Quick Start Guide

Imager-based barcode reader with superior decoding capability in a compact housing

This guide is designed to help you set up and install the ABR 3000. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at www.bannerengineering.com. Search for p/n 207637 to view the Instruction Manual and for p/n 207635 to view the Barcode Manager Software Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

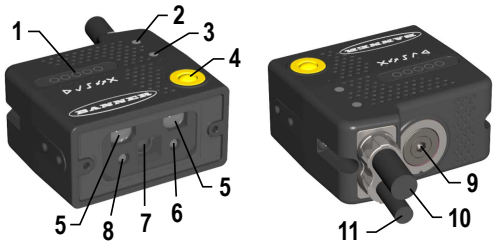
Models

Table 1: ABR 3000 Models

Model	Resolution	Lens	Lighting	Options	Communications	Codes
ABR3009-WSU2	WVGA (752 × 480 pixels)	9 mm, manual focus	White	Standard	Serial/USB	1D and 2D
ABR3009-WSE2					Serial/Ethernet	1D and 2D
ABR3009-WSU1					Serial/USB	1D
ABR3009-WSE1					Serial/Ethernet	1D
ABR3106-WSU2	1.2 MP (1280 × 960 pixels)	6 mm, manual focus			Serial/USB	1D and 2D
ABR3106-WSE2					Serial/Ethernet	1D and 2D
ABR3106-WSU1					Serial/USB	1D
ABR3106-WSE1					Serial/Ethernet	1D
ABR3106-WPU2				Polarized	Serial/USB	1D and 2D
ABR3106-WPE2					Serial/Ethernet	1D and 2D

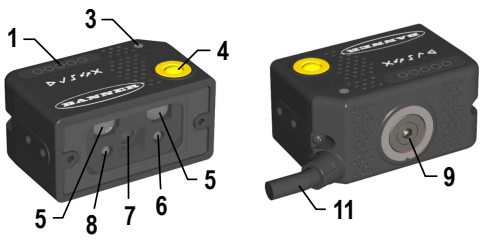
Features

Figure 1. Models with Serial and Ethernet



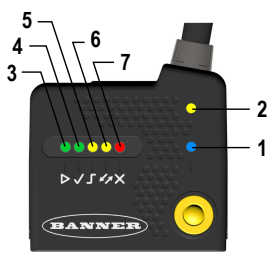
1. Smart Teach Interface
2. Ethernet Connection LED
3. Power LED
4. Button
5. Internal Illuminators
6. Good Read LED (green)
7. Lens
8. Aiming System Laser Source
9. Focus Adjustment Screw
10. Ethernet Cable
11. Power - Serial - I/O Cable

Figure 2. Models with Serial and USB



Indicators

Figure 3. Indicators—Top of Device



	Indicator	Color	LED Status During Normal Operation
1	Power	Blue	Indicates connection to the power supply
2	Ethernet Connection	Amber	Indicates connection to the Ethernet network
3	READY/Learn	Green	Ready
4	GOOD/Setup	Green	Reading successful
5	TRIGGER/Focus (Aim)	Amber	Reading in progress. Do not trigger a new reading attempt until the current attempt finishes
6	COM/Test	Amber	Active result output transmission on the Main serial or USB ports
7	STATUS	Red	No read result

During the reader startup, all of the LEDs turn on for one second.

See Smart Teach Interface on p. 3 for the colors and meanings of the five LEDs when the reader is in Smart Teach mode.

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Laser Description and Safety Information

All ABR 3000 contain one aiming laser source used to position the reader. Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light. The laser beam can be switched on or off through a software command.

These products conform to the applicable requirements of IEC 60825-1 and comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice N° 50, date June 24, 2007. This product is classified as a Class 1 M laser product according to IEC 60825-1 regulations.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Do not attempt to disassemble this sensor for repair. A defective unit must be returned to the manufacturer.

Class 1 lasers are lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Installation Instructions

Set the Focus

The reader is factory-calibrated at three focus positions (45 mm, 70 mm, and 125 mm for WVGA models; 45 mm, 80 mm, and 125 mm for 1.2 MP models). The focus range is continuous to provide fine-tuning for your application. This means you can select a focus position different than these three positions.

1. Determine the focus position needed for your application. The following tables show the reading ranges at the three focus positions for Code 128 (1D) and Data Matrix (2D) 10 mil resolution codes.

Table 2: WVGA Models

Focus Position (mm)	Horizontal Field of View	Reading Range (Depth of Field)	
		1D	2D
45	38 mm (1.5 in)	30 mm to 80 mm (1.2 in to 3.1 in)	25 mm to 70 mm (1.0 in to 2.8 in)
70	56 mm (2.2 in)	60 mm to 125 mm (2.4 in to 4.9 in)	45 mm to 100 mm (1.8 in to 3.9 in)
125	95 mm (3.7 in)	95 mm to 155 mm (3.7 in to 6.1 in)	65 mm to 120 mm (2.6 in to 4.7 in)

Table 3: 1.2 MP Models

Focus Position (mm)	Horizontal Field of View	Reading Range (Depth of Field)	
		1D	2D
45	52 mm (2.0 in)	25 mm to 90 mm (1.0 in to 3.5 in)	30 mm to 65 mm (1.2 in to 2.6 in)
80	86 mm (3.4 in)	65 mm to 145 mm (2.6 in to 5.7 in)	55 mm to 105 mm (2.2 in to 4.1 in)
125	130 mm (5.1 in)	105 mm to 180 mm (4.1 in to 7.1 in)	80 mm to 125 mm (3.1 in to 4.9 in)

2. Using a 2.5 mm hex key, rotate the focus ring at the back of the reader to one of the three pre-calibrated distances or to the desired distanced according to your application.

CAUTION: Do not rotate the focus ring beyond the focus scale limits; damage to the focus mechanism can occur.

Refer to the Reading Diagrams in the Instruction Manual which show the reading ranges at the different focus positions for Code 128 (1D) and Data Matrix (2D) codes.

Mount the Reader

Note: Mount the device at a 10° to 15° angle from the target to avoid direct reflections.

1. If a bracket is needed, mount the device onto the bracket.
2. Mount the device (or the device and the bracket) to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.

CAUTION: Always use the included washers, which help prevent over-insertion. Engaging the mounting screws more than 3.5 mm will damage the device.

3. Check the device alignment.
4. Tighten the mounting screws to secure the device (or the device and the bracket) in the aligned position.

Connect the Cables

Table 4: Power and I/O Pinouts for MQDC2S-17xx

Pin	Wire Color	Description
1	Brown	Power Supply Input Voltage + (V dc)
2	Blue	Power Supply Input Voltage - (GND)
3	White	not connected
4	Green	not connected
5	Pink	Reserved

Pin	Wire Color	Description	
6	Yellow	External Trigger	
7	Black	USB Data+ [2]	
8 [3]	Gray	Output 2	
9 [3]	Red	Output 1	
13	White/Green	Input Signal 2	
14	Brown/Green	not connected	
15	White/Yellow	USB Data - [2]	
16	Yellow/Brown	not connected	
Shield	n/a	Cable shield connected to chassis and 17-pin connector shell	
		RS232 Main Serial Interface	**RS422 FD Main Serial Interface**
10	Violet	-	RX- [4]
11	Gray/Pink	RX	RX+ [4]
12	Red/Blue	-	TX-
17	White/Gray	TX	TX+

All wires are referenced to GND, so any connected serial or I/O device must share a connection to GND.

If using a TCNM-ACBB1 connection box, connect the reader using cable MQDEC-1703SS-DB25 and refer to the Instruction Manual for writing details.

For Ethernet models, use Cat 5e or superior M12 D-code cables, such as STP-M12D-4xx.

To meet EMC requirements:

- Connect the reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm
- Conect pin "Earth" of the TCNM-ACBB1 connection box to a good earth ground

Simple Configuration

From the factory, all standard 1D and 2D ABR 3000 models are set up to read Data Matrix barcodes. To configure other codes, perform the simple configuration using the Smart Teach Interface. A simple configuration does not require Barcode Manager software.

Smart Teach Interface

Smart Teach is designed to improve ease of installation and maintenance.

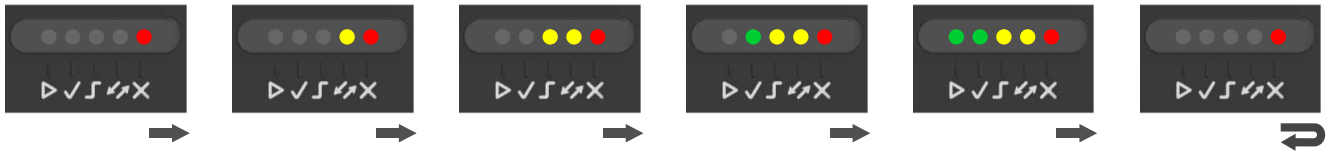
Status information is clearly presented by means of the five colored LEDs. The single push button provides access to the following modes.

Icon	Description
	Test Mode includes bar graph visualization to check static reading performance.
	Focus (Aim) turns on the laser aiming cross to aim the reader at the target.
	Setup self-optimizes and auto-configures image brightness parameters.
	Learn automatically detects and recognizes a single code which is presented to it. Successive Learns will substitute the current code. To configure multiple codes, use Barcode Manager.

Quick access to the following modes is provided using the push button:

1. Press the button. The **Status** LED gives visual feedback.
2. Hold the button until the specific mode LED is on (**Test**, **Focus/Aim**, **Setup**, or **Learn**).
3. Release the button to enter the specific mode.

After the button is pressed, the cycle of LED activation is as follows:



Release button to exit | Release button to enter **Test** mode | Release button to enter **Focus (Aim)** mode | Release button to enter **Setup** mode | Release button to enter **Learn** mode | Release button to exit (cycle)

[2] If using the USB interface without Banner accessory cables, EMC compliance requires USB data and power signals to originate from the same source (computer). Maximum USB cable length from M12 17-pin connector is 2 meters. Incorrect disconnection can result in damage to the USB hub.

[3] Referenced to GND; Outputs become opto-isolated and polarity sensitive when connected through the TCNM-ACBB1 connection box. See the Instruction Manual for connection details.

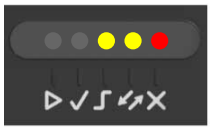
[4] If using RS422, do not leave floating. See the Instruction Manual for connection details.

Focus/Aiming

The reader includes a built-in aiming system to aid in reader positioning. Access the aiming system through the Smart Teach Interface.

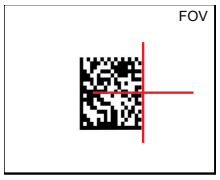
1. Apply power to the reader.
   During startup, all of the LEDs blink for one second. On the connector side of the reader near the cable, the **Power** LED (blue) indicates the reader is correctly powered.
2. Enter **Focus/Aim** mode by pressing and holding the Smart Teach button until the **Focus/Aim** LED is on.

Figure 4. Smart Teach Interface: Aim Mode



3. Release the button to enter **Aim** mode.
   The aiming system turns on.
4. Place an application-specific code in front of the reader at the reading distance indicated for your model (see Set the Focus on p. 2).
5. Position the center of the code 8 mm to the left of the aiming system indicator, as shown in the following figure.

Figure 5. Aiming Mode Using the Red Crosshairs



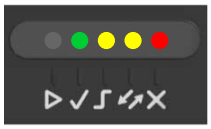
6. Exit **Aim** mode by pressing the Smart Teach button once. The aiming system turns off.

Setup

Once entered, the imager automatically performs the Image Acquisition parameter calibration for the specific code presented to it.

1. Enter **Setup** mode by pressing and holding the Smart Teach button until the **Setup** LED is on.

Figure 6. Smart Teach Interface: Setup Mode



2. Release the button to enter **Setup** mode.

   The **Setup** LED blinks until the procedure is completed. The **Setup** procedure ends when the Image Acquisition parameters are successfully saved in the reader memory, the **Setup** LED stops blinking, the ABR beeps once, and exits **Setup** mode.
3. If the calibration cannot be reached after a timeout of about 5 (five) seconds, ABR exits without saving the parameters to memory, the **Setup** LED stops blinking, and the ABR beeps once.

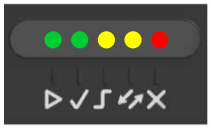
Learn

Once entered, the imager starts a procedure to automatically detect and recognize a single code [6] which is presented to it. Successive Learns will substitute the current code. To configure multiple codes, use the Barcode Manager Auto-learn procedure.

Exit **Learn** mode at any time by pressing the Smart Teach button once. After a short delay the Learn procedure is cancelled.

1. Enter **Learn** mode by pressing and holding the Smart Teach button until the **Learn** LED is on.

Figure 7. Smart Teach Interface: Learn Mode



2. Release the button to enter **Learn** mode.

   The **Learn** LED blinks until the procedure is complete. The Learn procedure ends when the Image Processing and Decoding parameters **for a single code** are successfully saved in the reader memory, the Green Spot is activated, the **Learn** LED stops blinking, the ABR beeps once, and exits **Learn** mode.

[6] The Learn procedure does not recognize the following symbologies: Postal Codes, Pharmacode, and MSI. Configure through Barcode Manager for these codes.

Advanced Configuration

Use the following procedures for a more advanced configuration of the ABR. Advanced configuration requires Barcode Manager software. For complete configuration instructions, refer to the Instruction Manual at www.bannerengineering.com. Search for p/n 207637 to view the Instruction Manual.

Install Barcode Manager

Administrative rights are required to install the Barcode Manager software.

Important: Install Barcode Manager on a Windows® 7, 8, or 10 [7] computer. Barcode Manager does not currently support Windows Embedded (often used in industrial PCs and/or PLCs).

1. Download the latest version of Barcode Manager from www.bannerengineering.com.
2. Navigate to and open the downloaded file.
3. Run the downloaded file to access the installation screen.
4. Follow the onscreen installation procedure.
   After the installation is complete, the Barcode Manager entry is created under **Start** > **Programs** > **Banner Engineering**. A desktop icon is also created.

Connect to Barcode Manager

Depending on your ABR 3000 model, connect to the Barcode Manager configuration environment through one of the following interfaces:

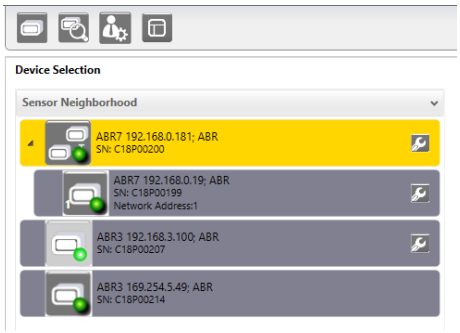
- Ethernet Configuration— Ethernet Device Discovery on p. 5
- USB Configuration— USB Device Discovery on p. 6
- Serial Configuration [8]—See the Instruction Manual

Ethernet Device Discovery

The following configuration procedure assumes that a laptop computer running Barcode Manager is connected to a factory default reader through the Ethernet port.

The Barcode Manager user interface opens and displays a list of all the devices belonging to the Local Area Network (LAN).

Figure 8. Device Discovery



The Barcode Manager discovery feature also shows devices not belonging to the LAN and displays them in light gray (see Figure 8 on p. 5).

The following is an example configuration for Windows® operating system version 7, 8, or 10.

1. Confirm the network connections. Changing the Local Area Connection (LAN) properties of the programming computer to be compatible with the ABR device on the network may be required for connection.
   a) Click the **Start** button, then on the **Start** menu, click **Control Panel** or search for **Control Panel**.
   b) In **Control Panel**, click **Network and Internet**, then click **Network and Sharing Center**, and then click **Change adapter settings**.
   c) Right-click on the connection that you want to change, then click **Properties**.
      If you are prompted for an administrator password or confirmation, enter the password or provide confirmation.
   d) In the connection properties, click **Internet Protocol Version 4 (TCP/IPv4)**, and then click **Properties**.
   e) In the **Internet Protocol (TCP/IPv4) Properties**, select **Use the following IP address**.
   f) Make sure that the IP address is 192.168.3.1, and the subnet mask is 255.255.255.0.
      The IP address must be compatible with the default device address 192.168.3.100.
2. As an alternate method, change the IP address of the device.
3. In Barcode Manager, click **Find Devices**.
   The device displays in **Sensor Neighborhood** with a dark gray icon, meaning it is now part of the LAN and can be configured. The new IP address also displays.
4. Double-click or drag the **device** icon into the **Selected Device Information Area**.
   Details about the device display in this area.

After device discovery, configure your device through Barcode Manager. Go to Automatic Setup on p. 6.

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7 Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.
8 All devices can be configured through their Main Serial port. However, through this interface, configuration is slower than the Ethernet or USB interfaces and presents some limitations. It is recommended to use the Serial interface for configuration only if the other interfaces are not available.

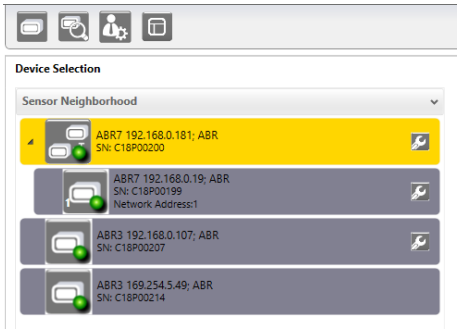
USB Device Discovery

The following configuration procedure assumes that a laptop computer running Barcode Manager is connected to an ABR 3000 USB model reader through the USB port using cable MQDEC-1703SS-USB or CSB-M121701USB02M121702.

ABR 3000 Ethernet models can also connect by USB. However, they do not show up with this device discovery method. For more information see *ABR 3000 Ethernet Model Connection via USB* available at www.bannerengineering.com.

1. After the reader is connected to the USB port and successfully starts, from Barcode Manager, click **Getting Started** to discover the reader.
   The reader is shown in the **Sensor Neighborhood** list.

*Figure 9. **Sensor Neighborhood** List*



2. Find your reader in the list by matching its serial number (SN). The USB driver creates a virtual Ethernet connection with an IP address that cannot be modified.

Tip: The USB unit is the one in the **Sensor Neighborhood** list without a **wrench** icon (used for modifying the IP parameters).

3. Double-click on or drag the **device** icon into the **Selected Device Information Area**. Details about the device display in this area.

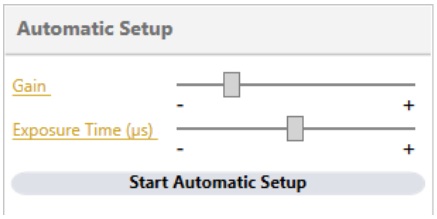
Automatic Setup

To begin configuration, the reader must be correctly mounted at the correct reading distance for your application so that its Field of View covers the application reading area.

1. Click **Open Device Configuration**. The **Open Device Configuration** window opens showing the list of configurations (jobs) currently saved on the device. For new devices, the only saved configuration is the Default configuration.
2. Click **OK**. The device enters Live Image Capture mode and begins acquiring images.
3. Place the application code [9] in front of the reader at the correct application reading distance.
4. If needed, set the focus manually. See Set the Focus on p. 2.
5. After the code is positioned, click **Pause** to stop image acquisition.

Note: If the image display area is too dark to see the images being captured, drag the Gain and Exposure Time sliders to the right to increase visibility. This will not affect Automatic Setup.

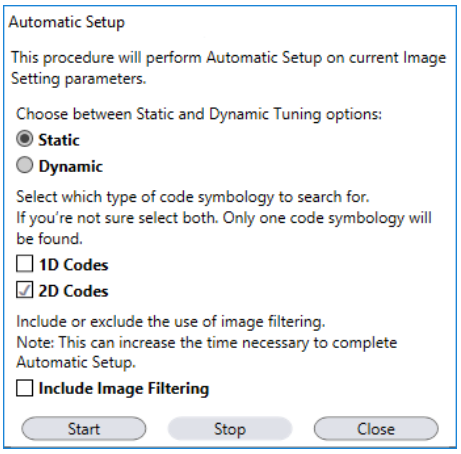
Figure 10. Gain and Exposure Time



6. Click **Start Automatic Setup**. The **Automatic Setup** window opens.

[9] Automatic Setup does not recognize the following symbologies: Postal Codes, Pharmacode, MSI, Standard 2 of 5, or Matrix 2 of 5, and Interleaved 2 of 5.

Figure 11. Automatic Setup



7. Select the correct reading conditions.
   - **Static** Tuning—No maximum limit on exposure time
   - **Dynamic** Tuning—Maximum allowable image exposure is automatically calculated using the parameters
   - **1D** code
   - **2D** code
   - **Include Image Filtering**—Select to find the best decoding condition.
8. Click **Start**.

   The reader begins acquiring images and adjusting the brightness and decoding settings to find a barcode and optimize reading for the first code it finds. At the end of the procedure the Status: Completed message displays.
9. Close the **Automatic Setup** window.

   Your reader is now optimized for decoding. Continue setting up the reader for your application as desired. Typically, **Reading Phase** is configured next.

Specifications—Reader

Supply Voltage
5 V dc to 30 V dc
10 V dc to 30 V dc with TCNM-ACBB1

Consumption
0.4 A (at 5 V dc) to 0.1 A (at 30 V dc) maximum

Communication Interface
Main RS232 or RS422 full duplex: 2400 bit/s to 115200 bit/s
USB: USB 2.0 Hi-Speed
Ethernet [10]: 10/100 Mbit/s

Inputs
Input 1 (External Trigger) and Input 2: Protected against short-circuits (opto-isolated, polarity insensitive, and PNP only when connected through TCNM-ACBB1)

Outputs
2 NPN/PNP/Push-Pull software selectable, reverse polarity and short circuit protected outputs available (2 Opto-isolated outputs instead if using TCNM-ACBB1)
Maximum Current: 100 mA maximum continuous or 145 mA pulsed
Maximum load device voltage drop (in NPN mode): 30 V

Optical Features
See the Instruction Manual for details
LED Safety: LED emission according to EN 62471

Imager
WVGA: 752 × 480 pixels, CMOS, 57 frames/second
1.2MP: 1280 × 960 pixels, CMOS, 36 frames/second

Construction
Aluminum, plastic window

Operating Conditions
Operating Temperature [11]: 0 °C to +45 °C (+32 °F to +113 °F)
Storage Temperature: –20 °C to +70 °C (–4 °F to +158 °F)
90% maximum relative humidity (non-condensing)

Environmental Rating
IEC IP65

Other
Smart Teach button (configurable via Barcode Manager), beeper

Parameter Storage
Permanent memory (Flash)

Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

Certifications

10 The Ethernet interface is compatible with the following application protocols: TCP/IP, EtherNet/IP™, MODBUS® TCP, SLMP, PROFINET®. (The ABR is PROFINET compatible but not PROFINET certified.)
11 High ambient temperature applications should use a metal mounting bracket for heat dissipation.

Barcode Types

1-D and stacked		2-D	POSTAL
• PDF417 Standard and Micro PDF417 • Code 128 (GS1-128) • Code 39 (Standard and Full ASCII) • Code 32 • MSI • Standard 2 of 5 • Matrix 2 of 5 • Plessey	• Interleaved 2 of 5 • Codabar • Code 93 • Pharmacode • EAN-8/13-UPC-A/E (including Addon 2 and Addon 5) • GS1 DataBar Family • Composite Symbologies	• Data Matrix ECC 200 (Standard, GS1 and Direct Marking) • QR Code (Standard and Direct Marking) • Micro QR Code • MAXICODE • Aztec Code • Dotcode	• Australia Post • Royal Mail 4 State Customer • Kix Code • Japan Post • PLANET • POSTNET • POSTNET (+BB) • Intelligent Mail • Swedish Post

FCC Statement

Modifications or changes to this equipment without the expressed written approval of Banner Engineering could void the authority to use the equipment.

This device 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 which may cause undesired operation.

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 his own expense.

PC Requirements—Barcode Manager

Administrative rights are required to install the Barcode Manager software.

Operating System
Microsoft® Windows® operating system version 7, 8, or 10 [12] [13]
Barcode Manager does not currently support Windows Embedded (often used in industrial PCs and/or PLCs)

System Type
32-bit or 64-bit

Hard Drive Space
2 GB hard disk for 64-bit machines; 1 GB hard disk for 32-bit machines

Memory (RAM)
1 GB RAM

Processor
2.00 GHz or faster microprocessor

Screen Resolution
One 19-inch or larger monitor, optimized for 1280×1024 resolution

Third-Party Software
Web Browser: Google Chrome, Mozilla Firefox, Microsoft Internet Explorer, Opera, etc.

Connection
100 Base-T Ethernet

This product is covered by one or more of the following patents:

Design patents: EP003042845; EP003074079

Utility patents: EP0996284B1; EP0999514B1; EP1014292B1; EP1128315B1; EP1172756B1; EP1396811B1; EP1413971B1; EP1804089B1; EP2315156B1; EP2517148B1; EP2649555B1; JP4435343B2; JP4571258B2; JP5192390B2; US6512218; US6616039; US6808114, US6877664; US6997385; US7053954; US7387246; US8058600; US8113430; US8368000; US8888003; US8915443; US9268982; US9430689; ZL200680050007.8.

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