

Diagnostics



Subject of this Part

This part describes the various diagnostics tools available in Unity Pro for the programming, maintenance and use of Premium, Atrium, Quantum and Modicon M340 PLCs.

What Is in This Part?

This part contains the following chapters:

- [Introduction to diagnostics tools](#)
- [Diagnostics screens](#)
- [Diagnostics Viewer](#)
- [System diagnostics](#)
- [Project diagnostics](#)

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Introduction to diagnostics tools



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At a Glance

Unity Pro diagnostics consist of a set of tools and functionalities which allow you to intervene at all stages in the development and use of an automation application.

The different resources available are as follows:

- Language Objects (*LODDTs*).
- Diagnostics screens.
- The Diagnostics Viewer.
- System diagnostics.
- Project diagnostics (diagnostic EFBs and DFBs).

Using the resources

The following table shows the resources available.

Resource	Use
Language objects	Language objects are diagnostics tools which can be used in a project to ascertain the status of a channel or module (for example the error bit for channel 1 of the module located in slot 2 of rack 3: %I3.2.1.ERR). These objects are described at the end of the documentation for each module. In general they are used in the form of <i>LODDT</i> variables.
Diagnostics screens	The diagnostics screens can be accessed from the configuration editor for the processor and the application-specific modules. To access the desired diagnostics screen double-click on the element (processor or module) then select the Fault tab. The fault information messages are generally very clear (for example: Range over/undershoot on an analog channel).
The Diagnostics Viewer for Unity Pro	The Diagnostics Viewer is a tool which can be used to view the alarms generated by the system diagnostics and the diagnostic DFBs. There is a Diagnostics Viewer built into Unity Pro but there are also Diagnostics Viewers available for Magelis HMI terminals or via Factory Cast applications.
System diagnostics	System diagnostics is a service which combines the use of system bits and words with the Diagnostics Viewer. When a project has been built with the System Diagnostics option , the system bits and words automatically generate diagnostics messages in the Diagnostics Viewers .
Project diagnostics (diagnostics EFBs and DFBs and SFC diagnostics)	Project diagnostics consist of specific EFBs and DFBs which are embedded in the code of an automation project to provide the user or maintenance personnel with clear information on the operating conditions of the monitored process. These program elements will trigger alarms which can be viewed in the Diagnostics Viewers. SFC diagnostics go hand in hand with the system diagnostics, which are an intrinsic part of SFC and enable step activity times to be monitored.

Advantages

The main advantages of these services are as follows:

- Diagnostics are an integral part of the project. It can therefore be thought out at the development stage in order to be able to best meet the requirements of the user and maintenance personnel.
- Errors are logged and dated at source (in the PLC), meaning that the information provided is an exact representation of the state of the process.
- You can connect several Viewers (Unity Pro, Magelis, Factory Cast) which will describe the exact state of the process to the user. Each Viewer works independently and any action taken with one (an acknowledgment for example) is automatically visible on the others.

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Diagnostics screens



Subject of this Chapter

This chapter describes the diagnostics screens enabling the user to perform troubleshooting for his automation system.

The screens dealt with are those for:

- Premium and Quantum processor modules,
- an application-specific counting module.

NOTE: by way of example, only diagnostics for the application-specific counting module are covered here. For the other modules please refer to the manuals for the corresponding specific applications.

What Is in This Chapter?

This chapter contains the following sections:

- [Module and processor diagnostics screens](#)

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Module and processor diagnostics screens



Subject of this Section

This section introduces the user to the counting module diagnostics screens.

NOTE: By way of example, only diagnostics for application-specific counting modules are covered here. The diagnostics screens for the other application-specific modules as well as those for processors are similar.

What Is in This Section?

This section contains the following topics:

- [Viewing fault diagnostics](#)
- [Lists of fault diagnostics](#)

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Viewing fault diagnostics



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At a Glance

The diagnostic screens on the module or channel are only accessible in connected mode. When an **un-masked** fault appears, this is reported:

- in the configuration screen of the rack, with the presence of a red square in the position of the faulty counting module,
- in all screens at module level (**Description** and **Fault** tabs),
 - in the module field with the **I/O** LED.
- in all channel level screens (**Configuration**, **Adjustment**, **Debug** and **Fault** tabs),
 - in the module field with the **I/O** LED.
 - in the channel field with the channel fault LED.
- in the fault screen that is accessed by the **Fault** where the fault diagnostics are described.

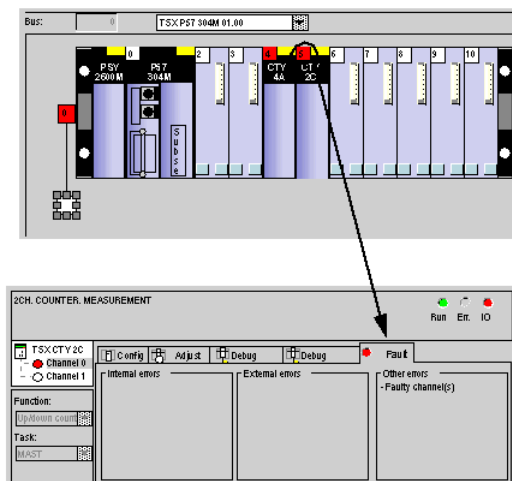
The fault is also reported:

- on the module, through the centralized viewing,
- with the dedicated language objects: **CH_ERROR** (%lr.m.c.ERR) and module error **MOD_ERROR** (%lr.m.MOD.ERR), **%MW.r.m.MOD.2**, etc., and *the status words*.

NOTE: even if the fault is masked (TSX CTY 2C), it is reported by the flashing of the LED **I/O** and in the fault screen.

Illustration

The diagram below shows the fault reporting structure.



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Lists of fault diagnostics



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At a Glance

The messages displayed on the diagnostics screens are used to assist in debugging the project. These messages must be concise and are sometimes ambiguous (as different faults may have the same consequences).

These diagnostics are on two levels: module and channel, the latter being the most explicit. The lists below show the message headings with suggestions for finding out what is wrong.

List of the module fault messages

The table below provides a list of the module fault messages.

Fault indicated	Possible interpretation and/or action
-----------------	---------------------------------------

Module failure	The module has a fault. Check the module mounting. Change the module.
Faulty channel(s)	One or more channels have a fault. Refer to channel diagnostics.
Self-test	The module is running a self-test. Wait until the self-test is complete. Note: For Modicon M340, if the Xbus line termination are missing, the module will stay in this state.
Different hardware and software configurations	There is a lack of compatibility between the module configured and the module in the rack. Make the configuration and the software configuration compatible.
Module is missing or off	Install the module. Fasten the mounting screws.

List of channel fault messages

The table below gives the list of fault messages at channel level.

Fault indicated. Other consequences.	Possible interpretation and/or action.
External fault or counting input fault: • encoder or proximity sensor supply fault, • line break or short circuit of at least one encoder differential signal (1A, 1B or 1Z), • SSI series frame fault, • specific fault on absolute encoder. Outputs are set to 0 in automatic mode. Invalid measurement message.	Check the sensor connections. Check the sensor power supply. Check the sensor operation. Delete the fault and acknowledge if the fault storing is configured (CTY 2C). Counting pulses or incremental encoder: preset or reset to acknowledge the Invalid measurement message.
Counting application fault: • measurement overrun • overspeed Outputs are set to 0 in automatic mode. Invalid measurement message.	Diagnose the fault more precisely (external causes). Check the application again, if necessary. Delete the fault and acknowledge if the fault storing is configured (CTY 2C). Counting pulses or incremental encoder: preset or reset to acknowledge the Invalid measurement message.
Auxiliary input/output fault: • power supply • short circuit of at least one output Outputs are set to 0 in automatic mode.	Check the output connections. Check the input/output power supply (24V). Diagnose the fault more precisely (external causes). Delete the fault and acknowledge if the fault storing is configured (CTY 2C).
Internal fault or channel self-test: • faulty module, • module missing or off, • module running self-test.	Module fault has gone down to channel level. Refer to module level diagnostics.
Different hardware and software configurations	Module fault has gone down to channel level. Refer to module level diagnostics.
Invalid software configuration: • incorrect constant • bit combination not associated with any configuration	Check and modify the configuration constants.
Communication fault	Check the connections between the racks.
Application fault: refusal to configure or adjust	Diagnose the fault more precisely.

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Diagnostics Viewer



Subject of this Chapter

The following chapter describes the Diagnostics Viewer, used to display error messages.

What Is in This Chapter?

This chapter contains the following topics:

- [Reminder of the Diagnostics Associated with the Viewer](#)
- [Operation of the diagnostics in Unity Pro](#)
- [Description of the Diagnostics Viewer](#)
- [How to find causes](#)
- [Configuring the display](#)
- [Managing error messages](#)
- [Diagnostics Viewer Commands](#)
- [DiagViewer Properties](#)
- [Archiving error messages](#)

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Reminder of the Diagnostics Associated with the Viewer



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Diagnostics in Unity Pro

In order to check the correct operation of your process, the Unity Pro software offers you 2 types of diagnostics:

- system diagnostics,

- project diagnostics.

The Diagnostics Viewer is used to display error messages.

System Diagnostics

System diagnostics are performed automatically. When the PLC detects a system error (for example, a watchdog being exceeded, an input/output error, division by zero, etc.), information is sent to the Diagnostics Viewer. The Diagnostics Viewer displays a system error message if in the project settings you have checked the [System diagnostics](#) box.

Project Diagnostics

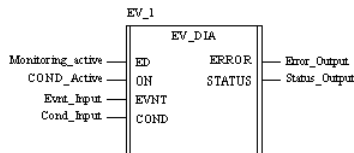
Project diagnostics uses diagnostics EFBs and DFBs. In addition, SFC program diagnostics form an integral part of the system and allow you to test the activation times of the steps.

When the [Project diagnostics](#) box is checked, information is sent to the viewer when a fault occurs, which displays an error message.

Diagnostics EFBs and DFBs

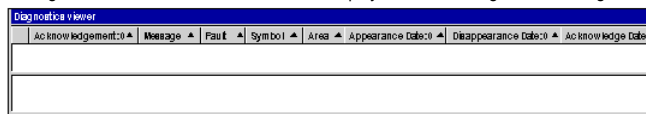
EFBs and DFBs are function blocks that are [programmed to carry out diagnostics in your project](#).

The graphic representation of a DFB is as follows:



Viewer

The Diagnostics Viewer is a tool that is used to display and acknowledge error messages linked to diagnostics:



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Operation of the diagnostics in Unity Pro



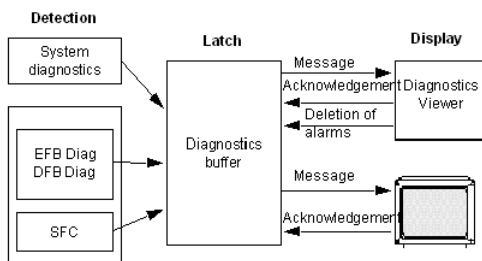
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General

The Unity Pro diagnostics function monitors the elements of the process to detect any faults there may be. When a fault occurs, it sends an error message to the display systems which display this fault.

Illustration

The following illustration shows the operation of the Unity Pro diagnostics:



Operation of the diagnostics

The table below describes the various phases of operation of the Unity Pro diagnostics:

Phase	Description
1	The diagnostics function blocks built into the project program and the diagnostics built into the system detect process faults.
2	The faults are stored in the form of date/time stamped messages in the diagnostics buffer memory.
3	The error messages are then displayed via the following display systems: Diagnostics Viewer or Human Machine Interface (HMI), used to: • display messages, • acknowledge messages that need an acknowledgement, • initialize animation tables and cross-references, • launch associated program editors, • delete diagnostics buffer alarms.

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Description of the Diagnostics Viewer



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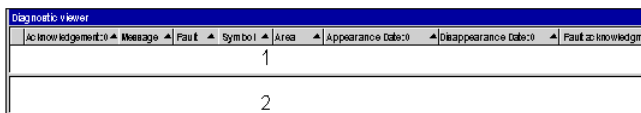
At a Glance

The Diagnostics Viewer is presented in the form of a display window comprising 2 display fields:

- a field that displays the diagnostics error messages,
- a field that provides additional information on the error message selected from the alarms list.

Diagnostics Viewer

The following screen presents the Diagnostics Viewer and its 2 display fields:



- 1 List of error messages
- 2 Additional information on the message selected

Description of error messages

For each of the alarms, the error messages list displays the following information:

Field	Description
Acknowledgement	The icon and the text indicate the message status: not acknowledged, acknowledged, deleted or no acknowledgement.
Message	Error message. This message contains the 40 first characters of the text entered in the comment of the function block instance that generated the error.
Fault	Type of diagnostics FB or system bit that detected the error.
Symbol	Symbol associated with the fault.
Field	Faulty PLC zone.
Appearance Date	Date and time of appearance of the fault.
Disappearance Date	Date and time of disappearance of the fault.
Acknowledge Date	Date and time of acknowledgement of the fault.

Definition of icons

The Diagnostics Viewer uses the following icons to indicate the message status:

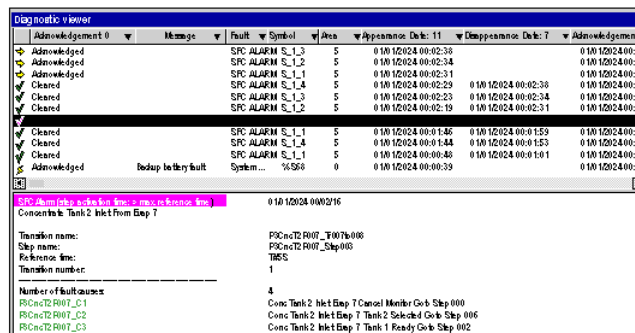
Icon	Description
	The fault has disappeared and has been acknowledged (if it needed an acknowledgement).
	The fault needs an acknowledgement.
	The fault has not disappeared.
	The system fault has disappeared and has been acknowledged (if it needed an acknowledgement).
	The system fault has not disappeared.

Description of the additional information field

The additional information field provides the following information for the message selected in the list:

- the alarm type with
 - a comment (defined by the user for the diagnostics FB)
 - the date of appearance,
- specific variables depending on the type of alarm,
- a list of error variables including any associated comments (if these exist),
- interpretation of the status words as a function of the STO file corresponding to this alarm.

The following screen gives an example of additional information on an error message:



If you want to refresh the values of the status words, reselect the message from the list or press the **F5** function key.

NOTE: If you wish, you can find the element that caused the error displayed in the viewer. This is called [finding the cause](#).

Each input with the **Diag** property can be used to search for causes.

How to find causes

The following table describes the procedure for finding causes.

Step	Action
1	Select the alarm in question in the Viewer. Result: The alarm line is shown in reverse video.
2	Right-click on the input for which you want to search for the cause. Result: The contextual menu allows you to initialize an animation table and to search for the DFB input variable so as to ascertain whether it is used in the program. This is called cause finding.
3	Click on the Initialize Search to search for cross-references to the selected input. Result: The Cross-References screen is displayed.

Lists of diagnostics inputs of diagnostics EFBs or DFBs

The table below specifies the diagnostics inputs (with **Diag** property selected) of diagnostics EFBs or DFBs in the diagnostics library.

Block name	Block type	Name of diagnostics inputs
ALRM_DIA	DFB	COND1 COND0
D_ACT	EFB	UNLOCK REACT
D_DYN	EFB	UNLOCK REACT
D_GRP	EFB	IN
D_LOCK	EFB	UNLOCK
D_PRE	EFB	IN
D_REA	EFB	REACT
EV_DIA	DFB	EVENT COND
MV_DIA	DFB	EVENT COND
NEPO_DIA	DFB	REQ_I REQ_O SENSOR_I SENSOR_O SECU_I SECU_O SECUPERM
TEPO_DIA	DFB	REQ_I REQ_O SENSOR_I SENSOR_O SECU_I SECU_O SECUPERM
SAFETY_MONITOR	DFB	-
USER_DIAG_ST_MODEL	DFB	COND

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Configuring the display



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At a Glance

The Diagnostics Viewer allows you to configure the display of the error messages. You can:

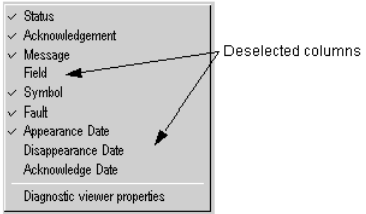
- select the columns to be displayed,
- resize the columns,
- choose the color and flashing of the messages.

Selecting the columns to be displayed

By default the Diagnostics Viewer displays all of its columns, but allows you to customize the display by removing columns that are of no use.

To remove a Diagnostics Viewer column, you must perform the following operations:

Step	Action
1	Right-click the title of the column selected. Result: A contextual menu containing the list of columns appears on the screen.
2	Click the title of the column you want to deselect.

	Result: The contextual menu disappears and the column no longer appears in the Diagnostics Viewer. Note: To reselect a column you have previously deselected, you must proceed in the same way. In this case, the contextual menu disappears and the column appears in the Diagnostics Viewer.
3	If you display the contextual menu again (steps 1 and 2), this column will not be preceded by a pointer (deselected column). 

Resizing of columns

To modify the size of a column, carry out the following operations:

Step	Action
1	Position your cursor in the column titles header, in between the column you want to modify and the next column. Result: The column resizing cursor appears on the screen.
2	When the cursor appears, press and hold the right button of the mouse and move the mouse to change the column size.
3	Once the correct column size has been reached release the mouse button. Result: The column is resized.

Choosing the color and flashing of messages

The **Properties** dialog box of the **Diagnostics Viewer** is used to change the color and flashing of error messages.

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Managing error messages



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At a Glance

The Diagnostics Viewer allows you manage the error messages. You can:

- sort the messages list,
- browse the messages list,
- acknowledge a message in the list,
- delete a message from the list,
- activate another tool,
- delete an alarm from the PLC memory.

Number of messages

The number of messages displayed in the list is defined solely by the size of the available memory.

If the memory becomes insufficient:

- the DIAG information flashes in the status bar,
- the messages associated with faults that have disappeared and have been acknowledged (if they needed acknowledging) are deleted.

Sorting messages

You can sort the messages by each column contained in the list except for the one containing the icons.

To sort the messages, simply click the header of the column containing the data you want to sort. If you click the same header a second time it will be sorted in reverse order.

By default the messages are inserted in the list in chronological order of appearance of the faults.

NOTE: Whatever the sort criterion for the list, a new message always appears at the **top of the list**.

Browsing the list

You can browse the list of messages using:

- the **Up**, **Down**, **PageUp**, **PageDown**, **Home** and **End** keys on the keyboard,
- the mouse. Use the scroll bar if the list contains more messages than can be displayed.

Acknowledging a message

To acknowledge a message that requires acknowledgement, you must select it and activate one of the following commands:

- the corresponding heading in the contextual menu (accessible by right-clicking with the mouse),
- the **F6** function key,
- the corresponding button in the toolbar,
- double-clicking the icon of the alarm selected.

You can acknowledge several messages at once (multiple selection). When you acknowledge a message, an order is sent to the PLC and the associated icon is modified in the list.

A message can be acknowledged from another viewer. In this case, the Unity Pro Diagnostics Viewer is advised and the message is displayed as if acknowledged locally (the associated icon is modified and the message no longer flashes).

Deleting messages from the list

You cannot delete a message that needs acknowledgement or where the associated fault has not disappeared.

However, you can delete the messages associated with faults that have disappeared and have been acknowledged. To do this activate:

- the corresponding heading in the contextual menu,
- the **Del** key.

Deleting an alarm from the PLC memory

This function is used to delete from the PLC all the messages selected in the list, even if the fault is still present and has not been acknowledged.

Use of this function is only possible if your [user profile](#) is different from **ReadOnly** or **Operate**.

Activating another tool

If at least one message is selected in the list, you can activate the following Unity Pro tools:

- the animation tables for displaying the diagnostics function block data (FB alarms only) and FFB system alarms,
- the cross-references with FB alarms and FFB system alarms only,
- the language editor where the diagnostics function block instance is referenced.

To launch these tools you must activate one of the following commands:

- the corresponding headings in the contextual menu,
- the **Ctrl + T** (animation tables), **Ctrl + U** (cross references) and **Enter** (language editor) function keys,
- the corresponding buttons in the toolbar.

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Diagnostics Viewer Commands



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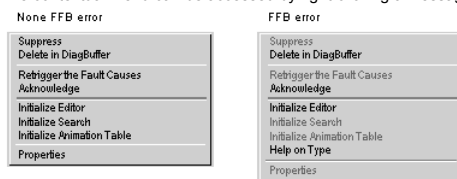
At a Glance

Once you have selected one or more error messages (active errors only), you have a number of options available for accessing the Diagnostics Viewer commands:

- using the contextual menu,
- using the function keys,
- using the toolbar.

Contextual Menu

The contextual menu can be accessed by right-clicking a message from the list with the mouse:



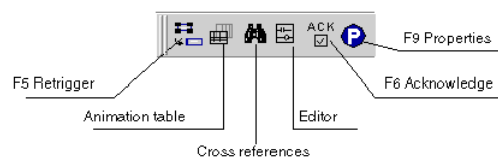
The commands and their function keys from the contextual menu are as follows:

Command	Function key	Description
Suppress	-	deletion of the message(s) selected
Delete in DiagBuffer	-	deletion of alarms in the diagnostics buffer
Retrigger the Fault Causes	F5	reactivation of the diagnostics function block
Acknowledge	F6	acknowledgments of selected message(s)
Initialize Editor	Enter	activation of the language editor
Initialize Search	Ctrl + U	activation of the cross references tool (search for active errors)
Initialize Animation Table	Ctrl + T	activation of the animation table tool (initialize animation table of active errors)
Help on Type	-	opening the online help for the concerned FFB
Properties	Alt + Enter	displaying the Diagnostics Viewer properties box

NOTE: The **Initialize Search** and **Initialize Animation Table** commands are also accessible through the contextual menu in the additional message information area.

Toolbar

The icons of the toolbar corresponding to the contextual menu or to the function keys are as follows:



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DiagViewer Properties



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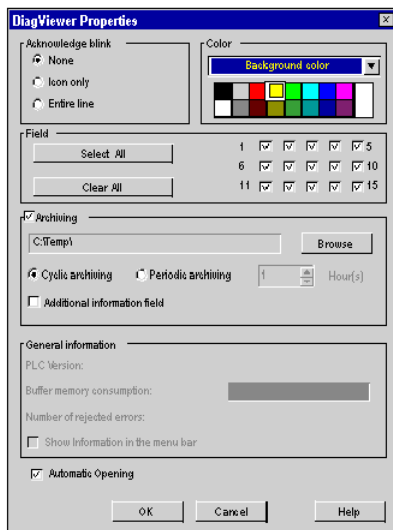
At a Glance

The **DiagViewer Properties** dialog box, accessible via the **DiagViewer Properties** command in the contextual menu, is used to:

- define the color of the error messages,
- define the flashing mode of the error messages,
- choose the fields to be displayed,
- define the archiving mode,
- define the mode of opening the Diagnostics Viewer.

Properties dialog box

The screen below presents the **DiagViewer Properties**:



Description

The following table describes the various fields of the **Properties** dialog box:

Field	Description
Acknowledge blink	Allows you to define the type of flashing when an error message to be acknowledged appears. Once acknowledged messages no longer flash. None: no flashing, Icon only: only the icon flashes, Entire line: the entire line flashes.
Color	Allows you to define the color of the error messages.
Field	Allows you to choose the fields to be displayed (fields 0 to 15). By default all the fields are displayed. Select all: selects all fields, Clear All: deselects all fields. To select a field check the corresponding box by clicking the mouse.
Archiving	Click this box to generate an archive . The entry field and the Browse button allow you to define the path of the archive file. Cyclic archiving: a new archive file is generated every 1000 saves. Periodic archiving: a new archive file is generated every x hours. Hour allows you to define the number x (between 1 and 24). Additional information field: allows you to store additional data in the file.
general information	Displaying various information: - PLC version. - diagnostics buffer memory usage. - number of alarms rejected if the diagnostics buffer is full. Show information in the menu bar is used to display this information in the title bar of the diagviewer window.
Automatic Opening	When this button is checked, the Diagnostics Viewer is automatically displayed when a fault appears.

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Archiving error messages



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At a Glance

Archiving is used to store in a file all error messages as soon as they appear, disappear or are acknowledged. As soon as a message is read in the diagnostics buffer it is saved in the archive file.

If a fault appears and then disappears, it is represented by a single message in the Diagnostics Viewer (a single line), but by 2 lines in the archive file.

The [Properties](#) dialog box allows you to activate archiving of error messages. It also allows you to define the type of archiving and the location of the archive file.

Type of archiving

You can choose between 2 types of archiving:

- cyclic archiving**: The history file created is named *ProjectName.his*, where *ProjectName* is the name you entered in the [Project Properties](#) dialog box is. in order to avoid the size of the archive file becoming too large, a new *ProjectName.his* file is created every 1000 saves. The old file then changes name and becomes *ProjectName.bak*.
Note: If a *ProjectName.bak* file already exists, it will be overwritten by the new file of the same name. To avoid a loss of data, you must therefore manage your archive files.
- periodic archiving**: the user defines the frequency with which a new archive file is created (between 1 and 24 hours). The file is created under the name *ProjectDraft_date_time* (for example, for a file created on 31 July 2001 at 12 h 26 min 55 s: *ProjectDraft_073101_122655*. If the chosen frequency is 1 h, the next file will be created under the name *ProjectDraft_073101_132655*, etc.). Creating a new file does not overwrite the previous file.

Archive file format

The archive file is a delimited ASCII file (each item of information is separated by the ; character). You can therefore easily import this file into a text editor or a spreadsheet.

Each line of the file takes the following form:

SystemAlarm ; 256 ; 1 ; 51 ; 0 ; 28/04/03 23:50:13 ; 28/04/03 23:51:15; 28/04/03 23:57:16 ; 0 ; 2; 10003 ;148 ; Arithmetic error where:

- SystemAlarm**: identifies the fault.
The types of fault can be:

- FBAlarm: function block fault
- SFCAlarm: sequential function chart fault
- SystemAlarm: system fault
- UndefinedAlarm: undefined fault
- AlarmERROR: errors
- **256**: fault identifier,
- **1**: name of this fault,
- **51**: state of the diagnostics bits,
- **0**: number of the declared area,
- **28/04/03 23:50:13**: date and time of appearance of the fault,
- **28/04/03 23:51:15**: date and time of acknowledgement of the fault,
- **28/04/03 23:57:16**: date and time of disappearance of the fault,
- **0**: available number of reasons for the fault,
- **2**: status length of the fault,
- **10003**: fault type,
- **148**: fault classification,
- Arithmetic error; %S18 (MAST): additional data if you have checked the **Additional information field** box.

The following table describes the additional information to a message according to fault type.

Error type	Information
FBAlarm	Comment Name of the function block instance Name of the function block type Name of the input or output of the faulty block
SFCAlarm	Comment Name of the faulty step Name of the faulty transition Format of the reference time Additional information
SystemAlarm	Fault name Additional information according to the fault: ● watchdog, ● arithmetic, ● task, ● SFC, ● ...

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System diagnostics



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At a Glance

The system diagnostic is performed automatically. When the PLC detects a system error (for example, a watchdog being exceeded, an input/output error, division by zero, etc.), information is sent to the diagnostic viewer. The diagnostic viewer will display a system error message if you have checked the [System diagnostics](#) checkbox.

NOTE: As with the project diagnostic, the information viewed on the Viewer comes from the PLC's [diag buffer](#), consequently the events are dated at the source and give the precise status of the process monitored.

Implementation

The following table describes the procedure to follow to use the system diagnostic on the Premium, Atrium and Quantum PLCs in Unity Pro.

Step	Action
1	Select Tools → Project Settings Result: the project settings configuration window is displayed.
2	In the Diagnostics area on the Build tab, check the System diagnostics checkbox.
3	Confirm with OK .
4	Build your project.
5	Transfer your project to the PLC.
6	Open the Diagnostic Viewer by selecting: Tools → Diagnostic Viewer . Result: the system diagnostic is operational and each system alarm now appears in the Viewer.

List of system alarms monitored

The following table summarizes the system information monitored automatically by the system diagnostic service.

System object	Succinct description of the alarm
%S10	Input/output error
%S11	Watchdog overflow!
%S15	Character string fault
%S18	Overflow or arithmetic error
%S19	Task period overrun
%S20	Index overflow
%S39	Saturation in event processing

%S51	Time loss in real time clock
%S65	Extract card command
%S66	Backup application to the memory card
%S67	State of the PCMCIA application memory card battery
%S68	State of processor battery
%S76	Diagnostic buffer configured
%S77	Diagnostic buffer full
%S96	Previously backup program
%S118	General Fipio I/O fault
%S119	General in-rack I/O fault
%SW0	Master task scanning period
%SW1	Fast task scanning period
%SW2	Period of auxiliary task scanning 0.
%SW3	Period of auxiliary task scanning 1.
%SW4	Period of auxiliary task scanning 2.
%SW4	Period of auxiliary task scanning 3.
%SW11	Watchdog duration
%SW17	Error status for floating operation
%SW76	Diagnostic function: save
%SW77	Diagnostic function: de-registration
%SW78	Diagnostic function: number of errors
%SW96	Save/restore %MW in flash memory.
%SW97	Storage card error code
%SW125	Type of blocking error
%SW146	Fipio bus arbiter function display
%SW153	List of Fipio channel manager faults
%SW154	List of Fipio channel manager faults

NOTE: The Fipio diagnostic is integrated in Unity Pro versions higher than 1.0.

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Project diagnostics



Subject of this Chapter

This chapter describes how to implement project diagnostics and its functionalities.

What Is in This Chapter?

This chapter contains the following topics:

- [How to Create a User Diagnostic DFB](#)
- [Project diagnostic](#)

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How to Create a User Diagnostic DFB



See: [Related Topics](#)

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At a Glance

You can create a diagnostic DFB in one of two ways.

- You can create a standard DFB and then define its values and program it so that it is a diagnostic DFB.
- You can use the [USER_DIAG_ST_MODEL](#) model that we will provide you with, or use a model you already have.

These two procedures are described below.

NOTE: to understand how user diagnostic DFBs work, refer to the [USER_DIAG_ST_MODEL](#) model described in the diagnostic library.

Creating a Diagnostic DFB without a Model

The following table describes the procedure to follow to create a diagnostic DFB without a predefined model.

Step	Action
1	In the structure view of the Project Browser, right-click on the directory Derived FB Types . Result: A shortcut menu is opened.
2	Activate the Open command. Result: The Data Editor window is opened. It is positioned directly under the DFB Types tab and shows the list of the project's DFBs.
3	Select the first empty cell in the Name column (indicated by an arrow) and enter the name of the new DFB type, then confirm using Enter .

	Result: The empty structure of the DFB type is now created. This new DFB is added to the list of existing DFBs. It also appears in the Derived FB Types directory tree.
4	In the Data Editor, right-click on the type of DFB you have just created. Result: the contextual menu appears.
5	Choose the Data Properties command. Result: the Data Properties window appears.
6	Click on the Diag button. Result: the checkbox is checked in red. This type of DFB is now a diagnostic DFB. If, in the Project Settings , the application diagnostic has been requested, the project's generation will incorporate the project diagnostic service in the PLC.
7	Create the inputs, outputs, inputs/outputs and the internal variables of the DFB. Note: in the input's properties, remember to check the Diag checkbox for inputs that will be monitored by the DFB.
8	Write your DFB's code using the REGDFB function to save and date the alarm, and the DEREG function to de-register the alarm. Note: refer to the description of the code of the USER_DIAG_ST_MODEL user diagnostic DFB model if you are not familiar with this type of DFB.
9	Run a project analysis to validate your new type of DFB. Result: your new type of DFB is created. You can now create and insert instances of this type of DFB in your program. When your PLC is in RUN mode, the Viewer will display the alarms according to the operation you have programmed.

Creating a Diagnostic DFB with the USER_DIAG_ST_MODEL Model

The following table describes the procedure to follow to create a diagnostic DFB using the USER_DIAG_ST_MODEL predefined model.

Step	Action
1	In the structure view of the Project Browser, right-click on the directory Derived FB Types . Result: A shortcut menu is opened.
2	Choose the Get from Library command. Result: the Library Browser window appears.
3	Select the USER_DIAG_ST_MODEL diagnostic DFB model in the diagnostic library, then click on the >> button to transfer it to your project.
4	Confirm the transfer with OK . Result: the model appears in the Project Browser.
5	Replace the USER_DIAG_ST_MODEL name with the name of the type of user DFB you want to create.
6	Modify and create the inputs, outputs, inputs/outputs and the internal variables of the DFB. Note: in the input's properties, remember to check the Diag checkbox for inputs that will be monitored by the DFB.
7	Write your DFB's code using the model. Note: refer to the description of the code of the user diagnostic DFB model if you are not familiar with this type of DFB.
8	Run a project analysis to validate your new type of DFB. Result: your new type of DFB is created. You can now create and insert instances of this type of DFB in your program. When your PLC is in RUN mode, the Viewer will display the alarms according to the operation you have programmed. Note: the message displayed by the Viewer is the comment associated with the instance of the DFB. You must therefore remember to fill in this comment for each instance created.

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Project diagnostic



See: [Related Topics](#)

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At a Glance

The project diagnostic uses the diagnostic EFBs and DFBs and the diagnostic integrated in the SFC to generate alarms on the Diagnostic Viewer.

Each diagnostic EFB and each diagnostic DFB has its own specific operation described in [the diagnostic library](#). If you cannot find the appropriate EFB or DFB among these elements, you can create [your own diagnostic DFB](#).

NOTE: It is strongly recommended to only program a diagnostic DFB instance once within the application.

NOTE: As with the system diagnostic, the information viewed on the Viewer comes from the PLC's [diag buffer](#), consequently the events are dated at the source and give the precise status of the process monitored.

Implementation of diagnostic EFBs or DFBs

The following table describes the procedure to follow to use the project with a diagnostic EFB or DFB on the Premium, Atrium and Quantum PLCs in Unity Pro.

Step	Action
1	Select Tools → Project Settings Result: the project settings configuration window is displayed.
2	In the Diagnostics area on the Build tab, check the Application diagnostics checkbox.
3	Choose the language of the messages in the Viewer.
4	Choose the Application level (alarm cause search level).
5	Confirm with OK .
6	Integrate the diagnostic EFBs or DFBs in your application. Note: The messages displayed in the Viewer will be the comments you will have associated with the instances of your diagnostic EFBs or DFBs.
7	Build your project.
8	Transfer your project to the PLC.

9	Open the Diagnostic Viewer by selecting: Tools → Diagnostic Viewer . Result: the system diagnostic is operational and each alarm generated by your EFBs or DFBs now appears in the Viewer.
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Implementation of the SFC diagnostic

The following table describes the procedure to follow to use the SFC diagnostic on the Premium, Atrium and Quantum PLCs in Unity Pro.

Step	Action
1	Select Tools → Project Settings Result: the project settings configuration window is displayed.
2	In the Diagnostics area on the Build tab, check the Application diagnostics checkbox.
3	Confirm with OK .
4	Build your project.
5	Transfer your project to the PLC.
6	Open the Diagnostic Viewer by selecting: Tools → Diagnostic Viewer . Result: the SFC diagnostic is operational and each alarm linked to the SFC now appears in the Viewer.

Error message display

The number of messages it is possible to display is limited only by the size of the memory buffer. When there is not enough memory, a message warns the user and any messages of errors that have disappeared or have been acknowledged (if necessary) are then deleted.

It is possible to modify the color of the messages and the blinking associated with an acknowledged message.

In the viewer, it is possible to show only those messages which come from one or more specific zones.

The list of messages can be sorted according to each field. To do this, simply click on the column header containing the data on the basis of which the sort is to be carried out.

A second click carries out the sort in opposite order.

By default, the error messages are inserted into the list in the chronological order in which they appear.