

X2000 Gateway – On-Premise User Guide



These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see **dodgeindustrial.com** for updated instruction manuals.

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1 INTRODUCTION

This guide describes how to use the X2000 Gateway – On-Premise that supports EtherNet/IP in an Ethernet network industrial protocol and OPC Unified Architecture (UA) to collect data from OPTIFY[™] sensors. This document guides you through setup configurations and mapping sensors to OPC-UA or EtherNet/IP subsystems.

The key performance indicator (KPI) values are:

- Surface temperature
- Acceleration RMS
- Velocity RMS
- Peak acceleration

The gateway application offers an interface for OPC-UA server and EtherNet/IP that can support:

- Up to 20 OPTIFY sensors
- Up to 10 OPC-UA clients
- Up to five EtherNet/IP-based devices

The typical gateway software functionality includes:

- Measurement interval and accelerometer range setup
- Sensor firmware update
- Sensor clock synchronization
- Back up and restore configuration data
- Export historical data: last 24 hours and last seven days
- Export sensor raw data
- Change unit values between metric and imperial

1.1 Acronyms

- EtherNet/IP Ethernet Network for Industrial Protocol
- OPC-UA Open Platform Communications Unified Architecture
- CIP Common Industrial Protocol

1.2 System requirements

The gateway software requires the following application components:

- X2000 Gateway with firmware version: 2.1.1 or newer
- Container version: 1.2.0 or newer
- Application version: 1.2 or newer

All the components are preinstalled on the gateway. In case of manual installation or updating the software please refer to section six of this user guide.

1.3 Tested OPC-UA client software

- Prosys OPC: downloads.prosysopc.com/opc-ua-client-downloads.php#download
- UaExpert: unified-automation.com/downloads/opc-ua-clients.html

1.4 Supported PLC controllers

- Allen-Bradley CompactLogix EtherNet/IP
 - Tested PLCs
 - 1769-L33ER Compact Logix 2 MB Memory
 - 1769-L16ER-BB1B

NOTE: To connect directly to a PLC, the PLC must be EtherNet/IP compatible. Check with your local IT department to confirm this before continuing. Not all PLCs that connect with an Ethernet cable are Ethernet/IP compatible.

1.5 References

- Open Source OPC UA licensed under the MPL v2.0 open62541.org/
- Open-source Rockwell Automation EtherNet/IP library <u>https://www.odva.org</u>

2 PRELIMINARY STEPS

2.1 Log into dashboard

Open your web browser (Google Chrome is recommended). Enter the assigned IP Address and press enter. Enter your username and password. For more information, please refer to the X2000 Gateway – On-Premise installation manual.

		B ks	
Cassia Blueto	ooth Gateway Manager	nent Platform	
Username			
Password			
	Login		
This console	e is optimized for Goo	gle Chrome	

Figure 1 - Login page

2.2 Dashboard view

Upon logging into the gateway, the Status tab is displayed by default. From the top banner, you can select the OPC-UA or EtherNet/IP tab.

- Select the OPC-UA tab to set up an OPC-UA server
- Select the EtherNet/IP tab to set up an EtherNet/IP interface

itus Basic S	ervice Container OPC-U	A EtherNet/IP Events Ot				
Model		X2000				
MAC		CC:1B:E0:E2:3D:C0				
Working Mode		Standalone				
ETH IP		10.85.13.114				
WLAN IP		192.168.40.				
Cellular IP						
Country/Region		United States				
Firmware Version		2.1.1.2111122257				
Up Time		1min 39sec				
Chip0		Active Scar				
Chip1		Idl				
CPU Usage		35.70%				
Memory Usage		18.13%				
Storage Usage		20.35MB / 111.20MI				
L Service Statistics (<i>i</i>	мотт)					
Type Code	Description	#of Packet				

Figure 2 - Dashboard view

3 SENSOR MONITORING MANAGEMENT

This gateway scans and captures Bluetooth[®] Low Energy (BLE) advertising packets transmitted by OPTIFY sensors. The same sensor management is available on both the OPC-UA and EtherNet/IP tabs and allows users to execute the following actions:

- Scan show a list of active sensors within range of the gateway
- Replace replace an existing sensor with a new sensor
- Delete remove selected sensor from the list
- Refresh refresh the list of sensors in range of the gateway every defined period or never
- Options show more settings
 - Export/Configuration export current list of sensors and settings
 - Export/Last 1 day history
 - Export/Last 7 days history
 - Export/Debug logs
 - Change units: imperial or metric
 - Change EtherNet/IP operating mode between CIP and EtherNet/IP tag writer
- Details show more information
 - Read sensor details and last performed measurement
 - · Read/update measurement interval and accelerometer range
 - Read firmware version
 - Enable tri-axis measurements
 - Download raw sensor data
 - Synchronize clock
 - Update firmware

Scar Replace Delete RefreshUsers Oppose # Channel serial Numbers OPC State BLE State MAC Address Action 1 1 1 10006981 CONFIG UP 50:31:AD:02:1D:94 Details 1 1 1000947 CONFIG UP 50:31:AD:02:2FG Details 1 1 1000945 CONFIG UP 50:31:AD:02:2FG Details 1 1 1000945 CONFIG UP 50:31:AD:02:2FG Details	Statu) (Js B	ည်း asic (Containe	er OPC-U	A EtherNe	et/IP Events	 Other
#ChannelSerial Number®OPC StateBLE StateMAC AddressAction111006981CONFIGUP5031:AD:02:1D:04Cetals111009329CONFIGUP5031:AD:02:27:68Cetals111009477CONFIGUP5031:AD:02:27:73Cetals111009455CONFIGUP5031:AD:02:27:73Cetals	Scan	Replace	Delete	Refresh(2	20 secs) 🔹			Options
Image: 1 state10006981CONFIGUP50:31:AD:02:1D:94Image: 1Image: 2 state10008329CONFIGUP50:31:AD:02:27:68DetailsImage: 3 state10009457CONFIGUP50:31:AD:02:27:73DetailsImage: 4 state10009455CONFIGUP50:31:AD:02:27:73Details	#	Channel Name	Serial Nur	nber <mark>^</mark>	OPC State	BLE State	MAC Address	Action
2-10008329CONFIGUP50:31:AD:02:22:FCDetails13-10009447CONFIGUP50:31:AD:02:27:63Details14-10009455CONFIGUP50:31:AD:02:27:73Details	□ 1	-	10006981		CONFIG	UP	50:31:AD:02:1D:94	Details
3 - 10009447 CONFIG UP 50:31:AD:02:27:68 Details - 4 - 10009455 CONFIG UP 50:31:AD:02:27:73 Details	□ 2	-	10008329		CONFIG	UP	50:31:AD:02:22:FC	Details
□ 4 - 10009455 CONFIG UP 50:31:AD:02:27:73 Details	3	-	10009447		CONFIG	UP	50:31:AD:02:27:6B	Details
	□ 4	-	10009455		CONFIG	UP	50:31:AD:02:27:73	Details

Figure 3 - OPC-UA page

Statu	ې s Ba	ည် isic (Container	DPC-UA	Ê EtherNet/IP	Events	 Other
Scan	Replace	Delete	Refresh(20 se	ecs) 🔻			Options
#	MAC Addr	ess	Serial Nu	mber 🔨	PLC State	BLE State	Action
□ 1	50:31:AD:0	2:1D:94	10006981		CONFIG	UP	Details
🌖 Ca	ISSIA						DODGE

Figure 4 - EtherNet/IP page

3.1 Adding sensors to monitoring list

From the OPC-UA or EtherNet/IP page:

- 1. Click scan.
- 2. Click add on the chosen sensor.

$\tilde{\mathbf{x}}$	\Diamond	ເລົ້າ ເ	<u>ו</u> בו
Add	to OPC-UA		
#	MAC Address	Serial Number	Action
1	50:31:AD:02:1D:94	10006981	Configured
2	50:31:AD:02:1D:CE	10007035	Add
3	50:31:AD:02:21:41	10007895	Add
4	50:31:AD:02:22:FC	10008329	Configured
5	50:31:AD:02:25:6B	10008938	Add
6	50:31:AD:02:27:6B	10009447	Configured
7	50:31:AD:02:27:6C	10009448	Add
8	50:31:AD:02:27:73	10009455	Configured
9	50:31:AD:02:28:F0	10009835	Add
10	50:31:AD:02:28:FA	10009845	Add
	50.04 A D 00.00 FF	40000050	

Figure 5 - Add sensor to OPC-UA

NOTE: To add a sensor on the EtherNet/IP page, you will also need to input the IP address of the PLC controller.

#	MAC Address	Serial Number <mark>^</mark>	Action
1	50:31:AD:02:1D:94	10006981	Configured
2	50:31:AD:02:1D:CE	10007035	Add
3	50:31:AD:02:21:41	10007895	Add
4	50:31:AD:02:22:FC	10008329	Add
5	50:31:AD:02:25:6B	10008938	Add
6	50:31:AD:02:27:6B	10009447	Add
7	50:31:AD:02:27:6C	10009448	Add
8	50:31:AD:02:27:73	10009455	Add
9	50:31:AD:02:28:F0	10009835	Add
10	50:31:AD:02:28:FA	10009845	Add

Figure 6 - Add sensor to EtherNet/IP

After adding the sensors, the gateway will start to synchronize the sensors' clocks. Wait for the synchronization process to complete on all sensors and press OK.

MAC Address	Status	
50:31:AD:02:40:6C	Sync OK	
		_

Figure 7 - Sensor clock synchronization

3.2 Deleting sensors from monitoring list

To delete sensors from the monitoring list:

- 1. Select sensors in the monitoring list.
- 2. Click delete.

Stat) J I us B	🚱 🗘	er OPC-U	A EtherNe	et/IP Events	 Other
Scan	Replace	Delete Refresh	(20 secs) 🔹			Options
#	Channel Name	Serial Number	OPC State	BLE State	MAC Address	Action
□ 1	000	10006981	CONFIG	UP	50:31:AD:02:1D:94	Details
2	001	10008329	CONFIG	UP	50:31:AD:02:22:FC	Details
☑ 3	002	10009447	CONFIG	UP	50:31:AD:02:27:6B	Details
□ 4	003	10009455	CONFIG	UP	50:31:AD:02:27:73	Details

Figure 8 - Delete sensors

3. Click yes.



Figure 9 - Delete sensors confirmation

3.3 Refreshing monitoring list

To change refresh rate in the monitoring list:

- 1. Click on the drop-down list.
- 2. Choose desired option from list.

State) us B	Sasic Contain	er OP	Ê) C-UA	EtherNet/IP	Ê Events	 Other
Scan	Replace	Delete Refresh	(20 secs)	-			Options
#	Channel Name	Serial Number	OPC St	5 secs 20 sec	s MAG	Address	Action
□ 1	000	10006981	CONFIG	5 mins Never	50:3	1:AD:02:1D:94	Details
□ 2	001	10008329	CONFIG	UI	P 50:3	1:AD:02:22:FC	Details
3	002	10009447	CONFIG	UI	P 50:3	1:AD:02:27:6B	Details
□ 4	003	10009455	CONFIG	UI	P 50:3	1:AD:02:27:73	Details

Figure 10 - Refresh rate

3.4 Options menu

This menu will allow you to change units, swap EtherNet/IP operating modes between CIP and EtherNet/IP tag writing, restore old monitoring configurations, and export historical and configuration data.

To access options:

1. Click options.

OC OC Statu	දරි s Basic	Container	DPC-UA	Ê EtherNet/IP	Events	 Other
Scan	Replace Delete	Refresh(20 se	ecs) 🔻			Options
#	MAC Address	Serial Nu	mber <mark>^</mark>	PLC State	BLE State	Action
□ 1	50:31:AD:02:1D:94	10006981		0/1	UP	Details
□ 2	50:31:AD:02:40:6C	10015798		CONFIG	UP	Details

Figure 11 - Options selection

To change units:

- 1. Select imperial or metric from the drop-down list.
- 2. Click save.

Options		×
e Unit		
Imperial		~
Save		
Ethernet/IP operation		
Ethernet/IP tag write	er	~
Save		
Restore Config		
Select File	Restore	
Export -		

Figure 12 - Unit selection

To export files:

- 1. Click export.
- 2. Select configuration, last 24 hours history, last 7 days history, or debug logs.

- <u>-</u> -			(= 1		
E	Options			×	s
ce	Unit				
d	Imperial			~	
C	Save				
D	Ethernet/IP operation				
	Ethernet/IP tag writer			~	
	Save				
	Restore Config				
	Select File	Restore			
	Export -				
L	Configuration				
	Last 24 Hours History				
	Last 7 Days History				
	Debug Logs				

Figure 13 - Export files

To restore configuration:

1. Click select file.

Options	×
Unit	
Imperial	~
Save	
Ethernet/IP operation	
Ethernet/IP tag writer	~
Save	
Restore Config	
Select File Restore	
Export -	

Figure 14 - Select configuration file

2. Locate the exported configuration file on your device and click open.

Open Open						×
$\leftarrow \rightarrow ~ \checkmark ~ \uparrow$	Search Results in Downl	oads	~	C sensors		×
Organize 👻					≣ •	•
> 🌰 Connor - RBC E	Name	Date modified	Туре	Size		
🛄 Desktop 🏾 🖈	12 sensors	10/30/2023 4:49 PM	Microsoft Excel C	2 KB		
↓ Downloads Documents Documents	> Last week > Earlier this month					
Pictures	> Last month > Earlier this year					
🕘 Work 🖌	Search again in:	C 💶 Custom				
🛂 Videos 🛛 🖈 🚞 Screenshots						
User Story Phot	(
F	ile name: sensors		~	All Files Open		∼ Cancel

Figure 15 - Open configuration file

3. Click restore.

×
~
~

Figure 16 - Restore configuration

3.5 Viewing sensor details

Once all sensors have been added, to view the sensor data within the OPC-UA or EtherNet/IP page:

• Click on details for the desired sensor.

Stat) us E	දිටි Basic (Container	Ê OPC-UA	EtherNe	t/IP Events	 Other
Scan	Replace	Delete	Refresh(20	secs) 🔹			Options
#	Channel Name	Serial Nur	nber <mark>^</mark>	OPC State	BLE State	MAC Address	Action
□ 1	000	10006981	(CONFIG	UP	50:31:AD:02:1D:94	Details
□ 2	001	10008329	(CONFIG	UP	50:31:AD:02:22:FC	Details
3	002	10009447	(CONFIG	UP	50:31:AD:02:27:6B	Details
□ 4	003	10009455	(CONFIG	UP	50:31:AD:02:27:73	Details

Figure 17 - Sensor details selection

Sensor details on the OPC-UA pages contains two tabs while the EtherNet/IP page contains one additional tab (three in total).

3.5.1 Measurement tab

The measurement tab inside the OPC-UA page contains information specific to the sensor, such as the MAC address, the serial number, and the sensor parameters data from the last measurement performed.

50:31:AD:02:1D:94 - Details ×					
Measurement	Settings				
Parameter	Value				
MAC Address	50:31:AD:02:1D:94				
Serial Number	10006981				
State	CONFIG				
BLE State	UP				
Acceleration RMS	0.00293 g				
Velocity RMS	0 in/s				
Surface Temperature	73.4 °F				
Peak	0.014 g				
Kurtosis	2.84765625				
Skewness	-0.96875				
Sensor Rssi Value	-39				
Timestamp	10/30/2023, 4:00:00 PM				
Index	15348				
Units	imperial				

Figure 18 - Measurement tab

J

The measurement tab inside EtherNet/IP contains the same information as the OPC-UA page, as well as an additional column based on the selected EtherNet/IP operation.

For selected CIP server operation, there is an input array parameter.

Measurement		PLC list	Settings	
Parameter	Value		Input Array	
MAC Address	50:31:AD:02:1D:94			
Serial Number	10006981		I.Data[0]	
State	0/1			
BLE State	UP			
Acceleration RMS	0.00293 g		I.Data[1]	
Velocity RMS	0 in/s		I.Data[2]	
Surface Temperature	73.4 °F		I.Data[3]	
Peak	0.014 g		I.Data[6]	
Kurtosis	2.84765625			
Skewness	-0.96875			
Sensor Rssi Value	-39			
Timestamp	10/30/2023, 4:00:0	0 PM	I.Data[4]	
Index	15348			
Units	imperial		I.Data[5]	

Figure 19 - Input array parameter

For selected EtherNet/IP tag writer operation, there is a PLC tag parameter.

Measureme	ent	PLC list	Setti	Settings	
Parameter	Value		PLC Tag		
MAC Address	50:31:AD:02:1D:94		-		
Serial Number	10006981		-		
State	0/1		-		
BLE State	UP		-		
Acceleration RMS	0.00293 g		_10006981_acc_rms		
Velocity RMS	0 in/s		_10006981_vel_rms		
Surface Temperature	73.4 °F		_10006981_skin_temp		
Peak	0.014 g		_10006981_peak		
Kurtosis	2.84765625		-		
Skewness	-0.96875		-		
Sensor Rssi Value	-39		-		
Timestamp	10/30/2023, 4:00:00 PM		_10006981_time		
Index	15348		-		
Units	imperial		_10006981_units		

Figure 20 - PLC tag parameter

For more information on how to change EtherNet/IP operation, please refer to section five of this guide.

NOTE: To learn more about what each sensor parameter means, please refer to the OPTIFY Sensor user guide at: <u>iiot-dodgeindustrial.swipeguide.com/guide/optify-sensor-user-guide</u>

3.5.2 PLC list tab (only EtherNet/IP page)

The PLC list tab appears only on the EtherNet/IP page and contains the configured IP address of the PLC controller which is set when adding a sensor.

50:31:AD:02:1D:94 - Details							
	Measurement	PLC list		Settings			
#	Ip address		State	Action			
1	192.168.40.1		DOWN	Delete			

Figure 21 - PLC list tab

3.5.3 Settings tab

3.5.3.1 Measurement interval and accelerometer range

The settings tab displays the sensor's current measurement interval and accelerometer range, which can be modified here if needed.

By default, the sensor measurement interval is one hour and the accelerometer range is auto. However, if the measurement interval and accelerometer range need to be changed, complete the following steps:

- 1. Click on the settings tab.
- 2. Click read.

50:31:AD:02:1D:94 - Details	×
Measurement Settings	
Measurement Interval	
~	~
Accelerometer Range	
	~
Read Write	
Firmware Version	
Read	
Tri-Axis	
Read Toggle	
Sync Sensor's Clock Get Raw Data	
Update Firmware	
Select File Install	

Figure 22 - Read sensor settings

- 3. Select desired measurement interval (from 15 minutes to 12 hours).
- 4. Select desired accelerometer range (up to 16 g).
- 5. Click write.

50:31:AD:02:1D:94	- Details			×
Measureme	ent		Settings	
Measurement Interval				
1 Hours	~	0 Minute	•	~
Accelerometer Range				
Auto				~
Read				
Firmware Version				
4.0.2				
Read				
Tri-Axis				
Disabled				
Read Toggle				
Sync Sensor's Clock	Get Raw	Data		
Update Firmware				
Select File	Insta	ill		

Figure 23 - Write sensor settings

3.5.3.2 Firmware version

In order to read the firmware version on the sensor:

1. Click read.



Figure 24 - Read firmware version

3.5.3.3 Enable/disable tri-axis data

In order to collect tri-axis raw data from the sensor:

1. Click read to check the current sensor setting.

50:31:AD:02:1D:94 - Details	×
Measurement Settings	
Measurement Interval	
~	~
Accelerometer Range	
	~
Read Write	
Firmware Version	
Read	
Tri-Axis	
Disabled	
Read Toggle	
Sync Sensor's Clock Get Raw Data	
Update Firmware	
Select File Install	

Figure 25 - Read sensor tri-axis status

2. Click toggle and wait for confirmation.



Figure 26 - Change sensor tri-axis status

3.5.3.4 Synchronize sensor clock

Synchronizing the sensors clock is critical for accurate measurement data. The gateway will sync a sensor clock when first adding the sensor, but if this fails or if measurements are showing the wrong time, please resynchronize the clock.

1. Click sync sensor's clock.

50:31:AD:02:1D:94 - Details	×
Measurement S	ettings
Measurement Interval	
~	~
Accelerometer Range	
	*
Read Write	
Firmware Version	
Read	
Tri-Axis	
Enabled	
Read Toggle	
Sync Sensor's Clock Get Raw Data	
Update Firmware	
Select File Install	
	J

Figure 27 - Synchronize sensor's clock

3.5.3.5 Update sensor firmware

In order to update sensor firmware:

1. Click select file.

NOTE: Contact Dodge IIoT technical support by phone at +1 864 284 5700 ext. 6 or email at <u>engineering@support.dodgeindustrial.com</u> to obtain the sensor firmware file.

50:31:AD:02:1D:94 -	Details		×
Measuremen	t	Settings	
Measurement Interval			
	~		~
Accelerometer Range			
			~
Read Write			
Firmware Version			
Read			
Tri-Axis			
Enabled			
Read Toggle			
Sync Sensor's Clock	Get Raw Data		
Update Firmware			
Select File	Install		

Figure 28 - Select file

2. Locate the sensor firmware file on your device and click open.

© Open	×
$\leftarrow \rightarrow \checkmark \uparrow$	✓ C edwinsensor ×
Organize 🔻	8= - 🖬 😗
Connor - RBC B EdwinSensorFW_3_2_4.bin.signe C:\Users\cjackson\Desktop Type: SIC	ed Date modified: 6/9/2022 3:06 PM SNED File Size: 118 KB
E Desktop 💉 Search again in:	
Libraries This PC Custom	
Documents *	
Z Pictures 🖈	
🚞 Work 🔹 🖈	
🕜 Music 🖈	
🔯 Videos 🖈	
Screenshots	
Tuser Story Photo	
File name: EdwinSensorFW_3_2_4.bin.signed	✓ All Files ✓
	Open Cancel

Figure 29 - Select sensor firmware

3. Click install.



Figure 30 - Install sensor firmware

4. Wait for the new firmware installation to complete.

		_	
50:31:AD:02:1D:9	4 - Details		×
Measurem	ent	Settings	
Measurement Interva	I		
	~		~
Accelerometer Range			:9
			↓ :F0
Read Write			:68
Firmware Update	e Finished		73
	100.009	6	
	Close		
Enabled			
Read Toggle			
Sync Sensor's Clock	Get Raw [Data	
Update Firmware			
Select File	Install		
EdwinSensorFW_3_2	4.bin.signed		
L			

Figure 31 - Finish installing firmware

3.5.3.6 Exporting raw sensor data

Raw sensor data can be exported to a .xlsx file for post-processing. To export:

1. Select the get raw data button under sensor settings.



Figure 32 - Select get raw data

2. An Excel file will download. Depending on whether the sensor is set to one axis or tri-axis, this sheet will include different columns.



Figure 33 - Raw data download

3.6 Replacing a sensor with a new one

In case of a dead battery or faulty sensor, purchase a new sensor. To replace the existing sensor with a new sensor, complete the following steps after commissioning the replacements following the instructions in the installation manual.

1. Select replace in either OPC-UA or EtherNet/IP.

State) (us B	ည် Basic Cor	() ntainer	DPC-UA	EtherNet	/IP Events	 Other
Scan	Replace	Delete	efresh(20 se	ecs) 🔫			Options
#	Channel Name	Serial Numbe	er <mark>(_</mark> OF	PC State B	BLE State	MAC Address	Action
□ 1	000	10006981	cc	ONFIG D	OOWN	50:31:AD:02:1D:94	Details
□ <u>2</u>	001	10008329	СС	ONFIG U	JP	50:31:AD:02:22:FC	Details
3	002	10009447	СС	ONFIG U	JP	50:31:AD:02:27:6B	Details
□ 4	003	10009455	СС	ONFIG U	JP	50:31:AD:02:27:73	Details

Figure 34 - Replace sensor

2. In the menu that appears, multiple sensors can be selected for replacement. One at a time, select an existing sensor and its corresponding replacement sensor. The number of the existing sensor will appear next to the sensor that will replace it.

Existing Sensors				Replace With			>			
#	MAC A	Address	Serial Number	Channel		<u>م</u>	#	MAC Address	Serial Number	
0	50:31:4	AD:02:1D:94	10006981	000				50:31:AD:02:3B:24		
1	50:31:4	AD:02:22:FC	10008329	001				50:31:AD:02:59:C9		
2	50:31:4	AD:02:27:6B	10009447	002			1	50:31:AD:02:1D:CE	10007035	
3 🗸	50:31:/	AD:02:27:73	10009455	003				50:31:AD:02:21:41	10007895	
					1	Ŧ	2	50:31:AD:02:25:6B	10008938	
							3 🗹	50:31:AD:02:27:6C	10009448	
								50:31:AD:02:28:F0	10009835	
								50:31:AD:02:28:FA	10009845	
								50:31:AD:02:28:FF	10009850	
								50:31:AD:02:29:03	10009854	
								50:31:AD:02:29:09	10009860	
								50:31:AD:02:29:0F	10009865	
								50:31:AD:02:29:11	10009867	
								50:31:AD:02:29:CA	10010049	
								50:31:AD:02:29:D9	10010064	
								50:31:AD:02:2C:78	10010731	
								50:31:AD:02:2C:7A	10010733	
								50:31:AD:02:2F:60	10011458	
								50:31:AD:02:2F:72	10011476	
								50:31:AD:02:2F:79	10011483	-
Refi	resh								Clear	Submit

Figure 35 - Replace sensor selection

3. Select submit and confirm the changes made. Click yes.

E:	The following sens	×					
	Old MAC	Old SN	New I	MAC	New SN	Channel	<u>_</u>
# MACA	50:31:AD:02:22:FC	10008329	50:31:	AD:02:1D:0	CE 10007035	001	
" MACA	50:31:AD:02:27:6B	10009447	50:31:	AD:02:25:6	B 10008938	002	
0 0 50:31:A	50:31:AD:02:27:73	10009455	50:31:	AD:02:27:6	C 10009448	003	
1 50:31:A 2 50:31:A 3 50:31:A	No Yes						11
			-	2 50:31	AD:02:25:6B	10008938	
				3 🗹 50:31	AD:02:27:60	10009448	
ŕ				50:31	AD:02:28:F0	10009835	
				50:31	AD:02:28:FA	10009845	
1				50:31	AD:02:28:FF	10009850	
				50:31	AD:02:29:03	10009854	
4				50:31	AD:02:29:09	10009860	
				50:31	AD:02:29:0F	10009865	
				50:31	AD:02:29:11	10009867	
				50:31	AD:02:29:CA	10010049	
				50:31	AD:02:29:D9	10010064	
				50:31	AD:02:2C:78	10010731	
				50:31	AD:02:2C:7A	10010733	
				50:31	AD:02:2F:60	10011458	
				50:31	AD:02:2F:72	10011476	
				50:31	AD:02:2F:79	10011483	-
Refresh						Clear	Submit

Figure 36 - Replacement validation

Once the sensors have been successfully replaced, a confirmation window will appear.



Figure 37 - Replacement confirmation window

4 OPC-UA SERVER CONFIGURATION

4.1 Before you begin

Ensure that the OPC-UA clients can ping the gateway.

4.2 Connecting to OPC-UA clients

There are many OPC-UA client software options available in the industry. For this user guide, Prosys OPC UA client is used.

- 1. Launch Prosys OPC UA client application.
- Write: opc.tcp://(IP address assigned to gateway by the local area network):61210 (e.g., opc.tcp://192.168.0.192:61210)



Figure 38 - Gateway network IP

- 3. Press enter key to connect to server.
- 4. Select none below security mode and security policy.
- 5. Click OK.

> New Connection × + sconnected 2 opc tcp://10 85 13 11	461210		
		Quick Links	
B	PC UA	x	
PROSYS @	Security Mode	Security Policy	
	None	Basic128Rss15	
T Connection to a Server	Sign	Basic256	
 Type the server address to the address window or choose one of the address 2. Press → to connect to the server Select Security Mode and Policy. 	Sign & Encrypt	Balac2560ha256Aa256Aa356Aa36aap Aes12850ha256Aa36aap Aes2860ha2360ha356Asa	
 Login with your user credentials or a 	 ✓ Show only modes that a ✓ Always prompt for Secur 	re supported by the server nty Settings	
L L L			
and the second se	(The her Checker)		

Figure 39 - Security settings

4.2.1 Checking sensor parameters

1. Click on the triangle symbol to expand objects folder.



Figure 40 - Objects folder

2. Click on the triangle symbol next to the sensor number.

Prosys OPC UA Browser					-	0	×
Dodge OPCUIA Application X +++							
Running A opc.tcp://10.85.13.114.6121	0 urn:dodge.server.applica	ation			* ×	: ď	۵
+ + 0 Q II	Attributes and References	+					
* Dijects	0		Filters 4 17	BrowseDirection	Forward	×	
	Attribute	Value	Reference	Туре	Terg	et	
Barver Types Views	No content i	n table		No contert in tai	sle		

Figure 41 - Sensor number

3. Click on the name of the variable (e.g., rms).



Figure 42 - Variables

4.2.2 Monitor sensor parameter

- 1. Right-click on the chosen variable.
- 2. Click monitor.

Figure 43 - Monitor sensor parameter

4.2.3 Observing new data of a sensor parameter

To observe new data of a certain variable:

- 1. Set publishing interval to 50.
- $2. \quad Click \, on \, checkbox \, on \, the \, graph \, column. \\$
- 3. Set show data for seconds to 3600.
- 4. Observe new data in the rms tab.



Figure 44 - Observing new data

5 ETHERNET/IP CONFIGURATIONS

5.1 Changing EtherNet/IP operation

EtherNet/IP setup supports two modes of operation. Select the appropriate mode for the PLC prior to viewing sensor data.

From the gateway EtherNet/IP page:

1. Select options.



Figure 45 - EtherNet/IP options

2. Select EtherNet/IP tag writer or CIP server, then click save.

CO Status E	오 오 손 손 소 Options × ts	 Other
Scan Replace	Unit	Options
# MAC Ad	Save	Action Details
2 50:31:AD	Ethernet/IP operation	Details
	Save	
	Select File Restore	
	Export *	
		DODGE





Figure 47 - Selecting CIP server

5.2 EtherNet/IP tag writer operation

Ensure EtherNet/IP tag writer operation is selected. Refer to section 5.1 of this user guide.

5.2.1 Viewing sensor details

To view selected sensor details:

1. Click details for selected sensor.

OC OC Statu	දිරි Is Basic	Container	DPC-UA	Ê EtherNet/IP	E vents	 Other
Scan	Replace Delet	te Refresh(20 s	ecs) 🔻			Options
#	MAC Address	Serial Nu	mber <mark>^</mark>	PLC State	BLE State	Action
□ 1	50:31:AD:02:1D:94	10006981		0/1	UP	Details
2	50:31:AD:02:40:6C	10015798	\$	0/1	UP	Details

Figure 48 - Viewing sensor details

The measurement tab contains information specific to the sensor such as the MAC address, the serial number, and the sensor parameters data from the last measurement performed.

Measureme	ent	PLC list	Settings
Parameter	Value		PLC Tag
MAC Address	50:31:AD:02:1D:94		-
Serial Number	10006981		-
State	0/1		-
BLE State	UP		-
Acceleration RMS	0.00293 g		_10006981_acc_rms
Velocity RMS	0.004488 in/s		_10006981_vel_rms
Surface Temperature	71.6 °F		_10006981_skin_temp
Peak	0.155 g		_10006981_peak
Kurtosis	2.94140625		-
Skewness	-1.15234375		-
Sensor Rssi Value	-47		-
Timestamp	1/1/1970, 10:00:00 AM		_10006981_time
Index	15365		-
Units	imperial		_10006981_units

Figure 49 - EtherNet/IP measurement tab

See table below with PLC tags and their types.

Parameter	PLC Tag	Туре
Acceleration RMS	_10015901_acc_rms	DINT
Velocity RMS	_10015901_vel_rms	DINT
Surface Temperature	_10015901_skin_temp	DINT
Timestamp	_10015901_time	DINT
Units	_10015901_units	DINT
Peak Acceleration	_10015901_peak	DINT

NOTE: [SN] = Serial Number of specific sensor (example: _10021078_acc_rms).

PLC list tab contains information about configured IP addresses for PLC controller.

	Measurement	PLC list		Settings
#	Ip address		State	Action
1	192.168.40.1		DOWN	Delete
+			-	Add

Figure 50 - PLC list tab

To add a new PLC controller to a specific sensor:

- 1. Write IP address of PLC controller.
- 2. Click add.

	Measurement	PLC list		Settings
#	Ip address		State	Action
1	192.168.40.1		DOWN	Delete
	ſ		-	Add

Figure 51 - Adding new PLC controller to sensor

5.2.2 Configuring EtherNet/IP tag writer inside Studio 5000

1. Launch Studio 5000 and open existing project.



Figure 52 - Open existing project

2. Navigate to controller tags, then navigate to edit tags.

10 Offline	No Forces F., No Edits unications Tools Window Help Controller Tags - tag writer, testicon). Iroller) ×	Favorites Add On P	erbits Saldy Alem	t Bt TinerCourter	reutiOutput Compare	ComputerMath MoveLog
	Scope: Bitag_witer_test ~ Show	All Tage					- T. Courseau Cher
Consoler hay Musice Consoler hay Musice Consoler hay Musice Consoler hay hundler Consoler hay hundler Consoler hay there Consoler hay Conso	Nune	Eff «JVdor	+ Force Mask	+ Style	Data Ige	Description	Constant
BI (0) 7749-1318 Rag, writer, text & Ethernet (0) 1769-1318R tag, writer, text							
印(日)1709-L33ER tag_umfar_text 教育 (themet 例 1709-L33ER tag_umfar_text	6 8 Monitor Tags (EditTags/						

Figure 53 - Edit tags

3. Copy PLC tags of specific sensor and create them.

Name	Data Type
_xxxxxxx_acc_rms	DINT
_xxxxxxx_vel_rms	DINT
_xxxxxxx_skin_temp	DINT
_xxxxxxx_time	DINT
_xxxxxx_units	DINT
_xxxxxxx_peak	DINT

NOTE: xxxxxxx is the serial number of the selected sensor (example: _10015901_acc_rms).

4. See example below with one sensor.

<i>0</i> 0	Controller Tags - tag_writ	er_test(controller) ×	
Sc	ope: [🏚 tag_writer_test	✓ Show: All Tags	
	Name 🔚 🔺	Alias For	Base Tag
	▶ _100019471_acc_rms		
	▶ _100019471_skin_t		
	▶ _100019471_time		
	_100019471_units		
	_100019471_vel_rms		
	▶ _100019471_peak		
0			
	-	•	

Figure 54 - Choosing tags

5. Save the project. Upload tags when prompted.



Figure 55 - Upload tags prompt

6. Navigate to monitor tags.

Controller Tags - tag_writer_test(controller)	×				
cope: 📴 tag_writer_test 🗸 Show: All Tag	18				
Name	📰 🔺 Value	 Force Mask 	•	Style	Data Type
▶ _100019471_acc_rms		0		Decimal	DINT
▶ _100019471_skin_temp		0		Decimal	DINT
▶ _100019471_time		0		Decimal	DINT
▶ _100019471_units		0		Decimal	DINT
▶ _100019471_vel_rms		0		Decimal	DINT
▶ _100019471_peak		0		Decimal	DINT
_10015911_acc_rms		0		Decimal	DINT

Figure 56 - Monitor tags

5.3 CIP server operation

5.3.1 Viewing sensor details

Ensure CIP operation is selected. Refer to section 5.1 of this user guide.

To view selected sensor details:

1. Click details for selected sensor.

OC Statu	දරා s Basic C	iontainer OPC-	UA EtherNet/I	P Events	 Other
Scan Replace Delete Refresh(20 secs)					
#	MAC Address	Serial Number	PLC State	BLE State	Action
□ 1	50:31:AD:02:1D:94	10006981	0/1	UP	Details
□ <mark>2</mark>	50:31:AD:02:40:6C	10015798	0/1	UP	Details

Figure 57 - Viewing sensor details

The measurement tab contains information specific to the sensor such as the MAC address, the serial number, the list of input arrays, and the sensor parameters data from the last measurement performed.

50:31:AD:02:1D:94 -	Details		r=1		() ×
Measureme	ent	PLC list		Settings	
Parameter	Value			Input Array	
MAC Address	50:31:AD:02:1D:9	4			
Serial Number	10006981			I.Data[0]	
State	0/1				
BLE State	UP				
Acceleration RMS	0.00293 g			I.Data[1]	
Velocity RMS	0.004488 in/s			I.Data[2]	
Surface Temperature	71.6 °F			I.Data[3]	
Peak	0.155 g			I.Data[6]	
Kurtosis	2.94140625				
Skewness	-1.15234375				
Sensor Rssi Value	-42				
Timestamp	1/1/1970, 10:00:0	00 AM		I.Data[4]	
Index	15365				
Units	imperial			I.Data[5]	

Figure 58 - CIP measurement tab

See table below with input array and their types.

Parameter	Input Array	Туре
Serial Number	I.Data[0]	DINT
Acceleration RMS	I.Data[1]	DINT
Velocity RMS	I.Data[2]	DINT
Surface Temperature	I.Data[3]	DINT
Peak Acceleration	I.Data[4]	DINT
Timestamp	I.Data[5]	DINT
Units	I.Data[6]	DINT

NOTE: Numbers inside square brackets stand for an index number in input array in CIP server and will change depending on the number of sensors in the server.

5.3.2 Configuring CIP server inside Studio 5000

1. Launch Studio 5000 and create new project.

	Studi	o 5000°	_ ×
	F	by ROCKWELL AUTOMATION	
	Create	Open	Explore
	New Project	Existing Project	Help
	From Import	Sample Project	About
Recent Projects	From Sample Pro	ject From Upload	
ổ cip_test	OPCUA_PLC_10_81	💕 OPCUA_PLC_10_81	💰 OPCUA_PLC_10_81
💕 test			~

Figure 59 - Create new project

- 2. Click on Logix tab.
- 3. Select a PLC type, and type a name for the project in the name field.
- 4. Click next.



Figure 60 - Select PLC type and name new project

5. Click finish. New instance of Logix designer will be opened.

🗿 New Project				?	×
1769-L33ER Com Test	pactLogix™ 5370 Controller				
Revision:	35 *				
Security Authority:	No Protection		~		
	Use only the selected Security A authorization	Authority for authe	ntication and		
Secure With:	Logical Name <controller nam<="" p=""></controller>	e>			
	Permission Set				
Description:					
	Cancel	Back	Next	Fini	ish

Figure 61 - New project configuration

6. Choose select path button.

🧳 Logix Designer - T	est (1769-L33ER	35.11J		1 at 11	N N. M. M.
E RUN CK Errerpy Storage E DO File Edit View	°∥ [™] P Offline Search Local	wh: <none></none>	▶. No Edits	a.	N 🐻 🕈 🤇 Fevorit
Controller Organizer	t Tags Fault Handler Handler	- 0 ×			

Figure 62 - Select path

7. Select your controller.



Figure 63 - Select controller

8. Click download.



Figure 64 - Download controller

9. After download is complete, the controller mode can be changed back to remote run. Click yes.



Figure 65 - Setting remote run

10. When everything is ready, Logix designer shows "rem run" in the marked box.



Figure 66 - Remote run confirmation

5.3.3 Create new module

1. Click go offline.



Figure 67 - Go offline

2. Right-click on Ethernet and choose new module.



Figure 68 - New module

- 3. Find generic Ethernet module on the list.
- 4. Select generic Ethernet module and click create.

Select Module Type Catalog Module Disc	covery Favorites			
generic	Clear Filter	3		Show Filters 🛛 📚
Catalog Number ETHERNET ETHERNET ETHERNET	Description Generic EtherNet/IP CIP Bridge Generic Ethernet Module Generic EtherNet/IP Safety and Standard Module	Vendor Rockwell Autom Rockwell Autom	Category Communication Communication Safety,Other	
3 of 711 Module T	ypes Found			Add to Favorites
Close on Create	3		Create	Close Help

Figure 69 - Select generic Ethernet module

5. Input the following data.

Parameter Name	Value
Name	Cassia
IP Address	192.162.0.40 [1]
Comm	Data - DINT
Input (Assembly Instance)	100
Input (Size)	120 [2]
Output (Assembly Instance)	150
Output (Size)	1
Configuration (Assembly Instance)	151
Configuration (Size)	4

[1] - Assigned IP address during local network configuration[2] - Reserved locations for six parameters for 20 sensors

6. Click OK.

New Module					\times
Type: Vendor: Parent: Name: Description:	ETHERNET-MODULE Generic Ethern Rockwell Automation/Allen-Bradley Local Cassia	et Module Connection Para Input: Output:	Assembly Instance: 100 150	Size: 120 ▲ 1 ▲	(32-bit) (32-bit)
Comm Format	: Data - DINT 🗸 🗸	Configuration:	151	4	(8-bit)
Address / H	ost Name Iss: 192 . 168 . 1 . 1	Status Input: Status Output:			
🗹 Open Modu	le Properties	OK	Cano	el l	Help

Figure 70 - General module settings

7. Change requested packet interval to 200 ms and click OK.

General Connection" Module I Requested Packet Interval (RPI)	nfo :200÷ms (1.0 - 32	200.0 ms)		
Major Fault On Controller If Co	onnection Fails While in Run M	ode		
Use Unicast Connection over	EtherNet/IP			
Module Fault				
Status: Offline	OK	Cancel Apply	Help	

Figure 71 - Requested packet interval

5.3.4 Inputs and outputs data

1. Double-click on the controller tags in the controller organizer.

UN SEC SCOL						10 M 10			
x Path: Baciplar hergy Storage ID Offline 1. No.	Forces P.	No Edits	a.	1 4 8	Terorites Add Or	+ ++ () (0) (0) PlantPAx Safety A3	ens Bt TimerCourber Hout	Vilput Compare	
oller Organizer + # x	Controller Tag	s - Testicontro	oler) ×						
7	Scoper DiTest		Show All Tags						
Controller Test	Name			🗐 - Value	• Force Mas	e 🔹 Style	Data Type	Description	
Controller Fault Handler	▶ CassiarC				6-3	[]	AB ETHERNET, MODU.		
Power-Up Handler	Carried				[]	()	AB:ETHERNET_MODU.		
a Taski 4 🗘 MainTask	Cassiar0				6-3	[]	AB:ETHERNET_MODU.		
b 5 MainProgram									
III Unscheduled									
Ungrouped Axes									
Assets									
Logical Model									
U/O Configuration									
4 10 1769 Bus									
[0 [0] 1769-L33ER Test									
Ch 1360 / Side Tue									
STATEDNET, MODULE CAMIN									
J control control									
	. Monitor	ags / Edit T	ags /				-		
	Errors		-						_
	0	0 Eron 1	0 Warning	0	1 Messages			Seach.	
	Geing coline s	ath contre	ller						
	Complete - 0 e	EEOE(8), C	warning(s)						

Figure 72 - CIP tags

2. Expand Cassia:I.Data.

Name 💷	🖌 Value 🔶 🔶	Force Mask 🗧 🗧	Style	D
▶ Cassia:C	{}	{}		A
▲ Cassia:I	{}	{}		A
🖌 Cassia:I.Data	{}	{}	Decimal	D
 Cassia:I.Data[0] 	0		Decimal	D
Cassia:I.Data[1]	0		Decimal	D
Cassia:I.Data[2]	0		Decimal	D
Cassia:I.Data[3]	0		Decimal	D
 Cassia:I.Data[4] 	0		Decimal	D
 Cassia:I.Data[5] 	0		Decimal	D
 Cassia:I.Data[6] 	0		Decimal	D
 Cassia:I.Data[7] 	0		Decimal	C
Cassia:I.Data[8]	0		Decimal	C
Cassia:I.Data[9]	0		Decimal	C
 Cassia:I.Data[10] 	0		Decimal	C
Cassia:I.Data[11]	0		Decimal	C
 Cassia:I.Data[12] 	0		Decimal	
 Cassia:I.Data[13] 	0		Decimal	0
 Cassia:I.Data[14] 	0		Decimal	C
 Cassia:I.Data[15] 	0		Decimal	C
Cassia:I.Data[16]	0		Decimal	C
 Cassia:I.Data[17] 	0		Decimal	C
Cassia:I.Data[18]	0		Decimal	C
 Cassia:I.Data[19] 	0		Decimal	C
 Cassia:I.Data[20] 	0		Decimal	C
 Cassia:I.Data[21] 	0		Decimal	0
Cassia:I.Data[22]	0		Decimal	C

Figure 73 - Expanded CIP tags

3. Click go online.

3 Logix Designer - cip_test [1769-L33ER 35.	11]							
12 C 13 1 X 19 2 C		v 7 7 1 1 1	 N & & & 	G 🛍	9.0			
E CN Path All	ETHEP-1110.05.13.160	to Edits R.	× & 1	Ferorites Add-On Par	1 () (U) (L) BAx Safety Alams	Bt Timer/Counter	PpulOutput Compare	ConputeMa
File Edit View Search Logic Ci	Go Online	w Help						
Controller Organizer 🔹	Upload Download							
Controller op test Controller ing Controller Sult Hundler Power-Up Handler OMainTak SMainTak SMainTak SMainTak	Program Mode Run Mode Test Mode Clear Faults Go To Faults							
Michaeluses Median Groups More Rouges Median Groups More Rouges More Rouges More Rouges More Rouges More Rouges More Rouges To Bus Biol To Public Rougest The Rougest								

Figure 74 - Go online

4. Download the project into the controller.

Options	General	Date/Time	Major Faults	Minor Faults	Project	Nonvolatile Memory		
Conditi	on: The o	pen project h	as offline chan	ges that aren't	in the cor	troller.		
Connec	ted Contro	oller:						
	Contro	oller Name:	Fest					
	Contro	oller Type:	1769-L33ER/A	CompactLogix	7 ^m 5370 C	ontroller		
	Comm	Path: B	8ackplane\16					
	Serial	Number: [D01D3B88					
	Secur	ity: 1	No Protection					
Offline	Project:							
	Contro	oller Name:	Fest					
	Contro	oller Type:	1769-L33ER Co	ompactLogix"	5370 Con	troller		
	File:	N	sers\nthomps	on\Documents	s/Studio 5	UUU\Projects\Test.AUD		
	Serial	Number: L	JUID 3688					
	Secu	ity. i	NU FIOLECIUM					
	Online	edits perforn	ned during uplo	ad may prever	it upload f	rom completing.		
-		🗆 Prohibit o	nline edits durir	ig upload.				
	-			ig oprodu.				
			_			_		
				Lipload	Downlo	ad Select File	Cancel	Help

Figure 75 - Download project

5. Each tag value corresponds to each parameter position shown in sensor details, measurement tab of the EtherNet/IP page.

Measureme	ent	PLC list	Settings	
Parameter	Value		Input Array	
MAC Address	50:31:AD:02:1D:94			
Serial Number	10006981		I.Data[0]	
State	0/1			
BLE State	UP			
Acceleration RMS	0.00293 g		I.Data[1]	
Velocity RMS	0.004488 in/s		I.Data[2]	
Surface Temperature	71.6 °F		I.Data[3]	
Peak	0.155 g		I.Data[6]	
Kurtosis	2.94140625			
Skewness	-1.15234375			
Sensor Rssi Value	-42			
Timestamp	1/1/1970, 10:00:00 AM		I.Data[4]	
Index	15365			
Units	imperial		I.Data[5]	

Figure 76 - Measurement tab

∠ Cassia:I.Data	
 Cassia:I.Data[0] 	
Cassia:I.Data[1]	
Cassia:I.Data[2]	
Cassia:I.Data[3]	
Cassia:I.Data[4]	
Cassia:I.Data[5]	
Cassia:I.Data[6]	

Figure 77 - Tag list

5.3.5 Converting data

1. Right-click on tasks/mainprogram and choose add new routine.

File Edit Vie	w Search Logic	Communicati	ons Tools Window Help	
Controller Organize	er 🔻	4 × 🥏	Controller Tags - Test(controller) ×	
đ •		s	cope: 😰 Test 🗸 Show: All Tags	
▲ 🚄 Controller [−]	Test	- E	Name	III 🔺 Va
Control	ller lags Iler Fault Handler		▶ Cassia:C	
Power-	Up Handler		▲ Cassia:I	
🔺 <u> Tasks</u>		_	∠ Cassia:I.Data	
Main la:	sk		Cassial Data[0]	
📕 Unsc	Add	•	New Routine	
🔺 <u> </u>	6 Cut	CtrI+X	New Local Tag Ctrl+W	
Ungr 🖞]] Сору	Ctrl+C	New Parameter	
Logical N] Paste	Ctrl+V	Import Routine	
🔺 <u> l</u> /O Conf	Delete	Delete	 Cassia:I.Data[5] 	
4 🌆 1769	Verify		 Cassia:I.Data[6] 	
a 🖧 Ether	Cross Reference	Ctrl+E	 Cassia:I.Data[7] 	
(in 1	Browse Logic	Ctrl+L	 Cassia:I.Data[8] 	
🖞 E	Find in Logical Org	ganizer	 Cassia:I.Data[9] 	
	Online Edits	+	 Cassia:I.Data[10] 	
	Print		 Cassia:I.Data[11] 	
			 Cassia:I.Data[12] 	
	Export Program		 Cassia:I.Data[13] 	
	Properties	Alt+Enter	 Cassia:I.Data[14] 	
			Cassia:I.Data[15]	
		- I.	Cassia:I.Data[16]	
		- L	 Cassia:I.Data[17] 	
		- I-	 Cassia:I.Data[18] 	
			 Cassia:I.Data[19] 	
			 Cassia:I.Data[20] 	
			 Cassia:I.Data[21] 	
			Cassia:I.Data[22]	
			Monitor Tags / Edit Tags /	

Figure 78 - Add new routine

2. Type "Conversion" in the name field. Select structured text from the type field drop-down menu.

New Routine		×
Name:	Conversion	OK
Description:	^	Cancel
	×	
Туре:	🐺 Structured Text 🗸 🗸	Help
In Program or Phase:	🔓 MainProgram 🗸 🗸	
	Assignment: <none> ~</none>	
🔄 Open Rou	tine	

Figure 79 - New routine settings

3. Navigate back to controller tags. Go offline to create the following tags:

Name	Data Type
vel_rms_divider	DINT
acc_rms_divider	DINT
skin_temp_divider	DINT
sensor1_serial_number	DINT
sensor1_acc_rms	REAL
sensor1_vel_rms	REAL
sensor1_acc_peak	REAL
sensor1_skin_temp	REAL
sensor1_units	BOOL
sensor1_time	DINT

4. Go offline to change data type.

💰 Logix Designer - Te	st [1769-L3	3ER 35	.11]	*								
) 🐿 🖆 💾 🖶 1	¥ 🗇 🖞	19	¢,				`	/ * , •	* . 🗖	te h	. 6	ь
Run Mode Controller OK	Ξ.	Path	: Ba	ickpl	lane\16*						٩.	윪
I/O Not Responding	Rem Run	1		I., I	No Forces	🕨 🖳 No E	dits		2	Ļ.		
File Edit View	Search L	Logic	c		Go Offline		V	Help				
Controller Organizer		-			Upload		(co	ntroller) ×			
0 "					Download		Г	~	Show:	All Tags		
🔺 <u> Controller</u> Test					Program Mode		F				_	
🗸 Controller	Tags				Run Mode		L					⊾ Va
📕 Controller i	Fault Hand	ler			Test Mode							
📕 Power-Up H	Handler						Г					
🔺 <u> T</u> asks					Clear Faults							
🔺 🛟 MainTask					Go To Faults		H					
🕨 🔓 MainPr	ogram											
📒 Unschedule	ed				Controller Pro	perties						
🔺 🚄 Motion Groups	5											
📁 Ungrouped	l Axes											
🕨 💼 Assets												

Figure 80 - Go offline

pe: PTest		~ Show	All Tags	~	T, E(
Name			2 2] •	Data Type	De
▶ vel_rms_	divider			DINT	
acc_rms_	divider			DINT	
skin_tem	p_divider			DINT	
▶ sensor1_	serial_numbe	er		DINT	
sensor1_	acc_rms			REAL	
sensor1_	ve <mark>l_</mark> rms			REAL	
sensor1_	skin_temp			REAL	
sensor1_	units			BOOL	
sensor1_	time			DINT	

Figure 81 - Controller tags

- 5. Double-click main program.
- 6. Go to the configuration tab and select conversion for main and <none> for fault from the corresponding drop-down menus.

🔳 Progra	m Properties	- Conversion	I					>	(
General	Configuration*	Parameters	Monitor			_			
- Assigned Main: Fault:	routines: Convers (none> program	on			~]			
				OK		Cancel	Apply	Help],



- 7. Click OK.
- 8. Go to conversion and paste the following text into the conversion routine:

vel_rms_divider := 1000;

acc_peak_divider := 1000;

acc_rms_divider := 2048;

skin_temp_divider := 10; sensor1_serial_number := cassia:I.Data[0];

sensor1_acc_rms := cassia:I.Data[1]/acc_rms_divider;

sensor1_vel_rms := cassia:I.Data[2]/vel_rms_divider;

sensor1_skin_temp := cassia:I.Data[3]/skin_temp_ divider;

sensor1_time := Cassia:I.Data[4];

sensor1_units := cassia:I.Data[5].0;



Figure 83 - Structured text conversion

9. Click save.



Figure 84 - Save

10. Go online and download program to PLC.



Figure 85 - Go online



Figure 86 - Download program

- 11. Go to monitor tags tab and observe the converted values.
 - Acc_rms is in [g] rms unit
 - Vel_rms is in in [/s] or[mm/s]
 - Skin_temp is in [°F] or [°C]
 - If units is 0 the system is [metric], if 1 the system is [imperial]
 - Time is the unix timestamp number of seconds since January 1, 1970

▶ vel_rms_divider	1000
▶ acc_rms_divider	2048
▶ acc_peak_divider	1000
skin_temp_divider	10
sensor1_serial_number	10019793
sensor1_acc_rms	0.001951
sensor1_vel_rms	0.0
sensor1_acc_peak	0.0012
sensor1_skin_temp	71.5
sensor1_units	0
▶ sensor1_time	0

Figure 87 - Converted values

6 UPDATING GATEWAY FIRMWARE/APPLICATION

6.1 Update gateway firmware

From the top banner, click other tab.

OO OO Status	င်္လာ Basic	Service	Container	Ê Events	 Other
Old Passwor	r <mark>assword</mark> rd				
New Passwo	ord				
Confirm Pas	sword				
		Aj	oply		
Control Contro	Gateway's Firmv lle File Encryption?	vare			
Upgrad Open Source	e E Licenses				

Figure 88 - Other tab

Scroll down to update gateway's firmware and click on select file.

NOTE: Contact Dodge technical support by phone at +1 864 284 5700 ext. 6 or by email at engineering@support.dodgeindustrial.com to obtain the latest firmware file.



Figure 89 - Select file for upgrade

Locate the provided file on your PC to update the router's firmware and click open.

💽 Open					
<	> Search Results in Desktop		~ C	x2000_2.1	×
Organize •				85 -	
Connor - RBC B	X2000_2.1.1.2309061648.gz.gpg C\Uvers\cjackson\Desktop	Type: GPG File	Date mod Size: 34.7	infried: 9/25/2023 9:42 AM MB	
Desktop Downloads Downloads Downloads Downloads Downloads Discussion Note Note Note	Search again in:				
File	name: X2000_2.1.1.2309061648.gr.gpg		i.	All Files	
				Open	Cancel

Figure 90 - Open firmware file

Click upgrade to start updating the router's firmware and wait until the process has completed.



Figure 91 - Upgrade gateway firmware

6.2 Check port forwarding

Under the container tab, scroll down to the port forwarding configuration tab. Click on protocol, select TCP. In port dialogue, enter "61210" then apply. This is used to forward OPC-UA data to a different OPC-UA client.

ON			~
Protocol		Port	
ТСР	~	61210	
Protocol		Port	
N/A	~		
Protocol		Port	
N/A	~		
Protocol		Port	
N/A	*		

Figure 92 - Port forwarding configuration

6.3 Update gateway application

NOTE: To download the newest X2000 – On-Premise Gateway application file, visit the link below. The application file will be under software in the literature tab.



https://dodge.ptplace.com/productDetail/_pn=749923

From the top banner, select either the OPC-UA or EtherNet/IP tab.

Click on options and export the configuration file (named "sensors.csv"). Save this file in an easily accessible location, as it will be used to reconfigure the gateway once the new application is installed.



Figure 93 - Export sensor configuration

Navigate to the gateway container section and scroll to the bottom of the page. Click reset and provide confirmation in order to reset the gateway container.



Figure 94 - Reset gateway container

Reconnect to the gateway and navigate back to the container page. There should no longer be any apps installed on the gateway. If there are any apps present, reset the container again. Wait for the container status to be running and not installing before continuing to the next step.

	ි		$\widehat{\mathbf{V}}$	Ê	\bigcirc
Status	Basic	Service	Container	Events	Other
Operating \$	System			Ubuntu 16	5.04.3 LTS
Container S	Status				running
Container \	/ersion				1.2.0
CPU Usage					6.10%
Memory Us	age				0.15%
Storage Us	age			1.02GE) / 2.28GB
Transmit Ra	ate				0.09KB
Transmit B	ytes				2.15KB
Receive Ra	te				0.12KB
Receive By	tes				2.84KB
Installed	d APPs ()	Name Version			Action
Install A Select Fi	PP				
Install					

Figure 95 - Empty container

On the container page, find the "Install APP" section. Click on the select file button.



Figure 96 - Install APP

Locate the application file that was previously downloaded and select open.

💽 Open				>
← → ~ ↑	Search Results in Desktop >	~ C	OnPremises.1.2	×
Organize •			8≡ -	
> 📥 Connor - RBC	OnPremises: 1.2.tar Date modified: 9/22/2023 12:40 PM	C:\Users\cjackson\Desktop		
Desktop /	Search again in			
🛓 Downloads 🧃	Libraries 📮 This PC 🔛 Custom			
Documents d				
Pictures d	, L			
늘 Work 🦽				
👩 Music 🧃				
Videos a				
Screenshots				
🚞 User Story Pho	4			
1	ile name:		All Files	30
			Open	Cancel

Figure 97 - Open application file

Click install to start installing the application. Wait until the process is complete.

Select File	OnPremises.1.2.tar.gz	
	·	

Figure 98 - Install application

Once the installation is complete, navigate to the gateway other page and scroll to the actions section. Reboot the gateway.

Actions			
Reboot	Reset	Export Debug Log	Sign Out
Cassia Networks			

Figure 99 - Reboot the gateway

When the gateway has finished rebooting, reconnect and navigate to the container section. The new application with an updated version number should display in the installed APPs section, as shown below.

Installed APPs (1))		
#	Name	Version	Action
1	OnPremises	1.2	Del

Figure 100 - New application version

After installing the new application, it is necessary to reconfigure the sensor settings. Go to the options section of either the OPC-UA or EtherNet/IP section.

1. Click select file.

Options	×
Unit	
Imperial	~
Save	
Ethernet/IP operation	
Ethernet/IP tag writer	~
Save	
Restore Config	
Select File Restore	
Export •	

Figure 101 - Select sensor configuration to restore

2. Locate the exported configuration file (sensors.csv) and click open.

😨 Open					×
\leftrightarrow \rightarrow \uparrow	Search Results in Downloads		9	C sensors (1)	×
Organize •					. · . •
> Connor - RBC B	Name V Today	Date modified	Туре	Size	
Desitop Documents Documents Documents Pictures Vork Vork Videos Videosechete	Vesterday Vesterday Last week Earlier this month Last month S Earlier this year Seirch again in: Distrier This PC Cuttom	10/31/2023 855 AM	Microsoft Excel C	2 KB	
📩 Hear Starv Phate Fil	e name: sensors (1)			All Files	Cancel

Figure 102 - Open sensor configuration

3. Click restore.

Options	×	
Unit		
Imperial	~	
Save		
Ethernet/IP operation		
Ethernet/IP tag writer		
Save		
Restore Config		
Select File Restore		
sensors (1).csv		
Export -		

Figure 103 - Restore file

7 KNOWLEDGE BASE

- How many EtherNet/IP devices and OPC-UA sessions can connect to a X2000 Gateway On-Premise?
 Each gateway functions as a server and can accept up to five EtherNet/IP devices and 10 OPC-UA sessions.
- How many OPTIFY sensors can be processed by a X2000 Gateway On-Premise? Each X2000 Gateway On-Premise can support up to 20 sensors.
- What protocol and service port does a X2000 Gateway On-Premise support? The gateway supports CIP protocol, using the industry standard UDP/TCP port: 44818.
- What KPIs from the sensor does the gateway transmit to connecting devices? Surface temperature, velocity and acceleration (RMS).
- What does it mean when BLE state is UP or DOWN and what actions should be taken? UP:

Indicates that the sensor is within range of the gateway and it is working correctly.

DOWN:

- Several instances may cause the BLE state to change to "DOWN" and it is generally attributed to the following conditions:
 - Sensor is out of range.
 - · Sensor battery is depleted.
 - Sensor stopped working unexpectedly.
- Actions:
 - Make sure the sensor is in range of the gateway. Use the refresh button on the OPC-UA or EtherNet/IP page.
 - If the status has not changed, press the button on the sensor to reset it. Remember, when the button is pressed, all settings on the sensor are set to default (measurement interval to 3600 seconds, accelerometer range to 2g and clock to 0 (1970 year)). Then use the refresh button on the OPC-UA or EtherNet/IP page.
 - · If the status has not changed, replace the defective sensor with a new one. Refer to section 3.6 of this user guide.
- What does it mean when OPC state is UP, DOWN, or CONFIG and what actions should be taken?

UP means that the sensor is currently connected with at least one OPC-UA Client.

DOWN means that the sensor is not currently connected to any OPC-UA Clients.

CONFIG indicates initial configuration and that the sensor has not yet been connected to any OPC-UA Client. For instructions on how to connect to OPC-UA Client, please refer to section 4.2 of this user guide.

What does it mean when PLC state is 0/0, 0/1, 1/1, DOWN or UP and what actions should be taken?

0/0, 0/1, and 1/1 refer only to EtherNet/IP tag writer operation.

- 0/0 indicates initial configuration. For more information on how to assign PLC Controller to a sensor, please refer to section 3.5 of this user guide.
- 0/1 indicates that the sensor has been configured with one PLC controller and it is not connected to any PLC controller.

- 1/1 indicates that the sensor has been configured with one PLC controller and it is connected to one PLC controller.

DOWN and UP refer only to CIP Server operation.

- DOWN indicates that the sensor is not connected to the PLC controller. For more information on how to assign PLC Controller to a sensor, please refer to section 3.5 of this user guide.
- UP indicates that the sensor is connected to the PLC controller.

8 GLOSSARY

- EtherNet/IP (IP = Industrial Protocol) uses the Ethernet infrastructure to manage the connection between various automation devices such as robots, PLCs, sensors, CNCs, and other industrial machines. It is managed by the Open DeviceNet Vendors Association (ODVA).
- **OPC-UA** stands for Open Platform Communications Unified Architecture and is a data exchange standard for industrial communication (machine-to-machine or PC-to-machine communication). This open interface standard is independent of the manufacturer or system supplier of the application, of the programming language in which the respective software was programmed, and of the operating system on which the application is running.
- **PLC** stands for Programmable Logic Controller and is a ruggedized computer used for industrial automation. These controllers can automate a specific process, machine function, or an entire production line.
- **BLE** stands for Bluetooth Low Energy, which is a variation of Bluetooth wireless standard designed for low power consumption.
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