Table 5.1.1 — Instrumentation device and function symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.1.

No.	Shared display, Shared control (1)		C	D	Location & accessibility (6)
	A	B			
	Primary Choice or Basic Process Control System (2)	Alternate Choice or Safety Instrumented System (3)	Computer Systems and Software (4)	Discrete (5)	
1					• Located in field. • Not panel, cabinet, or console mounted. • Visible at field location. • Normally operator accessible.
2					• Located in or on front of central or main panel or console. • Visible on front of panel or on video display. • Normally operator accessible at panel front or console.
3					• Located in rear of central or main panel. • Located in cabinet behind panel. • Not visible on front of panel or on video display. • Not normally operator accessible at panel or console.
4					• Located in or on front of secondary or local panel or console. • Visible on front of panel or on video display. • Normally operator accessible at panel front or console.
5					• Located in rear of secondary or local panel. • Located in field cabinet. • Not visible on front of panel or on video display. • Not normally operator accessible at panel or console.

Table 5.1.2 — Instrumentation device or function symbols, miscellaneous

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.1.

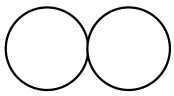
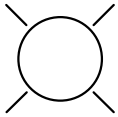
No	Symbol	Description
1		• Signal processing function: • Locate in upper right or left quadrant of symbols above. • Attach to symbols above where affected signals are connected. • Insert signal processing symbol from Table 5.6 • Expand symbol by 50% increments for larger function symbols.
2		• Panel-mounted patchboard plug-in point. • Console matrix point. • C-12 equals patchboard column and row respectively, as an example.
3	(7) (8) 	• Generic interlock logic function. • Undefined interlock logic function.
4	(7) (8) 	• 'AND' interlock logic function.
5	(7) (8) 	• 'OR' interlock logic function.
6		• Instruments or functions sharing a common housing. • It is not mandatory to show a common housing. • Notes shall be used to identify instruments in common housings not using this symbol.
7		• Pilot light. • Circle shall be replaced with any symbol from column D in Table 5.1.1 if location and accessibility needs to be shown.

Table 5.2.1 — Measurement symbols: primary elements and transmitters

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

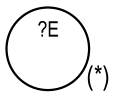
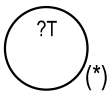
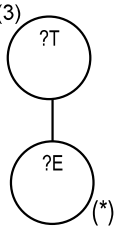
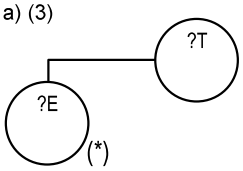
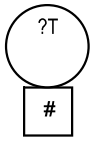
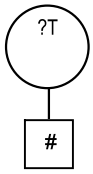
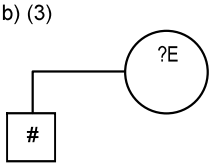
No	Symbol	Description
1	(1a) (2) 	• Generic primary element, bubble format. • Notation (*) from Table 5.2.2 should be used to identify type of element. • Connect to process or other instruments by symbols from Tables 5.3.1 and 5.3.2. • Insert in or on process flow line, vessel, or equipment.
2	(1a) ((2) (3) 	• Transmitter with integral primary element, bubble format. • Notation (*) from Table 5.2.2 should be used to identify type of element. • Connect to process or other instruments by symbols from Tables 5.3.1 and 5.3.2. • Insert in or on process flow line, vessel, or equipment.
3	(1a) (2) (3) 	• Transmitter with close coupled primary element, bubble format • Notation (*) from Table 5.2.2 should be used to identify type of element. • Connecting line shall be equal to or less than 0.25 inches (6 millimeters). • Connect to process or other instruments by symbols from Tables 5.3.1 and 5.3.2. • Insert element in or on process flow line, vessel, or equipment.
4	(1a) (3) 	• Transmitter with remote primary element, bubble format. • Notation (*) from Table 5.2.2 should be used to identify type of element. • Connecting line shall be equal to or greater than 0.5 inches (12 millimeters). • Connect to process or other instruments by symbols from Tables 5.3.1 and 5.3.2. • Insert element in or on process flow line, vessel, or equipment.
5	(1b) (3) 	• Transmitter with integral primary element inserted in or on process flow line, vessel, or equipment, bubble/graphic format. • Insert primary element symbol from Table 5.2.3 at #. • Connect to other instruments by symbols from Table 5.3.2.
6	(1b) (3) 	• Transmitter with close-coupled primary element inserted in or on process flow line, vessel, or equipment, bubble/graphic format. • Insert primary element symbol from Table 5.2.3 at #. • Connecting line shall be equal to or less than 0.25 inches (6 millimeters). • Connect to other instruments by symbols from Table 5.3.2.
7	(1b) (3) 	• Transmitter with remote primary element inserted in or on process flow line, vessel, or equipment, bubble/graphic format. • Insert primary element symbol from Table 5.2.3 at #. • Connecting line may be any signal line from Table 5.2.3. • Connecting line shall be equal to or greater than 0.5 inches (12 millimeters). • Connect to other instruments by symbols from Table 5.3.2.

Table 5.2.2 — Measurement symbols: measurement notations (4)

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2

Analysis							
AIR = Excess air	H2O = Water	O2 = Oxygen	UV = Ultraviolet
CO = Carbon monoxide	H2S = Hydrogen sulfide	OP = Opacity	VIS = Visible light
CO2 = Carbon dioxide	HUM = Humidity	ORP = Oxidation reduction	VISC = Viscosity
COL = Color	IR = Infrared	pH = Hydrogen ion	=
COMB = Combustibles	LC = Liquid chromatograph	REF = Refractometer	=
COND = Elec. conductivity	MOIST = Moisture	RI = Refractive index	=
DEN = Density	MS = Mass spectrometer	TC = Thermal conductivity	=
GC = Gas chromatograph	NIR = Near infrared	TDL = Tunable diode laser	=

Flow							
CFR = Constant flow regulator	OP = Orifice plate	PT = Pitot tube	VENT = Venturi tube
CONE = Cone	OP-CT = Corner taps	PV = Pitot venturi	VOR = Vortex Shedding
COR = Coriollis	OP-CQ = Circle quadrant	SNR = Sonar	WDG = Wedge
DOP = Doppler	OP-E = Eccentric	SON Sonic	=
DSON = Doppler sonic	OP-FT = Flange taps	TAR = Target	
FLN = Flow nozzle	OP-MH = Multi-hole	THER = Thermal	=
FLT = Flow tube	OP-P = Pipe taps	TTS = Transit time sonic	=
LAM = Laminar	OP-VC = Vena contracta taps	TUR = Turbine	=
MAG = Magnetic	PD = Positive displacement	US = Ultrasonic	=

Level							
CAP = Capacitance	GWR = Guided wave radar	NUC = Nuclear	US = Ultrasonic
d/p = Differential pressure	LSR = Laser	RAD = Radar	=
DI = Dielectric constant	MAG = Magnetic	RES = Resistance	=
DP = Differential pressure	MS = Magnetostrictive	SON = Sonic	=

Pressure							
ABS = Absolute	MAN = Manometer	VAC = Vacuum	
AVG = Average	P-V = Pressure-vacuum		=
DRF = Draft	SG = Strain gage	=	=

Temperature							
BM = Bi-metallic	RTD = Resistance temp detector	TCK = Thermocouple type K	TRAN = Transistor
IR = Infrared	TC = Thermocouple	TCT = Thermocouple type T	=
RAD = Radiation	TCE = Thermocouple type E	THRM = Thermistor	=
RP = Radiation pyrometer	TCJ = Thermocouple type J	TMP = Thermopile	=

Miscellaneous			
Burner, Combustion	Position	Quantity	Radiation
FR = Flame rod	CAP = Capacitance	PE = Photoelectric	α = Alpha radiation
IGN = Igniter	EC = Eddy current	TOG = Toggle	β = Beta radiation
IR = Infrared	IND = Inductive	=	γ = Gamma radiation
TV = Television	LAS = Laser	=	n = Neutron radiation
UV = Ultraviolet	MAG = Magnetic	=	=
=	MECH = Mechanical	=	=
=	OPT = Optical	=	=
=	RAD = Radar	=	=
=	=	=	=
Speed	**Weight, Force**		
ACC = Acceleration	LC = Load cell	=	=
EC = Eddy current	SG = Strain gauge	=	=
PROX = Proximity	WS = Weigh scale	=	=
VEL = Velocity	=	=	=
=	=	=	=

Table 5.2.3 — Measurement symbols: primary elements

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

No		Symbol (4)	Description
Analysis	1		• Conductivity, moisture, etc. • Single element sensing probe.
Analysis	2		• pH, ORP, etc. • Dual element sensing probe.
Analysis	3		• Fiberoptic sensing probe.
Burner	4		• Ultraviolet flame detector. • Television flame monitor.
Burner	5		• Flame rod flame detector.
Flow	6		• Generic orifice plate. • Restriction orifice.
Flow	7		• Orifice plate in quick-change fitting.
Flow	8		• Concentric circle orifice plate. • Restriction orifice.
Flow	9		• Eccentric circle orifice plate.
Flow	10		• Circle quadrant orifice plate.
Flow	11		• Multi-hole orifice plate
Flow	12		• Generic venturi tube, flow nozzle, or flow tube. • Notation from Table 5.2.2 required at (*) if used for more than one type.
Flow	13		• Venturi tube.
Flow	14		• Flow nozzle.
Flow	15		• Flow tube.

Table 5.2.3 — Measurement symbols: primary elements

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

No		Symbol (4)	Description
Flow	16		• Integral orifice plate.
Flow	17		• Standard pitot tube.
Flow	18		• Averaging pitot tube.
Flow	19		• Turbine flowmeter. • Propeller flowmeter.
Flow	20		• Vortex shedding flowmeter
Flow	21		• Target flowmeter.
Flow	22	(4) a)  b) 	• Magnetic flowmeter.
Flow	23	(4) a)  b) 	• Thermal mass flowmeter.
Flow	24		• Positive displacement flowmeter.
Flow	25		• Cone meter. • Annular orifice meter.
Flow	26		• Wedge meter.
Flow	27		• Coriollis flowmeter.
Flow	28		• Sonic flowmeter. • Ultrasonic flowmeter.
Flow	29		• Variable area flowmeter.
Flow	30		• Open channel weir plate.

Table 5.2.3 — Measurement symbols: primary elements

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

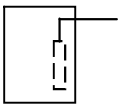
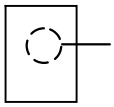
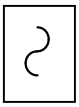
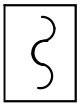
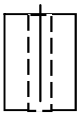
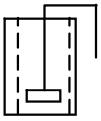
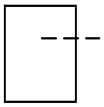
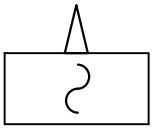
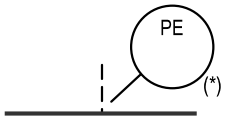
No		Symbol (4)	Description
Flow	31		• Open channel flume.
Level	32		• Displacer internally mounted in vessel.
Level	33		• Ball float internally mounted in vessel. • May be installed through top of vessel.
Level	34		• Radiation, single point. • Sonic.
Level	35		• Radiation, multi-point or continuous.
Level	36		• Dip tube or other primary element and stilling well. • May be installed through side of vessel. • May be installed without stilling well.
Level	37		• Float with guide wires. • Location of readout should be noted, at grade, at top, or accessible from a ladder. • Guide wires may be omitted.
Level	38		• Insert probe. • May be through top of vessel.
Level	39		• Radar.
Pressure	40		• Strain gage or other electronic type sensor. • Notation (*) from Table 5.2.2 should be used to identify type of element. • Connection symbols 6, 7, 8, or 9 in Table 5.3.1 are used if connection type is to be shown. • Bubble may be omitted if connected to another instrument.

Table 5.2.3 — Measurement symbols: primary elements

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

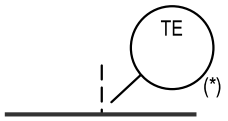
No		Symbol (4)	Description
Temperature	41		• Generic element without thermowell. • Notation (*) should be used to identify type of element, see Table 5.2.2. • Connection symbols 6, 7, 8, or 9 in Table 5.3.1 are used if connection type is to be shown. • Bubble may be omitted if connected to another instrument.

Table 5.2.4 — Measurement symbols: secondary instruments

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

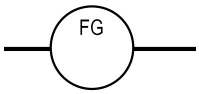
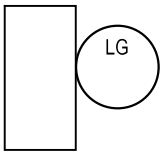
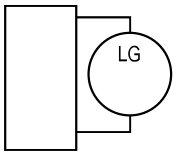
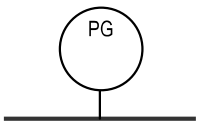
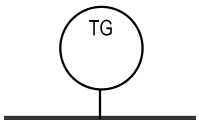
No		Symbol (4)	Description
Flow	1		• Sight glass.
Level	2		• Gage integrally mounted on vessel. • Sight glass.
Level	3		• Gage glass externally mounted on vessel or standpipe. • Multiple gages may be shown as one bubble or one bubble for each section. • Use connection 6, 7, 8, or 9 in Table 5.3.1 if connection type is to be shown.
Pressure	4		• Pressure gage. • Use connection 6, 7, 8, or 9 in Table 5.3.1 if connection type is to be shown.
Temperature	5		• Thermometer. • Use connection 6, 7, 8, or 9 in Table 5.3.1 if connection type is to be shown.

Table 5.2.5 — Measurement symbols: auxiliary and accessory devices

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2.

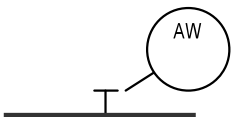
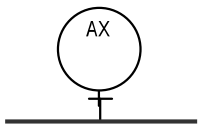
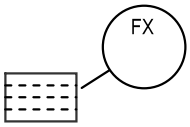
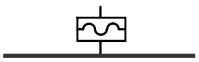
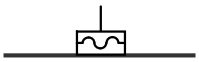
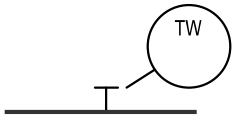
No		Symbol (4)	Description
Analysis	1		• Sample insert probe, flanged. • Sample well, flanged. • Use connection 7, 8, or 9 in Table 5.3.1 if flange is not used.
Analysis	2		• Sample conditioner or other analysis accessory, flanged. • Represents single or multiple devices. • Use connection 7, 8, or 9 in Table 5.3.1 if flange is not used.
Flow	3		• Flow straightening vanes. • Flow conditioning element.
Flow	4		• Instrument purge or flushing fluid. • Instrument purge or flushing device or devices. • Show assembly details on drawing legend sheet.
Pressure	5		• Diaphragm pressure seal, flanged, threaded, socket welded, or welded. • Diaphragm chemical seal, flanged, threaded, socket welded, or welded. • Use connection 6, 7, 8, or 9 in Table 5.3.1 if connection type is to be shown.
Pressure	6		• Diaphragm pressure seal, welded. • Diaphragm chemical seal, welded.
Temperature	7		• Thermowell, flanged. • Test well, flanged. • Bubble may be omitted if connected to another instrument. • Use connection 7, 8, or 9 in Table 5.3.1 if flange is not used.

Table 5.3.1 — Line symbols: instrument to process and equipment connections

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.3.

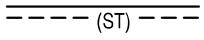
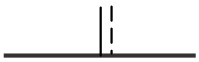
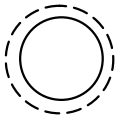
No	Symbol	Application
1		• Instrument connections to process and equipment. • Process impulse lines. • Analyzer sample lines.
2		• Heat [cool] traced impulse or sample line from process. • Type of tracing indicated by: [ET] electrical, [ST] steam, [CW] chilled water, etc.
3		• Generic instrument connection to process line. • Generic instrument connection to equipment.
4		• Heat [cool] traced generic instrument impulse line. • Process line or equipment may or may not be traced.
5		• Heat [cool] traced instrument. • Instrument impulse line may or may not be traced.
6		• Flanged instrument connection to process line. • Flanged instrument connection to equipment.
7		• Threaded instrument connection to process line. • Threaded instrument connection to equipment.
8		• Socket welded instrument connection to process line. • Socket welded instrument connection to equipment.
9		• Welded instrument connection to process line. • Welded instrument connection to equipment.

Table 5.3.2 — Line symbols: instrument-to-instrument connections

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.3.

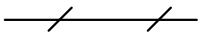
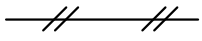
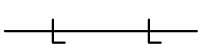
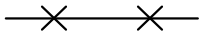
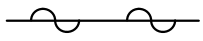
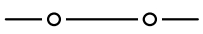
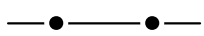
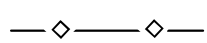
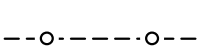
No	Symbol	Application
1	(1) IA ———	• IA may be replaced by PA [plant air], NS [nitrogen}, or GS [any gas supply]. • Indicate supply pressure as required, e.g., PA-70 kPa, NS-150 psig, etc.
2	(1) ES ———	• Instrument electric power supply. • Indicate voltage and type as required, e.g. ES-220 Vac. • ES may be replaced by 24 Vdc, 120 Vac, etc.
3	(1) HS ———	• Instrument hydraulic power supply. • Indicate pressure as required, e.g., HS-70 psig.
4	(2) 	• Undefined signal. • Use for Process Flow Diagrams. • Use for discussions or diagrams where type of signal is not of concern.
5	(2) 	• Pneumatic signal, continuously variable or binary.
6	(2)	• Electronic or electrical continuously variable or binary signal. • Functional diagram binary signal.
7	(2)	• Functional diagram continuously variable signal. • Electrical schematic ladder diagram signal and power rails.
8	(2) 	• Hydraulic signal.
9	(2) 	• Filled thermal element capillary tube. • Filled sensing line between pressure seal and instrument.
10	(2) 	• Guided electromagnetic signal. • Guided sonic signal. • Fiber optic cable.
11	(3) a)  b) 	• Unguided electromagnetic signals, light, radiation, radio, sound, wireless, etc. • Wireless instrumentation signal. • Wireless communication link.
12	(4) 	• Communication link and system bus, between devices and functions of a shared display, shared control system. • DCS, PLC, or PC communication link and system bus.
13	(5) 	• Communication link or bus connecting two or more independent microprocessor or computer-based systems. • DCS-to-DCS, DCS-to-PLC, PLC-to-PC, DCS-to-Fieldbus, etc. connections.
14	(6) 	• Communication link and system bus, between devices and functions of a fieldbus system. • Link from and to “intelligent” devices.
15	(7) 	• Communication link between a device and a remote calibration adjustment device or system. • Link from and to “smart” devices.

Table 5.3.2 — Line symbols: instrument-to-instrument connections

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.3.

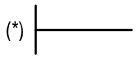
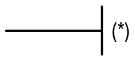
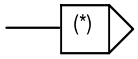
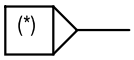
No	Symbol	Application
16		• Mechanical link or connection.
17	(3) a) (#) (##) a) (#) (##) b) (#) (##) b) (#) (##)	• Drawing-to-drawing signal connector, signal flow from left to right. • (#) = Instrument tag number sending or receiving signal. • (##) = Drawing or sheet number receiving or sending signal.
18		• Signal input to logic diagram. • (*) = Input description, source, or instrument tag number.
19		• Signal output from logic diagram. • (*) = Output description, destination, or instrument tag number.
20		• Internal functional, logic, or ladder diagram signal connector. • Signal source to one or more signal receivers. • (*) = Connection identifier A, B, C, etc.
21		• Internal functional, logic, or ladder diagram signal connector. • Signal receiver, one or more from a single source. • (*) = Connection identifier A, B, C, etc.

Table 5.4.1 — Final control element symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

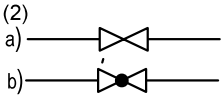
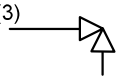
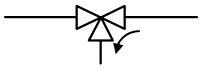
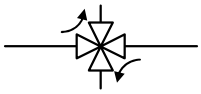
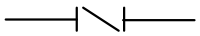
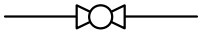
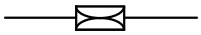
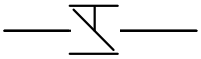
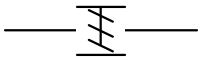
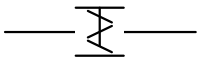
No	Symbol	Description
1	(1) (2) a) b) 	• Generic two-way valve. • Straight globe valve. • Gate valve.
2	(2) (3) 	• Generic two-way angle valve. • Angle globe valve. • Safety angle valve.
3	(2) 	• Generic three-way valve. • Three-way globe valve. • Arrow indicates failure or unactuated flow path.
4	(2) 	• Generic four-way valve. • Four-way four-ported plug or ball valve. • Arrows indicates failure or unactuated flow paths.
5	(2) 	• Butterfly valve.
6	(2) 	• Ball valve.
7	(2) 	• Plug valve
8	(2) 	• Eccentric rotary disc valve.
9	(1) (2) a) b) 	• Diaphragm valve.
10	(2) 	• Pinch valve.
11	(2) 	• Bellows sealed valve.
12	(2) 	• Generic damper. • Generic louver.
13	(2) 	• Parallel blade damper. • Parallel blade louver.
14	(2) 	• Opposed blade damper. • Opposed blade louver.

Table 5.4.1 — Final control element symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

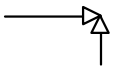
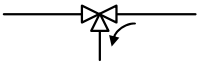
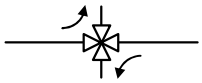
No	Symbol	Description
15	(4) 	• Two-way on-off solenoid valve.
16	(4) 	• Angle on-off solenoid valve.
17	(4) 	• Three-way on-off solenoid valve. • Arrow indicates de-energized flow path.
18	(4) 	• Four-way plug or ball on-off solenoid valve. • Arrows indicates de-energized flow paths.
19	(4) 	• Four-way five-ported on-off solenoid valve. • Arrows indicates de-energized flow paths.
20	(5) 	• Permanent magnet variable speed coupling.
21	(6) 	• Electric motor.

Table 5.4.2 — Final control element actuator symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4

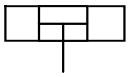
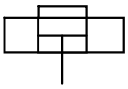
No	Symbol	Description
1	(7) 	• Generic actuator. • Spring-diaphragm actuator.
2	(7) 	• Spring-diaphragm actuator with positioner.
3	(7) 	• Pressure-balanced diaphragm actuator.
4	(7) 	• Linear piston actuator. • Single acting spring opposed • Double acting.
5	(7) 	• Linear piston actuator with positioner.
6	(7) 	• Rotary piston actuator. • May be single acting spring opposed or double acting.
7	(7) 	• Rotary piston actuator with positioner.
8	(7) 	• Bellows spring opposed actuator.
9	(7) 	• Rotary motor operated actuator. • Electric, pneumatic, or hydraulic. • Linear or rotary action.
10	(7) 	• Modulating solenoid actuator. • Solenoid actuator for process on-off valve.
11	(7) 	• Actuator with side-mounted handwheel.

Table 5.4.2 — Final control element actuator symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4

No	Symbol	Description
12	(7) 	• Actuator with top-mounted handwheel.
13	(7) 	• Manual actuator. • Hand actuator.
14	(7) 	• Electrohydraulic linear or rotary actuator.
15	(7) 	• Actuator with manual actuated partial stroke test device.
16	(7) 	• Actuator with remote actuated partial stroke test device.
17	(8) 	• Automatic reset on-off solenoid actuator. • Non-latching on-off solenoid actuator.
18	(8) 	• Manual or remote reset on-off solenoid actuator. • Latching on-off solenoid actuator.
19	(8) 	• Manual and remote reset on-off solenoid actuator. • Latching on-off solenoid actuator.
20	(9) 	• Spring or weight actuated relief or safety valve actuator.
21	(9) 	• Pilot actuated relief or safety valve actuator. • Pilot pressure sensing line deleted if sensing is internal.

Table 5.4.3 — Self-actuated final control element symbol

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

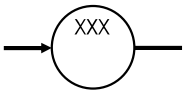
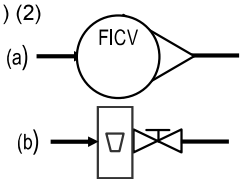
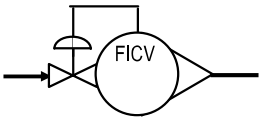
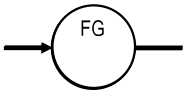
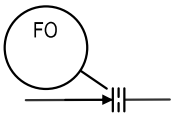
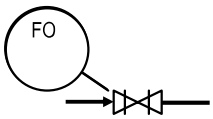
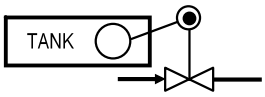
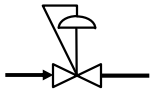
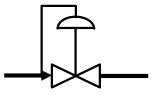
No	Symbol	Description
1		• Automatic flow regulator. • XXX = FCV without indicator. • XXX = FICV with integral indicator.
2	(1) (2) (a) (b) 	• Variable area flowmeter with integral manual adjusting valve. • Instrument tag bubble required with (b).
3		• Constant flow regulator.
4		• Flow sight glass. • Type shall be noted if more than one type used.
5		• Generic flow restriction. • Single stage orifice plate as shown. • Note required for multi-stage or capillary tube types.
6		• Restriction orifice hole drilled in valve plug. • Tag number shall be omitted if valve is otherwise identified.
7		• Level regulator. • Ball float and mechanical linkage.
8		• Backpressure regulator. • Internal pressure tap.
9		• Backpressure regulator. • External pressure tap.

Table 5.4.3 — Self-actuated final control element symbol

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

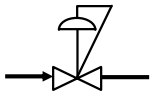
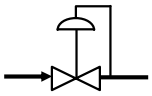
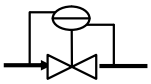
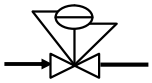
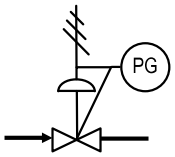
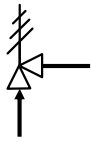
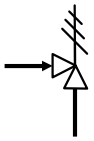
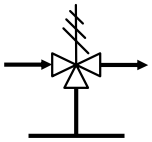
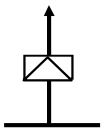
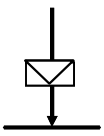
No	Symbol	Description
10		• Pressure-reducing regulator. • Internal pressure tap.
11		• Pressure-reducing regulator. • External pressure tap.
12		• Differential pressure regulator. • External pressure taps.
13		• Differential pressure regulator. • Internal pressure taps.
14		• Pressure-reducing regulator w/ integral outlet pressure relief and pressure gauge.
15		• Generic pressure safety valve. • Pressure relief valve.
16		• Generic vacuum safety valve. • Vacuum relief valve.
17		• Generic pressure - vacuum relief valve. • Tank pressure - vacuum relief valve.
18		• Pressure safety element. • Pressure rupture disk. • Pressure relief.
19		• Pressure safety element. • Vacuum rupture disk. • Vacuum relief.

Table 5.4.3 — Self-actuated final control element symbol

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

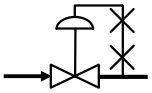
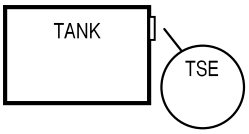
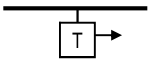
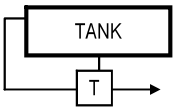
No	Symbol	Description
20		• Temperature regulator. • Filled thermal system.
21		• Thermal safety element. • Fusible plug or disk.
22		• Generic moisture trap. • Steam trap. • Note required for other trap types.
23		• Moisture trap with equalizing line.

Table 5.4.4 — Control valve failure and de-energized position indications

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.4.

No	Method A (1) (10)	Method B (1) (10)	Definition
1			• Fail to open position.
2			• Fail to closed position.
3			• Fail locked in last position.
4			• Fail at last position. • Drift open.
5			• Fail at last position. • Drift closed.

Table 5.5 — Functional diagramming symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.5.

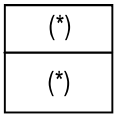
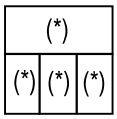
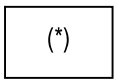
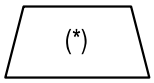
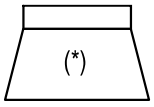
No	Symbol (1) (2)	Description
1		• Measuring, input, or readout device. • [*] = Instrument tag number. • Symbols from Table 5.2.1 may be used.
2	(3) (4) 	• Automatic single-mode controller.
3	(3) (4) 	• Automatic two-mode controller.
4	(3) (4) 	• Automatic three-mode controller.
5	(3) (4) 	• Automatic signal processor.
6	(4) 	• Manual signal processor.
7	(3) (4) 	• Final control element. • Control valve.
8	(3) (4) 	• Final control element with positioner. • Control valve with positioner.

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

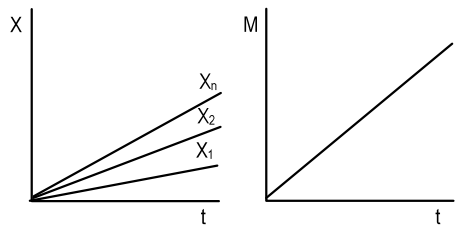
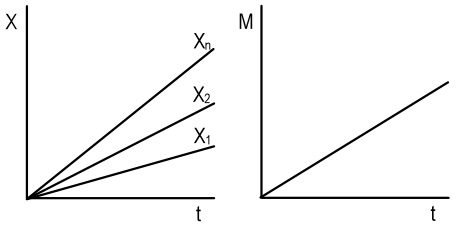
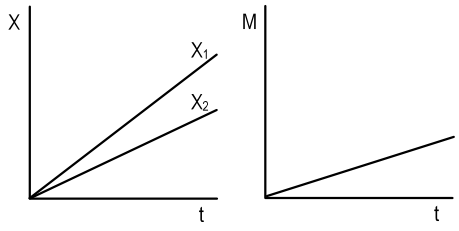
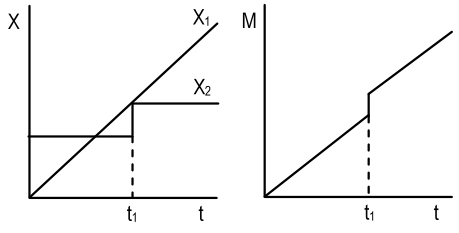
No	Function Symbol (1) (2)	Equation Graph	Definition
1	Summation Σ Σ	$M = X_1 + X_2 \ldots + X_n$ 	• Output equals algebraic sum of inputs.
2	Average Σ/n Σ/n	$M = X_1 + X_2 \ldots + X_n/n$ 	• Output equals algebraic sum of inputs divided by number of inputs.
3	Difference Δ Δ	$M = X_1 - X_2$ 	• Output equals algebraic difference of two inputs.
4	Multiplication X X	$M = X_1 \times X_2$ 	• Output equals product of two inputs.

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

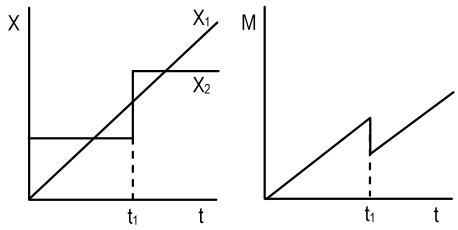
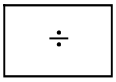
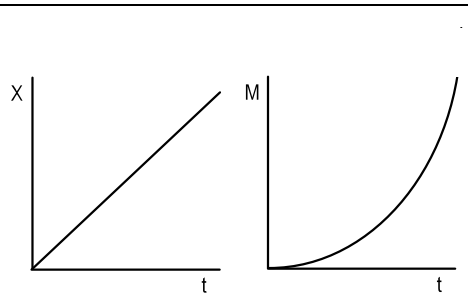
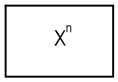
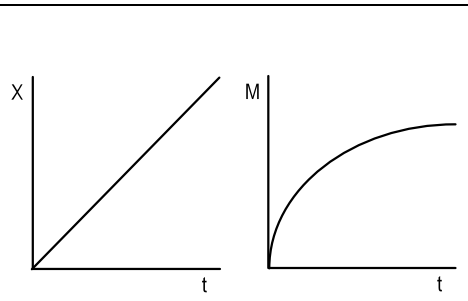
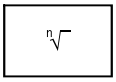
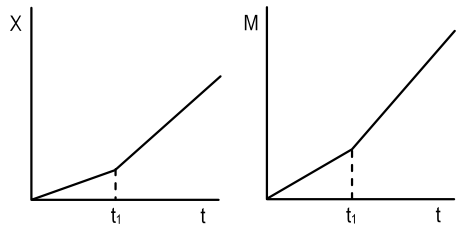
No	Function Symbol (1) (2)	Equation Graph	Definition
5	Division	$M = X_1 \div X_2$	• Output equals quotient of two inputs.
			
			
6	Exponential	$M = X^n$	• Output equals nth power of input.
			
			
7	Root extraction	$M = \sqrt[n]{X}$	• Output equals nth root of input. • If 'n' omitted, square root is assumed.
			
			
8	Proportion	M = KX or M = PX	• Output proportional to input. • Replace 'K' or 'P' with '1:1' for volume boosters. • Replace 'K' or 'P' with '2:1', '3:1', etc., for integer gains.
	(3) a) K b) P		
	(3) a) K b) P		

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

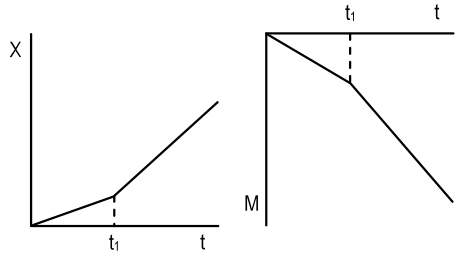
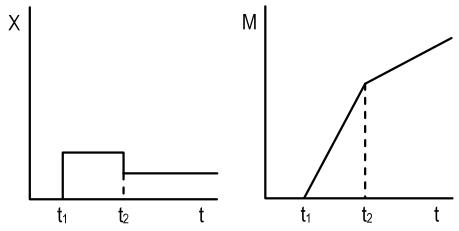
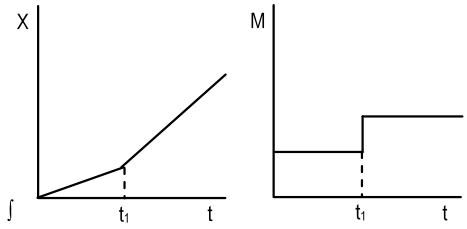
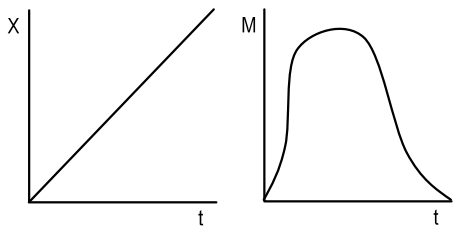
No	Function Symbol (1) (2)	Equation Graph	Definition
9	Reverse proportion (3) a) -K b) -P (3) a) -K b) -P	M = -KX or M = -PX 	• Output inversely proportional to input. • Replace '-K' or '-P' with '-1:1' for volume boosters. • Replace '-K' or '-P' with '-2:1', '-3:1', etc., for integer gains.
10	Integral (3) a) ∫ b) I (3) a) ∫ b) I	M = (1/T_I)∫Xdt 	• Output varies with magnitude and time duration of input. • Output proportional to time integral of input. • T_I = Integral time constant.
11	Derivative (3) a) d/dt b) D (3) a) d/dt b) D	M = T_D (dx/dt) 	• Output proportional to time rate of change of input. • T_D = derivative time constant.
12	Unspecified function $f_{(x)}$ $f_{(x)}$	M = f(x) 	• Output is a nonlinear or unspecified function of the input. • Function defined in note or other text.

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

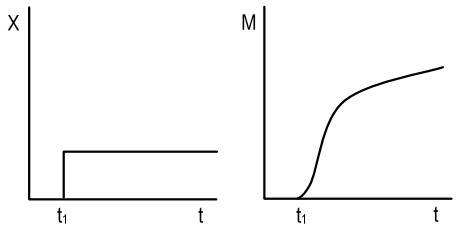
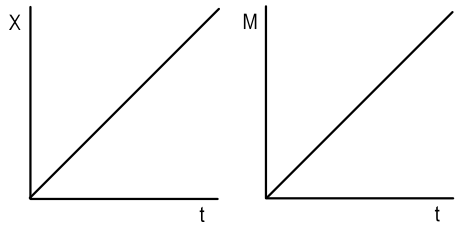
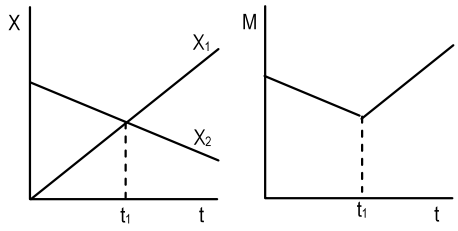
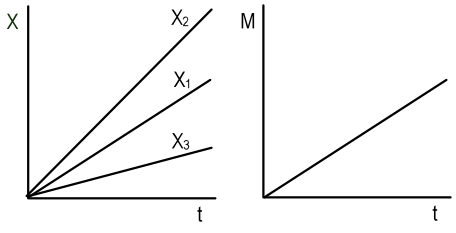
No	Function Symbol (1) (2)	Equation Graph	Definition
13	Time function $f_{(t)}$ $f_{(t)}$	M = Xf(t) 	• Output equals a nonlinear or unspecified time function times the input. • Output is a nonlinear or unspecified time function. • Function defined in note or other text.
14	Conversion I/P I/P	I = P, P = I, etc 	• Output signal type different from that of input signal. • Input signal is on the left and output signal is on the right. • Substitute any of the following signal types for 'P' or 'I': • A = Analog H = Hydraulic • B = Binary I = Current • D = Digital O = Electromagnetic • E = Voltage P = Pneumatic • F = Frequency R = Resistance
15	High signal select > >	M = X_1 for $X_1 > X_2$ M = X_2 for $X_1 \leq X_2$ 	• Output equals greater of 2 or more inputs.
16	Middle signal select M M	M = X_1 for $X_2 > X_1 > X_3$ or $X_3 > X_1 > X_2$ M = X_2 for $X_1 > X_2 > X_3$ or $X_3 > X_2 > X_1$ M = X_3 for $X_1 > X_3 > X_2$ or $X_2 > X_3 > X_1$ 	Output equals middle value of three or more inputs.

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

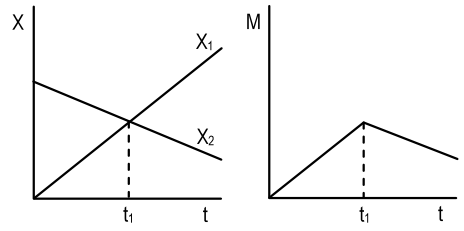
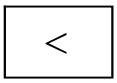
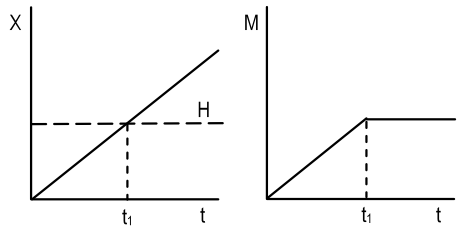
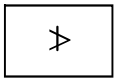
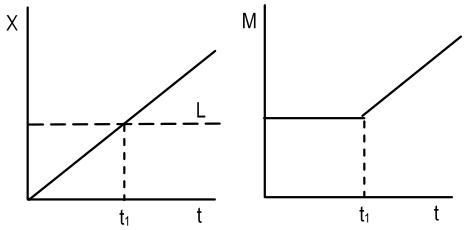
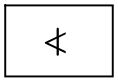
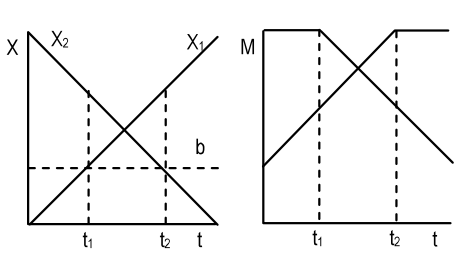
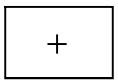
No	Function Symbol (1) (2)	Equation Graph	Definition
17	Low signal select	$M = X_1$ for $X_1 \leq X_2$ $M = X_2$ for $X_1 \geq X_2$	• Output equals lesser of 2 or more inputs.
			
			
18	High limit	$M = X$ for $X \leq H$ $M = H$ for $X \geq H$	• Output equals the lower of the input or high limit values.
			
			
19	Low limit	$M = X$ for $X \geq L$ $M = L$ for $X \leq L$	• Output equals the higher of the input or low limit values.
			
			
20	Positive bias	$M = X_1 + b$ $M = [-]X_2 + b$	• Output equal to input plus an arbitrary value.
			
			

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

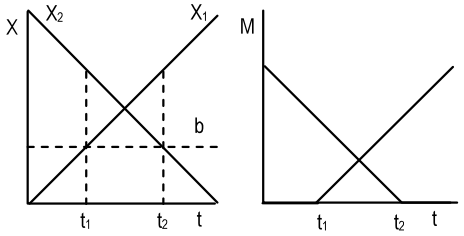
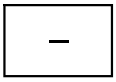
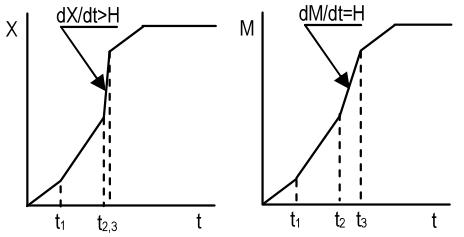
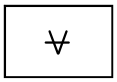
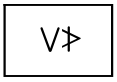
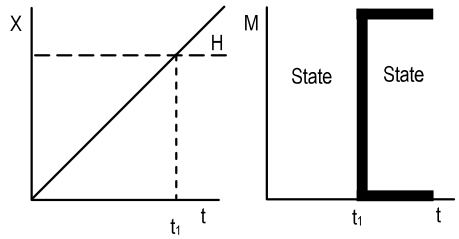
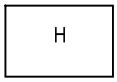
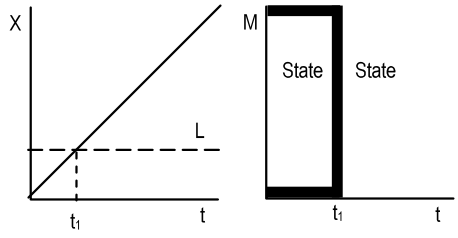
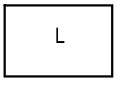
No	Function Symbol (1) (2)	Equation Graph	Definition
21	Negative Bias	$M = X_1 - b$ $M = [-]X_2 - b$	• Output equal to input minus an arbitrary value.
			
			
22	Velocity limiter	dM/dt = dX/dt for dX/dt ≤ H, M = X dM/dt = H for dX/dt ≥ H, M ≠ X	• Output equals input as long as the input rate of change does not exceed the limit value that establishes the output rate of change until the output again equals the input.
	(3) a)  b) 		
	(3) a)  b) 		
23	High signal monitor	(State 1) M = 0 @ X < H (State 2) M = 1 @ X ≥ H	• Output state is dependent on value of input. • Output changes state when input is equal to or higher than an arbitrary high limit.
			
			
24	Low signal monitor	(State 1) M = 1 @ X ≤ L (State 2) M = 0 @ X > L	• Output state is dependent on value of input. • Output changes state when input is equal to or lower than an arbitrary low limit.
			
			

Table 5.6 — Signal processing function block symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.6.

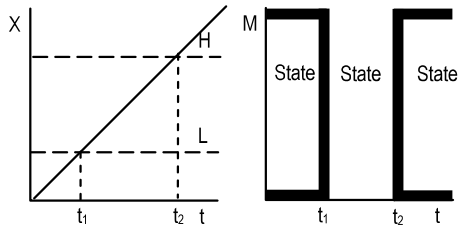
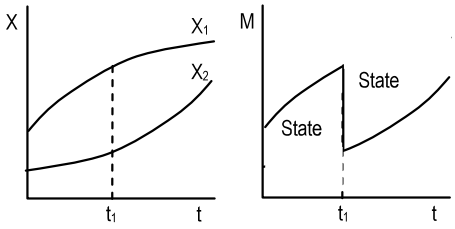
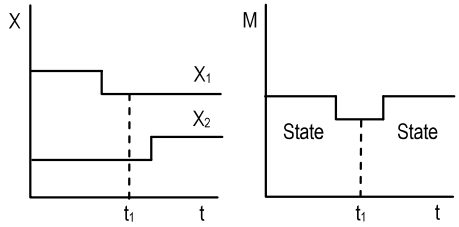
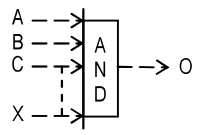
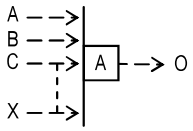
No	Function Symbol (1) (2)	Equation Graph	Definition
25	High/low signal monitor	(State 1) M = 1 @ X ≤ L (State 2) M = 0 @ L < X < H (State 3) M = 1 @ X ≥ H	• Output states are dependent on value of input. • Output changes state when input is equal to or lower than an arbitrary low limit or equal to or higher than an arbitrary high limit.
	HL HL		
26	Analog signal generator	No equation	• Output equals a variable analog signal that is generated: a.Automatically and is not adjustable by operator. b. Manually and is adjustable by operator.
	A A	No graph	
27	Binary signal generator	No equation	• Output equals an on-off binary signal that is generated: a. .Automatically and is not adjustable by operator. b. Manually and is adjustable by operator.
	B B	No graph	
28	Signal transfer	(State 1) M = X_1 (State 2) M = X_2	• Output equals input that is selected by transfer. • Transfer actuated by external signal.
	T	 Analog signal transfer	
	T	 Binary signal transfer	

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

<table>
<tr><td rowspan="3">No</td><td>Function</td><td rowspan="2">Definition (1)</td></tr>
<tr><td>Symbol</td></tr>
<tr><td>Truth Table (1)</td><td>Graph</td></tr>
<tr><td rowspan="2">1</td><td>AND gate
 
</td><td>• Output true only if all inputs are true.
• Alternate symbol. (2) (3)
 
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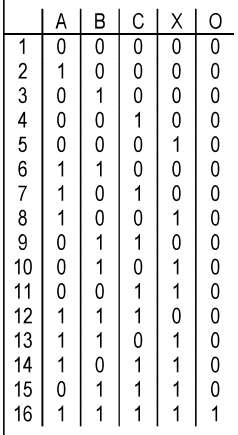
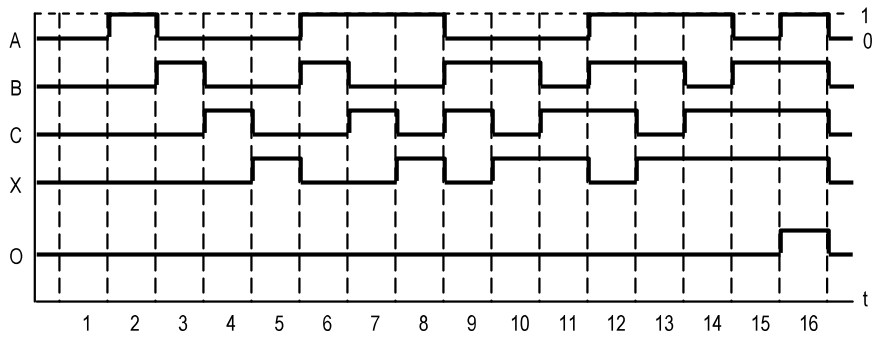
<tr><td> 

	A	B	C	X	O
1	0	0	0	0	0
2	1	0	0	0	0
3	0	1	0	0	0
4	0	0	1	0	0
5	0	0	0	1	0
6	1	1	0	0	0
7	1	0	1	0	0
8	1	0	0	1	0
9	0	1	1	0	0
10	0	1	0	1	0
11	0	0	1	1	0
12	1	1	1	0	0
13	1	1	0	1	0
14	1	0	1	1	0
15	0	1	1	1	0
16	1	1	1	1	1

</td><td> 
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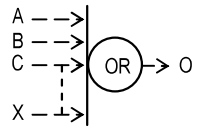
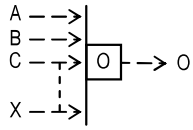
<tr><td rowspan="2">2</td><td>OR gate
 
</td><td>• Output true if any input is true.
• Alternate symbol. (2) (3)
 
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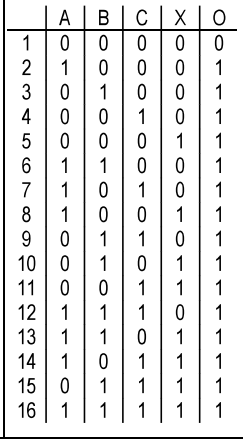
<tr><td> 

	A	B	C	X	O
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2	1	0	0	0	1
3	0	1	0	0	1
4	0	0	1	0	1
5	0	0	0	1	1
6	1	1	0	0	1
7	1	0	1	0	1
8	1	0	0	1	1
9	0	1	1	0	1
10	0	1	0	1	1
11	0	0	1	1	1
12	1	1	1	0	1
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16	1	1	1	1	1

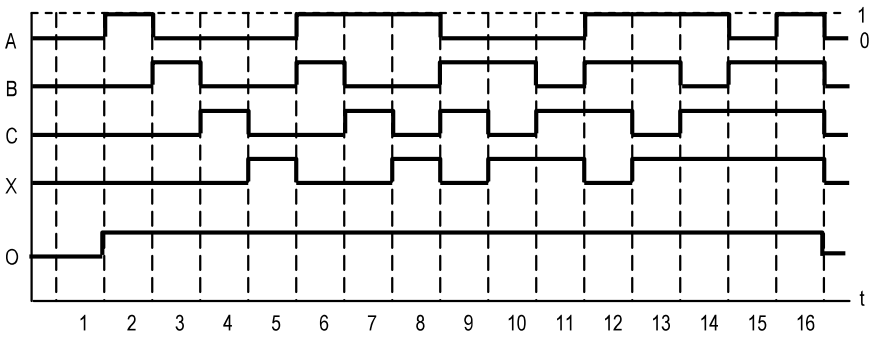
</td><td> 
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Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

<table>
<tr><td rowspan="3">No</td><td>Function</td><td rowspan="2">Definition (1)</td></tr>
<tr><td>Symbol</td></tr>
<tr><td>Truth Table (1)</td><td>Graph</td></tr>
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 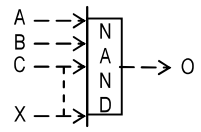
</td><td>• Output true only if all inputs are false.
• Output false if any input is true.</td></tr>
<tr><td>
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
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<tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
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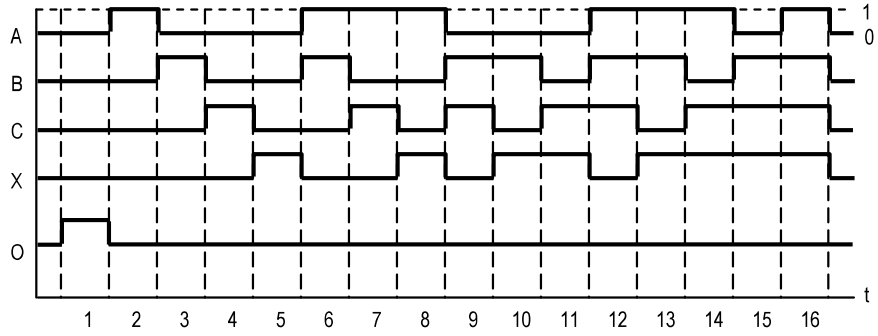
</td><td> 
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 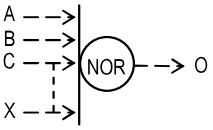
</td><td>• Output true if any input is false.
• Output false if any input is true.</td></tr>
<tr><td>
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<tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr>
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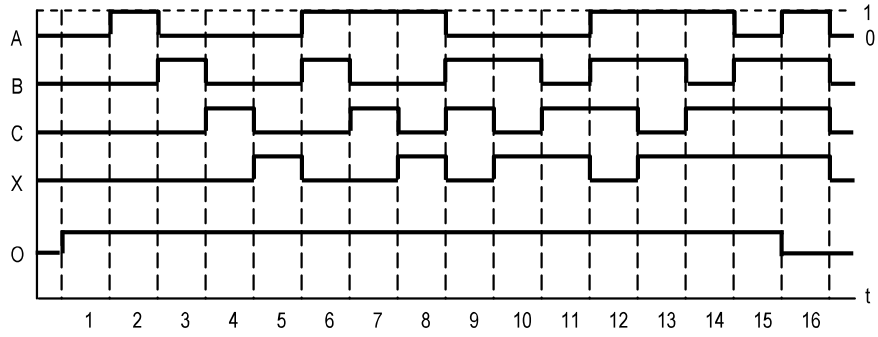
</td><td> 
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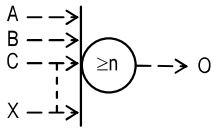
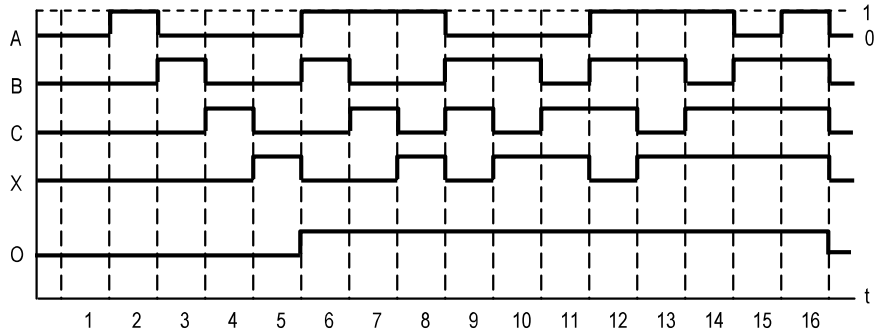
</table>

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

<table>
<tr><th rowspan="3">No</th><th>Function</th><th rowspan="2">Definition (1)</th></tr>
<tr><th>Symbol</th></tr>
<tr><th>Truth Table (1)</th><th>Graph</th></tr>
<tr><td>5</td><td>Qualified OR gate
Greater or equal to ‘n’
 
</td><td>• Output true if number of true inputs is greater than or equal to ‘n’.
• Truth table and graph are for n = 2.</td></tr>
<tr><td><table><tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>3</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>6</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>7</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>8</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>9</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>11</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>12</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>13</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>14</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>15</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>16</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table></td><td> 
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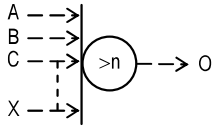
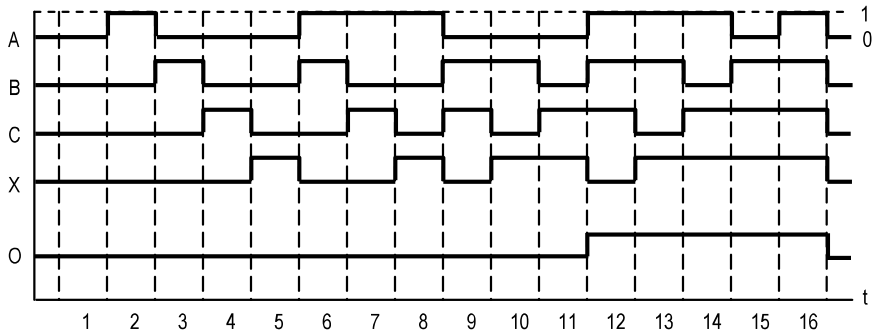
<tr><td>6</td><td>Qualified OR gate
Greater than ‘n’
 
</td><td>• Output true if number of true inputs is greater than ‘n’.
• Truth table and graph are for n = 2.</td></tr>
<tr><td><table><tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>3</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>6</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>7</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>8</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>9</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>11</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>12</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>13</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>14</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>15</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>16</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table></td><td> 
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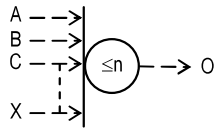
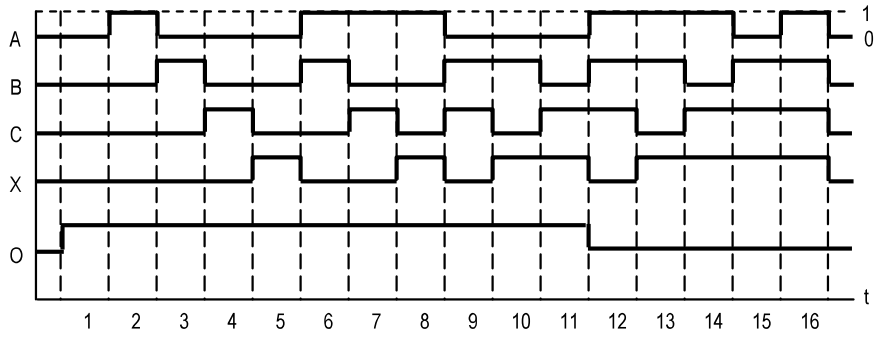
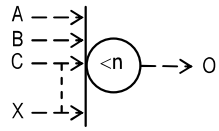
Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

<table>
<tr><td rowspan="3">No</td><td>Function</td><td rowspan="2">Definition (1)</td></tr>
<tr><td>Symbol</td></tr>
<tr><td>Truth Table (1)</td><td>Graph</td></tr>
<tr><td rowspan="2">7</td><td>Qualified OR gate
Less or equal to ‘n’
  </td><td>• Output true if number of true inputs is less than or equal to ‘n’.
• Truth table and graph are for n = 2.</td></tr>
<tr><td>
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>6</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>7</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>8</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>9</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>11</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>12</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>13</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>14</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>15</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>16</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
</table>
</td><td>  </td></tr>
<tr><td rowspan="2">8</td><td>Qualified OR gate
Less than ‘n’
  </td><td>• Output true if number of true inputs is less than ‘n’.
Truth table and graph are for n = 2.</td></tr>
<tr><td>
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>X</th><th>O</th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>6</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>7</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>8</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>9</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>10</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>11</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>12</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>13</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>14</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>15</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>16</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
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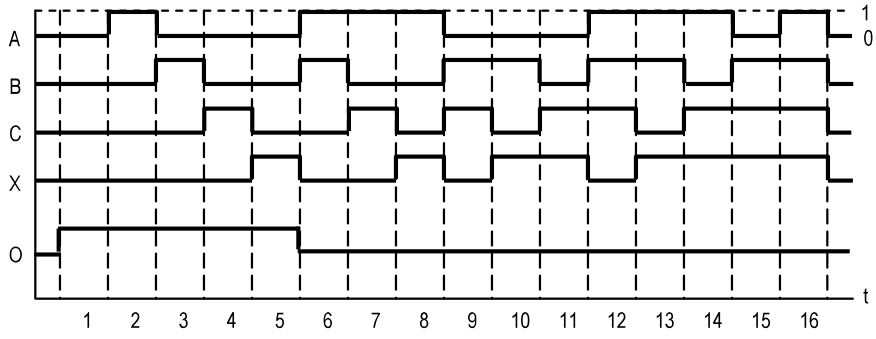
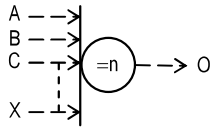
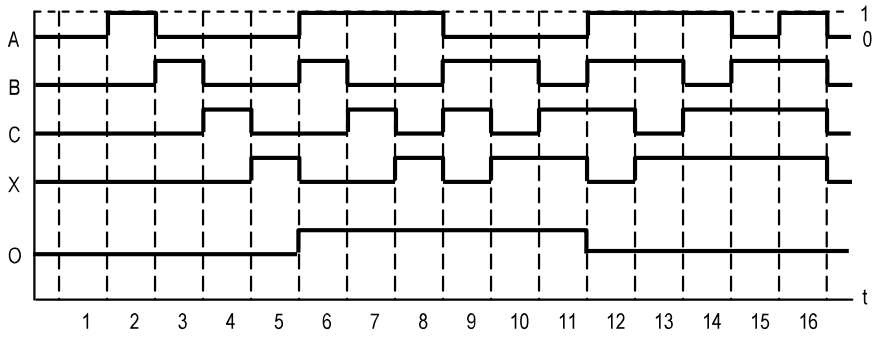
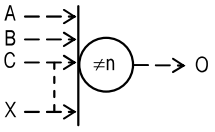
</td><td>•
  </td></tr>
</table>

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

<table>
<tr><th rowspan="3">No</th><th>Function</th><th rowspan="2">Definition (1)</th></tr>
<tr><th>Symbol</th></tr>
<tr><th>Truth Table (1)</th><th>Graph</th></tr>
<tr><td>9</td><td>Qualified OR gate
Equal to ‘n’</td><td>• Output true if number of true inputs is equal to ‘n’.
• Truth table and graph are for n = 2.</td></tr>
<tr><td></td><td> 

	A	B	C	X	O
1	0	0	0	0	0
2	1	0	0	0	0
3	0	1	0	0	0
4	0	0	1	0	0
5	0	0	0	1	0
6	1	1	0	0	1
7	1	0	1	0	1
8	1	0	0	1	1
9	0	1	1	0	1
10	0	1	0	1	1
11	0	0	1	1	1
12	1	1	1	0	0
13	1	1	0	1	0
14	1	0	1	1	0
15	0	1	1	1	0
16	1	1	1	1	0
</td><td> 
</td></tr>
<tr><td>10</td><td>Qualified OR gate
Not equal to ‘n’</td><td>• Output true if number of true inputs is not equal to ‘n’.
• Truth table and graph are for n = 2.</td></tr>
<tr><td></td><td> 

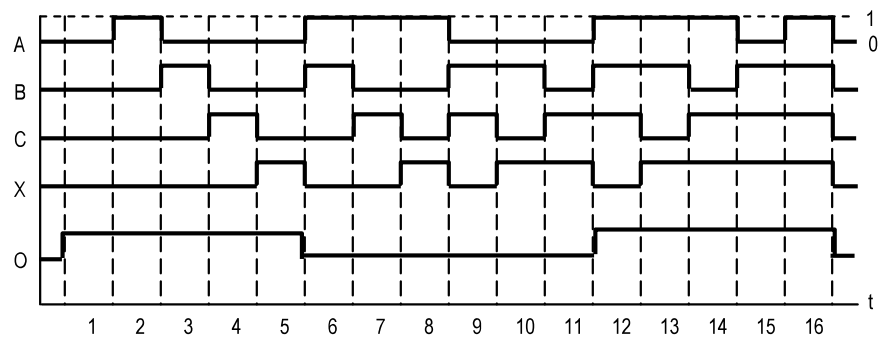
	A	B	C	X	O
1	0	0	0	0	1
2	1	0	0	0	1
3	0	1	0	0	1
4	0	0	1	0	1
5	0	0	0	1	1
6	1	1	0	0	0
7	1	0	1	0	0
8	1	0	0	1	0
9	0	1	1	0	0
10	0	1	0	1	0
11	0	0	1	1	0
12	1	1	1	0	1
13	1	1	0	1	1
14	1	0	1	1	1
15	0	1	1	1	1
16	1	1	1	1	1
</td><td> 
</td></tr>
</table>

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

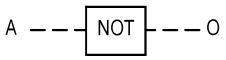
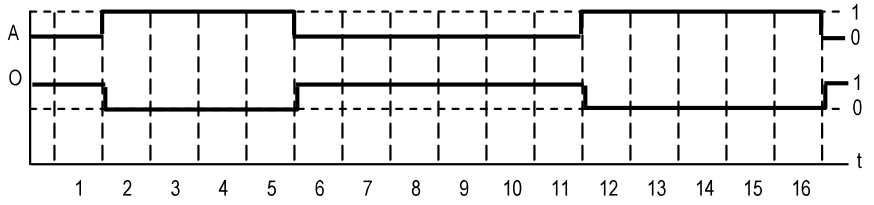
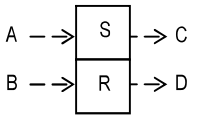
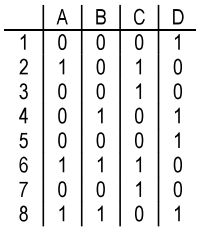
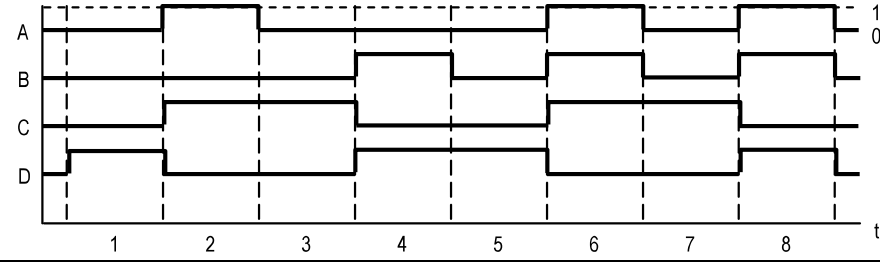
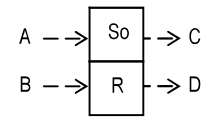
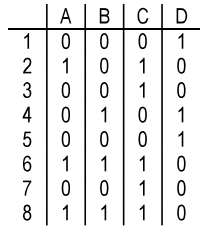
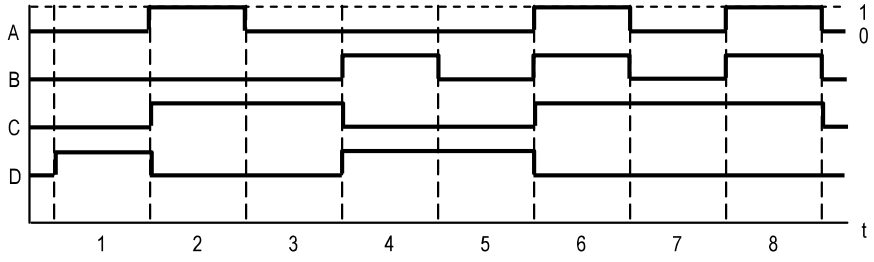
<table>
<tr><td rowspan="3">No</td><td>Function</td><td rowspan="2">Definition (1)</td></tr>
<tr><td>Symbol</td></tr>
<tr><td>Truth Table (1)</td><td>Graph</td></tr>
<tr><td rowspan="2">11</td><td>NOT gate
  </td><td>• Output false if input true.
• Output true if input false.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td rowspan="2">12</td><td>Basic memory
  </td><td>• Outputs [C] and [D] are always opposite.
• If input [A] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [A] changes to (0) output [C] remains (1) until input [B] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [B] equals (1) then output [D] equals (1) and output [C] equals (0).
• If input [B] changes to (0) output [D] remains (1) until input [A] equals (1), then output [D] equals (1) and output [C] equals (0).
• If inputs [A] and [B] are simultaneously equal to (1) then outputs [C] and [D] change state.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td rowspan="2">13</td><td>Set dominant memory
  </td><td>• Outputs [C] and [D] are always opposite.
• If input [A] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [A] changes to (0) output [C] remains (1) until input [B] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [B] equals (1) then output [D] equals (1) and output [C] equals (0).
• If input [B] changes to (0) output [D] remains (1) until input [A] equals (1), then output [D] equals (1) and output [C] equals (0).
• If inputs [A] and [B] are simultaneously equal to (1) then output [C] equals (1) and output [D] equals (0).</td></tr>
<tr><td>  </td><td>  </td></tr>
</table>

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

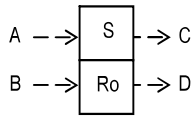
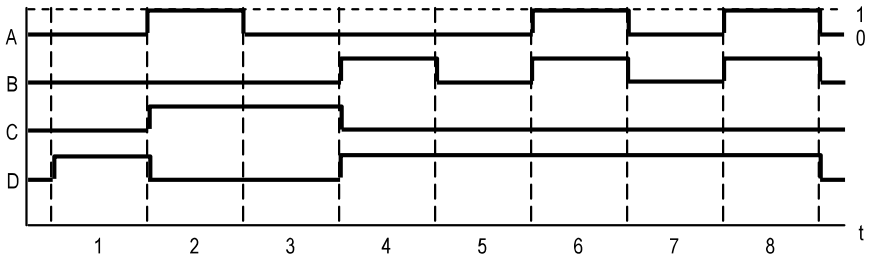
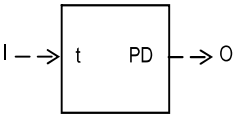
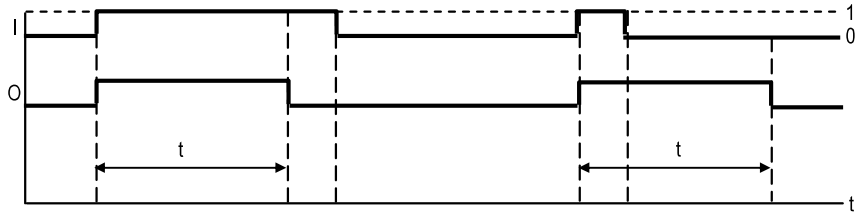
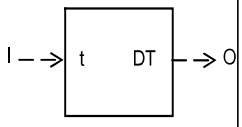
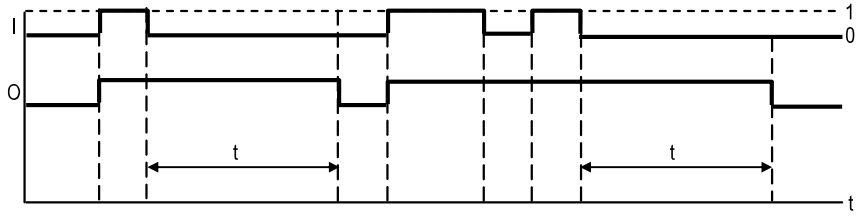
<table>
<tr><th rowspan="3">No</th><th>Function</th><th rowspan="2">Definition (1)</th></tr>
<tr><th>Symbol</th></tr>
<tr><th>Truth Table (1)</th><th>Graph</th></tr>
<tr><td rowspan="2">14</td><td>Reset dominant memory
 
</td><td>• Outputs [C] and [D] are always opposite.
• If input [A] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [A] changes to (0) output [C] remains (1) until input [B] equals (1) then output [C] equals (1) and output [D] equals (0).
• If input [B] equals (1) then output [D] equals (1) and output [C] equals (0).
• If input [B] changes to (0) output [D] remains (1) until input [A] equals (1), then output [D] equals (1) and output [C] equals (0).
• If inputs [A] and [B] are simultaneously equal to (1) then output [C] equals (0) and output [D] equals (1).</td></tr>
<tr><td><table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>2</td><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>4</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>6</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>7</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>8</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
</table></td><td> 
</td></tr>
<tr><td rowspan="2">15</td><td>Pulse duration - fixed
 
</td><td>• Output [O] changes from (0) to (1) and remains (1) for prescribed time duration (t) when input [I] changes from (0) to (1).</td></tr>
<tr><td>NONE</td><td> 
</td></tr>
<tr><td rowspan="2">16</td><td>Time delay - off
 
</td><td>• Output [O] changes from (0) to (1) when input [I] changes from (0) to (1).
• Output [O] changes from (1) to (0) after input [I] changes from (1) to (0) and has been equal to (0) for time duration (’t).</td></tr>
<tr><td>NONE</td><td> 
</td></tr>
</table>

Table 5.7 — Binary logic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.7.

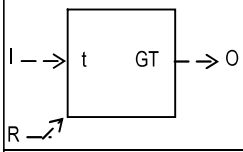
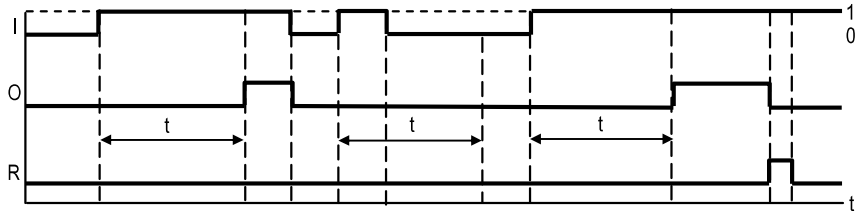
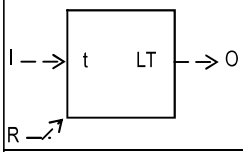
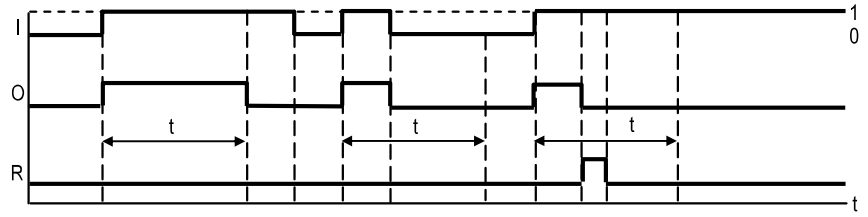
No	Function Symbol	Definition (1)
	Truth Table (1)	Graph
17	Time delay - on 	• Output [O] changes from (0) to (1) after input [I] changes from (0) to (1) and [I] remains (1) for prescribed time duration (t). • Output [O] remains (1) until Input [I] changes to (0) or optional Reset [R] changes to (1).
	NONE	
18	Pulse duration - variable 	• Output [O] changes from (0) to (1) when input [I] changes from (0) to (1). • Output [O] changes from (1) to (0) when Input [I] has been equal to (1) for time duration (t), Input [I] changes from (1) to (0), or optional Reset [R] changes to (1).
	NONE	

Table 5.8 — Electrical schematic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.8.

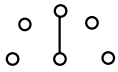
No	Symbol (1)	Description
1		• Device wiring point. • Device wiring terminal.
2	(2) 	• Normally open single circuit momentary pushbutton switch. • Form A switch contact. • Stack symbols to form multi-pole switches. • Combine with symbols 5 or 6 to form toggle or rotary actuated switches.
3	(2) 	• Normally closed single circuit momentary pushbutton switch. • Form B switch contact. • Stack symbols to form multi-pole switches. • Combine with symbols 5 or 6 to form toggle or rotary actuated switches.
4	(2) 	• Normally closed/normally open double circuit momentary pushbutton switch. • Form C switch contact. • Stack symbols to form multi-pole switches. • Combine with symbols 5 or 6 to form toggle or rotary actuated switches
5	(3) 	• Two-position toggle or rotary maintained position pushbutton switch actuator. • Combine with symbols 2, 3, and 4 to form single or multi-pole switches.
6	(3) 	• Three-position toggle or rotary maintained position pushbutton switch actuator. • Combine with symbols 2, 3, and 4 to form single or multi-pole switches.
7	(4) 	• Single-pole normally open toggle switch. • Form A switch contact. • Combine with symbols 10 thru 15.
8	(4) 	• Single-pole normally closed toggle switch. • Form B switch contact. • Combine with symbols 10 thru 15.
9	(4) 	• Double pole normally closed /normally open toggle switch. • Form C switch contact. • Combine with symbols 10 thru 15.
10		• Rotary selector switch.

Table 5.8 — Electrical schematic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.8.

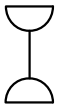
No	Symbol (1)	Description
11	(5) 	• Pressure switch actuator.
12	(5) 	• Differential pressure switch actuator.
13	(5) 	• Liquid level switch actuator.
14	(5) 	• Temperature switch actuator.
15	(5) 	• Flow switch actuator.
16	(5) 	• Foot switch actuator.
17		• Relay operating coil. • (*) = Relay designator, such as: • a. Instrument tag number if assigned. • b. RO1, RO2, R4, R5, MR10, etc.
18		• Normally open relay contact. • Form A contact.
19		• Normally closed relay contact. • Form B contact.
20		• Normally open, normally closed relay contact. • Form C contact.

Table 5.8 — Electrical schematic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.8.

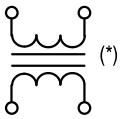
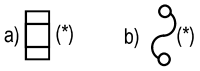
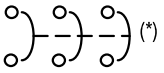
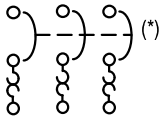
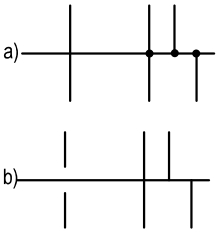
No	Symbol (1)	Description
21		• On time delay. • Moves after relay coil is energized and set time has elapsed. • (*) = Set time.
22		• Off time delay. • Moves after relay coil de-energizes and set time has elapsed. • (*) = Set time.
23		• Transformer. • (*) = Rating, 220/120 Vac or Vdc, etc.
24	(6) 	• Fuse, non-resettable. • (*) = Rating, 2 A, 5 A, etc.
25		• Thermal overload.
26		• Circuit interrupter, 1-pole, manual reset. • (*) = Rating, 10 A, 15 A, etc.
27		• Circuit interrupter, 3-pole, manual reset. • (*) = Rating, 15 A, 20 A, etc.
28		• Circuit breaker, 1-pole, manual reset. • (*) = Rating, 20A, 30A, etc.
29		• Circuit breaker, 3-pole, manual reset. • (*) = Rating, 20 A, 25 A, etc.
30		• Bell.

Table 5.8 — Electrical schematic symbols

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.8.

No	Symbol (1)	Description
31		• Horn or siren.
32		• Buzzer.
33		• Solenoid coil.
34		• Pilot light.
35		• Battery
36		• Ground
37	(6) 	• Connection conventions a) and b): Left = Not connected. Right = Connected.

6 Graphic symbol dimension tables

6.1 Graphic symbols dimension tables

6.1.1 The following tables provide measurement units for dimensioning the geometric shapes that are required to construct the graphic symbols.

6.1.2 The shapes in the tables are drawn twice their normal minimum size for clarity.

6.1.3 Symbols shall be drawn to a:

a) Larger size, by increasing the dimensional unit, when required reduction of an original drawing or document results in an illegible diagram.

b) Smaller size, by decreasing the dimensional unit, when required by space limitations of an original drawing or document.

6.1.4 All the symbols shown in Clause 5 are not individually dimensioned, but the geometric shapes required to construct all the symbols from the graphic symbol tables are included.

6.1.5 The traditional minimum size for device and function symbols from Table 6.1, a 7/16-inch (10.5-millimeter) circle, may be increased to a less commonly used 1/2-inch (12-millimeter) circle.

6.2 Measurement units

6.2.1 The dimensions are represented by measurement units (m.u.) that, as a minimum, shall have equivalent dimensions equal to:

a) One-sixteenth inch (1/16 inch or 0.0625 inch).

b) One and one-half millimeters (1.50 millimeters).

6.2.2 Symbols drawn in any full size diagram shall be the product of the symbol's geometric shape m.u. times a selected equivalent dimension equal to or greater than the minimum equivalent dimension.

6.2.3 Lettering shown is the minimum size allowed for full size symbols.

6.3 Dimensions for graphic symbol tables explanatory notes

6.3.1 Table 6.1 — Dimensions for measurement and control instrumentation device or function symbols, Tables 5.1.1 and 5.1.2

(1) Dimension in parentheses is for 1/2-inch (12-millimeter) option for generic circle symbol.

6.3.2 Table 6.2 — Dimensions for measurement symbols: primary elements and transmitters, Tables 5.2.1, 5.2.2, 5.2.3, 5.2.4, and 5.2.5

(1) Dimension in parentheses is for 1/2-inch (12-millimeter) option for generic circle symbol.

(2) Size as required by size of vessel as drawn or depth of application.

(3) Dip tube shown, show as required for other devices.

6.3.3 Table 6.3 — Dimensions for line symbols, Tables 5.3.1 and 5.3.2

(1) Recommended maximum signal line thickness.

(a) Signal lines are never thicker than process and equipment lines.

(2) Recommended minimum process and equipment line thickness for instrument sketches.

(3) Clearance around symbol shall be equal to half the width of the symbol.

6.3.4 Table 6.4 — Dimensions for final control elements, Tables 5.4.1, 5.4.2, 5.4.3, and 5.4.4.

(1) Table does not require any additional notes.

6.3.5 Table 6.5 — Dimensions for functional diagramming symbols, Table 5.5

(1) Graphics shown for top-to-bottom signal flow.

(2) Rotate graphics 90 degrees counterclockwise for left-to-right signal flow.

6.3.6 Table 6.6 — Dimensions for signal processing function block symbols, Table 5.6

(1) Small square graphic is used with graphics from Table 6.1.

(2) Large rectangular graphic is used with graphics from Table 6.5.

6.3.7 Table 6.7 — Dimensions for binary logic symbols, Table 5.7

(1) Input connection line dimensions are the minimum for:

(a) Five inputs.

(b) Three inputs.

(c) Two inputs.

(2) Two m.u.'s shall be added for each additional input

(3) Minimum spacing between inputs.

(4) Output signal line shall be centered on symbol.

6.3.8 Table 6.8 — Dimensions for electrical schematic symbols, Table 5.8

(1) Table does not require any additional notes.

Table 6.1 — Dimensions for Tables 5.1.1 and 5.1.2

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.1.

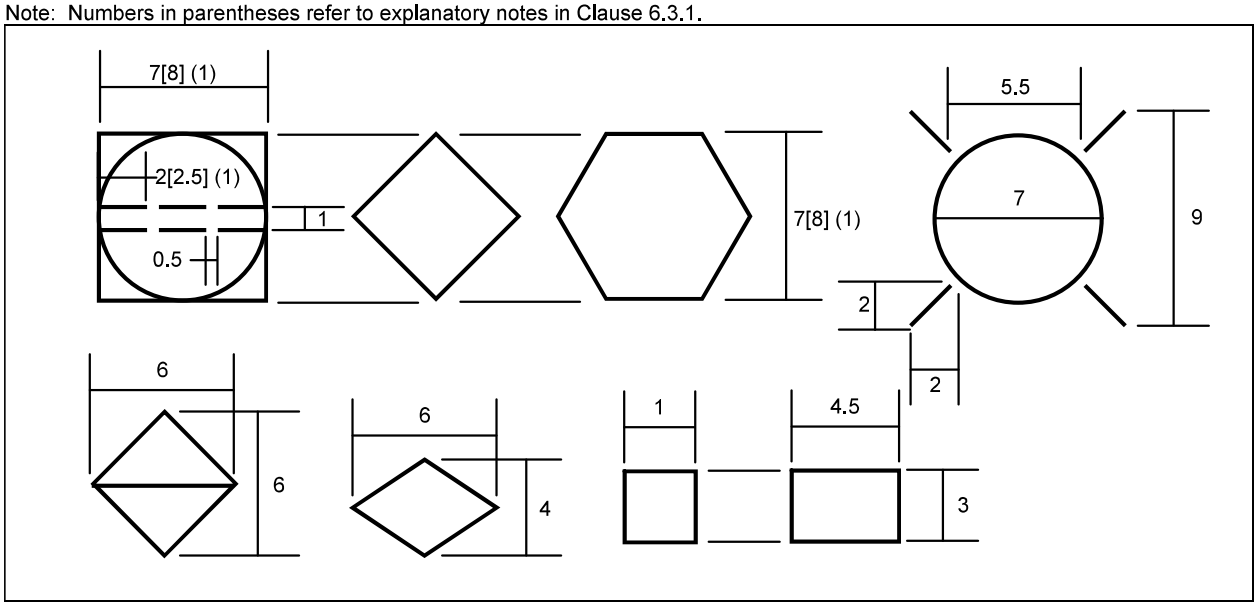


Table 6.2 — Dimensions for Tables 5.2.1, 5.2.2, 5.2.3, 5.2.4, and 5.2.5

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.2.

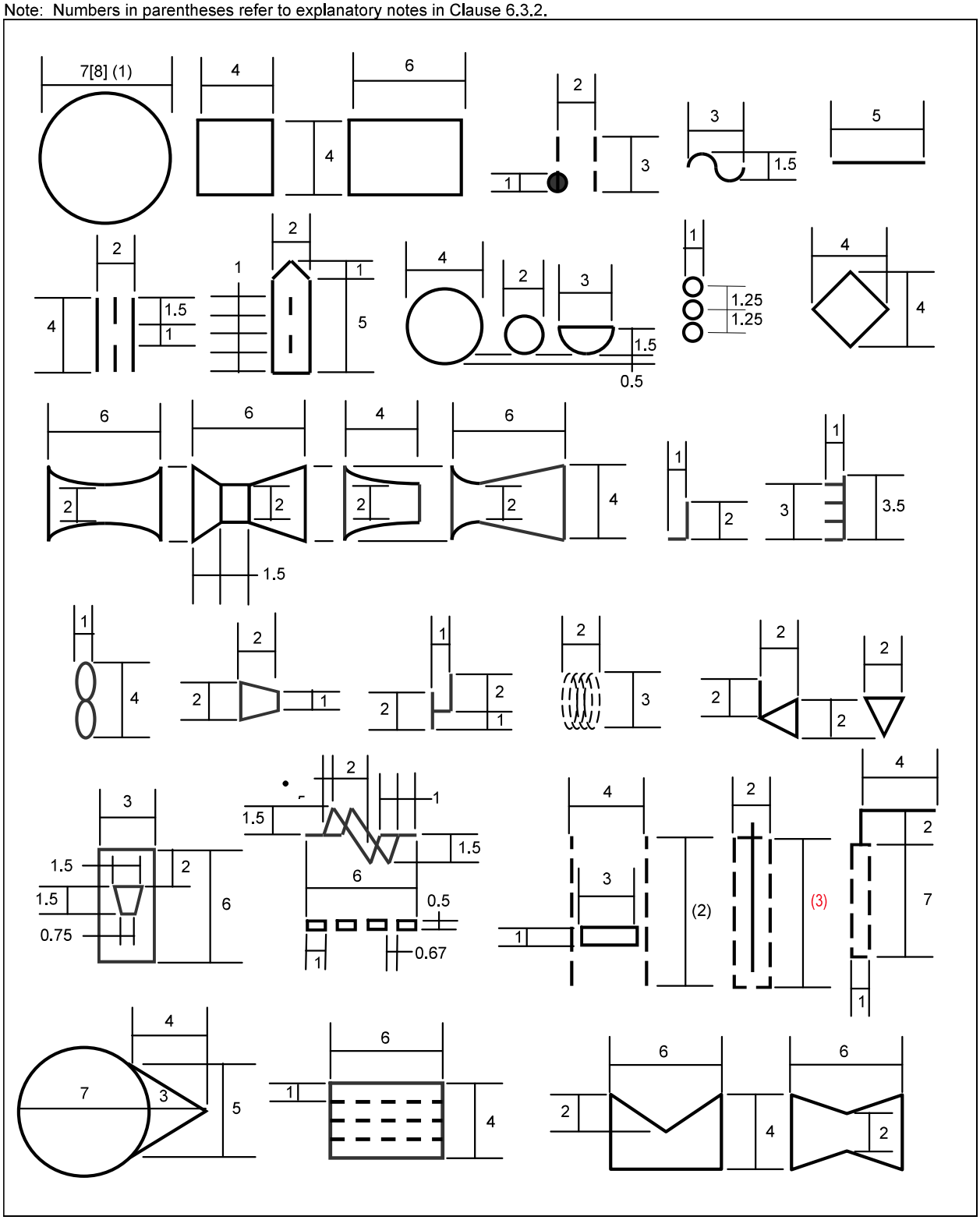


Table 6.3 — Dimensions for Tables 5.3.1 and 5.3.2

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.3.

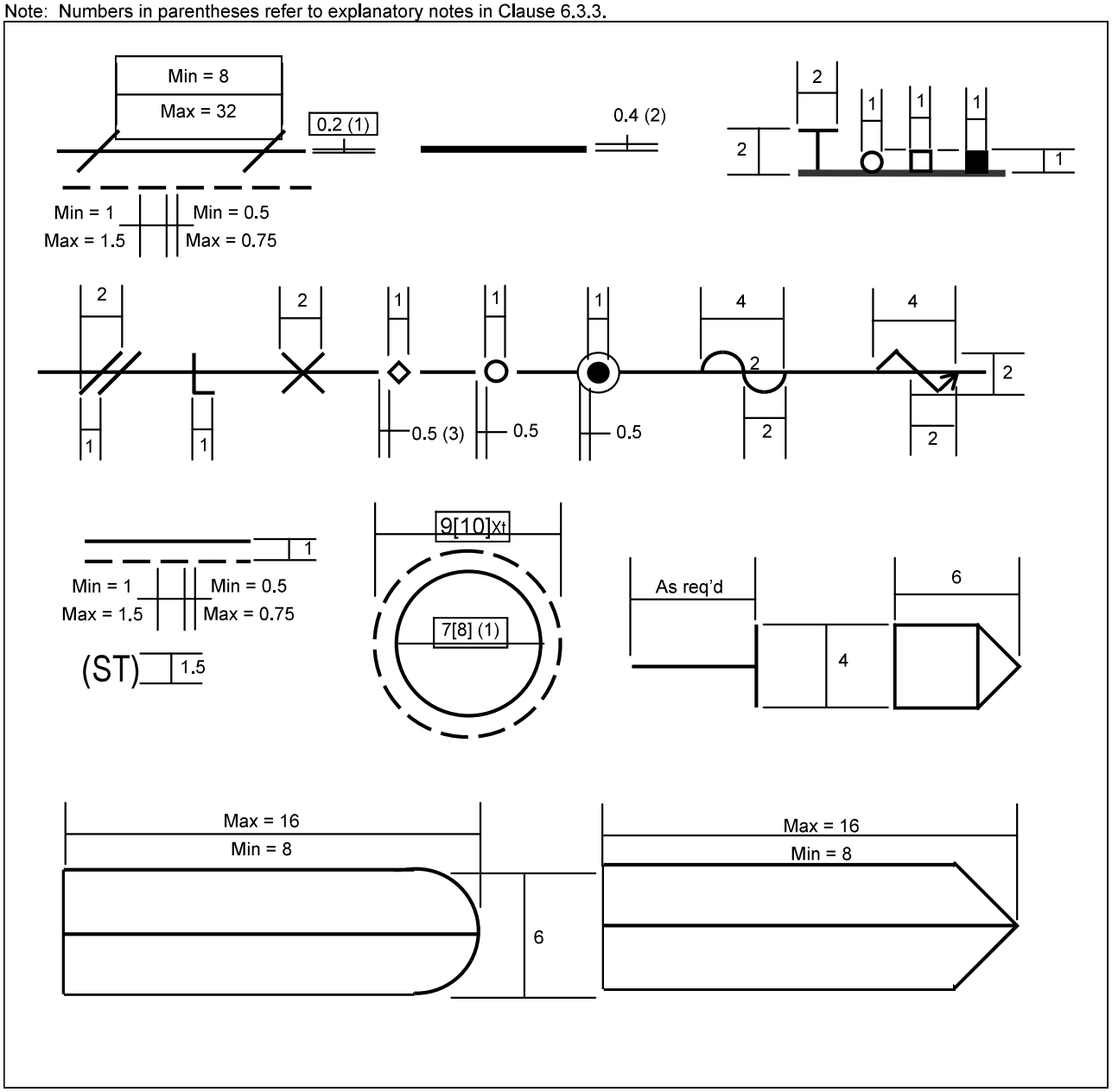


Table 6.4 — Dimensions for Tables 5.4.1, 5.4.2, 5.4.3, and 5.4.4

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.4.

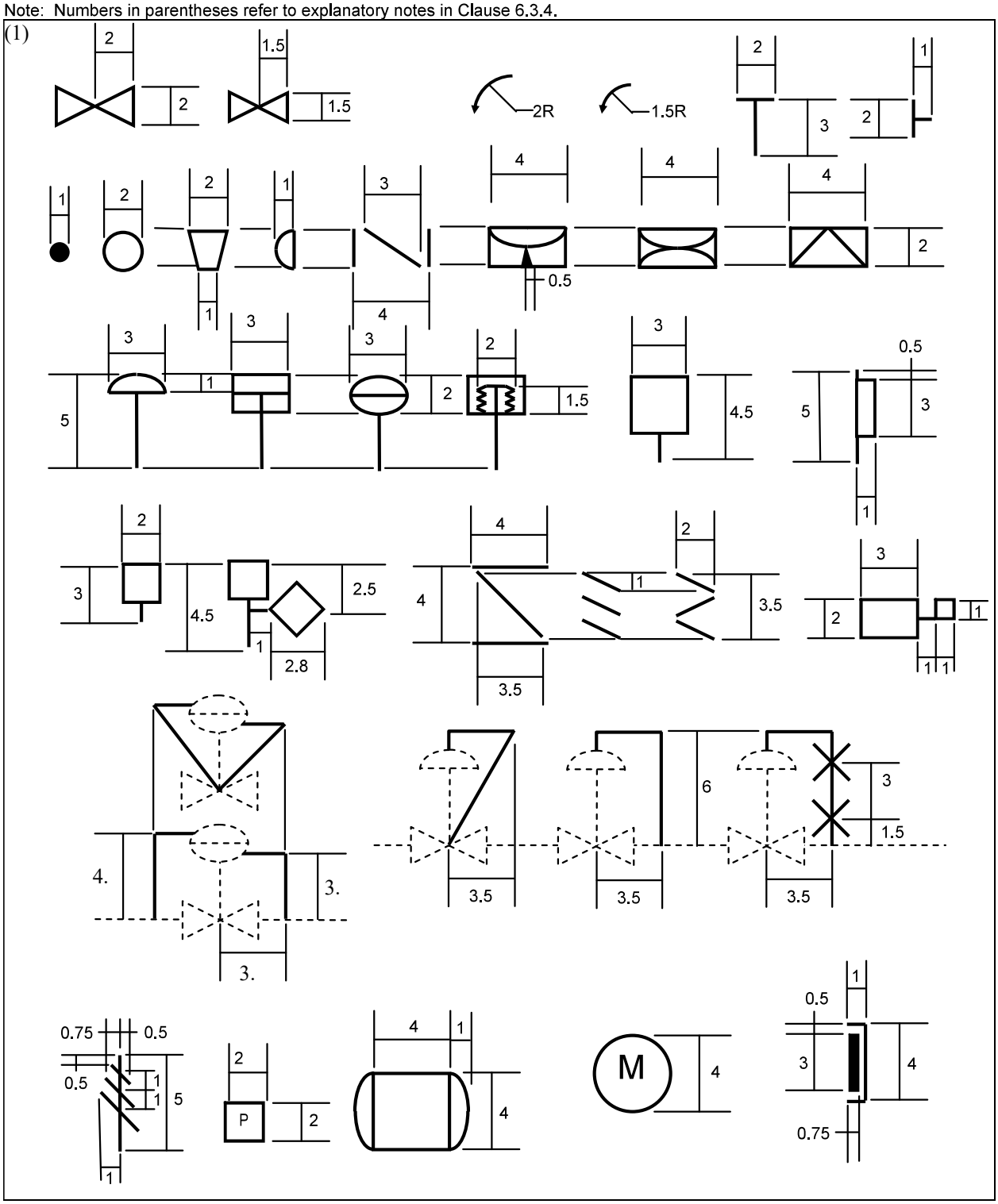


Table 6.5 — Dimensions for Table 5.5

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.5.

(1) (2)

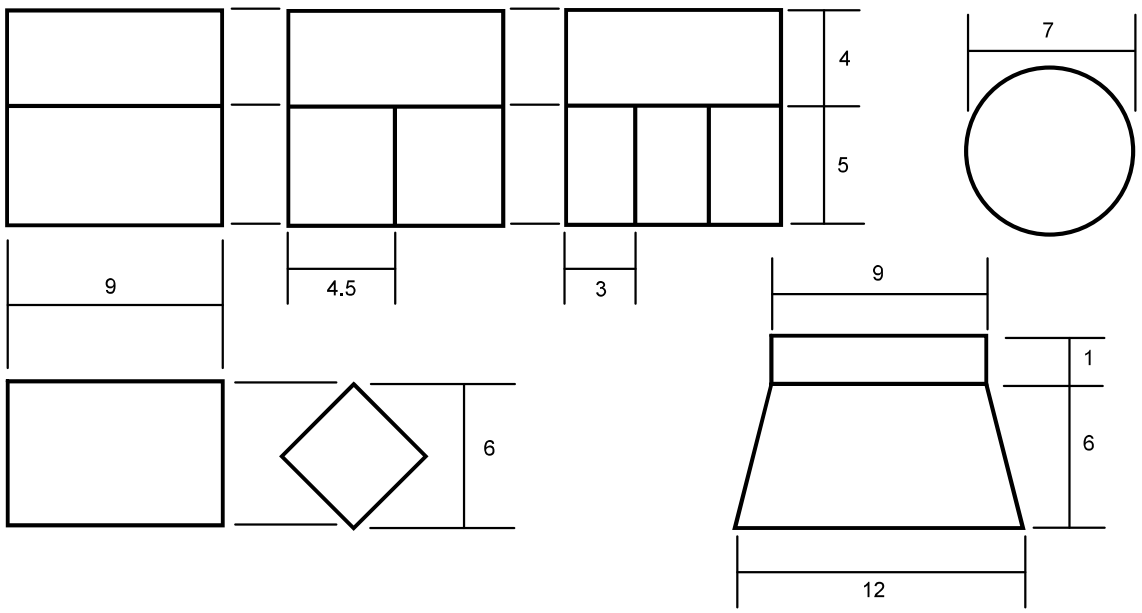


Table 6.6 — Dimensions for Table 5.6

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.6.

(1) (2)

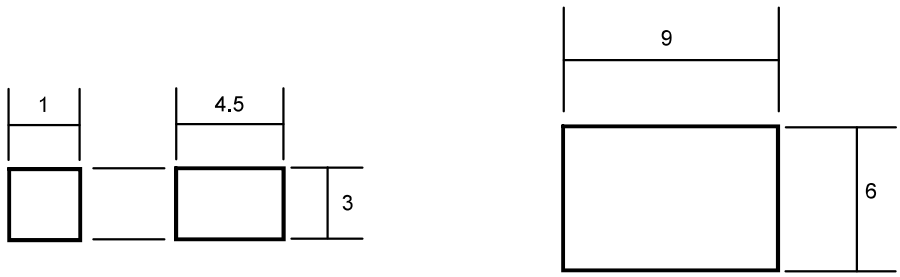


Table 6.7 — Dimensions for Table 5.7

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.7.

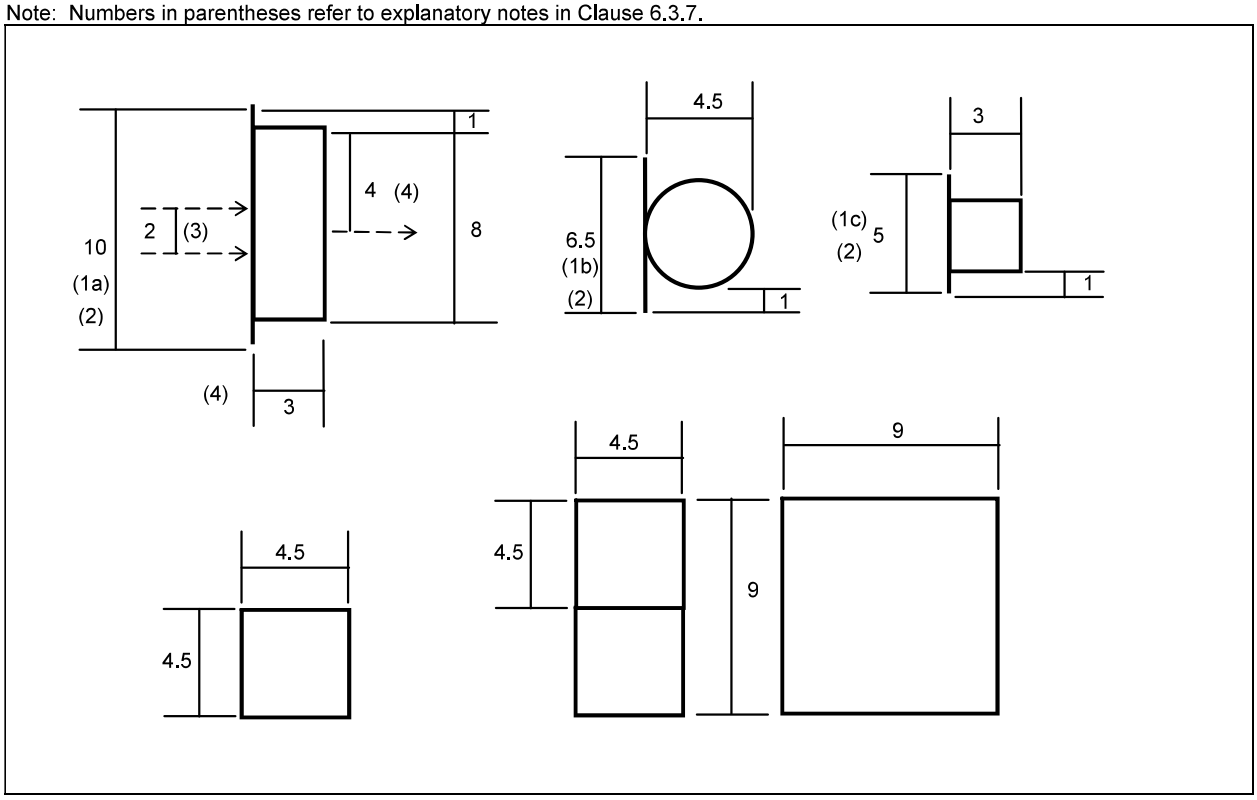


Table 6.8 — Dimensions for Table 5.8

Note: Numbers in parentheses refer to explanatory notes in Clause 6.3.8.

(1)