

Unity Pro PL7 application converter User manual

October 2005 eng



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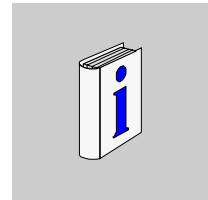
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About the Book



At a Glance

Document Scope This manual presents the PL7 application converter and describes the procedure for converting PL7 applications into Unity Pro applications. It also contains correspondence tables between PL7 programming elements and those of Unity Pro programming.

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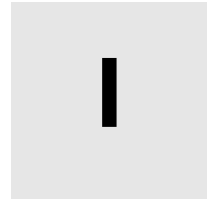
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The PL7 application converter: general



At a Glance

Subject of this Part

This part provides a general overview of the PL7 application converter and the conversion principle.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
1	Overview of the converter	13

Overview of the converter



At a Glance

Subject of this Chapter

This chapter presents the PL7 application converter and describes the procedure for converting PL7 applications into Unity Pro applications.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Overview of the PL7 Applications Converter	14
Conversion Principle: General Points	15
Conversion Principle: Applications and Processors	17
Conversion principle: technical aspects	19
Conversion to Unity V2.0	22

Overview of the PL7 Applications Converter

General Points

The PL7 application conversion tool is integrated into Unity Pro, and enables PL7 applications to be converted into Unity Pro applications. In order to perform a conversion, you first need to:

- update the application to **PL7 V4.3**,
- unprotect, where necessary, the application, as well as all sections, functional modules and DFBs,
- export and save the source file.

Note: The PL7 Micro applications are not converted.

Conversion Principle

The PL7 application converter transforms the source files exported by PL7 V4.3 into Unity Pro source files. Conversion stops automatically if the source file is from a earlier version of PL7 than 4.0 or if the configuration has not been exported (See *Software Applications, p. 17*) (version earlier than V4.3).


Conversion is:

- called automatic when a complete application is converted,
- called semi-automatic when one or more DFBs are converted.

If the conversion is automatic, the software generates a source file that can be directly analyzed using Unity Pro. The application is imported automatically; after the Unity Pro project analysis is manually started, the output window (See *"Convertor" message in the analysis procedure, p. 43*) containing the list of conversion errors is displayed on the screen.

If the conversion is semi-automatic, the converter generates a source file and a conversion report file.

In order for the contents of the converted source file to be usable, it needs to be imported **manually** into an application. Following this import; the output window (See *"Convertor" message in the analysis procedure, p. 43*) containing the list of conversion errors is displayed on the screen.

	WARNING
	<p>Note:</p> <p>The PL7 application converter translates the application but does not guarantee its correct operation.</p> <p>Failure to follow this precaution can result in death, serious injury, or equipment damage.</p>

Conversion Principle: General Points

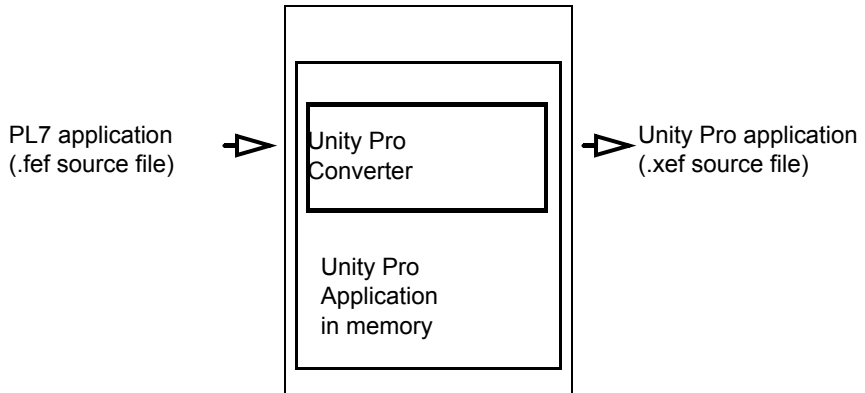
Introduction

The PL7 application converter is used to convert:

- a complete PL7 application. This procedure is called automatic,
 - a PL7 DFB. This procedure is called semi-automatic.
-

Automatic Conversion

The procedure for converting a PL7 application into a Unity Pro is as follows:



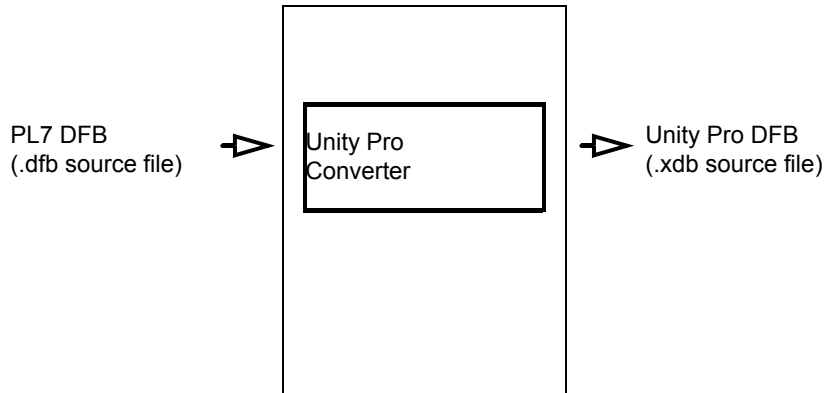
The **.fef** PL7 source file is converted into a **.xef** Unity Pro source file, then imported and analyzed automatically in the Unity Pro project. The analysis phase must be started manually in order to detect any conversion errors and display them on the screen in the form of an output window.

At the end of the procedure, the converted PL7 application and output window are opened and displayed on the screen in the Unity Pro software.

To correct any conversion errors, click on the error line displayed in the output window to go directly to the part of the program to be modified (See *"Convertor" message in the analysis procedure, p. 43*).

Semi-Automatic Conversion

The procedure for converting a PL7 DFB is as follows:



The **.dfb** PL7 source file is converted into a **.xdb** Unity Pro source file.

At the end of the procedure, the converted PL7 DFB is saved in its source format. In order for this DFB to be exploitable by Unity Pro, it must be **manually** imported into a Unity Pro application.

Following this import, you must start the project's analysis phase manually in order to detect any conversion errors and display them on the screen in the form of an output window.

To correct any conversion errors, click on the error line displayed in the output window to go directly to the part of the program to be modified (See "*Convertor*" message in the analysis procedure, p. 43).

Conversion Principle: Applications and Processors

General Points

The PL7 application converter transforms PL7 source files (.fef, .dfb) into Unity Pro source files (.xef, .xdb) and, during the conversion of a complete application (.fef), associates an equivalent to the old processor.

Software Applications

The conversion of a complete application is called automatic.

At the end of conversion, and after a manual analysis is started, the user has:

- a source file that is directly exploitable by Unity Pro,
- a Unity Pro application in memory,
- a conversion report file including all data, warnings and errors relating to the conversion,
- an output window containing the list of conversion errors.

Note: The recommended version of PL7 is V4.3. However, you may, under your own responsibility, convert the exported applications with versions V4.0, V4.1 and V4.2 if the hardware configuration has been explicitly exported in the FEF file. To export the hardware configuration, you must modify the `PL7SYS.INI` file located in the WINNT or Windows folder on your PC. This file must contain the following two lines:

```
[PL7TOOL132]
ExportConf=True
```


The conversion of a DFB PL7 is called semi-automatic.

At the end of conversion, the user has:

- the source file of the converted DFB,
- a conversion report file including all data and warnings relating to the conversion.

Following a manual import of this converted DFB and the analysis in a Unity Pro project, the output window containing the list of conversion errors is displayed.

Note: The recommended version of PL7 is V4.3. However, you may, under your own responsibility, convert the exported DFB with versions V4.0, V4.1 and V4.2

	WARNING
	<p>The conversion of complete applications or DFB using a version of PL7 earlier than PL7V4.3 is performed under your complete responsibility.</p> <p>Failure to follow this precaution can result in death, serious injury, or equipment damage.</p>

Processors

Sometimes the conversion procedure requires the size of the converted application to be increased.

By default, the PL7 application converter automatically updates the 'processor + memory card' configuration, and proposes an equivalent configuration (See *Inter-platform equivalence*, p. 47). However, this default selection may be modified.

Note: All PL7 applications earlier than version V4.0 must be updated.
--

For applications managed by the following processors, the update procedure involves the compulsory replacement of the processor:

- Premium processor (See *Premium processors*, p. 48) **TSX P57 •0**, **TSX P57 ••2** or **T PMX P57 ••2**,
 - Atrium processor (See *Atrium processors*, p. 51) **T PCX 57 •••2**.
-

Conversion principle: technical aspects

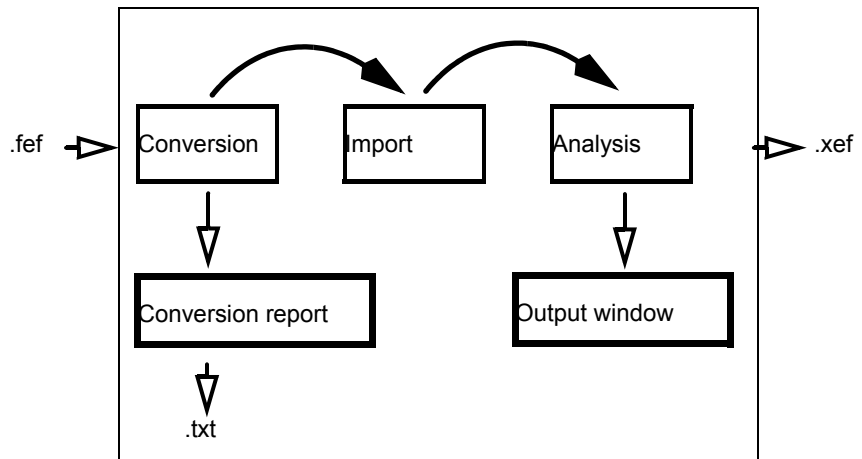
Introduction

The PL7 application converter is used to convert:

- a complete PL7 application; the procedure is automatic,
- a PL7 DFB; the procedure is semi-automatic.

Automatic conversion

The following diagram shows the technical aspects of the conversion procedure for a complete PL7 application.

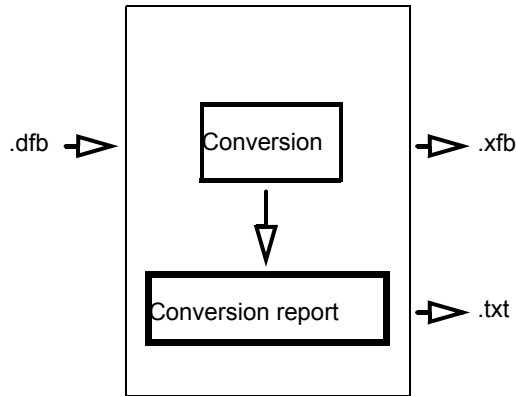


The following table describes the different steps involved in automatic conversion.

Step	Description
Conversion	During this phase, the .fef PL7 source file is converted into a .xef Unity Pro source file. Any data and warnings relating to the conversion are generated.
Conversion report	A .txt conversion report file is generated. It contains all data, warnings and errors relating to the conversion procedure.
Import	The .xef source file is imported automatically into Unity Pro.
Analysis	The imported file is analyzed by Unity Pro. Any conversion errors are detected and generated. Note: You must manually launch this analysis phase.
Output window	Any conversion errors are shown in the output window (See <i>End of the analysis procedure, p. 42</i>) which is automatically displayed at the end of conversion.

Semi-automatic conversion

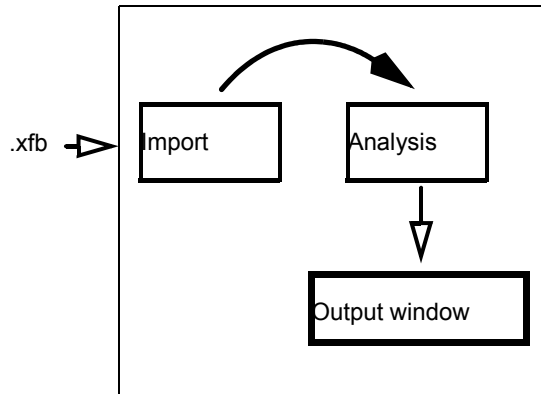
The following diagrams show the technical aspects of the conversion procedure for a PL7 DFB.



The following table describes the different steps involved in semi-automatic conversion.

Step	Description
Conversion	During this phase, the .dfb PL7 source file is converted into a .xfb Unity Pro source file. Any data and warnings relating to the conversion are generated.
Conversion report	A .txt conversion report file is generated. It contains all data and warnings relating to the conversion procedure. Once conversion is complete, the PL7 application converter stops.

The following diagram shows the technical aspects of the procedure for manually importing a converted PL7 DFB into a Unity Pro application.



The following table describes the different steps in the manual import procedure.

Step	Description
Import	In order for the converted .xfb source file to be exploitable by Unity Pro, it must be manually imported into a Unity Pro application.
Analysis	The imported file is analyzed by Unity Pro. Any conversion errors are detected. Note: You must manually launch this analysis phase.
Output window	Any conversion errors are shown in the output window (See <i>End of the analysis procedure, p. 42</i>) which is automatically displayed at the end of analysis.

Conversion to Unity V2.0

At a Glance

The conversion of a PL7 application to a Unity Pro project may be achieved from version 4.3 of PL7.

However, you can convert V4.4 PL7 applications to Unity Pro V1.0 or to Unity V2.0.

For the conversion of a V4.4 PL7 to Unity Pro V1.0:

- If the functionalities or modules do not exist in V1.0, they will be indicated and not acknowledged in the new Unity project.
- If all functionalities or modules are available in Unity V1.0, the conversion is performed normally.

For a V4.4 PL7 conversion to Unity Pro V2.0, the new functionalities and new modules are converted. The following paragraphs describe the new features and conversion rules to be used.

Fipio Applications

The PL7 applications containing the functionalities that implement a Fipio bus are converted from V4.3 or V4.4 PL7 to V2.0 Unity Pro.

The Fipio I/O objects are converted in line with the new topological addressing rule (See *Remote Fipio bus objects*, p. 83).

Lexium EF

PL7 applications containing Lexium EFs LXM_SAVE and LXM_RESTORE (See *Exchange Instructions*, p. 109) are converted from V4.3 or V4.4 PL7 to V2.0 Unity Pro.

Note: These EFs are used as part of applications that implement Lexium controllers on a Fipio bus.

TSX WMY 100 Module

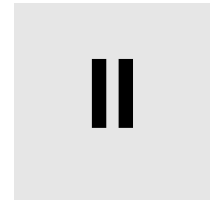
PL7 V4.3 service pack 1 is used in the TSX WMY 100 module. Applications containing this module are converted from PL7 V4.3 service pack 1 to Unity Pro V2.0.

CANopen Applications

PL7 applications containing CANopen functionalities are converted to Unity Pro V2.0, according to the following rules:

- Only the TSX CPP 110 card is available using Unity Pro V2.0,
 - A PL7 application containing a TSX CPP 110 card is entirely converted in Unity Pro V2.0,
 - For PL7 applications containing a TSX CPP 100 card, the TSX CPP 100 card is replaced using Unity Pro with a TSX CPP 110 card, and you must check or modify the .CO configuration file of the CANopen bus for this to be implemented with a TSX CPP 110 card.
-

PL7 application conversion procedure



At a Glance

Subject of this Part

This part presents the different steps involved in converting a PL7 application or PL7 DFB into Unity Pro.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
2	Conversion of a PL7 application	25
3	Conversion of a PL7 DFB	31
4	Analysis of a PL7 application converted into Unity Pro	39

Conversion of a PL7 application



At a Glance

Subject of this Chapter

This chapter describes the procedure for converting a complete PL7 application into a Unity Pro application.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General	26
Procedure for Converting a PL7 Application into a Unity Pro Application	28
Results of the PL7 application conversion	30

General

Introduction

Converting a PL7 application into a Unity Pro application requires the following:

- the application to be saved using PL7 V4.3 software,
 - a level **TSX 300 4** application processor,
 - the application, as well as the sections, functional modules and DFBs it contains to be unprotected,
 - the application source file to be exported and saved.
-

Update


All PL7 applications earlier than version 4.0 must be updated, before being converted into a Unity Pro application. To update a PL7 application, execute the following actions running PL7 V4.3.

Step	Action
1	Choose the Open command from the File menu.
2	Select the hard disk and/or directory containing the file to be opened.
3	Select the file to be opened; the name of this file then appears in the File Name field.
4	Confirm with Open .
5	In the Application Browser , double-click on the Configuration directory.
6	Double-click on the Hardware configuration sub-directory. Result: The Configuration screen appears.
7	Select a version TSX 300 3 processor that is compatible with your application from the drop-down menu in the top left-hand corner of the Configuration screen. Result: The Change Processor screen appears.
8	Confirm your selection with OK .
9	Select the Save command from the File menu.

Disabling the protection

To deactivate the protection of a PL7 application, execute the following actions running PL7 V4.3:

Step	Action
1	Select the Properties command from the Edit menu.
2	Select the Protection tab.
3	In the Application field, uncheck the Global application protection checkbox.
4	In the Sections field, check Protection deactivated .
5	Confirm with OK . The confirmation is only effective once the password is entered.

CAUTION	
	<p>Incomplete procedure</p> <p>If a PL7 application to be converted contains DFBs whose protection cannot be disabled (See <i>Disabling the protection</i>, p. 33), the converter converts neither the DFB declaration nor the calls from the DFB in the application.</p> <p>The networks containing the call from a protected DFB are not converted: an error message is displayed in the output window (See <i>"Convertor" message in the analysis procedure</i>, p. 43).</p> <p>In the conversion report file, the list of protected DFBs whose codes have not been able to be converted is provided.</p>
	<p>Failure to follow this precaution can result in injury or equipment damage.</p>

Exporting the source file

To export a PL7 application, execute the following actions running PL7 V4.3:

Step	Action
1	Select the Export application command from the File menu.
2	Select the disk and/or directory where the file must be stored.
3	Enter the file name in the Name field.
4	Confirm with Save .

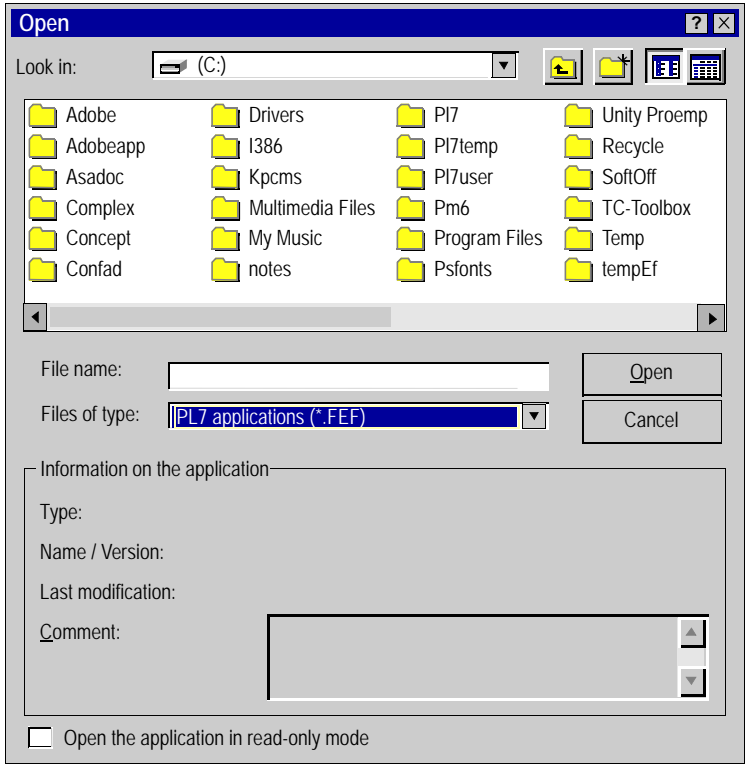
Procedure for Converting a PL7 Application into a Unity Pro Application

Introduction

The PL7 application converter is built into the Unity Pro software. The application to be converted is accessible using the command **File** → **Open**, which allows you to start the conversion.

Conversion Procedure

The following table describes the procedure for converting a PL7 application into a Unity Pro application.

Step	Action
1	Choose the Open command from the File menu.
2	In the Files of type field, select the type .fef (PL7 applications). 
3	Choose the hard drive and/or the directory containing the file to be converted.
4	Select the file (.fef) to be opened (and therefore converted). The name of this file then appears in the File name field.

Step	Action
5	Confirm with Open . Result: The conversion procedure is then started. The status bar shows how the procedure is progressing.
6	After the automatic import phase, you must start the analysis procedure (See <i>Analysis of a PL7 application converted into Unity Pro, p. 39</i>) manually in order to check the syntax of your application. Note: If during the import or analysis phase an output window (See <i>End of the analysis procedure, p. 42</i>) is displayed on the screen, this means that there are conversion errors. In this case, correct these errors (See <i>"Convertor" message in the analysis procedure, p. 43</i>).

Results of the PL7 application conversion

Introduction

The results of the conversion of a PL7 application into a Unity Pro application are described in the following paragraphs.

Results

At the end of the conversion procedure, there are two possible scenarios:

- the application has been correctly converted,
- conversion errors have been generated.

If the application has been correctly converted, it is displayed on screen and may be saved in Unity Pro application format (.stu file).

In the event of conversion errors, you must manually correct the application in order for it to be exploitable. The output window (See *End of the analysis procedure, p. 42*), which can be used to manually correct these errors, is automatically displayed on the screen.

Note: the converted PL7 application may be saved in Unity Pro application format (.stu) even if conversion errors have not been corrected. If this is the case, the next time the application is opened, you must first launch an **Analysis** of the application, in order to display the output window on the screen (See *Manual analysis procedure, p. 41*).

Note: conversion errors appear in the report but not concerning errors not related to the program (e.g. an incomplete configuration in the FEF) are listed in a section located at the start of the master task.

Conversion of a PL7 DFB

3

At a Glance

Subject of this Chapter

This chapter describes the procedure for converting a PL7 DFB into Unity Pro.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General	32
Procedure for converting a PL7 DFB into Unity Pro	35
Conversion of Protected DFBs	36
Procedure for importing a PL7 DFB into Unity Pro	37
Results of the PL7 DFB conversion	38

General

Introduction

Converting a PL7 DFB into Unity Pro requires the following:

- a PL7 V4.3 application,
 - the DFB to be unprotected,
 - the DFB source file to be exported and saved.
-


Update


All PL7 applications earlier than version 4.3 must be updated to V4.3 before being converted into a Unity Pro application (See *Update*, p. 26).

Disabling the protection

To deactivate the protection of a PL7 DFB, execute the following actions running PL7 V4.3:

Step	Action
1	In the application browser, double-click on the DFB type to be unprotected. Result: The DFB type Editor opens the screen for the selected DFB type.
2	Select the Properties command from the Edit menu.
3	Check the Not protected box.
4	Confirm with OK . Note: The confirmation is only effective once the password is entered.

CAUTION	
	<p>Conversion precautions</p> <p>The user's own diagnostics DFBs must be completed manually, after conversion.</p> <p>To complete them:</p> <ul style="list-style-type: none"> ● erase the private variables (ADR_PROG, COMMENT, INST_NAME), ● create two private variables PIN_NB (type INT) and PIN_VAL (type BOOL), ● modify the algorithm of the DFB in order to calculate the values of PIN_NB and PIN_VAL which contain the pin number in error and its expected value, ● modify the call parameters of the EF REGDFB: replace the parameters ADR_PROG, COMMENT, INST_NAME with PIN_NB and PIN_VAL, ● adapt the DFB code. <p>Failure to follow this instruction can result in injury or equipment damage.</p>

	CAUTION
	<p>Conversion precautions</p> <p>The Schneider PL7 Diagnostics DFBs ALRM_DIA, EV_DIA, MV_DIA, NEPO_DIA, TEPO_DIA and SAFETY_MONITOR are automatically converted to Schneider Unity Pro Diagnostics DFBs. It is therefore not necessary to unprotect these DFBs before starting the conversion procedure.</p> <p>The other PL7 diagnostics DFBs are not converted.</p> <p>All Schneider Diagnostics DFBs available using Unity Pro are catalogued in the diagnostics family (See Unity Pro, Standard Block Library Manual, SIN Function) of the diagnostics library.</p> <p>Failure to follow this instruction can result in injury or equipment damage.</p>

Exporting the source file

To export a PL7 DFB, execute the following actions running PL7 V4.3:

Step	Action
1	<ul style="list-style-type: none"> ● To export from the application browser: <ul style="list-style-type: none"> ● select the type of DFB by left-clicking. ● To export from the DFB type editor: <ul style="list-style-type: none"> ● double-click on the DFB type.
2	Select the Export command from the File menu.
3	Select the disk and/or directory where the file must be stored.
4	Enter the file name in the Name field.
5	Confirm with Save .

Procedure for converting a PL7 DFB into Unity Pro

Introduction

The PL7 application converter is built into the Unity Pro software. The DFB to be converted is accessible using the command **File** → **Open**, which allows you to start the conversion.

Conversion procedure

The following table describes the procedure for converting a PL7 DFB into Unity Pro.

Step	Action
1	Choose the Open command from the File menu.
2	In the Files of type field, select the type .dfb (DFB file). <div data-bbox="477 537 1222 1308" style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> </div>
3	Choose the hard drive and/or the directory containing the file to be converted.
4	Select the file (.dfb) to be opened (and therefore converted). The name of the file then appears in the File name field.
5	Confirm with Open .

Step	Action
6	The conversion procedure is then started. The status bar shows how the procedure is progressing.
7	At the end of conversion, a screen appears indicating the end of the procedure.

Conversion of Protected DFBs

Procedure

If you have sold protected DFBs to your customers, you must use the following procedure to convert them from PL7 to Unity Pro.

Step	Action
1	In PL7 clear the code for your protected DFBs.
2	Unprotect your DFBs.
3	Send your customers the unprotected DFBs (without the code) and ask them to replace the protected DFBs in their PL7 applications by these unprotected DFBs.
4	Ask your customers to convert their applications from PL7 to Unity Pro.
5	Convert your DFBs (with the code) and protect them.
6	Send them to your customers.
7	Ask your customers to update the unprotected DFBs with the protected DFBs containing the code.

Procedure for importing a PL7 DFB into Unity Pro

Introduction

When a PL7 DFB is converted into Unity Pro, you must manually launch the import and analysis operations that follow conversion.

Import procedure

The following table describes the procedure for initializing the import and analysis of a PL7 DFB converted into Unity Pro.

Step	Action
1	Open a Unity Pro application.
2	Select the Import command from the File menu.
3	Select the hard disk and/or directory containing the file to be imported.
4	Select the file to be imported. The name of this file then appears in the File name field.
5	Confirm with Open , which launches the import procedure.
6	When the screen indicating the end of the import procedure is displayed, select the Analyse command from the Build menu, which launches the analysis procedure.
7	Should any conversion errors occur, the output window (See <i>End of the analysis procedure</i> , p. 42) is displayed on the screen, allowing you to correct them.

Results of the PL7 DFB conversion

Introduction

The results of the conversion of a PL7 DFB into Unity Pro are described in the following paragraphs.

Results

At the end of the conversion procedure, there are two possible scenarios:

- the DFB has been correctly converted,
- conversion errors have been generated.

If the DFB has been correctly converted, it may be used in a Unity Pro application and saved in the application format (.stu file).

In the event of conversion errors, you must manually correct the DFB in order for it to be exploitable. The output window (See *End of the analysis procedure, p. 42*), which can be used to manually correct these errors, is automatically displayed on the screen at the end of the analysis procedure.

Note: The Unity Pro application containing the converted DFB may be saved in .stu format even if the DFB conversion errors have not been corrected. If this is the case, the next time the application is opened, you must first launch (See *Manual analysis procedure, p. 41*) an **Analysis** of the application, in order to display the output window on the screen.

Analysis of a PL7 application converted into Unity Pro

4

At a Glance

Subject of this Chapter

This chapter presents the analysis phase of a PL7 application converted into Unity Pro.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
General	40
Analysis Procedure	41
End of the analysis procedure	42
"Convertor" message in the analysis procedure	43
Miscellaneous errors in the analysis procedure	44

General

Introduction The analysis allows the detection of errors generated in the application during conversion

Analysis During the analysis phase, the following errors are detected:

- syntax errors,
- semantic errors,
- missing program parts,
- objects that have no Unity Pro equivalent,
- graphic objects or Grafcet drawings that have no Unity Pro equivalent,
- other errors (EFs developed by the user, etc.)

Output window All types of error detected during the analysis phase are automatically shown on the screen in the output window.

Errors necessitating manual correction are signaled by the message "Converror".

This message, which appears in inverted commas in the output window allows you to directly access the part of the program to be corrected by a left double click.

Analysis Procedure

Introduction The analysis procedure must be manually launched after the automatic import phase.

Manual analysis procedure The following table describes the procedure for manually running the analysis phase.

Step	Action
1	Select the Analyse command from the Build menu, which launches the analysis procedure.
2	Should any conversion errors occur, an output window is displayed on the screen, allowing you to correct them.

End of the analysis procedure

Introduction

The procedure of analyzing a PL7 application or a PL7 DFB converted into Unity Pro ends when the output window is displayed on the screen.

End of analysis

Once the analysis procedure is over, there are two possible scenarios:

- the output window contains "Convertor" messages: in order for the converted application or DFB to be exploitable, you must manually correct these conversion errors (See "*Convertor*" message in the analysis procedure, p. 43),
- the output window does not contain "Convertor" messages: the converted application or DFB is directly exploitable for compilation and transfer to the PLC.

Note: At any time during the manual correction of the converted PL7 application or PL7 DFB, you may save the application in Unity Pro format (.stu file). If this is the case, the next time the application is opened, you must first launch an **Analysis** of the application, (See *Manual analysis procedure*, p. 41) in order to display the output window on the screen.

"Convertor" message in the analysis procedure

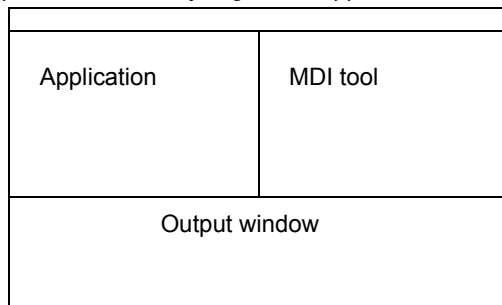
Introduction

The `Convertor` message appears in the output window if:

- you have to correct the errors resulting from the conversion,
- you have to complete missing programming parts.

Illustration

The following diagram shows the Unity Pro software screen at the end of the procedure of analyzing a PL7 application or a converted PL7 DFB.



Description

The following table describes the various parts of the Unity Pro screen.

Part	Description
Application	Browser of the converted PL7 application or the Unity Pro application into which you are importing the converted PL7 DFB.
Output window	Window containing all conversion or analysis error messages.
"Convertor"	Message displayed if you have to manually correct part of the program of the converted application or DFB. By double-clicking on the left button of the mouse on the word "Convertor", you access the MDI tool.
MDI tool	The part of the program to be corrected associated with the "Convertor" message is displayed in the field. You can correct the error directly in the MDI tool using Unity Pro commands.

Miscellaneous errors in the analysis procedure

Introduction

Conversion error messages are normally displayed in the output window. The following paragraphs contain examples of these errors.

User-developed EFs

If the PL7 application to be converted contains EFs developed by the user with **TLX L SDKC PL7 41M** software, the converter does not recognize them and therefore cannot convert them. A warning message is then displayed in the conversion report file and in the output window.

Availability of EFs

During the conversion of an EF, the converter does not guarantee the availability of the equivalent Unity Pro EF. In the event that, after converting the EF from the PL7 library, the equivalent EF is missing from the Unity Pro library, a conversion error is displayed. A warning message is then displayed in the conversion report file and in the output window.

Correspondence between PL7 and Unity Pro



At a Glance

Subject of this Part

This part contains the tables of correspondence between PL7 programming and its Unity Pro equivalent, as well as the equivalence tables for hardware devices (processor + memory card).

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
5	Inter-platform equivalence	47
6	Correspondence between application structures	53
7	Correspondences between common language elements	59
8	Correspondences between ladder language elements	127
9	Correspondences between Structured Text language elements	133
10	Correspondences between Instruction List language elements	137
11	Correspondences between Grafcet language elements	143
12	Other correspondences between PL7 and Unity Pro elements	147

Inter-platform equivalence

5

At a Glance

Subject of this Chapter

This chapter contains the hardware equivalence tables (processor + memory card).

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Premium processors	48
Atrium Processors	51

Premium processors

Introduction

The PL7 application converter ensures that the converted application is operational by providing a table of correspondences between the original processor and the updated processor.

Each processor is associated with an equivalent processor. If the original processor is equipped with a memory card (with or without data storage), the equivalent processor will also be equipped with the same type of card, except for the few specific cases indicated in the legend of the following table.

**Processor
Equivalence**

The following table indicates the equivalence between original processors and updated processors.

Original processor	Processor: upgrade to be performed using PL7 V4	Updated processor	Action performed
TSX P57 10/102	TSX P 57103 (1)	TSX P57 104	Processor replaced
T PMX P57 10/102	TSX P 57203 (2)	TSX P57 204	Processor replaced
TSX P57 103 (1)	Not necessary	TSX P57 104	Processor replaced
TSX P57 153 (1)	Not necessary	TSX P57 154	Processor replaced
TSX P57 20/202	TSX P 57203 (2)	TSX P57 204	Processor replaced
TSX P57 252	TSX P 57253 (2)	TSX P57 254	Processor replaced
T PMX P57 202	TSX P 57203	TSX P57 204	Processor replaced
TSX P57 203 (1)	Not necessary	TSX P57 203 with new OS	Processor version updated
TSX P57 253 (1)	Not necessary	TSX P57 253 (2) with new OS	Processor version updated
TSX P57 2623 (1)	Not necessary	TSX P57 2623 with a new OS, identified by Unity as a TSX P57 2634	Processor version updated
TSX P57 30/302	TSX P 57303 (1) (2)	TSX P57 304	Processor replaced
TSX P57 352	TSX P 57353 (1) (2)	TSX P57 354	Processor replaced
T PMX P57 352	TSX P 57353 (1)	TSX P57 354	Processor replaced
TSX P57 303 (1)	Not necessary	TSX P57 303 with new OS	Processor version updated
TSX P57 353 (1)	Not necessary	TSX P57 353 with new OS	Processor version updated
TSX P57 3623 (1)	Not necessary	TSX P57 3623 with a new OS, identified by Unity as a TSX P57 3634	Processor version updated
TSX P57 402	TSX P 57453 (1)	TSX P57 454	Processor replaced
TSX P57 452	TSX P 57453 (1)	TSX P57 454	Processor replaced
T PMX P57 452	TSX P 57453 (1)	TSX P57 454	Processor replaced
TSX P57 453 (1)	Not necessary	TSX P57 454	Processor replaced
Legend:			
(1)	Processors that do not accept 160K-word cards. Using PL7, 57 1** type processors do not accept memory cards greater than 64K words.		
(2)	These processors require two slot spaces, whereas the initial processors using PL7 require only one.		

Note: Processors **TSX P57 2823** and **TSX P57 4823** are not converted. You must therefore adapt your configuration using PL7 in order to convert it into Unity Pro.

Memory card equivalence

For all processors except those indicated (1) in the above table, the cartridge correspondence is as follows:

Memory card using PL7	Corresponding memory card using Unity Pro
None	None
32 K words	96 K bytes
64 K words	192 K bytes
128 K words	384 K bytes
128 K words + Storage	768 K bytes
160 K words	448 K bytes
160 K words + Storage	1000 K bytes
256 K words	768 K bytes
256 K words + Storage	2000 K bytes
384 K words	2000 K bytes
512 K words + Storage	2000 K bytes

Atrium Processors

Introduction

The PL7 application converter ensures that the converted application is operational by providing a table of correspondence between the original processor and the updated processor.

Each processor is associated with an equivalent processor. If the original processor is equipped with a memory card (with or without data storage), the equivalent processor will also be equipped with the same type of card, except for the few specific cases indicated in the legend of the following table.

Processor Equivalence

The following table indicates the equivalence between original processors and updated processors.

Original processor	Processor: upgrade to be performed running PL7 V4	Updated processor	Action performed
T PCX 57 1012	T PCX 57 203	TSX PCI 57 204	Processor replaced
T PCX 57 203	Not necessary	TSX PCI 57 204	Processor replaced
T PCX 57 3512	T PCX 57 353	TSX PCI 57 354 (2)	Processor replaced
T PCX 57 353 (1)	Not necessary	TSX PCI 57 354 (2)	Processor replaced
Key:			
(1)	Processors that do not accept 160K-word cards.		
(2)	These processors are available for Unity Pro versions higher than V1.0.		

**Memory Card
Equivalence**

For all processors except those indicated (1) in the above table, the cartridge correspondence is as follows:

Memory card using PL7	Corresponding memory card using Unity Pro
None	None
32 K words	96 K bytes
64 K words	192 K bytes
128 K words	384 K bytes
128 K words + Storage	768 K bytes
160 K words	448 K bytes
160 K words + Storage	1,000 K bytes
256 K words	768 K bytes
256 K words + Storage	2,000 K bytes
384 K words	2,000 K bytes
512 K words + Storage	2,000 K bytes

Correspondence between application structures

6

At a Glance

Subject of this Chapter

This chapter contains the tables of correspondence between PL7 and Unity Pro application structures.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
6.1	Correspondences between PL7 and Unity Pro: structural elements	54
6.2	Correspondences between PL7 and Unity Pro: functional modules	57

6.1 Correspondences between PL7 and Unity Pro: structural elements

At a Glance

Subject of this Section

This section contains the tables of correspondence between PL7 application structure elements and their Unity Pro equivalents.

PL7 application structure elements are divided into three categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),
- those that have no Unity Pro equivalent (status: deleted).

Note: if a PL7 element has no Unity Pro correspondence, a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Section?

This section contains the following topics:

Topic	Page
Tasks, events, and SRs	55
The sections	56

Tasks, events, and SRs

Introduction Conversion replaces PL7 tasks EVT and SR by their Unity Pro equivalents.

Tasks, EVTi, SR The following table describes any correspondence and differences between the EVT and SR tasks in PL7 and Unity Pro.

	PL7	Unity Pro	Status
MAST task	Cyclic or periodic	Cyclic or periodic	Converted
FAST task	Periodic	Periodic	Converted
Event processing: EVTi	The number of events available depends on the processor	The number of events available depends on the processor	Converted
	The system words manage the events	The system words manage the events	Converted (1)
	MASKEVT UNMASKEVT	MASKEVT UNMASKEVT	Converted (2)
EVTi: priority level	Priority level management	Priority level management	Converted
Subroutines: SRi	SRi	SR Section	Modified (3)
Legend:			
(1)	The same system objects exist in Unity Pro (See <i>System objects</i> , p. 69).		
(2)	The same EFs exist in Unity Pro (See <i>Other instructions</i> , p. 112).		
(3)	The SR name is modified but the operation remains the same. In Unity Pro, the SRi becomes an SR section named SRi().		

The sections

Introduction Conversion replaces PL7 section characteristics by their Unity Pro equivalents.

Sections The following table describes any correspondence and differences between PL7 and Unity Pro section characteristics.

		PL7	Unity Pro	Status
Sections		Yes	Yes	Converted
Activation condition		Yes	Yes	Converted
Objects (1)		%Si %Mi %MWi : Xj %SWi : Xj %KWi : Xj %Mi [%MWj] %Mi [%SWj] %Mi [%KWj] ...	Equivalent Unity Pro objects	Modified (2)
Protection of sections		Write Read/Write None	Write Read/Write None	Converted
Section attributes				
Long name		16 characters	≥ 16 characters	Modified (3)
Short name		8 characters	≥ 8 characters	Modified
Comment		250 characters	256 characters	Modified
Number of sections in ...	MAST, FAST, AUXi	4096	No limitation	Modified
	EVT	1	1	Converted
	DFB	1	≥ 1	Modified
	SR	1	1	Converted
Language		LD, ST, IL	LD, ST, IL	Converted
Legend:				
(1)		Objects that define the execution condition of a section.		
(2)		The PL7 application converter replaces these objects by their Unity Pro equivalents (See <i>Correspondences between PL7 and Unity Pro: language objects</i> , p. 64).		
(3)		The section name cannot already be used to define one of the variables of the application.		

6.2 Correspondences between PL7 and Unity Pro: functional modules

Functional modules

Introduction Conversion replaces PL7 functional module characteristics by their Unity Pro equivalents.

Functional modules The following table describes any correspondence and differences between PL7 and Unity Pro functional module characteristics.

		PL7	Unity Pro	Status	
Functional modules		Yes	Yes	Converted	
Nesting of functional modules		No limitation	No limitation	Converted	
Comment		0..127 characters	0..255 characters	Modified	
Size of description file		No limitation	No limitation	Converted	
Maximum capacity of a functional module	Number of functional modules	No limitation	No limitation	Converted	
	Number of sections	LD, ST, IL	No limitation	No limitation	Converted
		Grafcet	1	No limitation	Modified (1)
	Number of events in a section	No limitation	No limitation	Converted (2)	
	Number of macro steps:	Limited by the processor	None	Deleted (1)	
	Number of animation tables	No limitation	No limitation	Converted	
	Number of runtime screens	No limitation	No limitation	Converted	
Legend:					
(1)	The PL7 application converter does not convert all types of functional modules (See <i>Functional modules, p. 152</i>).				
(2)	The possible programming languages are the following: <ul style="list-style-type: none"> ● LD, ST, IL 				

Correspondences between common language elements

7

At a Glance

Subject of this Chapter

This chapter contains the tables of correspondences between the objects, instructions and SFBs common to the different languages.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
7.1	Correspondences between PL7 and Unity Pro: types and tables	60
7.2	Correspondences between PL7 and Unity Pro: language objects	64
7.3	Correspondences between PL7 and Unity Pro: instructions	87
7.4	Correspondences between PL7 and Unity Pro: SFBs	118

7.1 Correspondences between PL7 and Unity Pro: types and tables

At a Glance

Subject of this Section

This section contains the tables of correspondence between PL7 types and tables and their Unity Pro equivalents.

PL7 types and tables are divided into two categories :

- those that remain unchanged and are translated automatically (status: converted),
 - those that have a Unity Pro equivalent and are translated automatically (status: modified).
-

What's in this Section?

This section contains the following topics:

Topic	Page
Types and tables	61
Operations between mixed types	63

Types and tables

Introduction Conversion replaces the PL7 types and tables by their Unity Pro equivalent.

Types The following table describes any correspondence and differences between PL7 and Unity Pro types.

	PL7	Unity Pro	Status
Type	BOOL	BOOL	Converted
	EBOOL	EBOOL	Converted
	WORD	INT	Modified (1)
	DWORD	DINT	Modified (1)
	REAL	REAL	Converted
Legend:			
(1)	The WORD and DWORD types are converted into INT and DINT types (See <i>Types</i> , p. 155).		

Tables The following table describes any correspondence and differences between PL7 and Unity Pro tables.

	PL7	Unity Pro	Status
Table	Boolean table (EBOOL) %Mi:n	ARRAY [0..n-1] OF EBOOL	Modified (1)
	Word table (WORD) %MWi:n	ARRAY [0..n-1] OF EBOOL	Modified (1)
	Table of double words (DWORD) %MDi:n	ARRAY [0..n-1] OF DINT	Modified (1)
	Floating point table (REAL) %MFi:n	ARRAY [0..n-1] OF REAL	Modified (1)
	Bytes table %MBi:n	STRING [n]	Modified (1)
Legend:			
(1)	The converter modifies the declaration (See <i>Tables</i> , p. 155).		

Specific types and tables

The following table describes any correspondence and differences between specific PL7 and Unity Pro types and tables.

	PL7	Unity Pro	Status
Type	The TIME, DATE and TOD formats are double words (DWORD).	DINT	Modified (1)
Table	The DTformat is a table of 4 words %MWi : 4.	ARRAY[0..3] OF INT	Modified (1)
Legend:			
(1)	WORD and DWORD types are converted into INT and DINT types (See <i>Specific types and tables</i> , p. 155).		

Operations between mixed types

Introduction

Operations between mixed types are not always possible in Unity Pro. Conversion replaces these PL7 operations by their Unity Pro equivalent.

Mixed types

The following table describes any correspondence and differences between operations between mixed types.

Operations	PL7	Unity Pro	Status
Between words and double words (indexed or not) Between a word table and a double word table	Yes	No	Modified (1)
Between 2 word or double word tables	Yes	Yes	Converted (2)
Between word and double word tables and words or double words	Yes	No	Modified (3)
Assignment of a bit table into another bit table	Yes	Yes	Converted
Assignment of a word or double word table into a bit table	Yes	No	Modified (4)
Legend:			
(1)	Operations between words and double words are not possible in Unity Pro (See <i>Words and double words</i> , p. 156).		
(2)	This type of operations is possible in Unity Pro (See <i>Table instructions</i> , p. 101).		
(3)	Operations between word or double word tables and words or double words are not possible in Unity Pro (See <i>Tables and (double) words</i> , p. 156).		
(4)	The assignment of a word or double word table into a bit table is not possible in Unity Pro (See <i>Assignment of tables</i> , p. 156).		

7.2 Correspondences between PL7 and Unity Pro: language objects

At a Glance

Subject of this Section

This section contains the tables of correspondences between PL7 language objects and their Unity Pro equivalent.

The PL7 objects are split into three categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),
- those that have no Unity Pro equivalent (status: deleted).

Note: if a PL7 object has no Unity Pro correspondence, a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Section?

This section contains the following topics:

Topic	Page
Immediate values	65
Labels	68
System objects	69
Memory objects (variables and constants)	71
Word bits	74
Symbolized tables and indexed objects	75
SFBs	79
In-rack Input/Output objects	81
Remote input/output objects	83
Grafcet objects	85

Immediate values

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

Immediate values The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status	
	Syntax	Type of data	Syntax	Type of data		
Boolean	FALSE/TRUE	BOOL	0/1 or FALSE/TRUE	BOOL	Converted	
Decimal integer (base 10)	1234	WORD	1234	INT	Converted	
Long decimal integer (base 10)	123456	DWORD	123456	DINT	Converted	
Base 2 integer	2#x... (1...16 figures)	WORD	If 2#x ... ≤ +32767	2#x...	INT	Modified
			If 2#x ... > +32767	decimal value (1)		
Base 2 long integer	2#x... (17...32 figures)	DWORD	If 2#x ... ≤ +2147483647	2#x...	DINT	Modified
			If 2#x ... > +2147483647	decimal value (1)		
Base 16 integer	16#x... (1...4 figures)	WORD	If 16#x ... ≤ +32767	2#x...	INT	Modified
			If 16#x ... > +32767	decimal value (1)		
Base 16 long integer	16#x... (5...8 figures)	DWORD	If 16#x ... ≤ +2147483647	2#x...	DINT	Modified
			If 16#x ... > +2147483647	decimal value (1)		
Real	-1.32e-12	REAL	-1.32e-12	REAL	Converted	
Character string	' aAbBcC'	STRING	' aAbBcC'	STRING	Converted	
Network address	ADR#... (2)	AR_W:6	ADDR (2)	ARRAY OF INT	Modified	
Legend:						
(1)	This decimal value may be negative if the sign bit is equal to 1. (See <i>Integer and long integer words</i> , p. 158)					
(2)	See table below.					

Network address The following table describes any correspondence and differences between PL7 and Unity Pro network address objects.

PL7		Unity Pro	
Syntax	Type of data	Syntax (1)	Type of data
ADR#xy.i.e ADR#2.1.3	AR_W:6	ADDR('r.m.c.d') ADDR('0.2.1.3')	ARRAY OF INT
ADR#xy.i.SYS ADR#102.1.SYS	AR_W:6	ADDR('r.m.c.SYS') ADDR('1.2.1.SYS')	ARRAY OF INT
ADR#xy.SYS ADR#102.SYS	AR_W:6	ADDR('r.m.SYS') ADDR('1.2.SYS')	ARRAY OF INT
ADR#SYS	AR_W:6	ADDR('SYS')	ARRAY OF INT
ADR#APP	AR_W:6	ADDR('APP')	ARRAY OF INT
ADR#\xy.i.c\SYS ADR#\4.0.23\SYS	AR_W:6	ADDR('\b.e\SYS') ADDR('\4.23\SYS') (2)	ARRAY OF INT
ADR#{r.s}xy.i.e ADR#{2.4}2.1.3	AR_W:6	ADDR('{n.s}r.m.c.d') ADDR('{2.4}0.2.1.3')	ARRAY OF INT
ADR#{r.s}xy.i.SYS ADR#{2.4}102.1.SYS	AR_W:6	ADDR('{n.s}r.m.c.SYS') ADDR('{2.4}1.2.1.SYS')	ARRAY OF INT
ADR#{r.s}xy.SYS ADR#{2.4}102.SYS	AR_W:6	ADDR('{n.s}r.m.SYS') ADDR('{2.4}1.2.SYS')	ARRAY OF INT
ADR#{r.s}SYS ADR#{2.4}SYS	AR_W:6	ADDR('{n.s}SYS') ADDR('{2.4}SYS')	ARRAY OF INT
ADR#{r.s}APP ADR#{4}APP	AR_W:6	ADDR('{n.s}APP') ADDR('{4}APP')	ARRAY OF INT
ADR#{r.s}APP.num, ADR#{2.4}APP.0	AR_W:6	ADDR('{n.s}APP.num'), ADDR('{2.4}APP.0')	ARRAY OF INT
ADR#{r.s}\xy.i.c\SYS ADR#{2.4}\4.0.23\SYS	AR_W:6	ADDR('{n.s}\b.e\SYS') ADDR('{2.4}\4.23\SYS') (2)	ARRAY OF INT

Legend:		
(1)		The address ADR# is replaced by an EF (See <i>Network address words</i> , p. 158).
(2)		The converter selects the bus number.
PL7	Unity Pro	
x	r	Rack.
y	m	Position in the rack (module).
i	c	Channel.
e	d	Data. Operational if equal to zero.
c	e	Connection point (equipment).
r	n	Network. Operational if equal to zero.
s	s	Station.
num	num	SFB.
-	b	Bus.

Labels

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

Labels The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Program label	%Li (1)	label	Li	label	Modified
DFB label	Identifier	label	Identifier	label	Converted
Legend:					
(1)	i = 0...999.				

System objects

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

System objects The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
System bit	%Si (1)	EBOOL	%Si or %SXi	BOOL	Converted
System word	%SWi (1)	WORD	%SWi	INT	Converted
Real-time clock system word	%SW50:4	AR_W	%SW50:4	ARRAY [0..3] OF INT at %SW50	Converted
System double word	%SDi	DWORD	%SDi	DINT	Converted
Legend:					
(1)	See table below.				

System bits and words

The following table describes any correspondence and differences between PL7 and Unity Pro bits and system words.

	PL7	Unity Pro	Status
	Syntax	Syntax	
System bits	%S36	-	Deleted
	%S37	-	
	%S95	-	
System words	%SW160	%SW76	Modified
	%SW161	%SW77	
	%SW162	%SW78	
Grafcet system bits	%S21	SGT_21	Modified (1)
	%S22	SGT_22	
	%S23	SGT_23	
	%S24	SGT_24	
	%S25	-	Deleted
	%S26	-	
Grafcet system words	%SW20	-	Deleted
	%SW21	-	
	%SW22	SWG_T_22	Modified (1)
	%SW23	SWG_T_23	
	%SW24	SWG_T_24	
	%SW25	SWG_T_25	
	%SW125	-	Deleted
	%SW126	-	
%SW127	-		
Legend:			
(1)	Grafcet system bits and words are replaced in Unity Pro by equivalent EFs (See <i>Correspondences between Grafcet language elements</i> , p. 143).		

Note: all other system bits and words are converted.

Memory objects (variables and constants)

Introduction

Conversion replaces the PL7 objects by their Unity Pro equivalent.

Memory objects

The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Internal bits	%Mi	EBOOL	%Mi or %Mxi	EBOOL	Converted
	%Mi [%MWj]	EBOOL	%Mi [%MWj]	EBOOL	
	%Mi [%KWj]	EBOOL	%Mi [%KWj]	EBOOL	
	%Mi [n]	EBOOL	%Mi [n]	EBOOL	
	%Mi :L	AR_X	%Mi :L	ARRAY OF EBOOL	
Internal words	%MWi	WORD	%MWi	INT	Converted
	%MWi [%MWj]	WORD	%MWi [%MWj]	INT	
	%MWi [%KWj]	WORD	%MWi [%KWj]	INT	
	%MWi [n]	WORD	%MWi [n]	INT	
	%MWi :L	AR_W	%MWi :L	ARRAY OF INT	
	%MWi [%MWj] :L	AR_W	%MWi [%MWj] :L	ARRAY OF INT	
	%MWi [%KWj] :L	AR_W	%MWi [%KWj] :L	ARRAY OF INT	
	%MWi [n] :L	AR_W	%MWi [n] :L	ARRAY OF INT	

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Internal double words	%MDi	WORD	%MDi	DINT	Converted
	%MDi [%MWj]	DWORD	%MDi [%MWj]	DINT	
	%MDi [%KWj]	DWORD	%MDi [%KWj]	DINT	
	%MDi [n]	DWORD	%MDi [n]	DINT	
	%MDi :L	AR_D	%MDi :L	ARRAY OF DINT	
	%MDi [%MWj] :L	AR_D	%MDi [%MWj] :L	ARRAY OF DINT	
	%MDi [%KWj] :L	AR_D	%MDi [%KWj] :L	ARRAY OF DINT	
	%MDi [n] :L	AR_D	%MDi [n] :L	ARRAY OF DINT	
Internal reals	%MFi	REAL	%MFi	REAL	Converted
	%MFi [%MWj]	REAL	%MFi [%MWj]	REAL	
	%MFi [%KWj]	REAL	%MFi [%KWj]	REAL	
	%MFi [n]	REAL	%MFi [n]	REAL	
	%MFi :L	AR_R	%MFi :L	ARRAY OF REAL	
Constant words	%KWi	WORD	%KWi	INT	Converted
	%KWi [%MWj]	WORD	%KWi [%MWj]	INT	
	%KWi [%KWj]	WORD	%KWi [%KWj]	INT	
	%KWi [n]	WORD	%KWi [n]	INT	
	%KWi :L	AR_W	%KWi :L	ARRAY OF INT	
	%KWi [%MWj] :L	AR_W	%KWi [%MWj] :L	ARRAY OF INT	
	%KWi [%KWj] :L	AR_W	%KWi [%KWj] :L	ARRAY OF INT	
	%KWi [n] :L	AR_W	%KWi [n] :L	ARRAY OF INT	

		PL7		Unity Pro		Status
		Syntax	Type of data	Syntax	Type of data	
Constant double words		%KDi	WORD	%KDi	DINT	Converted
		%KDi [%MWj]	DWORD	%KDi [%MWj]	DINT	
		%KDi [%KWj]	DWORD	%KDi [%KWj]	DINT	
		%KDi [n]	DWORD	%KDi [n]	DINT	
		%KDi:L	AR_D	%KDi:L	ARRAY OF DINT	
		%KDi [%MWj]:L	AR_D	%KDi [%MWj]:L	ARRAY OF DINT	
		%KDi [%KWj]:L	AR_D	%KDi [%KWj]:L	ARRAY OF DINT	
		%KDi [n]:L	AR_D	%KDi [n]:L	ARRAY OF DINT	
Constant reals		%KFi	REAL	%KFi	REAL	Converted
		%KFi [%MWj]	REAL	%KFi [%MWj]	REAL	
		%KFi [%KWj]	REAL	%KFi [%KWj]	REAL	
		%KFi [n]	REAL	%KFi [n]	REAL	
		%KFi:L	AR_R	%KFi:L	ARRAY OF REAL	
Common words	network No. 0	%NW{j}k (1)	WORD	%NWs.d	INT	Modified
	other networks	%NW{i.j}k (1)	WORD	%NWn.s.d	INT	Modified
Variable-type character string		%MBi:L	STRING (2)	xxx_L:String[L]	STRING	Modified
Constant-type character string		%KBi:L	STRING (2)	xxx_L:String[L]	STRING	Modified
Legend:						
(1)		PL7	Unity Pro			
		i	n	network number.		
		j	s	station number.		
		k	d	word number.		
(2)		Objects %MBi:L and %KBi:L are replaced by a character string (See <i>Memory objects (variables and constants)</i> , p. 159).				

Word bits

Introduction

Conversion replaces the PL7 objects by their Unity Pro equivalent.

Word bits

The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Bit j j = 1..15	%SWi:Xj	BOOL	%SWi.j	BOOL	Converted (1)
	%MWi:Xj	BOOL	%MWi.j	BOOL	
	%MWi[%MWj]:Xj	BOOL	%MWi[%MWj].j	BOOL	
	%MWi[%KWj]:Xj	BOOL	%MWi[%KWj].j	BOOL	
	%MWi[n]:Xj	BOOL	%MWi[n].j	BOOL	
	%KWi:Xj	BOOL	%KWi.j	BOOL	
	%KWi[%MWj]:Xj	BOOL	%KWi[%MWj].j	BOOL	
	%KWi[%KWj]:Xj	BOOL	%KWi[%KWj].j	BOOL	
	%KWi[n]:Xj	BOOL	%KWi[n].j	BOOL	
	%NW{r.s}k:Xj	BOOL	%NWn.s.d.j	BOOL	
	%NW{s}k:Xj	BOOL	%NWs.d.j	BOOL	
@ = input/output addresses (2)	%IW@:Xj	BOOL	%IW@.j	BOOL	Modified
	%QW@:Xj	BOOL	%QW@.j	BOOL	
	%MW@:Xj	BOOL	%MW@.j	BOOL	
	%KW@:Xj	BOOL	%KW@.j	BOOL	
Legend:					
(1)	The syntax of the bits extracted into Unity Pro is modified. (See <i>Extracted bit</i> , p. 160)				
(2)	The address @ has been replaced by the PL7 converter: <ul style="list-style-type: none"> ● conversion of local addresses (See <i>In-rack Input/Output objects</i>, p. 81), ● conversion of remote addresses (See <i>Remote input/output objects</i>, p. 83). 				

Symbolized tables and indexed objects

Introduction

Conversion replaces the PL7 objects by their Unity Pro equivalent.

Tables of memory and constant objects

The following table describes any correspondence and differences between the symbolized tables of PL7 and Unity Pro memory and constant objects.

	PL7		Unity Pro		Status
	Address	Associated symbol	Address	Associated variable (1)	
Tables of memory and constant objects	%MWi:L	TABA:L	%MWi:L	TABA_L	Modified (2)
	%MDi:L	TABB:L	%MDi:L	TABB_L	
	%Mi:L	TABC:L	%Mi:L	TABC_L	
	%MFi:L	TABD:L	%MFi:L	TABD_L	
	%KWi:L	TABE:L	%MWi:L	TABE_L	
	%KDi:L	TABF:L	%MDi:L	TABF_L	
	%KFi:L	TABG:L	%MFi:L	TABG_L	
Legend:					
(1)	In Unity Pro, a variable is associated with each symbolized table (See <i>Symbolized tables, p. 161</i>).				
(2)	The table is declared from [0..L-1], its type and location depending on the address. Example: %MWi:L, declared in PL7 as TABA:L, is converted into TABA_L. TABA_L is therefore a declared table from [0..L-1], of type INT, located at %MWi and with the same comment as TABA.				

I/O object tables The following table describes any correspondence and differences between the symbolized tables of PL7 and Unity Pro input/output objects.

	PL7		Unity Pro		Status
	Address	Associated symbol	Address	Associated variable (1)	
I/O object tables	%I@:L	TABA:L	%I@:L	TABA_L	Modified (2)
	%IW@:L	TABB:L	%IW@:L	TABB_L	
	%Q@:L	TABC:L	%Q@:L	TABC_L	
	%QW@:L	TABD:L	%QW@:L	TABD_L	
Legend:					
@	Addressing of the in-rack (See <i>In-rack Input/Output objects</i> , p. 81) and/or remote (See <i>Remote input/output objects</i> , p. 83) input/output objects.				
(1)	In Unity Pro, a variable is associated with each symbolized table (See <i>Symbolized tables</i> , p. 161).				
(2)	The table is declared from [0..L-1], its type and location depending on the address. Example: %I@:L, declared in PL7 as TABA:L, in converted into TABA_L. TABA_L is therefore a declared table from [0..L-1], of type EBOOL, located at %I@ and with the same comment as TABA.				

Indexed memory and constant objects

The following table describes any correspondence and differences between PL7 and Unity Pro symbolized indexed memory and constant objects.

	PL7		Unity Pro		Status
	Address	Associated symbol	Address	Associated variable (1)	
Indexed memory and constant objects	%MWi [j]	TABA [j]	%MWi [j]	TABA_AR [j]	Modified (2)
	%MDi [j]	TABB [j]	%MDi [j]	TABB_AR [j]	
	%Mi [j]	TABC [j]	%Mi [j]	TABC_AR [j]	
	%MFi [j]	TABD [j]	%MFi [j]	TABD_AR [j]	
	%KWi [j]	TABE [j]	%KWi [j]	TABE_AR [j]	
	%KDi [j]	TABF [j]	%KDi [j]	TABF_AR [j]	
	%KFi [j]	TABG [j]	%KFi [j]	TABG_AR [j]	
Legend:					
(1)	In Unity Pro, a variable is associated with each indexed symbolized object (See <i>Symbolized indexed objects</i> , p. 161).				
(2)	The table is declared from [0..NbMaxMW-i-1], its type and location depending on the address. Example: %MWi [j], declared in PL7 as TABA [j], is converted into TABA_AR [j]. TABA_AR [j] is therefore a declared table from [0..NbMaxMW-i-1], of type INT, located at %MWi and with the same comment as TABA.				

Indexed I/O objects

The following table describes any correspondence and differences between PL7 and Unity Pro symbolized indexed input/output objects.

	PL7		Unity Pro		Status
	Address	Associated symbol	Address (1)	Associated variable	
Indexed I/O objects	%I@[j]	TABA[j]	%I@[j]	-	Modified
	%IW@[j]	TABB[j]	%IW@[j]	-	
	%Q@[j]	TABC[j]	%Q@[j]	-	
	%QW@[j]	TABD[j]	%QW@[j]	-	
Legend:					
@	Addressing of the in-rack (See <i>In-rack Input/Output objects</i> , p. 81) and/or remote (See <i>Remote input/output objects</i> , p. 83) input/output objects.				
(1)	Indexed input/output objects are converted into their non-symbolized form (address) (See <i>Symbolized indexed objects</i> , p. 161).				

SFBs

Introduction

Conversion replaces the PL7 objects by their Unity Pro equivalent.

SFB

The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax (1)	Type of data	
PL7_3 Timer (2)	%Ti	T	Ident	EFB (PL7_TIMER)	Modified
current value word	%Ti.V	WORD	Ident.ET	INT	
preset value word	%Ti.P	WORD	Ident.PT	INT	
elapsed timer bit	%Ti.D	BOOL	Ident.D	BOOL	
current timer bit	%Ti.R	BOOL	Ident.R	BOOL	
PL7 Timers (2)	%Tmi	TM	Ident	EFB (PL7_TON, PL7_TOF, PL7_TP)	Modified
current value word	%Tmi.V	WORD	Ident.ET	INT	
preset value word	%Tmi.P	WORD	Ident.PT	INT	
current timer bit	%Tmi.Q	BOOL	Ident.Q	BOOL	
Monostable (2)	%Mni	M	Ident	EFB (PL7_MONOSTABLE)	Modified
current value word	%Mni.V	WORD	Ident.ET	INT	
preset value word	%Mni.P	WORD	Ident.PT	INT	
current timer bit	%Mni.R	BOOL	Ident.R	BOOL	
Up/down counter	%Ci	C	Ident	EFB (PL7_COUNTER)	Modified
current value word	%Ci.V	WORD	Ident.CV	INT	
preset value word	%Ci.P	WORD	Ident.PV	INT	
upcounting overrun bit	%Ci.E	BOOL	Ident.E	BOOL	
standby preset bit	%Ci.D	BOOL	Ident.D	BOOL	
downcounting overrun bit	%Ci.F	BOOL	Ident.F	BOOL	

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax (1)	Type of data	
Register	%Ri	R	Ident	EFB (PL7_REGISTER_32, PL7_REGISTER_255)	Modified
input word	%Ri.I	WORD	Ident.INW	INT	
output word	%Ri.O	WORD	Ident.OUTW	INT	
full register bit	%Ri.F	BOOL	Ident.F	BOOL	
empty register bit	%Ri.E	BOOL	Ident.E	BOOL	
Drum	%DRi	DR	Ident	EFB (PL7_DRUM)	Modified
full drum bit	%DRi.F	BOOL	Ident.F	BOOL	
current step	%DRi.S	WORD	Ident.S	INT	
duration word	%DRi.V	WORD	Ident.V	INT	
i step states	%DRi.Wj j = 0..15	WORD	Ident.Wj	INT	
Legend:					
(1)	The SFBs are replaced in Unity Pro by equivalent EFBs. The PL7 application converter must therefore replace the names of the SFBs with the names of the corresponding EFBs (See <i>Correspondences between PL7 and Unity Pro: SFBs, p. 118</i>).				
(2)	The correspondence between PL7 and Unity Pro for the value of the basic time (TB) is as follows: <ul style="list-style-type: none"> ● 10 ms = 1, ● 100 ms = 2, ● 1 s = 4, ● 1 mn = 8. 				
Ident	EFB instance name.				

In-rack Input/Output objects

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

In-rack I/O objects. The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Channel (Io DTT)	%CHxy.0 %CH3.2	CHANNEL	%CHr.m.c %CH0.3.2		Modified
Inputs %I					
Module or channel fault	%Ixy.i.ERR %I2.3.ERR	BOOL	%Irr.m.c.ERR %I0.2.3.ERR	BOOL	Modified
Bit	%Ixy.i.r %I2.3.1	EBOOL	%Irr.m.c.d %I0.2.3.1	EBOOL	Modified
	%Ixy.i.r[index] %I2.3.1[index]	EBOOL	%Irr.m.c.d[index] %I0.2.3.1[index]	EBOOL	
	%Ixy.i.r:L %I2.3.1:L	AR_X	%Irr.m.c.d:L %I0.2.3.1:L	ARRAY OF EBOOL	
Word	%IWxy.i.r %IW2.3.1	WORD	%IWrr.m.c.d %IW0.2.3.1	INT	Modified
Double word	%IDxy.i.r %ID2.3.1	DWORD	%IDrr.m.c.d %ID0.2.3.1	DINT	Modified
Real	%IFxy.i.r %IF2.3.1	REAL	%IFrr.m.c.d %IF0.2.3.1	REAL	Modified
Outputs %Q					
Bit	%Qxy.i.r %Q2.3.1	EBOOL	%Qrr.m.c.d %Q0.2.3.1	EBOOL	Modified
	%Qxy.i.r[index] %Q2.3.1[index]	EBOOL	%Qrr.m.c.d[index] %Q0.2.3.1[index]	EBOOL	
	%Qxy.i.r:L %Q2.3.1:L	AR_X	%Qrr.m.c.d:L %Q0.2.3.1:L	ARRAY OF EBOOL	
Word	%QWxy.i.r %QW2.3.1	WORD	%QWrr.m.c.d %QW0.2.3.1	INT	Modified

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Double word	%QDxy.i.r %QD2.3.1	DWORD	%QDr.m.c.d %QD0.2.3.1	DINT	Modified
Real	%QFxy.i.r %QF2.3.1	REAL	%QFr.m.c.d %QF0.2.3.1	REAL	Modified
Variables %M					
Word	%MWxy.i.r %MW2.3.1	WORD	%MWr.m.c.d %MW0.2.3.1	INT	Modified
Double word	%MDxy.i.r %MD2.3.1	DWORD	%MDr.m.c.d %MD0.2.3.1	DINT	Modified
Real	%MFxy.i.r %MF2.3.1	REAL	%MFr.m.c.d %MF0.2.3.1	REAL	Modified
Constants %K					
Word	%KWxy.i.r %KW2.3.1	WORD	%KWr.m.c.d %KW0.2.3.1	INT	Modified
Double word	%KDxy.i.r %KD2.3.1	DWORD	%KDr.m.c.d %KD0.2.3.1	DINT	Modified
Real	%KFxy.i.r %KF2.3.1	REAL	%KFr.m.c.d %KF0.2.3.1	REAL	Modified
Character string	%KBxy.i.r:L %KF2.3.4:L	STRING	(1)	STRING	Modified
Legend:					
(1)	The %KBxy.i.r:L and %KF2.3.4:L character strings are replaced by a single character string (See <i>Memory objects (variables and constants)</i> , p. 159).				
PL7	Unity Pro				
x	r	Rack.			
y	m	Position in the rack (module).			
i	c	Channel number.			
r	d	Rank. Optional if equal to zero.			

Remote input/output objects

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

Remote Fipio bus objects The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7	Unity Pro	Status
	Syntax	Syntax	
Remote Fipio bus objects	%I\p.2.c\xy.i.r %I\0.2.34\1.2.1	%I\b.e\r.m.c.d %I\2.34\0.1.2.1 (1)	Modified
Legend:			
(1)	In Unity Pro, the bus identifier has been added. In order to convert Remote Fipio bus objects, the selected b identifier is assigned the value 2.		
PL7	Unity Pro		
p	-	Module address.	
c	e	Connection point.	
i	c	Channel number.	
r	d	Rank.	
-	b	Bus identifier.	
x	r	Rack.	
y	m	Position in the rack.	

Remote AS-i bus objects The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7	Unity Pro	Status
	Syntax	Syntax	
Remote AS-i bus objects	%I\xy.0\n.i %I\104.0\2.3	%I\b.e\r.m.c %I\15.2\0.0.3 (1)	Modified
Legend:			
(1)	In Unity Pro, the bus identifier has been added. In order to convert remote AS-i bus objects, the selected b identifier corresponds to the number of the xy rack/module.		
PL7	Unity Pro		
x	r	Rack.	
y	m	Position in the rack.	
0	-	AS-i channel (the module TSX SAY .100 has only one channel).	
n	e	Slave number.	
i	c	Channel.	
-	b	Bus identifier.	

Grafcet objects

Introduction Conversion replaces the PL7 objects by their Unity Pro equivalent.

Grafcet objects The following table describes any correspondence and differences between PL7 and Unity Pro objects.

	PL7		Unity Pro		Status
	Syntax	Type of data	Syntax	Type of data	
Grafcet objects	%Xi	BOOL	X_i.x	SFCSTEP_STATE	Modified (1)
	%XMj		XM_j.x		
	%Xj.i		X_j_i.x		
	%Xj.IN		X_j_IN.x		
	%Xj.OUT		X_j_OUT.x		
Grafcet objects	%Xi.T	WORD	X_i.t	SFCSTEP_STATE	Modified (1)
	%XMj.T		XM_j.t		
	%Xj.i.T		XM_j_i.t		
	%Xj.IN.T		XM_j_IN.t		
	%Xj.OUT.T		XM_j_OUT.t		
Legend:					
(1)	PL7 steps and macrosteps become, in Unity Pro, structured objects SFCSTEP_STATE. For the activity times of the steps, we advise you to check your program in order to use the TIME type instead of the a whole value, converted into PL7.				

Grafcet words and bits

The following table describes the correspondence and possible differences between Grafcet words and bits.

	PL7	Unity Pro	Status
	Syntax	Syntax	
Indexed Grafcet words and bits	%Xi [%MWj]	%Mi [%MWj]	Modified (1)
	%Xi.T [%MWj]	-	Deleted (2)
Grafcet words and bits table	%Xi:L	%Mi:L	Modified (1)
	%Xi.T:L	-	Deleted (2)
Legend:			
(1)	The objects of steps are no longer contiguous in the memory. Therefore, a set of %Mi objects is assigned by the PL7 application converter to simulate indexed Grafcet words or bits and the tables of Grafcet words or bits.		
(2)	You must replace these objects manually in the program.		

7.3 Correspondences between PL7 and Unity Pro: instructions

At a Glance

Subject of this Section

This section contains the tables of correspondences between PL7 common language instructions and their Unity Pro equivalent.

The PL7 instructions are split into three categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),
- those that have no Unity Pro equivalent (status: deleted).

Note: if a PL7 instruction has no Unity Pro correspondence, a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Section?

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Boolean instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
Operator	:=	:=	Converted
	AND	AND	Converted
	OR	OR	Converted
	XOR	XOR	Converted
	NOT	NOT	Converted
	RE	RE	Modified (1)
	FE	FE	Modified (1)
	SET	SET	Modified (1)
	RESET	RESET	Modified (1)
Legend:			
(1)	Replaced by an EF.		

Comparison instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD)	Unity Pro (INT)	Status
Operator	>	>	Converted
	<	<	Converted
	≤	≤	Converted
	≥	≥	Converted
	=	=	Converted
	≠	≠	Converted

Long integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (DWORD)	Unity Pro (DINT)	Status
Operator	>	>	Converted
	<	<	Converted
	≤	≤	Converted
	≥	≥	Converted
	=	=	Converted
	≠	≠	Converted

Real words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (Floating point)	Unity Pro (REAL)	Status
Operator	>	>	Converted
	<	<	Converted
	≤	≤	Converted
	≥	≥	Converted
	=	=	Converted
	≠	≠	Converted

Bit table instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
Operator: between two bit tables	:=	:=	Converted
Operator: between a bit table and an integer or long integer word	:=	MOVE_INT_AREBOOL MOVE_DINT_AREBOOL	Modified (1)
Operator: between an integer or long integer word and a bit table	:=	MOVE_AREBOOL_INT MOVE_AREBOOL_DINT	Modified (1)
EF	BIT_D	COPY_AREBOOL_ARDINT	Modified (2)
	BIT_W	COPY_AREBOOL_ARINT	Modified (2)
	COPY_BIT	COPY_AREBOOL_AREBOOL	Modified (2)
	D_BIT	COPY_ARDINT_AREBOOL	Modified (2)
	LENGTH_ARX	LENGTH_AREBOOL	Modified (3)
	W_BIT	COPY_ARINT_AREBOOL	Modified (2)
Legend:			
(1)	The operator is replaced by an EF, which depends on the type of operand.		
(2)	The function name is modified, but the operation remains the same except in the case of negative ranks (See <i>Tables: functions, p. 164</i>).		
(3)	The function name is modified but the operation remains the same.		

Arithmetic instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Integer words The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD)	Unity Pro (INT)	Status
Operator	+	+	Converted
	-	-	Converted
	*	*	Converted
	/	/	Converted
	REM	MOD	Modified (1)
EF	SQRT	SQRT_INT	Modified (2)
	ABS	ABS_INT	Modified (2)
Operator	INC	INC_INT	Modified (2)
	DEC	DEC_INT	Modified (2)
	:=	:=	Converted
Legend:			
(1)	The operator name is modified but the operation remains the same.		
(2)	Replaced by an EF whose name depends on the type of data processed.		

Long integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (DWORD)	Unity Pro (DINT)	Status
Operator	+	+	Converted
	-	-	Converted
	*	*	Converted
	/	/	Converted
	REM	MOD	Modified (1)
EF	SQRT	SQRT_DINT	Modified (2)
	ABS	ABS_DINT	Modified (2)
Operator	INC	INC_DINT	Modified (2)
	DEC	DEC_DINT	Modified (2)
	:=	:=	Converted
Legend:			
(1)	The operator name is modified but the operation remains the same.		
(2)	Replaced by an EF whose name depends on the type of data processed.		

Real words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (Floating point)	Unity Pro (REAL)	Status
Operator	+	+	Converted
	-	-	Converted
	*	*	Converted
	/	/	Converted
EF	SQRT	SQRT_REAL	Modified (1)
	ABS	ABS_REAL	Modified (1)
	ACOS	ACOS_REAL	Modified (1)
	ASIN	ASIN_REAL	Modified (1)
	ATAN	ATAN_REAL	Modified (1)
	COS	COS_REAL	Modified (1)
	EXP	EXP_REAL	Modified (1)
	EXPT	EXPT_REAL	Modified (1)
	LN	LN_REAL	Modified (1)
	LOG	LOG_REAL	Modified (1)
SIN	SIN_REAL	Modified (1)	
TAN	TAN_REAL	Modified (1)	
Operator	:=	:=	Converted
Legend:			
(1)	The function name is modified but the operation remains the same.		

Logic instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD)	Unity Pro (INT)	Status
Operator	AND	AND	Converted
	OR	OR	Converted
	XOR	XOR	Converted
	NOT	NOT	Converted

Long integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (DWORD)	Unity Pro (DINT)	Status
Operator	AND	AND	Converted
	OR	OR	Converted
	XOR	XOR	Converted
	NOT	NOT	Converted

Shift instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Integer words The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD)	Unity Pro (INT)	Status
EF	SHL	SHL_INT	Modified (1)
	SHR	SHRZ_INT	Modified (1)
	ROL	ROL_INT	Modified (1)
	ROR	ROR_INT	Modified (1)
	ROLW	ROL_INT	Modified (2)
	RORW	ROR_INT	Modified (2)
	WSHL_RBIT	SHL_RBIT_INT	Modified (2)
	WSHR_RBIT	SHR_RBIT_INT	Modified (2)
	WSHRZ_C	SHRZ_RBIT_INT	Modified (2)
Legend:			
(1)	Replaced by an EF whose name depends on the type of operand.		
(2)	The function name is modified but the operation remains the same.		

Long integer words

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD)	Unity Pro (INT)	Status
EF	SHL	SHL_DINT	Modified (1)
	SHR	SHRZ_DINT	Modified (1)
	ROL	ROL_DINT	Modified (1)
	ROR	ROR_DINT	Modified (1)
	SHL_DWORD	SHL_DWORD	Converted
	SHR_DWORD	SHR_DWORD	Converted
	ROL_DWORD	ROL_DWORD	Converted
	ROR_DWORD	ROR_DWORD	Converted
	DSHL_RBIT	SHL_RBIT_DINT	Modified (2)
	DSHR_RBIT	SHR_RBIT_DINT	Modified (2)
	DSHRZ_C	SHRZ_RBIT_DINT	Modified (2)
	ROLD	ROL_DINT	Modified (2)
	RORD	ROR_DINT	Modified (2)
Legend:			
(1)	Replaced by an EF whose name depends on the type of operand.		
(2)	The function name is modified but the operation remains the same.		

Numerical conversion instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	BCD_TO_INT	BCD_TO_INT	Converted
	INT_TO_BCD	INT_TO_BCD	Converted
	GRAY_TO_INT	GRAY_TO_INT	Converted
	INT_TO_REAL	INT_TO_REAL	Converted
	DINT_TO_REAL	DINT_TO_REAL	Converted
	DINT_TO_DWORD	DINT_TO_DWORD	Converted
	DINT_TO_INT	DINT_TO_INT	Converted
	DINT_TO_WORD	DINT_TO_WORD	Converted
	DWORD_TO_DINT	DWORD_TO_DINT	Converted
	DWORD_TO_INT	DWORD_TO_INT	Converted
	DWORD_TO_WORD	DWORD_TO_WORD	Converted
	INT_TO_DINT	INT_TO_DINT	Converted
	INT_TO_WORD	INT_TO_WORD	Converted
	REAL_TO_DINT	REAL_TO_DINT	Converted
	REAL_TO_INT	REAL_TO_INT	Converted
	WORD_TO_DINT	WORD_TO_DINT	Converted
	WORD_TO_INT	WORD_TO_INT	Converted
	WORD_TO_DWORD	WORD_TO_DWORD	Converted
	TRUNC	REAL_TRUNC_INT REAL_TRUNC_DINT	Modified (1)
DEG_TO_RAD	DEG_TO_RAD	Converted	

	PL7	Unity Pro	Status
EF	RAG_TO_DEG	RAG_TO_DEG	Converted
	CONCATW	INT_AS_DINT	Modified (2)
	DBCD_TO_DINT	DBCD_TO_DINT	Converted
	DBCD_TO_INT	DBCD_TO_INT	Converted
	DINT_TO_DBCD	DINT_TO_DBCD	Converted
	HW	HIGH_INT	Modified (2)
	INT_TO_DBCD	INT_TO_DBCD	Converted
	LW	LOW_INT	Modified (2)
Legend:			
(1)	Replaced by an EF whose name depends on the type of operand.		
(2)	The function name is modified but the operation remains the same.		

Table instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Integer and long integer word tables: instructions

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD or DWORD)	Unity Pro (INT or DINT)	Status
Operator between two tables	:=	:=	Converted
Operator between a table and an integer word or a long integer word	:=	MOVE_INT_ARINT MOVE_DINT_ARDINT	Modified (1)
Operator between two tables	+	EF: ADD_ARINT ADD_ARDINT	Modified (2)
	-	EF: SUB_ARINT SUB_ARDINT	Modified (2)
	*	EF: MUL_ARINT MUL_ARDINT	Modified (2)
	/	EF: DIV_ARINT DIV_ARDINT	Modified (2)
Operator between two tables	REM	EF: MOD_ARINT MOD_ARDINT	Modified (2)
Operator between a table and an integer word or a long integer word	+	EF: ADD_ARINT_INT ADD_ARDINT_DINT	Modified (2)
Operator between a table and an integer word or a long integer word	-	EF: SUB_INT_ARINT SUB_ARINT_INT SUB_DINT_ARDINT SUB_ARDINT_DINT	Modified (1)
Operator between a table and an integer word or a long integer word	*	EF: MUL_ARINT_INT MUL_ARDINT_DINT	Modified (2)

	PL7 (WORD or DWORD)	Unity Pro (INT or DINT)	Status
Operator between a table and an integer word or a long integer word	/	EF: DIV_INT_ARINT DIV_ARINT_INT DIV_DINT_ARDINT DIV_ARDINT_DINT	Modified (1)
Operator between a table and an integer word or a long integer word	REM	EF: MOD_INT_ARINT MOD_ARINT_INT MOD_DINT_ARDINT MOD_ARDINT_DINT	Modified (1)
EF	SUM	SUM_ARINT or SUM_ARDINT	Modified (3)
EF	EQUAL	EQUAL_ARINT or EQUAL_ARDINT	Modified (5)

	PL7 (WORD or DWORD)	Unity Pro (INT or DINT)	Status
EF	FIND_EQD	FIND_EQ_ARDINT	Modified (4)
	FIND_EQDP	FIND_EQP_ARDINT	Modified (5)
	FIND_EQW	FIND_EQ_ARINT	Modified (4)
	FIND_EQWP	FIND_EQP_ARINT	Modified (5)
	FIND_GTD	FIND_GT_ARDINT	Modified (4)
	FIND_GTW	FIND_GT_ARINT	Modified (4)
	FIND_LTD	FIND_LT_ARDINT	Modified (4)
	FIND_LTW	FIND_LT_ARINT	Modified (4)
	LENGTH_ARD	LENGTH_ARDINT	Modified (4)
	LENGTH_ARW	LENGTH_ARINT	Modified (4)
	MAX_ARD	MAX_ARDINT	Modified (4)
	MAX_ARW	MAX_ARINT	Modified (4)
	MIN_ARD	MIN_ARDINT	Modified (4)
	MIN_ARW	MIN_ARINT	Modified (4)
	OCCUR_ARD	OCCUR_ARDINT	Modified (4)
	OCCUR_ARW	OCCUR_ARINT	Modified (4)
	ROL_ARD	ROL_ARDINT	Modified (4)
	ROL_ARW	ROL_ARINT	Modified (4)
	ROR_ARD	ROR_ARDINT	Modified (4)
	ROR_ARW	ROR_ARINT	Modified (4)
SORT_ARD	SORT_ARDINT	Modified (4)	
SORT_ARW	SORT_ARINT	Modified (4)	
Legend:			
(1)	The operator is replaced by an EF, which depends on the type of operand.		
(2)	The operator is replaced by an EF, which depends on the type of operand (See <i>Integer and long integer word tables: instructions, p. 163</i>).		
(3)	Replaced by an EF whose name depends on the type of operand.		
(4)	The function name is modified but the operation remains the same.		
(5)	The function name is modified, but the operation remains the same except in the case of negative ranks (See <i>Tables: functions, p. 164</i>).		

Integer and long integer word tables: logic instructions

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7 (WORD or DWORD)	Unity Pro (INT or DINT)	Status
Operator	NOT	EF: NOT_ARINT NOT_ARDINT	Modified (1)
Operator between two tables	AND	EF: AND_ARINT AND_ARDINT	Modified (1)
	OR	EF: OR_ARINT OR_ARDINT	Modified (1)
	XOR	EF: XOR_ARINT XOR_ARDINT	Modified (1)
Operator between a table and an integer word or a long integer word	AND	EF: AND_ARINT_INT AND_ARDINT_DINT	Modified (1)
Operator between a table and an integer word or a long integer word	OR	EF: OR_ARINT_INT OR_ARDINT_DINT	Modified (1)
Operator between a table and an integer word or a long integer word	XOR	EF: XOR_ARINT_INT XOR_ARDINT_DINT	Modified (1)
Legend:			
(1)	The operator is replaced by an EF, which depends on the type of operand (See <i>Integer and long integer word tables: logic instructions, p. 163</i>).		

Bit tables: logic instructions

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	AND_ARX	AND_AREBOOL	Modified (1)
	NOT_ARX	NOT_AREBOOL	Modified (1)
	OR_ARX	OR_AREBOOL	Modified (1)
	XOR_ARX	XOR_AREBOOL	Modified (1)
Legend:			
(1)	The function name is modified but the operation remains the same.		

Floating point tables: instructions

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
Operator between two tables	:=	:=	Converted
Operator between a table and a real word	:=	MOVE_REAL_ARREAL	Modified (1)
EF	EQUAL_ARR	EQUAL_ARREAL	Modified (3)
	FIND_EQR	FIND_EQ_ARREAL	Modified (2)
	FIND_EQRP	FIND_EQP_ARREAL	Modified (3)
	FIND_GTR	FIND_GT_ARREAL	Modified (2)
	FIND_LTR	FIND_LT_ARREAL	Modified (2)
	LENGTH_ARR	LENGTH_ARREAL	Modified (2)
	MAX_ARR	MAX_ARREAL	Modified (2)
	MIN_ARR	MIN_ARREAL	Modified (2)
	OCCUR_ARR	OCCUR_ARREAL	Modified (2)
	ROL_ARR	ROL_ARREAL	Modified (2)
	ROR_ARR	ROR_ARREAL	Modified (2)
	SORT_ARR	SORT_ARREAL	Modified (2)
	SUM_ARR	SUM_ARREAL	Modified (2)
Legend:			
(1)	The operator is replaced by an EF.		
(2)	The function name is modified but the operation remains the same.		
(3)	The function name is modified, but the operation remains the same except in the case of negative ranks (See <i>Tables: functions, p. 164</i>).		

Character string instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	STRING_TO_INT	STRING_TO_INT	Converted
	STRING_TO_DINT	STRING_TO_DINT	Converted
	INT_TO_STRING	INT_TO_STRING	Converted
	DINT_TO_STRING	DINT_TO_STRING	Converted
	STRING_TO_REAL	STRING_TO_REAL	Converted
	REAL_TO_STRING	REAL_TO_STRING	Converted
Operators	>, <, ≤, ≥, =, ≠	>, <, ≤, ≥, =, ≠	Converted
EF	FIND	FIND_INT	Modified (1)
	EQUAL_STR	EQUAL_STR	Converted
	LEN	LEN_INT	Modified (1)
	MID	MID_INT	Modified (2)
	INSERT	INSERT_INT	Modified (2)
	DELETE	DELETE_INT	Modified (2)
	CONCAT	CONCAT_STR	Modified (1)
	REPLACE	REPLACE_INT	Modified (2)
	LEFT	LEFT_INT	Modified (2)
	RIGHT	RIGHT_INT	Modified (2)
	ROUND	STR_ROUND	Modified (1)
Legend:			
(1)	The function name is modified but the operation remains the same.		
(2)	In order to comply with the IEC standard, the function name is modified and the operation stays the same except in extreme cases. Refer to the documentation on these EF for further details		

Time management instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	RRTC	RRTC	Converted
	WRTC	WRTC	Converted
	PTC	PTC	Converted
	ADD_TOD	ADD_TOD_PL7	Modified (1)
	ADD_DT	ADD_DT_PL7	Modified (1)
	DELTA_TOD	DELTA_TOD	Converted
	DELTA_D	DELTA_D	Converted
	DELTA_DT	DELTA_DT	Converted
	SUB_TOD	SUB_TOD_PL7	Modified (1)
	SUB_DT	SUB_DT_PL7	Modified (1)
	DAY_OF_WEEK	DAY_OF_WEEK	Converted
	TRANS_TIME	TRANS_TIME	Converted
	DATE_TO_STRING	DATE_DINT_TO_STRING	Modified (1)
	TOD_TO_STRING	TOD_DINT_TO_STRING	Modified (1)
	DT_TO_STRING	DT_ARINT_TO_STRING	Modified (1)
TIME_TO_STRING	TIME_DINT_TO_STRING	Modified (1)	
	SCHEDULE	SCHEDULE	Converted
Legend:			
(1)	The function name is modified but the operation remains the same.		

Exchange Instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction List The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	READ_STS	READ_STS	Modified (1)
	WRITE_CMD	WRITE_CMD	Modified (1)
	READ_PARAM	READ_PARAM	Modified (1)
	WRITE_PARAM	WRITE_PARAM	Modified (1)
	RESTORE_PARAM	RESTORE_PARAM	Modified (1)
	SAVE_PARAM	SAVE_PARAM	Modified (1)
	SMOVE	SMOVE	Modified (1)
	XMOVE	XMOVE	Modified (1)
	LXM_SAVE	LXM_SAVE	Modified (1)(2)
	LXM_RESTORE	LXM_RESTORE	Modified (1)
Key:			
(1)	The function is replaced by an EF. The parameters are entered between brackets (example: <code>READ_STS (%CH0 . 4 . 0)</code>).		
(2)	The order of the function parameters has been modified (See <i>Process control, Other and Communication instructions, p. 165</i>).		

Input/output instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	MOD_CAM	MOD_CAM	Modified (1)
	MOD_PARAM	MOD_PARAM	Modified (1)
	MOD_TRACK	MOD_TRACK	Modified (1)
	TRF_RECIPE	TRF_RECIPE	Modified (1)
	DETAIL_OBJECT	DETAIL_OBJECT	Modified (1)
Legend:			
(1)	The function is replaced by an EF. The parameters are entered between brackets (example: MOD_CAM (%CH0.2.0, 1, 2, 9)).		

Process control instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	PID	PID_INT	Modified (1)
	PID_MMI	-	Deleted
	PWM	PWM_INT	Modified (1)
	SERVO	SERVO_INT	Modified (1)
Legend:			
(1)	The function name is modified: its operation remains the same but the order of its parameters has been changed (See <i>IN</i> , <i>OUT</i> , <i>INOUT</i> parameters, p. 165).		

Other instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	FTOF	FTOF	Modified (1)
	FTON	FTON	Modified (1)
	FTP	FTP	Modified (1)
	SCOUNT	SCOUNT	Modified (1)
	MASKEVT	MASKEVT	Converted (2)
	UNMASKEVT	UNMASKEVT	Converted (2)
	FPULSOR	FPULSOR	Modified (1)
	READ_PCMCIA	READ_PCMCIA	Modified (3)
	READ_PCMEXT	READ_PCMCIA	Modified (4)
	SET_PCMCIA	SET_PCMCIA	Modified (3)
	SET_PCMEXT	SET_PCMCIA	Modified (4)
	WRITE_PCMCIA	WRITE_PCMCIA	Modified (3)
	WRITE_PCMEXT	WRITE_PCMCIA	Modified (4)
Legend:			
(1)	The order of the function parameters has been modified (See <i>IN</i> , <i>OUT</i> , <i>INOUT parameters</i> , p. 165).		
(2)	In Unity Pro, the operation and comparison blocks of Instruction List language written in Structured Text language (See <i>IL extensions</i> , p. 142) are not converted. Consequently, the MASKEVT and UNMASKEVT instructions located in one of these blocks are not converted.		
(3)	The function name remains the same but a parameter is added in the first position. When the call is made the value 0 must be entered in this parameter.		
(4)	The function name is modified but the operation remains the same.		

Communication instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	CALL_MODEM	CALL_MODEM	Converted
	CANCEL	CANCEL	Converted
	DATA_EXCH	DATA_EXCH	Modified (1)
	INPUT_CHAR	INPUT_CHAR	Modified (1)
	OUT_IN_CHAR	OUT_IN_CHAR	Modified (1)
	PRINT_CHAR	PRINT_CHAR	Modified (1)
	RCV_TLG	RCV_TLG	Modified (1)
	READ_ASYN	READ_ASYN	Modified (1)
	READ_GDATA	READ_GDATA	Modified (1)
	READ_VAR	READ_VAR	Modified (1)
	ROR1_ARB	ROR1_ARB	Converted
	SEND_REQ	SEND_REQ	Modified (1)
	SEND_TLG	SEND_TLG	Converted
	SERVER	UNITE_SERVER	Modified (1) (2)
	SWAP	SWAP_ARINT	Modified (2)
WRITE_ASYN	WRITE_ASYN	Converted	
WRITE_GDATA	WRITE_GDATA	Converted	
WRITE_VAR	WRITE_VAR	Converted	

Legend:

(1)	The order of the function parameters has been modified (See <i>IN</i> , <i>OUT</i> , <i>INOUT</i> parameters, p. 165).
(2)	The function name is modified but the operation remains the same.

TCP Open instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list: TCPIP_LEVEL1

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	FCT_ACCEPT	-	Deleted
	FCT_BIND	-	Deleted
	FCT_LISTEN	-	Deleted
	FCT_RECEIVE	-	Deleted
	FCT_SELECT	-	Deleted
	FCT_CONNECT	FCT_CONNECT	Converted
	FCT_SEND	-	Deleted
	FCT_SHUTDOWN	-	Deleted
	FCT_SOCKET	-	Deleted
	FCT_SETSOCKOPT	-	Deleted

Instruction list: TCPIP_DFB

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	FCT_ACCEPT_DFB	FCT_ACCEPT	Modified (1)
	FCT_BIND_DFB	FCT_BIND	Modified (1)
	FCT_LISTEN_DFB	FCT_LISTEN	Modified (1)
	FCT_RECEIVE_DFB	FCT_RECEIVE	Modified (1)
	FCT_SELECT_DFB	FCT_SELECT	Modified (1)
	FCT_SEND_DFB	FCT_SEND	Modified (1)
	FCT_SHUTDOWN_DFB	FCT_SHUTDOWN	Modified (1)
	FCT_SOCKET_DFB	FCT_SOCKET	Modified (1)
	FCT_SETSOCKOPT_DFB	FCT_SETSOCKOPT	Modified (1)
Legend:			
(1)	The function name is modified but the operation remains the same.		

Diagnostics instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	DEREG	DEREG	Converted
	REGDFB	REGDFB	Modified (1)
	REGIO	-	Deleted
Legend:			
(1)	The function interface is modified. You must modify this function manually (See <i>General</i> , p. 32) before launching the conversion procedure.		

Grafcet instructions

Introduction

Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list

The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	RESET_XIT	-	Deleted

Human Machine Interface (HMI) instructions

Introduction Conversion replaces the PL7 instructions by their Unity Pro equivalent.

Instruction list The following table describes any correspondence and differences between PL7 and Unity Pro instructions.

	PL7	Unity Pro	Status
EF	ADJUST	No equivalent	Deleted
	ASK_MSG		
	ASK_VALUE		
	ASSIGN_KEYS		
	CONTROL_LEDS		
	DISPLAY_ALARM		
	DISPLAY_GRP		
	DISPLAY_MSG		
	GET_MSG		
	GET_VALUE		
	PANEL_CMD		
	SEND_ALARM		
	SEND_MSG		

7.4 Correspondences between PL7 and Unity Pro: SFBs

At a Glance

Aim of this sub-section

In Unity Pro, SFBs are replaced by equivalent EFBs (state: converted); SFB instances are also converted automatically.

Example: the SFB %Ti is translated by an EFB of instance name Ti and type PL7_3_TIMER.

This sub-section therefore contains the tables showing correspondence between SFBs and EFBs.

Note: where a PL7 SFB has no correspondence in Unity Pro, a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Section?

This section contains the following topics:

Topic	Page
Types of Unity Pro EFB instances	119
Call of an SFB in structured text	120
Call of an SFB in instruction list language	121
Call of an SFB in ladder language	123

Types of Unity Pro EFB instances

Introduction

Whatever the language used, each SFB instance is converted into an EFB instance.

Types of instances

The following table shows the types of instances

SFB		Types of Unity Pro instances
%T		PL7_3_TIMER
%TM	TON	PL7_TON
	TOF	PL7_TOF)
	TP	PL7_TP
%C		PL7_COUNTER
%MN		PL7_MONOSTABLE
%R	$\%Ri.L \leq 32$	PL7_REGISTER_32
	$32 < \%Ri.L \leq 255$	PL7_REGISTER_255
%DR		PL7_DRUM
Key:		
(1)	The PL7_DRUM EFB contains an extra output parameter (See <i>Types of Unity Pro EFB instances</i> , p. 167) compared with the PL7 %DR instance type.	

Call of an SFB in structured text

Introduction The conversion automatically replaces SFBs with equivalent EFBs, insofar as these exist.

Call of an SFB in ST The following table describes the correspondence and possible differences between SFBs and EFBs.

		PL7	Unity Pro	State	
SFB	%T	START %Ti STOP %Ti PRESET %Ti	START_PL7_3_TIMER(Ti) STOP_PL7_3_TIMER(Ti) PRESET_PL7_3_TIMER(Ti)	Converted	
SFB	%TM	TON	START_PL7_TON(TMi) DOWN_PL7_TON(TMi)	Converted	
		TOF	START_PL7_TOF(TMi) DOWN_PL7_TOF(TMi)		
		TP	START_PL7_TP(TMi) DOWN_PL7_TP(TMi)		
SFB	%C	RESET %Ci PRESET %Ci UP %Ci DOWN %Ci	RESET_PL7_COUNTER(Ci) PRESET_PL7_COUNTER(Ci) UP_PL7_COUNTER(Ci) DOWN_PL7_COUNTER(Ci)	Converted	
SFB	%MN	START %MNi	START_PL7_MONOSTABLE(MNi)	Converted	
SFB	%R	%Ri.L ≤ 32	RESET %Ri PUT %Ri GET %Ri	RESET_PL7_REGISTER_32(Ri) PUT_PL7_REGISTER_32(Ri) GET_PL7_REGISTER_32(Ri)	Converted
		32 < %Ri.L ≤ 255	RESET %Ri PUT %Ri GET %Ri	RESET_PL7_REGISTER_255(Ri) PUT_PL7_REGISTER_255(Ri) GET_PL7_REGISTER_255(Ri)	
SFB	%DR	RESET %DRi	RESET_PL7_DRUM(DRi) WORD_TO_BIT (INT_TO_WORD (DRi.W), list of 16 DRUM output objects) (1)	Converted	
		UP %DRi	UP_PL7_DRUM(DRi) WORD_TO_BIT (INT_TO_WORD (DRi.W), list of 16 DRUM output objects) (1)		
		%DRi:S=number _of_step	FSSTEP_PL7_DRUM (number_of_step, DRi)		
Key:					
(1)	The precise syntax of the EFB is given in the following sections (See <i>Types of Unity Pro EFB instances</i> , p. 167).				

Call of an SFB in instruction list language

Introduction

The conversion automatically replaces SFBs with equivalent EFBs, insofar as these exist.

Call of an SFB in IL

The following table describes the correspondence and possible differences between SFBs and EFBs.

		PL7	Unity Pro	State
SFB	%T	Not used in instruction list language	-	-
SFB	%TM	TON	IN %T <i>M</i> _{<i>i</i>} ST TEMPBOOL CAL T <i>M</i> _{<i>i</i>} (IN:=TEMPBOOL)	Converted
		TOF	IN %T <i>M</i> _{<i>i</i>} ST TEMPBOOL CAL T <i>M</i> _{<i>i</i>} (IN:=TEMPBOOL)	
		TP	IN %T <i>M</i> _{<i>i</i>} ST TEMPBOOL CAL T <i>M</i> _{<i>i</i>} (IN:=TEMPBOOL)	
SFB	%C	R %C <i>i</i>	ST TEMPBOOL CAL C <i>i</i> (CU:=0, CD:=0, R:=TEMPBOOL, LD:=0)	Converted
		LD %C <i>i</i>	ST TEMPBOOL CAL C <i>i</i> (CU:=0, CD:=0, R:=0, LD:=TEMPBOOL)	
		CU %C <i>i</i>	ST TEMPBOOL CAL C <i>i</i> (CU:=TEMPBOOL, CD:=0, R:=0, LD:=0)	
		CD %C <i>i</i>	ST TEMPBOOL CAL C <i>i</i> (CU:=0, CD:=TEMPBOOL, R:=0, LD:=0)	
SFB	%MN	S %M <i>N</i> _{<i>i</i>}	ST TEMPBOOL CAL M <i>N</i> _{<i>i</i>} (S:=TEMPBOOL)	Converted

Correspondences between common language elements

			PL7	Unity Pro	State
SFB	%R	%Ri.L ≤ 32	R %Ri	ST TEMPBOOL CAL Ri (R:=TEMPBOOL, I:=0, O:=0)	Converted
			I %Ri	ST TEMPBOOL CAL Ri (R:=0, I:=TEMPBOOL, O:=0)	
	O %Ri	ST TEMPBOOL CAL Ri (R:=0, I:=0, O:=TEMPBOOL)			
32 < %Ri.L ≤ 255	R %Ri	ST TEMPBOOL CAL Ri (R:=TEMPBOOL, I:=0, O:=0)			
		I %Ri	ST TEMPBOOL CAL Ri (R:=0, I:=TEMPBOOL, O:=0)		
		O %Ri	ST TEMPBOOL CAL Ri (R:=0, I:=0, O:=TEMPBOOL)		
SFB	%DR		R %DRi	ST TEMPBOOL CAL DRi (R:=TEMPBOOL, U:=0) (1)	Converted
			U %DRi	ST TEMPBOOL CAL DRi (R:=0, U:=TEMPBOOL) (1)	
Key:					
(1)	You must also assign the values of the current step to the DRUM output objects (See <i>Types of Unity Pro EFB instances</i> , p. 167).				

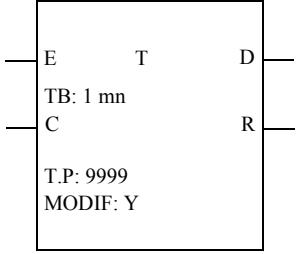
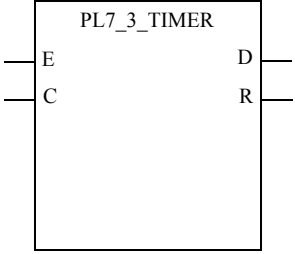
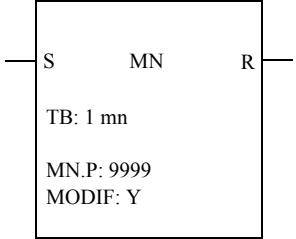
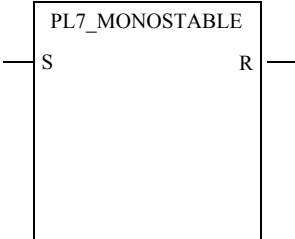
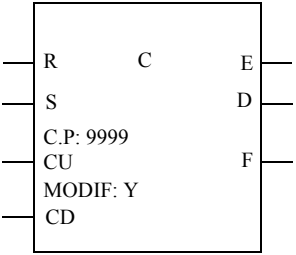
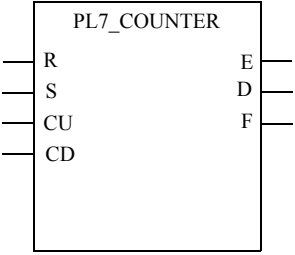
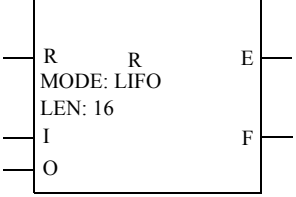
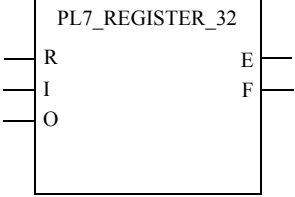
Note: reversible SFBs (BLK, END_BLK) are not converted; a warning and a conversion error message are generated (See *Analysis*, p. 40).

Call of an SFB in ladder language

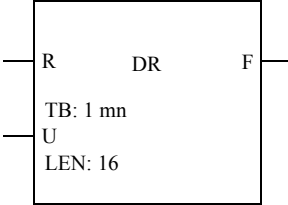
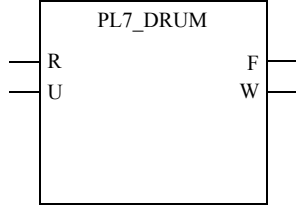
Introduction The conversion automatically replaces SFBs with equivalent EFBs, insofar as these exist.

Call of an SFB in Ladder The following table describes the correspondence and possible differences between SFBs and EFBs.

		PL7	Unity Pro	State
SFB	PL7 Timer	<p style="text-align: center;">%TM10</p>	<p style="text-align: center;">TOF_Timer_1</p>	Modified (1)
		<p style="text-align: center;">%TM10</p>	<p style="text-align: center;">TON_Timer_1</p>	
		<p style="text-align: center;">%TM10</p>	<p style="text-align: center;">TP_Timer_1</p>	

		PL7	Unity Pro	State
SFB	PL7_3 Timer	<p style="text-align: center;">%T0</p>  <p>The diagram shows a rectangular box representing a timer. On the left side, there are two input lines labeled 'E' (top) and 'C' (bottom). On the right side, there are two output lines labeled 'D' (top) and 'R' (bottom). Inside the box, the text reads: 'TB: 1 mn', 'T.P: 9999', and 'MODIF: Y'.</p>	<p>PL7_3_Timer_1</p>  <p>The diagram shows a rectangular box representing a timer. On the left side, there are two input lines labeled 'E' (top) and 'C' (bottom). On the right side, there are two output lines labeled 'D' (top) and 'R' (bottom). Inside the box, the text reads: 'PL7_3_TIMER'.</p>	Modified (1)
SFB	PL7 Monostable	<p style="text-align: center;">%MN0</p>  <p>The diagram shows a rectangular box representing a monostable timer. On the left side, there is one input line labeled 'S'. On the right side, there is one output line labeled 'R'. Inside the box, the text reads: 'TB: 1 mn', 'MN.P: 9999', and 'MODIF: Y'.</p>	<p>Mn_1</p>  <p>The diagram shows a rectangular box representing a monostable timer. On the left side, there is one input line labeled 'S'. On the right side, there is one output line labeled 'R'. Inside the box, the text reads: 'PL7_MONOSTABLE'.</p>	Modified (1)
SFB	PL7 Counter	<p style="text-align: center;">%C0</p>  <p>The diagram shows a rectangular box representing a counter. On the left side, there are four input lines labeled 'R' (top), 'S', 'CU', and 'CD' (bottom). On the right side, there are three output lines labeled 'E' (top), 'D', and 'F' (bottom). Inside the box, the text reads: 'C.P: 9999', 'MODIF: Y'.</p>	<p>Counter_1</p>  <p>The diagram shows a rectangular box representing a counter. On the left side, there are four input lines labeled 'R' (top), 'S', 'CU', and 'CD' (bottom). On the right side, there are three output lines labeled 'E' (top), 'D', and 'F' (bottom). Inside the box, the text reads: 'PL7_COUNTER'.</p>	Modified (1)
SFB	PL7 Register	<p style="text-align: center;">%R1</p>  <p>The diagram shows a rectangular box representing a register. On the left side, there are three input lines labeled 'R' (top), 'I', and 'O' (bottom). On the right side, there are two output lines labeled 'E' (top) and 'F' (bottom). Inside the box, the text reads: 'MODE: LIFO', 'LEN: 16'.</p>	<p>R_1</p>  <p>The diagram shows a rectangular box representing a register. On the left side, there are three input lines labeled 'R' (top), 'I', and 'O' (bottom). On the right side, there are two output lines labeled 'E' (top) and 'F' (bottom). Inside the box, the text reads: 'PL7_REGISTER_32'.</p>	Modified (1)

(2)

		PL7	Unity Pro	State
SFB	PL7 Drum	<p style="text-align: center;">%DR0</p> 	<p>PL7_Drum_1</p>  <p>(3)</p>	Modified (1)
Key:				
(1)	The PL7 SFBs are converted into Unity Pro EFBs.			
(2)	Depending on the register length (See <i>Types of instances, p. 119</i>), can be converted into <code>PL7_REGISTER_255</code> .			
(3)	You must also assign the values of the current step to the DRUM output objects (See <i>Types of Unity Pro EFB instances, p. 167</i>).			

Correspondences between ladder language elements

8

At a Glance

Subject of this Chapter

This chapter contains the tables of correspondence between ladder language elements

The PL7 ladder language elements are divided into two categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
The definition of a ladder network	128
The rungs	129
Coils	130
Operate and compare blocks	131
Conversion restrictions: PL7 ladder language	132

The definition of a ladder network

Introduction

Conversion replaces the PL7 ladder language elements by their Unity Pro equivalent.

Definition of a ladder network

The following table describes any correspondence and differences between PL7 and Unity Pro ladder language objects.

	PL7	Unity Pro	Status
Label	%Li	Li	Modified
Comment	Network comment	Network comment	Converted

The rungs

Introduction Conversion replaces the PL7 ladder language elements by their Unity Pro equivalent.

Rungs The following table describes any correspondence and differences between PL7 and Unity Pro ladder language graphic objects.

Type of rung	PL7 Graphic representation	Unity Pro Graphic representation	Status
Direct	-- --	-- --	Converted
Reverse	-- / --	-- / --	Converted
Rising edge	-- P --	-- P --	Converted
Falling edge	-- N --	-- N --	Converted

Coils

Introduction

The conversion replaces the PL7 ladder language elements with their Unity Pro equivalent.

Coils

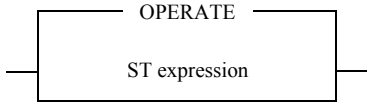
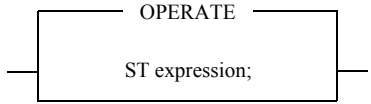
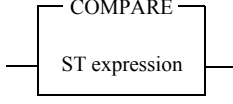
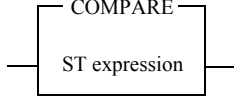
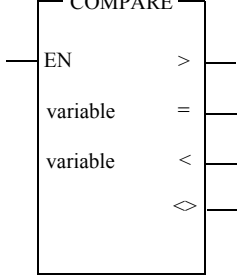
The following table describes the correspondence and possible differences between PL7 and Unity Pro graphic objects.

	PL7 Graphical representation	Unity Pro Graphical representation	State
Direct coil	--()--	--()--	Converted
Negated coil	--(/)--	--(/)--	Converted
Set coil	--(S)--	--(S)--	Converted
Reset coil	--(R)--	--(R)--	Converted
Jumps to a label	-->>%Li	-->>Li	Converted
Subroutine return	--<RETURN>--	--<RETURN>--	Converted
Program halt coil	--<HALT>--	EF	Modified (1)
Coil #	--(#)--	--(name)--	Modified (2)
SR call coil	--(C)--	EF	Modified (1)
Key:			
(1)	The coil is replaced by an EF.		
(2)	The coil # is replaced by a direct coil with the transition name ^(name) superimposed.		

Operate and compare blocks

Introduction The conversion replaces the PL7 ladder language elements with their Unity Pro equivalent.

Operate and compare blocks The following table describes the correspondence and possible differences between PL7 and Unity Pro ladder language graphic objects.

	PL7 Graphical representation	Unity Pro Graphical representation	State
Operate block			Modified (1)
Horizontal compare block			Converted
Vertical compare block		EF	Modified (2)
Key:			
(1)	A semi-colon is added to the end of the ST expression.		
(2)	The operate block is replaced by an EF.		

Conversion restrictions: PL7 ladder language

Conversion of blocks

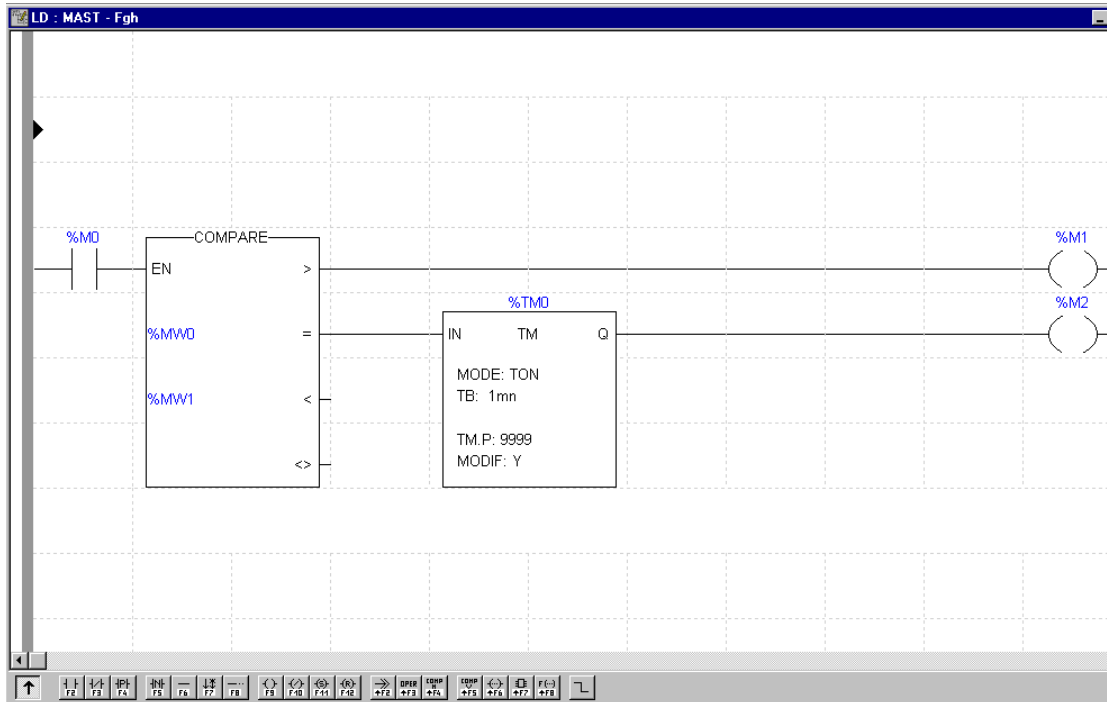
The blocks in Unity Pro ladder language are taller than the blocks in PL7 ladder language.

The PL7 application converter automatically reorganizes the height of the blocks to guarantee that the application works correctly.

However, if a block is embedded between two outputs of another block, the procedure for converting the application:

- clears the network,
- displays a Converter message (See *"Converter" message in the analysis procedure, p. 43*) in the output window enabling you to complete the drawing manually.

The following screen gives an example of a block embedded between two outputs of another block: this part of the program cannot be automatically converted.



Correspondences between Structured Text language elements

9

At a Glance

Subject of this Chapter

This chapter contains the tables of correspondence between structured text language elements.

The PL7 Structured Text language elements are divided into three categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),
- those that have no Unity Pro equivalent (status: deleted).

Note: if a PL7 Structured Text language element has no Unity Pro correspondence, both a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
9.1	Correspondences between PL7 and Unity Pro: Structured Text language sequences	134
9.2	Correspondences between PL7 and Unity Pro: Structured Text language instructions	135

9.1 Correspondences between PL7 and Unity Pro: Structured Text language sequences

The sequences

Introduction

Conversion replaces the PL7 Structured Text language elements by their Unity Pro equivalent.

Sequences

The following table describes any correspondence and differences between PL7 and Unity Pro Structured Text language sequences.

	PL7	Unity Pro	Status
Label	%Li	Li	Modified
Comment	Comment linked to the sequence	Comment linked to the sequence	Converted

9.2 Correspondences between PL7 and Unity Pro: Structured Text language instructions

Command instructions

Introduction Conversion replaces the PL7 Structured Text language elements by their Unity Pro equivalent.

Instruction list The following table describes any correspondences and differences between PL7 and Unity Pro Structured Text command instructions.

	PL7	Unity Pro	Status
Instructions	IF	IF	Converted
	CASE	CASE	Converted
	WHILE	WHILE	Converted
	REPEAT	REPEAT	Converted
	EXIT	EXIT	Converted
	FOR	FOR	Modified (1)
	HALT	HALT()	Modified (2)
	JUMP	JUMP	Converted
	SRi	SRI()	Modified (3)
	RETURN	RETURN	Converted
Legend:			
(1)	Conversion of this instruction generates an error message during the analysis phase (See <i>FOR instruction</i> , p. 170).		
(2)	The instruction is replaced by an EF.		
(3)	This instruction is replaced by a section call.		

Correspondences between Instruction List language elements

10

At a Glance

Subject of this Chapter

This chapter contains the tables of correspondence between Instruction List language elements.

The PL7 Instructions List language elements are divided into three categories:

- those that remain unchanged and are translated automatically (status: converted),
- those that have a Unity Pro equivalent and are translated automatically (status: modified),
- those that have no Unity Pro equivalent (status: deleted).

Note: if a PL7 Instruction List language element has no Unity Pro correspondence, both a warning and a conversion error message are generated (See *Analysis*, p. 40).

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
10.1	Correspondences between PL7 and Unity Pro: Instruction List language sequences	138
10.2	Correspondences between PL7 and Unity Pro: Instruction List language instructions	139

10.1 Correspondences between PL7 and Unity Pro: Instruction List language sequences

The sequences

Introduction

Conversion replaces the PL7 Instruction List language elements by their Unity Pro equivalent.

Sequences

The following table describes any correspondence and differences between PL7 and Unity Pro Instruction List language sequences.

	PL7	Unity Pro	Status
Label	%Li	Li	Modified
Comments	Comments linked to the sequence	Comments linked to the sequence	Converted

10.2 Correspondences between PL7 and Unity Pro: Instruction List language instructions

At a Glance

**Subject of this
Section**

This section contains the tables of correspondence between PL7 Instruction List language instructions and their Unity Pro equivalent.

**What's in this
Section?**

This section contains the following topics:

Topic	Page
Command instructions	140
Boolean instructions	141
Instruction List language extensions	142

Command instructions

Introduction

Conversion replaces the PL7 Instruction List language elements by their Unity Pro equivalent.

Instruction list

The following table describes any correspondences and differences between PL7 and Unity Pro Instruction List command instructions.

	PL7	Unity Pro	Status
Instructions	HALT	HALT	Modified (1)
	HALTC	ST ACCU HALT (EN:=ACCU)	Modified
	HALTCN	STN ACCU HALT (EN:=ACCU)	Modified
	END	END	Modified (1)
	ENDC	ST ACCU END (EN:=ACCU)	Modified
	ENDCN	STN ACCU END (EN:=ACCU)	Modified
	JMP	JMP	Converted
	JMPC	JMPC	Converted
	JMPCN	JMPCN	Converted
	RET	RET	Converted
	RETC	RETC	Converted
	RETCN	RETCN	Converted
	SRI	CAL SRI	Modified (2)
NOP	-	Deleted	
Edge management (3)	F	FE	Modified
	R	RE	Modified
Legend:			
(1)	The instruction is replaced by an EF.		
(2)	This instruction is replaced by a conditional section call.		
(3)	In Unity Pro, edges are managed by EFs.		

Boolean instructions

Introduction

Conversion replaces the PL7 Instruction List language elements by their Unity Pro equivalent.

Instruction list

The following table describes any correspondences and differences between the Boolean instructions of PL7 and Unity Pro Instruction List language.

	PL7	Unity Pro	Status
Instructions	LD	LD	Converted
	LDF	LDF	Converted
	LDN	LDN	Converted
	LDR	LDR	Converted
	ST	ST	Converted
	STN	STN	Converted
	AND	AND	Converted
	OR	OR	Converted
	XOR	XOR	Converted
))	Converted
	N	N	Converted
	R	RESET	Modified (1)
	S	SET	Modified (1)
MPS, MRD, MPP	-	Modified (2)	
Legend:			
(1)	These instructions are replaced by an EF. (See Unity Pro, Standard Block Library Manual, Logic family)		
(2)	The instructions MPS, MRD and MPP do not exist in Unity Pro (See <i>MPS, MRD, MPP instructions</i> , p. 172).		

Instruction List language extensions

Introduction In Unity Pro, the operation and comparison blocks of Instruction List language written in Structured Text language are not converted.

IL extensions The following table describes the Instruction List language extensions which have no Unity Pro equivalents.

	PL7	Unity Pro	Status
	[OF]	-	Deleted (1)
	MASKEVT		
	UNMASKEVT		
	[...expression...]		
Legend:			
(1)	It is necessary to manually replace this part of the application.		

Correspondences between Grafcet language elements

11

At a Glance

Aim of this section

This section contains the tables showing correspondence between Grafcet language elements.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Grafcet instructions	144
Conversion restrictions: PL7 Grafcet language	145


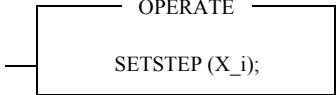

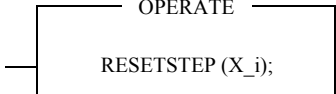
Grafcet instructions

Introduction

The conversion replaces the PL7 Grafcet language elements with their Unity Pro equivalent.

Grafcet instructions in ladder language

The following table describes the correspondence and possible differences between PL7 and Unity Pro ladder language Grafcet instructions.

	PL7	Unity Pro	State
Instructions			Modified
			Modified

Grafcet instructions in structured text

The following table describes the correspondence and possible differences between PL7 and Unity Pro structured text Grafcet instructions.

	PL7	Unity Pro	State
Instructions	SET %Xi	SETSTEP (X_i);	Modified
	RESET %Xi	RESETSTEP (X_i);	Modified

Grafcet instructions in instruction list language

The following table describes the correspondence and possible differences between PL7 and Unity Pro instruction list language Grafcet instructions.

	PL7	Unity Pro	State
Instructions	S %Xi	CAL SETSTEP (X_i)	Modified
	R %Xi	CAL RESETSTEP (X_i)	Modified

Conversion restrictions: PL7 Grafcet language

Size of programming in SFC language

Diagrams in PL7 Grafcet language are automatically restructured by the PL7 application converter into diagrams in Unity Pro SFC language.

The corresponding Unity Pro SFC language has a single programming page with a maximum of 200 lines.

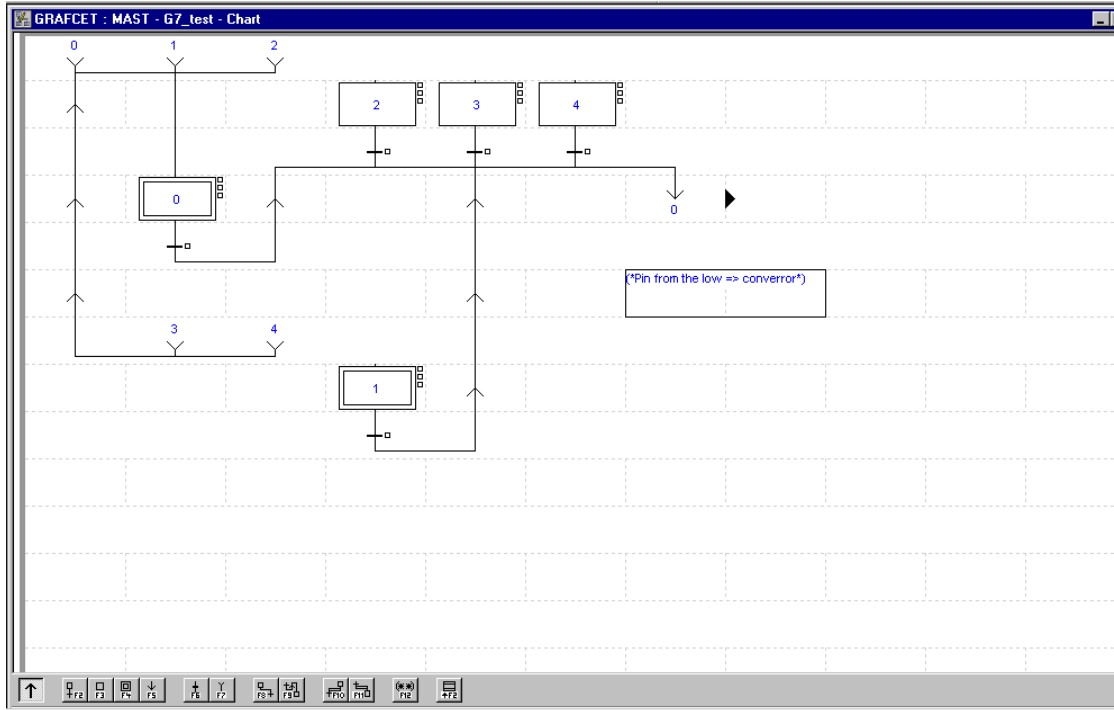
In the rare cases when the Grafcet programming exceeds this limits, a *Converror* message (See "*Converror*" message in the analysis procedure, p. 43) will be displayed in the output window.

Link from bottom to top

In Unity Pro SFC language, it is not possible to have several links going towards the same connector. The PL7 application converter automatically replaces this configuration with an equivalent Unity Pro configuration.

However, it is impossible, in SFC language, to have a **link from bottom to top**. If your PL7 application to be converted contains this type of link, you must manually complete the diagram using the Converter message (See *"Converter" message in the analysis procedure, p. 43*) that is displayed in the output window.

The following screen gives an example of a link from bottom to top drawn up in PL7 Grafcet language: this part of the program cannot be automatically converted.



Other correspondences between PL7 and Unity Pro elements

12

Printouts, animation tables, and runtime screens

- | | |
|-------------------------|---|
| Introduction | Converting a PL7 application into a Unity Pro application generates certain correspondences which are described in the following paragraphs. |
| Printouts | No conversion of the printed parts (title pages, headers, and footers) is possible between PL7 and Unity Pro, because, in PL7, no page setup file is saved on the disk after the generation of a document. |
| Animation tables | The animation tables are automatically converted into Unity Pro format by the PL7 application converter.
The list of PL7 variables contained in each animation table is replaced by the corresponding list of Unity Pro variables. |

Note: if a PL7 variable has no Unity Pro equivalent, an error will be signaled in the conversion report file

Runtime screens The animation tables are automatically converted into Unity Pro format by the PL7 application converter.
The list of PL7 variables contained in each runtime screen is replaced by the corresponding list of Unity Pro variables.

Note: if a PL7 variable has no Unity Pro equivalent, an error will be signaled in the conversion report file

Note: the files which describe the runtime screens are contained in the sub-folders whose addresses are specified in the .fef source file. The conversion procedure from PL7 to Unity Pro maintains this structure.

Differences between PL7 and Unity Pro



At a Glance

Subject of this Part

This part presents the main differences between PL7 programming and its equivalent in Unity Pro.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
13	Differences between the application structures	151
14	Differences between common language elements	153
15	Differences between Structured Text language elements	169
16	Differences between Instruction List language elements	171
17	Different display in runtime screens	173

Differences between the application structures

13

At a Glance

Subject of this Chapter

This chapter describes the main differences between the PL7 application structure and its Unity Pro equivalent.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
13.1	Differences between PL7 and Unity Pro: functional modules	152

13.1 Differences between PL7 and Unity Pro: functional modules

Functional Modules

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Functional modules

The PL7 application converter converts only the functional models which:

- contain a complete Grafcet section (PRL, Chart, Pos),
- do not contain isolated elements of Grafcet,
- do not contain macro steps.

Note: a functional model containing a Grafcet function, even it is complete, is not converted if it also contains a macro step.

The names of the functional modules which cannot be converted are listed in the conversion report file.

Differences between common language elements

14

At a Glance

Subject of this Chapter

This chapter describes the main differences between the objects common to different languages.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
14.1	Differences between PL7 and Unity Pro: types and tables	154
14.2	Differences between PL7 and Unity Pro: objects	157
14.3	Differences between PL7 and Unity Pro: instructions and functions	162
14.4	Differences between PL7 and Unity Pro: SFBs	167

14.1 Differences between PL7 and Unity Pro: types and tables

At a Glance

Subject of this Section

This section describes the main differences between PL7 types and tables and their Unity Pro equivalent.

What's in this Section?

This section contains the following topics:

Topic	Page
Types and tables	155
Operations between mixed types	156

Types and tables

Introduction	Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.
Types	<p>WORD and DWORD types exist in Unity Pro but do not make it possible to carry out arithmetic operations.</p> <p>Arithmetic and logic operations are performed in Unity Pro with INT and DINT type objects.</p> <p>For this reason the PL7 converter converts WORD or DWORD type objects into INT or DINT type objects.</p> <p>Example: The SHL operation on WORD (or DWORD) type objects is converted into SHL_INT (or SHL_DINT) (See <i>Correspondences between PL7 and Unity Pro: instructions, p. 87</i>).</p>
Tables	<p>The PL7 converter modifies the syntax of the declaration in the tables (Boolean, word, double word, floating point and byte tables).</p> <p>Example: ARRAY1 : %M1 : 10 is converted into ARRAY1 : ARRAY [0 . . 9] OF BOOL.</p> <div style="border: 1px solid black; padding: 5px;"><p>Note: in Unity Pro, elements keep the same name as in PL7 (example: ARRAY1).</p></div>
Specific types and tables	<p>(WORD) words and (DWORD) double words in TIME, DATE, TOD and DT formats are converted into INT and DINT.</p> <p>Example: %MD10 := ADD_TOD (%MD20, %MD30) is converted into: %MD10 := ADD_TOD_PL7 (%MD20, %MD30).</p> <p>Time management EFs in PL7 are converted into their corresponding EFs in Unity Pro (See <i>Correspondences between PL7 and Unity Pro: instructions, p. 87</i>).</p>

Operations between mixed types

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Words and double words

Operations between different object types are not possible in Unity Pro. During the conversion procedure, operations of this type are detected and replaced by their corresponding EFs (See *Correspondences between PL7 and Unity Pro: instructions, p. 87*).

Example: `MD0 :=%MD0+%MW4` is converted into

`%MD0 :=%MD0+INT_TO_DINT(%MW4)`.

Example: `%MW20 :=%MD10` is converted into

`%MW20 :=DINT_TO_INT(%MD10)`.

Tables and (double) words

Operations between word tables or double word tables and words or double words are not possible in Unity Pro.

During the conversion procedure, operations of this type are detected and replaced by their corresponding EFs (See *Table instructions, p. 101*).

Example: `%MW100:20 :=%MW10+5` is converted into

`MOVE_INT_ARINT(%MW10+5,%MW100:20)`.

Example: `%MW100:20 :=%MW100:20+5` is converted into

`%MW100:20 :=ADD_ARINT_INT(%MW100:20.5)`.

Assignment of tables

The assignment of a word or double word table into a bit table is not possible in Unity Pro.

During the conversion procedure, the assignment operator `:=` is replaced by the corresponding EF (See *Bit table instructions, p. 92*).

Example: `%M0:16 :=%MW20` is converted into

`MOVE_INT_ARX(%MW20,%M0:16)`.

14.2 Differences between PL7 and Unity Pro: objects

At a Glance

Subject of this Section

This section describes the main differences between PL7 objects and their Unity Pro equivalent.

What's in this Section?

This section contains the following topics:

Topic	Page
Immediate values	158
Memory objects (variables and constants)	159
Word bits	160
Symbolized tables and indexed objects	161

Immediate values

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Integer and long integer words

WORD and DWORD types are converted into INT and DINT types by the PL7 converter.

A hexadecimal immediate value greater than 16#7FFF (+32767) is converted to a negative decimal value, the original value is shown in the comment (example: %MW0:=16#ABCD is converted to %MW0:=-21555 {16#ABCD}).

The conversion of the immediate value of a long integer is identical for values greater than 16#7FFFFFFF (+2147483647) (example: %MD80:=16#ABCDABCD is converted to %MD80:=-1412584499 {16#ABCDABCD}).

Network address words

The address ADR# is replaced in Unity Pro by an EF. For a given address ADR#{r.s}\xy.i.c\xy.i.SYS, there are two possible scenarios:

- xy corresponds to the bus address:
 - the converter replaces xy by a bus number,
 - the converter chooses the bus number, which is specified in the Unity Pro configuration.
 - xy corresponds to the rack number and position:
 - the converter replaces xy by r.m,
 - the rack 0 information becomes explicit.
If $xy < 100$, the rack number is equal to 0 (example: $xy=12$, $r.m = 0.12$).
If $xy > 100$, the rack number is equal to the first digit (example: $xy=715$, $r.m = 7.15$).
-

Memory objects (variables and constants)

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Character strings

The converter replaces the %MB and %KB objects with character strings; their position in the memory remains identical.

The name associated with the new character string is:

- if no symbol is associated with the object %MB or %KB, **MBi_I**:
 - i = integer,
 - I = length of character table,
(example: %MB1000:20 is converted to MB1000_20:STRING[20]).
- if no symbol is associated with the object %MB or %KB, **symbole_I**:
 - symbol = symbol of variable,
 - I = length of character table,
(example: %MB1000:20 with the symbol TABLE is converted into TABLE_20:STRING[20]).

If there is a comment associated with the first element of a table from %MB or from %KB, the converter declares a character string of length 1 and associates the comment with this (example: TABLE, symbol of %MB500:20 (*This is the TABLE comment*), is converted to TABLE_1:STRING[1] (*This is the TABLE comment*)).

Word bits

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Extracted bit

In order to avoid any conflicts of syntax in the PL7 user applications to be converted, the Unity Pro syntax for extracted bits has been modified.

The PL7 syntax for the extracted bit `:Xi` is therefore replaced with Unity Pro syntax `.i`.

Example: `%IW12.3.1:X5` is converted into `%IW12.3.1.5`.

The Unity Pro syntax for the extracted bit on the rank 0 object is as follows:
%IW12.3.0.5.

Symbolized tables and indexed objects

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Symbolized tables

In Unity Pro you can associate a symbol with a simple object, but cannot use the same symbol to refer to a table.

Example: if `%MWi` is symbolized by `TABA`, in PL7 `%MWi:L` is symbolized by `TABA:L`. This is no longer possible in Unity Pro.

The PL7 application converter replaces `TABA:L` by a long integer table `L` named `TABA_L` and located on the basis of `%MWi`.

Symbolized indexed objects

In Unity Pro you can associate a symbol with a simple object, but cannot use the same symbol to refer to an indexed object.

Example: if `%MWi` is symbolized by `TABA`, in PL7 `%MWi[j]` is symbolized by `TABA[j]`.

This is no longer possible in Unity Pro.

The PL7 application converter replaces `TABA[j]` by a maximum length integer table named `TABA_AR` and located on the basis of `%MWi`.

<p>Note: symbolized indexed input/output objects cannot be converted into equivalent tables as the length of this table is unknown. These objects are therefore converted into their non-symbolized form (address).</p>
--

14.3 Differences between PL7 and Unity Pro: instructions and functions

At a Glance

Subject of this Section

This section describes the main differences between PL7 instructions and functions, and their Unity Pro equivalent.

What's in this Section?

This section contains the following topics:

Topic	Page
Table instructions and functions	163
Process control, Other and Communication instructions	165

Table instructions and functions

Introduction	<p>Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.</p>
Integer and long integer word tables: instructions	<p>The operators (+, -, *, /, REM) between two integer and long integer word tables have been deleted in Unity Pro. The PL7 application converter replaces these operators with EF equivalents (See <i>Integer and long integer word tables: instructions, p. 101</i>). Example: TABINT1, TABINT2, TABINT3 are integer tables. TABINT1:=TABINT2 + TABINT3 is replaced with TABINT1:=ADD_ARINT (TABINT2, TABINT3).</p> <p>The operators (+, -, *, /, REM) between a table and an integer or long integer word have been deleted in Unity Pro. The PL7 application converter replaces these operators with EF equivalents (See <i>Integer and long integer word tables: instructions, p. 101</i>). A single EF is used for each switching operator. Example: INT1 is an integer; TABINT1 and TABINT2 are integer tables. Both TABINT1:=INT1 + TABINT2 and TABINT1:=TABINT2 + INT1 are replaced with TABINT1:=ADD_ARINT_INT (TABINT2, INT1)</p>
Integer and long integer word tables: logic instructions	<p>The operators (AND, OR, XOR, NOT) between two integer and long integer word tables have been deleted in Unity Pro. The PL7 application converter replaces these operators with EF equivalents (See <i>Integer and long integer word tables: logic instructions, p. 104</i>). Example: TABINT1, TABINT2, TABINT3 are integer tables. TABINT1:=TABINT2 AND TABINT3 is replaced with TABINT1:=AND_ARINT (TABINT2, TABINT3).</p> <p>The operators (AND, OR, XOR) between a table and an integer or long integer word have been deleted in Unity Pro. The PL7 application converter replaces these operators with EF equivalents (See <i>Integer and long integer word tables: logic instructions, p. 104</i>). A single EF is used for each switching operator. Example: INT1 is an integer; TABINT1 and TABINT2 are integer tables. Both TABINT1:=INT1 AND TABINT2 and TABINT1:=TABINT2 AND INT1 are replaced with TABINT1:=AND_ARINT_INT (TABINT2, INT1)</p>

**Tables:
functions**

The table functions for which you must indicate a rank (rank of an element in the table) behave in the same way as the corresponding PL7 functions, except when the rank is negative. In this case operation is as follows:

Functions	Operation when the rank is negative
COPY_ARDINT_AREBOOL	If one of the ranks is negative (source or destination), the function is not executed, and the resulting table is not modified. In PL7, the ranks are set automatically to 0 and the function is executed.
COPY_ARINT_AREBOOL	
COPY_AREBOOL_ARDINT	
COPY_AREBOOL_ARINT	
COPY_AREBOOL_AREBOOL	If the rank from which the comparison is launched is negative, the result is equal to this negative rank and the function is not executed. In PL7, the function is executed from rank 0.
EQUAL_***	
FIND_EQP_***	If the rank from which the search is launched is negative, the result is equal to this negative rank and the function is not executed. In PL7, the function is executed from rank 0.

Process control, Other and Communication instructions

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

IN, OUT, INOUT parameters

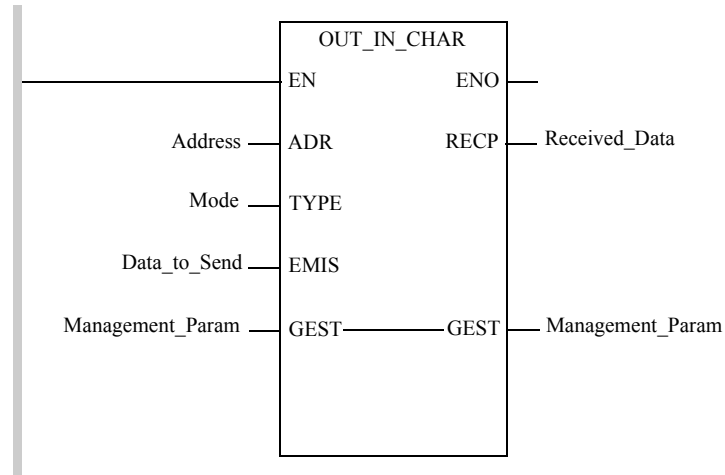
In Unity Pro, for all EFs that use input, output and input/output parameters (IN, OUT and INOUT), the order of these parameters has been modified.

Example: in PL7, the order of the parameters is as follows: **IN, OUT, INOUT**. In Unity Pro, this becomes: **IN, INOUT, OUT**.

The EFs concerned by this modification are the following:

Process control instructions (See <i>Process control instructions, p. 111</i>)		Other instructions (See <i>Other instructions, p. 112</i>)		Communication instructions (See <i>Communication instructions, p. 113</i>)	
PL7	Unity Pro	PL7	Unity Pro	PL7	Unity Pro
PID	PID_INT	FTOF	FTOF	DATA_EXCH	DATA_EXCH
PWM	PWM_INT	FTON	FTON	INPUT_CHAR	INPUT_CHAR
SERVO	SERVO_INT	FTP	FTP	OUT_IN_CHAR	OUT_IN_CHAR
		SCOUNT	SCOUNT	PRINT_CHAR	PRINT_CHAR
		FPULSOR	FPULSOR	RCV_TLG	RCV_TLG
				READ_ASYN	READ_ASYN
				READ_GDATA	READ_GDATA
				READ_VAR	READ_VAR
				SEND_REQ	SEND_REQ
				SERVER	UNITE_SERVER

The following diagram shows the example of the communication instruction `OUT_IN_CHAR`.



The following table describes the parameters of the communication instruction `OUT_IN_CHAR`.

Input parameters (IN)	Input/output parameters (INOUT)	Output parameters (OUT)
ADR	GEST	RECP
TYPE		
EMIS		

The ST representation of the instruction `OUT_IN_CHAR` in PL7 is as follows:
`OUT_IN_CHAR (Address, Mode, Data_to_Send, Received_Data, Management_Param)`.

The ST representation of the instruction `OUT_IN_CHAR` in Unity Pro is as follows:
`OUT_IN_CHAR (Address, Mode, Data_to_Send, Received_Data, Management_Param)`.

14.4 Differences between PL7 and Unity Pro: SFBs

Types of Unity Pro EFB instances

Introduction The conversion of a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Value of current step The PL7_DRUM EFB has an extra output parameter compared with its PL7 equivalent. This parameter contains the value of the current step. Henceforth, the values of the current step are assigned in the user program to DRUM output objects.

Example in structured text: RESET %DRi is replaced by:

```
RESET_PL7_DRUM (DRi)
WORD_TO_BIT (INT_TO_WORD (DRi.W),
             %M4,
             %O2.3,
             %O4.5,
             %M6, , , , , , , , , , , , )
```

Note: in the case of converting the ladder language, if the network including the call to DRUM contains the output objects of this DRUM, an error message is displayed. If these objects are assigned in the network, you must modify the program manually using the Convertor message (See "*Convertor*" message in the analysis procedure, p. 43) in the output window.

Differences between Structured Text language elements

15

At a Glance

Subject of this Chapter

This chapter describes the main differences between Structured Text language elements.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
15.1	Differences between PL7 and Unity Pro: Structured Text language instructions	170

15.1 Differences between PL7 and Unity Pro: Structured Text language instructions

Command instructions

Introduction Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

FOR instruction The PL7 application converter converts the FOR command instruction. In Unity Pro the index variable used in the FOR instruction is usable only within the programming loop.

During conversion of the first FOR instruction of a PL7 application , an error message will warn you to check that each of the programming loop variables is used only within the loop.

If this is not the case, the variable not having been declared, the command is not carried out.

Differences between Instruction List language elements

16

At a Glance

Subject of this Chapter

This chapter describes the main differences between Instruction List language elements.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
16.1	Differences between PL7 and Unity Pro: Instruction List language instructions	172

16.1 Differences between PL7 and Unity Pro: Instruction List language instructions

Boolean instructions

Introduction

Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

MPS, MRD, MPP instructions

The instructions MPS, MRD and MPP do not exist in Unity Pro. The PL7 application converter replaces these instructions with variables adapted to the environment. For each module of a PL7 application in which an MPS, MRD or MPP instruction appears, the converter declares a 8 BOOL table and an INT type index simulating the behavior of the instruction to be replaced.

Note: before replacing MPS, MRD and MPP instructions, the PL7 applications converter verifies that the names of the created variables have not already been used in the application.

Different display in runtime screens

17

Runtime screens

Introduction Converting a PL7 application into a Unity Pro application generates certain differences, which are described in the following paragraphs.

Runtime screens The display format of the values of text objects (Binary and Hex) have been modified in the Runtime Screen tool.
The new format is identical to the one used in all other tools of Unity Pro: animation tables and language editors.

Example: The WORD type variable, 0 in binary format 2#0000000000000000 is converted into 2#0000_0000_0000_0000.

The PL7 applications to be converted may therefore show display errors. If the display zone has been adjusted to the maximum size of the text, in animation, running Unity Pro the value of the variable will be replaced by the sequence #####, indicating that the size of the zone is insufficient to display the value in its entirety.

You must then either resize the display zone of the text, or lower the size of the font used.

Appendices



At a Glance

Subject of this Appendix

This appendix presents the solutions to the different problems most commonly met when converting PL7 applications into Unity Pro.

What's in this Appendix?

The appendix contains the following chapters:

Chapter	Chapter Name	Page
A	Recommendations	177

Recommendations




A

Recommendations during conversion

At a Glance

When converting PL7 applications, certain cases have been identified in which manual solutions are required. These are described in this appendix.

	CAUTION
	Control loop variables are not recovered by PL7. If you are using control loops parametered using PL7 variables (%MW, %MF...) in the FEF file to be converted, you must enter them again using Unity Pro. Failure to follow this instruction can result in injury or equipment damage.

What to do when the conversion fails

The following table shows the procedure when the conversion fails just after opening the FEF file.

If	Then
an error message appears	consult the report file to obtain additional information.
in the report file, the error concerns an unknown hardware configuration	<ul style="list-style-type: none"> ● open the STX file using version 4.3 of PL7, ● modify the processor version, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
in the report file, the error concerns the name of a character string longer than 32 characters	<ul style="list-style-type: none"> ● using PL7, modify the name of the variable to lower the size to under 32 characters, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
in the report file, the error concerns a name conflict between variables, sections, etc.	<ul style="list-style-type: none"> ● using PL7, modify the names or symbols concerned, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
the FEF file was created with a version of PL7 previous to 4.0	<ul style="list-style-type: none"> ● open the FEF file using version 4.3 of PL7 (See <i>Conversion Principle: Applications and Processors, p. 17</i>), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
the FEF file was created with a 4.0, 4.1 or 4.2 version of PL7	<ul style="list-style-type: none"> ● open the FEF file using version 4.3 of PL7 (See <i>Conversion Principle: Applications and Processors, p. 17</i>), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.

If	Then
the processor is not level 3	<ul style="list-style-type: none"> ● open the FEF file using version 4.3 of PL7, (See <i>Conversion Principle: Applications and Processors, p. 17</i>), ● modify the processor version (See <i>Conversion Principle: Applications and Processors, p. 17</i>), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
in the FEF file, built-in control loops are used, set using PL7 variables (%MF, for example)	<ul style="list-style-type: none"> ● using PL7, modify the loops concerned, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
you have modified the configuration of a TSX SCY 21601 module just before exporting the FEF file	<ul style="list-style-type: none"> ● using PL7, save the stx file before exporting the application (this allows you to save all last-minute modifications), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.

What to do when the import fails

The following table describes the procedure when the import phase fails (this phase is launched automatically after the conversion phase).

If	Then
the hardware configuration of the FEF file has ATV 16 controllers on a Fipio bus	<ul style="list-style-type: none"> ● using PL7 remove the ATV 16 controllers from the Fipio bus (ATV 16 no longer recognized by Unity), ● the simulation is not possible using PL7, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
the hardware configuration of the FEF file has CCX 17 controllers on a Fipio bus	<ul style="list-style-type: none"> ● using PL7 remove the CCX 17 controllers from the Fipio bus (CCX 17 no longer recognized by Unity), ● the simulation is not possible using PL7, ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
the hardware configuration of the FEF file has a TSX P57 2823 or TSX P57 4823 processor	<ul style="list-style-type: none"> ● using PL7 replace the processor with one that is recognized by Unity, then modify the configuration to obtain equivalent functionalities (for example, use a TSX P57 253 processor and ETY module to replace a TSX P57 2823), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
the PL7 application to convert has a TSX SPY 400 simulation module or TSX ISPY 100 weighing module	<ul style="list-style-type: none"> ● using PL7, delete all the parts concerning these (configuration, sections, etc.), ● export the PL7 application to obtain a new FEF file, ● restart the conversion, opening the FEF file with Unity Pro.
an indexed variable is used as an activation condition	using Unity Pro, write the missing condition without using indexed variables.

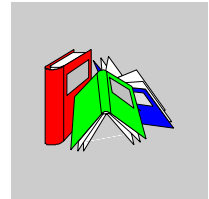
What to do when the generation of the project fails

The following table describes the procedure when the Unity Pro generation phase fails.

If, in the generation report, one of the following cases appears	Then
a section written in ST language has a truncated line	<ul style="list-style-type: none"> ● using Unity Pro, correct the faulty line return generated during editing (the ST editor does not authorize lines of over 300 characters), ● generate the project again.
an error occurs on a macro step bit	<ul style="list-style-type: none"> ● using Unity Pro, check that the macro step is declared (using PL7 it is possible to use a macro step bit without it being declared), ● if this is the case, correct the program accordingly. ● generate the project again.
an error on input or output-type objects (%Q1.2.48:16 for example) is generated	<ul style="list-style-type: none"> ● check that these objects are configured using PL7, ● if this is not the case, correct the program accordingly. ● generate the project again.
an error on FIPIO objects (%IW2.80\0.0.0.3 for example) is generated	<ul style="list-style-type: none"> ● check that these objects are configured using PL7, ● if this is not the case, correct the program accordingly. ● generate the project again, ● if you are using ADM 390 10 modules, it is no longer possible to use FIPIO objects under Unity Pro.
an error in the system word tables is generated	<ul style="list-style-type: none"> ● create a table of integers with 4 elements, ● assign each element one by one, ● generate the project again.
an error occurs on a table-type DFB output	a table-type DFB output is no longer accessible outside the DFB. To access it, you must use the variable connected to the corresponding output pin. For further information on DFBs, (See <i>General</i> , p. 32)
an error on the DINT-type variables recognized as INT by Unity Pro	<ul style="list-style-type: none"> ● modify the program to make the types compatible, ● example: SD52, the solution consists of creating a DINT-type SD52 object by writing SD52:=INT_AS_DINT(%SW52,%SW53), ● generate the project again.

If, in the generation report, one of the following cases appears	Then
an error occurs on the %I or %IW assigned in the program	modify the program to delete these assignments. Assignment on inputs is no longer accepted by Unity Pro.
an error occurs on a vertical comparison block located in the first column of the editor	using the Copy/Paste function, modify the program to move this block by one column.
an error occurs in an SFC. An error message indicates that alternative divergences or parallel convergences must be followed respectively by a transition or a step	modify the SFC following the indications of the output window.
an error indicates that the maximum number of configured steps is insufficient	increase the maximum number of steps as indicated in the output window (use the command Tools → Project settings → Language extensions). The calculation of the maximum number of steps using Unity Pro includes macro-steps.
an error indicates an incompatibility between the different types of an assignment (probably a multi-assignment using PL7)	modify the program to remove these incompatibilities.
an error occurs on a multi-assignment in an LD operate block	modify the program by writing as many blocks as there are assignments.

Glossary



D

- DFB** User Function Block.
- DT** Date and Time.

E

- EF** Elementary Function.
- EFB** Elementary Function Block.
- EVT** Event.

I

- IL** Instruction List language.
-

L

LD Ladder language.

S

SFB Standard Function Block.

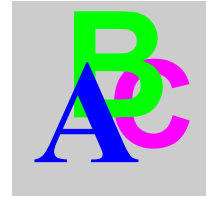
SFC Sequential Function Chart language.

SR Subroutine.

ST Structured Text language.

STRING Character string.

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