Digital Trip Module

Attributes	Definition
See physical device template (Device.wb3) for attributes	
Behaviors	
Receive Digital Inputs ( ) -- For each input fun	The initiation of a signal for the purpose of accomplishing a safety function.
Function Name	The identification of the specific function under review.
Inputs	
Input Description	The input signals including the electrical and encoding characteristics and maximum and minimum values.
Process	
Communications Protocol	The set of rules required of a functional unit to achieve communications with other elements of the system.
Data Validation	The methods used to authenticate data.
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Update Rate	The time required to obtain a collection of data
Receive Binary Inputs ( ) -- For each input function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Inputs	
Input Description	The electrical and encoding characteristics of the input signal including maximum and minimum values.
Process	
Data Validation	The methods used to authenticate data.
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Update Rate	The time required to obtain a collection of data
Receive Analog Inputs ( ) -- For each input function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Inputs	
Input Description	The input signals including the electrical and encoding characteristics and maximum and minimum values.
Process	
Data Validation	The methods used to authenticate data.
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Update Rate	The time required to obtain a collection of data
Channel Trip ( ) - For each trip function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Trip Algorithm	The logical or mathematical description of the conditions under which trip is to occur.
Setpoint Algorithm	The algorithm that is used to calculate the setpoint (often setpoint = constant)
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data
Channel Operational Bypass ( ) - For each operational bypass function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Bypass Algorithm	The logical or mathematical description of the conditions under which division operational bypass is to occur.
Setpoint Algorithm	The algorithm that is used to calculate the bypass permissive setpoint (often setpoint = constant)
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data

Digital Output ( ) -- For each output function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Communications Protocol	The set of rules required of a functional unit to achieve communications with other elements of the system.
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Output Description	The output signals to be produced in electrical and encoding characteristics of the output signal including maximum and minimum values.
Communications Protocol	The set of rules required of a functional unit to achieve communications with other elements of the system.
Performance	
Precision	The degree of exactness or discrimination with which a quantity is stated; for example a precision of 2 vs. 5 decimal places.
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data
Display ( ) -- For each display function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Display Algorithm	The function that describes the relationship between input conditions and the display. Typically a simple function such as "if bypass then display bypass."
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Display Outputs	The description of the information to be displayed including formats, graphics, and navigation functions.
Performance	
Uncertainty	The allowable about by which the channel output is in doubt. Typically includes accuracy, environment effects, drift, etc.
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data
Test ( ) -- For each test function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Inputs	
Manual Controls	The operator controls over test performance
Process	
Test Process	The description of the testing to be performed including sequencing, and scheduling.
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Functional Outputs	The condition the normal outputs assume during testing.
Local Displays	The displays provided on the device to indicate the status and results of the test function.
Remote Outputs	The output signals to remotely indicate the status and results of the test function, including electrical and encoding characteristics and max. and min. values.
Performance	
Uncertainty	The allowable about by which the test results are in doubt. Typically includes accuracy, environment effects, drift, etc.
Test Completion Time	The time allowed for test performance, particularly automatic test performance.
Test Frequency	The frequency at which testing is repeated.
Maintenance Bypass ( ) -- For each bypass function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Inputs	
Manual Controls	The operator controls over maintenance bypass
Process	
Bypass algorithms	The relationship between input and the bypass/unbypass conditions. Typically a function of the manual bypass control and the status of redundant channels.
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Trip Outputs	The condition the normal outputs assume during bypass.
Local Displays	The displays provided on the device to indicate the status and results of the bypass function.
Remote Outputs	The output signals to remotely indicate the status and results of the bypass, including electrical and encoding characteristics and max. and min. values.
Maintain ( )	

Function Name	The identification of the specific function under review.
Inputs	
Input Description	The input signals including the electrical and encoding characteristics and maximum and minimum values.
Communications Protocol	The set of rules required of a functional unit to achieve communications with other elements of the system.
Process	
Maintenance Process	The types of maintenance activities that are allowed.
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Output Description	The output signals to be produced in electrical and encoding characteristics of the output signal including maximum and minimum values.
Communications Protocol	The set of rules required of a functional unit to achieve communications with other elements of the system.
Access Control ( )	
Function Name	The identification of the specific function under review.
Inputs	
Input Description	The input signals including the electrical and encoding characteristics and maximum and minimum values.
Process	
Validate Access	The provisions required to prevent unauthorized operation or modification of the system or system parameters.
Change Access Criteria	The provisions required to prevent unauthorized changes to access criteria.
Initialization / Reset Mode	The condition that the function assumes upon startup or energization - both initially and after reset.
Outputs	
Output Description	The output signals to remotely indicate system and maintenance function status , including electrical and encoding characteristics and max. and min. values.
Division Trip ( ) - For each trip function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Trip Algorithm	The logical or mathematical description of the conditions under which trip is to occur.
Performance	
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data
Division Operational Bypass ( ) - For each operational bypass function the following constraints should be considered	
Function Name	The identification of the specific function under review.
Process	
Bypass Algorithm	The logical or mathematical description of the conditions under which division operational bypass is to occur.
Performance	
Response Time	The time required after an abrupt change input until the output comes to rest a its new value
Update Rate	The time required to obtain a collection of data

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Attributes	Typical Source of Constraints	Typical Location of Constraints	Comments
See physical device template (Device.wb3) for attributes			
Behaviors			
Receive Digital Inputs ( ) -- For each input function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Inputs			
Input Description	Noise immunity & failure mode requirements	Protection System Specification	
Process			
Communications Protocol	Error rates & determinism requirements	Protection System Specification	
Data Validation	Reliability strategy	Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	

Receive Binary Inputs ( ) -- For each input function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Inputs			
Input Description	Noise immunity & failure mode requirements	Protection System Specification	
Process			
Data Validation	Reliability Strategy	Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	
Receive Analog Inputs ( ) -- For each input function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Inputs			
Input Description	Noise immunity & failure mode requirements	Protection System Specification	
Process			
Data Validation	Reliability Strategy	Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	
Channel Trip ( ) - For each trip function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Process			
Trip Algorithm	Assumed safety functions	Setpoint Analysis, Protection System Specification	
Setpoint Algorithm	Assumed safety functions	Setpoint Analysis, Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Response Time	Function delay time assumption	Setpoint Analysis, Protection System Specification	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	
Channel Operational Bypass ( ) - For each operational bypass function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Process			
Bypass Algorithm	Assumed safety functions	Protection System Specification	
Setpoint Algorithm	Assumed safety functions	Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Response Time	Function delay time assumption	Protection System Specification	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	
Digital Output ( ) -- For each output function the following constraints should be considered			
Function Name	Assumed safety functions	Protection System Specification	
Process			
Communications Protocol	Error rates & determinism requirements	Protection System Specification	
Initialization / Reset Mode	Defined safe state	Protection System Specification	
Outputs			

Output Description	Noise immunity & failure mode requirements	Protection System Specification	
Communications Protocol	Error rates & determinism requirements	Protection System Specification	
Performance			
Precision	System uncertainty requirements	Setpoint Analysis	
Response Time	Function delay time assumption	Protection System Specification	
Update Rate	System bandwidth & response time	Protection System Specification, Setpoint Analysis	
Display ( ) -- For each display function the following constraints should be considered			
Function Name	Operator task analysis	Protection System Specification	
Process			
Display Algorithm	Operator task analysis	Protection System Specification	
Initialization / Reset Mode	Operator task analysis	Protection System Specification	
Outputs			
Display Outputs	Operator task analysis, Human factors standards	Protection System Specification	
Performance			
Uncertainty	Operator task analysis	Protection System Specification	
Response Time	Operator task analysis, Human factors standards	Protection System Specification	
Update Rate	Operator task analysis, Human factors standards	Protection System Specification	
Test ( ) -- For each test function the following constraints should be considered			
Function Name	Integrity strategies	Protection System Specification	
Inputs			
Manual Controls	Integrity strategies	Protection System Specification	
Process			
Test Process	Integrity strategies	Protection System Specification	
Initialization / Reset Mode	Defined safe state	Protection System Specification	
Outputs			
Functional Outputs	Defined safe state	Protection System Specification	
Local Displays	Operator task analysis	Protection System Specification	
Remote Outputs	Operator task analysis	Protection System Specification	
Performance			
Uncertainty	Integrity strategies	Protection System Specification	
Test Completion Time	Allowed out-of service time	Protection System Specification	
Test Frequency	Reliability assumptions	Protection System Specification	
Maintenance Bypass ( ) -- For each bypass function the following constraints should be considered			
Function Name	Maintenance task analysis	Protection System Specification	
Inputs			
Manual Controls	Maintenance task analysis	Protection System Specification	
Process			
Bypass algorithms	Integrity strategies	Protection System Specification	
Initialization / Reset Mode	Defined safe state	Protection System Specification	
Outputs			
Trip Outputs	Defined safe state	Protection System Specification	
Local Displays	Maintenance task analysis	Protection System Specification	
Remote Outputs	Maintenance task analysis	Protection System Specification	
Maintain ( )			
Function Name	Maintenance task analysis	Protection System Specification	
Inputs			
Input Description	Maintenance task analysis	Protection System Specification	
Communications Protocol	Error rates & determinism requirements	Protection System Specification	

Process			
Maintenance Process	Maintenance task analysis	Protection System Specification	
Initialization / Reset Mode	Maintenance task analysis	Protection System Specification	
Outputs			
Output Description	Maintenance task analysis	Protection System Specification	
Communications Protocol	Error rates & determinism requirements	Protection System Specification	
Access Control ( )			
Function Name	Security Analysis	Protection System Specification	
Inputs			
Input Description	Integrity strategies	Protection System Specification	
Process			
Validate Access	Integrity strategies	Protection System Specification	
Change Access Criteria	Integrity strategies	Protection System Specification	
Initialization / Reset Mode	Defined safe state	Protection System Specification	
Outputs			
Output Description	Integrity strategies	Protection System Specification	

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Attributes	Safety Constraint	Source	Actual Requirement	Source	Constraints Met?	Comments
See physical device template (Device.wb3) for attributes						
Behaviors - Behaviors are defined for specific physical devices						
Receive Digital Inputs ( ) -- For each input function the following constraints should be considered						
Function Name						
Inputs						
Input Description						
Process						
Communications Protocol						
Data Validation						
Performance						
Precision						
Update Rate						
Receive Binary Inputs ( ) -- For each input function the following constraints should be considered						
Function Name						
Inputs						
Input Description						
Process						
Data Validation						
Performance						
Precision						
Update Rate						
Receive Analog Inputs ( ) -- For each input function the following constraints should be considered						
Function Name						
Inputs						
Input Description						
Process						
Data Validation						
Performance						
Precision						
Update Rate						
Channel Trip ( ) - For each trip function the following constraints should be considered						

Function Name						
Process						
Trip Algorithm						
Setpoint Algorithm						
Performance						
Precision						
Response Time						
Update Rate						
Channel Operational Bypass ( ) - For each operational bypass function the following constraints should be considered						
Function Name						
Process						
Bypass Algorithm						
Setpoint Algorithm						
Performance						
Precision						
Response Time						
Update Rate						
Digital Output ( ) -- For each output function the following constraints should be considered						
Function Name						
Process						
Communications Protocol						
Initialization / Reset Mode						
Outputs						
Output Description						
Communications Protocol						
Performance						
Precision						
Response Time						
Update Rate						
Display ( ) -- For each display function the following constraints should be considered						
Function Name						
Process						
Display Algorithm						
Initialization / Reset Mode						
Outputs						
Display Outputs						
Performance						
Uncertainty						
Response Time						
Update Rate						
Test ( ) -- For each test function the following constraints should be considered						
Function Name						
Inputs						
Manual Controls						
Process						
Test Process						
Initialization / Reset Mode						
Outputs						
Trip Outputs						
Local Displays						

Remote Outputs						
Performance						
Uncertainty						
Response Time						
Update Rate						
Maintenance Bypass ( ) -- For each bypass function the following constraints should be considered						
Function Name						
Inputs						
Input Description						
Process						
Bypass algorithms						
Initialization / Reset Mode						
Outputs						
Trip Outputs						
Local Displays						
Remote Outputs						
Maintain ( )						
Function Name						
Inputs						
Input Description						
Communications Protocol						
Process						
Maintenance Process						
Initialization / Reset Mode						
Outputs						
Output Description						
Comr						
Access Control ( )						
Function Name						
Inputs						
Input Description						
Process						
Validate Access						
Change Access Criteria						
Initialization / Reset Mode						
Outputs						
Output Description						