

7 APPLICATION MEMORY

7.1 GENERAL INFORMATION

The application memory (APM) is required to store application programs. It is inserted in the respective slot in the CPU. Operating system ROM, application RAM and application PROM are found in the APM. Both EPROM and also FlashPROM APMs can be ordered from B&R.

The operating system is programmed in the system flash. With the help of the programming system a download of the operating system or an operating system update can be carried out. (see section "System Flash Programming").



An APM is only allowed to be inserted or removed with power removed.

The buffer time for the lithium battery is mostly determined by the storage or operating temperature. Proper storage of the battery (cool and dry) is recommended to ensure that the given buffer times remain valid.

7.2 TECHNICAL DATA



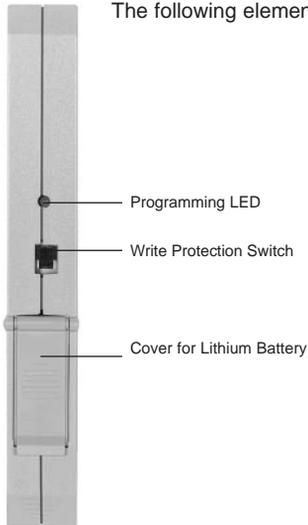
| Module ID | ME960 | ME963 | ME965 |
|-------------------|---|--|--|
| Model Number | 3ME960.90-1 | 3ME963.90-1 | 3ME965.90-1 |
| Short Description | 2005 Application Memory, 64 KB SRAM, 256 KB FlashPROM with PCC Operating System | 2005 Application Memory, 512 KB SRAM, 1 MB FlashPROM with PCC Operating System | 2005 Application Memory, 1 MB SRAM, 2 MB FlashPROM with PCC Operating System |
| C-UL-US Listed | Yes | Yes | Yes |
| Operating System | PCC Software | PCC Software | PCC Software |
| User RAM | 64 KByte | 512 KByte | 1 MByte |
| User PROM | 256 KByte Flash | 1024 KByte Flash | 2 MByte Flash |
| Deleting the PROM | Programming logic in module | | |

| Module ID | ME960 | ME963 | ME965 |
|--|---|-------|-------|
| FlashPROM Programming | Programming logic in module, LED display | | |
| Write Protection | Switch on the module | | |
| Buffering RAM Lithium Battery (in APM) Gold Leaf Capacitor (in APM) | min. 2 years ¹⁾ min. 10 min | | |
| Storage Temperature APM without Lithium Battery APM with Lithium Battery Lithium Battery (not inserted) | -20 to +70 °C -20 to +60 °C -20 to +60 °C | | |
| Storage Time Lithium Battery (not inserted) | max. 3 years at 30 °C | | |
| Dimensions (H, W, D) [mm] | 140, 20, 90 | | |

¹⁾ The given buffer times are for application memory that is not inserted in the CPU. Otherwise the buffer time is reduced to 1 year since the RAM in the CPU is also buffered.

7.3 OPERATIONAL AND DISPLAY ELEMENTS

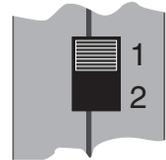
The following elements are found on the front side of the application memory:



The **Programming LED** is lit if application EPROM is being written to (burned).

The **Write Protection Switch** is used to protect the PROM from being inadvertently written to or deleted.

In position 1 (write position), the application PROM can be written to. In position 2, the PROM cannot be written to.



The position of the write protect switch is not allowed to be changed when burning B&R modules to the application PROM!

A lithium battery is found behind the **battery cover** which supplies the application RAM and CPU RAM when power is removed.

If the APM is stored for long periods of time, the battery should be removed if buffering is not required.

7.4 CHANGING THE LITHIUM BATTERY

Lithium Battery: 3 V / 950 mAh
 Model No.: 0AC201.9 (5 lithium batteries)

Storage Time: Max. 3 years at 30 °C
 Relative Humidity: 0 to 95 % (non-condensing)

The design of the product allows the battery to be changed with or without power applied to the PCC. However in some countries, changing batteries under power is not allowed. For this reason, B&R recommends that batteries be changed with the PCC turned off.

Exchanging the lithium battery can be done with the APM inserted or removed. In this case, a gold foil capacitor on the APM or a NiCd rechargeable battery or gold foil capacitor on the CPU takes over buffering the RAM. For APMs with a revision < 11.xx, battery exchange can only take place with the APM inserted!

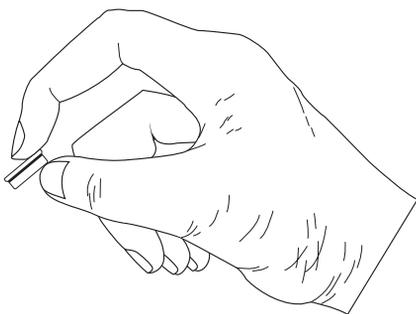
Take the following points into consideration when changing the lithium battery if the PCC is not under power or if the APM is not inserted:

- The PCC must be turned on for at least 5 minutes without interruption before changing the battery to guarantee that the gold foil capacitor is loaded and/or the NiCd is charged.
- The battery must be changed within 10 minutes of turning off the system.

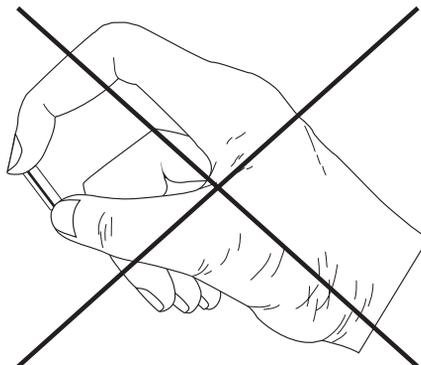
Procedure when Changing Battery

- 1) Remove voltage to power supply
- 2) Discharge electrostatic energy by touching the mounting rail or the ground connection (not in the power supply) !
- 3) Open lithium battery cover
- 4) Pull the battery from the battery compartment using the removal ribbon
- 5) Remove lithium battery (don't touch battery with uninsulated tools -> short circuit). The battery is not allowed to be touched on the edges with the hand. The battery can also be removed with an insulated tool.

Right:



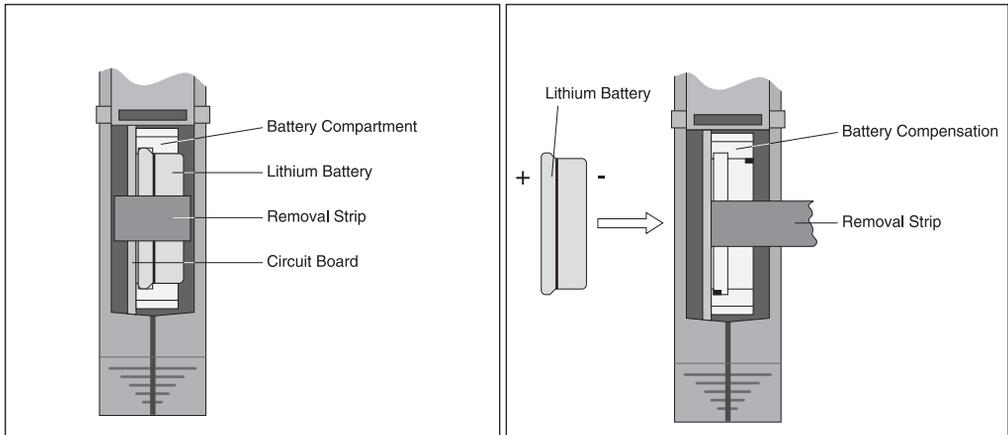
Wrong:



- 6) Insert the new battery with the proper polarity (don't forget the removal ribbon)
- 7) Place the end of the removal ribbon between the housing and the circuit board
- 8) Close lithium battery cover
- 9) Return voltage to power supply



Lithium batteries are considered hazardous waste! Please dispose of batteries according to the guidelines in your area.



7.5 SYSTEM FLASH PROGRAMMING

7.5.1 General Information

All application memory is delivered without an operating system. An operating system download or a operating system update is carried out with the help of the programming system.

An operating system installation with PG2000 is possible with versions 2.20 or higher.

7.5.2 Operating System Download

All application memory is delivered without an operating system. The following steps should be followed when installing the operating system ("operating system download") for the first time:

- 1) Switch off voltage supply to PCC. This step is necessary because the application memory must only be inserted when the power is switched off.
- 2) Insert the new FlashPROM application memory and switch power back on. Do not forget that the write protection switch on the front of the application memory is set to write position.
- 3) Establish online connection between programming device (PC or Industrial PC) and CPU.
- 4) Start programming system PG2000
- 5) Call up the PCCSW update function in PG2000 (see menu item "Service" in the pull down menu "System").
- 6) A dialog box appears in which the baudrate for the download procedure and the PC interface (to be used for the online connection) can be defined (e.g. 57600 baud, COM1).
- 7) Selecting [OK] opens the next dialog box,
- 8) In this box, the operating system version can be selected. After closing this box (by choosing "Yes"), the download procedure begins. The progress of the download procedure is displayed in the message line.



The User Flash is deleted!

- 9) When the download procedure has finished the PCC must be switched off and on again.
- 10) The PCC is now ready for operation.

7.5.3 Operation System Update

When updating the operating system, the following steps should be taken:

- 1) Turn off the supply voltage to the PCC. This step is necessary because the application memory can only be inserted when the power is switched off.
- 2) Remove the application memory from the CPU
- 3) An operating system update is only possible if the CPU is in bootstraploader mode. Open the FlashPROM side panel of the application memory and set the hardware switch to "ERASE".
- 4) Re-insert application memory into the CPU and return power. Do not forget that the write protection switch on the front of the application memory is set to the write position.
- 5) Establish online connection between the programming device (PC or industrial PC) and the CPU.
- 6) Start PG2000.
- 7) Call up the PCCSW update function in PG2000 (see menu item "Service" in the pull down menu "System").
- 8) A dialog box appears in which the baudrate for the update procedure and the PC interface (to be used for the online connection) can be defined (e.g. 57600 baud, COM1).
- 9) Selecting OK opens the next dialog box.
- 10) In this box the operating system version can be selected. After closing this box (by choosing "Yes"), the system ROM is deleted (incl. operating system). The selected version of the operating system is then transferred into the system ROM. The progress of the download procedure is displayed in the message line.



The User Flash is deleted !

- 11) When the update procedure is finished, the PCC has to be turned off.
- 12) Remove the application memory from the CPU and set the hardware switch to "OK"
- 13) Re-insert the application memory into the CPU and apply power again.
- 14) The PCC is now ready for operation.