Explanation About Library for SISTEMA

1. Overview

(1) Overview

This document explains how to load library for SISTEMA which includes data of Safety Programmable Controller, Safety Controller and Safety Relay Module (hereinafter “this library”) and registered data or the like.

(2) What this library can do

Loading this library into SISTEMA enable to reduce the burden of data input of subsystem which is necessary for PL evaluation of the safety system (including Safety Programmable Contorller, Safety Controller and Safety Relay Module).

2. How to Load This Library

The following shows how to load this library into SISTEMA and its procedure.

1) Store this library in the folder name of “\My Documents\SISTEMA\Libraries”.
2) Start up SISTEMA.
3) Create project (**PR**) and create safety function (**SF**) in the profect.
4) Click on safety function (**SF**) with the right mouse button and select “Load from Library” from pull-down menue. (Library window is started up after selection).
5) Click “Add local Library” button on the upper part of the window.
6) Select to load this library which is stored in the hierarchy of 1).

By the operation of the above, registered data of this library becomes available.
Data of products is available from the list in the library window of SISTEMA.

Note: This library is made and checked the operation by using SISTEMA Ver.1.1.4. When using this library, we recommend using SISTEMA Ver. 1.1.4. (For the details, refer to the after-mentioned URL.)

3. Library Registered Data

(1) Library registered data

The following table shows product data which is registered in this library.
Subsystem name in the table presents name of subsystem which has necessary parameter for PL evaluation. By selecting this subsystem name on SISTEMA for load, the parameter of this product is utilized without any change.
The value of parameter might change depending on the condition such as how to use the product or shipment time even if the same product is used. Select the subsystem name which matches to the product or its condition when using parameter.

(1) Safety Programmable Controller
As a product of the Safety Programmable Controller, data of safety CPU module, safety power supply module and CC-Link safety system remote I/O module is registered.

Product			Library Registered Data			
Product name	Model		Subsystem name	Parameter		
				PFH [1/h]	PL	Category
Safety CPU module	QS001CPU	When upper 4 digit of serial No. is “1208” or later	QS0 - Safety CPU : QS001CPU	9.20×10^{-10}	PL e	Cat.4
		When upper 4 digit of serial No. is “1207” or earlier	QS0 - Safety CPU : QS001CPU ("1207" or earlier)	1.15×10^{-9}	PL e	Cat.4
Safety power supply module	QS061P-A1 QS061P-A2	When upper 4 digit of serial No. is “1206” or later	QS0 - Safety Power Supply : QS061P-A1/A2	3.85×10^{-9}	PL e	Cat.4
		When upper 4 digit of serial No. is “1205” or earlier	QS0 - Safety Power Supply : QS061P-A1/A2 ("1205" or earlier)	3.80×10^{-9}	PL e	Cat.4
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT		QS0 - Safety I/O : QS0J65BTB2-12DT	1.15×10^{-9}	PL e	Cat.4
	QS0J65BTS2-8D		QS0 - Safety I/O : QS0J65BTS2-8D	7.46×10^{-10}	PL e	Cat.4
	QS0J65BTS2-4T		QS0 - Safety I/O : QS0J65BTS2-4T	7.46×10^{-10}	PL e	Cat.4
Safety CPU module	QS001CPU-K		QS0 - Safety CPU : QS001CPU-K	9.20×10^{-10}	PL e	Cat.4
Safety power supply module	QS061P-A1-K QS061P-A2-K		QS0 - Safety Power Supply : QS061P-A1-K/A2-K	3.80×10^{-9}	PL e	Cat.4
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT-K		QS0 - Safety I/O : QS0J65BTB2-12DT-K	1.21×10^{-9}	PL e	Cat.4

(Note) Products, QS034B(-K), QS0J61BT12(-K) and QS0J71GF11-T2, are not registered in the library since they are not related to PL evaluation.

(2) Safety Controller

As a product of the Safety Controller, data of CPU module, safety input module, safety I/O combined module and safety relay output module is registered.

Product			Library Registered Data			
Product name	Model		Subsystem name	Parameter		
				PFH [1/h]	PL	Category
CPU module	WS0-CPU0		WS0 - Safety CPU : WS0-CPU0	1.07×10^{-9}	PL e	Cat.4
CPU module (with EFI)	WS0-CPU1		WS0 - Safety CPU : WS0-CPU1	1.69×10^{-9}	PL e	Cat.4
Safety input module	WS0-XTDI		WS0 - Safety I/O : WS0-XTDI	0.4×10^{-9}	PL e	Cat.4
Safety I/O combined module	WS0-XTIO	When outputting single channel (with test pulse (Cat.4))	WS0 - Safety I/O : WS0-XTIO (1 ch output with test pulses)	4.8×10^{-9}	PL e	Cat.4
		When outputting single channel (without test pulse (Cat.3))	WS0 - Safety I/O : WS0-XTIO (1 ch output without test pulses)	4.8×10^{-9}	PL e	Cat.3
		When outputting dual channel or output is not used	WS0 - Safety I/O : WS0-XTIO	0.9×10^{-9}	PL e	Cat.4
Safety relay output module	WS0-4RO	When load current : 0.75[A]	WS0 - Safety Relay : WS0-4RO	1.2×10^{-9} *	PL e	Cat.4

* PFH value of Safety relay output module is changed by load current. When product which is not stated in this document is used, refer to the manual because it is necessary to input appropriate PFH value.

(3) Safety Relay Module

As a product of the Safety Relay Module, data of safety relay module for Q series, safety relay module for CC-Link and extension safety relay module is registered.

Product			Library Registered Data					
Product name	Model		Subsystem name	Parameter				
				PL	Category	$MTTF_d$ [year]	DC_{avg}	CCF
Safety relay module for Q series	QS90SR2SP-Q	When using Type4 light curtain (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SP-Q (Cat.4)	PL e	Cat.4	100	99	65
		When using Type4 light curtain (maximum rated current :5.0[A]) or using contact-type input device	QS9 – Safety Relay : QS90SR2SP-Q (Cat.3)	PL e	Cat.3	100	99	65
	QS90SR2SN-Q	When using contact-type input deveice (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SN-Q (Cat.4)	PL e	Cat.4	100	99	65
		When using contact-type input deveice (maximum rated current: 5.0[A])	QS9 – Safety Relay : QS90SR2SN-Q (Cat.3)	PL e	Cat.3	100	99	65
Safety relay module for CC-Link	QS90SR2SP-CC	When using Type4 light curtain (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SP-CC (Cat.4)	PL e	Cat.4	100	99	65
		When using Type4 light curtain (maximum rated current :5.0[A]) or using contact-type input device	QS9 – Safety Relay : QS90SR2SP-CC (Cat.3)	PL e	Cat.3	100	99	65
	QS90SR2SN-CC	When using contact-type input deveice (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SN-CC (Cat.4)	PL e	Cat.4	100	99	65
		When using contact-type input deveice (maximum rated current: 5.0[A])	QS9 – Safety Relay : QS90SR2SN-CC (Cat.3)	PL e	Cat.3	100	99	65
Extension safety relay module	QS90SR2SP-EX	When using Type4 light curtain (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SP-EX (Cat.4)	PL e	Cat.4	100	99	65
		When using Type4 light curtain (maximum rated current :5.0[A]) or using contact-type input device	QS9 – Safety Relay : QS90SR2SP-EX (Cat.3)	PL e	Cat.3	100	99	65
	QS90SR2SN-EX	When using contact-type input deveice (maximum rated current: 3.6[A])	QS9 – Safety Relay : QS90SR2SN-EX (Cat.4)	PL e	Cat.4	100	99	65
		When using contact-type input deveice (maximum rated current: 5.0[A])	QS9 – Safety Relay : QS90SR2SN-EX (Cat.3)	PL e	Cat.3	100	99	65

(2) Remarks

(1) Reference manual

This document and this library have been created based on the manuals listed in the following table. Please check the manual and parameters corresponding to the shipping time of your device because value of the parameter used for PL evaluation of safety devices might be changed.

Safety device	Name of manual	Manual version
Safety Programmable Controller	Safety Guidelines	Version G
Safety Controller	Safety Controller User's Manual	Version F
Safety Relay Module	Safety Relay Module User's Manual	Version E

Each manual can be downloaded from FA device website of Mitsubishi Electric Corporation.

(2) Differences of parameters which is used for PL evaluation

Parameter used for PL evaluation is different based on safety device to be used. For example, Safety Programmable Controller or Safety Controller uses parameter of PFH, PL or category for PL evaluation because they are certified products compliant of ISO 13849-1 and IEC 61508.

On the other hand, Safety Relay Module does not have parameter of PFH because it comforms of ISO 13849-1 but not IEC 61508. Instead of it, parameters of PL, category, $MTTF_d$, DC_{avg} and CCF are used for PL evaluation.

4. Reference

SISTEMA is provided free of charge by IFA (Institute of Financial Accountants) in Germany. Please contact to IFA regarding how to use the tool.
The following are the URLs which are helpful for using SISTEMA.

(1) IFA

http://www.dguv.de/ifa/en/pra/softwa/sistema/index.jsp

You can download tool and manual of SISTEMA. (Registration of e-mail address is necessary for download the SISTEMA.)

(2) Examination Report Database by The Japan Machinery Federation

http://www.jmf.or.jp/japanese/houkokusho/kensaku/2010/21hyojun_02.html

Technical documents relating to PL evaluation method and operation method of SISTEMA are available.