Instruction Leaflet **IL159026EN** Effective February 2022

Replacement instructions for CX with CX Plus controller

⚠ WARNING

ENSURE THAT THE UPSTREAM AND INTEGRAL (IF INCLUDED) DISCONNECT / OVERCURRENT PROTECTION DEVICE HAS BEEN TURNED OFF AND LOCKED OUT. ALSO ENSURE THE CT WIRES THAT ARE TERMINATED ON TERMINALS TB1–1 AND TB1–2 ARE SHORTED. WAIT AT LEAST 5 MINUTES AFTER DISCONNECTION OF POWER SUPPLY BEFORE OPENING THE ENCLOSURE FOR SERVICE.

CX controller removal

1. For catalog option "W", remove all caulking around the CX controller.
2. Remove all wires terminated into the BLR-CX controller, ensuring the wire markers do not become removed.
3. Open the enclosure door and lift up/pull the slide tabs toward you to loosen the controller from its enclosure.
4. The controller can now be removed by gently pushing the controller away from the enclosure door.

CX Plus controller installation

1. Place the BLR-CX Plus controller into the slot from the BLR-CX.
2. Secure the controller in place using the tab slide-in mechanism (similar to the BLR-CX).
3. For catalog option "W", caulk around the CX Plus controller (between the facia and the door cutout).
4. Reconnect all the following wires for UM1, UM2, A through 12, k and 1.

   Note: Output stages 13 and 14 will not have any wires connected to them.
5. Remove and discard shorting wires from UM1 and UM2 to Lb (or La) and N.
6. If this is an AutoVAR Filter, remove the RTF wire from Lb (CX) and connect it to UM2 (CX Plus).
7. For catalog option "A", remove the wires from M/MS (CX) and terminate it onto the M/MS terminals of the CX Plus. Wire extension or rewiring from TB may be necessary for this change.

Re-energizing the unit

1. Once all wiring connections are completed, check all wiring is secured and tight.
2. Remove the CT shorting link at TB1 terminals 1 and 2.
3. Energize the upstream and/or integral disconnect/ overcurrent protection device.
4. The CX Plus controller is shown below.

Figure 1. CX Plus controller

Figure 2. Digital display

Screen legend

INFO	Capacitor Database
AUTO	Automatic Mode
MANUAL	Manual Mode
SETUP	Setup Mode
ALARM	Blinking during alarm
NT	Second target-pf is active
EXPORT	Export of active energy
1-12	Capacitor stage number indication

5. The CX Plus controller is operated by using four keys.

Figure 3. Operational keys

Powering Business Worldwide

6. Press the up or down keys to scroll through submenus.
7. Pressing the right key (enter) allows selection, entering the Edit Mode, or accepts the edited values.
8. In the Edit Mode, the left key (escape) or right key scroll left and right to allow setting of the appropriate digit.
9. Outside of Edit Mode, the left key exits to the next higher level.
10. Press and hold the left key for approximately 3 seconds to silence any alarms.
11. Upon power on the controller displays the existing power factor value (X.XX i) and enters the Automatic Control Mode.
    a. The "I" at the end indicates an inductive power factor and would be appropriate for most installations.
    b. A "c" at the end indicates capacitive power factor and suggests reactive power export and may not be appropriate. Refer to the troubleshooting guide for resolution steps.
12. Set up the basic parameters in the controller.
13. From the main screen, press the down key to step through the "INFO", "MANUAL", and "SETUP" modes.
14. When "SETUP" is shown, press the right key to enter the Menu 100.
15. Press the right key and program and/or verify the following values:

Un	Nominal voltage (factory programmed; customer may verify)
Ct	CT-ratio (factory set to 600, which corresponds to 3000:5 current transformer ratio. Changing the CT ratio will change the capacitor step sizes in 402 and those values will have to be reprogrammed.
Pt	PT-ratio (factory programmed)
Ai	Start of automatic initialization (factory programmed)
PFC	PF-control ON/OFF/HOLD (factory programmed)
CP1	Target-PF (customer to program)
St	Switching time delay (factory programmed; customer may verify)
Out	Output type of each stage (Auto/Alarm/Fixed Off/Fixed On) (factory programmed; customer may verify)

16. Once the Menu 100 is programmed, press the left key three times to return to the main screen that displays the existing PF.
17. From the main screen, press the left key to enter the Measurement Mode to verify the measured values. See the menu map for a list of designated parameters.
18. Press the left key to return to the main screen that displays the existing PF.
19. To verify the capacitor bank is working, activate the controller in Manual Control Mode and cycle through all the available steps.

    Note: The steps will switch on only after the factory-set capacitor stage discharge time has elapsed.

20. After each manual operation of the stage, the PF should change in the right direction (for example, 0.70 i >> 0.78 i >> 0.85 i…).
21. If the PF changes in the right direction, the capacitor bank has been correctly commissioned. If not, please refer to the troubleshooting guide.
22. To switch the controller in Manual and Control Mode, press the down key to step through the "INFO" mode to "MANUAL" mode.
23. Press and hold the right key for approximately 3 seconds until "1" displays, indicating the stage number 1 is available for control.

    Note: In Manual Mode, the controller freezes the stages in their existing state (ON, OFF, or HOLD). Therefore, it is important to ensure that at the end of this step, the controller is returned to the Automatic Control Mode by pressing the left key to return to the main screen that displays the existing PF.

24. After activating all available steps, one should make note of the displayed PF values, as that reading should be greater than or equal to the target PF desired.
25. If the displayed PF (with the electrical system fully loaded and all steps energized) is less than the target PF, then the selected capacitor bank is not sized adequately to raise the PF to the desired value. The customer should either upgrade the capacity of the capacitor bank or the target PF value should be decreased to prevent "PF alarms".

Table 1. Default settings

Menu	Function	Default	Customer settings
100	**Quick start setup**		
Un	Nominal voltage (phase-phase)	208 V / 240 V / 480 V / 600 V	
Ct	CT-Ratio	600 (corresponds to 3000:5 CT ratio)	
Pt	VT-ratio	1.7 (240 V unit) 3.7 (480 V unit) 4.7 (600 V unit)	
Ai	Start automatic initializing	N	
PFC	Start/Stop/Hold PF-control	On	
CP1	Target-PF 1	0.95i	
St	Switching time delay	60 s	
Out	Type of each step (1, 2, 3…12)	Auto (for each step installed in unit), Fixed Off (for unused controller outputs)	
200	**Setup measuring system**		
201	Nominal voltage (phase-phase)	208 V / 240 V / 480 V / 600 V	
202	CT-ratio	600 (corresponds to 3000:5 CT ratio)	
203	VT-ratio	1.7 (240 V unit) 3.7 (480 V unit) 4.7 (600 V unit)	
204	Tolerance nominal voltage	20%	
205	Voltage measuring	Y = L–L	
206	Phase-offset	90	
207	Start automatic initializing	N	
208	Synchronization to frequency	60 (60 Hz unit)	
209	Temperature offset	0 °C	
300	**Setup control system**		
301	Switching threshold	55%	
302	Target-PF 1	0.95i	
303	Target-PF 2	0.95i	
304	Target-PF 2 at KW-export	N	
305	Switching time delay	60 s	
306	Switching time delay for fine control	10 s	
307	Fine control active	N (for units with equal stage sizes), Y (for units with multiple stage sizes)	
308	Automatic Stage detection	N	
309	Block defective Capacitors	N	
310	Start/Stop/Hold PF-control	On	
311	Control algorithm	1	
312	Reactive-power offset	0	
313	Asymmetrical switching time delay	1	
314	Switch-off capacitors in leading condition	N	
315	Distribute sw. operations	N	
316	Detect faulty stages	Y	
400	**Setup capacitor database**		
401	Discharge time	60 s	
402	Capacitor size: step 1…max. 12	Varies (see equipment drawings for step size, typically 25, 50, or 100 kvar capacitive)	
400	**Setup capacitor database, continued**		
403	Type of exit: step 1…max. 12	Auto (for each step installed in unit), Fixed Off (for unused controller outputs)	
404	Switching operations: step 1…max. 12	0	
405	Operations hours counter: step 1…max. 12	0 h	
406	Fan relay as stage output	N	
500	**Setup alarm system**		
501	Reset alarms manually	N	
502	THD-U threshold	6%	
503	Disconnect capacitors when THD >	N	
504	THD alarm delay	120 s	
505	Stop control if I=0	N	
506	Service alarm	N	
507	Max. operations per step	262 k	
508	Max. operation hours of BLR-ACX-V	65.5 k	
509	Max. operation hours per step	65.5 k	
510	THD-I threshold	20%	
511	Digital input logic	Y	
512	Temp. threshold level 1 (fan control, type of exit: AL)	40 °C	
513	Temp. threshold level 2, disconnect capacitors	55 °C	
514	Control alarm (target cannot be reached)	Y	
515	Faulty stages alarm	Y	
516	Stage power loss alarm	Y	
517	Flashing display	N	
518	Digital input function	CP2	
519	I-Low alarm suppr.	Y	
520	Switch off active stages if digital input alarm	N	
521	I-Low alarm	Y	
522	I-High alarm delay	10 s	
523	Switch-off interval	60 s	
600	**Reset**		
601	Reset to default values	N	
602	Reset capacitor database to default	N	
603	Reset operation hours	N	
604	Reset average PF	N	
605	Reset max. temperature	N	
606	Reset alarm	N	
607	Info firmware	—	
608	Change password	242	
609	Restart first setup	N	
700	**Modbus**		
—	Baud rate	19.2 k	
—	Parity and stop bits	EVEN	
—	Slave address	1	
800	**System**		
801	Backlight during commissioning mode	N	
802	Backlight delay time	0.25 h	

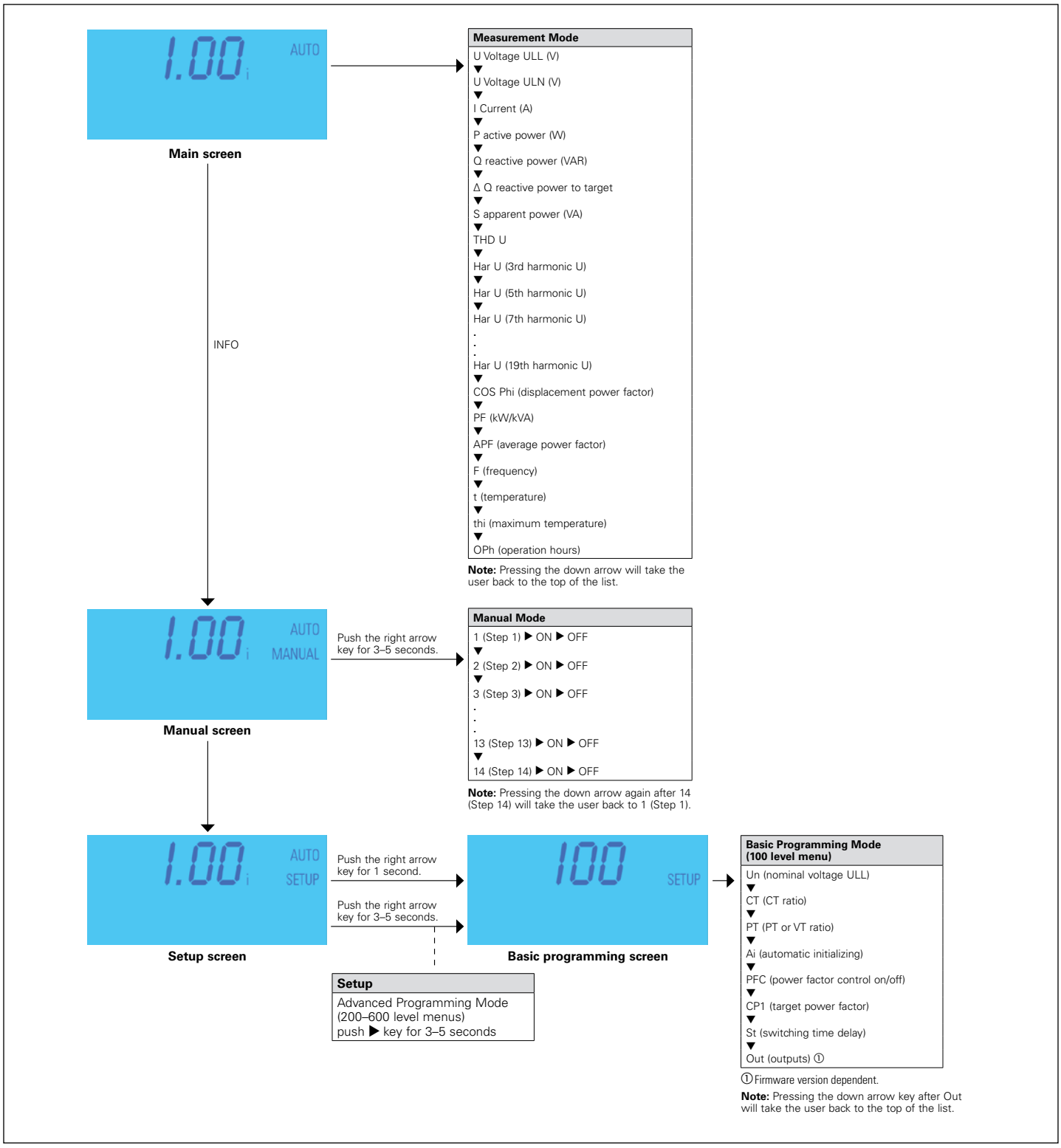

Figure 4. Menu map

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