your display solution using a team of industry and technology experts to ensure the product delivered is tailored to your expectations.
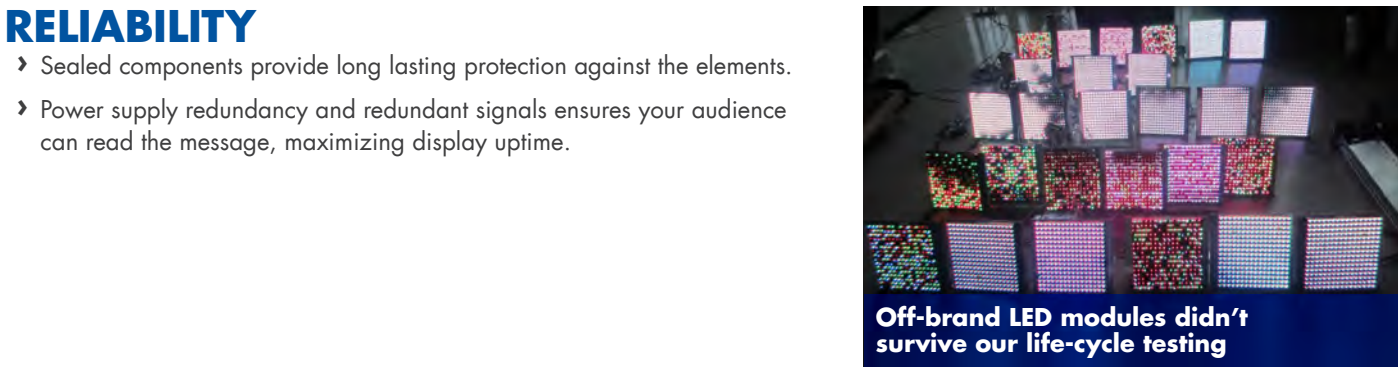
We take pride in our product and develop solutions that turn your location into a landmark and that philosophy continues with the introduction of our Vanguard VF-2360 series. Developed specifically for the global transportation market, it provides a **flexible**, **reliable** and **serviceable** solution. Using the highest quality LEDs available, the Vanguard displays showcases crisp, vibrant images, and ensures that your messages capture attention and resonate with your audience.

FLEXIBILITY

› Variable display sizes to meet your needs, ranging from 1x1 meter to 6x30 meters.

› Variety of mounting options allows for attachment to any structure.

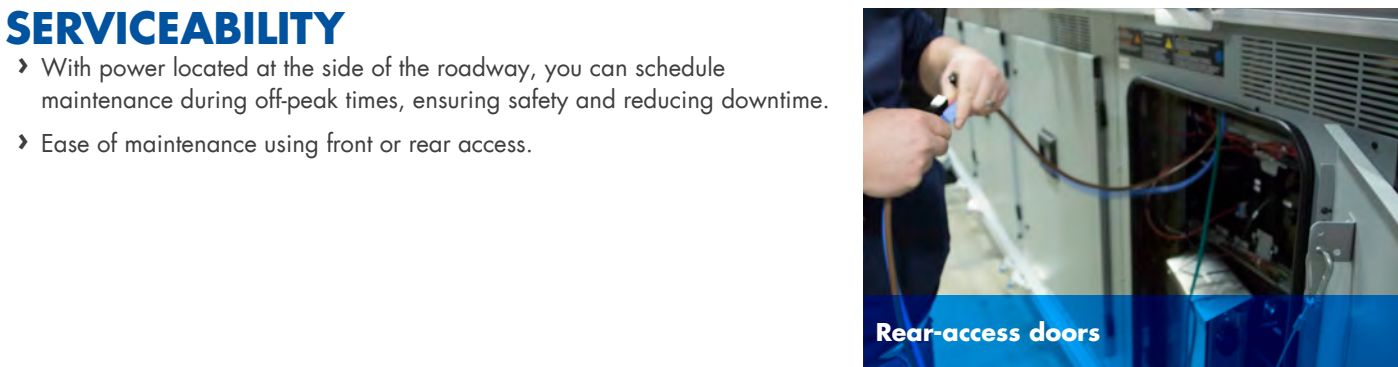› Manage up to 8 signs from one controller for convenient operation.

RELIABILITY

› Sealed components provide long lasting protection against the elements.

› Power supply redundancy and redundant signals ensures your audience can read the message, maximizing display uptime.

Off-brand LED modules didn't survive our life-cycle testing

Entire section eliminated without redundant signal path

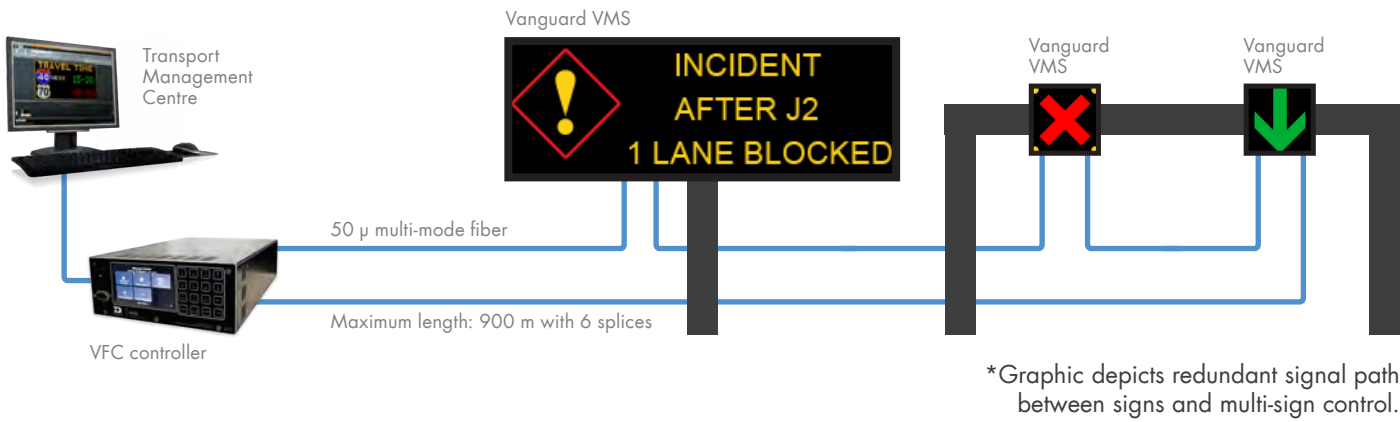Redundant signal path minimizes loss of critical information

SERVICEABILITY

› With power located at the side of the roadway, you can schedule maintenance during off-peak times, ensuring safety and reducing downtime.

› Ease of maintenance using front or rear access.

Rear-access doors

MULTI-SIGN CONTROL

Vanguard controllers and sensor networks for Variable Message Signs (VMS) provide several functions that allow for better sign control and reliability. Multi-sign control allows users to manage several signs from one controller while providing redundant signal paths in the event of a single line failure.

The Vanguard® controller can manage up to eight signs, reducing the number of controllers required to manage several signs. A multi-sign system greatly reduces space with the traffic cabinet, the enclosure that houses the controller and other components. Although the signs are managed through a single piece of hardware, each sign works independently of the other signs.

Transport Management Centre

Vanguard VMS

INCIDENT
AFTER J2
1 LANE BLOCKED

Vanguard VMS

Vanguard VMS

50 µ multi-mode fiber

VFC controller

Maximum length: 900 m with 6 splices

*Graphic depicts redundant signal path between signs and multi-sign control.

FLORIDA TURNPIKE
Florida, USA

VFC SIGN CONTROLLER

Daktronics offers the most powerful and easy-to-use VMS controllers in the industry. The Vanguard VFC is a reliable, feature-rich, high-performance controller unit that sets the standard for quality, features and maintainability. This state-of-the-art VMS controller simplifies system installation and operation.

Dimensions:
88 mm x 222 mm x 305 mm
(3.4" H x 8.75" W x 12" D)

Weight:
5 kg (11 lbs)

Power:
120/240 VAC, 50 or 60 Hz,
65 W max.

Operating Temperatures:
-37° C to +74° C
(-34° F to +165° F)

KEY FEATURES AND BENEFITS:
> Interactive, menu-driven front panel with keypad and backlit full-colour LCD and status indicators are easy to read and use
> Integrated surge protection for communication signals and power prevents damage to communication ports
> Real-time monitoring of display and all electronic subsystems allows immediate reaction to sign issues
> Redundant fiber-optic signal path provides reliability and eliminates electromagnetic interference
> EN-12966 compliance and testing ensure performance even in harsh environmental conditions
> Multiple sign control for up to 8 VMS adds flexibility when cabinet space is at a premium
> The controller mounts side-by-side in standard 19-inch equipment cabinet rack (2RU)
> Integrated Ethernet and serial ports simplify integration
> Allows simple integration with any VMS system

EN-12966

VMS SOFTWARE

Vanguard Version 4 offers robust control of Variable Message Signs (VMS). Vanguard v4 is available in two versions: Standard for field technicians, and Professional for traffic management centers.

KEY FEATURES AND BENEFITS:
> Complete message creation, playback tools, pixel-level diagnostics
> Trusted as a VMS system management tool
> Intuitive interface

Vanguard v4 Standard Component-Level Diagnostics

Vanguard v4 Standard Pixel Test

Vanguard v4 Professional Content Studio

Vanguard v4 Professional Display Monitor

> Standard: offers test patterns, editing tools and full diagnostics
> Professional: provides client-server architecture, advanced Content Studio (fonts and pre-designed graphics)
> Security: user profiles with passwords, real-time display status
> Daktronics provides instant Internet updates, allows precautionary measures

DAKTRONICS TRANSPORTATION ONLINE

Visit **daktronics.com/transportation** to find more information about our products and applications. We've assembled material to help you understand our products and VMS technology in general, including:

> The VMS 101 section with basic information and tips regarding VMS technology
> An extensive photo gallery of ITS projects
> Usage examples for many ITS applications

> *"Daktronics has been a reliable supply partner of Transport Infrastructure Ireland for many years. Daktronics not only give us constant support; they continue to assist us with their technical expertise to ensure our signs are working to their full potential."*

David Laoide-Kemp
Senior Engineer - Intelligent Transport Systems
Transport Infrastructure Ireland
Dublin, Ireland

We stand by our products and help our customers after the sale and installation is complete. To best serve the life of your display, Daktronics offers you a variety of service packages available to suit your needs. These packages ensure that no matter what happens, from installation to troubleshooting to display maintenance and upkeep, we've got you covered.

If you ever encounter an issue, we provide on-site field service support, web-based support and 24/7 phone support, all with highly trained individuals who are ready to help.

BENEFITS OF A SERVICE AGREEMENT

> Protects investment
> Helps maintain the visual quality of the display
> Confirms proper installation techniques
> Priority service
> Energy efficiency
> Optimum display performance
> Piece of mind
> Fixed budgetary costs
> 24-hour service options

Live support is available 24/7, provided by customer service representatives and our technical operations group.

SERVICE AGREEMENTS OFFER

> Parts coverage
> Technical Help Desk 24/7, 365
> Weekend on-call solutions
> On-site parts inventory management
> On-site scheduled services
> Repair and return parts

1 DISPLAY SERVICES
Preventative and responsive service to ensure your display is up and running correctly.
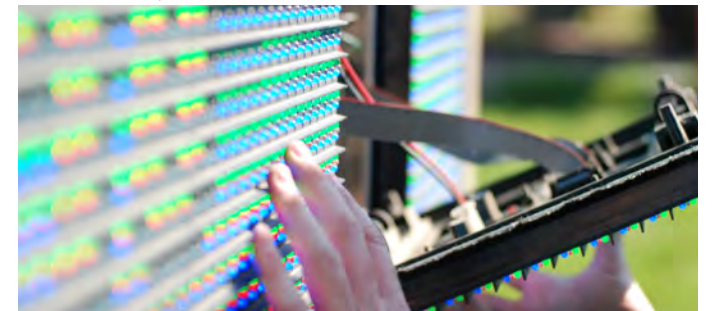
2 PHONE & WEB SUPPORT
Find answers to any question, conveniently available 24/7.

3 REPLACEMENT
Quick and convenient replacement of stock components in need of repair.

4 UPGRADES
As technology improves, upgrades will be available to ensure the best system for crunch time.

6 PROFESSIONAL SERVICES
Daktronics offers multiple services in addition to the display installation and servicing, including content creation, event production, training and consulting.

5 TRAINING
Give production and maintenance staff the foundation for a great presentation with on-site and web-based trainings.

★ **GLOBAL** HEADQUARTERS

★ **MANUFACTURING** LOCATIONS

★ **REGIONAL** OFFICES

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*Numerous Solutions Partners and Authorized Service Companies throughout the world.

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