Navigator

power factor controller

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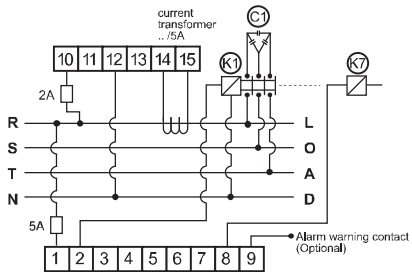
User guide for model NV-5 & NV-7
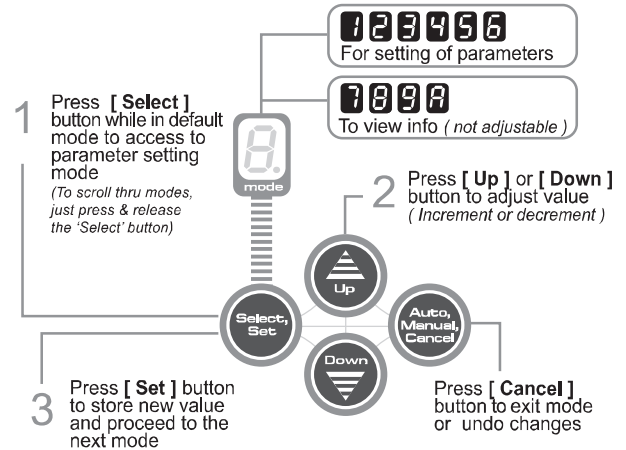
Wiring Diagram
Wiring connection

NV-5

NV-7
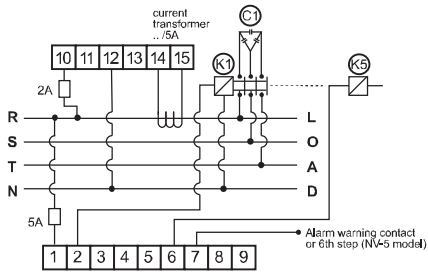
How to do setting
To go to the Modes for setting of parameters

Press 'Select' button while in default mode to acess to Parameter Setting mode. (*Default mode = info mode @ cos*n)

For setting of parameters

To view info (*not adjustable*)

1 Press **[Select]** button while in default mode to access to parameter setting mode
(*To scroll thru modes, just press & release the 'Select' button*)

2 Press **[Up]** or **[Down]** button to adjust value (*Increment or decrement*)

3 Press **[Set]** button to store new value and proceed to the next mode

Press **[Cancel]** button to exit mode or undo changes

(*For fast increment or decrement, press and hold the UP or Down button*)

Specification
Technical data / Setting range

Technical Specification

Power Supply	240 VAC ±10% or other on request
Rated Current (In)	. . / 5A (same phase with power supply)
Working Current	0.02 - 10A
Rated Frequency	45 ~ 65 Hz
Output Relay / Alarm	5 A / 250 VAC
Weight	~ 600 g
Operating Temperature	0° to + 55° C

Setting Range

C / K value	:	Auto / 0.03 - 1.00
COS n (target power factor)	:	0.85 (ind) - 0.95 (cap)
Switching Program	:	Auto / P-0 - P-6
Switching Interval	:	2 - 60 sec.
V > (Over-voltage)	:	Off / 240 - 270 V

Parameter Modes Definition
Modes definition

1 - 6 : For Setting (Adjustable)

1	C / K	Auto / Manual *Sensitivity setting = 1st cap. bank (Kvar) ÷ C.T. ratio*
2	Target Cos n	Power factor to be achieved
3	Step Interval	Capacitor bank switching delay time (sec.)
4	Program Sequence	Auto / 7 selectable switching programs
5	No. Connected Steps	Number of capacitor bank connected to network
6	V > (Over-voltage)	Over-voltage limit

7 - A : For Viewing (Not adjustable)

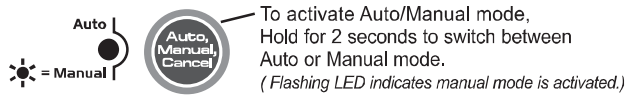| **7**	Voltage Info	Real-time line voltage value *Press [Up] button to view Frequency(Hz) value*
8	I secondary info	Real-time secondary current value *Press [Up] button to view THD (%) value* *Press [Down] button to view P.F. value*
9	Operation hr.	Operation hour x 1000 hours
A	Alarm info.	Alarm warnings (*Refer to pg.10*)

Auto / Manual operation mode
To set Auto or Manual mode

User can activate Auto or Manual mode only when the unit is in default mode. *(When no mode is selected)*

In Auto mode, the unit will automatically detects when to step in or out. In Manual mode, user can manually using [Up] or [Down] to step in or out respectively.
(Default mode = info mode @ cosn)

Auto ⌐
☀ = Manual ⌐

To activate Auto/Manual mode,
Hold for 2 seconds to switch between
Auto or Manual mode.
(Flashing LED indicates manual mode is activated.)

In Manual mode

Press once to step in one cap. bank (+C)
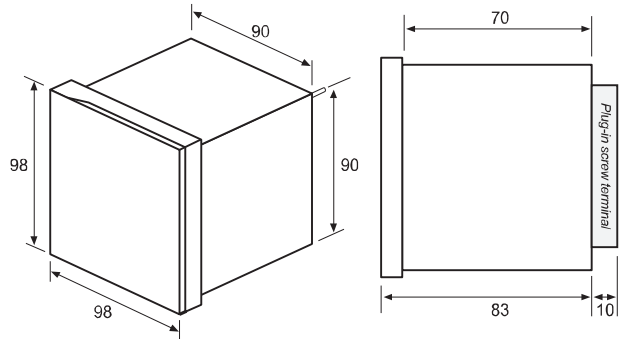Hold for 2 seconds to step in all (+C...)

Press once to step out one cap. bank (-C)
Hold for 2 seconds to step out all (-C...)

Press [Cancel] once to stop continuous manual step in / out.

Casing Dimension
All measurement in millimetres

90

70

98

90

98

83   10

Plug-in screw terminal

Panel cut-out 92 x 92 mm

C/K setting
To set C/K value for optimun compensation

When no mode is selected, press [Select] once to enter mode [1]. Set the correct C/K value using the [Up] or [Down] button. Newly selected C/K value will flash. Press [Select] to store / confirm new value, or press [Cancel] to undo changes. Set value to 'AUT' for automatic C/K detection. However, if load is fast-varying, auto detection may not be possible. It is recommended to manually set the C/K if possible. Follow the example below.

The C/K value is defined as the ratio of the 1st capacitor to the C.T. ratio.

Calculation of C/K

E.g. 1st cap bank = 25KVAR (true kvar)
      (CT) ratio   = 800/5   = 160

      C/K value   = KVAR (1st cap) ÷ CT ratio
                  = 25 ÷ 160
                  = 0.15

It is recommended to set C/K to a slightly lower than calculated value, so in the above example, set C/K value to 0.13 (approx. 80% of calculated).

Actual kvar versus rated kvar of Capacitor

The rated kvar of capacitor is true only if the rated voltage is supplied. In case when rated voltage is very much different from the voltage supply, follow the example to calculate the true kvar.

True kvar $= \dfrac{(\text{actual voltage})^2}{(\text{rated voltage})^2} \times$ rated kvar

e.g. 30 kvar rated 525 V
      actual voltage supply = 415 V

Then true kva $\dfrac{415^2}{525^2} \times 30$
              $= 19$

Keypad lock / Alarm or 6th step
To prevent unauthorized adjustment / To set alarm warnings

When no mode is selected, press [Select] and [Cancel] button simultaneously and hold for 5 secs.

L mode is displayed (Lock mode)

Press **[Up]** or **[Down]** button to select 'ON' or 'OFF'
Press **[Set]** button to confirm

r mode is displayed **(For model NV-5 only)**

Press **[Up]** or **[Down]** button to select either
ALr or C6 (6th step for NV-5 model)

Press **Set** button to confirm and exit

6th step activation for model NV-5

If C6 is selected, user will have to adjust the number of connected steps in mode 5 to ' C6 ' which is the 6th step for model NV-5 to function as an additional step.

4 Program sequence *(Switching program)*
To select auto / preset program sequence

Press [Select] button until mode [4] is displayed. The display will show 'Aut' as the default setting. User can select one of the 7 preset sequence 'P-0' to 'P-6' or select 'Aut' (Auto) and let the unit detects the ratio of the indiviual cap banks. Press [Up] or [Down] to modify the switching program. The new selection will be flashing on the display. Press [Set] to confirm.

Program Sequence	
P-0	Linear
P-1	11111
P-2	12222
P-3	11222
P-4	11122
P-5	12444
P-6	11224

5 No. of connected steps
To set the no. of cap bank to be utilized in the network

Press [Select] button to go to mode [5]. The existing value is displayed. Set correctly the number of available capacitor bank that would be utilized in the network using [Up] or [Down]. Press [Set] to confirm.

For model NV-5, an additional 6th step is available. (Refer to pg. 11)

6 V > (Overvoltage)
To set over-voltage monitoring

Press [Select] button until mode [6] is displayed. The display will show 'OFF' which means that over-voltage is not monitored. To change, press [Up] or [Down] to adjust the desired value for over-voltage monitoring then press [Set] to confirm setting. Alarm warning for over-voltage will be display as ⬛.

7 Voltage (V) / Frequency (Hz)
To view Voltage and Frequency info

This mode is not adjustable.

To view Voltage value, press [Select] button to go to mode [7]. The display will show the value of the voltage.

To view frequency (Hz), press and hold the [Up] button.

To exit, press [Cancel] button.

8 I Sec. (A) / THD-I (%)
To view I Secondary (A) and THD-I (%) info

This mode is not adjustable.

To view the secondary / C.T. current (A), press [Select] button to go to mode [8]. The display will show the value of I Secondary.

To view THD-I (%), press and hold the [Up] button.

To view P.F. value, press and hold the [Down] button.

To exit, press [Cancel] button.

If I secondary < 0.50A, THD-I will not be computed.

Display will show ' ⬛ '.

Notes

Contents
Power Factor Controller : NV-5 / NV-7

9 Operation Hour
To view the number of hours the unit in used

This mode is not adjustable.

Press [Select] button to go to mode [9]. The display will show the no. of hour the unit is in used.

To exit, press [Cancel] button.

e.g.   0.05 x 1000 = 50 hours

A Alarm Info
To view alarm info

This mode is not adjustable.

To view any active alarm warnings, press [Select] button to go to mode [A].

Press [Up] button to scroll thru' alarm (if multiple alarm are active).

The display will show ▪▪▪ indicating that no alarm is active.

To exit, press [Cancel] button.

Alarm warnings indication :

---	- No active alarm	**U-C**	- Under Compensate
O-C	- Over Compensate	**OU**	- Over Voltage
FrE	- Out of Freq. Range : 45Hz - 67Hz		

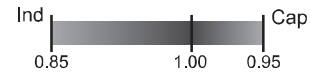---

2 Target cosφ setting
To set target cosφ for optimum compensation

Press [Select] button until mode [2] is displayed.

Press [Up] or [Down] to adjust the value. The new value will be flashing on the display.

Press [Set] to confirm the new value.

It is recomemded not to set target value to < 0.90 ind.

Ind ───────────────── Cap
0.85   1.00   0.95

3 Step interval
To set cap bank switching delay time

Set the appropriate switching time (sec) which is the time interval between the stepping in/out of each cap bank. This interval allows load condition to settle such that frequent switching can be avoided.

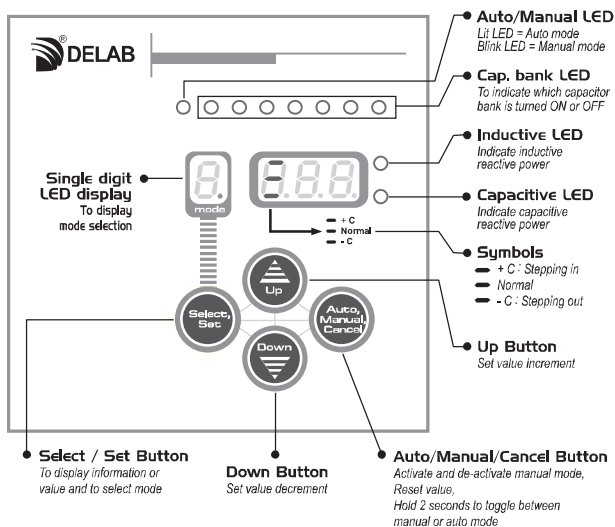Press [Select] button until mode [3] is displayed.

Press [Up] or [Down] to adjust the value (sec). The new value will be flashing on the display.

Press [Set] to confirm the new value.

Panel Description
Overview / Buttons function

DELAB

Auto/Manual LED
Lit LED = Auto mode
Blink LED = Manual mode

Cap. bank LED
To indicate which capacitor bank is turned ON or OFF

Inductive LED
Indicate inductive reactive power

Capacitive LED
Indicate capacitive reactive power

Single digit LED display
To display mode selection

Symbols
+ C : Stepping in
Normal
- C : Stepping out

Up Button
Set value increment

Select / Set Button
To display information or value and to select mode

Down Button
Set value decrement

Auto/Manual/Cancel Button
Activate and de-activate manual mode,
Reset value,
Hold 2 seconds to toggle between manual or auto mode

Notes