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Programming style guide for JavaScript in SIMATIC WinCC Unified

SIMATIC WinCC Unified V20

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1. Introduction

When writing JavaScript code, the task of the programmer is to make the user program as clear and readable as possible.

Each programmer uses his/her own strategy, for example in naming variables or functions, or in writing comments.

The various approaches of programmers result in wildly different user programs, which frequently can only be interpreted by their own creators.

Note The programming style guide for SIMATIC S7-1200/S7-1500 serves as a basis for this document.
https://support.industry.siemens.com/cs/ww/en/view/81318674

1.1. Objectives

The rules and recommendations described here will help you create more consistent code which can be better maintained and reused.

If multiple programmers are working on the same program, it is therefore recommended to define terminology for the whole project, and to adhere to a mutually agreed-upon programming style. In this way, errors can be recognized and/or prevented as early as possible.

For the maintainability and clarity of the source code, it is first of all necessary to maintain a certain surface form. Visual effects do not significantly improve the quality of the software. It is much more important, for example, to define rules that support the developer in the following way:

- Avoid typos and careless mistakes which are then misinterpreted by the compiler.

  Objective: The compiler should detect as many errors as possible.

- Support the programmer when diagnosing program errors, e.g. inadvertent reuse of a temporary variable beyond one cycle.

  Objective: The identifier quickly indicates problems.

- Standardization of default applications and default libraries

  Objective: It should be easy to learn, and the reusability of program code should be increased.

- Simple maintenance; simplification of development

  Objective: Changes to program code at individual points of use, scripts on screen objects and in global modules should have minimal impact on the overall configuration. It should be possible for different programmers to make changes to program code in individual modules.

Note Ensure that the rules and recommendations described in this document are self-consistent and build on each other.

1.2. Advantages of a uniform programming style

- Integrated, uniform style
- Easy to read and understand
- Simple maintenance and reusability
- Simple and fast error identification and correction
- Efficient collaboration between multiple programmers

1.3. Validity

This document applies to projects and libraries in TIA Portal in connection with the JavaScript scripting environment as per the ECMAScript Language Specification.

Google V8 is used as a script engine, which largely implements ECMAScript 2015, 6th Edition from June 2015 (ECMAScript 6).

ESLint rules

This document uses ESLint rules as a basis. The rules listed here sometimes differ slightly from the ESLint rules, as the primary goal is to achieve consistency in the TIA Portal configuration (interplay with programming style guide for SIMATIC S7-1200/S7-1500).

1.4. Limitation

This document does not provide a description of:

- HMI configuration in TIA Portal
- Commissioning HMI projects

Sufficient experience in these topics is required in order to sensibly interpret and apply the rules and recommendations. This document is not a replacement for expertise in software development, but rather serves as a reference.

1.5. Deviations from the rules, other specifications

For customer projects, the required standards as well as customer- or industry-specific standards on the customer's side (or the technology used) must be observed and take priority over this style guide or parts thereof.

When combining customer specifications with this style guide, attention must be paid to the integrity of said combination and of the project as a whole. Deviating from the rules must be justified at the corresponding point in the user program, and must be documented. The rules defined by the customer must be documented in a suitable form.

2. Definition of terms

2.1. Rules/recommendations

The stipulations in this document are divided into recommendations and rules:

- **Rules** are obligatory and must be observed. They are imperative for reusable, well-performing code. Rules may also be broken in exceptions. But this must be documented appropriately.
- **Recommendations** are specifications that firstly serve for the uniformity of the code, and secondly which are intended as support and information. Recommendations should be observed in principle, but there can certainly be cases in which a recommendation is not followed. Reasons for doing this may be higher efficiency or better readability.

2.2. Numbering of rules

For a unique assignment of rules between various categories, the rules and recommendations are labeled with a prefix according to their category (two characters) and then numbered (3 numbers).

If a rule is missing, the number is not reassigned. If you define additional rules, you can use numbering between 901 and 999.

Table 2-1

Prefix	Category
ES	Engineering system (Programming environment)
GR	General rules
SR	Stylistic rules
ST	Script variables
FO	Functions and objects
IL	Commands and loops
EA	Expressions to avoid
DD	Diagnostics and debugging

2.3. Terms (block, function and parameter)

Some of the rules in this programming style guide make reference to functions, function parameters, and blocks.

The following descriptions provide a brief explanation of these terms for clarification. This clarification is necessary for a shared understanding of the terms in use moving forward.

Function and parameter

When you create a function in JavaScript or use that function, then you can also pass values to the function. You can do this with the help of "parameters". "Parameters" are often also called "arguments", but the meaning is identical.

```
const tagValue1, tagValue2;


function doSomething(parameter1, parameter2) {
  // …function code
}


// …code
doSomething(tagValue1, tagValue2);
```

Block

A block, or a command block, is used to group one or more commands. A block is identified by the curly brackets that contain it.

The following example shows a block using the example of an If command.

```
if (a > 2) {
  tagValue = a * 6;
  HMIRuntime.Trace(a);
}
```

3. Settings in the TIA Portal

This section describes the rules and recommendations for default settings in the TIA Portal programming environment.

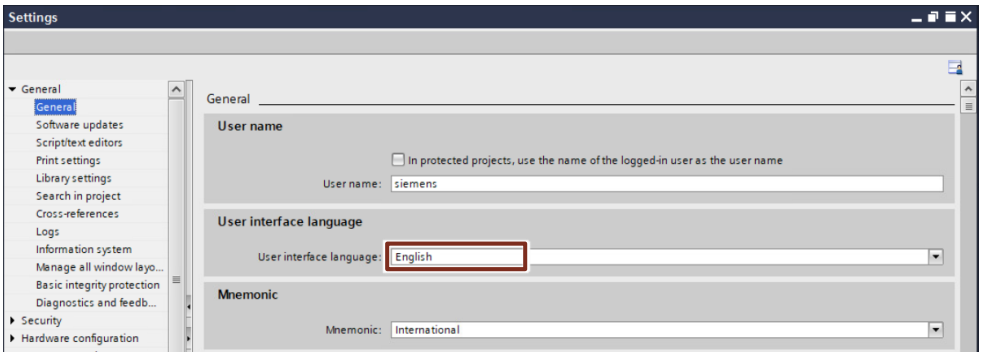
Note	The following settings have no direct impact on the JavaScript script editor. However, they are recommended for the sake of consistency with other style guides.

ES001 rule: User interface language "English"

The user interface language in TIA Portal is set to "English". This means that all newly created projects will be automatically created in the editing and reference language, and the system constants will be created in "English".

Reason: The user interface language must be set consistently so that the system constants in all projects are in the same language.

Figure 3-1

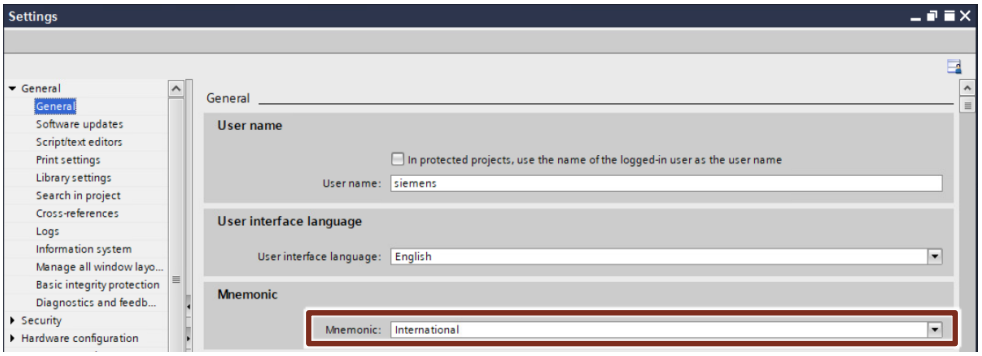


ES002 rule: "International" mnemonics

The mnemonics (language setting for programming language) is set to "International".

Reason: All system languages and system parameters are thus clear and language-independent. This ensures smooth collaboration in teams.

Figure 3-2



4. General rules

GR001 rule: Curly brackets for multi-line commands

If you have commands (e.g. if, while, function) that extend over multiple lines, always use curly brackets.

Additional information: http://eslint.org/docs/rules/curly

GR002 rule: Use valid regular expressions

Only use valid regular expressions in your JavaScript code. You can use the following website for this: https://regexr.com/

Additional information: http://eslint.org/docs/rules/no-invalid-regexp

GR003 rule: Use more typical equal-to operators

When comparing values, always use the more typical equal-to operators (e.g. "===", "!==") rather than the counterparts "==" and "!=".

Additional information: http://eslint.org/docs/rules/eqeqeq

You should use the more typical equality operators especially if you wish to compare a command with "null".

Additional information: http://eslint.org/docs/rules/no-eq-null

GR004 recommendation: Avoid assignment operators with multiple meanings in conditional commands

In conditional commands (e.g. if, for, while command), avoid assignment operators with multiple meanings (=). Instead, use more typical equal-to operators.

Additional information: http://eslint.org/docs/rules/no-cond-assign

```
// Allowed:
if (x === 0) {
  const b = 1;
}

// Disallowed:
if (x = 0) {
  const b = 1;
}
```

GR005 recommendation: Avoid empty commands

Avoid commands and functions with no content, as they can cause confusion while reading.

Additional information: http://eslint.org/docs/rules/no-empty

GR006 recommendation: Use single quotes

JavaScript allows you to define strings in one of three ways:

- Double quotes ("),
- Single quotes (') and
- backticks (`)

In WinCC Unified, it is recommended by default to use single quotes for strings. If you need additional quote marks in a string, use double quotes.

Additional information: http://eslint.org/docs/rules/quotes

```
// Allowed:
const value = 'myValue';
const string = 'a string containing "double" quotes';

// Disallowed:
const value = "myValue";
const string = "a string containing "double" quotes";
```

Note

You can also use backticks (`) as template strings. In this way, you can connect text and variable with each other in one expression. In this case, the variables are specified with Dollar signs and curly brackets "${Variable}".

```
// Allowed:
const value = 'myValue';
const string = `The tag value is ${value}`;
```

GR007 recommendation: Avoid commas with an expected expression

Avoid commas if only one expression is expected.

The comma operator encompasses multiple expressions, while only one is expected. It evaluates every operand from left to right and returns the value of the last operator. However, this often hides unwanted side-effects, and its use is often by mistake.

Additional information: http://eslint.org/docs/rules/no-sequences

5. Stylistic Rules

SR001 rule: Two spaces for code structuring

In order to better structure your JavaScript code, it is recommended to use two spaces to indent content in WinCC Unified. This helps the traceability and readability of the code.

Additional information: http://eslint.org/docs/rules/indent

```
// Allowed:
if (x === 0) {
··const b = 1;
}

// Disallowed:
if (x === 0) {
const b = 1;
}
```

SR002 rule: Maximum of two empty lines in the code

In order to structure your code, you can use empty lines, e.g. to logically and visually set off if commands. It also improves the readability of the code.

It is recommended to use a maximum of two empty spaces between blocks of code.

Additional information: http://eslint.org/docs/rules/no-multiple-empty-lines

SR003 rule: Spaces after every sentence punctuation mark

The following punctuation marks are important elements when creating code in JavaScript:

- Comma (",")
- Colon (":")
- Semicolon (";")

If you use one of these punctuation marks in your code, no spaces should appear before it. A sentence punctuation mark should however have a space after it.

Additional information:

- Comma (","): http://eslint.org/docs/rules/comma-spacing
- Colon (":"): http://eslint.org/docs/rules/key-spacing
- Semicolon (";"): http://eslint.org/docs/rules/semi-spacing

SR004 rule: End code line with semicolon (";")

Every line of code in JavaScript must end with a semicolon, otherwise it will cause an error.

Additional information: http://eslint.org/docs/rules/semi

However, try not to use too many semicolons, as this can cause confusion.

Additional information: http://eslint.org/docs/rules/no-extra-semi

SR005 rule: Surround key words with spaces

If you use key words (e.g. "if", "else", "switch") in your JavaScript, they should be surrounded by spaces (i.e. there should be a space before and after the key word).

Additional information: http://eslint.org/docs/rules/keyword-spacing

```
// Allowed:
if (true) {
  //...
} else {
  //...
}

// Disallowed:
if (true) {
  //...
}else{
  //...
}
```

SR006 recommendation: Space before every command block

If you start a command block, for instance after an if command, you should insert a space.

Additional information: http://eslint.org/docs/rules/space-before-blocks

```
// Allowed:
if (true) {
  //...
}

// Disallowed:
if (true){
  //...
}
```

SR007 recommendation: Space between operands

If you have a mathematical calculation in your code, then every operand and every operator should be followed by a space.

Additional information: http://eslint.org/docs/rules/space-infix-ops

```
// Allowed:
a = b + c;

// Disallowed:
a=b+c;
```

SR008 recommendation: Avoid comma at line start

It is recommended to use commas (",") at the end of a line rather than at the line start.

Additional information: http://eslint.org/docs/rules/comma-style

```
// Allowed:
const foo = 1, bar = 2;
const value1 = 1,
    value2 = 2;

// Disallowed:
const foo = 1
, bar = 2;
const value1 = 1
  , value2 = 2;
```

SR009 recommendation: No spaces at line end

When you are writing and commenting your code, you should make sure not to end the line with a space.

This is not an error in general, but can lead to misinterpretation.

Additional information: http://eslint.org/docs/rules/no-trailing-spaces

```
// Allowed:
const foo = 1, bar = 2; //comment

// Disallowed:
const foo = 1, bar = 2; //comment...
//...
```

SR010 recommendation: No empty lines at block starts and classes

Avoid an empty line at the start of a block or class.

Additional information: http://eslint.org/docs/rules/padded-blocks

SR011 recommendation: Avoid space between function and identifier

Ensure that you do not place a space between the function and the identifier.

Example

```
// Allowed:
myFunction();

// Disallowed:
myFunction ();
```

Additional information: http://eslint.org/docs/rules/no-spaced-func

SR012 recommendation: Space before function brackets

Always leave a space between the function and the curly function brackets.

Additional information: http://eslint.org/docs/rules/space-before-function-paren

```
// Allowed:
myFunction(a) {};

// Disallowed:
myFunction(a){};
```

SR013 recommendation: Begin comments with space

When you comment a line of code, then insert a space before you begin the comment text.

This rule does not apply to structuring lines ("//*********") for visually separating code lines from one another.

Additional information: http://eslint.org/docs/rules/spaced-comment

```
// Allowed:
// This is an example comment
/* This is an example comment */
//******************************

// Disallowed:
//This is an example comment
/*This is an example comment*/
```

SR014 recommendation: Use normal tabs and spaces

Only use the Tab or Space key to insert spaces.

Additional information: http://eslint.org/docs/rules/no-irregular-whitespace

SR015 recommendation: Limit strings to one line

Do not enter strings in your code that are longer than a line. If you nevertheless need multi-line strings, then you can implement this with a line break "\n".

Additional information: http://eslint.org/docs/rules/no-multi-str

```
// Allowed:
const x = "Line 1\n" +
        "Line 2";

// Disallowed:
const x = "Line 1 \
        Line 2";
```

6. Script variables, arrays and structures

6.1. General rules for script variables

ST001 rule: Use "camelCase" notation

Use the camelCase notation for writing variables.

Additional information: http://eslint.org/docs/rules/camelcase

```
// Allowed:
let machineState;
let standardValue;

// Disallowed:
let machine_State;
let StandardValue;
```

ST002 rule: Unique variable naming

When you define variables, ensure that they have unique names and are only used once.

Additional information: http://eslint.org/docs/rules/no-redeclare

Within a function, variables should likewise be unique and not overlap with global variables.

Additional information: http://eslint.org/docs/rules/no-shadow

ST003 rule: Use dot notation

Use dot notation to access properties of objects and elements.

Additional information: http://eslint.org/docs/rules/dot-notation

```
Screen.Items('Rectangle1').BackColor = 0xFF00FF00;
```

ST004 rule: Do not use key words for functions or variables

Do not use native key words or object names (e.g. "length", "top", "undefined", "NaN", "Infinity", "eval" or "arguments") as the name of a function or a variable. This can cause confusion and hinders traceability of the code.

Additional information: http://eslint.org/docs/rules/no-native-reassign

http://eslint.org/docs/rules/no-shadow-restricted-names

ST005 rule: Do not create any new primitive wrappers

In JavaScript, there are three primitive data types which have wrapper objects:

- String
- Numbers
- Boolean.

Avoid creating your own manual wrapper instances, even if JavaScript allows it.

Additional information: http://eslint.org/docs/rules/no-new-wrappers

ST006 recommendation: Prohibit octal escape sequence in string literals

Since JavaScript version ECMAScript 5 specification, octal escape sequences in string literals are obsolete and should no longer be used. Instead, Unicode escape sequences should be used.

Additional information: http://eslint.org/docs/rules/no-octal-escape

ST007 recommendation: Avoid unnecessary Boolean operations

With comparisons or assignments, avoid unnecessary Boolean operations, such as double negation.

Additional information: http://eslint.org/docs/rules/no-extra-boolean-cast

6.2. Declaring and Using variables

ST008 rule: Declare variables (block validity ranges)

In order to use variables in your script, you first have to declare them.

A basic distinction is made between the types of declaration:

Table 6-1

Declaration	Explanation
var	Declares a variable, has no block validity range.
let	Declares a variable with validity in the current block.
const	Declares a constant with validity in the current block. An error will occur if an attempt is made to overwrite the variable.

Note The "var" declaration is outdated and should be avoided for new JavaScript scripts.

A rule of thumb for declaring variables:

- By default, use the variable declaration "const".
- If the value or object of the variable changes during the script, the declaration type "const" will be replaced by "let".

```
var a = 5;
let b = 50;
const c = 500;

if (a > 2) {
  a = 6;
  let b = 60;                 //only in the block visible
  HMIRuntime.Trace(a); //Trace output: 6
  HMIRuntime.Trace(b); //Trace output: 60
  HMIRuntime.Trace(c); //Trace output: 500
}

HMIRuntime.Trace(a);  //Trace output: 6
HMIRuntime.Trace(b);  //Trace output: 50
HMIRuntime.Trace(c);  //Trace output: 500
```

ST009 rule: Declare variables at the start of a code block

When writing code, make sure to declare the variables at the beginning of a block of code.

Additional information: http://eslint.org/docs/rules/vars-on-top

ST010 Rule: Use "var" declared script variables in defined code block

Please avoid the "var" declaration type. If you nevertheless need "var", then always use the script variable that was declared with "var" inside the code block where you defined it, otherwise error messages may occur.

Additional information: http://eslint.org/docs/rules/block-scoped-var

```
// Allowed:
function doSomething() {
  var result;

  if (x > 10) {
    result = true;
  } else {
    result = false;
  }
}

// Disallowed:
function doSomething() {
  if (x > 10) {
    var result = true;
  } else {
    var result = false;
  }
}
```

ST011 rule: One line per variable declaration

Use a separate line for every variable declaration.

Additional information: http://eslint.org/docs/rules/one-var

ST012 recommendation: Avoid unnecessary variable declarations

Only define as many variables as you need in your code. Too many defined variables easily give an impression of overcomplexity.

Additional information: http://eslint.org/docs/rules/no-unused-vars

ST013 recommendation: Avoid "var" declaration in sub-functions/commands

Please avoid the "var" declaration type. If you nevertheless need "var", the always define variables and functions as "var" in the main part of a function and avoid defining them in nested sub-functions or commands.

Additional information: http://eslint.org/docs/rules/no-inner-declarations

6.3. Comparing Variables

ST014 rule: Do not compare a variable with itself

Never compare a variable with itself, as this will cause an error. An exception is checking for the function "isNaN()".

Additional information: http://eslint.org/docs/rules/no-self-compare

```
// Disallowed:
var x = 10;
if (x === x) {
    x = 20;
}
```

ST015 rule: Checking a number for whether it is not a number

If you are checking the value of a variable for whether it is not a number, then use the function "isNaN()" in place of the expression "NaN" (abbreviation for "Not a Number").

Additional information: http://eslint.org/docs/rules/use-isnan

```
// Allowed:
if (isNaN(x))

// Disallowed:
if (x == NaN)
```

ST016 rule: Specify output format (radix argument) with parseInt() function

Besides the expression to be converted, the parseInt() function also has a second argument (the radix) for the output format of the expression to be converted. By default, the parseInt() function automatically detects whether this is an integer or a hexadecimal number (using the 0x prefix).

However, in order to specify the arguments clearly, it is recommended to include the output format in the function.

Additional information: http://eslint.org/docs/rules/radix

6.4. Entering numbers

ST017 rule: Fully specify floating point numbers

If you enter floating point numbers, always use the established number formats in order to obtain a clear representation as a decimal number. This prevents misinterpretations when reading the code.

Additional information: http://eslint.org/docs/rules/no-floating-decimal

```
// Allowed:
const x = -0.2;
const y = 5.0;

// Disallowed:
const x = -.2;
const y = 5.;
```

ST018 rule: Do not begin numbers with "0"

If you use numbers in your script code, then make sure to enter them without leading zeroes, otherwise they could be interpreted as octal numbers.

Additional information: http://eslint.org/docs/rules/no-octal

6.5. Arrays and structures

ST019 rule: Commas between structure and array elements

The enumeration of elements in an array is separated by commas. There must not be a comma after the final element.

Additional information: http://eslint.org/docs/rules/comma-dangle

ST020 recommendation: Avoid empty array elements

When creating an array, make sure that you do not insert any empty array elements.

Additional information: http://eslint.org/docs/rules/no-sparse-arrays

```
// Allowed:
const colors = ['red','green','blue'];

// Disallowed:
const colors = ['red', ,'blue'];
```

7. Functions and objects

7.1. Functions

FO001 rule: Do not redefine functions

If you have declared functions, make sure not to redefine them in another place.

Additional information: http://eslint.org/docs/rules/no-func-assign

```
// Disallowed:
function multiply(x, y) {
  return x * y;
}
multiply = 22;
```

If, however, you assign an anonymous function to a variable, then you can overwrite the variable in another place.

```
// Allowed:
let multiply = function (x, y) {
  return x * y;
}
multiply = 22;
```

FO002 rule: Define return value

In a function, define whether that function has a return value or not. If the function has a return value, then define what it is.

Additional information: http://eslint.org/docs/rules/consistent-return

FO003 rule: Do not overwrite call parameters

Make sure not to overwrite the call parameters of a function or within a function.

Additional information: http://eslint.org/docs/rules/no-ex-assign
Additional information: http://eslint.org/docs/rules/no-param-reassign

FO004 rule: Function call with declaration in brackets

If a declared function is to be invoked immediately, you must wrap it with brackets.

Additional information: http://eslint.org/docs/rules/wrap-iife

FO005 rule: Do not write commands to a string

Avoid assigning JavaScript commands to a string, as this will cause an error.

Additional information: http://eslint.org/docs/rules/no-implied-eval

FO006 rule: Create function without "new"

When creating a function, ensure that you create it without "new".

Additional information: http://eslint.org/docs/rules/no-new-func

FO007 rule: Do not use global object properties as function

Do not use global object properties as a function (Math, JSON,...).

Additional information: http://eslint.org/docs/rules/no-obj-calls

FO008 recommendation: Avoid single-line code blocks

Avoid one-line code blocks in your script, as they are easy to miss and difficult to trace.

Additional information: http://eslint.org/docs/rules/no-lone-blocks

```
// Allowed:
function doSomething () {
  test();
}

// Disallowed:
function doSomething () {
  {
    test();
  }
}
```

FO009 recommendation: Avoid "eval()" function

The "eval()" function evaluates JavaScript code and represents it as a string. This function is potentially dangerous and often misused. Avoid this function and use alternatives as described in the link.

Additional information: http://eslint.org/docs/rules/no-eval

FO010 recommendation: Avoid unnecessary function binding

Avoid unnecessary use of he "bind()" function.

Additional information: http://eslint.org/docs/rules/no-extra-bind

7.2. Objects

FO011 rule: Have new objects in variables

When you create a new object, then it is recommended to save it in a script variable.

Additional information: http://eslint.org/docs/rules/no-new

```
// Allowed:
const myObject = new Object();
myObject();

// Disallowed:
new object();
```

FO012 rule: Begin object names with capital letters

The object name after the "new" operator starts with an uppercase letter.

Additional information: http://eslint.org/docs/rules/new-cap

```
// Allowed:
const myObject = new Object();

// Disallowed:
const myObject = new object();
```

FO013 rule: No duplicate property declarations for objects

Do not assign values to a variable multiple times, as this can cause unexpected behavior.

Additional information: http://eslint.org/docs/rules/no-dupe-keys

```
// Allowed:
const testObject = {
  value1 = 'red',
  value2 = 'green'
};

// Disallowed:
const testObject = {
  value = 'red',
  value = 'green'
};
```

FO014 rule: Do not modify native objects

JavaScript allows objects to be extended, including native objects. This can cause the behavior of the objects to change, which in turn can lead to irritation if you use the "native" object in another code block.

Therefore, avoid modifying or extending "native" objects.

Additional information: http://eslint.org/docs/rules/no-extend-native

FO015 recommendation: Avoid object constructor when creating object

When you create a new object, you should make sure to prefer the object-literal syntax, meaning that the object constructor should be avoided.

Additional information: http://eslint.org/docs/rules/no-new-object

```
// Allowed:
const a = {};

// Disallowed:
const a = new Object();
```

8. Conditional commands, branches, and loops

IL001 rule: "if": With "return", "else" is superfluous

If an "if" command contains a return command, the "else" block is superfluous. The content can thus be placed outside of the block.

Additional information: http://eslint.org/docs/rules/no-else-return

IL002 rule: Do not use constants alone in conditions

If you use a command with a condition, make sure that you always use a comparison, e.g. with a constant, with the condition.

If you specify a constant without a comparison in a condition, then the command will either be executed always or never.

This mainly affects the following commands:

- "if" command
- "for" command
- "while" command
- "do...while" command

Additional information: http://eslint.org/docs/rules/no-constant-condition

```
// Allowed:
if (value === 0) {
  myFunction();
}

// Disallowed:
if (false) {
  myFunction();
}
```

IL003 rule: "for…in": First check properties before working with them

First check in a "for...in" loop whether a property exists before you continue working with that property.

Additional information: http://eslint.org/docs/rules/guard-for-in

IL004 rule: Define "default" in "for"/"switch" commands

To the extent possible, always define a "default" state in a "for" or "switch" command.

If the use case does not allow for it, then add an appropriate comment to the code, "// No Default".

Additional information: http://eslint.org/docs/rules/default-case

IL005 rule: No double "case" commands

Make sure that you haven't duplicated a "case" condition in a "switch...case" command (e.g. due to a copy & paste error).

Additional information: http://eslint.org/docs/rules/no-duplicate-case

```
// Allowed:
switch (value) {
  case 1:
    break;
  case 2:
    break;
  case 3:
    break;
  default:
    break;
}
// Disallowed:
switch (value) {
  case 1:
    break;
  case 2:
    break;
  case 1:         // duplicate test expression
    break;
  default:
    break;
}
```

IL006 rule: Every "case" has a "break"

In a "switch" command, every case or "case" command should be given "break". This prevents a "fall through" through all "case" commands. If a fall through is desired, add the comment "//fall through".

Additional information: http://eslint.org/docs/rules/no-fallthrough

IL007 recommendation: Avoid nested ternary operations

Avoid nested ternary operations within a line. Employ the "if" command as an alternative.

Additional information: http://eslint.org/docs/rules/no-nested-ternary

```
// Allowed:
const a = b ? 1: c;

// Disallowed:
const a = b ? 1: c ? 2: 3;
```

9. Expressions to Avoid

EA001 rule: Avoid "with" expression

Avoid the command "with()" because you are adding members of an object to the current range and this makes it impossible to recognize what a variable is actually referring to within the block.

Additional information: http://eslint.org/docs/rules/no-with

EA002 rule: Avoid "arguments.caller" and "arguments.callee" expression

Avoid obsolete and sub-optimal code such as "arguments.caller" and "arguments.callee".

Additional information: http://eslint.org/docs/rules/no-caller

EA003 rule: Avoid "_proto_" property

The "_proto_" property has been obsolete since ECMAScript 3.1 and should not be used in code anymore. Instead, use "Object.getPrototypeOf" and "Object.setPrototypeOf"

Additional information: http://eslint.org/docs/rules/no-proto

10. Diagnostics and Debugging

DD001 rule: Trace() function for diagnostics

To debug your code and eliminate any errors, you can use the Trace() function of SIMATIC WinCC Unified.

When finished, make sure to remove all unnecessary Trace() messages from your code, otherwise the code will quickly become confusing.

Additional information: http://eslint.org/docs/rules/no-unreachable

http://eslint.org/docs/rules/no-console

http://eslint.org/docs/rules/no-debugger

11. Appendix

11.1. Service and support

SiePortal

The integrated platform for product selection, purchasing and support - and connection of Industry Mall and Online support. The SiePortal home page replaces the previous home pages of the Industry Mall and the Online Support Portal (SIOS) and combines them.

- Products & Services
  In Products & Services, you can find all our offerings as previously available in Mall Catalog.
- Support
  In Support, you can find all information helpful for resolving technical issues with our products.
- mySieportal
  mySiePortal collects all your personal data and processes, from your account to current orders, service requests and more. You can only see the full range of functions here after you have logged in.

You can access SiePortal via this address: sieportal.siemens.com

Industry Online Support

Industry Online Support is the previous address for information on our products, solutions and services.

Product information, manuals, downloads, FAQs and application examples - all information is available with just a few mouse clicks: support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.
Please send queries to Technical Support via Web form: support.industry.siemens.com/cs/my/src

SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.
For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page: siemens.com/sitrain

Industry Online Support App

You will receive optimum support wherever you are with the "Industry Online Support" app. The app is available for iOS and Android:

11.2. Links and literature

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/xxx
\3\	Find and fix problems in your JavaScript code https://eslint.org/

Table 11-1

11.3. Change documentation

Version	Date	Modification
V1.0	11/2020	First version
V2.0	08/24	Update new versions
V3.0	09/25	Update Version V20

Table 11-2