

Specialists in Information Displays

# Electronic Displays, Inc. ED2xx, ED4xx Numeric Series LED Signs Allen Bradley AOI (Add on Instruction) Software Manual



#### **Version Control**

Version	Date	Author	Change Description
1.0	5/28/2013	c.elston	Initial release
1.1	8/30/2013	Szukewich	Modifications

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# 1 INTRODUCTION

This manual is provided as a guide for using ED2xx and ED4xx Numeric Series LED Signs with RS Logix 5000 software by Allen Bradley. This manual provides detailed configuration instructions to configure Ethernet/IP and importing AOIs (add-on-instructions) to RS Logix 5000 software projects.

#### 1.1 Supported PLC Controllers

At this time only Allen Bradley CompactLogix and ControlLogix PLC CPUs that use RS Logix 5000 software are supported. Sample projects can be downloaded from the Electronic Displays, Inc. website.

Allen Bradley Micrologix, SLC500 or PLC5 PLC CPUs are **NOT supported** using RS Logix 500 software. Please refer to the ASCII protocol manual for examples. Typically, you will need to connect the serial port from the PLC directly to the LED sign using the DF1 channel 0 port with these types of PLCs.

## 1.2 Add-On Instructions

Add-on instructions provided in this manual are used to make ladder logic based programming very easy. These set of AOIs can be imported into your project and reused in ladder flow.

#### 1.3 Supported LED Signs

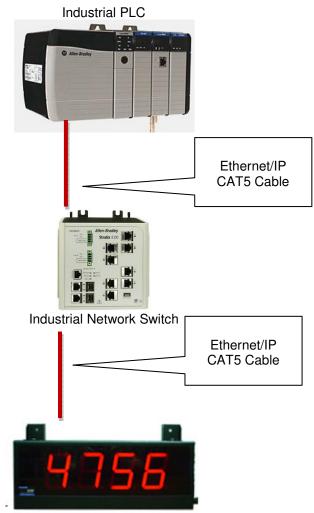
- ED202
- ED206
- ED402
- ED406



## 2 SYSTEM BLOCK DIAGRAM

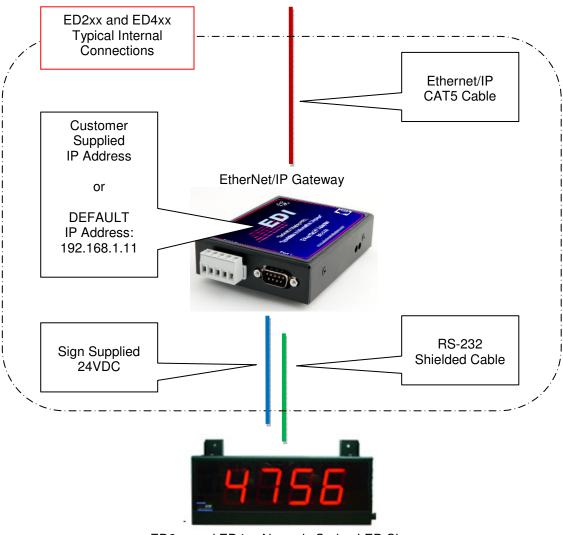
ED2xx and ED4xx Numeric LED signs come equipped with an Ethernet/IP (EIP)\_ gateway device that exchanges the Ethernet/IP protocol into ASCII serial strings compatible with the LED signs. This allows for the LED signs to be connected via an Ethernet CAT5 cable and not limited to a short distance RS-232 cable typically connected to traditional LED signs displays.

## 2.1 Typical Connection Diagram



EDV2xx or ED4xx Numeric Series LED Sign





ED2xx and ED4xx Numeric Series LED Sign

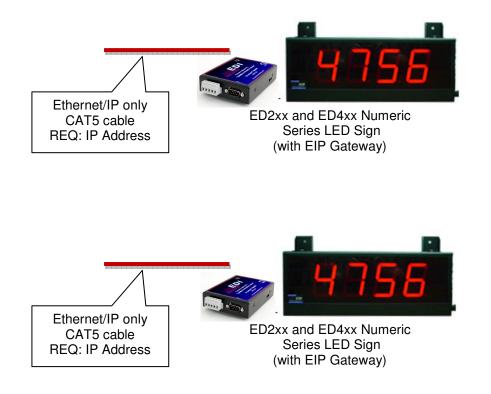
## 2.3 Single Sign Connection

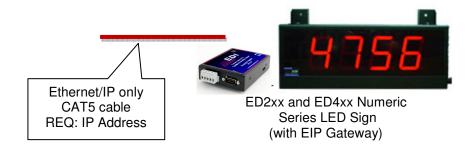
Single sign connection must have an installed "Master" EIP gateway device.



## 2.4 Multiple Sign Connection (More than 50 Feet apart)

Each sign will require an ED2xx or ED4xx to be internally installed as a "Master" EIP gateway device.





# 3 CUSTOMIZE THE IP ADDRESS EIP Gateway

### 3.1 Install Electronic Displays Network Manager

Download and install the EDI Network Manager software from EDI website Before the device can be configured, the gateway's network settings must be set.

Location: <u>http://www.electronicdisplays.com/</u>  $\rightarrow$  <u>Support</u>  $\rightarrow$  <u>Downloads</u>  $\rightarrow$  <u>Allen Bradley</u>  $\rightarrow$  <u>ED3600</u> <u>Network Manager</u>

- 1) If the PC is currently setup with DHCP turned on, turn off DHCP and set a static IP and corresponding Subnet Mask for your PC.
- 2) Connect the 7-30 VDC power source to the device.
- 3) Using the supplied crossover cable, connect the device to the PC.

🗮 RTA IPSetup V2.1	×
RTA Settings         IP       192       168       1       11         Network Mask       255       255       255       0         GateWay       192       168       1       1	Select a Unit CB34EX [00-03-F4-06-A6-84] at 192.168.47.201 runn
DNS 0 . 0 . 0 . 0 Baudrate 115200	Search Again       Launch Webpage       Advanced       Help       Close

- 4) RTA Settings: IP Address is set to 192.168.1.11 and Subnet Mask is set to 255.255.255.0 by default.
- 7) Configure the IP Address and the Subnet Mask so that it matches your PC's network settings.
- 8) Click Set->. This will restart the gateway.
- 9) Under Select a Unit, the gateway will come back online. When visible again, highlight and click Launch Webpage.

10) If gateway does not reappear under Select a Unit, click **Search Again** and repeat step 10. If problems continue, jump to the Troubleshooting section. Otherwise, you may continue with your normal gateway configuration.

## QUICK START USING TEMPLATE PROGRAM

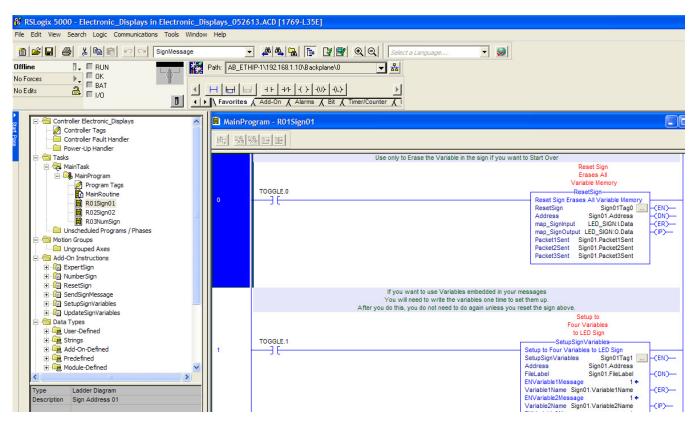
Download the sample PLC program from the Electric Displays website.

Electronic\_Displays\_052613.acd (or latest version)

#### 3.3 Quick Start with Template Program

The purpose of the template sample program is provide a bases of settings and tags that are setup in the PLC along with sample ladder logic that can be written to send messages to the sign.

This template file is design to communicate with the Number Sign logic and is located in "Rung 03". There are also examples for the EDV111 signs. Sign #1 is a master sign which is connected via an RS-232 cable daisy chained to Sign #2.



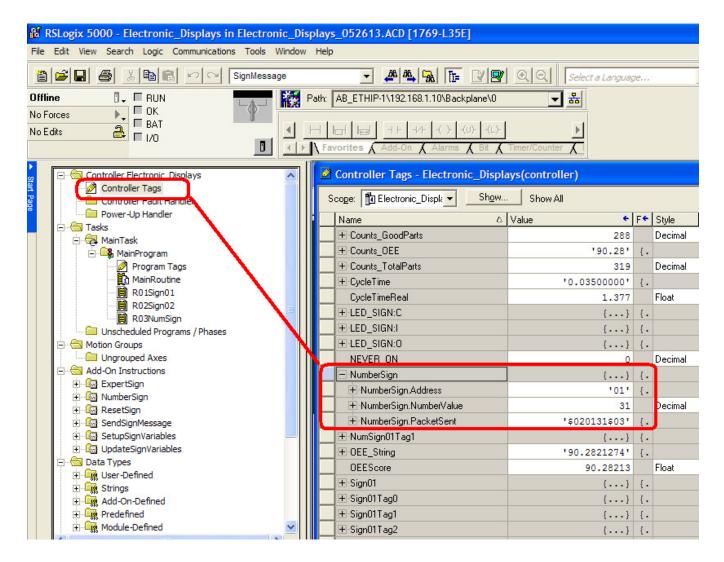
## 3.4 Update Sign IP Address in Sample Program

Open the Ethernet Module setting and update the IP Address of the sample program. The sample program is setup with the default sign IP address of 192.168.1.11. If you customized your IP, you will need to update this target address below.

Program Tags	MainProgram - R01Sign01	
🗎 R01Sign01	H SSEE	
Constructions     Constru	Use only to Erase the Variable in the sign if you v Module Properties: LocalENB (ETHERNET-MODULE 1.1) General Connection Module Info	want to Start Over
SendsignMessage     SetupSignVariables     G SetupSignVariables     G JupdateSignVariables     G	Type:       ETHERNET-MODULE Generic Ethernet Module         Vendor:       Allen-Bradley         Parent:       LocalENB         Name:       LED_SIGN         Description:       Anybus Communicator         Imput:       100         32         Output:       150	• (8-bit) • (8-bit)
I/O Configuration Backplane, CompactLogix Syster 1769-L32E Electronic_Displar 1769-L32E Ethernet Port Loc Backplane, CompactLogix Syster 1769-L32E Ethernet 1769-L32E Ethernet 1769-L32E Ethernet 1769-L32E Ethernet 1769-L32E Ethernet 1769-L32E Ethernet	Comm Format:     Data - SINT       Address / Host Name     Configuration:       IP Address:     192 . 168 . 1 . 11       Host Name:     Status Output:	÷ (8-bit)
Module Defined Tags	Status: Offline OK Cancel Apply	Help Variable1Name ENVariable2Name ENVariable3Name Variable3Name ENVariable4Mess

### 3.5 Update Messages and Sign Format Tags

Open the Controller Tags and update the NumberSign tag with the sign address. See the description or AOI help file to determine which options are available.



### 3.6 Create and Customize Ladder Logic

Create ladder logic to enable the rungs in sequence to send message to the sign. The .NumberValue parameter expects a DINT format to send a number to the sign.

🗎 MainPro	gram - R03NumSign	
田國	5 E E	
0	TOGGLE.20	Actual Number to Send to Sign (DINT Format) Move Source Counts_BadParts 31 ← Dest NumberSign.NumberValue 31 ←
1	UpdateSign01Timer.DN	Number Sign         NumberSign         NumberSign         NumberSign         NumberSign         NumberSign         NumberSign         NumberSign         NumberSign.NumberValue         MumberValue         NumberSign.NumberValue         Mump_SignInput         LED_SIGN:0.Data         PacketSent

## 4 IMPORTING WITH NEW PROGRAM OR EXISITING PROGRAM

#### 4.1 Start a new project with RS Logix 5000

Click File, New Project to start a new PLC project.

Choose PLC Type.

Choose PLC firmware revision.

Name your PLC Project.

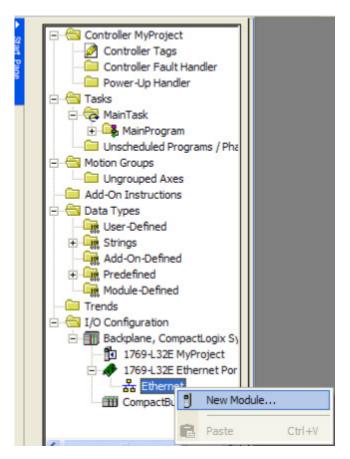
New Controlle	er -		X
Vendor:	Allen-Bradley		
Туре:	1769-L32E CompactLogix5332E Controller	•	OK
Revision:	<u> </u>		Cancel
	16 17 ancy Enabled		Help
Name:			
Description:		^	
		v	
Chassis Type:	<none></none>	Ŧ	
Slot	Safety Partner Slot:		
Create In:	C:\RSLogix 5000\Projects		Browse

#### 4.2 Create a New Ethernet Connection

In the controller tree view.

Right click the Ethernet ICON

Choose New Module



Choose Communication.

Choose ETHERNET-MODULE (Generic Ethernet Module)

Click OK

Module	Description	Vendor
ETHERNET-BRIDGE	1788 10/100 Mbps Ethernet Bridge, Twisted-Pair Media 1788 10/100 Mbps Ethernet Bridge w/Enhanced Web Serv. 1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media 1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media 10/100 Mbps Ethernet Port on DriveLogix5730 Generic EtherNet/IP CIP Bridge Generic Ethernet Module	Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley Allen-Bradley
EtherNet/IP     PH-PSSCENA/A     Digital     Drives     HMI	SoftLogix5800 EtherNet/IP Ethernet Adapter, Twisted-Pair Media	Allen-Bradley Parker Hannif
By Category     By Ve	Find	Add Favorite

Name the Ethernet Connection: **LED\_SIGN** (This will be the prefix name of the tags in the controller.)

Enter the Anybus Communicator Default IP address or your custom IP address: 192.168.1.11 or custom IP address

(xxx.xxx.xxx.xxx)

Choose Comm Format Data-SINT (Important)

Enter Required Assembly Instance Input: 100 and 32 bytes Output: 150 and 496 bytes Configuration: 1 and 0 bytes

Click OK

New Module		$\mathbf{X}$
Type: ETHERNET-MODULE Generic Ethern Vendor: Allen-Bradley Parent: LocalENB Name: LED_Sign	et Module	
Description:	Assembly Instance: Size: Input: 100 32 (8-bit) Output: 150 496 (8-bit)	
Comm Format: Data - SINT Address / Host Name IP Address: 192 . 168 . 1 . 11	Configuration: 1 0 (8-bit) Status Input:	
<ul> <li>⊂ Host Name:</li> <li>✓ Open Module Properties</li> </ul>	Status Output OK Cancel Help	1

Choose RPI interval:

Default 10.0 ms is ok

Click OK

Module Properties: LocalENB (ETHERNET-MODULE 1.1)
General       Connection       Module Info         Requested Packet Interval (RPI):       10.0 ± ms       (1.0 - 3200.0 ms)         Inhibit Module       Major Fault On Controller If Connection Fails While in Run Mode         Module Fault       Module Fault
Status: Offline OK Cancel Apply Help

#### Confirm Controller Tags

Confirm Ethernet Module is configured

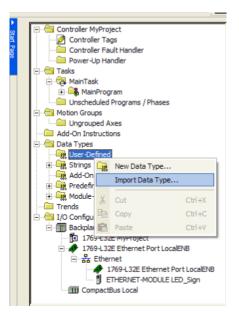
Name	△ Value	€ F€	Style Data Type
+-LED_Sign:C			AB:ETHERNET
			AB:ETHERNET
			AB:ETHERNET_
LE CEU_DIGIEO		1	Able filterine [
	++LED_Sign:C ++LED_Sign:1 ++LED_Sign:0	+-LED_Sign:I	

#### 4.3 Importing Data-Types

In the controller tree view

Right click User-Defined under "Data Types"

Choose Import Data Type



Browse to the folder containing Data Type

Import NUMSIGN.L5X file

Click OK



Confirm no version conflicts

Click OK

Import Configuration				$\mathbf{X}$
Eind: Find: Final Name	▲ ▲	Find/Replace		
Import Content:	Configure Data T Import Name: Operation: Final Name: Description:	NUMSIGN Use Existing NUMSIGN		
Ready			OK	Cancel Help

#### Confirm Data Type "NUMSIGN"

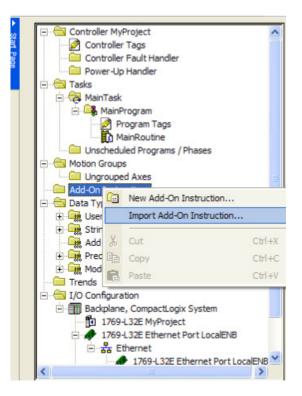
	MainPro	-	n - RO3NumSign			(				
Power-Up Handler	1.00		📓 Data Type: NUMSIGN							
🖃 🔂 Tasks			bata rype. noma							
🖻 🤕 MainTask										
🖻 🕞 MainProgram										
Program Tags	0	N.	ame:	NUMSIGN						
	·									
- 🗎 R01Sign01		D	escription:							
R02Sign02										
Unscheduled Programs / Phases										
Horischeduled Programs / Phases										
Ungrouped Axes			I							
Add-On Instructions										
+ i ExpertSign										
		Me	mbers:			Data Type Size: 180 byte(s)				
ResetSign			Name	Data Type	Style	Description				
🛨 💼 SendSignMessage			Address	STRING	style					
SetupSignVariables	1		Audress NumberValue	DINT		"01"=sign address 1 "02"=sign address 2 etc per protocol [must be two digits]				
		₩			Decimal	Actual Number to Send to Sign (DINT Format)				
🚊 🚔 Data Types			⊞ PacketSent	STRING		The actual packet sent to the sign.				
🖃 🦏 User-Defined		10f <sup>2</sup> 010								
I LEDSIGN I MUMSIGN ⊕ G Strings										
🗄 🚂 Add-On-Defined 💽 💌										
<	(End)	<	( <b>m</b> )			X				
Description	(end)			. 1						
Size 180 Bytes			Move Up Move	<u>D</u> own		OK Cancel Apply Help				

#### 4.4 Importing Add-on Instructions

In the controller tree view

Right click Add-On Instruction

Choose Import Add-On Instruction



Browse to the folder containing Add-On Instructions

Import the NumberSign .L5X extension.

This is the only AOI required for the ED2xx or ED4xx signs.

Click OK

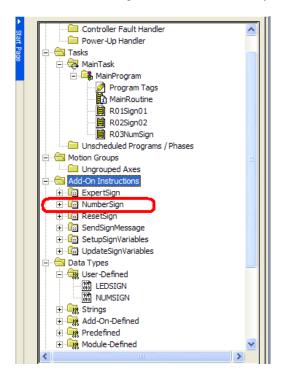
Import Instruct	tion	
Look in: My Recent Documents Desktop My Documents My Documents	-	* .
My Network Places	Files of type:     RSLogix 5000 XML Files (*.L5X)       Files containing:     Instruction	

#### Confirm no version conflicts

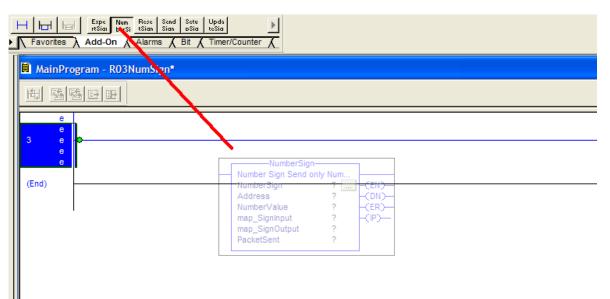
#### Click OK

Import Configuration				
Find: Find: Find Within: Final Name	- <u>A</u>	Find/Replace		
Import Content:	Configure Add-O Import Name: Operation: Final Name: Description:	n Instruction Properties NumberSign Use Existing NumberSign NumberSign Send only Numbers	Collision Details	
	Revision: Revision Note: Vendor:	v1.0 Original Release Electronic Displays, Inc.		
Ready			OK	Cancel Help

#### Confirm NumberSign AOI Instruction is imported



Confirm AOIs are added to Toolbar in RS Logix 5000



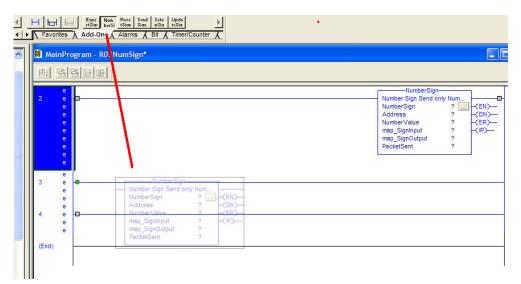
# **5 USING THE AOI INSTRUCTIONS IN THE PROJECT**

## 5.1 Add AOIs to Ladder Programming via Drag and Drop

Click on the Add-On Toolbar

Drag and Drop the desired control AOI block to a new rung

#### TIP: You can also drag and drop from the Add-On Menu Tree on the left as well

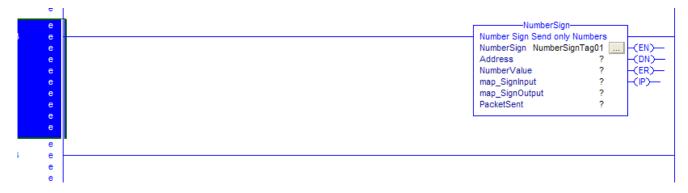


### 5.2 Creating Unique Tags for AOI

Under the AOI "Tag" parameter, begin to type a desired tag name.

Best Practice here might be to name the tag with the sign address. In this case, the default sign address is "01". NumberSignTag01 might be an example.

Be sure you scope your tag properly.



### 5.3 Creating Unique Tags for Sign Parameters

Each sign, needs a "parameter" file which it retrieves all information and settings from the PLC to the sign.

Best practice would be to create a tag with the name of your sign.

Choose NUMSIGN as the Data Type.

Controller Electronic_Displays		Controller Tags - Electronic_Displ	ays(controller)				
Controller Tags		Scope: Displar Show.	Show All				
Power-Up Handler		Name 🛆	Value 🗧	F+	Style	Data Type	Desci
⊡		ALWAYS_ON	0		Decimal	BOOL	
⊡ ••••• Main I ask ⊡ ••••• MainProgram		+ ColorGreen	'1'	{.		STRING	
Program Tags		+ ColorRed	.0.	1.		STRING	
MainRoutine		+ Counts BadParts	31		Decimal	DINT	-
🗎 R01Sign01		+ Counts Cycle	'1.389'	1.		STRING	
R02Sign02		+ Counts_GoodParts	288		Decimal	DINT	
R03NumSign		+ Counts_DEE	'90.28'	1.	Doolindi	STRING	-
Unscheduled Programs / Phases	N	+ Counts TotalParts	319	1.	Decimal	DINT	-
Ungrouped Axes		+ CycleTime	'0.03500000'	1.		STRING	-
- G Add-On Instructions		CycleTimeReal	1.377	1.	Float	BEAL	-
ExpertSign		+ ED SIGN:C			FIUAL	AB:ETHERNET	-
			{}				_
🗈 🕼 ResetSign		T-LED SIGN:	{}			AB:ETHERNET	-
	╵║╻		{}			AB:ETHERNET	
Generation SetupSignVariables     UpdateSignVariables		NEVER ON	0	-	Decimal	BOOL	h
		- NumberSign	{}	{.		NUMSIGN	
		+ NumberSign.Address	'01'	{.		STRING	2015
回 · · · · · · · · · · · · · · · · · · ·			31		Decimal	DINT	Actua
NUMSIGN			'\$020131\$03'	{.		STRING	The a
E Cings		+-NumSign01Tag1	{}	{.		NumberSign	Numb



Map the DATA TYPE of your "Sign" tag to the NUMSIGN data type. (This data type was imported earlier)

	<u></u>		1	1.5.9.5
ALWAYS_ON			0001	
	Selec	t Data Type		
	Data	Types:		
	NUM	SIGN		ок
	HOY			
		ING_AVERAGE ING STD DEV		Cancel
		TIPLEXER		Help
	MUT	ING_FOUR_SENSOR_BIDIR		
		ING_TWO_SENSOR_ASYM		
CycleTimeReal		ING_TWO_SENSOR_SYM	-	
		perSign SIGN		
	I	DIT CAM	<b>·</b>	
	Arra	y Dimensions		
NEVER_ON	Dim	2 Dim 1	Dim 0	
📃 🕀 NumberSign 🥢	0		0 ÷	
		_ , _	,	
	🗆 🗆 SI	how Data Types by Groups		
OEEScore			DEAL	riual

	JIIIING
+-Counts_BadParts	DINT Decimal
	STRING
	DINT Decimal
	STRING
I ±-Counts_TotalParts	DINT Decimal
	STRING
CycleTimeReal	REAL Float
	AB:ETHERNET
	AB:ETHERNET
	AB:ETHERNET
NEVER ON	BOOL Decimal
	NUMSIGN 🔜
🖬 NanSign01Tagt	Numberöign
	STRING
OEEScore	REAL Float
+-Sign01	LEDSIGN
Image: Here and the second	ResetSign
±-Sign01Tag1	SetupSignVariables
±-Sign01Tag2	SendSignMessage
++-Sign01Tag3	UndateSignVariab

#### 5.4 Setting up the Sign Tag

Sign tag will now need parameter information filled out.

Click the **IDEN** to begin filling in initial information.

Use the description column for "help".

Several of the parameters have "defaults" that can be used.

Hover mouse over description column to see details.

NEVER_UN	0		Decimal	BUUL	
-NumberSign	{}	{.		NUMSIGN	
	'01'	{.		STRING	"01"=sign address 1 "02"=sign address 2 etc per protocol [must be two digits]
	31		Decimal	DINT	Actual Number to Send to Sign (DINT Format)
	'\$020131\$03'	{.		STRING	The actual packet sent to the sign.
	{}	{.		NumberSign	Number Sign Send only Numbers

## 5.5 Mapping Sign Tag to AOI Function Block in Ladder Logic

Begin mapping all the sign tags to the fields in the AOI function blocks.

Sign tag parameters are word for word matched.

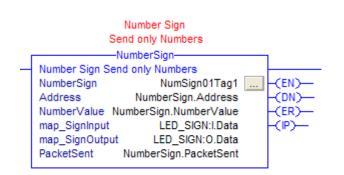
Map all parameters.

Send o	NumSign01Tag1 (EN)-			
map_SignI Name	-	Data Type	Description	<u>^</u>
	NumberSign.Address	STRING	"01"=sign address 1 "02"	
	NumberSign.NumberValue	DINT	Actual Number to Send to	
	NumberSign.P. Name: NumberSign		The actual packet sent to	
🖞 🛨 - Nu	ImSign01Tag1 Description: "01"=		Number Sign Send only N	
🖞 🕀 -OE	EE_String 02"=sign address	2		~
<u>C</u> on	troller per protocol	,		
Pro	gram	1		
Show: LEC	DSIGN, NUMSIGN, STRING, Expe	rtSign, NumberSign, Re	esetSign, SendSignMessag 📃	>>

# **6 ELECTRONIC DISPLAY AOI INSTRUCTIONS**

## 6.1 Number Sign Message AOI

Instruction used to send numbers to sign. (see video tutorials)



Operand	Туре	Description
NumberSign	Tag	Unique Tag
Address	String	Two character sign address "00"
NumberValue	DINT	Value of Number to Send to Sign
map_SignInput	I:Data	Ethernet/IP Input Data Mapping
map_SignOutput	O:Data	Ethernet/IP Output Data Mapping
PacketSent	String	82 Length String Debug of Packet
EN	Bool	Instruction is enabled
DN	Bool	Instruction is done sending message
IP	Bool	Instruction is in progress sending
ER	Bool	Instruction failed to send message