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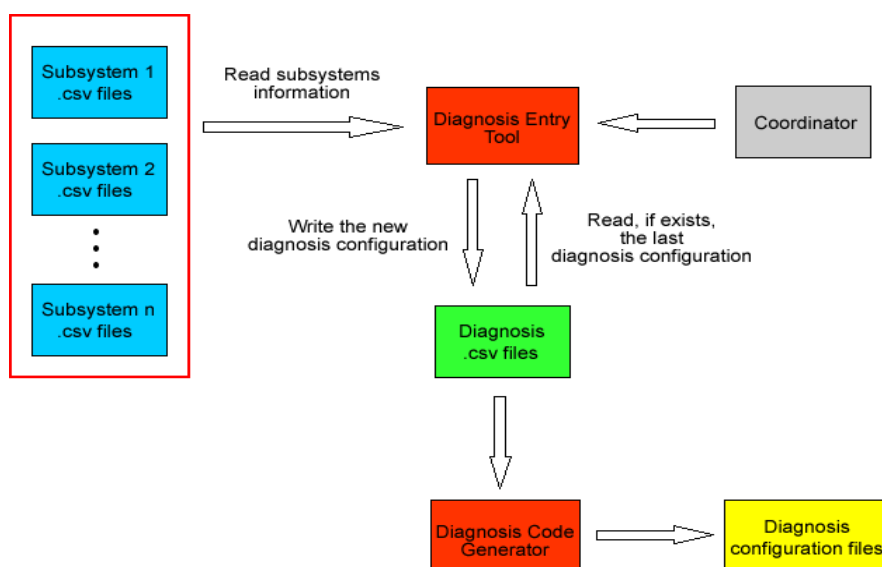
1 Introduction

The Common Diagnosis Sub-System Entry Tool for the ABB Common Diagnosis Sub-System was developed with the intention to be able to create on a simple way the needed CSV-Files for the Common Diagnosis Sub-System code generator and to control the user input to reduce mistakes.


To simplify the CSV-File creation the Entry Tool provides a graphical user interface on which the user can create his Common Diagnosis Configuration. Additionally it provides the possibility to execute the code generators.

This document describes how the project should be prepared to be used with the Common Diagnosis Sub-System Entry Tool, with the code generators and it comprised a tutorial how the user can create the needed subsystem data.

2 Design Concept – Code Generating



The Common Diagnosis Sub-System Entry Tool reads: subsystems csv - files, Coordinator information and the last Common Diagnosis Configuration from diagnosis CSV – files, if exists. The Common Diagnosis Sub-System Entry Tool save the new Common Diagnosis Configuration in the diagnosis CSV files. The Common Diagnosis Sub-System code generator expects diagnosis CSV – files as input and generates Diagnosis Configuration files.

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3 Prepare the project

To use the Common Diagnosis Sub-System Entry Tool with the code generator a project must be prepared as follow:

1. The project shall be developed with the Entry Tool.
2. Download the Common Diagnosis Sub-System code generator from Sharepoint (actual version 0.4) and insert it in the **generators** folder.
3. Download the Common Diagnosis Sub-System Entry Tool from Sharepoint (actual version 0.4). The Entry Tool could lie on any path in the Windows file system e.g. also in the **generators** folder.
4. The Common Diagnosis Sub-System Entry Tool was developed with the Microsoft .NET Framework 2.0. Without this MS-Framework the Common Diagnosis Sub-System Entry Tool could not be executed.
5. The project shall contain a Coordinator Subsystem containing the Subsystem Indexes Enumeration (E_SUBSYSTEM_IDX) in the subsystem_idx.h file as shown in the figure below.

```

//-----
//! subsystem idx
typedef enum _E_SUBSYSTEM_IDX
{
    DIAGNOSIS_IDX,
    SENSORINTERFACE_IDX,
    CURRENTOUT_IDX,
    DIGITALOUT_IDX,

    MEMBER_IDX_NUM_ELEMENTS    // Number of subsystems available
} E_SUBSYSTEM_IDX;

```

6. The project shall contain a Common Diagnosis Subsystem (actual version 0.4).
7. The project shall contain some input/output Subsystem as defined in [1].

Includere procedura inserimento T_DIAGNOSIS_ALARM nei cvs del framework e spiegare quali oggetti devono essere implementati.

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4 Common Diagnosis Subsystem Entry Tool

4.1 Open Project

After starting Common Diagnosis Entry Tool, you can open a project by clicking on the Menu item **Open**. Select your path and click **ok**.



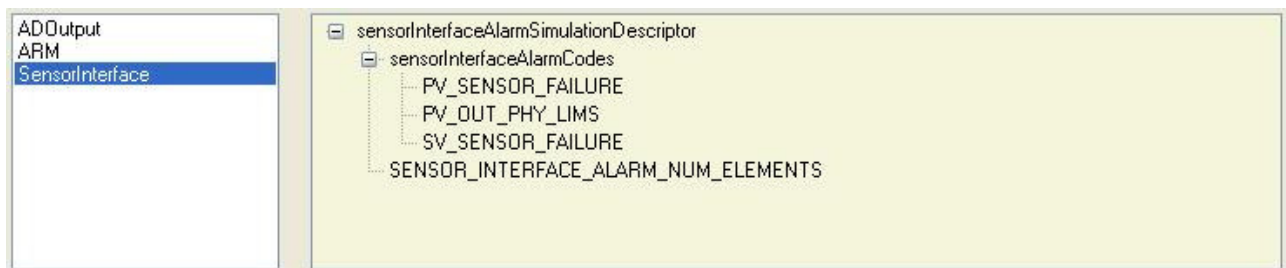
The Diagnosis Entry Tool checks the user selected path, that means if the chosen folder doesn't include the Framework specified folders like generators, Diagnosis or Coordinator, then the Diagnosis Entry Tool shows an error message and the project would not be opened.

4.2 Project Control


After a project was successfully opened the user will see active the following commands:

- Save, which is used to save the diagnosis configuration.
- CodeGen, which is used to start the c code generation process.

4.3 Explorer Box



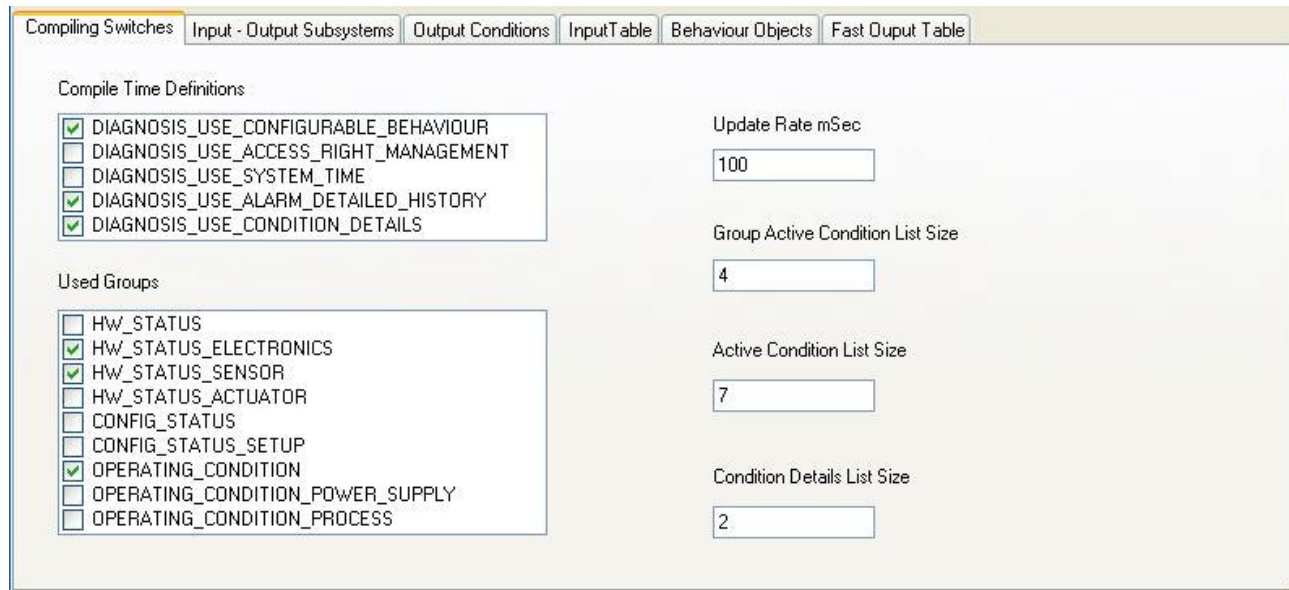
The explorer box shows the descriptors loaded from the subsystems included into the working project. It's could be useful to check wheter the Common Diagnosis Entry Tools was able to load all the information needed to configure the Common Diagnosis Subsystem.

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5 Common Diagnosis Configuration Process

5.1 Compiler Switches

The first part is used to configure the Common Diagnosis Subsystem compiler switches, in order to fit the user preferences and to exclude functions during the compiling process.



Compile Time Definitions:


1. Configurable Behaviour, this switch enable/disable the configurable behaviour mechanism [1] used to define the output reaction to different diagnostic conditions or combination of them. If the switch is disabled the Behaviour Object and the Fast Output Table Tabs are unaccessible.
2. Access Right Management, this switch enable/disable the simulation rules defined in [1].
3. Diagnosis Use System Time, this switch is used to link/unlink the diagnosis condition run time hour counter to the system time if available.
4. Diagnosis Use Alarm Detailed History, this switch enable/disable the logging of the input alarm conditions. This feature is in addition to the simple alarm history and to the alarms details.
5. Diagnosis Use Condition Details, enabling this switch the GetDetailsOfDiagnosticConditionSRV will produce the details about the composition of an output condition. This means that it will return a list composed by the active input conditions that are summarized in the output condition.

Used Groups, this switch is used to configure which groups are used by the device as sources of diagnosis conditions.

Update Rate mSec, represents the update rate for the Common Diagnosis UpdateDeviceStatusEXE method. It is used to update the diagnosis condition run time hour counter when the system time is not available.

Group Active Condition List Size, set the size of the list returned by the GetActiveDiagnosticConditionsSRV method when the request is about one group. It shall be set on the basis of the number of concurrent conditions the device could produce.

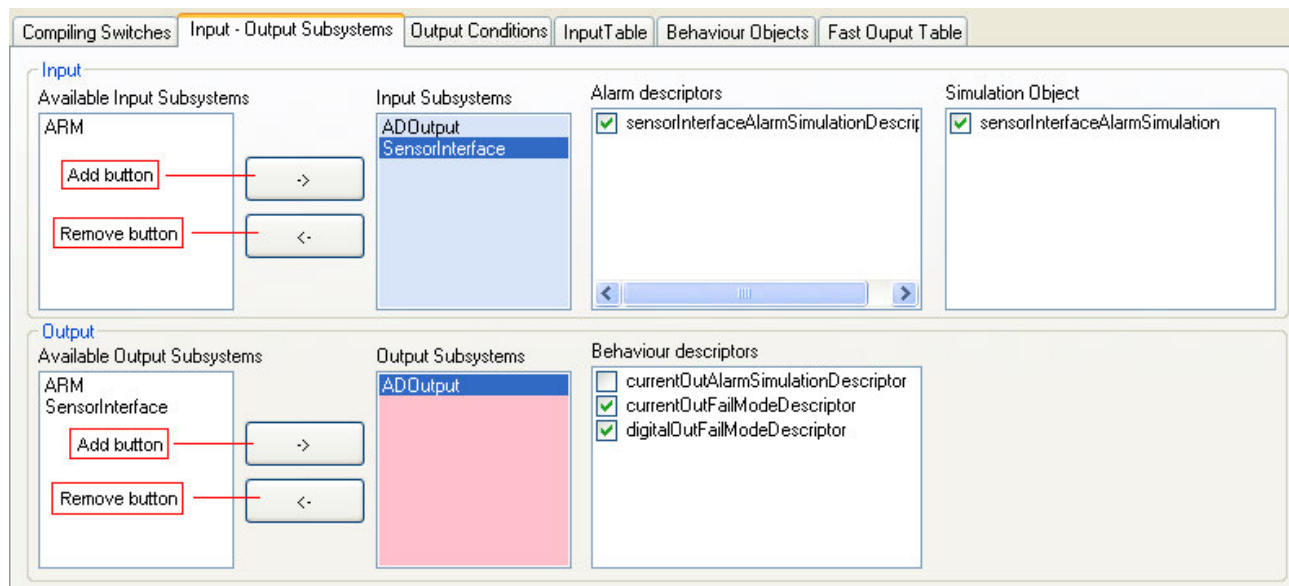
Active Condition List Size, set the size of the list returned by the GetActiveDiagnosticConditionsSRV method when the request is all groups. It shall be set on the basis of the number of concurrent conditions the device could produce.

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Condition Details List Size, set the size of the list returned by the GetActiveDiagnosticConditionsSRV containing the details of the requested active condition.

5.2 Input-Output Subsystems

The Input-Output Subsystem Tab is used to choose which subsystems are input, output or input/output for the Common Diagnosis Subsystem.



Define an Input Subsystem:

1. Get from the available input subsystem list all the subsystems that are inputs for the Common Diagnosis Subsystem through the add button.
2. For each subsystem in the Input Subsystems list select a:
 - a. Alarm Descriptor, that is imported into the Common Diagnosis Subsystem and used to construct the alarm object related to the subsystem.
 - b. Simulation Object, that is used by the Common Diagnosis Subsystem to drive Subsystem's alarm simulation [2].

To remove a subsystem from the Input Subsystems use the remove button.

Define an Output Subsystem:

1. Get from the available output subsystem list all the subsystems that are outputs for the Common Diagnosis Subsystem through the add button.
2. For each subsystem in the Output Subsystems list select a:
 - a. Behaviour Descriptor, that is imported into the Common Diagnosis Subsystem and used to construct the behaviour objects related to the subsystem.

To remove a subsystem from the Output Subsystems use the remove button.

Important Note: the alarm and behavior descriptors are declared by the SubGen and by the Entry Tool as static. In order to use them inside the Common Diagnosis Subsystem the static qualifier shall be manually removed.

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5.3 Output Conditions

Compiling Switches	Input - Output Subsystems	Output Conditions	Input Table	Behaviour Objects	Fast Output Table
		Condition Name	Value (30<x<47)		
		READBACK_FAILURE	31		
		▶▶			

In the Output Condition tab you can define your device specific diagnosis conditions that you will use in the Input Table configuration. Diagnosis subsystem has some common diagnosis conditions (see Common Diagnosis Conditions Definition) already defined, the device specific diagnosis condition values must be between 30 and 47.

5.4 Input Table

Input Table contains all the information about how the diagnosis subsystem shall produce output.

Subsystem	Input Condition	Priority	Class	Group	Output Conditions	Alarm Details	Condition Details
CurrentOut	ALARM_READBACK_FAILURE						
SensorInterface	PV_SENSOR_FAILURE						
SensorInterface	SV_SENSOR_FAILURE						
SensorInterface	PV_OUT_PHY_LIMS_PLUS						
SensorInterface	PV_OUT_PHY_LIMS_MINUS						

Subsystem	Input Condition	Priority	Class	Group	Output Conditions	Alarm Details	Condition Details
CurrentOut	ALARM_READBACK_FAILURE	90	FAILURE	HW_STATUS_ELECTRONICS	READBACK_FAILURE	Yes	Yes
SensorInterface	PV_SENSOR_FAILURE	100	FAILURE	HW_STATUS_SENSOR	PV_SENSOR_FAILU...	Yes	Yes
SensorInterface	SV_SENSOR_FAILURE	75	MAINTENANCE	HW_STATUS_SENSOR	SV_SENSOR_FAILU...	Yes	Yes
SensorInterface	PV_OUT_PHY_LIMS_PLUS	50	OFF_SPECIFICATION	OPERATING_CONDITION	PV_SENSOR_OUT_...	Yes	Yes
SensorInterface	PV_OUT_PHY_LIMS_MINUS	50	OFF_SPECIFICATION	OPERATING_CONDITION	PV_SENSOR_OUT_...	Yes	Yes


The table is partially completed, the entry tool fills automatically the first two columns with the conditions coming from the alarm descriptor choosen in Input-Output Subsystems Tab.

For each row the user shall add the priority, the class, the group, the output condition (refer to [1] for details), record details and condition details.

5.4.1 Input Table Constraint

If the Common Diagnosis Entry Tool user is not able to complete the Input Table, the Entry Tool and the Code Generator will produce the code if requested. A warning will be displayed remembering the user which rows are empty.

If two different input condition produce the same output condition they shall have the same priority, class and group. A check function has been implemented into the Entry Tool and will produce an error if a misconfiguration is detected.

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5.5 Behaviuor Objects

In this section you can create your alarm behaviour objects, that store the reaction of a FAST response subsystem related to a specific alarm condition. If the Configurable Behaviour flag in Compiler Switches is unchecked this section is unavailable.

Compiling Switches	Input - Output Subsystems	Output Conditions	InputTable	Behaviour Objects	Fast Output Table
	Name	Type	Descriptors	Default Value	
	PVSensorFailureBehaviour	TABENUM8	currentOutFailModeDescriptor	CURRENTOUT_ALARM_BEHAVIOUR_OK	
	digitalOut_ReadbackFailureBehaviour	TABENUM8	digitalOutFailModeDescriptor	DIGITALOUT_ALARM_BEHAVIOUR_OK	
	ReadbackFailureBehaviour	CONST_U8	currentOutFailModeDescriptor	CURRENTOUT_ALARM_BEHAVIOUR_FAIL_HI	
▶▶					

Each row represent a behaviuor object and it is composed by:

1. Name, the name of the alarm behaviour object.
2. Type, the data type of the alarm behaviour object. It could be an enumeration (TABENUM8) if the behaviuor is configurable, or a constant (CONST_U8) if the behaviour is a constant one.
3. Descriptor, represent the object descriptor in case the object is an enumeration or the value possible choices in case the object is a constant one.
4. Default value, is the object default value when it is an enumerated data type or the value if it is a constant one.

5.6 Fast Output Table

Fast Output Table contains all the information about how the diagnosis subsystem shall drive output subsystem in the fast task execution [1].

Compiling Switches		Input - Output Subsystems		Output Conditions		InputTable		Behaviour Objects		Fast Output Table	
		Driven Subsystem		Input Table Condition				Behaviour Objects			
		ADOutput		1 - SensorInterface.PV_SENSOR_FAILURE				currentOutFailModeDescriptor_PVSensorFailureB...			
		ADOutput		2 - SensorInterface.PV_OUT_PHY_LIMS				NULL			
		ADOutput		0 - ADOutput.CURRENTOUT_ALARM_READBACK_FAIL...				currentOutFailModeDescriptor_ReadbackFailureB...			
		ADOutput		1 - SensorInterface.PV_SENSOR_FAILURE				NULL			
		ADOutput		3 - SensorInterface.SV_SENSOR_FAILURE				digitalOutFailModeDescriptor_digitalOut_Readbac...			
▶*											


Each row represent the reaction of an output subsystem to an alarm condition:

1. Driven Subsystem, is the subsystem the fast path has to drive.
2. Input Condition, is the alarm condition that drive the subsystem during the fast path.
3. Behaviuor Object, is the link to the Behaviuor Object that stores the reaction of the driven subsystem. If the driven subsystem has not its own Behaviuor Object set it to NULL, the value will be automatically choose by the Common Diagnosis Subsystem the two values defined in diagnosis.h file.

```


// I FAST Output User Defined Behaviours Constant Definitions
// todoCode: Verify the position of the following defines
#define ALARM_BEHAVIOUR_OK 0
#define ALARM_BEHAVIOUR_GENERAL_FAILURE 1

```

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6 Common Diagnosis Conditions Definition

	MNEMONIC	TYPE OF ERROR	TYPE OF DETECTION
SENSOR	PV_SENSOR_FAILURE	Primary variable sensor failure	Device specific
	SV_SENSOR_FAILURE	Secondary variable sensor failure	Device specific
	TV_SENSOR_FAILURE	Tertiary variable sensor failure	Device specific
	FV_SENSOR_FAILURE	Fourth variable sensor failure	Device specific
	PV_SENSOR_OUT_LIMS	Primary variable out of limits	Device specific
	SV_SENSOR_OUT_LIMS	Secondary variable out of limits	Device specific
	TV_SENSOR_OUT_LIMS	Tertiary variable out of limits	Device specific
	FV_SENSOR_OUT_LIMS	Fourth variable out of limits	Device specific
APPLICATION	PV_SENSOR_OUT_RANGE	Primary variable out of range	PV > Sensor Limit Hi
	SV_SENSOR_OUT_RANGE	Secondary variable out of range	PV < Sensor Limit Lo
	TV_SENSOR_OUT_RANGE	Tertiary variable out of range	SV > Sensor Limit Hi
	FV_SENSOR_OUT_RANGE	Fourth variable out of range	SV < Sensor Limit Lo
			TV > Sensor Limit Hi
			TV < Sensor Limit Lo
			FoV > Sensor Limit Hi
			FoV < Sensor Limit Lo
FRONT END	FE_BOARD_FAILURE	Front End Board Failure	PV > Range Limit Hi
	FE_NV_FAILURE	Front End NvMem Failure	PV < Range Limit Lo
	FE_NV_WARNING	Front End NvMem Warning	SV > Range Limit Hi
	FE_BOARD_NOT_DETECTED	Front End Not Detected	SV < Range Limit Lo
			TV > Range Limit Hi
			TV < Range Limit Lo
			FoV > Range Limit Hi
			FoV < Range Limit Lo
NV			ROM CRC
			ResponseTimeout
			CRC Check
			EEPROM write cycles exceeded
			No Startup Communication
			Data CRC
			Framecounter
			CRC Check
NV	CB_NV_FAILURE	Communication Board NvMem Failure	EEPROM write cycles exceeded
	CB_NV_WARNING	Communication Board NvMem Warning	
	NV_STORAGE_ACTIVE	NV storage active	
	NV_CONCISTENCY_CHECK	EEPROM Consistency Check	NV Failures states, repair

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7 Revision Chart

Rev.	Description of Version/Changes	Primary Author(s)	Date
0.4	First Draft (the revision start from 0.4 to keep this document consistent with other Common Diagnosis Documents)	Roberto Colombo	2007 March 19
0.5	Second Draft: <ul style="list-style-type: none"> • Added output condition details feature • Better explanation on some topics 	Giovanni Invernizzi	2008 December 17