Sure Cross® Performance Direct Select Operator Interface Node

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Datasheet

The Direct Select takes Banner's wireless pendant offering to a new level. This package combines a multicolor indicator with capacitive touch input and a numerical display with four tactile pushbuttons. Although the Direct Select is perfectly suited for pick-to-light applications, it is capable of much more. Because it is battery powered, you can have a bi-directional operator interface mounted anywhere in your facility without the need for local power. Additionally, this completely wireless device can travel along with operators for mobile cart and forklift applications.

Benefits

- **Flexible Operator Interface**—Useful as an Input or Output device
    - Call for Parts
    - Operator Guidance
    - Pick to Light
    - Put to Light
    - Mobile Equipment

- **Deploy easily**—Simplify installation on existing equipment and remote locations where a wired solution is impractical
- **No wiring**—Battery powered with no external wiring
- **Two-way**—Node can send information back to the controller for short or missing items
- **Multi-color indication**—Active control of more than one operator using different colors
- **Capacitive touch input**—No mechanical parts, can be activated with a glove
- **Four tactile buttons**—Enable increment/decrement as well as other commands

⚠️ **WARNING:**

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Models

Model	Frequency	Inputs and Outputs
DX80N9DSTS	900 MHz ISM Band	Multicolor capacitive touch/indicator with four buttons and a three-digit numerical LCD

To order integrated battery models without the batteries, add **-NB** to the model number (for example, **DX80N9DSTS-NB**). If you purchase a model without the battery, Banner Engineering recommends battery model BWA-BATT-013.

Overview
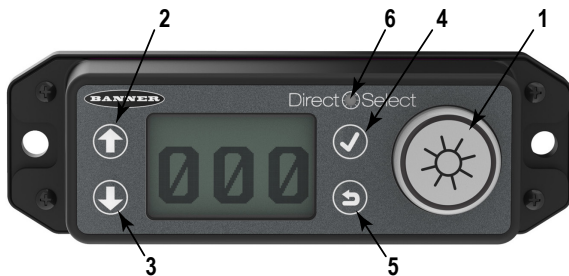
1. Capacitive touch and multicolor indicator
2. Up arrow
3. Down arrow
4. Check button
5. Back button
6. Red/green LED—Indicates the network/binding status

Configuration Instructions

Configure the DIP Switches

1. Unscrew the four screws that mount the top of the Node to its base.
2. Make the necessary changes to the DIP switches.
3. Fasten the Node back to its base.
4. Hold down ↩ (Back) and click ✔ (Check) three times. Release ↩ (Back).
   The direct select wireless indicator oscillates between red to green at a rate of 1 Hz to indicate you were successful.
5. Wait one second.
6. Press and hold down ↩ (Back) and click ✔ (Check) twice. Release ↩ (Back).
   The Node resets and returns to Run mode with the updated DIP switch configuration.

DIP Switch Settings

Device Settings	DIP Switches			
	1	2	3	4
900 MHz transmit power level: 1 Watt (30 dBm)	OFF *			
900 MHz transmit power level: 250 mW (24 dBm), DX80 compatibility mode	ON			
Default I/O		OFF *	OFF *	OFF *
Single register control mode		ON	OFF	OFF
PICK mode		OFF	ON	OFF
Operator lockout		OFF	OFF	ON
DEMO mode		ON	ON	ON
User Configuration Software configurable		OFF	ON	ON
Reserved		ON	OFF	ON
Reserved		ON	ON	OFF

Transmit Power Levels

The 900 MHz radios transmit at 1 Watt (30 dBm) or 250 mW (24 dBm). While the Performance radios operate in 1 Watt mode, they cannot communicate with the older 150 mW radios. To communicate with 150 mW radios, operate this radio in 250 mW mode. For 2.4 GHz models, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 65 mW EIRP (18 dBm), making the 2.4 GHz Performance models automatically compatible with older 2.4 GHz models.

Bind the Direct Select Node to the Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices.

1. On the DXM Gateway, enter binding mode by going to the Main menu and selecting **ISM Radio** > **Binding**.
2. Select the Node ID you would like to assign to the Direct Select Node.

   Node IDs 1 through 47 are the valid selections.
3. Click **Enter** to start the binding procedures.
4. On the Direct Select Node, enter binding mode by holding down ↩ (Back) and clicking ✔ (Check) three times.
   The red and green LEDs flash alternately and the sensor searches for a Gateway in binding mode. After the Direct Select Node is bound, the LEDs stay solid momentarily (appears orange), then they both flash together four times. The Node exits binding mode.
5. Label the Node's ID number with the supplied Device ID sticker.
6. On the DXM Gateway, click **Back** to return to the **Bind to > #** screen.
7. Repeat steps 2 through 6 for as many Direct Select Nodes needed for your network.
8. After binding all Direct Select Nodes, exit binding mode on the DXM Gateway by clicking **Back** until you return to the **Main** menu.

Holding Registers

Default I/O

This configuration uses individual output registers to control the Direct Select node.

Default I/O							
Modbus Registers		I/O Type	Additional Function	I/O Range		Holding Register Representation (Dec.)	
Gateway	Node			Min.	Max.	Min.	Max.
1	1 + (Node# × 16)	Button 1 - Capacitive Touch		0	65535	0	65535
2	2 + (Node# × 16)	Button 2 - Up	Increment LCD value by 1	0	65535	0	65535
3	3 + (Node# × 16)	Button 3 - Down	Decrement LCD value by 1	0	65535	0	65535
4	4 + (Node# × 16)	Button 4 - Check		0	65535	0	65535
5	5 + (Node# × 16)	Button 5 - Back		0	65535	0	65535
6	6 + (Node# × 16)	LCD State		0	1023	0	1023
7	7 + (Node# × 16)	Reserved					
8	8 + (Node# × 16)	Device Message					
9	9 + (Node# × 16)	Red Light		0	1	0	1
10	10 + (Node# × 16)	Green Light		0	1	0	1
11	11 + (Node# × 16)	Blue Light		0	1	0	1
12	12 + (Node# × 16)	Yellow Light		0	1	0	1
13	13 + (Node# × 16)	Back Light		0	1	0	1
14	14 + (Node# × 16)	LCD Control		0	1023	0	1023
15	15 + (Node# × 16)	Control Message					
16	16 + (Node# × 16)	Reserved					

Inputs 1 through 5 holding registers increment up 1 for each touch and up 1 for each release. It counts both the high (touch) and the low (release) transition for each button press.

Single Register Control or PICK Mode

Single Register control combines all the output registers from the default I/O mode into a single register. (See Single Register Control Word section for a binary breakdown).

PICK Mode: The output flashed red (mis-pick) when the Capacitive Touch is pressed unless a green pick request is sent via Single Register Control. To turn off the mis-pick condition, press the **Back** button to return the Node to a time-out state. **Enter** and **Back** do not control the Back light in PICK mode.

Single Register Control or PICK Mode							
Modbus Registers		I/O Type	Additional Function - Single Register/PICK Mode	I/O Range		Holding Register Representation (Dec.)	
Gateway	Node			Min.	Max.	Min.	Max.
1	1 + (Node# × 16)	Button 1 - Capacitive Touch		0	65535	0	65535
2	2 + (Node# × 16)	Button 2 - Up	Increment LCD value by 1	0	65535	0	65535
3	3 + (Node# × 16)	Button 3 - Down	Decrement LCD value by 1	0	65535	0	65535
4	4 + (Node# × 16)	Button 4 - Check	Turn on Back light/No function	0	65535	0	65535
5	5 + (Node# × 16)	Button 5 - Back	Turn off Back light/Clear screen	0	65535	0	65535
6	6 + (Node# × 16)	LCD State		0	65535	0	65535
7	7 + (Node# × 16)	Reserved					
8	8 + (Node# × 16)	Device Message					
9	9 + (Node# × 16)						
10	10 + (Node# × 16)						
11	11 + (Node# × 16)						
12	12 + (Node# × 16)						
13	13 + (Node# × 16)						
14	14 + (Node# × 16)	Single Register Control		0	65535	0	65535
15	15 + (Node# × 16)	Control Message					
16	16 + (Node# × 16)	Reserved					

Single Register Control Word

Single Register Control						
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bits 9-0
Flash/Solid	Back Light	Yellow	Blue	Green	Red	0-999: Display number on screen
0: Off	0: Off	0: Off	0: Off	0: Off	0: Off	1000: Turn off the display
1: On	1: On	1: On	1: On	1: On	1: On	1023: Turn off the display and indicator

For bits 9–0, 1001–1022 are reserved.

For example: For a flashing red light with a value of 24 on the screen, enter decimal value 536.

Operator Lockout

Use this mode when you would like to use the Node as a display. Touching the buttons causes registers 1 through 5 to increase at the controller. The screen's number will not increase, you cannot turn the back light on or off, and you cannot turn off the screen and indicator as in the other modes.

Operator Lockout						
Modbus Registers		I/O Type	I/O Range		Holding Register Representation (Dec.)	
Gateway	Node		Min.	Max.	Min.	Max.
1	1 + (Node# × 16)	Button 1 - Capacitive Touch	0	65535	0	65535
2	2 + (Node# × 16)	Button 2 - Up	0	65535	0	65535
3	3 + (Node# × 16)	Button 3 - Down	0	65535	0	65535
4	4 + (Node# × 16)	Button 4 - Check	0	65535	0	65535
5	5 + (Node# × 16)	Button 5 - Back	0	65535	0	65535
6	6 + (Node# × 16)	LCD State	0	1023	0	1023
7	7 + (Node# × 16)	Reserved				
8	8 + (Node# × 16)	Device Message				
9	9 + (Node# × 16)	Red Light	0	1	0	1
10	10 + (Node# × 16)	Green Light	0	1	0	1
11	11 + (Node# × 16)	Blue Light	0	1	0	1
12	12 + (Node# × 16)	Yellow Light	0	1	0	1
13	13 + (Node# × 16)	Back Light	0	1	0	1
14	14 + (Node# × 16)	LCD Control	0	1023	0	1023
15	15 + (Node# × 16)	Control Message				
16	16 + (Node# × 16)	Reserved				

Light Colors

Use the following table of outputs to produce more colors.

Color to Display	Output Status to Produce Selected Color			
	Output 1 (red LED)	Output 2 (green LED)	Output 3 (blue LED)	Output 4 (yellow LED)
Red	ON			
Green		ON		
Blue			ON	
Yellow				ON
Magenta	ON		ON	
Orange	ON			ON
Cyan		ON	ON	
White	ON	ON	ON	

For example, to produce the color orange, outputs 1 and 4 (red and yellow) must be on. To create white, outputs 1, 2, and 3 (red, green, and blue) must be on.

Replace the Battery

To replace the lithium C cell battery, follow these steps.

As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water. Properly dispose of used batteries according to local regulations by taking the batteries to a hazardous waste collection site, an e-waste disposal center, or other facility qualified to accept lithium batteries.

1. Unscrew the four corner screws and open the Node.
2. Remove the discharged battery and replace with a new battery.

   Use a 3.6 V C cell lithium battery, such as Titus ER26500 (Banner model **BWA-BATT-013**) or equivalent.
3. Verify the battery's positive and negative terminals align to the positive and negative terminals as marked.

   ⚠️ **CAUTION:** There is a risk of explosion if the battery is replaced incorrectly.

4. Reassemble the Node and tighten the four corner screws.

Specifications

Performance 900 MHz Radio Specifications for Internal Antennas

Radio Range[1]
900 MHz, 1 Watt: Up to 9.6 km (6 miles)

Antenna Minimum Separation Distance
900 MHz, 1 Watt: 4.57 m (15 ft)

Radio Transmit Power
900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

900 MHz Compliance (1 Watt)
FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

Link Timeout
Gateway: Configurable via User Configuration Software
Node: Defined by Gateway

Specifications for the Direct Select Node

Construction
Molded plastic, polycarbonate housing, o-ring sealed gray cover, PC Bayer plastic indicator dome, stainless steel hardware.

Indicators
Red-yellow-green-blue colors configurable in the register

Default Sensing Interval
62.5 milliseconds

Report Rate
On Change of State

Environmental Rating
IEC IP65

Typical Battery Life
Up to 2 years

Button Input
Sample Rate: 62.5 milliseconds
Report Rate: On Change of State
ON Condition: Button pressed
OFF Condition: Button not pressed

Operating Conditions
–25 °C to +70 °C (–13 °F to +158 °F)
90% at +50 °C maximum relative humidity (non-condensing)

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[1] Radio range is with the 2 dB antenna that ships with the product. High-gain antennas are available, but the range depends on the environment and line of sight. Always verify your wireless network's range by performing a Site Survey.

Warnings

Install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors invalidate the manufacturer's warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross device during a thunderstorm.

Exporting Sure Cross® Radios. It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. **Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country.** The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. This device has been designed to operate with the antennas listed on Banner Engineering's website and having a maximum gain of 9 dBm. Antennas not included in this list or having a gain greater that 9 dBm are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen such that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication. Consult with Banner Engineering Corp. if the destination country is not on this list.