



the machine safety specialist

# MICRO-SCREEN® DIN Controllers with DeviceNet™ – Latch Output

Supplement to MICRO-SCREEN Instruction Manual P/N 54202



## Features

- Offers all of the features of standard MICRO-SCREEN DIN controllers (see Instruction Manual P/N 54202 and 4-Output Supplement, P/N 55631 if your system has 4 outputs), plus DeviceNet BUS network communications of non-safety monitoring of status and diagnostic information

- Wires to network using simple junction boxes or "T" connectors

- The following information is available to DeviceNet:

**System Identification:** Product name, manufacturer, model, etc.

**System Status:**

- Operating mode: Run, lockout, etc.
- Status of defined area: blocked or clear
- Output relay status: FSD1, FSD2, SSD, Alarm
- Status of key reset, test, and E-stop inputs
- Noise detected

**Sensor Alignment:**

- Number of sensor beams
- Number of beams blocked
- Location of blocked beams

**System Settings:**

- Auto power-up: ON or OFF
- Floating blanking: 1-beam, 2-beam, or OFF
- Fixed blanking: Number and location of blanked beams, or OFF (models USDINT-2L2D, USDINT-2L4D)

**Diagnostic Information:**

- Error code
- Problem description (cause of lockout)
- Troubleshooting suggestions

- An Electronic Data Sheet (EDS) is supplied with each controller to assist in device configuration.

- Manual MAC ID Address Switches and LED

- AUTOBAUD

- Selectable COS Trigger

## MICRO-SCREEN DIN Controllers with DeviceNet™ – Latch Output

Model	Part Number	Refer to Instruction Manual	Supply Voltage	Output Type	Blanking	E-stop Input	Number of Outputs
USDINT-1L2D	54177	P/N 54202	24V dc	Latch	1- or 2-beam floating	Yes	2
USDINT-2L2D	54179				Fixed and 1- or 2-beam floating		
USDINT-1L4D	55598	P/N 54202 and Supplement P/N 55631			1- or 2-beam floating		4
USDINT-2L4D	55600				Fixed and 1- or 2-beam floating		

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## MICRO-SCREEN DIN Controllers with DeviceNet Specifications

See Instruction Manual P/N 54202 for additional control module specifications

<b>DeviceNet Power</b>	11 to 25V dc; 80 mA - supplied by DeviceNet BUS Network																																				
<b>Indicators</b>	<p>Network Status Indicator -</p> <p>A bi-colored (red/green) LED visible on the control module indicates network status:</p> <table border="0"> <tr> <td>Green</td> <td>Steady</td> <td>On-line, connected/allocated to master</td> </tr> <tr> <td></td> <td>Flashing</td> <td>On-line, not connected/allocated to master; if Autobaud is ON, address and baud rate OK</td> </tr> <tr> <td>Red</td> <td>Steady</td> <td>Critical network fault or duplicate node address detected</td> </tr> <tr> <td></td> <td>Flashing</td> <td>Connection time-out or no power to light screen</td> </tr> <tr> <td>OFF</td> <td></td> <td>No network power or off-line</td> </tr> <tr> <td>Green/Red/OFF</td> <td></td> <td>Autobaud detecting network baud rate</td> </tr> </table>	Green	Steady	On-line, connected/allocated to master		Flashing	On-line, not connected/allocated to master; if Autobaud is ON, address and baud rate OK	Red	Steady	Critical network fault or duplicate node address detected		Flashing	Connection time-out or no power to light screen	OFF		No network power or off-line	Green/Red/OFF		Autobaud detecting network baud rate																		
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<b>Poll and COS I/O Assembly Instances</b>	<p>The MICRO-SCREEN device I/O assemblies consist of:</p> <ul style="list-style-type: none"> <li>• <b>Poll:</b> One product specific input assembly containing operating mode, status of defined area, status of output relays, status of inputs (Key Reset, Test, and E-Stop), noise detected, number of sensor beams, number of beams blocked, Auto Power-up switch settings, COS trigger setting, autobaud setting, floating blanking switch settings and number of fixed beams (Fixed Blanking models only).</li> <li>• <b>COS:</b> One product-specific input assembly containing the operating mode and defined area status.</li> </ul>																																				

<b>I/O Assembly Data Attribute Format</b>	<p><b>Assembly instance 1</b> is used as the response data for the <b>Poll</b> command. Produced connection size is 7 bytes for models without Fixed Blanking and 8 bytes for models with Fixed Blanking. Consumed connection size is 0 bytes for all models.</p>									
<b>Instance</b>	<b>Byte</b>	<b>Bit 7</b>	<b>Bit 6</b>	<b>Bit 5</b>	<b>Bit 4</b>	<b>Bit 3</b>	<b>Bit 2</b>	<b>Bit 1</b>	<b>Bit 0</b>	
1	0	Reserved	Reserved	Latch Mode	Program Mode	Lockout Mode	Run Mode	Power-up Mode	Off	
	1	FSD1 Invalid	FSD1 State	FSD2 Invalid	FSD2 State	SSD Invalid	SSD State	Alarm Invalid	Alarm State	
	2	Reserved	Reserved	Defined Area Invalid	Defined Area	Test Input Invalid	Test Input	Noise Invalid	Noise	
	3	Reserved	Reserved	Reset Key Invalid	Reset Key	Reserved	E-stop Invalid	E-stop Input a-b	E-stop Input c-d	
	4	Floating Blanking Invalid	Floating Blanking Switch 2	Floating Blanking Switch 1	Reserved	Autobaud	COS Trigger	Auto Power-up Invalid	Auto Power-up	
	5	Number of Sensor Beams								
	6	Number of Blocked Beams								
	7	Number of Fixed Beams (This byte exists only for models with Fixed Blanking.)								

<b>I/O Assembly Data Attribute Format</b>	<p><b>Assembly instance 2</b> is used as the data for the <b>COS</b> command. A COS command is issued in response to a change in the MICRO-SCREEN operating mode or in response to a change in the operating mode or the defined area status (see selecting COS trigger). Produced connection size is 1 byte. Consumed connection size is 0 bytes. NOTE: Bit 4 only applies to models with Fixed Blanking Program Mode.</p>								
<b>Instance</b>	<b>Byte</b>	<b>Bit 7</b>	<b>Bit 6</b>	<b>Bit 5</b>	<b>Bit 4</b>	<b>Bit 3</b>	<b>Bit 2</b>	<b>Bit 1</b>	<b>Bit 0</b>
2	0	Defined Area Invalid	Defined Area	Latch Mode	Program Mode	Lockout Mode	Run Mode	Power-up Mode	Off

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## Selecting the Autobaud Feature

The MICRO-SCREEN has an autobaud feature which allows for automatic recognition of the baud rate on the network into which the MICRO-SCREEN is installed. This convenient feature automatically matches the MICRO-SCREEN baud rate to the network without requiring a baud rate configuration step. The autobaud feature is set to ON at the factory. When the autobaud parameter is set to ON, the baud rate parameter may not be set via the DeviceNet network. The autobaud parameter may be turned off by setting the DeviceNet autobaud parameter to OFF (see the EDS file for path information). When the autobaud parameter is set to OFF, the baud rate parameter may be set via the DeviceNet network to the desired baud rate.

To determine if autobaud is set to ON, power the MICRO-SCREEN at the DeviceNet power inputs while it is not connected to the DeviceNet network; the Bus Status Indicator will flash green, then red, then OFF in a repetitive sequence. If autobaud is set to OFF, then the Bus Status Indicator will flash green (or red) after the initial green/red sequence at power up.

## Selecting the COS Trigger Feature

The MICRO-SCREEN has a COS trigger feature that allows the user to select the parameters used for triggering a COS data response. The COS trigger is set to operating mode change only at the factory. With this setting, only changes in the operating mode of the MICRO-SCREEN will generate the COS data message (see I/O Assembly Data Attribute Format; Instance 2 for details). The COS trigger may also be set to operating mode/defined area (see the EDS file for path information). With this setting, changes in either the operating mode or the defined area status of the MICRO-SCREEN will generate the COS data message.

## Setting the MAC ID Address

In order for the DeviceNet controller to process information from its individual inputs, each input must have a unique 2-digit address. (For example, two devices on the same bus network may not both have 26 as their address; however, two devices within the same factory may have addresses of 26, if they are on separate bus networks.)

The MICRO-SCREEN's address may be assigned in two ways: locally, using the two rotary selectors on the front of the module (see Figure 1), or remotely, using the rotary selectors and the DeviceNet controller. To set the address locally, set the rotary selectors to a number between 00 and 63 and cycle power to the DeviceNet connection. To allow the DeviceNet controller to set the address, set the rotary selectors to a number higher than 63; the address can then be set using the controller.

The MAC ID LED will be OFF when the MAC ID Address rotary switches match the current address of the MICRO-SCREEN (as recognized by the DeviceNet controller). If the addresses do not agree, the LED will flash. (To correct this problem, see DeviceNet Troubleshooting.) The MAC ID LED will be ON steadily when the MAC ID Address rotary switches are above 63 and the current address of the MICRO-SCREEN (as recognized by the DeviceNet controller) was set with the MAC ID Address rotary switches above 63.

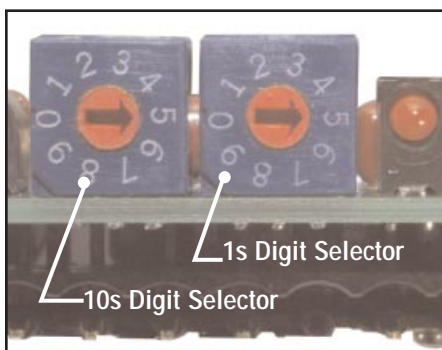


Figure 1. MAC ID Address rotary selectors and LED

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## DeviceNet Troubleshooting

MICRO-SCREEN Network Status Indicator	Description	Recommended Action
Green ON Steady	On-line, connected/allocated to master	No action required.
Green Flashing	On-line, not connected/allocated to master; If autobaud is ON, address and baud rate OK	<ol style="list-style-type: none"> <li>1) Connect/allocate the device to the master.</li> <li>2) Check that all connectors and wiring are correct and tightly connected.</li> <li>3) Check that the overall network is functional by connecting to some other device on the same DeviceNet network.</li> <li>4) If autobaud is turned OFF, set the autobaud parameter (off-line) to ON or set the MAC ID switches to a value known not to be in use and off-line try to connect at 125K (factory default), then 250K, then 500K baud until successful. If unsuccessful, repeat step 2.</li> </ol>
Red ON Steady	Critical network fault or duplicate node address detected	<ol style="list-style-type: none"> <li>1) Check to ensure that no other device on the network has the same MAC ID (network address). Each DeviceNet device must have a unique MAC ID. Use the MAC ID address switches (set at 00 to 63) to set the MAC ID over the network by setting the MAC ID parameter to the desired value (the MAC ID switches must be set to 64 or higher to allow setting of the MAC ID via the network).</li> <li>2) If autobaud is turned OFF, check that the configured baud rate matches the baud rate of the network.</li> <li>3) Ensure that the DeviceNet network is properly terminated and grounded per DeviceNet specifications.</li> <li>4) Check for insufficient network power supply.</li> </ol>
Red Flashing	Connection timeout or no power to light screen	<ol style="list-style-type: none"> <li>1) Check input power to the MICRO-SCREEN.</li> <li>2) Check DeviceNet I/O connection time-out expected packet rate (EPR) parameter setting and/or for problem with DeviceNet master.</li> </ol>
OFF	No network power or off-line	<ol style="list-style-type: none"> <li>1) Check the DeviceNet connector(s) for proper supply voltage and wiring for loose or incorrect connections.</li> </ol>
Green/Red/OFF	Autobaud detecting network baud rate	<ol style="list-style-type: none"> <li>1) Check that all connectors and wiring are correct and tightly connected.</li> <li>2) Check that the overall network is functional by connecting/allocating to some other device on the same DeviceNet network.</li> <li>3) Create repetitive network communication to some other device on the same DeviceNet network. This will allow detection of the baud rate.</li> </ol>

MICRO-SCREEN MAC ID Indicator	Description	Recommended Action
ON Steady	MAC ID address is controlled by the master.	No action required.
Flashing	The address indicated by the MAC ID switches does not match the current address. This indicates that the switch setting has been changed with the device on. This is normal if the user is in the process of changing the address.	<ol style="list-style-type: none"> <li>1) If switches have been changed, return the switches to the correct address (the indicator will stop flashing)</li> <li>2) If trying to change the address, complete the address change procedure.</li> </ol>
OFF	MAC ID address is controlled by the MAC ID switches.	No action required.

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## Latch Mode

- 1: The MICRO-SCREEN is in Latch mode.
- 0: The MICRO-SCREEN is not in Latch mode.

## Program Mode (Valid only for models with Fixed Blanking.)

- 1: The MICRO-SCREEN is in Fixed Blanking Program mode.
- 0: The MICRO-SCREEN is not in Fixed Blanking Program mode.

## Lockout Mode

- 1: The MICRO-SCREEN is in Lockout mode.
- 0: The MICRO-SCREEN is not in Lockout mode.

## Run Mode

- 1: The MICRO-SCREEN is in Run mode.
- 0: The MICRO-SCREEN is not in Run mode.

## Power-Up Mode

- 1: The MICRO-SCREEN is in Manual Power-up mode and is waiting for a Key Reset.
- 0: The MICRO-SCREEN is not in Manual Power-up mode.

## Off Mode

- 1: The MICRO-SCREEN is OFF.
- 0: The MICRO-SCREEN is ON.

## FSD1 Invalid

- 1: The state of the FSD1 Relay is unknown (not available).
- 0: The state of the FSD1 Relay is known.

## FSD1 Relay State

- Indicates the state of the FSD1 Relay (FSD1 Invalid must be 0):
- 1: Energized
- 0: De-energized

## FSD2 Invalid

- 1: The state of the FSD2 Relay is unknown (not available).
- 0: The state of the FSD2 Relay is known.

## FSD2 Relay State

- Indicates the state of the FSD2 Relay (FSD2 Invalid must be 0):
- 1: Energized
- 0: De-energized

## SSD Invalid

- 1: The state of the SSD Relay is unknown (not available).
- 0: The state of the SSD Relay is known.

## SSD Relay State

- Indicates the state of the SSD Relay (SSD Invalid must be 0):
- 1: Energized
- 0: De-energized

## Alarm Invalid

- 1: The state of the Alarm Relay is unknown (not available).
- 0: The state of the Alarm Relay is known.

## Alarm Relay State

- Indicates the state of the Alarm Relay (Alarm Invalid must be 0):
- 1: Energized
- 0: De-energized

## Defined Area Invalid

- 1: The state of the Defined Area is unknown (not available).
- 0: The state of the Defined Area is known.

## Defined Area

- Indicates whether the protected area is blocked or clear (Defined Area Invalid must be 0):
- 1: The defined area is blocked.
- 0: The defined area is clear.

## Test Input Invalid

- 1: The state of the Test Input is unknown (not available).
- 0: The state of the Test Input is known.

## Test Input

- Indicates the state of the Test input (Test Input Invalid must be 0):
- 1: The Test Input is closed (Test mode).
- 0: The Test Input is open (Normal operation).

## Noise Invalid

- 1: The state of the system noise level is unknown (not available).
- 0: The state of the system noise level is known.

## Noise

- Indicates whether the MICRO-SCREEN system is detecting electrical or optical noise (Noise Invalid must be 0):
- 1: Noise detected.
- 0: No noise detected.

## Reset Key Invalid

- 1: The position of the Reset Key is unknown (not available).
- 0: The position of the Reset Key is known.

## Reset Key

- Indicates the position of the Reset Key (Reset Key Invalid must be 0):
- 1: The Reset Key is in the Reset position (closed).
- 0: The Reset Key is in the RUN position (open).

## E-Stop Invalid

- 1: The state of the E-Stop is unknown (not available).
- 0: The state of the E-Stop is known.

## E-Stop

- Indicates the state of the E-Stop (E-Stop Invalid must be 0):
- 3: The E-Stop is closed (Go)
- 2: E-Stop input a-b is open and input c-d is shorted
- 1: E-Stop input a-b is shorted and input c-d is open
- 0: The E-Stop is open (Stop)

## Floating Blanking Invalid

- 1: The number of Floating Blanking beams is unknown (not available).
- 0: The number of Floating Blanking beams is known.

## Floating Blanking

- Indicates the number of Floating Blanking beams (Floating Blanking Invalid must be 0):
- 2: Two Floating Blanking beams used.
- 1: One Floating Blanking beam used.
- 0: Floating Blanking not being used.

## Auto Power-up Invalid

- 1: The Auto Power-up setting is unknown (not available).
- 0: The Auto Power-up setting is known.

## Auto Power-up

- Indicates the state of the Auto Power-up setting:
- 1: Auto Power-up is ON.
- 0: Auto Power-up is OFF.

## COS Trigger

- Indicates the state of the COS Trigger setting:
- 1: Operating mode or defined area change.
- 0: Operating mode change only.

## Autobaud

- Indicates the state of the Autobaud setting
- 1: Autobaud is ON.
- 0: Autobaud is OFF.

## Number of Sensor Beams

- The total number of beams in the sensor. A value of 255 indicates that the actual number of beams is not known (not available).

## Number of Beams Blocked

- The number of beams that are blocked. A value of 255 indicates that the actual number of blocked beams is not known (not available).

## Number of Fixed Beams

- The number of beams that are set for fixed blanking. A value of 255 indicates that the actual number of blocked beams is not known (not available). This byte is returned only for models with Fixed Blanking.

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## Additional Information Available Through Explicit Messaging

**Location of Blocked Beams** 1-16, 17-32, 33-48, 49-64, 65-80, 81-96 (see EDS file for path information)

Location of which individual beams are blocked. The format is:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Beam	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96

The bit will have the value:

1: If the beam is clear (not blocked).

0: If the beam is blocked or if the beam does not exist in the light screen.

**Location of Fixed Blanked Beams** 1-16, 17-32, 33-48, 49-64, 65-80, 81-96 (see EDS file for path information)

Location of which individual beams have been programmed as fixed blanked. The format is:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Beam	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96

The bit will have the value:

1: If the beam is blanked

0: If the beam is active (not blanked) or if the beam does not exist in the light curtain

### Diagnostic Information

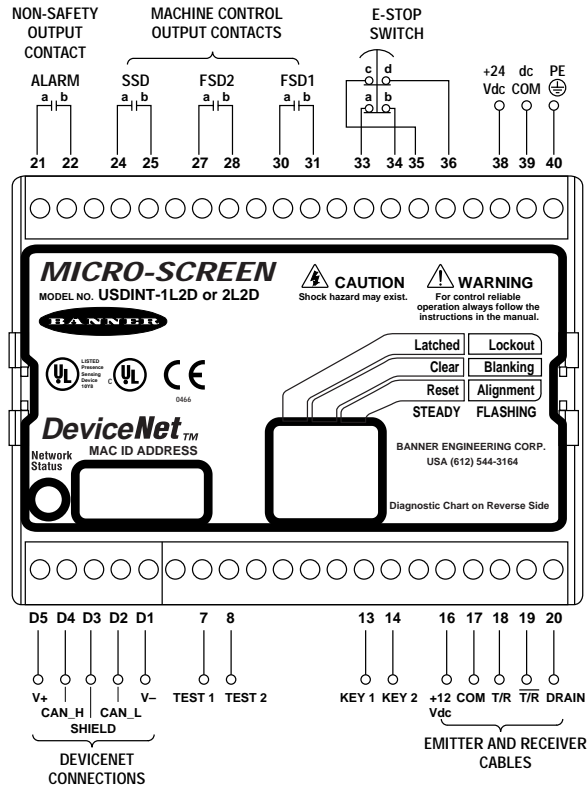
See EDS file for details regarding Error code, Problem description (cause of lockout) and Troubleshooting suggestion information.

## Replacement Parts

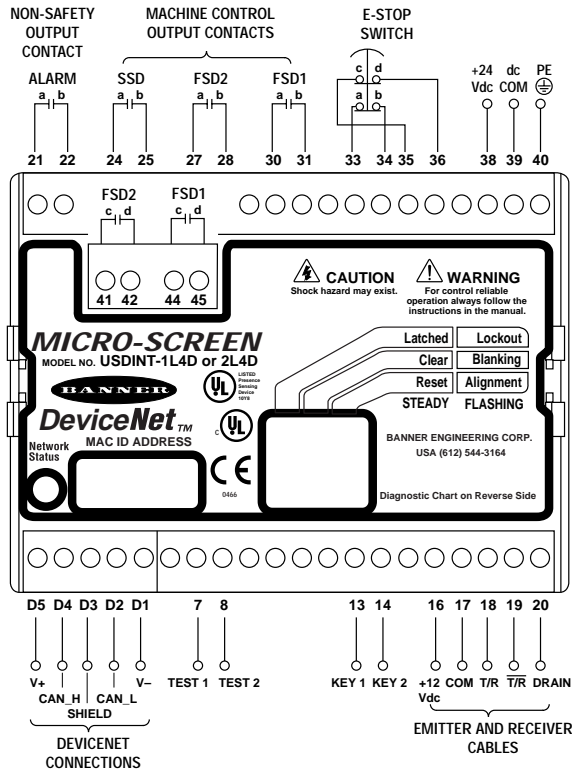
Models	P/N	Description
USDAL-1D	55625	Replacement controller board for controllers USDINT-1L2D, -1L4D
USDAL-2D	55627	Replacement controller board for controllers USDINT-2L2D, -2L4D
USA-PBT-2	55677	Replacement terminal block, 15 terminals, emitter/receiver hookup
USA-PBT-3	55678	Replacement terminal block, 5 terminals, DeviceNet hookup
USA-PBT-4	55679	Replacement terminal block, 20 terminals, output/e-stop/power hookup
USA-PBT-5	55680	Replacement terminal block, 5 terminals, FSD hookup (4-output models)

# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

## USDINT-1L2D and USDINT-2L2D



## USDINT-1L4D and USDINT-2L4D



# MICRO-SCREEN™ DIN Controllers with DeviceNet™ – Latch Output

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**WARRANTY:** Banner Engineering Corporation warrants its products to be free from defects for one year. Banner Engineering Corporation will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.