

KES

Electric Design of Welding Fixture

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1. Scope of Application

This standard shall apply to the related electricity drawing.

2. Normal Matters

2.1 Employed parts

The employed parts should follow the KS or specifications of other related regulations.

2.2 Contact of electric circuit

The electric circuit is possibly connected to one power source. When the required power voltage is the same as that of other electric equipments, it is obtained from the converting equipment of transformer or purifier.

2.3 Open circuit equipment

The electric equipments of machines are operated as follows.

- (1) If it is dangerous, it should be stopped by a reducer.
- (2) The whole equipment is opened from the power circuit. The equipments, which are able to do these, should be installed.

2.3.1 Emergency stop equipment

Emergency stop equipment should be able to be out of contact accidents for workers or machines and the machines should possibly be stopped. For these, the following two methods are shown.

- (1) Switchgear for an emergency stop is installed so that the power circuit of machines should be able to be opened & closed by manual or automatic operation.
- (2) The control circuit is installed so that the electric contact flow of circuit, which can be consider to be dangerous, is opened & closed simultaneously by one order. For example, the whole contact flow of coil is opened when several electric contactor is employed as the Δ -Y starting circuit in reversible driving circuit.

(a) Exception of emergency stop

- ① Power breaker, worker or dangerous circuit to the equipment. For example, the stop circuit, which executed electronic check circuit quick stop, should not be broken by the emergency stop equipment.
- ② When reversible operation is not dangerous to workers or machines, the reversible operation is started by the emergency stop.

(b) Mount position of emergency stop equipment

The handle or push-button S/W for operating emergency stop equipment is indicated clearly by red and it is located at the position where workers conveniently operate.

When push-button S/W is employed, it should be protrusion type (Mushroom shape).

When there are several working positions in machines, the push-button S/W is installed to be reachable from any place of operation.

(c) Electric function of emergency stop equipment

The emergency stop equipment should be able to break the maximum current of machine.

2.3.2 Power open circuit equipment

Power open circuit equipment is employed on the following cases

- When it is cleaning
- When it is repairing
- When it is not employed for long time

The electric equipment should be composed of manual operation, which is capable of opening from all power sources. When small motors are employed as a simple control circuit, it can be omitted if not specially required.

(1) Required condition of power open circuit equipment

Power open circuit equipment should have the followings.

- (a) All have opening function except for neutral line and should have stable opening &

closing position and indication.

(b) When there are more than 2 power sources, each of power open circuit equipment is installed at each power source. When it is dangerous that either one of power open circuit equipments is operated, an appropriate inner lock is installed at the circuit or power open circuit equipment.

(c) The position of power open circuit equipment is originally 1400 mm ~ 1800 mm from the working surface.

(2) Open circuit equipment of illumination circuit

For the illumination circuit not through the power open circuit equipment, exclusive open circuit equipment or plug should be installed. The tag for showing the usage should also be attached around the open circuit equipment.

(3) Break capacity of power circuit equipment

When the power open circuit equipment is installed near workers, break capacity is should be able to break the maximum current of machine as emergency stop equipment.

(4) Common use of power open circuit & emergency stop equipment

When all of electric equipment is opened at the power by operating emergency stop equipment on 2.3.1, the emergency stop equipment is employed as a power open circuit equipment if it satisfies the request on 2.3.2.

2.4 Contact of belongings

When it is connected to the external belongings in machine, short circuit should be protected at fuse or circuit breaker.

2.5 Driving of motors

It is appropriate to employ direct induction driving for AC motors. When many motors are driven, they are driven with sequences.

3. Preservation

3.1 Prevention of electric shock

3.1.1 Installation of groundbreaker

Groundbreaker should be installed in the electric furnace supplying more than 60V.

The manufacturing company of machines is not responsible for the installation of groundbreaking equipment.

3.1.2 Protection of charging region

In order not to have danger of mis-contact on the charged region with more than 50V on the belongings in control part and compartment, it should be protected with more than 1 method on (1) ~ (4).

(1) When the power circuit equipment is short, the method for inter lock of power open circuit equipment and door is employed to open the door.

(2) Method to lock the door and cover not to be able to untie without using tools

(3) Method to close the door and cover with key

(4) In order not to have mis-contact when the door is open, the method for coating the whole charging region with insulation materials is employed. Repair and adjust of electric equipment treatment is executed by electric handler.

3.2 Protection of short circuit

3.2.1 Installation of breaker

The manufacturing company of machines installed excess current breaker to protect the electric equipment.

3.2.2 Excess current and breaking equipment for diverging circuit

When the wire is diverged from thick to thin, the excess current breaker is installed at each pole of separating point.

The excess current breaker can be omitted for the following cases.

- (1) When the excess current breaker for thick wire protects the thin wire
- (2) When allowable current of thin wire is more than 55% of nominal current for allowable current of thick wire or excess current breaker directly connected to the thick wire.
(35% for less than 8m of thin wire length)
- (3) When other interference is connected to the drive side on less than 3m of thin wire length
- (4) When each of excess load protection equipment is installed on more than 2 motors, which attached a machine connecting load or electric equipments of different current.

3.2.3 Nominal current of excess current breaker

- (1) Nominal current of excess current breaker should be less than 1.2 times to that of connected machines.
- (2) When the connected machine to the excess current breaker is one in big driving current machine (Hereinafter referred to as motor), its nominal current is less than 3 times to that of the motor.
- (3) When motors are included in the connected machines to the excess current breaker, its nominal current is the sum of maximum capacity of 1 motor and 3 times of different motors.
- (4) When the value of calculated nominal current is not the nominal value of excess current breaker, its value is the close nominal value.

3.2.4 Thickness of wire

- (1) When motors are not included in the connected machines or the maximum capacity of 1 motor's nominal current is lack of other machine's nominal current, the employed wire should be able to allow the nominal current including motors.
- (2) When the nominal current for 1 maximum capacity of motors in the connected machines is greater than the sum of other machine's nominal current, the wire should be able to flow the sum of other machine's nominal values and more than the sum of following current values. When the connected machine is one motor, the wire should

be able to flow more than the allowable current of following values.

(a) When the nominal current of motors (One maximum capacity of more than two motors) is less than 50A, 1.25 times of its nominal current value is employed.

(b) When the nominal current of motors (One maximum capacity of more than two motors) is over 50A, 1.25 times of its nominal current value is employed.

(3) It is possible to use the allowable current wire, which is more than the appropriately revised load current when demand of machines is clear by reverse rate.

3.3 Protection of over load

- (1) The protecting equipment for over load should be installed on the motor.
- (2) Minimum number for protecting factors of over load and installing poles follow table 1.

Table 1

Type of Motors	Type of Supplying Current		Minimum Summary of Over Load Protecting Factor & Installing Method
Single Phase Motor	Single phase-2 line type	Non-grounding	Random 1 line
	Single phase-2 line type	1 line grounding	Non-grounding 1 line
	Single phase-3 line type	Neutral line grounding Other grounding	Random 1 line except for neutral line
3 Phase Motor	3 phase-3 line type	Non-grounding	Random 2 line
	3 phase-3 line type	1 line grounding	Non-grounding 2 line
	3 phase-3 line type	Neutral line grounding	Random 2 line
	3 phase-4 line type	Neutral line grounding Other non-grounding	Random 2 line except for neutral line

(3) The protection is performed by the inserted detector in the motor, which is started and stopped quite often.

(4) Automatic returning protecting equipment for over load is not employed when there is a danger possibly caused by re-starting.

3.4 Protection of no voltage

When the static power is recovered, the protection of no voltage is performed for the machines not to be started automatically.

3.5 Protection of lack voltage

When the voltage quickly drops, the operators get hurt by mis-operation or maneuvering materials & machines are damaged. Therefore, the protection of lack voltage should be performed.

3.6 Speed protection of DC motors

Speed protection of DC motors should be installed on the dangerous DC motors by over speed. For the shunt motors or separately excited motors, protecting equipment of non-excitation motors can be employed for over speed protection equipment.

Remark

Solenoid valve and sequencer protection: When solenoid valve is damaged or lost, circuit protector (CP) is employed as an over speed protecting equipment. When the number of contacted solenoid valve per one CP is prohibited to insert simultaneously with protective number of CP, it is possible to have 8 of contactable solenoid valve.

The installing position of CP is as follows.

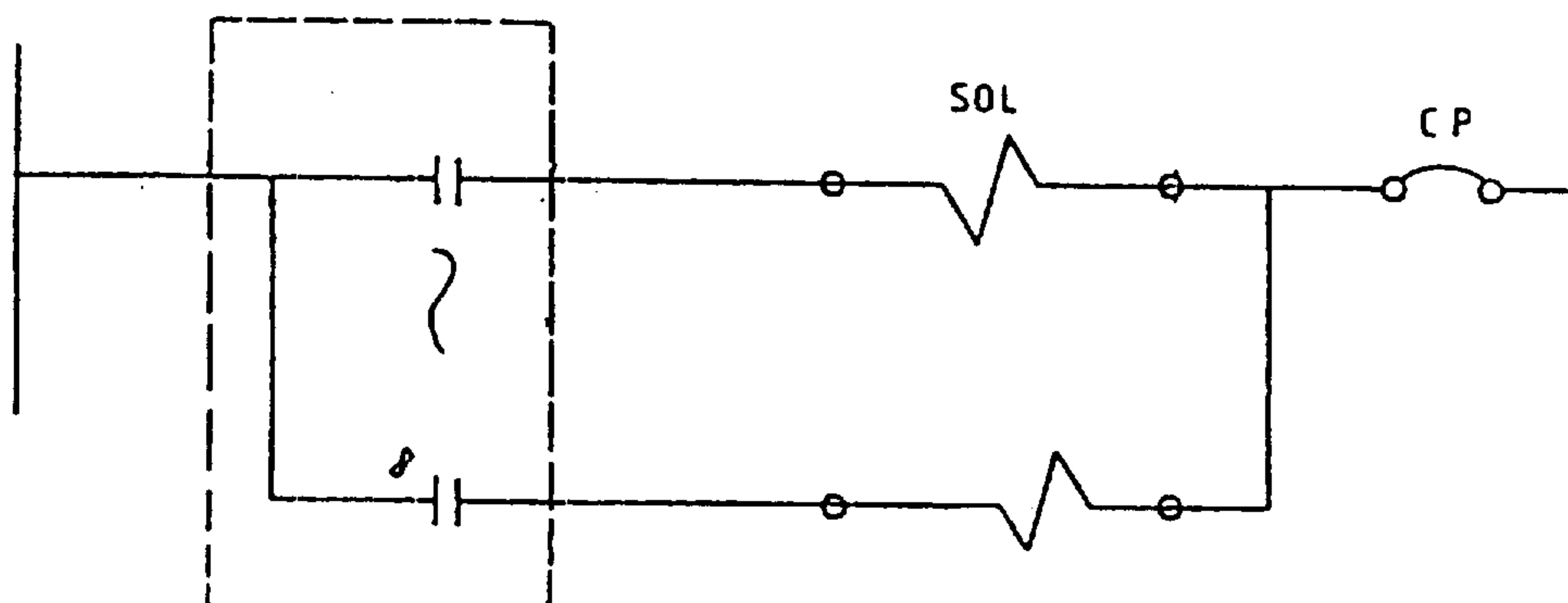


Figure 1 Case of Sequencer Control

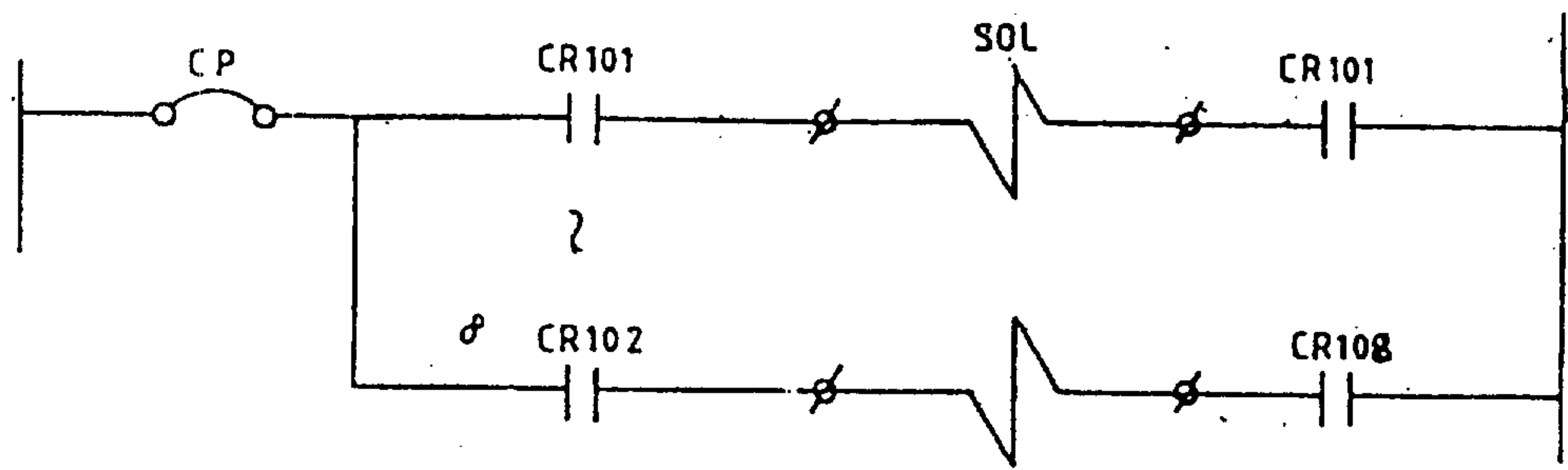


Figure 2 Case of Relay Control

4. Control Circuit

The control circuit should consider the safety of human body and the protection of machinery.

4.1 Power source of control circuit

When hydroelectricity power is AC 220/440V, the transformer is employed. This transformer is called insulated transformer and should be connected to the load side of power open circuit equipment. (120% of maximum voltage)

(1) Voltage of control circuit: Voltage of AC control circuit is shown in table 2. Voltage of AC control circuit is 24V, 48V, 110V and 220V.

Table 2

Sort	220V	440V
1 st Side Tap	210V, 220V, 230V	420V, 440V, 460V
2 nd Side Tap	100V	220V