QVN-1000 SERIES

DAKT-0203-13

DISPLAY MANUAL

P2082

DD3973761
Rev 01
07 February 2020

201 Daktronics Drive
Brookings, SD 57006-5128
www.daktronics.com/support
800.325.8766

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FCC Statement

Supplier Declaration of Conformity (SDoC)

This product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Warning: The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Industry Canada Regulatory Information

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Inquiries

Contact Daktronics with any questions regarding our product compliance.

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Table of Contents

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1 Introduction

How to Use This Manual

This manual explains the installation, maintenance, and troubleshooting of this video display system. For additional information regarding the safety, installation, operation, or service of this system, refer to the telephone numbers listed in **Daktronics Exchange and Repair & Return Programs (p.7)**. This manual contains only generic installation topics and is not specific to a particular installation. Contract-specific information takes precedence over any general information found in this manual.

Daktronics identifies manuals by the DD number located on the cover page of each manual. For example, this manual would be referred to as **DD3973761**.

Numbering Conventions

Drawing Numbers

Figure 1 illustrates a Daktronics drawing label. This manual refers to drawings by listing the last set of digits. In the example, the drawing would be referred to as **DWG-3983388**.

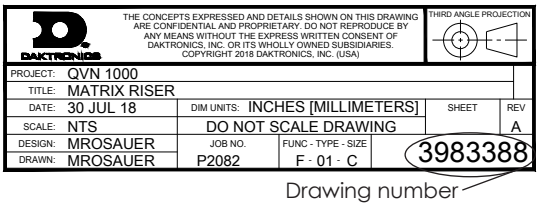

Figure 1: *Drawing Label*

All references to drawing numbers, appendices, figures, or other manuals are presented in bold typeface, as shown in the example below:

> Refer to **DWG-3983388** in **Appendix B: Reference Drawings (p.13)** for the locations of internal display components.

Part Numbers

Most display components within a display carry a white label that lists the part number. The component part number uses the following format: 0A-XXXX-XXXX (multi-component assembly) or 0P-XXXX-XXXX (display interface board). **Daktronics Exchange and Repair & Return Programs (p.7)** contains the Daktronics Exchange Policy as well as the Repair & Return Program. Refer to these instructions if any display components need replacing or repairing. If an interface board or assembly is not found in the replacement parts list in **Replacement Parts List (p.7)**, use the label to order a replacement. **Figure 2** illustrates a typical label. The part number is in bold.

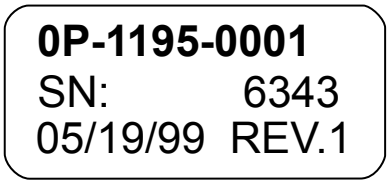

Figure 2: *Typical Label*

Part Type	Part Example	Part Number
Assembly	Display interface board and its mounting plate or bracket	0A-XXXX-XXXX
Individual display interface board	ProLink Router (PLR)	0P-XXXX-XXXX
Wire or cable	SATA cable	W-XXXX

Module Numbers

Figure 3 explains the module labeling method in more detail, and **Figure 4** illustrates how Daktronics numbers modules on a video display.

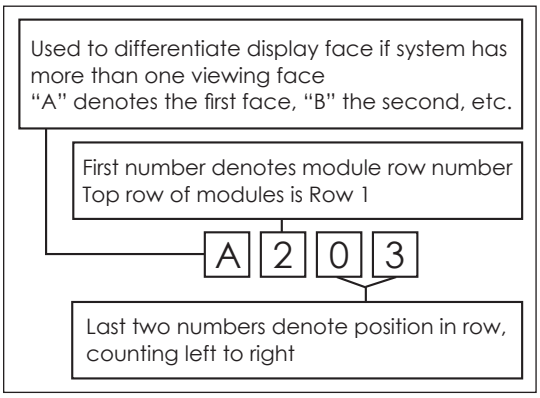

Figure 3: *Module Numbering Breakdown*

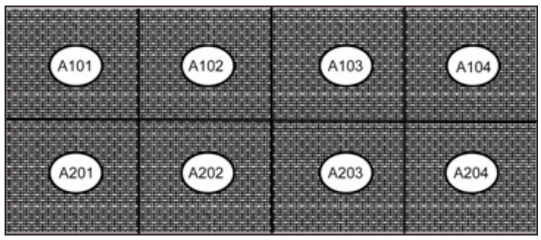

Figure 4: *Module Numbering*

Model Numbers

Each video display system has a model number that explains the display specifications.

QVN-1000-2.9/3.9/5.9MN-HHHxWWW		
QVN	=	Product series
1000	=	Product generation
2.9/3.9/5.9MN	=	Pixel pitch/layout
HHH	=	Matrix height
WWW	=	Matrix width

Important Safeguards

- Read and understand the installation instructions before beginning the installation process.
- Do not drop the control equipment or allow it to get wet.
- Do not disassemble the control equipment or electronic controls of the display; failure to follow this safeguard will make the warranty null and void.
- Disconnect the display power when not in use or when servicing.
- Disconnect the display power before servicing the power supplies to avoid electrical shock. The power supplies run on high voltage and may cause injury if touched while powered.

2 Warnings/Disclaimers

Review the reference documents and drawings in **Appendix A: Reference Documents (p.11)** and **Appendix B: Reference Drawings (p.13)** prior to installation as well as during the installation process.

Display

Daktronics engineering staff must approve any changes that may affect the strength or protective integrity of the display frame or enclosures. If any modifications of this nature are made, detailed drawings of the change(s) must be submitted to Daktronics engineering staff for evaluation and approval, or the warranty will be null and void.

Displays must be lifted appropriately to ensure the display sections will not be damaged. It is the installer's responsibility to ensure the installation meets all local codes and standards. All hardware processes used during display installation must meet the approved, stamped drawings from a professional engineer.

The display is intended to be installed in accordance with the requirements of Article 600 of the National Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.

Only qualified individuals should access the electrical components of this display and its associated equipment.

Structure

It is the installer's responsibility to ensure the mounting structure and hardware are built per the stamped engineering drawings and are capable of supporting the display prior to beginning the installation.

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3 Glossary

Light emitting diode (LED): a low energy, high intensity lighting unit.

Pixel: the smallest single point of light on a display that can be turned on and off. For LED displays a pixel is the smallest block of light emitting devices that can generate all available colors.

Power supply: a device that converts AC line voltage from the termination panel to low DC voltage for one or more module driver boards. One power supply may power multiple modules.

Termination block: an electrical point usually used to connect internal power and signal wires to wires of the same type coming into the display from an external source.

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4 Replacement Parts

Replacement Parts List

Part Description	Part Number
Jumper; SJTW 3x14 AWG with YM20 Plug @ 2, Horizontal, 3.9 NL	0A-1995-3309
Jumper; SJTW 3x14 AWG with YM20 Plug @ 2, Vertical, 3.9 NL	0A-1995-3311
Jumper; Cat5E, RJ45 Male-to-RJ45 Male, Horizontal, 3.9 NL	0A-1995-3312
Jumper; Cat5E, RJ45 Male-to-RJ45 Male, Vertical, 3.9 NL	0A-1995-3313
Harness Assembly; 14 AWG, E-1217 to Bare	0A-2087-3326
Harness Assembly; 14 AWG THHN, RT-to-YM20, L	0A-2087-3327
Harness Assembly; 14 AWG THHN, RT-to-YM20, R	0A-2087-3328
Harness Assembly; 14 AWG THHN, Bonding	0A-2087-3329
Harness Assembly; 18 AWG, RT to RT	0A-2087-3330
Module-SC73.64PKI0V-T00-3.91MN-BM 3N1-64x64-Left	0A-2089-3201
Module-SC73.64PKI0V-T00-3.91MN-BM 3N1-64x64-Right	0A-2089-3202
Module-SC73.64PKI0V-T00-5.95MN-BM 3N1-42x42	0A-2090-3200
Hub Card; QVN-1000 Product Series; 4 GP Data	0P-2090-0102
Power Supply; 4.5 V @ 40 A, AC Full Range, without Fan	A-3725586
Receiver Card; NovaStar® A4S	A-3770535
Cable Assembly; PM RJ45 Jack-to-RJ45 Plug, 300 mm Cat5E	W-3774463
Cable Assembly; PM RJ45 Jack-to-RJ45 Plug, 510 mm Cat5E	W-3871038

Daktronics Exchange and Repair & Return Programs

To serve customers' repair and maintenance needs, Daktronics offers both an Exchange Program and a Repair & Return Program.

Exchange Program

Daktronics unique Exchange Program is a quick service for replacing key parts in need of repair. If a part requires repair or replacement, Daktronics sends the customer a replacement, and the customer sends the defective part to Daktronics. This decreases display downtime.

Before contacting Daktronics, identify these important part numbers:

Display Serial Number: _____

Display Model Number: _____

Contract Number: _____

Installation Date: _____

Sign Location: _____

Daktronics Customer ID Number: _____

To participate in the Exchange Program, follow these steps:

1. **Call Daktronics Customer Service.**

Market Description	Customer Service Number
Schools (primary through community/junior colleges), religious organizations, municipal clubs, and community centers	877-605-1115
Universities and professional sporting events, live events for auditoriums, and arenas	866-343-6018
Financial institutions, petroleum, sign companies, gaming, and wholesale/retails establishments	866-343-3122
Department of Transportation, mass transits, airports, and parking facilities	800-833-3157

2. **Mail the old part to Daktronics when the new exchange part is received.**

   If the replacement part fixes the problem, send in the problem part which is being replaced.

   a. Package the old part in the same shipping materials in which the replacement part arrived.

   b. Fill out and attach the enclosed UPS shipping document.

   c. Ship the part to Daktronics.

   Daktronics will charge for the replacement part immediately, unless a qualifying service agreement is in place. In most cases, the replacement part will be invoiced at the time it is shipped.

3. **Return the part within 30 working days if the replacement part does not solve the problem, or Daktronics will charge the full purchase price.**

   If the part is still defective after the exchange is made, please contact Daktronics Customer Service immediately. Daktronics expects immediate return of an exchange part if it does not solve the problem. Daktronics also reserves the right to refuse parts that have been damaged due to acts of nature or causes other than normal wear and tear.

Repair & Return Program

For items not subject to exchange, Daktronics offers a Repair & Return Program. To send a part for repair, follow these steps:

1. **Call Daktronics Customer Service.**

   Refer to the telephone number listed on the previous page.

2. **Receive a Return Materials Authorization (RMA) number before shipping.**

   Refer to the telephone number listed on the previous page.

3. **Package and pad the item carefully to prevent damage during shipping.**

   Electronic components, such as printed circuit boards, should be placed in an antistatic bag before boxing. Daktronics does not recommend packing peanuts when shipping.

4. **Enclose the following information:**

   - Name
   - Address
   - Phone number
   - RMA number
   - Clear description of symptoms

Shipping Address

Daktronics Customer Service
600 E 54th St N
Sioux Falls, SD 57104
Case #

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A Reference Documents

Use the following documents in the order listed:

- **QVN-1000 Series Wall-Mount Substructure Quick Guide (DD3949131)**
- **QVN-1000 Series Panel Basics Quick Guide (DD3962224)**
- **QVN-1000 Series Panel Installation & Service Quick Guide (DD3974493)**

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QVN-1000 Series Wall-Mount Substructure Quick Guide

1. Set the first tube on the ground or prep work surface with one of the 3" walls touching the surface. Mark the top-left corner of the tube with "TL" to create a starting point for the panel-interference jigs (Daktronics part number 0M-3955274). Use the jigs to ensure the screws do not land in a KEEP-OUT zone.

   a. Hand-bend the top three bracket tabs on the jigs (if not already bent). Refer to **Figure 1**.

   b. Align the top-left ("TL") corner of the tube face with the top-left corner of the first jig at START.

   c. Use a marker to mark the outline of the KEEP-OUT slots and fill in the three $^{1}/_{8}$" vertical slots. Refer to **Figure 2**.

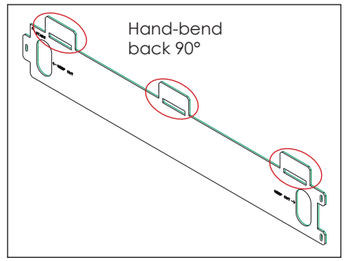

Figure 1: *Hand-Bend Bracket Tabs*

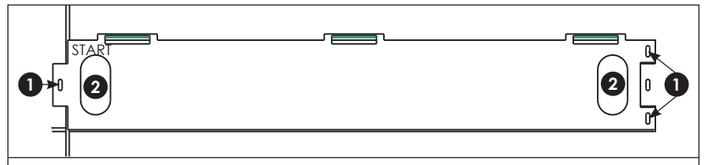

Figure 2: *Panel-Interference Jig*

   d. Place another jig to the right of the first jig and piece them together.

   e. Remove the left jig and continue down the tube, using as many jigs as supplied/necessary. Refer to **Figure 3**.

2. Mark the wall for tube placement. Refer to **Figure 4**. A horizontal line represents the bottom of a tube, and a vertical line represents the end of a tube or the side of a display.

   Except for the top row of the display, each row of panels has only one tube. The tube will be undersized by $^{1}/_{4}$" at each end of the display. Refer to the contract-specific Shop Drawing for site-specific dimensions.

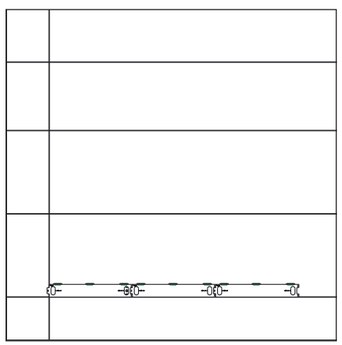

Figure 3: *Use Jigs*

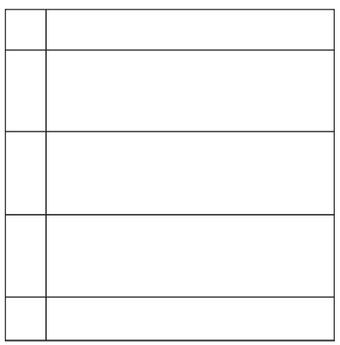

Figure 4: *Mark Tube Locations*

3. Find and mark the stud on the wall closest to the vertical tube edge line along the horizontal tube line within 16" from the edge of the tube. Continue down the horizontal tube line, marking stud locations at 32" increments. Measure the distance from the vertical tube line on the wall to the edges of the first stud. Go back to the marked-up tube and use the measurement to mark the stud limits on the tube. Continue down the tube, marking the stud locations at 32" increments.

4. Mark new stud locations at 16" increments on both sides of the stud if a stud location directly overlaps with a KEEP OUT slot. Refer to **Figure 5**. If a stud location overlaps with a KEEP OUT slot but not enough to reach the center of the stud mark, do not consider this an interference.

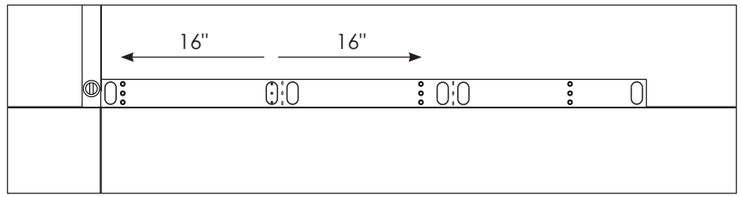

Figure 5: *Move Studs at Interference Locations*

5. Drill three 0.266" (~$^{17}/_{64}$") clearance holes through the front and rear walls of the tube at each marked stud location. Refer to **Figure 6**.

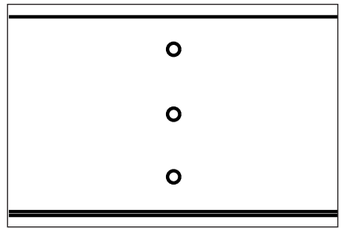

Figure 6: *Drill Clearance Holes*

6. Place the marked-up bottom tube on the wall so the bottom horizontal line aligns with the bottom of the tube, the vertical line aligns with its respective edge, and "TL" is in the top-left corner. Refer to **Figure 7**. Use a level (digital is recommended) to fine-tune the tube position, which has a $\pm^{1}/_{4}$" tolerance in all directions.

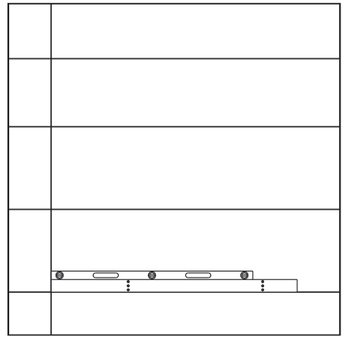

Figure 7: *Place Tube*

7. Screw the supplied hardware into the wall as shown on the contract-specific Shop Drawing, but do not tighten the hardware all the way. Ensure the holes are properly aligned in the front and rear tube walls so they are not out of plane by more than $^{1}/_{16}$" and install screws in the center of the stud flange. Repeat this for all stud locations along the bottom row of tube(s).

8. Move up to the next row of tubes and repeat the stud attachment pattern from the bottom row. Refer to **Figure 8**. Verify the tube is horizontally level and the tubes are plumb and level to each other by a tolerance of $\pm^{1}/_{4}$" in the X-axis and by $+^{1}/_{4}$"-$^{1}/_{2}$" in the Y-axis. Y-axis tolerance for the top tube is $\pm^{1}/_{4}$" to prevent the tube from extending above the top of the display.

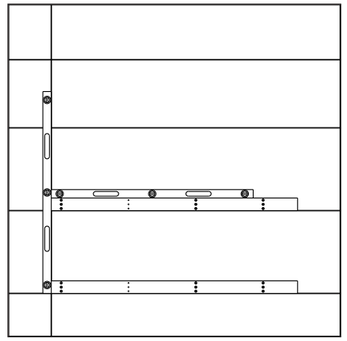

Figure 8: *Repeat Stud Attachment Pattern*

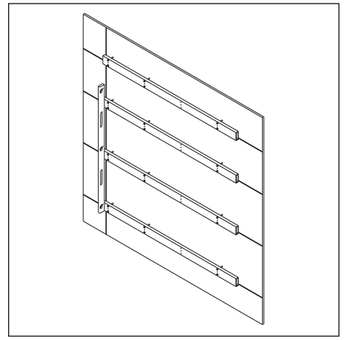

Figure 9: *Ensure Plumb & Flat Tube Faces*

9. Use a level to ensure the tube faces are plumb to the wall and flat to each other. Refer to **Figure 9**. If the tubes need Z-axis adjustment, add shims between the wall and the tube to adjust by $^{1}/_{2}$" maximum. Ensure the shims bear the full height of the tube as shown in **Figure 10**. Tighten down the hardware.

Figure 10: *Add Shims between Wall & Tube*

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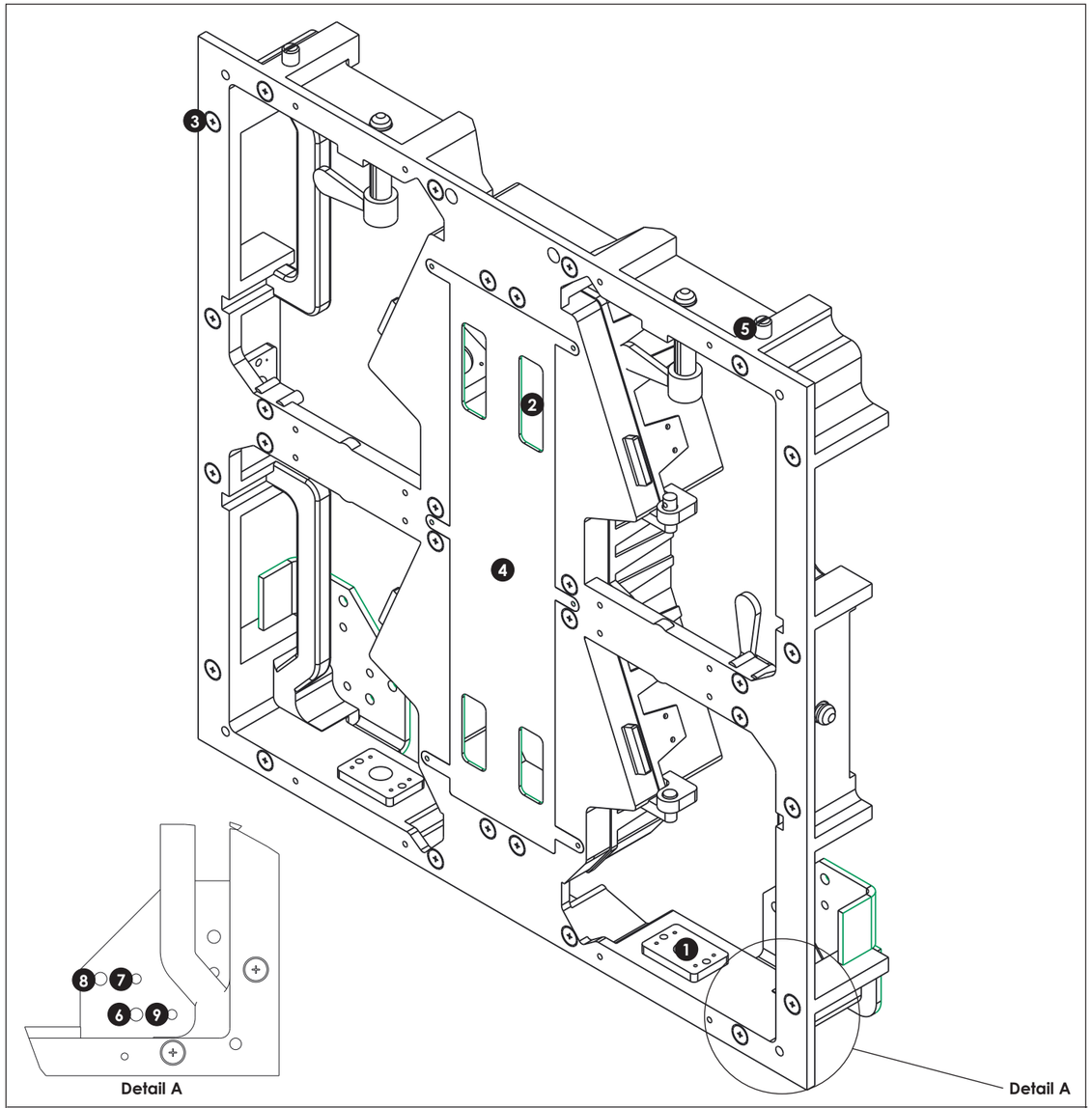
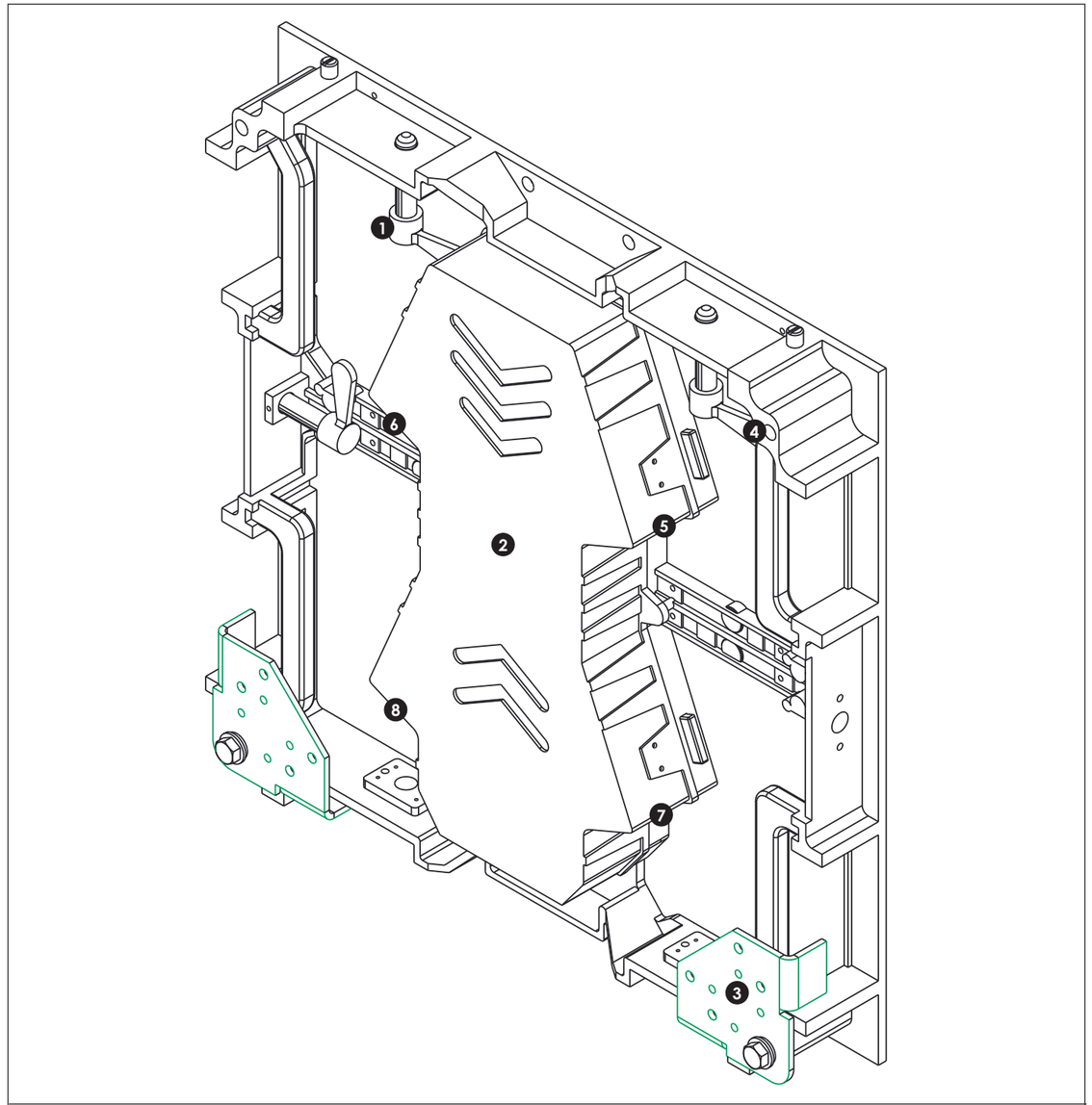
Figure 1 (rotated front view) and **Figure 2** (rotated rear view) show the basic features of a typical QVN-1000 series display panel.



1: Quarter-turn interconnect latch receptacle @ 3 per panel
2: Module power/signal jack location @ 4 per panel
3: Module magnet @ 28 per panel
4: Component front-access plate @ 1 per panel
5: Panel alignment pin @ 2 per panel
6: Standard self-drilling screw attachment hole @ 2 per panel
7: Standard jacking hardware attachment hole @ 2 per panel
8: Alternate self-drilling screw attachment hole @ 2 per panel
9: Alternate jacking hardware attachment hole @ 2 per panel

Figure 1: *Display Panel (Rotated Front View)*



1: Quarter-turn interconnect latch @ 3 per panel
2: Component rear-access door @ 1 per panel
3: Front-installation converter plate @ 2 (standard) per panel
4: Front-installation converter plate attachment hole (for top row of panels only) @ 2 per panel
5: Power entrance plug @ 1 per panel
6: Power exit plug @ 1 per panel
7: Signal entrance plug @ 1 per panel
8: Signal exit plug @ 1 per panel

Figure 2: *Display Panel (Rotated Rear View)*

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30 November 2018

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Mechanical

Panel-to-Tube Attachment

Panels are equipped with one steel converter plate on each of the lower-rear corners. Refer to **Figure 1** and the **QVN-1000 Series Panel Basics Quick Guide (DD3962224)** for more details. The plates provide holes and threads to self-drill the panel to the tube and to jack the panel away from the tube (approximately $^{1}/_{4}$" [6.35 mm]) with an M6 bolt if Z-axis adjustment is needed.

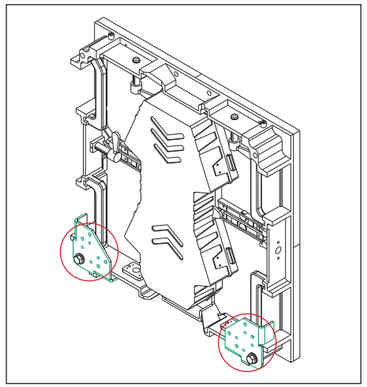
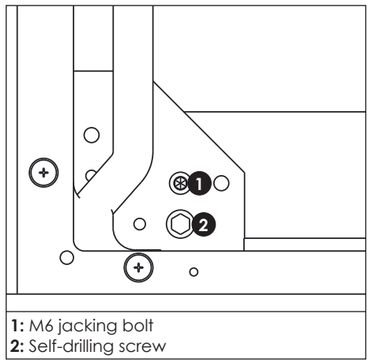


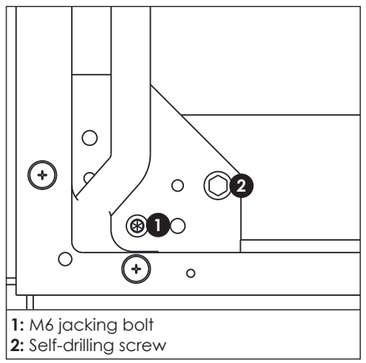
Figure 1: *Panel Rear*

Figure 2 shows standard panel-to-tube attachment. If there is bolt head interference at the standard location, use the attachment pattern shown in **Figure 3**.



1: M6 jacking bolt
2: Self-drilling screw

Figure 2: *Standard Panel-to-Tube Attachment*



1: M6 jacking bolt
2: Self-drilling screw

Figure 3: *Alternate Panel-to-Tube Attachment*

These steps provide only a general overview of panel-to-tube attachment. Refer to **Panel Installation (p.1)** for more detailed instructions.

1. Insert one self-drilling screw and one M6 jacking bolt in the lower-left and lower-right corners on each panel. Refer to **Figure 2**.
2. Insert one self-drilling screw and one M6 jacking bolt in the upper-left and upper-right corners on each panel in the top row of panels only.
3. Use the alternate mounting holes as shown in **Figure 3** to secure a panel if a tube-to-wall mounting bolt head interferes with the standard mounting hardware.

Panel Installation

Note: Use a level through this section to verify each panel is level in the X and Y directions.

Panels have four modules as shown in **Figure 4**.

1. Start the first panel (with the modules removed) at the middle of the bottom tube. Refer to **Figure 5**. Use a straight edge to position the panel so the bottom is flush with the bottom of the tube and does not hang below the bottom of the tube by more than $^{1}/_{4}$" [6.35 mm]. The left and right edges of the panel should align with the dashed vertical lines created with the interference jig.

Note: This step is easiest with three people.

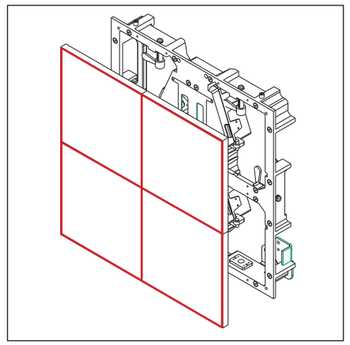


Figure 4: *Modules on Panel*

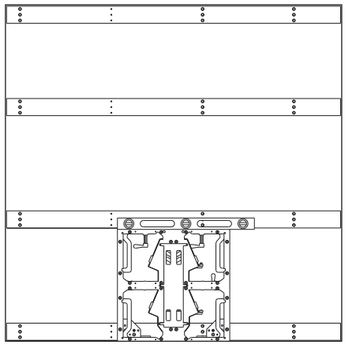


Figure 5: *Install First Panel*

2. Use a level to verify the panel is level in the X and Y directions.
3. Mark the location of the lower-left self-drilling screw. Drill a $^{13}/_{64}$" [5.16 mm] pilot hole.
4. Mark the location of the lower-right self-drilling screw while the panel is level. Drill a $^{13}/_{64}$" [5.16 mm] pilot hole.
5. Start the attachment of the self-drilling screws in both pilot holes, but do not tighten the screws down all the way.
6. Hand-bend an installation jig plate (Daktronics part number 0M-3921813) to a 90° angle. Refer to **Figure 6**. Slide the slot in the jig plate around the pin on the interconnect latch and temporarily secure the plate in place with a self-drilling screw. Refer to **Figure 7**.

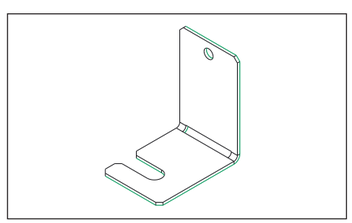


Figure 6: *Hand-Bend Jig Plate*

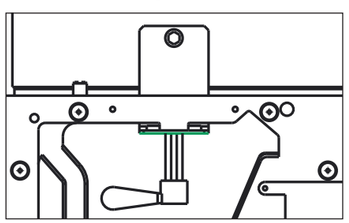


Figure 7: *Secure Jig Plate*

7. Place the second panel next to the existing panel.
8. Engage the interconnect hardware between the panels with the Y-axis handle turned down and the X-axis handle turned right. When the hardware is engaged to the spring mechanism, tighten the hardware a $^{1}/_{4}$ turn to secure.
9. Check the panel alignment top-to-bottom to ensure the panels are level.
10. Clamp the panels together with two C-clamps, one at the top and one at the bottom. Refer to **Figure 8**.

Figure 8: *Clamp Panels Together*

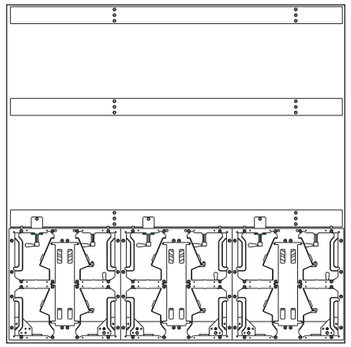


Figure 9: *Install Bottom Row of Panels*

11. Mark the self-drilling screw holes. Remove the panel and drill the $^{13}/_{64}$" [5.16 mm] pilot holes.
12. Install the M6 jacking hardware until it touches the horizontal stringer.
13. Install the self-drilling screws.
14. Repeat **Steps 5-13** for each panel in the row, ensuring the machined surfaces are as flush as possible. Refer to **Figure 9**.
15. Start on the next row after the bottom row is completed, working from the center out. Remove the self-drilling screws that are temporarily securing the installation jig plates and transfer the jig plates to the next panel up when the bottom connections of the panel are started. Refer to **Figure 10**.

Note: The jig plate prevents the latches from engaging if it is not removed before the panel above is installed. Use jig plates for every row.

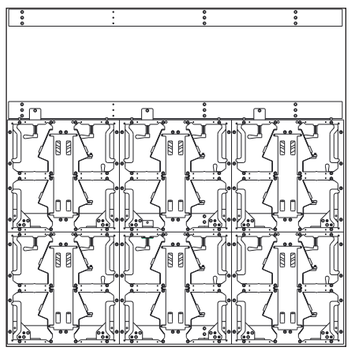


Figure 10: *Install Second Row of Panels*

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16. Continue attaching panels up to the top row. Use M10 hardware to attach a steel converter plate on each of the upper corners in the top row before installing the panels. Refer to **Figure 11**.

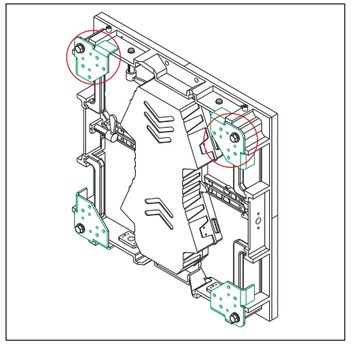

Figure 11: *Install Converter Plates*

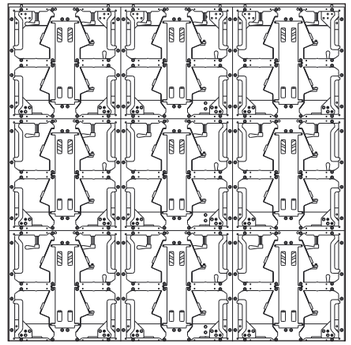

Figure 12: *Install Tubes*

17. Self-drill through all four corner locations to secure the top row of panels. Refer to **Figure 12**.

18. Use a level after all panels are up and the hardware is started to verify the panels are all plumb, flat, and level to each other in the X, Y, and Z directions. Use the jacking hardware in the front-installation converter plate to brace the panels away from the tubes by no more than $^{1}/_{4}$". After verified, tighten down the hardware in all applicable corners.

Electrical

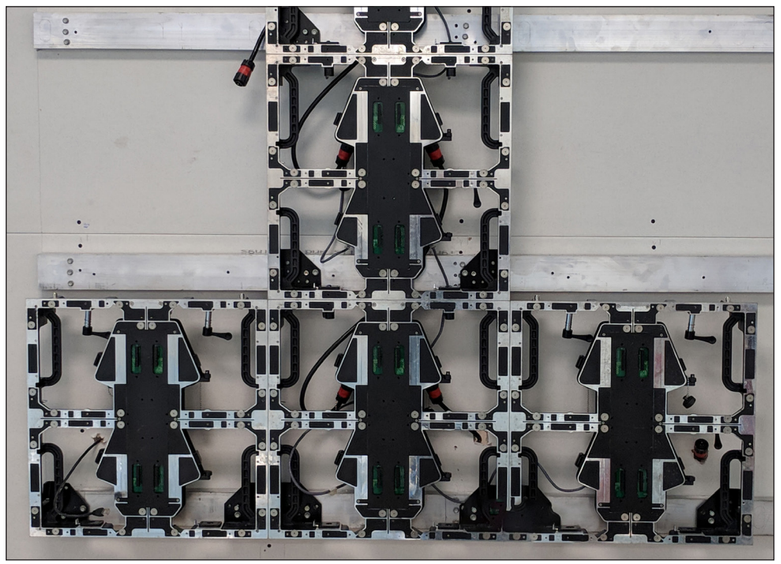

Figure 13: *Standard Panel*

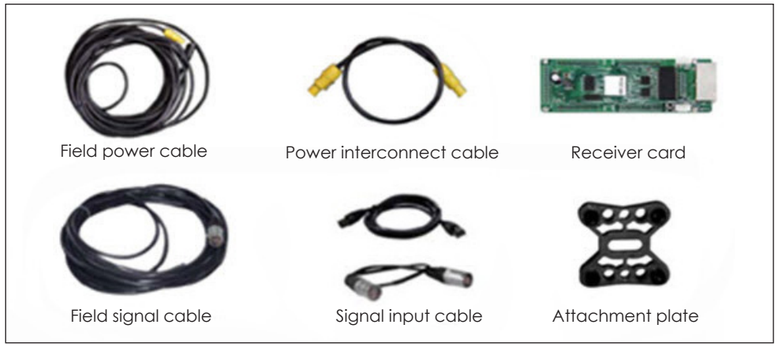

Figure 14: *Accessories*

Signal Connection

A DVI cable connects a computer located in the control room to a sending box. Some sending boxes may have additional signal input options, such as HDMI and SDI. The sending box passes signal via a Cat 5e/Cat 6 cable into the receiver card located inside the first panel. Each panel has a receiver card, and Cat 5e/Cat 6 cables daisy-chain the receiver cards together. The last panel can connect back to the sending box for redundant data to the receiver cards if desired.

1. Connect the sending box to the computer with a DVI cable. Refer to **Figure 15** and **Figure 16**.

Figure 15: *Sending Box Front*

Figure 16: *Sending Box Rear*

2. Connect a Cat 5e/Cat 6 cable from the sending box RJ45 output jack to the RJ45 quick connect jacks on the receiver card in the first panel. Refer to **Figure 16**, **Figure 17**, and the contract-specific Riser Diagram.

Figure 17: *Cat 5e/Cat 6 Cable*

Note: The maximum cable distance from the sending box to the first receiver card is 328.08' [100 m]. For installations exceeding this distance, use a fiber converter to convert the Cat 5e/Cat 6 cable to a fiber cable, which offers an additional 984.25' [300 m] with multi-mode fiber or up to 9.32 mi [15 km] with single-mode fiber. Two fiber converters can be used to convert the cable to a fiber cable and then back to a Cat 5e/Cat 6 cable. The cable can connect to the first panel. Use additional cables to connect to the next panel. Refer to **Figure 18** and **Figure 19**.

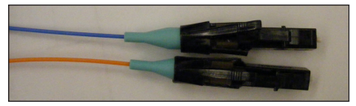

Figure 18: *Fiber Cable*

Figure 19: *Fiber Converter*

3. Route the Cat 5e/Cat 6 cable from the signal output jack to the signal input jack on the next panel. Refer to **Figure 20** and the Riser Diagram.

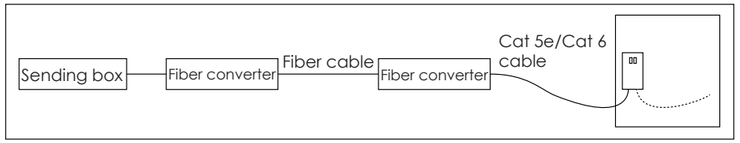

Figure 20: *Route Cable*

Note: Routing may vary based on converter type.

4. Connect the last panel back to the sending box for redundant signal connection if desired.

5. Refer to the **NovaStar® LED Display Control System M3 User's Manual** for details on how to configure the system and run the display.

Refer to **Figure 21** for an example of four panels connected together.

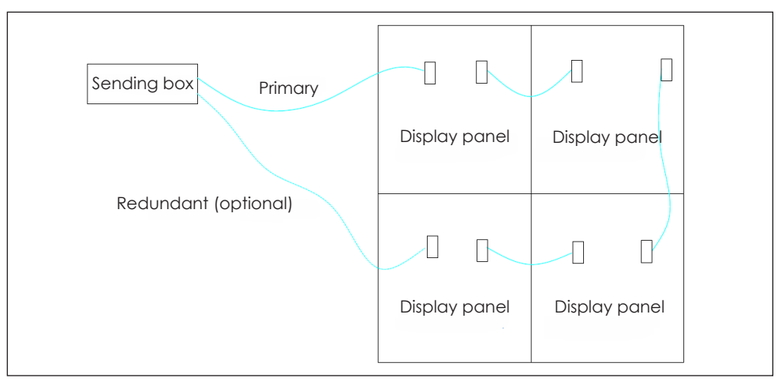

Figure 21: *Connect Signal*

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Power Connection

Most standard panels include power quick connects with pre-terminated connectors at each end.

Power interconnect cables are shipped with the displays. Every six panels require a new field power input cable. *Refer to the contract-specific Riser Diagram for more details.*

The main field power input cable has a pre-terminated connector at one end and bare wires at the other end. Both vertical and horizontal interconnects are available. Refer to **Figure 22**.

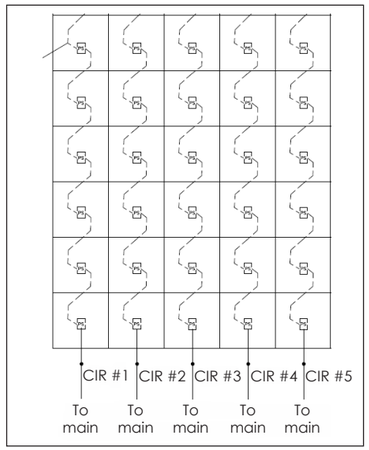

Figure 22: *Interconnect Sections*

Service

Remove Module

1. Disconnect power to the display.
2. Turn the knob on the module removal tool clockwise to disengage the tool. Refer to **Figure 23**.
3. Center the tool on the face of the module to be removed.
4. Turn the knob on the tool counterclockwise to engage the magnets. Refer to **Figure 23**.
5. Pull the module straight out until it disengages from the display face.

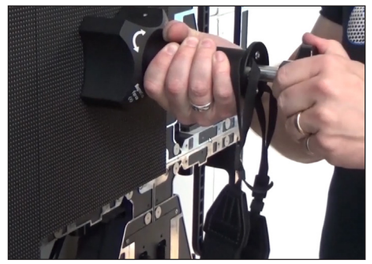

Figure 23: *Remove Module*

Reverse these steps to install a module.

Remove Front-Access Plate

1. Disconnect power to the display.
2. Use the module removal tool to remove the modules from the panel to be serviced. Refer to **Remove Module (p.3)**.
3. Use a Phillips screwdriver to loosen the six screws securing the front-access plate to the panel. Refer to **Figure 24**.
4. Pull the plate gently and clip any zip ties securing the cables in place to allow the plate to be fully removed.

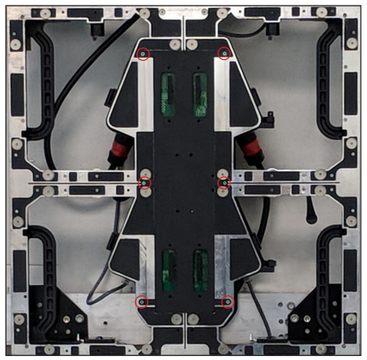

Figure 24: *Loosen Six Screws*

Reverse these steps to install a front-access plate.

Remove Power Supply

1. Disconnect power to the display.
2. Remove the front-access plate on the panel to be serviced. Refer to **Remove Front-Access Plate (p.3)**.
3. Use a Phillips screwdriver to loosen and remove the power cables extending from the power supply.
4. Use a Phillips screwdriver to remove the screws securing the power supply to the panel.

Reverse these steps to install a power supply.

Remove Hub Board/Receiver Card

1. Disconnect power to the display.
2. Remove the front-access plate on the panel to be serviced. Refer to **Remove Front-Access Plate (p.3)**.
3. Disconnect the Cat-5 cables from the RJ45 jacks on the hub board. Refer to **Figure 25**.
4. Disconnect the power supply from the hub board. There are two ways to do this:
   - Use a Phillips screwdriver to loosen the connections on the power supply and disconnect the cables extending from the board. Refer to **Figure 26**.

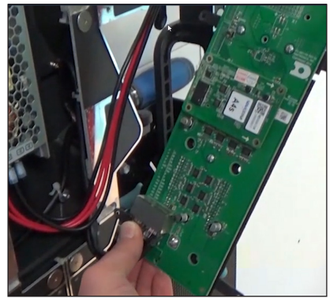

Figure 25: *Disconnect Cat-5 Cables from RJ45 Jacks*

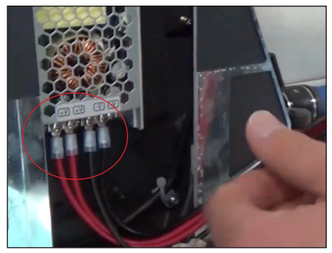

Figure 26: *Disconnect Cables from Power Supply*

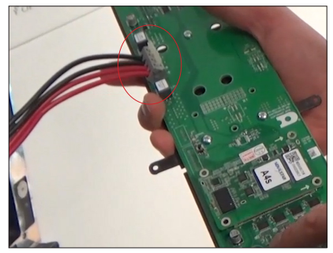

Figure 27: *Disconnect Cables from Terminal Block*

   - Push in the positions on the spring-loaded terminal block and disconnect the cables extending from the board. Refer to **Figure 27**.
5. Use a Phillips screwdriver to remove the screws securing the hub board to the front-access plate.
6. Use a Phillips screwdriver to remove the screws securing the receiver card to the hub board if necessary.

Reverse these steps to install a hub board.

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B Reference Drawings

Refer to **Numbering Conventions (p.1)** for information regarding how to read the drawing number.

These drawings offer general information pertaining to most QVN-1000 series displays and are listed in numeric order. Any contract-specific drawings take precedence over the general drawings.

Linear Riser..... **DWG-3982297**
Matrix Riser..... **DWG-3983388**
2 Column Power Riser..... **DWG-4001452**

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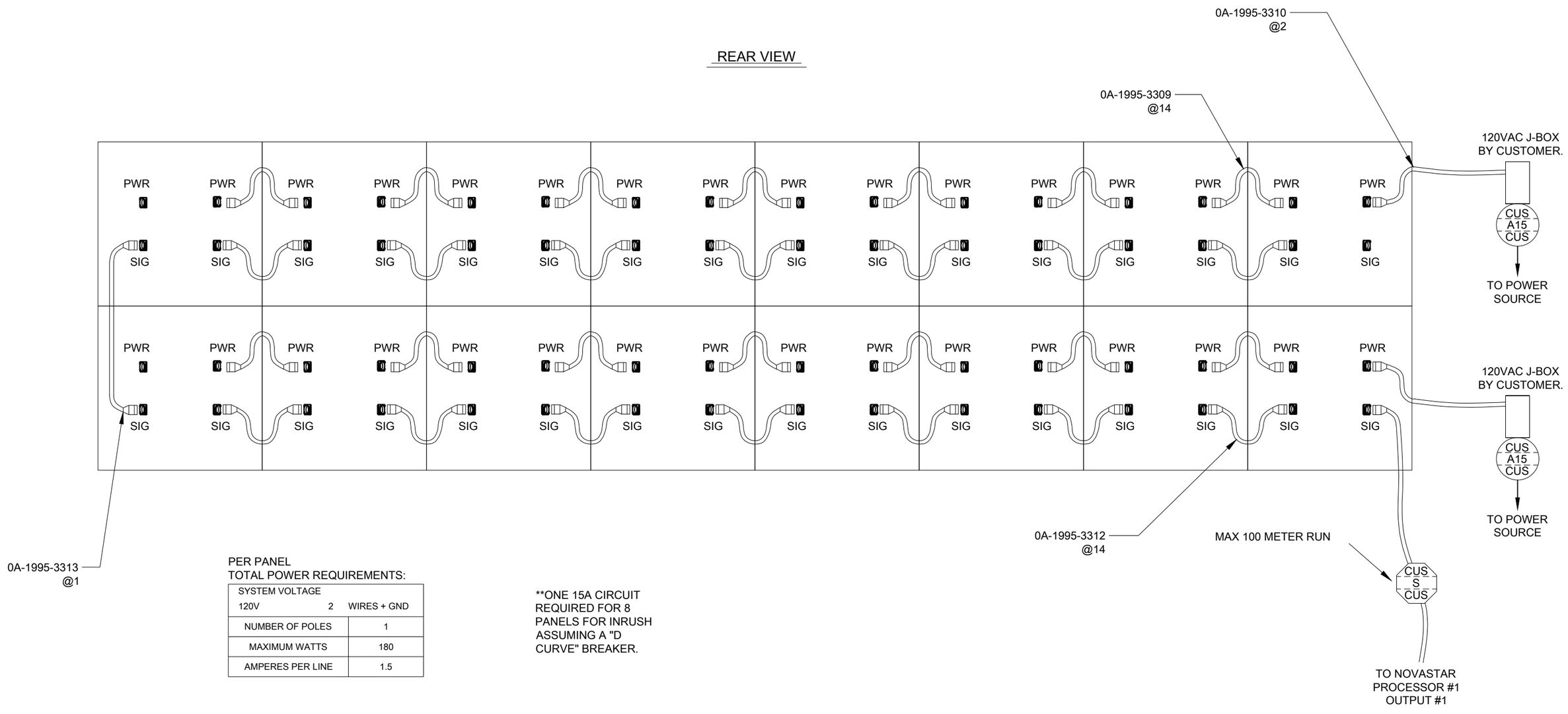
QVN-1000-3.9MN-1000-BM-MA-256X1024-AUTOBR-LT-NR

PANEL IS 128X128 PIXELS

REAR VIEW



PER PANEL
TOTAL POWER REQUIREMENTS:

SYSTEM VOLTAGE	
120V 2	WIRES + GND
NUMBER OF POLES	1
MAXIMUM WATTS	180
AMPERES PER LINE	1.5

**ONE 15A CIRCUIT REQUIRED FOR 8 PANELS FOR INRUSH ASSUMING A "D CURVE" BREAKER.

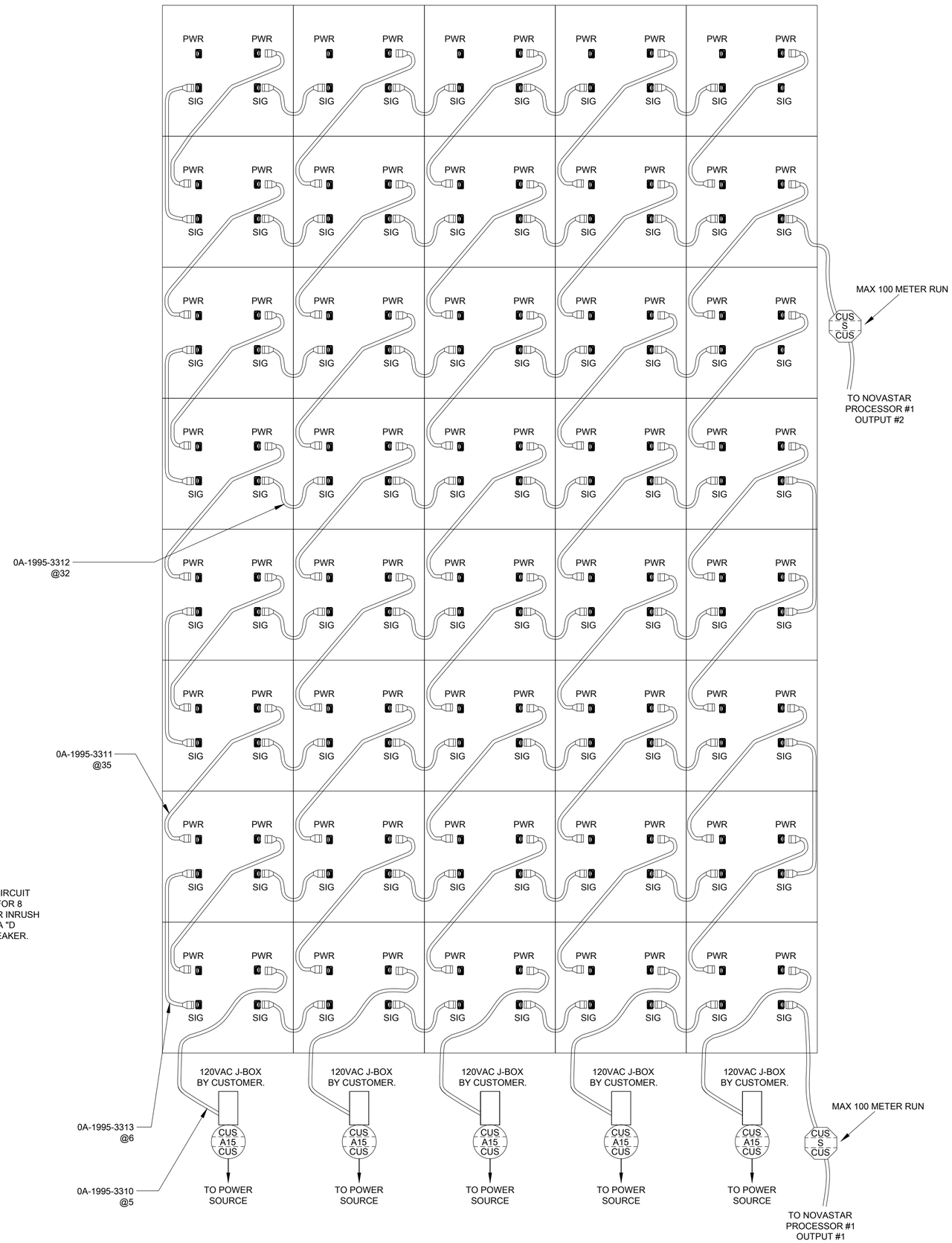
THIRD ANGLE PROJECTION

PROJECT:	QVN-1000			
TITLE:	CONCEPTUAL LINEAR RISER			
DATE:	27 JUL 18	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		00
DESIGN:	MROSAUER	JOB NO.	FUNC - TYPE - SIZE	3982297
DRAWN:	MROSAUER	P2082	F - 01 - B	

QVN-1000-3.9MN-1000-BM-MA-1024X640-AUTOBR-LT-NR

PANEL IS 128X128 PIXELS

REAR VIEW



PER PANEL
TOTAL POWER REQUIREMENTS:

SYSTEM VOLTAGE	
120V 2	WIRES + GND
NUMBER OF POLES	1
MAXIMUM WATTS	180
AMPERES PER LINE	1.5

**ONE 15A CIRCUIT
REQUIRED FOR 8
PANELS FOR INRUSH
ASSUMING A "D
CURVE" BREAKER.

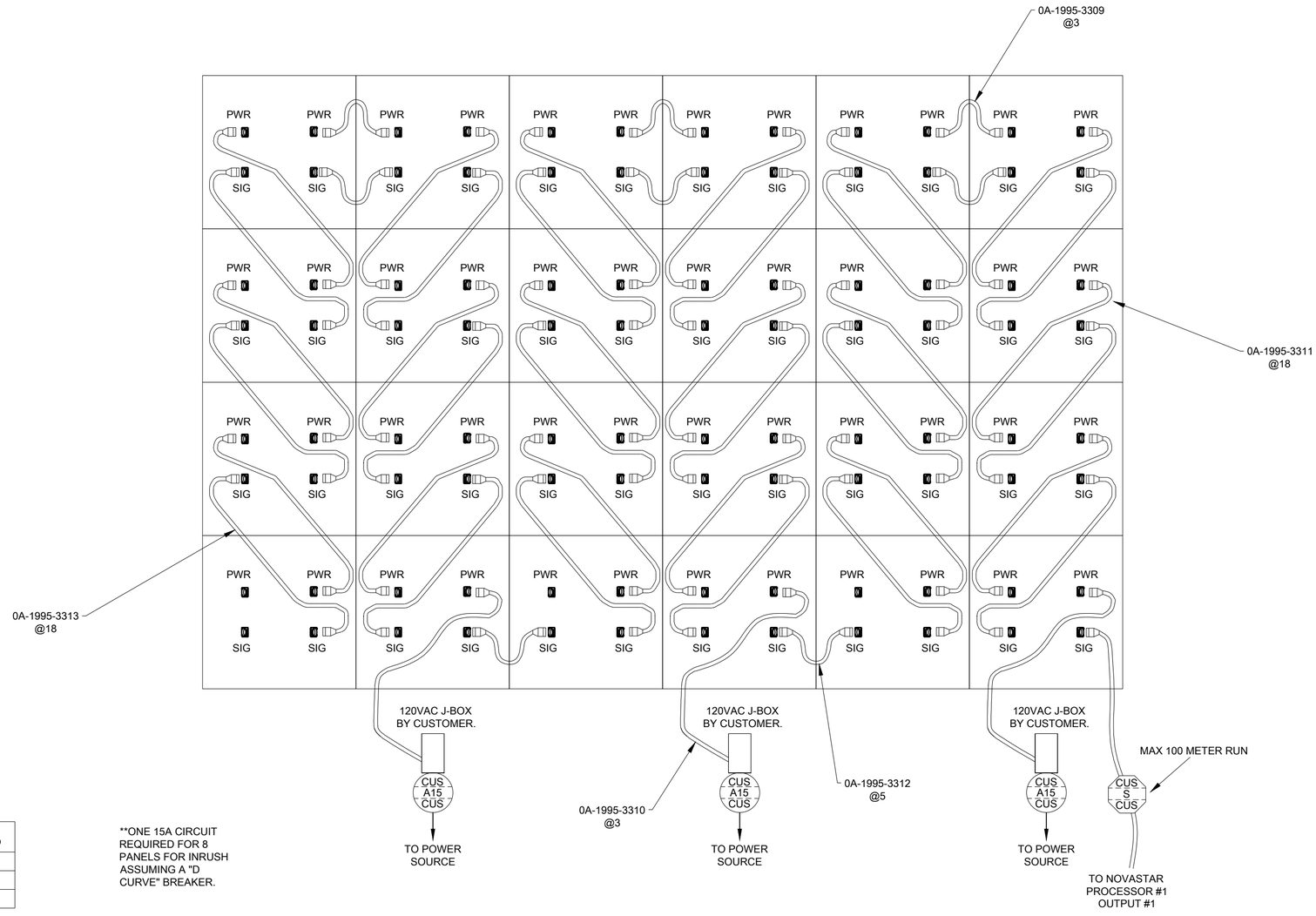
THIRD ANGLE PROJECTION

PROJECT:	QVN 1000			
TITLE:	CONCEPTUAL MATRIX RISER			
DATE:	30 JUL 18	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		00
DESIGN:	MROSAUER	JOB NO. / FUNC - TYPE - SIZE		
DRAWN:	MROSAUER	P2082 / F - 01 - C		3983388

QVN-1000-3.9MN-1000-BM-MA-512X768-AUTOBR-LT-NR

PANEL IS 128X128 PIXELS

REAR VIEW



PER PANEL
TOTAL POWER REQUIREMENTS:

SYSTEM VOLTAGE	
120V 2	WIRES + GND
NUMBER OF POLES	1
MAXIMUM WATTS	180
AMPERES PER LINE	1.5

**ONE 15A CIRCUIT REQUIRED FOR 8 PANELS FOR INRUSH ASSUMING A "D CURVE" BREAKER.

THIRD ANGLE PROJECTION

PROJECT:	QVN 1000			
TITLE:	CONCEPTUAL 2 COLUMN POWER RISER			
DATE:	22 AUG 18	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		00
DESIGN:	MROSAUER	JOB NO. P2080	FUNC - TYPE - SIZE F - 01 - C	4001452
DRAWN:	MROSAUER			

C Daktronics Warranty & Limitation of Liability

This section includes the Daktronics Warranty & Limitation of Liability statement.

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DAKTRONICS WARRANTY & LIMITATION OF LIABILITY

This Warranty and Limitation of Liability (the "Warranty") sets forth the warranty provided by Daktronics with respect to the Equipment. By accepting delivery of the Equipment, Purchaser and End User agree to be bound by and accept these terms and conditions. Unless otherwise defined herein, all terms within the Warranty shall have the same meaning and definition as provided elsewhere in the Agreement.

DAKTRONICS WILL ONLY BE OBLIGATED TO HONOR THE WARRANTY SET FORTH IN THESE TERMS AND CONDITIONS UPON RECEIPT OF FULL PAYMENT FOR THE EQUIPMENT

1. Warranty Coverage.

A. Daktronics warrants to the original end user (the "End User", which may also be the Purchaser) that the Equipment will be free from Defects (as defined below) in materials and workmanship for a period of one (1) year (the "Warranty Period"). The Warranty Period shall commence on the earlier of: (i) four weeks from the date that the Equipment leaves Daktronics' facility; or (ii) Substantial Completion as defined herein. The Warranty Period shall expire on the first anniversary of the commencement date.

"Substantial Completion" means the operational availability of the Equipment to the End User in accordance with the Equipment's specifications, without regard to punch-list items, or other non-substantial items which do not affect the operation of the Equipment

B. Daktronics' obligation under this Warranty is limited to, at Daktronics' option, replacing or repairing, any Equipment or part thereof that is found by Daktronics not to conform to the Equipment's specifications. Unless otherwise directed by Daktronics, any defective part or component shall be returned to Daktronics for repair or replacement. This Warranty does not include on-site labor charges to remove or install these components. Daktronics may, at its option, provide on-site warranty service. Daktronics shall have a reasonable period of time to make such replacements or repairs and all labor associated therewith shall be performed during regular working hours. Regular working hours are Monday through Friday between 8:00 a.m. and 5:00 p.m. at the location where labor is performed, excluding any holidays observed by Daktronics.

C. Daktronics shall pay ground transportation charges for the return of any defective component of the Equipment. All such items shall be shipped by End User DDP Daktronics designated facility per Incoterms® 2020. If returned Equipment is repaired or replaced under the terms of this Warranty, Daktronics will prepay ground transportation charges back to End User and shall ship such items DDP End User's designated facility per Incoterms® 2020; otherwise, End User shall pay transportation charges to return the Equipment back to the End User and such Equipment shall be shipped Ex Works Daktronics designated facility per Incoterms® 2020. All returns must be pre-approved by Daktronics before shipment. Daktronics shall not be obligated to pay freight for any unapproved return. End User shall pay any upgraded or expedited transportation charges

D. Any replacement parts or Equipment will be new or serviceably used, comparable in function and performance to the original part or Equipment and warranted for the remainder of the Warranty Period. Purchasing additional parts or Equipment from the Seller does not extend the Warranty Period.

E. Defects shall be defined as follows. With regard to the Equipment (excepting LEDs), a "Defect" shall refer to a material variance from the design specifications that prohibit the Equipment from operating for its intended use. With respect to LEDs, "Defects" are defined as LED pixels that cease to emit light. Unless otherwise expressly provided, this Warranty does not impose any duty or liability upon Daktronics for partial LED pixel degradation. Notwithstanding the foregoing, in no event does this Warranty include LED pixel degradation caused by UV light. This Warranty does not provide for the replacement or installation of communication methods including but not limited to, wire, fiber optic cable, conduit, trenching, or for the purpose of overcoming local site interference radio equipment substitutions.

EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS WARRANTY, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, DAKTRONICS DISCLAIMS ANY AND ALL OTHER PROMISES, REPRESENTATIONS AND WARRANTIES APPLICABLE TO THE EQUIPMENT AND REPLACES ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ACCURACY OR QUALITY OF DATA. OTHER ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY DAKTRONICS, ITS AGENTS OR EMPLOYEES, SHALL NOT CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS LIMITED WARRANTY.

THIS LIMITED WARRANTY IS NOT TRANSFERABLE.

2. Exclusion from Warranty Coverage

This Warranty does not impose any duty or liability upon Daktronics for any:

A. damage occurring at any time, during shipment of Equipment unless otherwise provided for in the Agreement. When returning Equipment to Daktronics for repair or replacement, End User assumes all risk of loss or damage, agrees to use any shipping containers that might be provided by Daktronics, and to ship the Equipment in the manner prescribed by Daktronics;

B. damage caused by: (i)the improper handling, installation, adjustment, use, repair, or service of the Equipment, or (ii) any physical damage which includes, but is not limited to, missing, broken, or cracked components resulting from non-electrical causes;

altered, scratched, or fractured electronic traces; missing or gauged solder pads; cuts or clipped wires; crushed, cracked, punctured, or bent circuit boards; or tampering with any electronic connections, provided that such damage is not caused by personnel of Daktronics or its authorized repair agents;

C. damage caused by the failure to provide a continuously suitable environment, including, but not limited to: (i) neglect or misuse; (ii) improper power including, without limitation, a failure or sudden surge of electrical power; (iii) improper air conditioning, humidity control, or other environmental conditions outside of the Equipment's technical specifications such as extreme temperatures, corrosives and metallic pollutants; or (iv) any other cause other than ordinary use;

D. damage caused by fire, flood, earthquake, water, wind, lightning or other natural disaster, strike, inability to obtain materials or utilities, war, terrorism, civil disturbance, or any other cause beyond Daktronics' reasonable control;

E. failure to adjust, repair or replace any item of Equipment if it would be impractical for Daktronics personnel to do so because of connection of the Equipment by mechanical or electrical means to another device not supplied by Daktronics, or the existence of general environmental conditions at the site that pose a danger to Daktronics personnel;

F. statements made about the product by any salesperson, dealer, distributor or agent, unless such statements are in a written document signed by an officer of Daktronics. Such statements as are not included in a signed writing do not constitute warranties, shall not be relied upon by End User and are not part of the contract of sale;

G. damage arising from the use of Daktronics products in any application other than the commercial and industrial applications for which they are intended, unless, upon request, such use is specifically approved in writing by Daktronics;

H. replenishment of spare parts. In the event the Equipment was purchased with a spare parts package, the parties acknowledge and agree that the spare parts package is designed to exhaust over the life of the Equipment, and as such, the replenishment of the spare parts package is not included in the scope of this Warranty;

I. security or functionality of the End User's network or systems, or anti-virus software updates;

J. performance of preventive maintenance;

K. third-party systems and other ancillary equipment, including without limitation front-end video control systems, audio systems, video processors and players, HVAC equipment, batteries and LCD screens;

L. incorporation of accessories, attachments, software or other devices not furnished by Daktronics; or

M. paint or refinishing the Equipment or furnishing material for this purpose.

3. **Limitation of Liability**

A. Daktronics shall be under no obligation to furnish continued service under this Warranty if alterations are made to the Equipment without the prior written approval of Daktronics.

B. It is specifically agreed that the price of the Equipment is based upon the following limitation of liability. In no event shall Daktronics (including its subsidiaries, affiliates, officers, directors, employees, or agents) be liable for any claims asserting or based on (a) loss of use of the facility or equipment; lost business, revenues, or profits; loss of goodwill; failure or increased cost of operations; loss, damage or corruption of data; loss resulting from system or service failure, malfunction, incompatibility, or breaches in system security; or (b) any special, consequential, incidental or exemplary damages arising out of or in any way connected with the Equipment or otherwise, including but not limited to damages for lost profits, cost of substitute or replacement equipment, down time, injury to property or any damages or sums paid to third parties, even if Daktronics has been advised of the possibility of such damages. The foregoing limitation of liability shall apply whether any claim is based upon principles of contract, tort or statutory duty, principles of indemnity or contribution, or otherwise

C. In no event shall Daktronics be liable for loss, damage, or injury of any kind or nature arising out of or in connection with this Warranty in excess of the Purchase Price of the Equipment. The End User's remedy in any dispute under this Warranty shall be ultimately limited to the Purchase Price of the Equipment to the extent the Purchase Price has been paid.

4. Assignment of Rights

A. The Warranty contained herein extends only to the End User (which may be the Purchaser) of the Equipment and no attempt to extend the Warranty to any subsequent user-transferee of the Equipment shall be valid or enforceable without the express written consent of Daktronics.

5. Governing Law; Election of Remedies

A. The rights and obligations of the parties under this Warranty shall not be governed by the provisions of the United Nations Convention on Contracts for the International Sales of Goods of 1980. The parties consent to the application of the laws of the State of South Dakota to govern, interpret, and enforce each of the parties' rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Warranty, without regard to conflict of law principles.

B. Any dispute, controversy or claim arising from or related to this Warranty, the parties shall first attempt to settle through negotiations. In the event that no resolution is reached, then such dispute, controversy, or claim shall be resolved by final and binding arbitration under the Rules of Arbitration of the International Chamber of Commerce. The language of the arbitration

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shall be English. The place of the arbitration shall be Sioux Falls, SD. A single arbitrator selected by the parties shall preside over the proceeding. If a single arbitrator cannot be agreed upon by the parties, each party shall select an arbitrator, and those arbitrators shall confer and agree on the appointed arbitrator to adjudicate the arbitration. The arbitrator shall have the power to grant any provisional or final remedy or relief that it deems appropriate, including conservatory measures and an award of attorneys' fees. The arbitrator shall make its decisions in accordance with applicable law. By agreeing to arbitration, the Parties do not intend to deprive any court of its jurisdiction to issue a pre-arbitral injunction, pre-arbitral attachment, or other order in aid of arbitration proceedings and the enforcement of any award. Without prejudice to such provisional remedies as may be available under the jurisdiction of a court, the arbitrator shall have full authority to grant provisional remedies and to direct the Parties to request that any court modify or vacate any temporary or preliminary relief issued by such court, and to award damages for the failure of any Party to respect the arbitrator's orders to that effect.

6. Availability of Extended Service Agreement

A. For End User's protection, in addition to that afforded by the warranties set forth herein, End User may purchase extended warranty services to cover the Equipment. The Extended Service Agreement, available from Daktronics, provides for electronic parts repair and/or on-site labor for an extended period from the date of expiration of this warranty. Alternatively, an Extended Service Agreement may be purchased in conjunction with this Warranty for extended additional services. For further information, contact Daktronics Customer Service at 1-800-DAKTRONics (1-800-325-8766).

Additional Terms applicable to sales outside of the United States

The following additional terms apply **only** where the installation site of the Equipment is located outside of the United States of America.

1. In the event that the installation site of the Equipment is in a country other than the U.S.A., then, notwithstanding Section 5 of the Warranty, where the selling entity is the entity listed in Column 1, then the governing law of this Warranty is the law of the jurisdiction listed in the corresponding row in Column 2 without regard to its conflict of law principles. Furthermore, if the selling entity is an entity listed in Column 1, then the place of arbitration is listed in the corresponding row in Column 3.

Column 1 (Selling Entity)	Column 2 (Governing Law)	Column 3 (Location of Arbitration)
Daktronics, Inc.	The state of Illinois	Chicago, IL, U.S.A.
Daktronics Canada, Inc.	The Province of Ontario, Canada	Toronto, Ontario, Canada
Daktronics UK Ltd.	England and Wales	Bristol, UK
Daktronics GmbH	The Federal Republic of Germany	Wiesbaden, Germany
Daktronics Hong Kong Limited	Hong Kong, Special Administrative Region of the P.R.C.	Hong Kong SAR
Daktronics Shanghai Co., Ltd.	The Peoples Republic of China	Shanghai, P.R.C.
Daktronics France, SARL	France	Paris, France
Daktronics Japan, Inc.	Japan	Tokyo, Japan
Daktronics International Limited	Macau, Special Administrative Region of the P.R.C.	Macau SAR
Daktronics Australia Pad Ltd	Australia	Sydney, Australia
Daktronics Singapore Pte. Ltd	Singapore	Singapore
Daktronics Brazil LTDA	Brazil	São Paulo, Brazil
Daktronics Spain S.L.U.	Spain	Madrid, Spain
Daktronics Belgium N. V	Belgium	Kruibeke, Belgium
Daktronics Ireland Co. Ltd.	Ireland	Dublin, Ireland