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# Conformity with the Standard

# Sucosoft S 40
# IEC Features

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## List of revisions to AWB 27-1310 GB

| Edition | Page | Revision | New | Rev. | n. a. |
|---|---|---|---|---|---|
| 03/99 | 28 | 2.4.3 | | × | |

## About This Manual

The following tables have the same numbering as those in the IEC 1131 standard. Tables showing features not yet supported by version 3.0 of Sucosoft S 40 are not listed.

The “PLC” column indicates the PLCs that support the features concerned.

| | |
|---|---|
| x | All PLCs |
| PS 416 | PS 416PS modular PLC |
| PS 4-200 | PS 4-201-MM1, PS 4-141-MM1, PS 4-151-MM1 compact PLCs |
| PS 4-300 | PS 4-341-MM1 compact PLC |

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# 1 Common Elements

The Sucosoft system fulfills the requirements of IEC1131-3 in the following language features:

*Table 1: Character set features*

| No. | Description | PLC | Comment |
|---|---|---|---|
| 1 | Required character set | x | according to ISO/IEC 646, Table 1 |
| 2 | Lower case | x | |
| 3a<br>or<br>3b | Number sign (#)<br>or<br>Pound sign (£) | x | # used |
| 4a<br>or<br>4b | Dollar sign ($)<br>or<br>Currency sign | x | $ used |
| 5a<br>5b | Vertical bar (\|)<br>Exclamation mark (!) | x | Only for graphical languages |
| 6a<br>or<br>6b | Subscript delimiters:<br>brackets [ ]<br>or<br>parentheses ( ) | x | [ ] used |

*Table 2: Identifier features*

| No. | Description | PLC |
|---|---|---|
| 1 | Upper case and numbers | x |
| 2 | Upper and lower case, numbers, embedded underlines | x |
| 3 | Upper and lower case, numbers, leading or embedded underlines | x |

*Table 3: Comment features*

| No. | Description | PLC |
|---|---|---|
| 1 | Comment | x |

*Table 4: Numeric Literals*

| No. | Description | PLC |
|---|---|---|
| 1 | Integer literals | x |
| 2 | Real literals | x |
| 3 | Real literals with exponents | x |
| 4 | Base 2 literals | x |
| 5 | Base 8 literals | x |
| 6 | Base 16 literals | x |
| 7 | Boolean zero and one | x |
| 8 | Boolean FALSE and TRUE | x |

*Table 5: Character string literal features*

| No. | Description | PLC |
|---|---|---|
| 1 | Empty string (length zero) | x |
| | String of length 1 containing simple character A | x |
| | String of length 1 containing "space" character | x |
| | String of length 1 containing the single "quote" character | x |
| | String of length " containing CR and LF | x |
| | String of length five which is printed as "$1.00" | x |



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*Table 6: Two character combinations in character string*

| No. | Description | PLC |
|---|---|---|
| 2 | Dollar sign ($$) | x |
| 3 | Single quote ($´) | x |
| 4 | Line feed ($L or $l) | x |
| 5 | New line ($N or $n) | x |
| 6 | New page ($P or $p) | x |
| 7 | Carriage return ($R or $r) | x |
| 8 | Tab ($T or $t) | x |

*Table 7: Duration literal features*

| No. | Description | PLC |
|---|---|---|
| | Duration literals without underlines | |
| 1a | – short prefix | x |
| 1b | – long prefix | x |
| | Duration literals with underlines | |
| 2a | – short prefix | x |
| 2b | – long prefix | x |

*Table 8: Date and time of day literals*

| No. | Description | PLC |
|---|---|---|
| 1 | Date literals (long prefix: DATE#) | x |
| 2 | Date literals (short prefix: D#) | x |
| 3 | Time of day literals (long prefix: TIME_OF_DAY#) | x |
| 4 | Time of day literals (short prefix: TOD#) | x |
| 5 | Date and time of day literals (long prefix DATE_AND_TIME#) | x |
| 6 | Date and time literals (short prefix: DT#) | x |

*Table 10: Elementary data types*

| No. | Keyword | Description | PLC |
|---|---|---|---|
| 1 | BOOL | Boolean | x |
| 2 | SINT | Short integer | x |
| 3 | INT | Integer | x |
| 4 | DINT | Double integer | PS 416, PS 4-300 |
| 5 | LINT | Long integer | – |
| 6 | USINT | Unsigned short integer | x |
| 7 | UINT | Unsigned integer | x |
| 8 | UDINT | Unsigned double integer Integer | PS 416, PS 4-300 |
| 9 | ULINT | Unsigned long integer | – |
| 10 | REAL | Real numbers | PS 416, PS 4-300 |
| 11 | LREAL | Long reals | – |
| 12 | TIME | Duration | x |
| 13 | DATE | Date (only) | x |
| 14 | TIME_OF_DAY or TOD | Time of day (only) | x |
| 15 | DATE_AND_ TIME or TD | Date and time | x |
| 16 | STRING | Variable length character string | x |
| 17 | BYTE | Bit string of length 8 | x |
| 18 | WORD | Bit string of length 16 | x |
| 19 | DWORD | Bit string of length 32 | PS 416, PS 4-300 |
| 20 | LWORD | Bit string of length 64 | – |



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*Table 12: Data type declaration features*

| No. | Description | PLC |
|---|---|---|
| 1 | Direct derivation of elementary types | x |
| 2 | Enumerated data types | x |
| 3 | Subrange data types | x |
| 4 | Array data types | x |
| 5 | Structured data types | PS 416, PS 4-300 |

*Table 13: Default initial values*

| Description | Initial value |
|---|---|
| SINT, INT, DINT | 0 |
| USINT, UINT, UDINT | 0 |
| BOOL, BYTE, WORD, DWORD | 0 |
| REAL | 0.0 |
| TIME | T#0s |
| DATE | D#1900-01-01 |
| TIME_OF_DAY | TOD#00:00:00 |
| DATE_AND_TIME | DT#1900-01-01-00:00:00 |
| STRING | "(the empty string) |

*Table 14: Data type initial value declaration features*

| No. | Description | PLC |
|---|---|---|
| 1 | Initialization of directly derived types | x |
| 2 | Initialization of enumerated data types | x |
| 3 | Initialization of subrange data types | x |
| 4 | Initialization of array data types | x |
| 5 | Initialization of structured data types | PS 416, PS 4-300 |
| 6 | Initialization of derived structured data types | PS 416, PS 4-300 |

*Table 15: Location and size prefix features for directly represented variables*

| No. | Description | PLC |
|---|---|---|
| 1 | I: Input location | x |
| 2 | Q: Output location | x |
| 3 | M: Marker location | x |
| 4 | X: (Single) bit size | x |
| 5 | None: (Single) bit size | x |
| 6 | B: Byte (8 bits) size | x |
| 7 | W: Word (16 bits) size | x |
| 8 | D: Double word (32 bits) size | PS 416, PS 4-300 |
| 9 | L: Long word (64 bits) size | – |

*Table 16: Variable keywords for variable declaration*

| Keyword | PLC |
|---|---|
| VAR | x |
| VAR_INPUT | x |
| VAR_OUTPUT | x |
| VAR_IN_OUT | x |
| VAR_EXTERNAL | x |
| VAR_GLOBAL | x |
| VAR_ACCESS | – |
| RETAIN | x |
| CONSTANT | x |
| AT | x |



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*Table 17: Variable type assignment features*

| No. | Description | PLC |
|---|---|---|
| 1 | Declaration of directly represented, non-retentive variables | x |
| 2 | Declaration of directly represented,retentive variables | x |
| 3 | Declaration of locations of symbolic variables | x |
| 4 | Array location assignment | x |
| 5 | Automatic memory allocation of symbolic variables | x |
| 6 | Array declaration | x |
| 7 | Retentive array declaration | x |
| 8 | Declaration of structured variables | PS 416, PS 4-300 |

*Table 18: Variable initial value assignment features*

| No. | Description | PLC |
|---|---|---|
| 1 | Initialization of directly represented, non-retentive variables | x |
| 2 | Initialization of directly represented, retentive variables | x |
| 3 | Location and initial value assignment to symbolic variables | x |
| 4 | Array location assignment and initialization | x |
| 5 | Initialization of symbolic variables | x |
| 6 | Array initialization | x |
| 7 | Retentive array declaration and initialization | x |
| 8 | Initialization of structured variables | PS 416, PS 4-300 |
| 9 | Initialization of constants | x |

*Table 19: Graphical negation of Boolean signals*

| No. | Description | PLC |
|---|---|---|
| 1 | Negated input | x |
| 2 | Negated output | x |

*Table 20: The use of the “EN” input and “ENO” output*

| No. | Description | PLC |
|---|---|---|
| 1 | Use of “EN” and “ENO” with LD | – |
| 2 | Use of “EN” and “ENO” with FBL | – |
| 3 | FBD without “EN” and “ENO” | x |

*Table 21: Typed and overloaded functions*

| No. | Description | PLC |
|---|---|---|
| 1 | Overloaded functions (non type-dependent) | x |
| 2 | Typed functions | x |

*Table 22: Type conversion function features*

| No. | Description | PLC |
|---|---|---|
| 1 | *_TO_** | x |
| 2 | TRUNC | PS 416, PS 4-300 |
| 3 | BCD_TO_** | x |
| 4 | *_TO_BCD | x |



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*Table 23: Standard functions of one numeric variable*

| No. | Name | I/O type | Description | PLC |
|---|---|---|---|---|
| General functions | | | | |
| 1 | ABS | ANY_NUM | Absolute value | x |
| 2 | SQRT | ANY_REAL | Square root | – |
| Logarithmic functions | | | | |
| 3 | LN | ANY_REAL | Natural logarithm | – |
| 4 | LOG | ANY_REAL | Logarithm base 10 | – |
| 5 | EXP | ANY_REAL | Natural exponential (e function) | – |
| Trigonometric functions | | | | |
| 6 | SIN | ANY_REAL | Sine of input in radians | – |
| 7 | COS | ANY_REAL | Cosine in radians | – |
| 8 | TAN | ANY_REAL | Tangent in radians | – |
| 9 | ASIN | ANY_REAL | Principal arc sine | – |
| 10 | ACOS | ANY_REAL | Principal arc cosine | – |
| 11 | ATAN | ANY_REAL | Principal arc tangent | – |

*Table 24: Standard arithmetic functions*

| No. | Name | Symbol | PLC |
|---|---|---|---|
| 12 | ADD | + | x |
| 13 | MUL | * | x |
| 14 | SUB | – | x |
| 15 | DIV | / | x |
| 16 | MOD | | PS 416, PS 4-300 |
| 17 | EXPT | ** | – |
| 18 | MOVE | := | – |

*Table 25: Standard bit-shift functions*

| No. | Name | PLC |
|---|---|---|
| 1 | SHL | x |
| 2 | SHR | x |
| 3 | ROR | x |
| 4 | ROL | x |

*Table 26: Standard bitwise Boolean functions*

| No. | Name | PLC |
|---|---|---|
| 1 | AND | x |
| 2 | OR | x |
| 3 | XOR | x |
| 4 | NOT | x |

*Table 27: Standard selection functions*

| No. | Name | PLC |
|---|---|---|
| 1 | SEL | PS 416, PS 4-300 |
| 2 | MAX | PS 416, PS 4-300 |
| 3 | MIN | PS 416, PS 4-300 |
| 4 | LIMIT | PS 416, PS 4-300 |
| 5 | MUX | PS 416, PS 4-300 |

*Table 28: Standard comparison functions*

| No. | Name | PLC |
|---|---|---|
| 1 | GT | x |
| 2 | GE | x |
| 3 | EQ | x |
| 4 | LE | x |
| 5 | LT | x |
| 6 | NE | x |



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*Table 29: Standard character string functions*

| No. | Name | PLC |
|---|---|---|
| 1 | LEN | x |
| 2 | LEFT | PS 416, PS 4-300 |
| 3 | RIGHT | PS 416, PS 4-300 |
| 4 | MID | PS 416, PS 4-300 |
| 5 | CONCAT | PS 416, PS 4-300 |
| 6 | INSERT | PS 416, PS 4-300 |
| 7 | DELETE | PS 416, PS 4-300 |
| 8 | REPLACE | PS 416, PS 4-300 |
| 9 | FIND | PS 416, PS 4-300 |

*Table 30: Functions of time data types*

| No. | Name | Operation | PLC |
|---|---|---|---|
| 1 | ADD | TIME + TIME = TIME | x |
| 2 | | TOD + TIME = TOD | x |
| 3 | | DAT + TIME = DAT | PS 416, PS 4-300 |
| 4 | SUB | TIME – TIME = TIME | x |
| 5 | | DATE – DATE = TIME | PS 416, PS 4-300 |
| 6 | | TOD – TIME = TOD | x |
| 7 | | TOD – TIME = TIME | x |
| 8 | | DAT – TIME = DAT | PS 416, PS 4-300 |
| 9 | | DAT – DAT = TIME | PS 416, PS 4-300 |
| 10 | MUL | TIME* ANY_NUM = TIME | PS 416, PS 4-300 |
| 11 | DIV | TIME/ANY_NUM = TIME | PS 416, PS 4-300 |
| 12 | CONCAT | DATE TOD = DAT | PS 416, PS 4-300 |
| Type conversion functions | | | |
| 13 | | DATE_AND_TIME_TO_TIME_OF_DAY | x |
| 14 | | DATE_AND_TIME_TO_DATE | x |

*Table 31: Functions of enumerated data types*

| No. | Name | PLC |
|---|---|---|
| 1 | SEL | – |
| 2 | MUX | – |
| 3 | EQ | x |
| 4 | NE | x |

*Table 33: Function block declaration features*

| No. | Description | PLC |
|---|---|---|
| 1 | RETAIN qualifier on internal variables | PS 416, PS 4-300 |
| 2 | RETAIN qualifer on output variables | PS 416, PS 4-300 |
| 3 | RETAIN qualifier on internal function blocks | PS 416, PS 4-300 |
| 4a<br>4b | Input/output declaration<br>– textual<br>– graphical | <br>x<br>– |
| 5a<br>5b | Function block instance name as input<br>– textual<br>– graphical | <br>PS 416, PS 4-300<br>PS 416, PS 4-300 |
| 6a<br>6b | Function block instance name as input/output<br>– textual<br>– graphical | <br>PS 416, PS 4-300<br>PS 416, PS 4-300 |
| 7a<br>7b | Function block instance name as external variable<br>– textual<br>– graphical | <br>x<br>x |
| 8a<br>8b | Textual declaration of<br>– rising edge inputs<br>– falling edge inputs | <br>PS 4-200, PS 4-300<br>PS 4-200, PS 4-300 |
| 9a<br>9b | Graphical declaration of<br>– rising edge inputs<br>– falling edge inputs | <br>–<br>– |



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*Table 34: Standard bistable function blocks*

| No. | Name | PLC |
|---|---|---|
| 1 | SR<F4>1) | x |
| 2 | RS[1)] | x |
| 3 | SEMA | – |

*Table 35: Standard edge detection function blocks*

| No. | Name | PLC |
|---|---|---|
| 1 | R_TRIG | x |
| 2 | F_TRIG | x |

*Table 36: Standard counter function blocks*

| No. | Name | PLC |
|---|---|---|
| 1 | CTU[1)] | x |
| 2 | CTD[1)] | x |
| 3 | CTUD[1)] | x |

[1)] Input parameters such as R (Reset), S (Set), LD (Load) and others (see Table 54) have already been defined as keywords. They cannot therefore be used as operators. The standard itself does not permit the use of keywords as identifiers. The following declaration would thus not meet the standard:

```
VAR_INPUT
  R :BOOL;
  (* R is keyword for input parameter Reset *)
END_VAR
```

The declaration of the “CTU” IEC function block would thus not be possible. The parameters have therefore been changed in the Sucosoft:

– S parameter in SET
– R parameter in RESET
– LD parameter in LOAD

The modifications refer to a proposal of the PLCOpen committee.

*Table 37: Standard timer function blocks*

| No. | Name | PLC |
|---|---|---|
| 1 | TP (Pulse) | x |
| | On-delay | |
| 2a | – TON | x |
| 2b | – T---0 | x |
| | Off-delay | |
| 3a | – TOF | x |
| 3b | – 0---T | x |
| 4 | RTC (real-time clock) | x |

*Table 39: Program declaration features*

| No. | Description | PLC |
|---|---|---|
| 1 | RETAIN qualifier on internal variables | x |
| 2 | RETAIN qualifer on output variables | – |
| 3 | RETAIN qualifier on internal function blocks | x |
| | Input/output declaration | |
| 4a | – textual | – |
| 4b | – graphical | – |
| | Function block instance name as input | |
| 5a | – textual | – |
| 5b | – graphical | – |
| | Function block instance name as input/output | |
| 6a | – textual | – |
| 6b | – graphical | – |
| | Function block instance name as external variable | |
| 7a | – textual | – |
| 7b | – graphical | – |
| | Graphical declaration of | |
| 9a | – rising edge inputs and | – |
| 9b | – falling edge inputs | – |



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| No. | Description | PLC |
|---|---|---|
| 10 | Formal input and output parameters | – |
| 11 | Declaration of directly represented, non-retentive variables | x |
| 12 | Declaration of directly represented, retentive variables | x |
| 13 | Declaration of locations of symbolic variables Variables | x |
| 14 | Array location assignment | x |
| 15 | Initialization of directly represented, non-retentive variables | x |
| 16 | Initialization of directly represented, retentive variables | x |
| 17 | Location and initial value assignment to symbolic variables | x |
| 18 | Array location assignment and initialization | x |
| 19 | Use of directly represented variables | x |
| 20 | VAR_GLOBAL .. END_VAR<br>Declaration within a PROGRAM | x |
| 21 | VAR_ACCESS.. END_VAR<br>Declaration within a PROGRAM | – |

*Table 52: Instruction list (IL) operators*

| No. | Operator | Modifiers | PLC |
|---|---|---|---|
| 1 | LD | N | x |
| 2 | ST | N | x |
| 3 | S<br>R | | x<br>x |
| 4 | AND | N,( | x |
| 5 | & | N,( | x |
| 6 | OR | N,( | x |
| 7 | XOR | N,( | x |
| 8 | ADD | ( | x |
| 9 | SUB | ( | x |
| 10 | MUL | ( | x |
| 11 | DIV | ( | x |
| 12 | GT | ( | x |
| 13 | GE | ( | x |
| 14 | EQ | ( | x |
| 15 | NE | ( | x |
| 16 | LE | ( | x |
| 17 | LT | ( | x |
| 18 | JMP | C, N | x |
| 19 | CAL | C, N | x |
| 20 | RET | C, N | x |
| 21 | ) | | x |

*Table 53: Function block invocation feature for IL language*

| No. | Description | PLC |
|---|---|---|
| 1 | CAL with input list | x |
| 2 | CAL with load/store of inputs | x |
| 3 | Use of input operators | – |

*Table 57: Representation of lines and blocks*

| No. | Features | PLC |
|---|---|---|
| 1, 2 | Horizontal lines | x |
| 3, 4 | Vertical lines | x |
| 5, 6 | Horizontal/vertical connection | x |
| 7, 8 | Line crossings without connection | – |
| 9, 10 | Connected and not connected | x |
| 11, 12 | Blocks with connecting lines | x |
| 13, 14 | Connectors[1)] | – |

[1)] Not necessary since right power rail in Sucosoft is unlimited.

*Table 58: Graphical elements for execution control*

| No. | Description | PLC |
|---|---|---|
| | Unconditional jump | |
| 1 | – FBD | x |
| 2 | – LD | x |
| | Conditional jump | |
| 3 | – FBD | x |
| 4 | – LD | x |
| | Conditional return | |
| 5 | – FBD | x |
| 6 | – LD | x |
| | Unconditional return | |
| 7 | – FBD | x |
| 8 | – LD | x |



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*Table 59: Power rails*

| No. | Description | PLC |
|---|---|---|
| 1 | Left power rail<br>(with connected horizontal connection) | x |
| 2 | Right power rail<br>(with connected horizontal connection) | x |

*Table 60: Link elements*

| No. | Description | PLC |
|---|---|---|
| 1 | Horizontal connection | x |
| 2 | Vertical connection | x |

*Table 61: Static contacts*

| No. | Description | PLC |
|---|---|---|
| 1<br>2 | Normally open contact | x<br>– |
| 3<br>4 | Normally closed contact | x<br>– |
| 5<br>6 | Positive transition sensing contacts | –<br>– |
| 7<br>8 | Negative transition sensing contacts | –<br>– |

*Table 62: Coils*

| No. | Symbol | Description | PLC |
|---|---|---|---|
| 1 | --( )-- | Coil | x |
| 2 | --(/)-- | Negative coil | x |
| Latched coils | | | |
| 3 | --(S)-- | SET coil | x |
| 4 | --(R)-- | RESET coil | x |
| Retentive coils | | | |
| 5 | ----(M)---- | Retentive memory coils | x[1)] |
| 6 | ----(SM)---- | SET retentive coils<br>Retentive memory coils | x[1)] |
| 7 | ----(RM)---- | RESET retentive memory coil | x[1)] |
| Transition sensing contacts | | | |
| 8 | --(P)-- | Positive transition sensing coil | x |
| 9 | --(N)-- | Negative transition sensing coil | x |

[1)] Retentive behaviour is defined in the declaration section



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# Annex

## Annex D (normative): Implementation-dependent parameters

*Table D.1: Implementation-dependent parameters*

| Clause | Parameter | PS 4-200 | PS 416 | PS 4-300 |
|---|---|---|---|---|
| 1.5.1 | Error handling procedure | Array subscript overflow | | |
| 2.1.1 | National characters used | depending on user | | |
| 2.1.2 | Maximum length of identifiers | 64 | 64 | 64 |
| 2.1.5 | Maximum comment length | 512 | 512 | 512 |
| 2.2.3.1 | Range of values of duration | +63/–64 days, 23 hrs., 59 min., 59 sec., 999 ms | +127/–128 days, 23 hrs., 59 min., 59 sec., 999 ms | +127/–128 days, 23 hrs., 59 min., 59 sec., 999 ms |
| 2.2.3.2 | Value range for date | 1900-1-1 to 2154-12-31 | | |
| 2.3.1 | Range of values for variables of type TIME | +63/–64 days, 23 hrs., 59 min., 59 sec., 999 ms | +127/–128 days, 23 hrs., 59 min., 59 sec., 999 ms | +127/–128 days, 23 hrs., 59 min., 59 sec., 999 ms |
| | Precision of representation of seconds in types TIME_OF_DAY and DATE_AND_TIME | 1 sec. | 1 sec. | 1 sec. |
| 2.3.3 | Maximum | | | |
| | – Number of array subscripts | 3 | 4 | 4 |
| | – Array size | 8 KByte | 16 KByte | 16 KByte |
| | – Number of structure elements | – | up to16 KByte/POU | up to16 KByte/POU |
| | – Structure size | – | up to16 KByte/POU | up to16 KByte/POU |
| | – Maximum number of variables per declaration | See 2.4.3 | See 2.4.3 | See 2.4.3 |

| Clause | Parameter | PS 4-200 | PS 416 | PS 4-300 |
|---|---|---|---|---|
| 2.3.3.1 | Maximum number of enumerated values | 256 | 65000 | 65000 |
| 2.3.3.2 | Default maximum length of STRING variable | 32 Byte | 32 Byte | 32 Byte |
| | Maximum permissible length of STRING variables | 253 | 1024 | 1024 |
| 2.4.1.1 | Maximum number of hierarchical levels | 5 | 5 | 5 |
| | Logical or physical mapping | Both | Both | Both |
| 2.4.1.2 | Maximum number of array subscripts | 3 | 4 | 4 |
| | Maximum range of subscript values | USINT-value range | DINT-value range | DINT-value range |
| | Maximum number of structure levels | – | up to 16 KByte | up to 16 KByte |
| 2.4.2 | Initialization of system inputs | The value of the system inputs corresponds to value of the physical inputs at the start of the program. | | |
| 2.4.3 | Maximum number of variables per declaration | 32000 global 32000/POU local | 16000 global 16000/POU local | 16000 global 16000/POU local |
| 2.5 | Information to determine execution times of POUs | No | 1 KByte per function<br>No | No |
| 2.5.1.1 | Method of function representation | Textual | Textual | Textual |
| 2.5.1.3 | Maximum number of function specifications | 0 | 255 | 255 |
| 2.5.1.5 | Maximum number of inputs of extensible functions | 2 | MUX 7; MIN + MAX: any otherwise: 2 | |
| 2.5.1.5.1 | Effects of type conversions on accuracy | none | none | none |



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| Clause | Parameter | PS 4-200 | PS 416 | PS 4-300 |
|---|---|---|---|---|
| 2.5.1.5.2 | Accuracy of functions of one variable<br>Implementation of arithmetic functions | exact<br>– | exact<br>– | exact<br>– |
| 2.5.2 | Maximum number of function blocks and instantiations | Limited by the maximum program size, however, with no more than 255 POUs per project and 4000 FB instances per program | | |
| 2.5.2.3.3 | PVmin, PVmax of counters | –32768 to 32767 | | |
| 2.5.3 | Program size limitations | approx. 56 KByte | CPU 400:<br>1 MByte<br>CPU 300:<br>512 KByte<br>CPU 200:<br>256 KByte | 512 KByte |

## Annex E (normative): Error conditions

*Table E.1: Error conditions*

| Clause | Error conditions | Sucosoft behaviour |
|---|---|---|
| 2.3.3.1 | Value of a variable exceeds the specified subrange | Automatic correction; overflow can be scanned during run time |
| 2.4.2 | Length of initialization list does not match the number of array entries | Syntax error |
| 2.5.1.5.1 | Type conversion errors | Syntax error |
| 2.5.1.5.2 | Numerical result exceeds range for data type<br>Division by zero | Overflow can be scanned during run time |
| 2.5.1.5.4 | Mixed input data types to a selection function<br>Selector (K) out of range for MUX function | Syntax error<br>Last permissible operand |

| Clause | Error conditions | Sucosoft behaviour |
|---|---|---|
| 2.5.1.5.5 | Invalid character position | String returned unchanged |
| | Result exceeds maximum string length | Reduce to maximum permissible length |
| 2.5.1.5.6 | Result exceeds range for data type | Overflow can be scanned during run time |
| 2.6.2 | Zero or more than one initial step in the SFC network | – |
| | User program attempts to modify step state or time | – |
| 2.6.2.5 | Simultaneously true, non-prioritized transitions in a selection divergence | – |
| 2.6.3 | Side effects in evaluation of transition condition | – |
| 2.6.4.5 | Action control contention error | – |
| 2.6.5 | “Unsafe” or “Unreachable” SFC | – |
| 2.7.1 | Data type conflict in VAR_ACCESS | – |
| 2.7.2 | Task requires too many processor resource | – |
| | Execution deadline not met | – |
| | Other task scheduling conflicts | – |
| 3.2.2 | Numerical result exceeds range for data type | Overflow can be scanned during run time |
| 3.3.1 | Division by zero | See 2.5.1.5.2 |
| | Invalid data type for operation | Error message |
| 3.3.2.1 | Return from function without value assigned | urns default initial values |
| 3.3.2.4 | Iteration fails to terminate | – |
| 4.1.1 | Same identifier as connector label and element name | – |
| 4.1.4 | Uninitialized feedback variable | – |
| 4.1.5 | Numerical result exceeds range for data type | See 2.5.1.5.2 |
| | Division by 0 | |



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