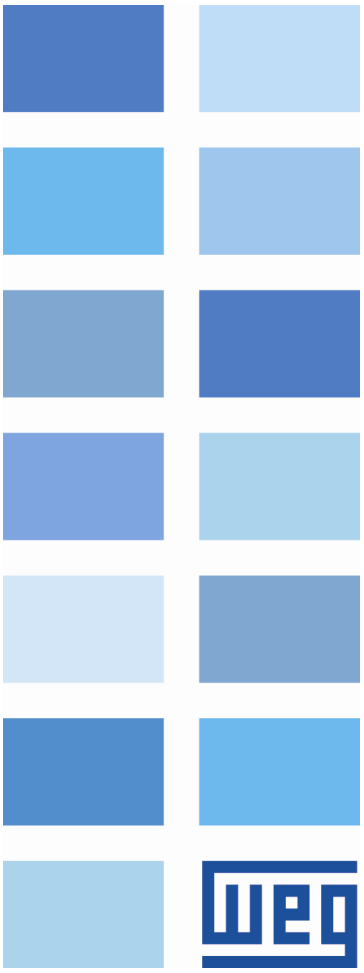
Operation on DeviceNet network using Rockwell ControlLogix PLC

SSW900-CAN-W

Application Note



SSW900-CAN-W DeviceNet Application Note

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Language: English

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Build 5249

Publication Date: 01/2019

The information below describes the reviews made in this manual.

Version	Revision	Description
-	R00	First edition

CONTENTS

1 DESCRIPTION

This application note is intended to provide a description of how to program a soft-starter SSW900 with accessory SSW900-CAN-W to communicate in DeviceNet network using Rockwell ControlLogix PLC.

This document is meant for trained personnel working with the equipment described and DeviceNet network installation, besides a good knowledge of automation and programmable logic controllers, in particular about Rockwell Automation software.

1.1 REFERENCED DOCUMENTS

This application note was developed based on the following documents and tools:

Document	Version	Source
SSW900 User's Manual	10005616165 / 04	WEG
SSW900 Soft-Starter Programming Manual	10003989140 / 03 (1.2X)	WEG
SSW900-CAN-W DeviceNet User's Guide	10006223733 / 00 (1.2X)	WEG
WPS	2.40	WEG
Planning and Installation Manual - DeviceNet Cable System	PUB00027R1	ODVA
RSNetWorx for DeviceNet	21.00	Rockwell Automation
Studio 5000 PLC programming software	26.00	Rockwell Automation

1.2 ARCHITECTURE

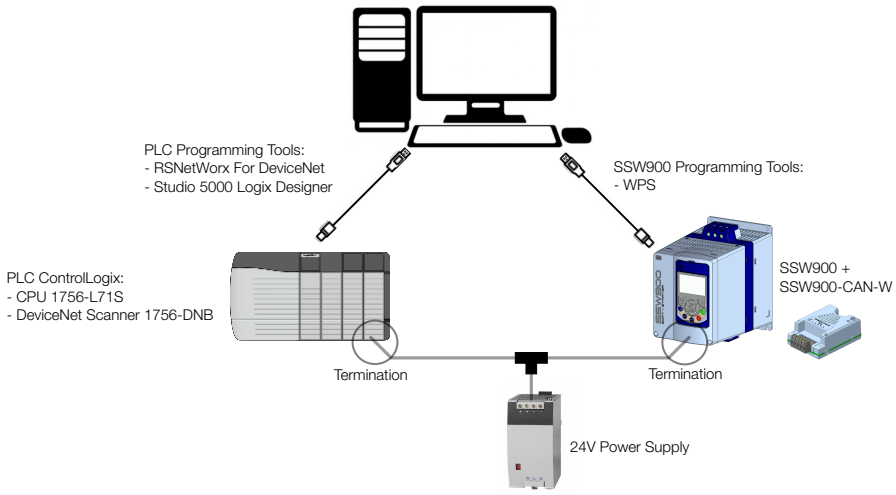

Figure 1.1: *Network components for this application*

1.3 SSW900

- Equipment: SSW900 with accessory SSW900-CAN-W installed at slot 1.
- Version: 1.20
- EDS file: DN_SSW900_V12X.eds
- Programming tools:
  - WPS version 2.40

1.4 CONTROLLOGIX

- CPU: 1756-L71S version 26.013

- DeviceNet Scanner: 1756-DNB version 7.03
- Programming tools:
  - RSNetWorx For DeviceNet version 21.00
  - Studio 5000 Logix Designer version 26.01

1.5 PASSIVE NETWORK COMPONENTS

For passive network components - cables, connectors, terminating resistors, power supply - we recommend using certified components for DeviceNet network. Please refer to the product documentation for information about the proper network installation.

2 SLAVE CONFIGURATION

This section describes the main configurations for soft-starter SSW900 operation with accessory SSW900-CAN-W in DeviceNet network. Some of the described configurations are only available if SSW900-CAN-W accessory is properly installed.

Refer to the SSW900 programming manual for the necessary configurations related to other device functions, like motor configuration, protections, etc.

2.1 DEVICENET INTERFACE

For soft-starter SSW900 operation in the DeviceNet network, it is necessary to program the protocol, address (or Node-ID), and baud rate. For this application, the following configurations have been done:

- C8.4.1 CANopen/DeviceNet Protocol: DeviceNet. ❶
- C8.4.2 CANopen/DeviceNet Address: 1. ❷
- C8.4.3 CANopen/DeviceNet Baud Rate: 125 Kbps. ❸

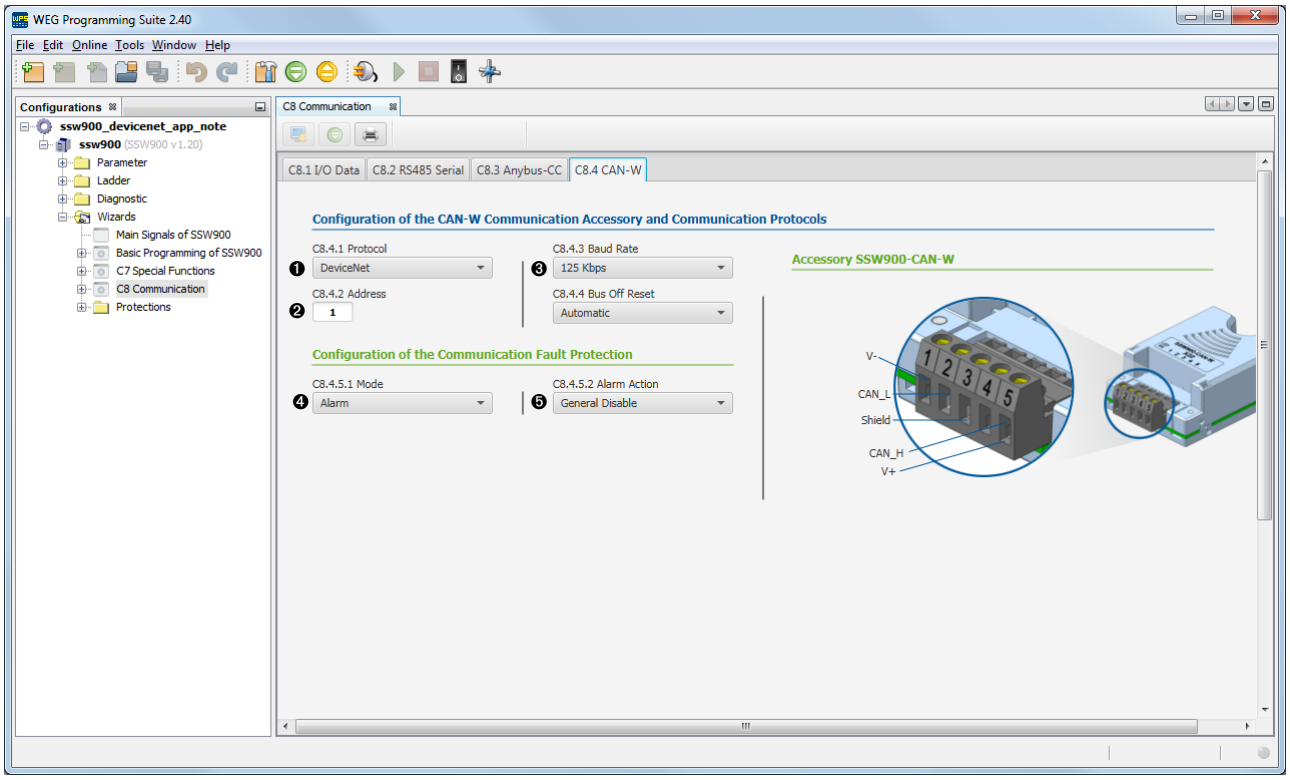

Figure 2.1: *WPS - CAN accessory configuration*

2.2 I/O DATA

SSW900 has a set of configurations where it is possible to define any device data to exchange with network master. There is an appendix at DeviceNet User's Guide describing the entire list of device data that can be programmed to I/O Data.

Parameter	Description	Range of values	Decimal places	Class	Instance	Attribute	CIP data type	Net Id	Size	Qty mapped words
S5.1	Status Word									
S5.1.1	SSW	Bit 0 = Running Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = Initial Test Bit 4 = Ramp Up Bit 5 = Full Voltage Bit 6 = Bypass Bit 7 = Ramp Down Bit 8 = Remote Bit 9 = Braking Bit 10 = FWD/REV Bit 11 = Reverse Bit 12 = Ton Bit 13 = Toff Bit 14 = Alarm Bit 15 = Fault		64h	07h	B4h	WORD	680	16bit	1

Figure 2.2: *List of available data described at SSW900-CAN-W DeviceNet User's Guide*

For each application, it is necessary to look at this appendix and define the data to communicate between SSW900 and network master. Considering SSW900-CAN-W accessory installed at slot 1, for this application, SSW900 will transfer the following I/O data with network master:

Mapped Inputs	Net Id	Size	Qty Mapped Words
S5.1.1 Status Word SSW	680	16bit	1
S1.2.4 Main Line Voltage Average	4	16bit	1
S1.1.4 Current Average	24	32bit	2
		TOTAL	4 Words (8 Bytes)

Mapped Outputs	Net Id	Size	Qty Mapped Words
S5.2.5 Command Word Slot1	685	16bit	1
		TOTAL	1 Word (2 Bytes)

Based on this sequence of data for communication, the following configurations have been programmed:

Data read configuration (Input Words):

- C8.1.1.1 Data Read Slot 1 1st Word: 1. ❶
- C8.1.1.4 Data Read Slot 2 Quantity: 4. ❷
- C8.1.1.5 Data Read Word #1: 680 (Status Word SSW). ❸
- C8.1.1.6 Data Read Word #2: 4 (Main Line Voltage Average). ❹
- C8.1.1.7 Data Read Word #3: 24 (Current Average - high word). ❺
- C8.1.1.8 Data Read Word #4: 24 (Current Average - low word).

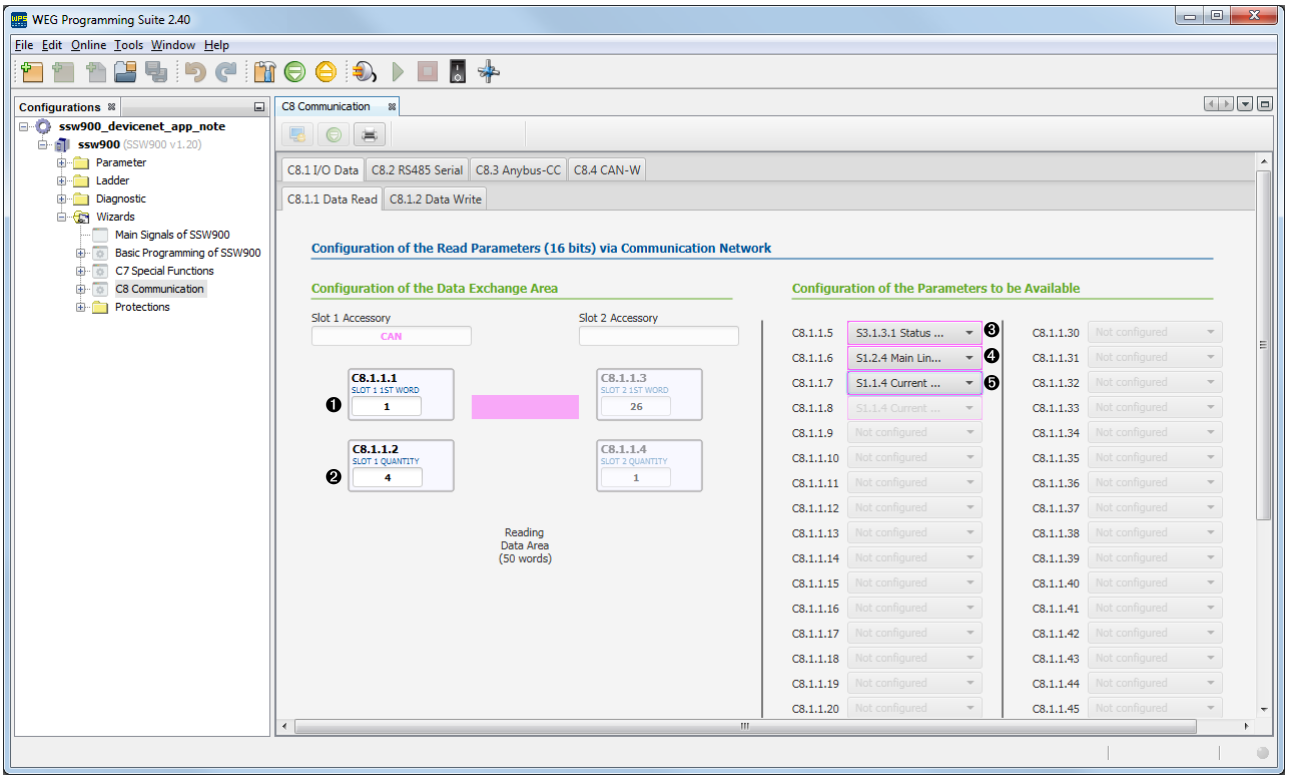

Figure 2.3: *WPS - Data read configuration*

Data write configuration (Output Words):

- C8.1.2.1 Data Write Slot 1 1st Word: 1. ❶
- C8.1.2.2 Data Write Slot 1 Quantity: 1. ❷
- C8.1.2.6 Data Write Word #1: 685 (Command Word Slot1). ❸

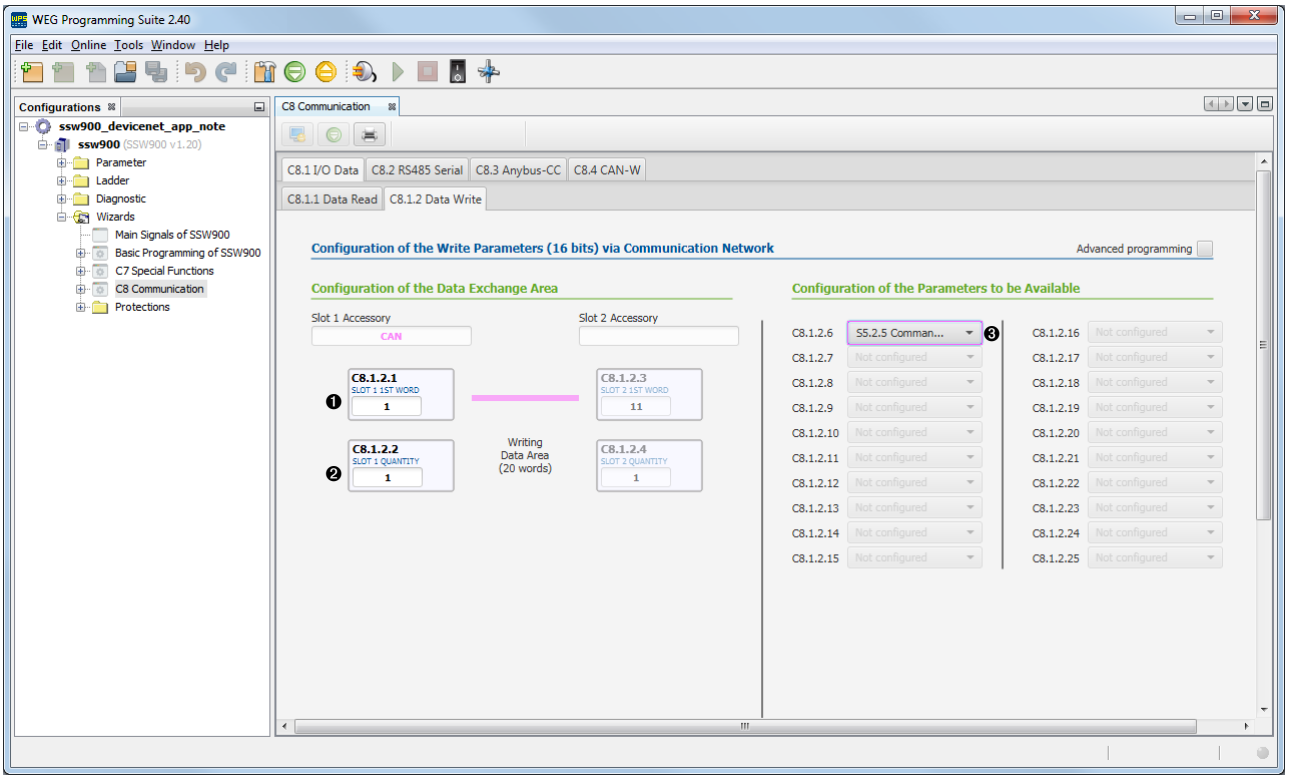

Figure 2.4: *WPS - Data write configuration*

2.3 LOCAL/REMOTE

SSW900 has two operation modes: local and remote. For each operation mode, it is necessary to define the source that it will use to receive commands, like start/stop, error reset. For this application, considering SSW900-CAN-W accessory installed at slot 1, the following control sources have been defined:

- Local: keypad will control SSW900 in local mode.
- Remote: slot 1 (SSW900-CAN-W) will control SSW900 in remote mode.
- Local/Remote transition: the definition if the device is in local or remote mode will be controlled by slot 1 commands also, in remote mode by default (at power on).

Based on this, the following configurations have been programmed:

- C3.1 LOC/REM Selection Mode: Slot 1 REM. ❶
- C3.2 LOC/REM Selection LOC Command: HMI Keys. ❷
- C3.3 LOC/REM Selection REM Command: Slot 1. ❸

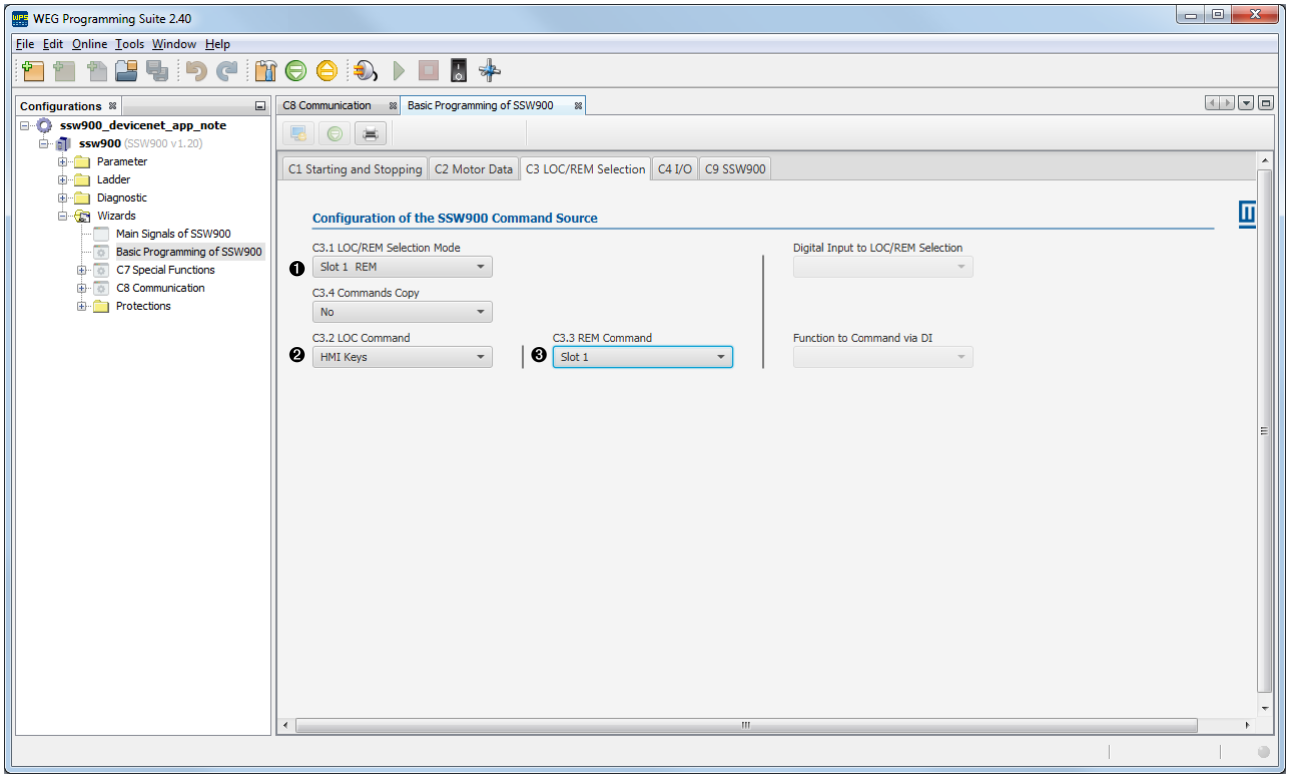

Figure 2.5: *WPS - Local/Remote configuration*

2.4 COMMUNICATION ERROR

It is important to define the action SSW900 must take in case of communication error. For this application, a communication error should lead to an alarm indication. If SSW900 was running the motor via network command, SSW900 should also perform a general disable.

Based on this, the following configurations have been programmed (refer to figure 2.1):

- C8.4.5.1 CAN Error Mode: Alarm. ❹
- C8.4.5.2 CAN Error Alarm Action: General Disable. ❺

3 DEVICENET NETWORK CONFIGURATION

For DeviceNet configuration, use RSNetWorx for DeviceNet. The main steps are described below.

3.1 IMPORT EDS FILE

Import EDS file using EDS Wizard tool. Follow the wizard instruction to import the EDS file. It is important to use the EDS file according to SSW900 firmware version.

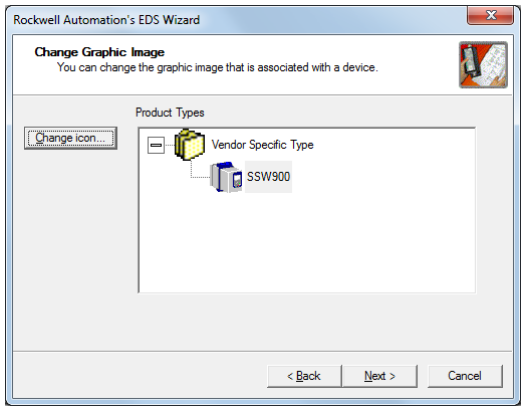

Figure 3.1: *Register SSW900 EDS file*

3.2 IDENTIFY PRODUCT ON THE NETWORK

Add devices on the network. If devices are online, it is possible to scan the network to automatically find them.

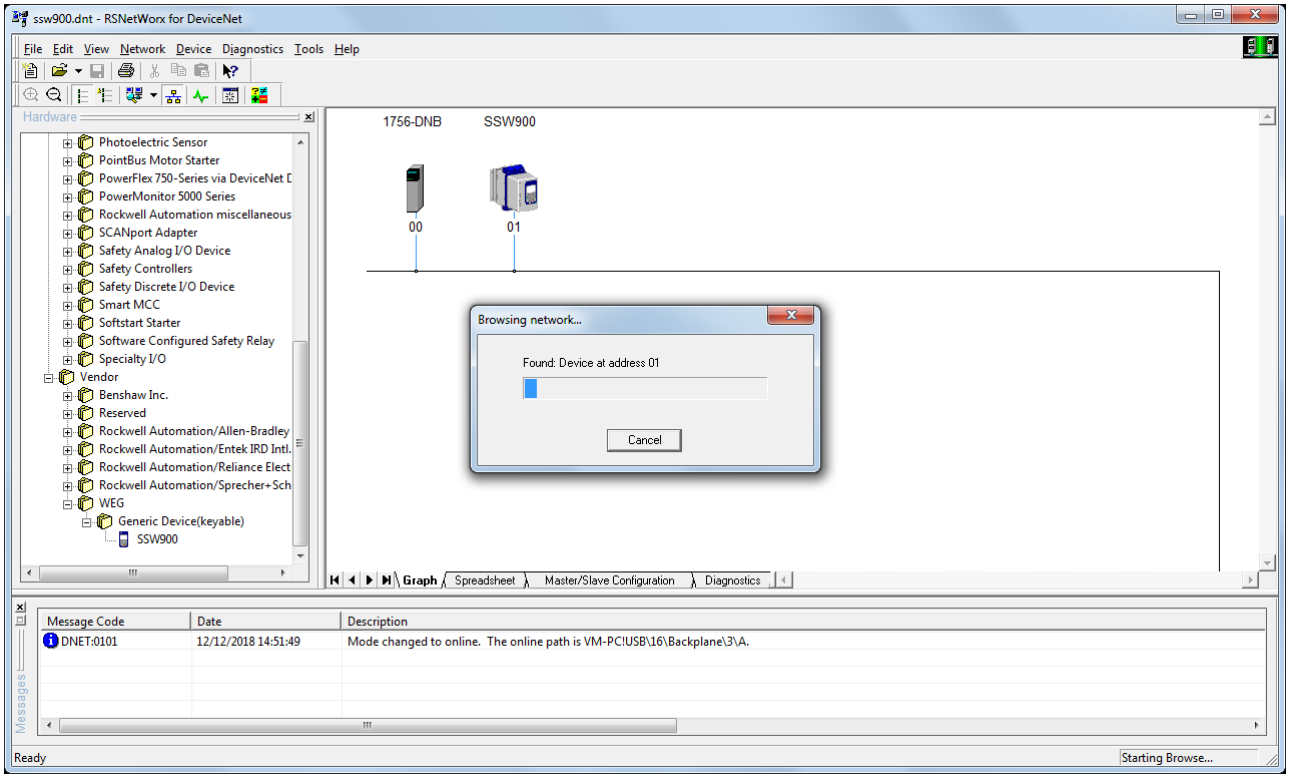

Figure 3.2: *Scan network devices*

3.3 MONITOR SSW900 PARAMETERS

The EDS file has the list of parameters (status and configurations) available to SSW900. Double clicking on the device opens its properties, including this parameter list. If SSW900 is online, it is possible to upload and see online all status and configurations available to it.

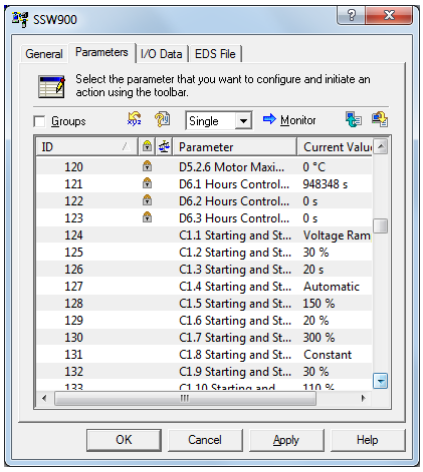

Figure 3.3: *Device parameters*

3.4 PROGRAM I/O DATA

Double clicking on the scanner to open its properties. At tab “Scanlist”, it is possible to program all devices the master should communicate with, as well the number of bytes for cyclic data exchange, the communication method and data mapping at the scanner.

For this application, the communication method will be “polled”. The I/O size was defined at item 2.2:

- Input size: 8 bytes. ❶
- Output size: 2 bytes. ❷

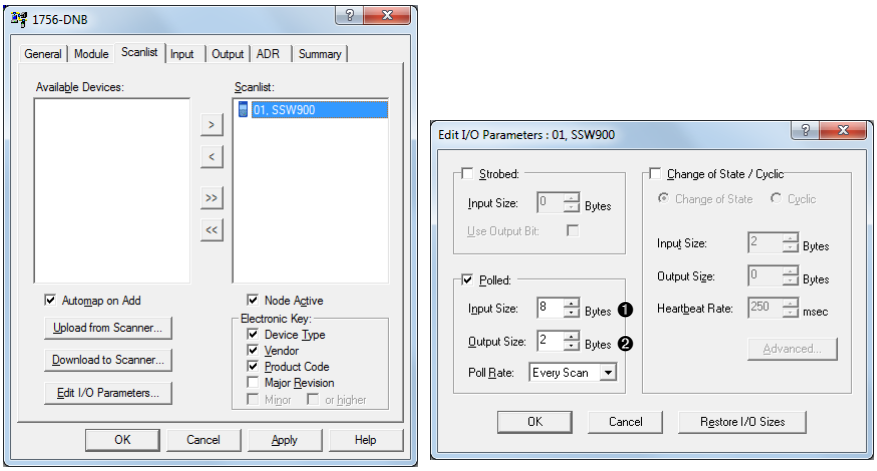

Figure 3.4: *Device parameters*

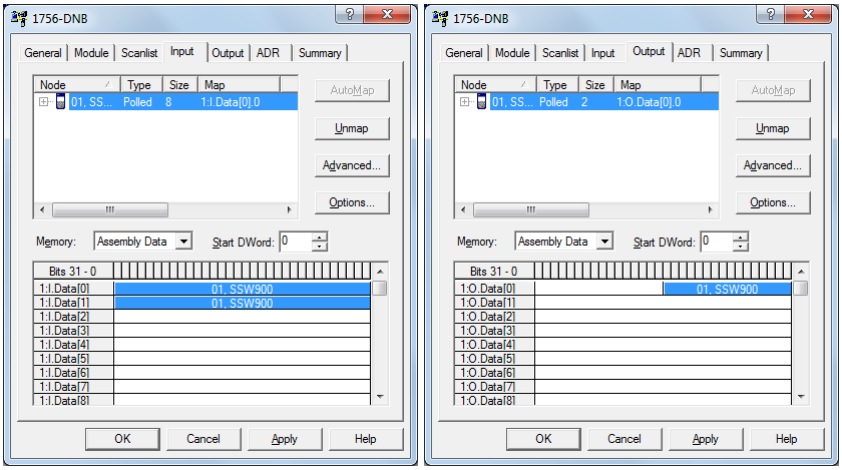

Figure 3.5: *Location of communication data*

Once the I/O configuration is finished, download it to PLC.

4 CONTROL AND MONITORING

Once network configuration is done, use Studio 5000 Logix Designer to configure PLC and access device data. The main steps are described below.

4.1 DOWNLOAD CONFIGURATION TO PLC

Configure PLC according to CPU and additional modules connected to the backplane, and download this configuration to PLC. In order to exchange input and output data with slaves, command PLC and DeviceNet scanner to run mode.

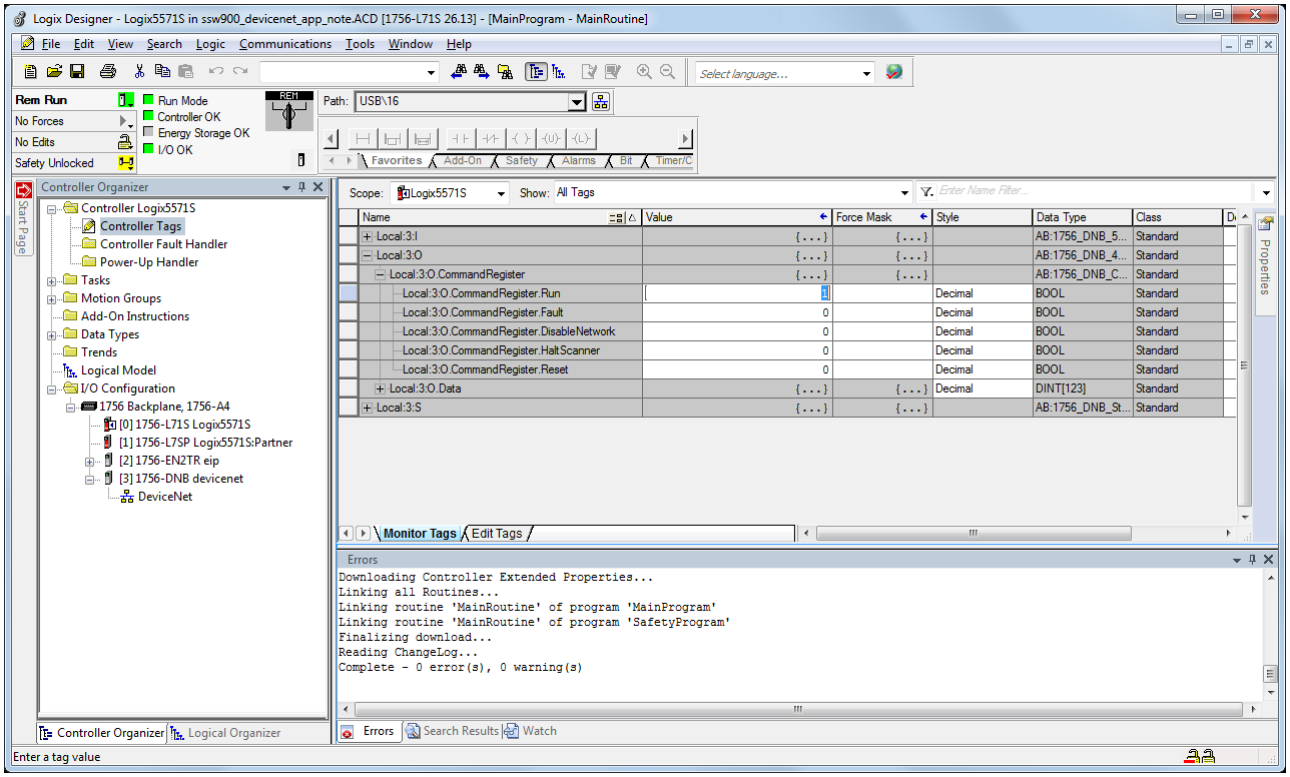

Figure 4.1: *Scanner tags*

4.2 VIEW AND EDIT CYCLIC DATA

With DeviceNet master is at run mode, it is possible to check input and write output data directly at controller memory.

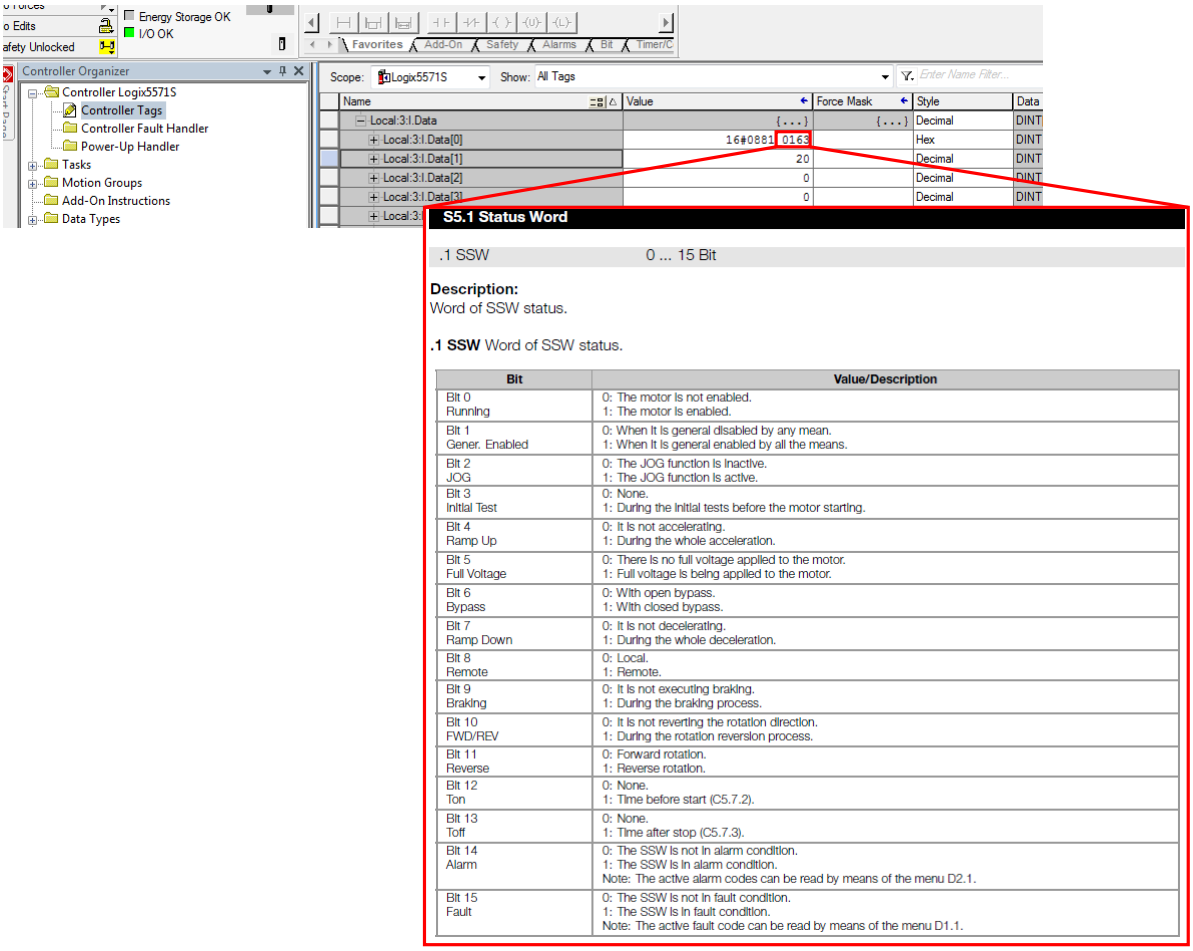

Figure 4.2: *Read data, with highlight to the status word as described at SSW900 DeviceNet documentation*

For inputs, as described at 2.2, it is programmed to read the following information:

- Local:3:I.Data[0] (low word): Status Word SSW: value 0x0163.
  - Bit 0 = 1 (running).
  - Bit 1 = 1 (general enabled).
  - Bit 5 = 1 (at full voltage).
  - Bit 6 = 1 (bypass active).
  - Bit 8 = 1 (at remote mode).
- Local:3:I.Data[0] (high word): Main Line Voltage Average: value 0x0881 (2177 = 217.7V).
- Local:3:I.Data[1] (double word): Current Average: value 20 (2.0A).

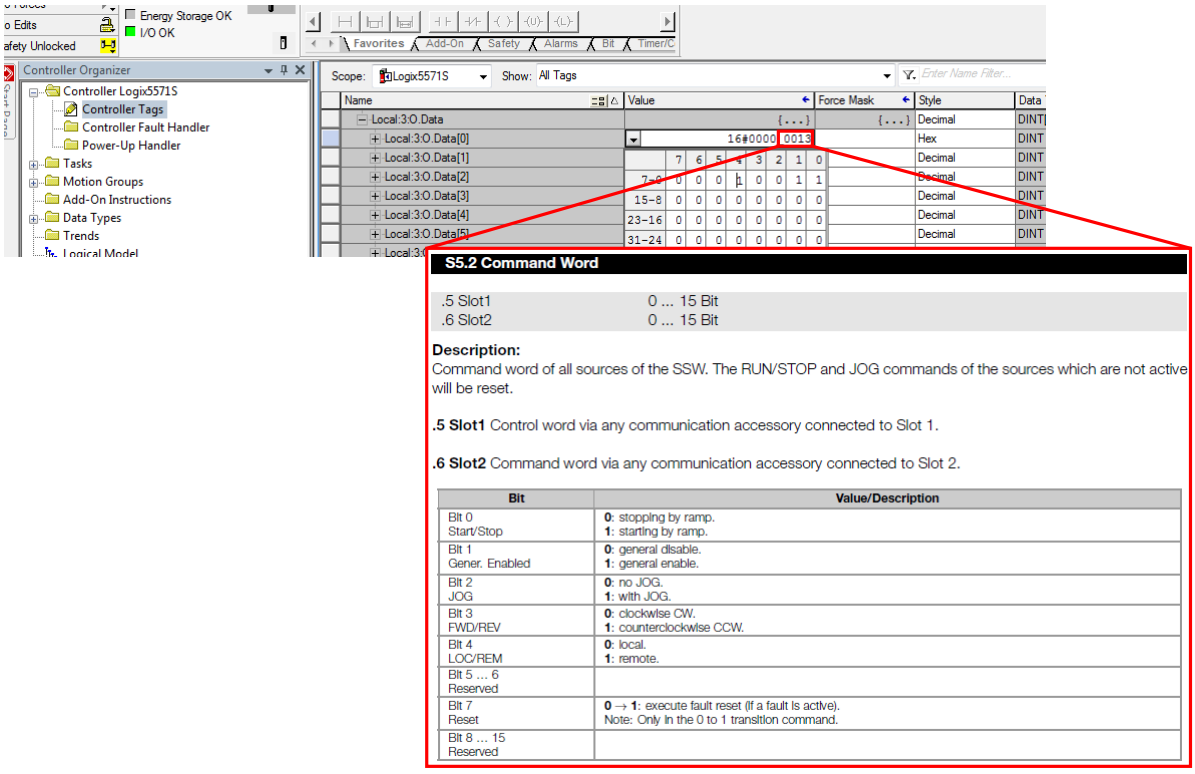

Figure 4.3: *Write data, with highlight to the command word as described at SSW900 DeviceNet documentation*

For output, as described at 2.2, it is programmed to write the following information:

- Local:3:O.Data[0] (low word): Command Word Slot1: value 0x0013.
  - Bit 0 = 1 (ramp enable).
  - Bit 1 = 1 (general enable).
  - Bit 4 = 1 (remote mode).

Using this data, it is possible to design a PLC program, creating tags representing device information, and a PLC logic to manipulate such data according to desired to the application.

4.3 LADDER LOGIC FOR ACYCLIC DATA TRANSFER

There is an appendix at DeviceNet User's Guide describing the entire list of device data that is possible to access via DeviceNet Interface. This list also indicates the class, instance and attribute of each data.

For this example, we will read the value of D1.1.1 - Actual fault FXXX.

Parameter	Description	Range of values	Decimal places	Class	Instance	Attribute	CIP data type	Net Id	Size	Qty mapped words
D1 Diagnostics\Fault										
D1.1	Actual									
D1.1.1	Fxxx	0 to 999	0	64h	01h	BEh	UINT	90	16bit	1
D1.2	Fault History									
D2 Diagnostics\Alarms										
D2.1	Actual									
D2.1.1	Axxx 1	0 to 999	0	64h	01h	BFh	UINT	91	16bit	1
D2.1.2	Axxx 2	0 to 999	0	64h	01h	C0h	UINT	92	16bit	1
D2.1.3	Axxx 3	0 to 999	0	64h	01h	C1h	UINT	93	16bit	1

Figure 4.4: *SSW900 DeviceNet documentation describing CIP path for acyclic access*

Once defined the information for acyclic access, program a message at PLC logic. It will be necessary to configure the following information:

- Service Type: Get Attribute Single (use "set" attribute single in case of write access). ❶

- Class, Instance and Attribute of data, as described by SSW900 DeviceNet documentation. ❷
- Destination Element: a variable to store the read value (must be compatible with the data size of the read object). ❸
- Path: with the following format:
  - name of DeviceNet Scanner. ❹
  - channel (in this case, 2 for channel 0). ❺
  - slave address (for this example, SSW900 at address 1). ❻

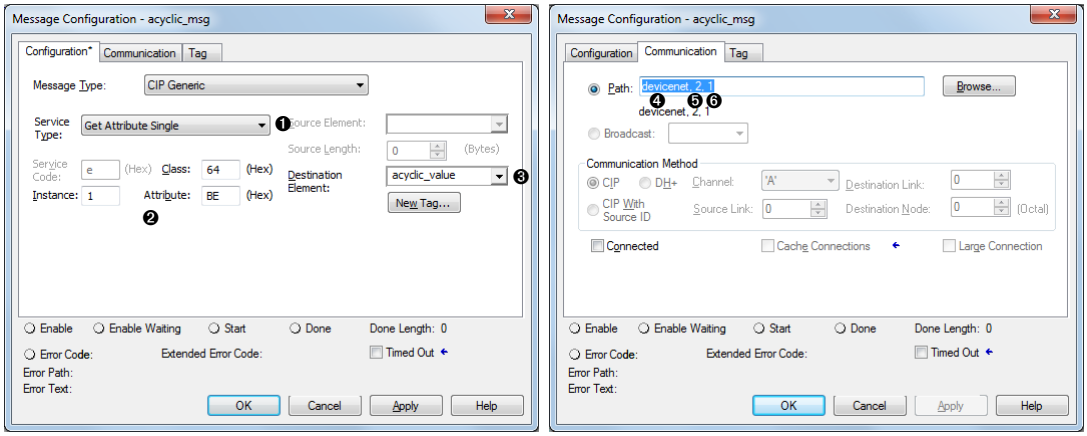

Figure 4.5: *Acyclic message configuration*

Activate MSG block input to send an acyclic request to slave. For this example, the value read from D1.1.1 is “3”, representing the active fault code (3 = Motor Start Phase Loss).

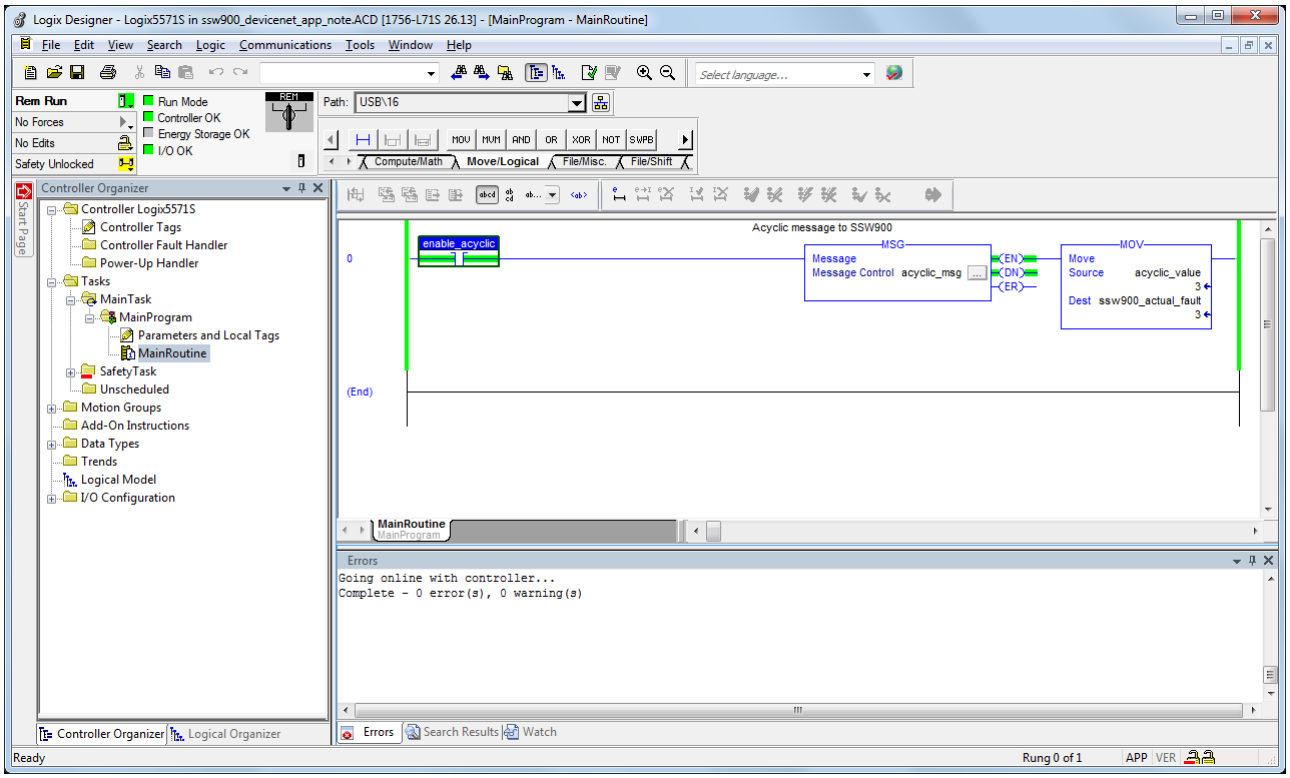

Figure 4.6: *Main ladder sending an acyclic message to the slave*

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