Operation Manual
BLR-CX

ATTENTION!

When installing BLR-CX, there are the dangers of electric shock! Installation and commissioning are therefore to be performed by a technician with necessary qualification. During installation, the relevant regulations setting up of switchboards and accident prevention have to be respected.

Equipment with damaged or open housing or terminals shall not be operated at mains and are instantly to unlock.

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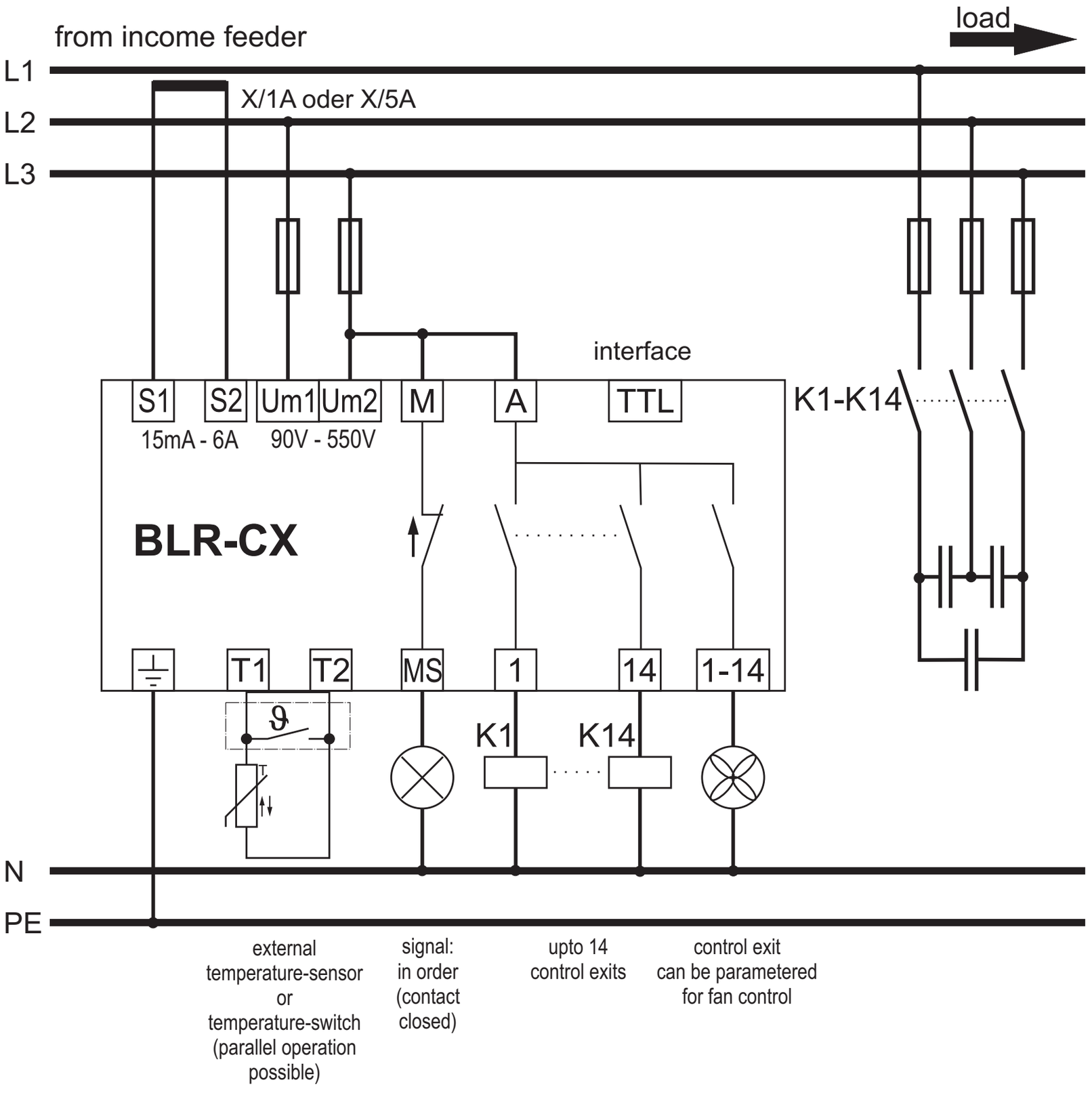

from income feeder
load
L1
L2
L3
X/1A oder X/5A
interface
S1
S2
Um1
Um2
M
A
TTL
15mA - 6A
90V - 550V
K1-K14
BLR-CX
T1
T2
MS
1
14
1-14
K1
K14
N
PE
external temperature-sensor or temperature-switch (parallel operation possible)
signal: in order (contact closed)
upto 14 control exits
control exit can be parametered for fan control

Installation and Commissioning:

1) Compare voltage and current ratings of BLR-CX with data of mains and installation!
2) Disconnect panel from mains voltage (5 safety rules of electricity!)
3) Is CT short-linked or not in operation?
   High voltage level of an open secondary of CT endangers people and devices. The CT will be damaged by this.
4) Disconnect and remove previous pfc-relay..
5) Mount BLR-CX to the control panel with two mounting clips. (cutout 138x138mm)
6) Connect protection earth to PE connection of metal case.
7) Connect BLR-CX according to connection diagram.
   (CT/P1 income-feeder, CT/P2 load!)
8) Remove short-link from CT
9) Connect mains voltage to panel.
10) When connection of relay is correct and technical data of mains is according to ratings and settings of BLR-CX, LCD will show **AUTO** and control function will start!

FAQ during Commissioning:

1) **No indication AUTO** → PFC is stopped
   Cause: manual operation, SETUP/100/PFC = OFF or HOLD, temperature is too high, current < 15mA, voltage oder THD U is out of tolarance.

2) **Indication U ALARM** → voltage out of tolerance
   Check settings for nominal voltage (SETUP/Un) and voltage transformer (SETUP/Pt)

3) **Indication I Lo ALARM** → current < 15mA
   Cause: connection error of CT; short-link of CT is not removed; CT-ration is too big compared to real current; no current

4) **Indication EXPORT** → kW export
   if there is no real kW export, voltage and current connection of BLR-CX has to be checked! → chapter wrong connection

5) **Wrong Cos φ indication** → wrong connection
   voltage and current connection of BLR-CX has to be checked!
   → chapter wrong connection

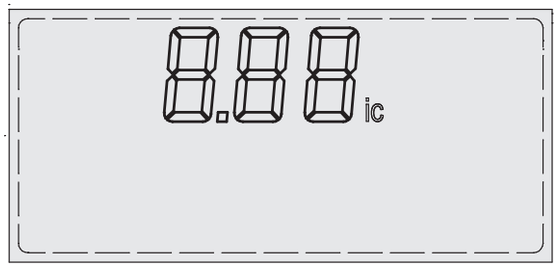
6) **Exits are connected and immediately disconnected**
   → chapter stepsize detection / defective capacitors

7) **Frequent switching operations**
   size of capacitors is not completely detected

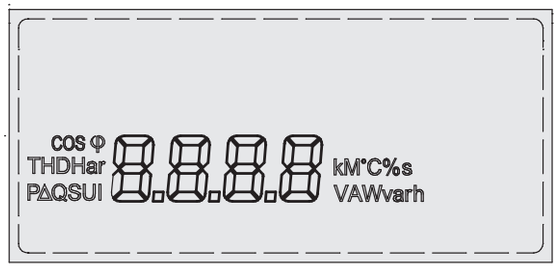
Display:

INFO: step database
AUTO: PFC is working
MANUAL: manual mode
SETUP: Setup of parameters

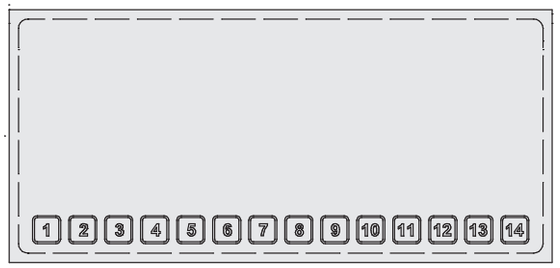
EXPORT: kW export
NT: 2nd target-cosφ is working
ALARM: blinking during alarm



1. line:
cosφ
menue items



2. line:
measuring values
paramters
alarm codes



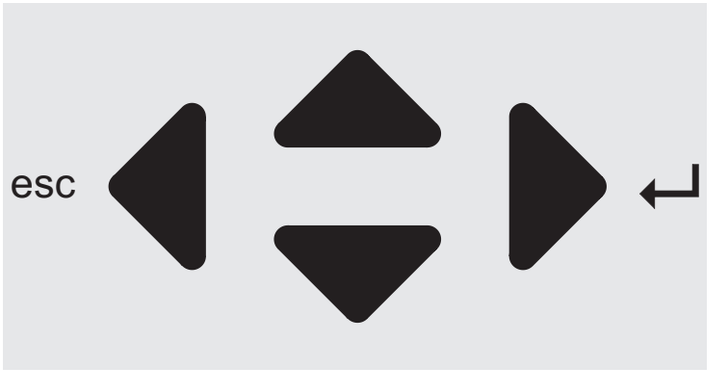
Step indication:
state of step (on/off)
step defective (blinking)

Handling:

BLR-CX has 4 keys for navigation and input of parameters.

Increase values
choose menue items

exit menue
move cursor left
reset alarm (5 sec)



open menue
move cursor right
confirm input

Decrease values
choose menue items

Input parameter:

▲, ▼ setting of number

▶ selection of next digit

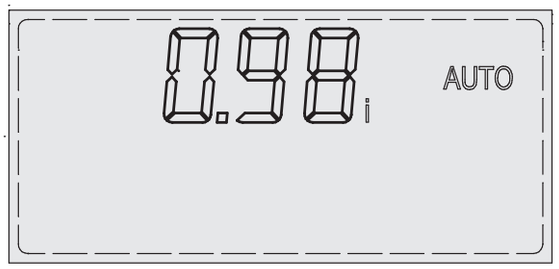
▲, ▼ after setting of last digit, selection of:
- multiplier **k** (kilo) or **M** (Mega)
- leading sign **I** (induktive) or **C** (capacitive) (blinking of I or C)

▶ storage of setting

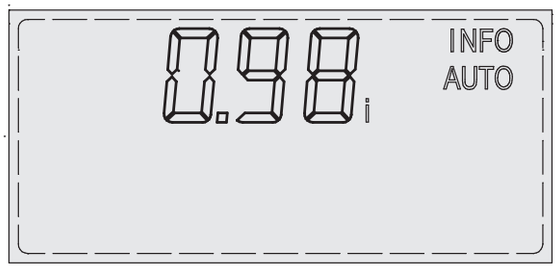
◀ abort input

Main Menue:

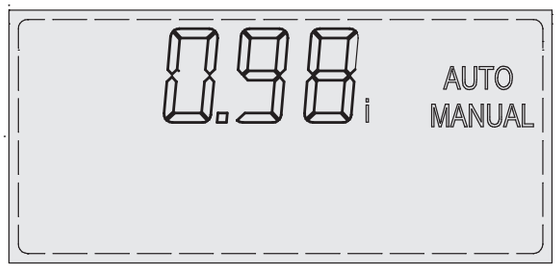
Choosing menue items by pushing ▲, ▼, enter submenue by pushing ▶



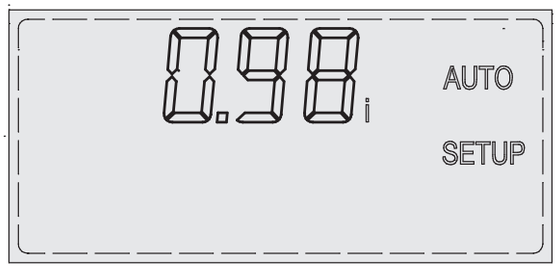
Measuing Values: (choose by ▲, ▼)
U_{LL}, U_{LN}, A (I), kW (P), kVar (Q), ΔkVar (ΔQ), kVA (S), THD U, 3. -19. Har. U, cosφ, Λ (PF), ϕΛ (APF), tan φ (tAn), Hz (F), °C(t), °Cmax (thi), operation hours (OPh)



INFO Step Database:
size and derating of steps,
switch cycles, steptype
(→ chapter INFO Step Database)



MANUAL Operation:
Selective switching in and out of control exits
(→ chapter MANUAL operation)

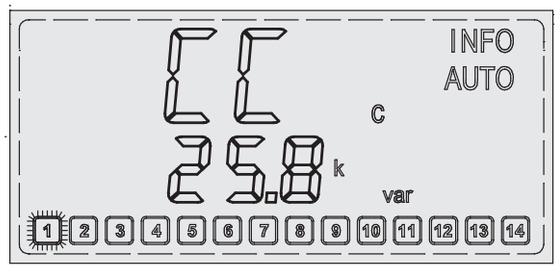


SETUP Parameters:
Nominal voltage (Un),CT-ratio Ct, VT-ratio (Pt), Automatic Initialising (Ai), PFC ON/OFF/HOLD (PFC), target-cosφ (CP1), switch time delay (St), steptype (Out)
(→ chapter SETUP Parameters)

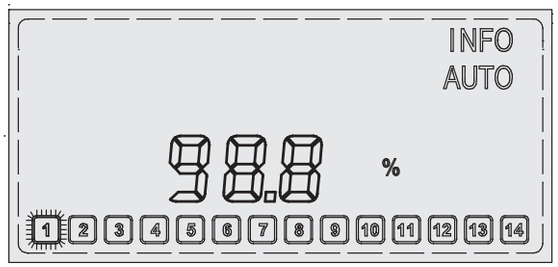
INFO Step Database:

Attention: Actual state of control outputs is not shown!

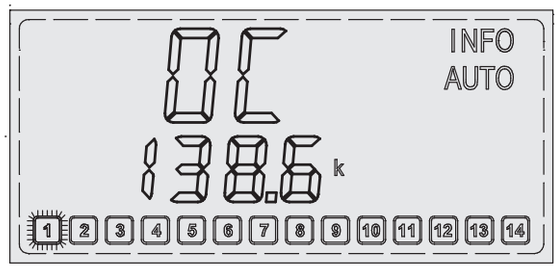
Choose step by ▲, ▼ and enter by ▶ . The selected step is blinking. By using ▲, ▼ following information can be selected:



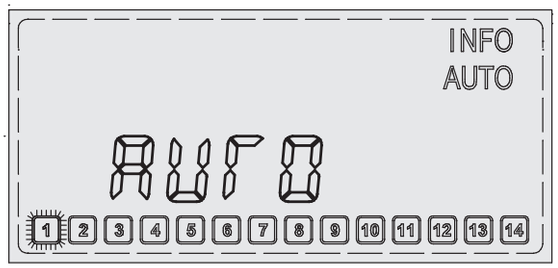
Actual Size of Capacitor
the value is rated to nominal voltage



Derating of Capacitor:
actual power / nominal power in %



Switch Cycles:



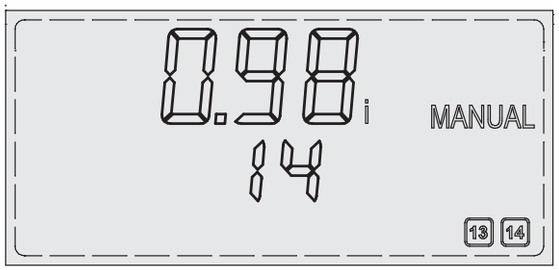
Steptype:
AUTO: automatic controlled step
Fon: step fix on
Foff: step fix off
AL: step used for fan control
FLty: defective step

MANUAL Operation:

For manual operation ▶ has to be pushed for 3 seconds!

Selection of step by ▲, ▼. Number of selected step is shown in line 2 of LCD. By pushing ▶ selected step will switch on / off..

Manual operation will be left by ◀ .



Important Information:

- Menue Manual Operation cannot be opend in modes LIFO and Combi-Filter. (→Referencebook!)
- Discharging lock-time is also active during manual operation (steps are locked a certain time after switching-off)
- when voltage is out of tolerance all steps are disconnected.
- THD U-alarm and overtemperature are locking switching-in steps in manual operation.
- Only steps with steptype AUTO can be switched!
- After leaving manual operation menue, control continues from actual state.

SETUP Parameters:

Choosing SETUP, submenue 100 is indicated. ▶ Opening menue 100. ▲, ▼ menue 200-600 (protected by pin, → Referencebook)

Un **Nominal voltage (very important!)**
OV / UV monitoring, reference for step database.

Ct **CT-ratio**
indication of measuring values. (enables many measuring values)

Pt **VT-ratio**
important base for nominal voltage

AI **Automatic Initialising**
→ chapter wrong connection

PFC **PFC ON / OFF / HOLD**
on, off, freezing of automatic pfc-correction

CP1 **Target-cosφ 1**
base for compensation target

St **Switch time delay**
definition of speed of regulation

OUt **Step type**
definition of step type: AUTO, Fon, Foff, AL
reset of defective steps (FLty)

Wrong Connection / AI - Automatic Initialising:

A pfc-relay needs a correct connection of voltage and current (polarity and phase), for a proper function. If this is not the case, connection must be corrected. As this is not always possible, BLR-CX is offering alternativly the following functions:

Manual Correction: SETUP / 200 → Referencebook

Automatic Initialising: SETUP/ 100 / Ai

Ai is connecting and disconnecting all control exits several times on and off. Duration for this is several minutes! Not connected exits get steptype Foff. Stepsizes are not detected by this function!

After finished Ai, BLR-CX has to be checked for correct function!

Requirements for successful operation of Ai:

- voltage is within tolerance
- CT is conencted (no simulation!)
- capacitor banks are installed and fuses are insert

Possible problems for function of Ai:

- load variations
- small current signals (big CT-ratio, small stepsizes)

Failure indication Ai / Abrt:

Ai is abort, as no clear result could be achieved,PFC = OFF.

Step Size Detection:

At each switching operation, step size is measured (except this function is not active SETUP / 300 → Referencebook)

Because of this setting of c/k value is not necessary. Switching sequence is defined automatically by using the selectied capacitors.

The recognised values are taken to stepdatabase. A derating of capacitors can be seen there.

Is there no function of a step during the first 3 switching operations after a reset of stepdatabase, steptype **Foff** is set automatically.

Defective Steps:

When a step is switched 3 times in series without measured size, it is detected as defective and it is blocked for 24h.

Step state: blinking
Status: Flty, step is blocked

Failure analysis:

After commissioning, all steps have step type Foff:
Is short link of CT secondary removed?
Is position of CT correct?
Are all fuses present and in order?

In normal operation, one or more steps are blinking?

How is condition of fuses, contactors and capacitors of this step.

Reset in SETUP / 100 / OUt or by re-start (interruption of supply voltage) of BLR-CX!

Alarms:

Settings of alarm system: SETUP / 500 → Referencebook

U $_{ALARM}$**:** Voltage out of tolerance

I LO $_{ALARM}$**:** Current < 15mA (check current path)

I Hi $_{ALARM}$**:** Current > 6A. (CT rating is too small)

PFC $_{ALARM}$**:** Target cannot be reached (check panel)

HAr $_{ALARM}$**:** Limit of THD U is exceeded

StEP/FLtY $_{ALARM}$**:** Defective steps

SPL/Nr $_{ALARM}$**:** Derating of stepsize (< 70% of original size)
stepnumber and code are blinking rotational

thi $_{ALARM}$**:** Overtemperature disconnection of steps

OPH $_{ALARM}$**:** max. operation hours are reached (maintenance)

OPC/Nr $_{ALARM}$**:** max. switch cycles per step (maintenance)
stepnumber and code are blinking rotational

AI/Abrt $_{ALARM}$**:** Abort of automatic initialising
Start AI again at more quiet load conditions or manual setting of phaseoffset
(SETUP / 200 → Referencebook)

Factory settings from Process Technique :

SETUP / 100 (free access)

Important paramters

Un:	400V
Ct:	1
Pt:	1
Ai:	(no setting)
PFC:	ON
CP1:	1
St:	10s
OUt:	Auto

SETUP / 200 (locked access)

MEASURING

201/nominal voltage:	400V
202/CT-ratio	1
203/VT-ratio:	1
204/tolerance voltage:	15%
205/Ph-Ph/Ph-N:	(automatic)
206/phaseoffset:	0°
207/Ai:	(no setting)
208/countdown with Ai:	NO
209/synchronising:	AUTO
210/temperatureoffset:	0°C

SETUP / 300 (locked access)

CONTROL

301/sensitivity:	60%
302/target-cos1φ:	1.00
303/target-cosφ2:	i0.95
304/EXPORT cosφ2:	NO
305/switch time delay:	10s
306/St step exchange:	2s
307/step exchange:	YES
308/step recogn. off:	NO
309/lock defective steps:	YES
310/PFC:	ON
311/Algorithm:	Bes Fit (1)
312/kvar offset:	0kvar
313/asymmetric St:	1
314/Qcap steps off:	NO

SETUP / 400 (locked access)

STEP DATABASE

401/discharge lock time:	75s
402/nom. stepsize CT=1:	5var
403/step type:	Auto
404/switch cycles:	0

Factory settings from Process Technique :

SETUP / 500 (locked access)

ALARMSETTINGS

501/Reset manual	NO
502/THD U alarm	NO
503/THD U limit	20%
504/THD steps off	NO
505/Verz. THD, temp2	60s
506/I=0 freeze PFC	NO
507/maintenancealarm	NO
508/limit switch cycles	262k
509/limit operation hours	65.5k
510/target-cosφ2 by DI=1	NO
511/DI=1 when T1/T2 closed	NO
512/temperaturealarm	NO
513/temp1 limit	30°C
514/temp2 limit	55°C
515/control alarm	NO
516/defective steps alarm	NO
517/derating alarm	NO

SETUP / 600 (locked access)

RESET

601/factory settings
602/reset step database
603/reset operation hours
604/reset APF
605/reset max. temperature
606/reset alarm
607/info firmware relaese
608/change password

Technical Data:

Voltage:	90-550V, 1ph., 50/60Hz, 6VA
Current:	15mA-6A, 1ph., <1VA,
Control exits:	relay, N/C, common root 250V AC / 5A, 400V AC / 2A
Temperaturemeasuring:	by pluggable NTC
Alarm contact:	relay, voltfree, N/C operated, 250V AC / 5A, 400V AC / 2A
Fan control:	using of control exit
Interface:	TTL, rear (standard) optional: RS485 Modbus, USB
Ambient temperature:	operation: -20°V - 70°C starage: -40°C - 85°C
Humidity:	0% - 95%, without condensation
Overvoltage:	II, dirt class 3
Connection:	screw type, pluggable
Case:	front: instrument case plastic rear: metal
Protection:	front: IP50, (IP54 by using a gasket) rear: IP20
Weight:	ca. 0,6kg
Size:	144x144x58mm hxwxd cutout: 138 (+0,5) x 138 (+0,5)mm