

Electrical Documentation and Schematics

Supplemental Materials

TABLE OF CONTENTS

Electrical Labeling Legend.....	3
Cable Wiring & Plug Numbers.....	5
Wire Conversion Chart.....	6
Identifying Cables & Wires.....	7
Flat Festoon Cable – Hardwire application example:.....	7
Graphical Symbols for Circuit Diagrams.....	11

Electrical Labeling Legend

Location Labels

Abbreviation	Location
BR	Bridge
E0	Electrical (no panel)
E1 or E1.1	Bridge Panel
E1.BR	Plug connections on festoon from bridge to bridge panel
E1.W2A	Plug connections on festoon run W2A (power) going to the bridge panel
E1.W3	Plug connections on festoon run W3 (control)going to the bridge panel
E2A or E2A.1	Hoist Panel for Hoist #1
E2B or E2B.1	Hoist Panel for Hoist #2
E2A.W2A	Plug connections on festoon run W2A (power)going to the hoist panel E2A
E2B.W2A	Plug connections on festoon run W2A going (controlto the hoist panel E2B
E2A.TR	Motor junction box for hoist #1
E2B.TR	Motor junction box for hoist #2
TR1	Trolley components not in the panels but shown in the schematics
E3	Pushbutton pendant
E2.W3	Plug connections on festoon run W3 (control) going to the pendant

Device Labels

1st Character	Device		
A, B, C, D	Hoisting machinery		
E, F, G	Trolley traversing machinery		
H	Bridge traveling		
H1, H2	Gantry traveling machinery (fixed leg & joint)		
K	Slewing machinery		
M, N	Grab machinery		
O	Power Supply		
P	Luffing machinery (double boom cranes)		
S	Storm locking machinery		
T	Lighting, Heating, Air conditioning circuits		
U	Magnet devices, Spreaders		
V	Selection circuits		
Z	PLC, Overload protection, Monitoring systems		
2 nd Character	Device		
A	Control unit, Regulator, Amplifier		
B	Transducer, Load sensor, Synchro, Tachometer, Pulse sensor		
D	Timer Relay		
F	Fuse, Fused switch, Circuit breaker, Thermal overload		
G	Generator, Rectifier, Stabilizer, Battery, Power supply device		
H	Light fixture, Horn, Bell, Buzzer, Signal device		
K	Contactor, Relay		
L	Coil, Inductor, Reactor, Transductor		
M	Motor		
Q	Main disconnect, Isolator, Mechanically operated switching device		
S	Control switch, Selector, Push-button, Limit switch, Switching device		
T	Transformer		
U	Modulator, Converter, Radio control equipment		
X	Terminal block, plug socket, connector		
Y	Brake, Clutch, Valve, Electromechanical device		
Specifier	Hoist	Trolley	Bridge
1	Up	Right	Forward
2	Down	Left	Reverse

Cable Wiring & Plug Numbers

CABLE NUMBER	FROM	PLUG NUMBER	TO	PLUG NUMBER	USE
01	BRIDGE PANEL	X012	POWER SOURCE	NONE	MAIN POWER CONNECTION
21	BRIDGE PANEL	X211	BRIDGE DRIVE NEAR	X212	POWER
22	BRIDGE PANEL	X221	BRIDGE DRIVE FAR	X222	POWER
25	BRIDGE PANEL	X251	BRIDGE TRAVEL LIMIT	NONE	CONTROL
31	BRIDGE PANEL	X31A1	HOIST PANEL	X31A2	HOIST POWER
32	BRIDGE PANEL	X32A1	HOIST PANEL	X32A2	HOIST CONTROL
51	PENDANT TROLLEY	X511	PENDANT CONTROLLER	NONE	CONTROL
52	BRIDGE PANEL	X521	PENDANT TROLLEY	X511	CONTROL
53	BRIDGE PANEL	X521	PENDANT TROLLEY	X511	CONTROL

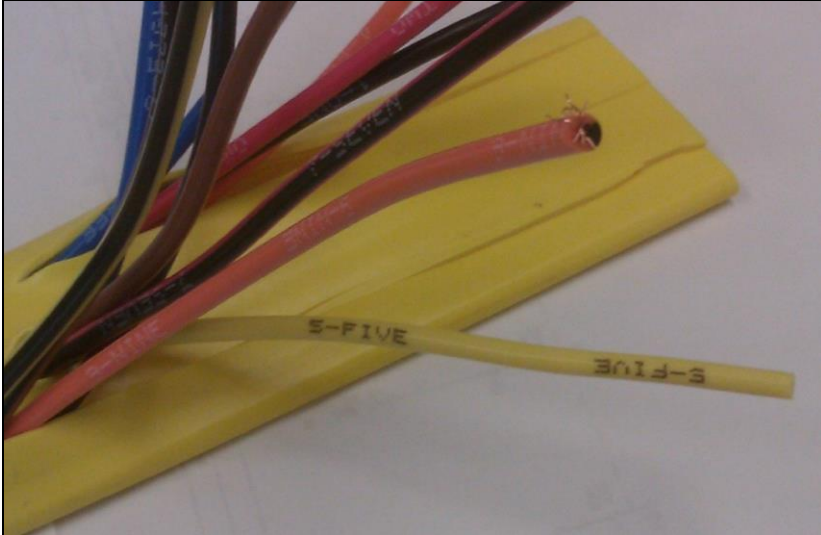


Wire Conversion Chart

mm ²	AWG
0.82	18
1	-
1.31	16
1.5	-
2.08	14
2.5	-
3.31	12
4	-
5.26	10
6	-
8.37	8
10	-
13.3	6
16	-
21.15	4
25	-
33.62	2
35	-
42.41	1
50	-
53.51	0
67.44	00
70	-
85.03	000
95	-
107.22	0000
120	-

Identifying Cables & Wires

Flat Festoon Cable – Hardwire application example:



Wires are individually numbered & correspond with the wiring diagram.





Identifying Cables & Wires (cont.)

R&M
MATERIALS
HANDLING
INC.

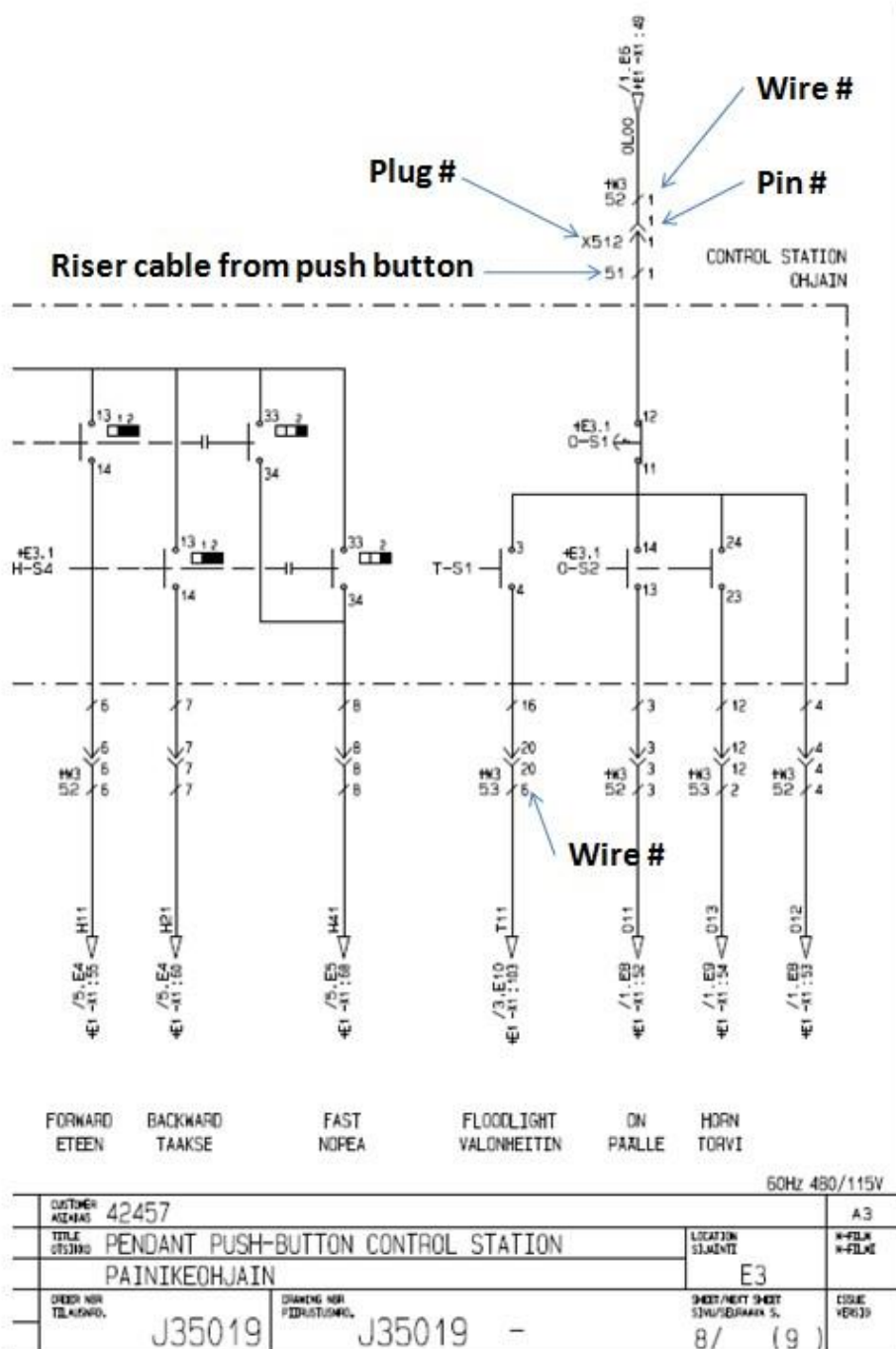
CABLE WIRING
KAAPELILISTA

J35019 +W3
60Hz, 480//115V

Date/Päivä	Dept./Osasto	Designer/Suunn.	Issue/Version	Order/Tilaus	Page/Sivu
08.11.2010	KHA	ett02436	-	J35019	6 (6)
Cable specification Kaapelin tyyppi	Cable no. Johdin	From Mistä	To Mihin	Sheet S.viite	
12XAWG16 FLAT	52	E1	E3		
	1	X1 49	X512. 1		8.E9
	2	X1 51	X512. 2		8.E2
	3	X1 52	X512. 3		8.B9
	4	X1 53	X512. 4		8.B10
	5	X1 50	X512. 5		8.E3
	6	X1 55	X512. 6		8.B7
	7	X1 60	X512. 7		8.B7
	8	X1 68	X512. 8		8.B8
	9	X1 89	X512. 9		8.B3
	10	X1 90	X512. 10		8.B3
	11	X1 91	X512. 11		8.B4
	PE	PE	X512. PE		8.E1
12XAWG16 FLAT	53				
	1				
	2	X1 54	X512. 12		8.B10
	3	X1 93	X512. 13		8.B5
	4	X1 94	X512. 14		8.B5
	5	X1 95	X512. 15		8.B6
	6	X1 103	X512. 20		8.B9
	7	X1 201	X512. 24		8.E1
	8				
	9				
	10				
	11				
	GND	X1 GND	X512. GND		
	Wire #	Terminal Strip	Terminal #	Terminal Strip	Terminal #

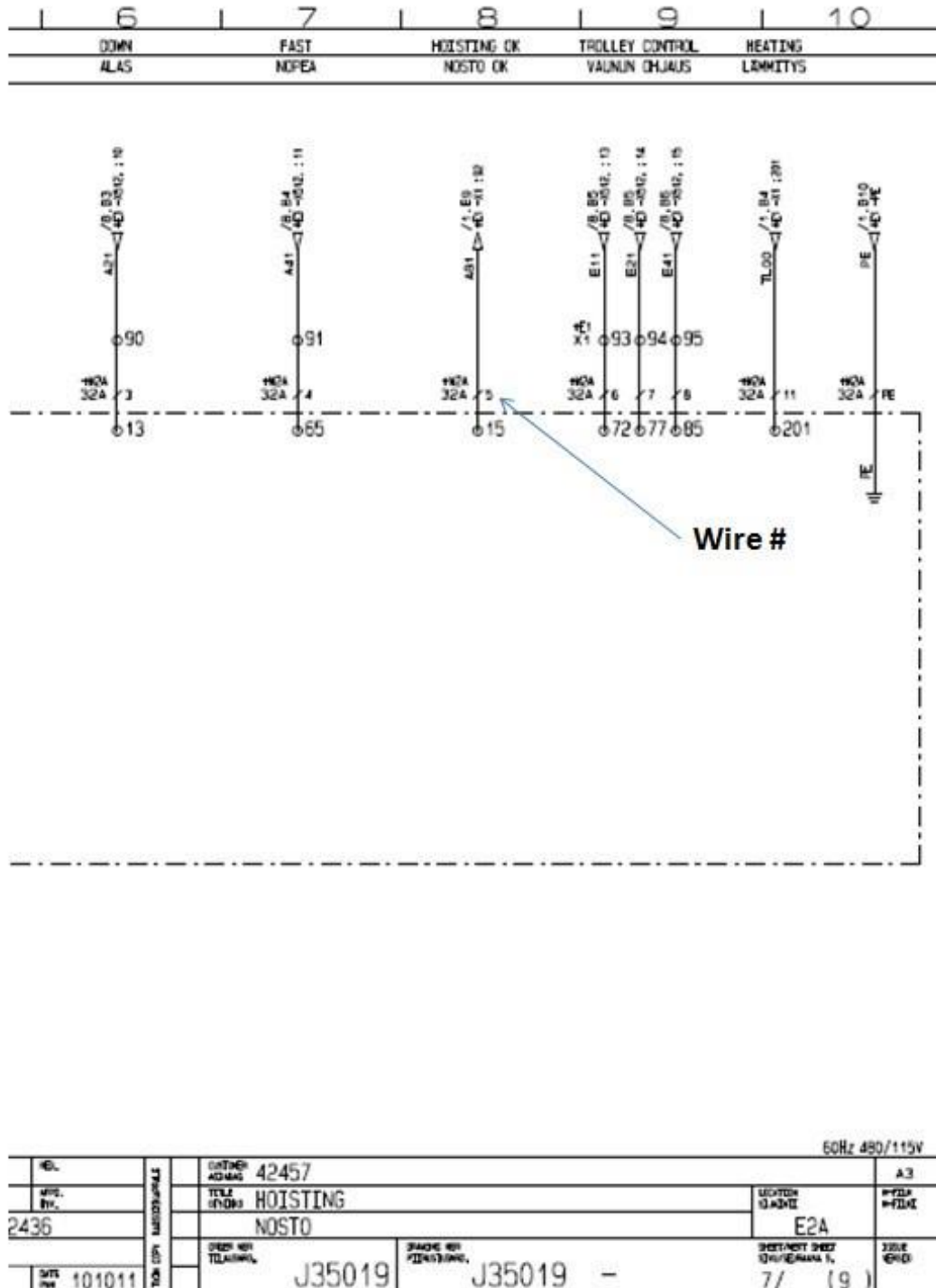


Identifying Cables & Wires (cont.)



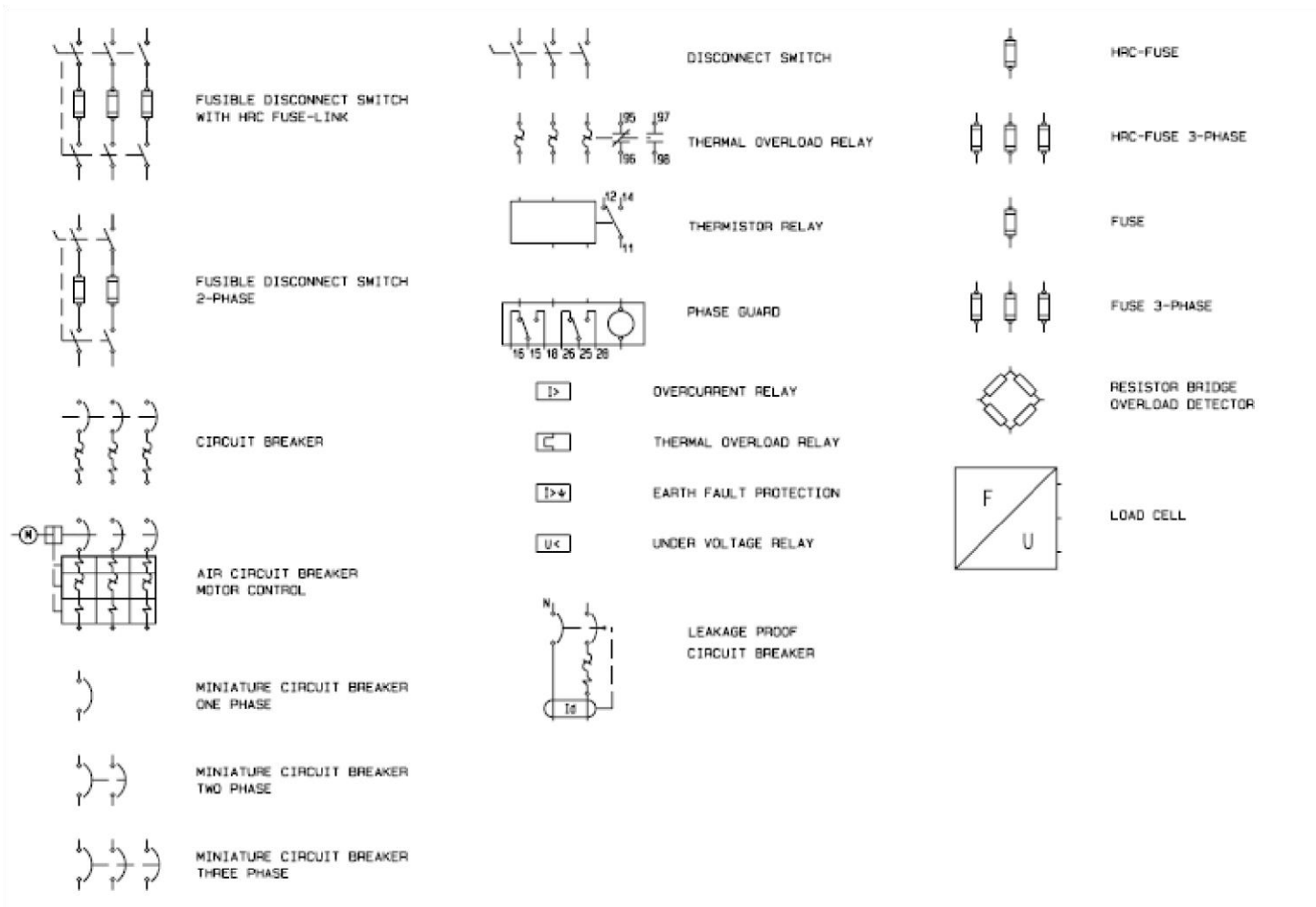


Identifying Cables & Wires (cont.)

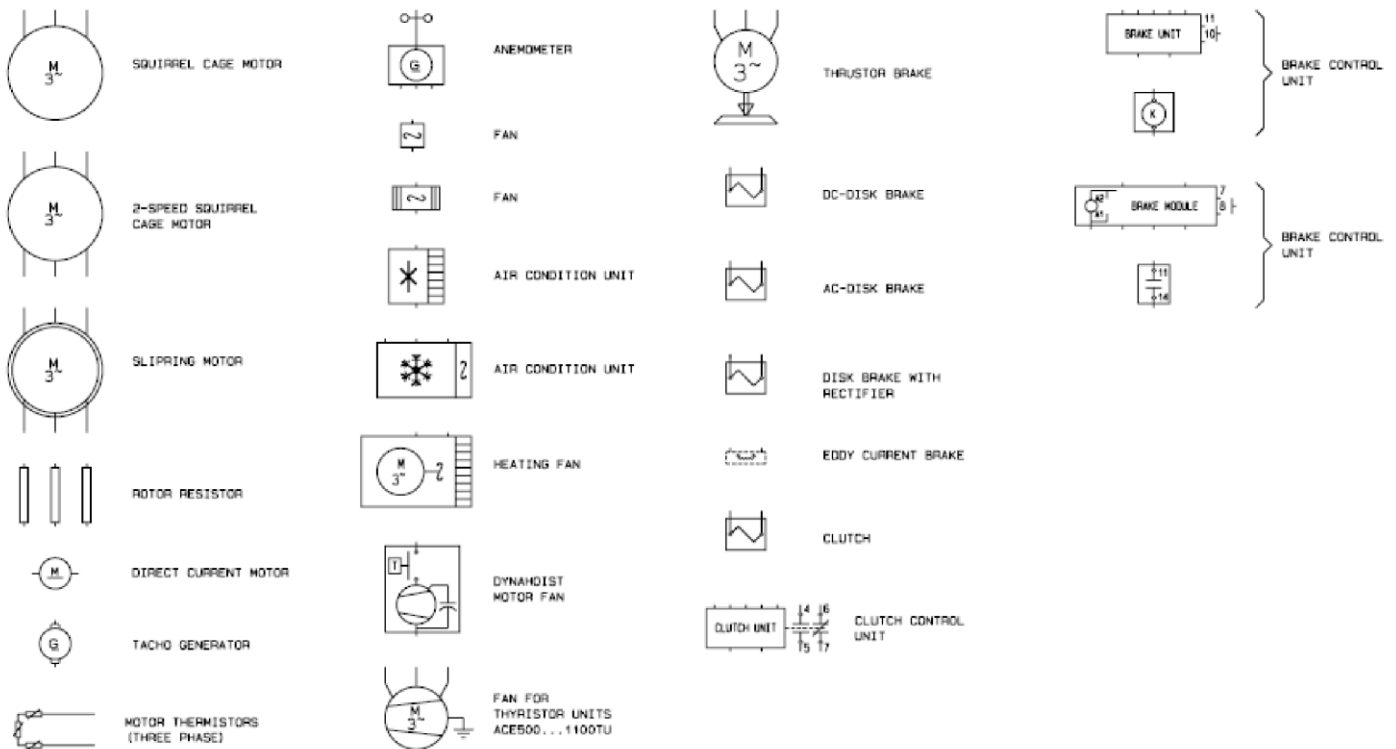


Graphical Symbols for Circuit Diagrams

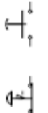
Protection Switches and Devices



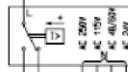
Motors and Brakes



Switches, Push Buttons, Contacts and Relays

	THREE PHASE CONTACT		MUSHROOMHEAD EMERGENCY PUSH BUTTON		THERMO SWITCH		OPERATING DEVICE CONTACTOR, RELAY
	MAKE CONTACT						MAKE DELAY
	BRAKE CONTACT		MANUALLY OPERATED SWITCH (MASTER SWITCH)		FLOW SWITCH		PULSE RELAY
	CHANGE OVER CONTACT		MANUALLY OPERATED SWITCH CLOSED AT ZERO POSITION		LOAD SWITCH		MECHANICAL INTERLOCKING
	MAKE CONTACT DELAYED WHEN CLOSING		SELECTOR SWITCH WITH KEY		AUX. CONTACT OF THERMAL RELAY (NORMAL CLOSED)		OPERATING DEVICE * WITH PREFIX
	MAKE CONTACT DELAYED WHEN OPENING		SELECTOR SWITCH				TEMPERATURE
	BRAKE CONTACT DELAYED WHEN RECLOSING		WIRE EMERGENCY STOP LIMIT SWITCH				OVERLOAD
	PUSH BUTTON NORMAL OPEN CONTACT		FOOT OPERATED SWITCH				CURRENT
	PUSH BUTTON NORMAL CLOSE CONTACT		MANUALLY OPERATED				VOLTAGE
	PUSH BUTTON WITH KEY						OIL LEVEL
							PRESSURE
							MAGNETIC VALVE
							SERVO VALVE
							RC-SUPPRESSOR

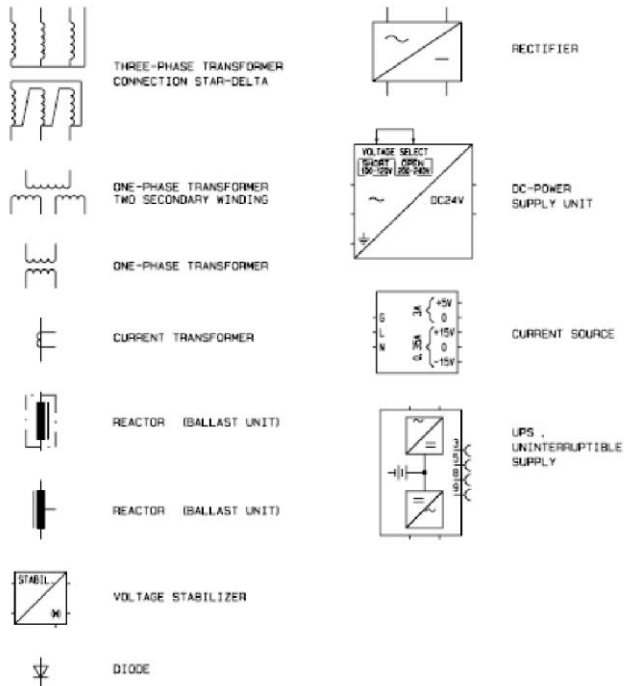
Lighting, Heating and Signaling Devices

	FLOODLIGHT		HEATER
	EMERGENCY LIGHT		RESISTOR GENERAL (BRAKE RESISTOR)
	BULB LIGHT		ADJUSTABLE RESISTOR (POTENTIOMETER, DIMMER)
	FLUORESCENT LIGHT		ADJUSTABLE RESISTOR (POTENTIOMETER, DIMMER)
	INDICATION LIGHT		HORN
	ONE-PHASE SOCKET		SIGNAL HORN
	THREE-PHASE SOCKET		SOUND ALARM, BELL, ETC.
	THERMOSTAT		BUZZER
	THERMOSTAT		INDICATING INSTRUMENT *) V, A, ETC.
	THERMOSTAT		

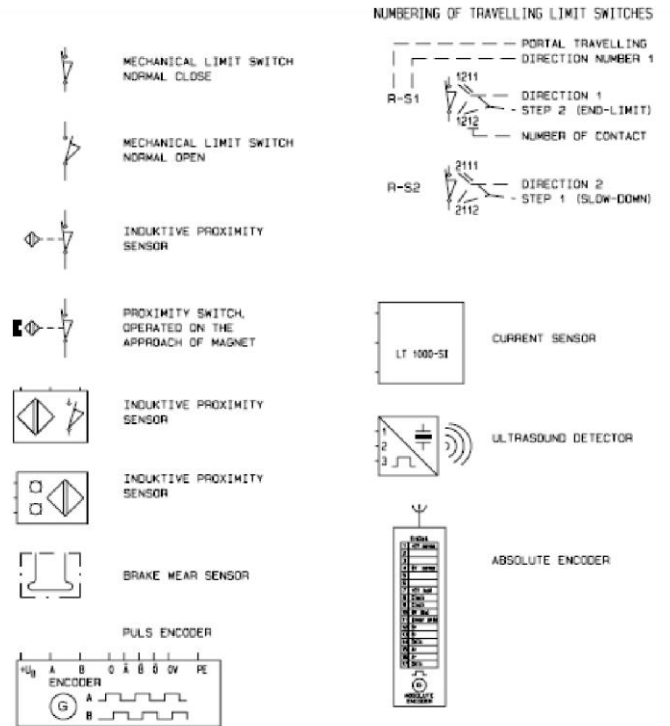
Connection Symbols

	SLIPPING CONTACT		TERMINAL
	PLUG AND SOCKET		DIODE TERMINAL
	SCREENED CABLE		SWITCH TERMINAL WITH KNIFE
	SCREENED CONDUCTOR		SWITCH TERMINAL WITH PLUG
	CONDUCTOR OR CABLE NOT CONNECTED (=ISOLATED)		EARTH TERMINAL BLOCK
	CONNECTION OF CONDUCTOR		
	JUNCTION OF CONDUCTORS		
	SIGNAL ARROW (SOURCE) /12.A2C (DESTINATION) WITH SHEET AND GRID REFERENCE		
	TWISTED CONDUCTORS		
	EARTHING		
	SIZE OF CABLE AND CONDUCTOR		

Power Supply Units



Limit Switches and Sensors





PLC Signals

Signal Amplifiers

