Auto PF Controller

TYPE - MICROCHIP

OPERATIONS MANUAL

PENTACON

PENTACON ELECTRO-CONTROL (INDIA)

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NOTE

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchasers purposes, the matter should be referred to our PENTACON ELECTRO-CONTROL (INDIA) office.

The contents of this instruction Manual shall not become part of or modify any prior or existing agreement or relationship. The sales contract contains the entire obligations of PENTACON ELECTRO-CONTROL (INDIA). The warranty contained in the contract between the parties is the sole warranty of PENTACON ELECTROCONTROL (INDIA). Any statements contained herein do not create new warranties or modify the existing warranty.

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Features :

- ⇨ Power Factor indication in either direction of CT polarity
- ⇨ Real time display
- ⇨ Suitable for Contactorised capacitor switched panel. and for SSR (solid state relay) switched panel on demand.
- ⇨ No effects of harmonics on performance.
- ⇨ Intelligent switching for bank selection. Other switching on demand.
- ⇨ Input sensing through Individual phase with a CT.
- ⇨ Wide current input range.
- ⇨ Wide working voltage range.
- ⇨ Separate button for desired power factor setting.
- ⇨ Separate button for desired dead band setting.
- ⇨ Separate button for desired switching delay setting.
- ⇨ Output relay contacts up to 12 output available.
- ⇨ AMP indicator for ct fault or very low current.
- ⇨ Slide switch for locking, to avoid pinning.
- ⇨ Standard 144 X 144 mm panel flush mounting arrangement. Max depth 75mm.

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Specifications :

⇨ Working Voltage	:	110V to 285V
⇨ Current Input	:	----/ 5A (CT ratio)
⇨ Frequency Input range	:	30 Hz to 100 Hz
⇨ Switching Contacts	:	1 Amps, 250V AC (max)
⇨ Switching Sequence	:	Intelligent-Switching
⇨ Display	:	.01 lag ----1---- .01 lead
⇨ Target Power Factor	:	.80 lag - to - .80 lead
⇨ Bank Selection	:	1 + 2 + 4 + 8 (for best result)
⇨ Working Temperature	:	-10ºC to + 45ºC
⇨ Harmonics Effect	:	Nil (performance unaffected)
⇨ Stage	:	Up to 12 Stage
⇨ dimensions	:	144mm x 144mm x 75mm
⇨ Weight	:	600 grams

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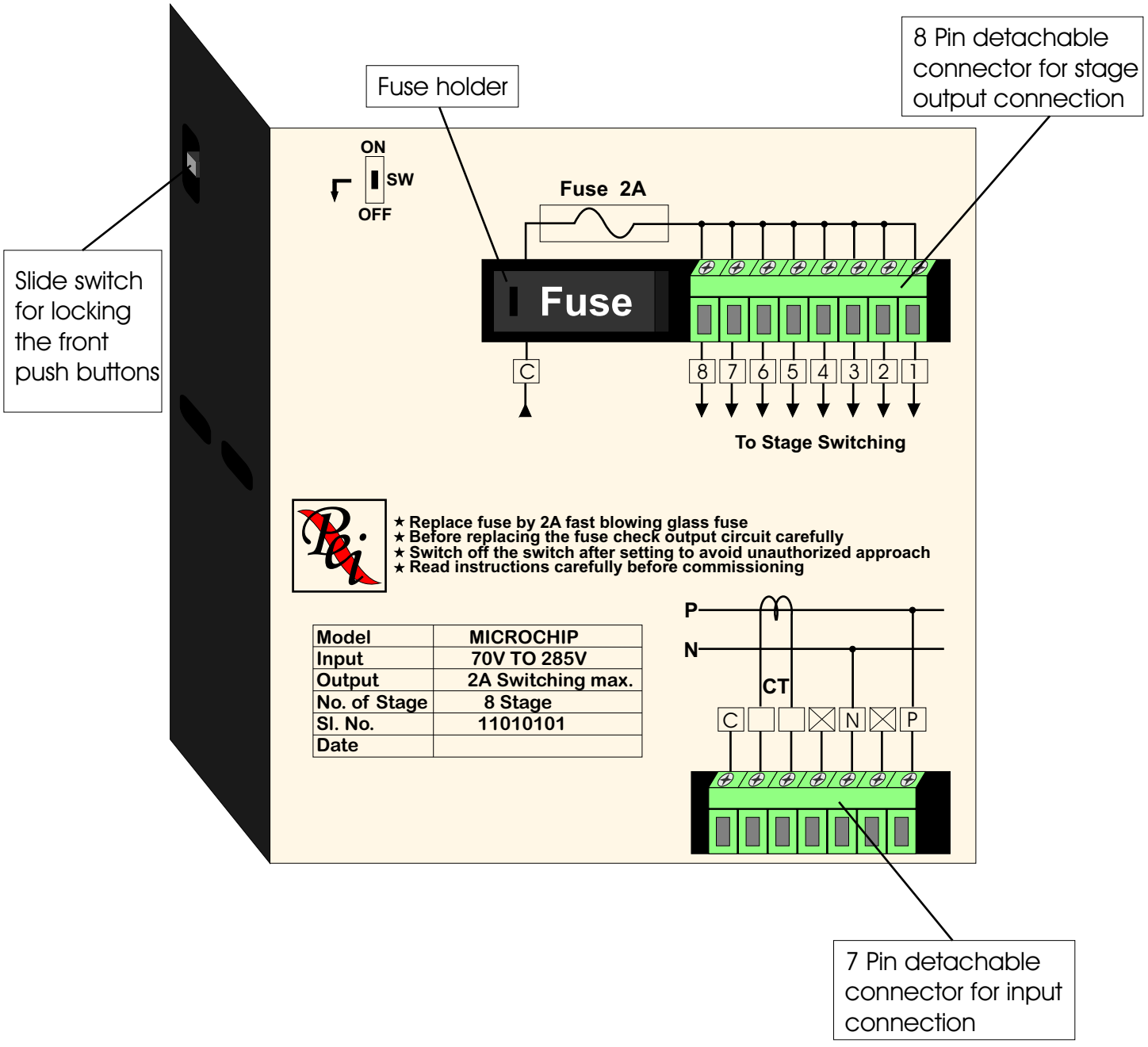
BACK SIDE VIEW OF 8 STAGE RELAY



Model	MICROCHIP
Input	70V TO 285V
Output	2A Switching max.
No. of Stage	8 Stage
Sl. No.	11010101
Date	

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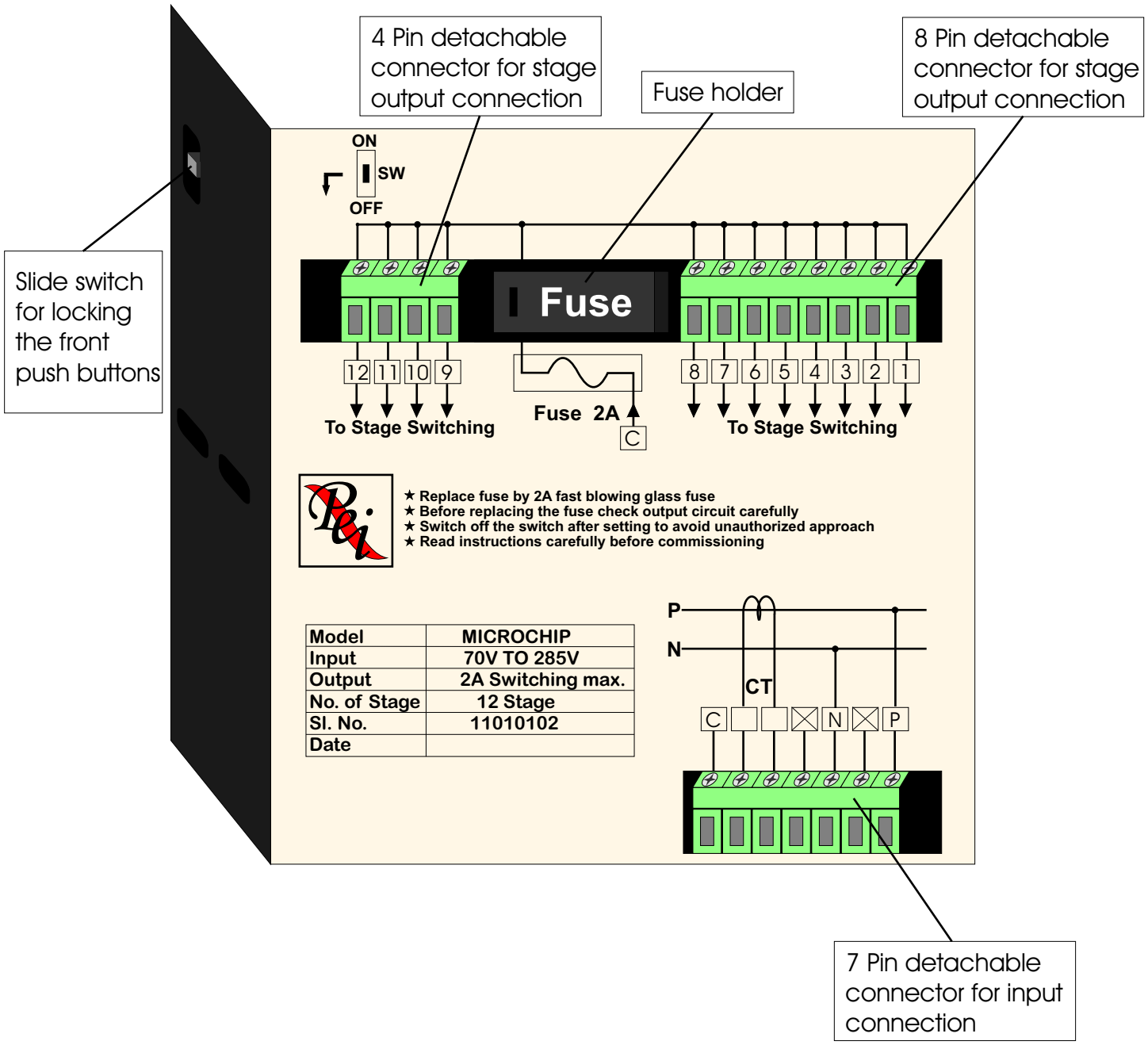
BACK SIDE VIEW OF 12 STAGE RELAY



Model	MICROCHIP
Input	70V TO 285V
Output	2A Switching max.
No. of Stage	12 Stage
Sl. No.	11010102
Date	

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INSTALLATION :

The Controller rear panel has **P**, **N**, **CT**, **C** input terminals for external electrical signal input.

1. P & N terminals are to be connected to one phase & N of a 3 phase electrical system.
   CT terminals are to be connected to CT secondary

2. In case the CT secondary is connected to other instruments in addition to the Controller.
   a. current coils of other instruments and controller terminal must be connected in series
   b. rated burden of the CT must be sufficiently large to accommodate the burdens imposed by all the instruments, terminal, cable etc. connected in the CT secondary circuit.

3. The CT must be mounted on
   a. the main in comer bus-bar carrying sum total of load and capacitive currents.
   b. Same phase of the system of which is connected to R phase.

4. The rated current of CT secondary and rated signal input current of the Controller must be identical i.e. xx/5 Amps.

5. The Controller rear panel has 1, 2, 3,.... stage wise and **C** as a common normally open potential free output contact terminal. Hence separate supply to coils of the contractors used for switching the capacitor banks must be provided through these terminals.

COMMISSIONING :

1. Confirm the set-up as per the installation instruction.
2. Check the fuse provided on the Controller rear panel.
3. Switch off all the capacitor bank in the entire circuit.
4. Confirm the **CT** secondary current with a multimeter by connecting it in series with **CT** terminals of the Controller. It must be at least 2% of its rated value, for proper functioning of the Controller. (**CT** secondary can also be checked with clip-on type ammeter)
5. Switch on the capacitor control panel and the controller.

   a. **H/L** L.E.D.(red), **CT/Load** L.E.D.(red), glows and persists, Power Factor display will shows the PF value, stage will start switching one by one and unless the display shows app. 1.00 (or set value).

   APFC RELAY IS FUNCTIONING PROPERLY

   b. If the CT/ Load (red) L.E.D. not glows and LEAD indicator L.E.D.(red), Power Factor display shows **0** and blink at regular interval.

   (i) **Absence of input current signal, or (ii) CT is not connected properly into terminals.**

   c. CT/Load L.E.D.(red), LEAD indicator L.E.D.(red), glows and persists, Power Factor display show the some PF value, stages are not switching. (No one capacitor bank is on in panel but APFC relay is indicating power factor in lead side))

   (i) **Check if there may be any fixed capacitor connected in circuit**
   (ii) **Wrong phase given to APFC relay**

   d. **CT/Load** L.E.D.(red), glows and LEAD indicator is green, Power Factor display shows the some PF value, stage will start switching one by one but Power Factor display is un-changed or irregular.

   (i) **Check if current of APFC panel & load is passing out through CT,**
   (ii) **Low CT rating (rating should be 5 VA min.), or**
   (iii) **Faulted CT.**

   Some time CT shows the ampere but does not work with APFC relay. In this case CT should be changed by new one.

   e. Relay shows on status of all the stages but no contactor is on.

   (i) **Check fuse (2 amp) on controller's rear panel or**
   (ii) **Phase is not connected to the C terminal at rear panel.**

   f. All capacitor on but relay shows LAG PF or below the desired PF.

   (i) **At the extreme is the possibility the total installed KVAr is too low, or**
   (ii) **Check if the capacitors are healthy**

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Stage Hunting

Increase the dead band if problem rectifies then ok otherwise check the steps given below :

a. All stages are off except first stage, but first stage is switching on and off frequently.

(i) kvr rating of capacitor of first stage is large than what it required.

b. If as soon as first stage on, CT/Load L.E.D. goes off and fist stage off, AMP L.E.D. goes on

(i) load on P phase is very low, apfc relay leave sensing after switching the first stage. Increase the load or use the lower ratio CT.

c. start switching-on stages one by one but after switch-on a particular stage start switching-off one by one.

(i) check the capacitors, contactors, m.c.b. and switching & protection devices carefully. Total sum of kvr before that particular stage is low and kvr of that particular single stage is high according to running load.

d. Relay does not hold

(i) Increase the dead band setting, if problem persist it means that the capacitor bank is too large or banks are not divided properly.

(ii) Capacitors should be in increasing order for example,

1, 2 ,4 ,8, 10, 15, ……. Etc.

METHOD OF SETTINGS :

1. Switch on the locking slide switch by pushing upward, the **SW** L.E.D. will glow. Now the keys are activated. (Switch is situated at the rite side of the relay)

2. Keep press the button **SET PF** the power factor will change from lag to lead to lag (lag 0.80 to 1.00 to lead 0.80). After releasing the button the last displayed PF will be stored automatically.

3. Keep press the button **DEAD BAND** to set the dead band, release the button when desired no. Comes on display. (Range- 1 to 5)

4. Keep press the button **DELAY** to set the delay time of on & off of the steps (Range- 1 to 10 equal to 0.5 second to 5 seconds)

   If slide switch is off and SW is not glowing, Pressing buttons will show the last stored data accordingly for 3 sec.

5. AMP. is an indicator of load through ct, if there is no load through ct or in case of any fault condition in ct line, the AMP. Light will not glow the display will show 0 will blink frequently.

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