

AS/NZS 1102.113:1995
IEC 617-13:1993

Australian/New Zealand Standard

Graphical symbols for electrotechnology

Part 113: Analogue elements

[IEC title: Graphical symbols for diagrams,
Part 13: Analogue elements]

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AS/NZS 1102.113:1995

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Part 113: Analogue elements

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE/13 on Symbols, Units and Quantities for Electrotechnology. It is issued as a Joint Standard.

The objective of this Standard is to provide users of electrotechnical documents with graphical symbols for analogue elements to obtain consistent presentation and meaning in diagrams.

This Standard is identical with and has been reproduced from IEC 617-13:1993, *Graphical symbols for diagrams*, Part 13: *Analogue elements*.

As this Standard is reproduced from an international Standard, the following applies:

- (a) The international Standard number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text, 'this International Standard' should read 'this Australian/New Zealand Standard'.
- (c) A full point substitutes for a comma when referring to a decimal marker.

The symbol numbers in this Standard have retained the IEC 617-13 numbers. In AS 1102, *Graphical symbols for electrotechnology*, Part 101: *General information and general index*, the symbol numbers have '113' as the first part of the symbol number instead of '13'. References in this Standard to symbols in which the first part of the symbol number is '01' to '10' should be substituted by '101' to '110' respectively.

References to international Standards should be replaced by equivalent Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian or Australian/New Zealand Standard</i>	
IEC		AS	
27-1	Letter symbols to be used in electrical technology, Part 1: General	1046	Letter symbols for use in electrotechnology 1046.1 Part 1: General
617-2	Graphical symbols for diagrams, Part 2: Symbol elements, qualifying symbols and other symbols having general application	1102	Graphical symbols for electrotechnology 1102.102 Part 102: Symbol elements, qualifying symbols and other symbols having general application
617-3	Graphical symbols for diagrams, Part 3: Conductors and connecting devices	1102.103	Part 103: Conductors and connecting devices
617-5	Graphical symbols for diagrams, Part 5: Semiconductors and electron tubes	1102.105	Part 105: Semiconductors and electron tubes
617-10	Graphical symbols for diagrams, Part 10: Telecommunications: Transmission	1102.110	Part 110: Telecommunications—Transmission
		AS/NZS	
617-12	Graphical symbols for diagrams, Part 12: Binary logic elements	1102.112	Part 112: Binary logic elements.

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AUSTRALIAN/NEW ZEALAND STANDARD

Graphical symbols for electrotechnology**Part 113:
Analogue elements****1 Scope**

This part of IEC 617 contains graphical symbols that have been developed to represent functions operating on and/or producing analogue quantities. They are intended also to represent physical devices or combinations of physical devices capable of carrying out these functions.

The symbols have been prepared with a view to electrical applications, but many can also be applied to non-electrical devices, for example pneumatic, hydraulic or mechanical.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 617. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 617 are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid normative documents.

IEC 27-1: 1992, *Letter symbols to be used in electrical technology — Part 1: General*

IEC 617-2: 1983, *Graphical symbols for diagrams — Part 2: Symbol elements, qualifying symbols and other symbols having general application*

IEC 617-3: 1983, *Graphical symbols for diagrams — Part 3: Conductors and connecting devices*

IEC 617-5: 1983, *Graphical symbols for diagrams — Part 5: Semiconductors and electron tubes*

IEC 617-10: 1983, *Graphical symbols for diagrams — Part 10: Telecommunications: Transmission*

IEC 617-12: 1991, *Graphical symbols for diagrams — Part 12: Binary logic elements*

3 General notes

3.1 Construction and combination of outlines, labels and dependency notation should follow the applicable general rules of IEC 617-12 with the understanding that analogue connections carry a continuous range of signal levels rather than two logic states. Provided the direction of signal flow is

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clear or properly indicated, inputs may be shown on the right and outputs may be shown on the left if it aids layout of the diagram or better conveys the structure of the device.

3.2 In some figures, lower-case letters that are not part of the symbols have been shown outside the outline just to identify the inputs and outputs as referenced in the description.

3.3 Weighting factors applied to the input signals are each indicated by a sign indicator in combination with a numerical value placed inside the outline of the symbol adjacent to the relevant input.

In this International Standard $w_1, w_2, \dots, w_n$, which are understood to include the proper sign, are used to denote the values of the weighting factors. The symbols for sign indication are $+$ and $-$. If the weighting factor is $+1$ or -1 , such as where a simple non-inverting or inverting input is shown, the number 1 may be omitted.

3.4 In IEC 27, letter symbols for quantities are shown in italic (inclined) type. Upright lettering is allowed and normally used on diagrams. In this International Standard, upright letters are used for all lettering that is intended to be a final part of a symbol or a diagram.

3.5 In IEC 27, the letters V and v are recommended as reserve symbols for voltage; however, in the field of semiconductor devices and generally in the field of electronics, these symbols are so widely used that in graphical symbols prepared in accordance with this International Standard, V and v shall be considered equivalent to U and u including their use in qualifying symbols. In this International Standard, V and v and U and u are considered to be alternative chief symbols for voltage.

3.6 In symbols in this International Standard, the comma has been used for the decimal sign, as recommended in IEC 27-1.

3.7 In this International Standard, the “ φ ” has been used for phase (difference). The “ ϕ ” is considered to be equivalent.

3.8 In many cases, examples are based on commercially available devices. Therefore, type numbers and terminal designations (for one unspecified package type) are shown for the assistance of the reader. Where the type number implies the product of a specific manufacturer, this is done to avoid uncertainties caused by functional variations that sometimes occur between devices that have the same generic portion of the type number but are made by different manufacturers.

3.9 Some symbols are shown in this International Standard with external connections or external networks. The function indicated by the symbol might be performed only when these external connections or external networks are present.

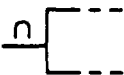
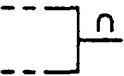
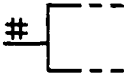
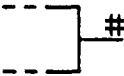
3.10 In cases where binary inputs or outputs are shown in this International Standard and the logic polarity indicator has not been used, positive logic convention is to be assumed.

3.11 Label grouping (see 54.6 of IEC 617-12) may be employed to group adjacent and associated connecting lines whose labels are partially alike.

Chapter II : Qualifying symbols associated with inputs, outputs and other connections

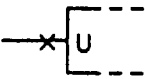
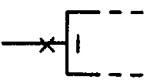
4 Qualifying symbols indicating the type of signal

The symbols $\cap$ and $\#$ (symbols 02-17-08 and 02-17-09 of IEC 617-2) shall be used when it is necessary to distinguish between analogue and digital signals. They may also be added to a general qualifying symbol or placed adjacent to symbols 12-08-01, 12-08-05, and 12-08-06 of IEC 617-12 if confusion is likely regarding whether the function or signal is digital or analogue.

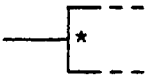
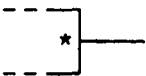
No.	Symbol	Description
13-04-01		Analogue input
13-04-02		Analogue output
13-04-03		Digital input
13-04-04		Digital output
13-04-05	Use symbol 12-10-01 of IEC 617-12	Subsidiary connection An input supplying power to the device or a connection the knowledge of whose level is not important to understand the function of the element and the circuit (e.g., a connection to an external supplementary resistor or capacitor).

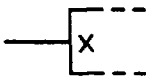
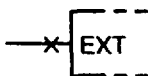
5 Qualifying symbols indicating the functions of inputs, outputs and other connections

5.1 Any necessary supplementary information may be added to the symbols in this section, provided no confusion is likely.

No.	Symbol	Description
13-05-01		Supply-voltage terminal, shown on the left-hand side
13-05-02		Supply-current terminal, shown on the left-hand side A terminal to be connected to a source of power. U [I] may be followed by the polarity sign or may be replaced by — the nominal signed value (e.g., +5 V, 10 mA) or by — a suitable mnemonic (e.g., VCC, GND). NOTE — Supply terminals are not always shown.

No.	Symbol	Description
13-05-03		Supply-voltage output
13-05-04		Supply-current output An output that is a source of power. U [I] may be followed by the polarity sign or may be replaced by — the nominal signed value (e.g., resulting in +5 V PWR, 1 A PWR), or by — a suitable mnemonic (e.g., resulting in VCCPWR, GNDPWR). If it is not necessary to emphasize the fact that it is a power output, use symbol 13-05-08.
13-05-05		Reference input An input to be connected to a reference source.
13-05-06		Reference output An output that is a reference source. The asterisk shall be replaced by the symbol for the reference quantity (e.g., U, I, f, φ).

		The quantity symbol may be followed by the polarity sign or may be replaced by — the nominal signed value (e.g., resulting in + 5 V REF, 10 mA REF), or by — a suitable mnemonic (e.g., resulting in VCCREF, GNDREF). If it is not necessary to emphasize the fact that it is a reference input [output] use symbol 13-05-07 [13-05-08].
13-05-07		Quantity-sensing input
13-05-08		Quantity output Input [output] for which the indicated quantity represents the information. The asterisk shall be replaced by the symbol for the quantity representing the information (e.g., U, I, f, φ). The quantity symbol may be followed by the polarity sign or may be replaced by one of the following indications of the range or fixed value: — a nominal signed value or values (e.g., +5 V, 0 mA ... 20 mA, 440 Hz) or — a suitable mnemonic (e.g., VCC, GND, A#). (continued overleaf)

No.	Symbol	Description (continued)								
		If the polarity sign is not shown, U should be omitted unless confusion is likely. If this symbol is combined with other symbols (e.g., 13-05-09) it should follow those other symbols, enclosed, if necessary, in square brackets.								
13-05-09		Analogue operand input (X-input shown) This input represents an operand on which one or more analogue functions are performed. For analogue operands, the letters X and Y should be used. If more than two operands are involved, other characters may be used or suffixes may be added, providing no confusion is likely.								
13-05-10		Terminal, shown on the left-hand side, to be externally connected to a subsidiary circuit or circuit element EXT should be replaced by another designation, e.g., <table><tr><td>RX</td><td>resistance</td></tr><tr><td>CX</td><td>capacitance</td></tr><tr><td>RCX</td><td>resistance and capacitance</td></tr><tr><td>XTAL</td><td>crystal</td></tr></table>	RX	resistance	CX	capacitance	RCX	resistance and capacitance	XTAL	crystal
RX	resistance									
CX	capacitance									
RCX	resistance and capacitance									
XTAL	crystal									