

5.3 CP360

5.3.1 General Information

The CP360 is a high performance CPU for the B&R SYSTEM 2005. The CPU is operated in the main rack directly beside the power supply module. It requires two slots.

It is equipped with an insert slot for aPCI interface modules, a Compact Flash interface for CF memory cards and a floating point unit. An RS232 programming interface and a 10/100 BASE-T ETHERNET interface are available.

The aPCI insert slot for interface modules makes it possible to connect the CPU to different bus and network systems.

The Compact Flash interface allows the size of the memory to be adjusted to suit different memory requirements of many diverse applications.

The CP360 is especially useful for applications, where lower cycle times are required, very large amounts of data must be processed or for applications using the FPU.

5.3.2 Order Data


| Model Number | Short Description | Image |
|---------------|--|---|
| | CPU |  |
| 3CP360.60-2 | 2005 CPU, 32 MB DRAM, 512 KB SRAM, 256 KB for remanent data, removable application memory: Compact Flash, 1 plug in slot for aPCI modules, 1 RS232 interface, 1 Ethernet interface 10/100 Base-T. Order application memory separately! | |
| | Program Memory¹⁾ | |
| 9A0015.07 | Compact Flash 8MB ATA/True IDE | |
| 9A0015.06 | Compact Flash 32MB ATA/True IDE | |
| 9A0015.02 | Compact Flash 64MB ATA/True IDE | |
| 9A0015.05 | Compact Flash 128MB ATA/True IDE | |
| 9A0015.08 | Compact Flash 192MB ATA/True IDE | |
| 9A0015.10 | Compact Flash 256MB ATA/True IDE | |
| 9A0015.09 | Compact Flash 320MB ATA/True IDE | |
| | Accessories | |
| 0G0001.00-090 | Cable PC <-> PLC/PW, RS232, online cable | |
| | | |
| | | |

Table 59: CP360 order data

1) Program memory is required to operate the CP360. It is not included with the delivery of the CPU, instead it must be ordered as an accessory.

5.3.3 Technical Data

| Product ID | CP360 |
|--|--|
| General Information | |
| C-UL-US Listed | Yes |
| B&R ID Code | --- |
| Module Type | B&R 2005 CPU |
| Slot Main Rack Expansion Rack | 3 + 4 No |
| Power Consumption 5 V 24 V Total | Max. 9 W Max. 2 W Max. 11 W without memory cards and without interface modules |
| Processor | |
| Instruction Cycle Time | 0.02 µs |
| Data and Program Code L1 Cache | 2 x 16 KByte |
| L2 Cache | 512 KByte |
| Standard Memory RAM User RAM | 32 MByte DRAM 496 KByte SRAM |
| Integrated I/O Processor | Processes I/O data points in the background |
| Data Buffering Lithium Battery Battery Monitoring | At least 3 years Yes |
| Peripherals | |
| Compact Flash Interface Connection Memory Size | 1 ATA / True IDE 8 MByte to 320 MByte (as of 10/2001) |
| Real-time Clock Resolution | Nonvolatile 1 s |
| Reset Button | Yes |
| Status Display | LEDs |
| Insert Slots | 1 (for aPCI interface modules IF7xx) |
| Standard Communication Interfaces | |
| Application Interface IF1 Electrical Isolation Design Distance Baud Rate | RS232 No 9 pin DSUB plug Max. 15 m / 19200 Baud Max. 115.2 kBaud |
| Application Interface IF2 Electrical Isolation Design Distance Baud Rate | ETHERNET Yes RJ45 Max. 100 m 10/100 MBaud |

Table 60: CP360 technical data

| Product ID | CP360 |
|----------------------------|-----------------------|
| Mechanical Characteristics | |
| Dimensions | B&R 2005 double width |

Table 60: CP360 technical data

5.3.4 Limitations

| Limitation | Replacement |
|---|--|
| NC Manager software for NC modules NC154 and NC157 is not supported by the CP360. That means, these NC modules do not function with the CP360. The NC150 can be used in applications with direct IO access when the NC Manager is not used. | Direct control of ACOPOS via the CAN interface or ETHERNET Powerlink with the new NC Manager software. |
| The RIO Master EX150 is not supported by the CP360. | CAN IO, ETHERNET Powerlink |
| The PROFIBUS FMS module NW150 is not supported. | CAN IO, ETHERNET Powerlink |
| The IF050 communication module is not supported. | IF060 |
| The IF681 interface module is not supported. | ETHERNET Onboard Interface |

Table 61: CP360 limitations

5.3.5 Status LEDs

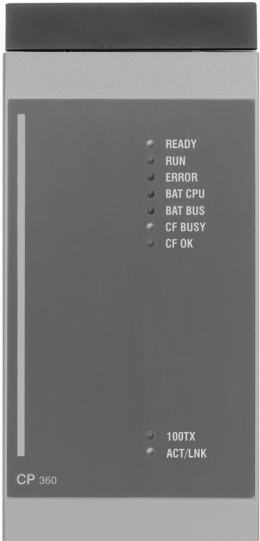
| Image | LED | Description |
|--|---------|----------------------------------|
|  | READY | CPU is active |
| | RUN | Application running |
| | ERROR | SERVICE mode |
| | BAT CPU | CPU battery empty or not present |
| | BAT BUS | Bus battery empty or not present |
| | CF BUSY | Compact Flash BUSY |
| | CF OK | Compact Flash OK |
| | 100TX | 10/100 MBaud ETHERNET |
| | ACT/LNK | ETHERNET Activity/Link |
| | | |

Table 62: CP360 status LEDs

5.3.6 Operational and Connection Elements

The operational elements, display elements, an insert slot for an aPCI interface module, the slot for the program memory, the battery compartment and the connection plug for the RS232 interface are all found behind the module door. The RJ45 socket for the ETHERNET interface is on the bottom of the module.

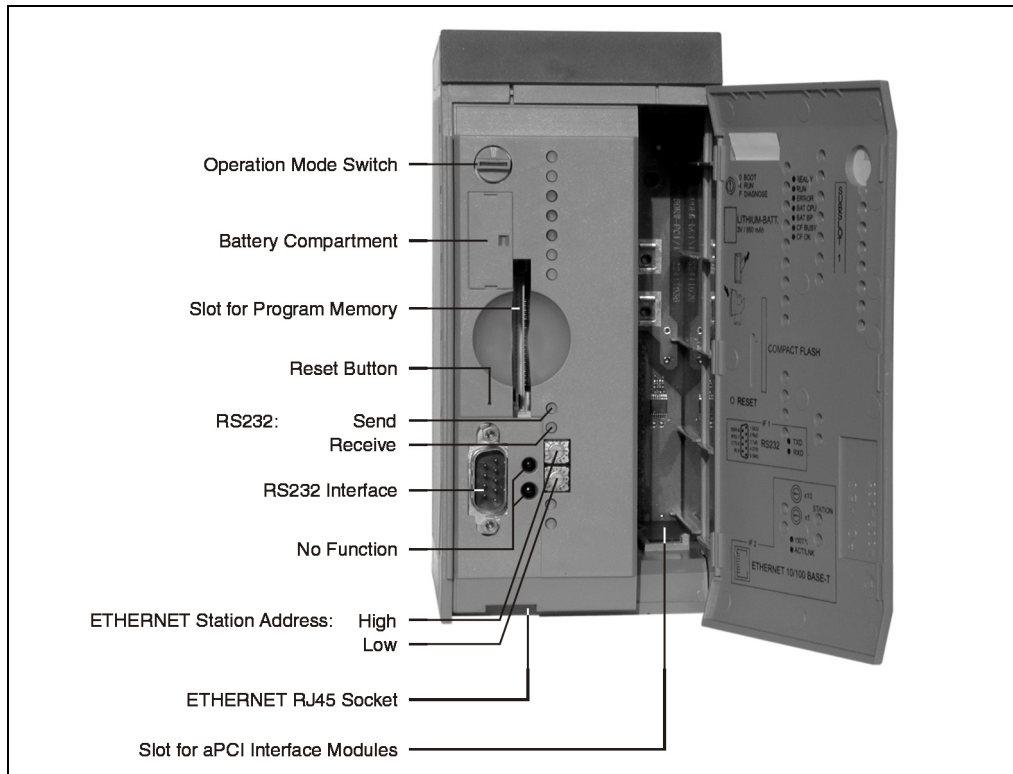


Figure 56: CP360 operational and connection elements

5.3.7 Slot for Program Memory

Program memory is required to operate the CP360. The program memory is Compact Flash. It is not included with the delivery of the CPU, instead it must be ordered as an accessory.

5.3.8 Reset Button

The reset button can be pressed with any small pointed object (e. g. paper clip). The reset button is protected by the module door. Pressing the reset button triggers a hardware reset, that means:

- All application programs are stopped
- All outputs are set to zero

The PLC then goes into SERVICE mode.

5.3.9 Operating Mode Switch

The CP360 is equipped with a hex switch, which is used as an operating mode switch.

| Switch Position | Operating Mode | Description |
|-----------------|----------------|--|
| \$0 | Boot | In this switch position the default B&R Automation Runtime™ (AR) is started, and the runtime system can be installed using the online interface (B&R Automation Studio™). User Flash is deleted after the download begins. |
| \$4 | Run | RUN Mode |
| \$F | Diagnosis | The CPU boots in diagnosis mode. The program sections in User RAM and User FlashPROM are not initialized. After diagnosis mode, the CPU always boots with a warm restart . |

Table 63: CP360 operating modes

5.3.10 RS232 Interface (IF1)

The RS232 interface is not electrically isolated. It can be used as an online interface for communicating with the programming device.

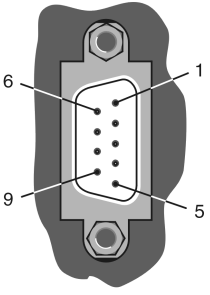
| Interface | Description | Pin Assignments | |
|---|--|-----------------|------------------------------|
| PG interface RS232  9 pin DSUB plug | The RS232 interface operates as an online interface. Online connection to the PG is achieved using a standard RS232 cable that is available from B&R: Product ID RS232 Cable Model No. 0G0001.00-090 Max. baud rate: 115.2 kBaud Max. cable length: 15 m | RS232 | |
| | | 1 | DCD Data Carrier Detect |
| | | 2 | RXD Receive Signal |
| | | 3 | TXD Transmit Signal |
| | | 4 | DTR Data Terminal Ready |
| | | 5 | GND Ground |
| | | 6 | DSR Data Set Ready |
| | | 7 | RTS Request To Send |
| | | 8 | CTS Clear To Send |
| | | 9 | RI Ring Indicator |

Table 64: CP360 RS232 interface (IF1)

5.3.11 ETHERNET Interface (IF2):

IF2 is an ETHERNET interface. The connection is made using a 10/100 BASE-T Twisted Pair RJ45 socket on the bottom of the module.

The INA2000 station number for the ETHERNET interface is set with both hex switches.



The onboard ETHERNET interface is not suitable for ETHERNET Powerlink.

5.3.12 Insert Slot

The CP360 CPU is equipped with an insert slot for aPCI interface modules.

The B&R SYSTEM 2005 can be connected to various bus or network systems using plug-in interface modules.

The following aPCI interface modules can be operated in the CP360 :

| Module | Description |
|----------|---|
| 3IF772.9 | aPCI interface module with one RS232 interface and two CAN interfaces |

Table 65: CP360 aPCI interface module inserts

5.3.13 Data/Realtime Buffering

The following areas are buffered:

- Remanent Variables
- User RAM
- System RAM
- Real-time Clock

Buffering is achieved using a lithium battery in the following order:

- 1) CPU Battery: The battery is in the CP360
- 2) Bus Battery: The backup battery is either in the B&R 2005 rack or in the AC240 battery module

Battery Monitoring

The battery voltage is checked cyclically. The cyclic load test of the battery does not considerably shorten the battery life, instead it gives an early warning of weakened buffer capacity.

The status information, "Battery OK" is available from the system library function "BatteryInfo".

Battery Changing Intervals

| Battery | Change Interval |
|-------------|--|
| CPU Battery | The battery should be changed every 4 years. The change interval refers to the average life span and operating conditions and are recommended by B&R. This does not correspond to the maximum buffer duration. |
| Bus Battery | See section "Backup Battery" in sections 2 "Module Racks" and 17.2 "AC240" (battery module). |

Table 66: CP360 battery changing intervals

5.3.14 Changing the Lithium Battery

The CP360 CPU is equipped with a lithium battery. The lithium battery is placed in a separate compartment and protected by a cover.

Buffer Battery Data

| | |
|---------------------|---|
| Lithium Battery | 3 V / 950 mAh |
| Product ID | 0AC201.9 |
| Short Description | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell |
| Storage Temperature | -20 to +60 °C |
| Storage Time | Max. 3 years at 30 °C |
| Relative Humidity | 0 to 95 % (non condensing) |

Table 67: CP360 buffer battery data

The product design allows the battery to be changed with the PLC switched on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.



Data stored in RAM will be lost if the battery is changed with the PLC switched off!

Procedure for Changing Battery

- 1) Touch the mounting rail or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- 2) Remove the cover from the lithium battery holder using a screwdriver.

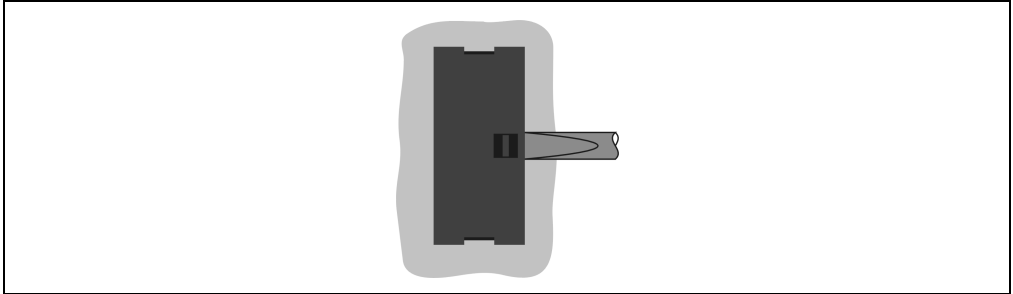


Figure 57: Removing the CP360 cover for the lithium battery

- 3) Remove the battery from the holder by pulling the removal strip (don't use uninsulated tools > - risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.

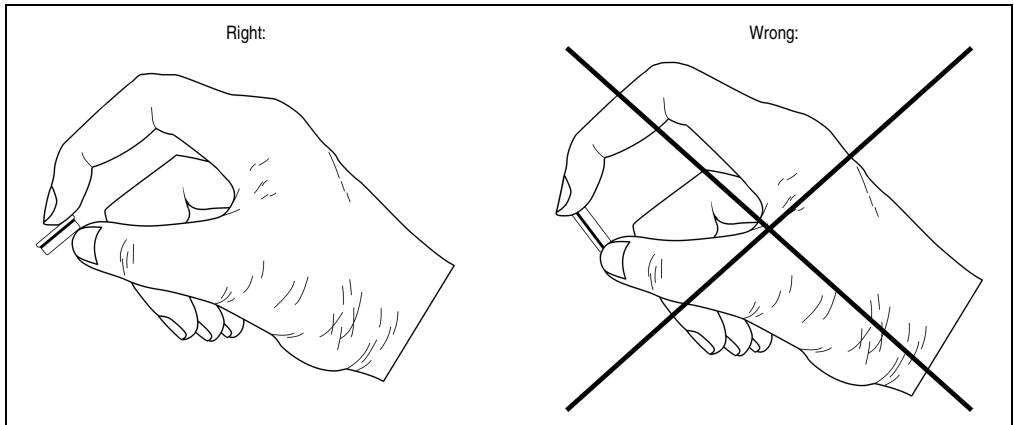


Figure 58: Correct grip for the CP360 battery

- 4) Insert the new battery with correct polarity. The removal strip should be pulled to the right of the battery holder and the "+" side of the battery should be facing left. In order to be able to remove the battery again in future, the removal strip **must** be on the right side of the battery.

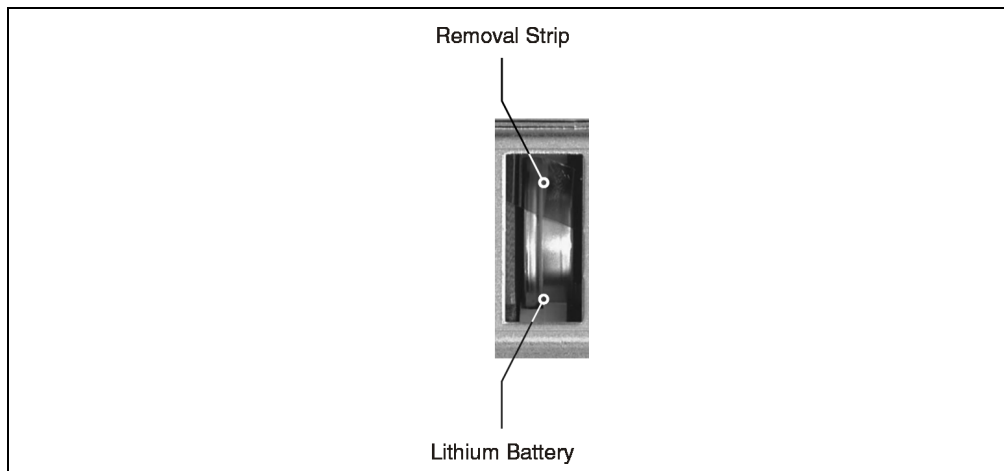


Figure 59: CP360 removal strip must be on the right side of the battery

- 5) Now wrap the end of the removal strip over the top of the battery and insert it underneath the battery so that it does not protrude from the battery holder.
- 6) Replace cover. Insert the lower edge of the cover in the battery holder opening. Press the upper end of the cover home firmly.



Lithium batteries are considered hazardous waste! Used batteries should be disposed of accordingly.

5.3.15 Local I/O Bus Expansion

Since the CP360 does not have its own expansion master, the EX350 I/O master controller is needed for local I/O bus expansion. By using this controller, up to four expansion racks with all I/O modules can be used with the CP360.

The I/O master controller is operated in the expansion slot of a power supply module PS465, PS694, PS754 or PS794. I/O modules on the main rack are handled by the CPU. The EX350 module supports the CPU by processing I/O module data on the expansion racks.

5.3.16 System Flash Programming

General Information

The CP360 is delivered with a default B&R Automation Runtime™ (with limited functions) already installed. This runtime system is started in boot mode (operating mode switch position 0). It initializes and operates the serial RS232 onboard interface, allowing a runtime system download via INA2000 protocol.

This run time system download is carried out during the commissioning of the CP360. The runtime system is stored in the program memory (Compact Flash) of the processor. A runtime system update can be later carried out.

A runtime system download or update is made using the programming system (starting with B&R Automation Studio™ V 2.1).

Runtime System Download

When installing the runtime system (runtime system download) the following procedure must be carried out:

- 1) Turn off power to the PLC.
- 2) A runtime system download is only possible if the processor is in boot mode. To do this, the operating mode switch must be turned to 0.
- 3) Switch on the power supply again.
- 4) Establish online connection between programming device (PC or Industrial PC) and the CPU. A runtime system download is only possible using the serial RS232 onboard interface.
- 5) Start B&R Automation Studio™:
- 6) Start the download procedure by calling the **Services** command from the **Project** menu. Select **Transfer Operating System...** from the menu shown. Follow the instructions from B&R Automation Studio™.
- 7) A dialog box is shown where you can set the CAN baud rate, CAN ID and the CAN node number (the CAN node number set here is only relevant, if an interface module does not contain a CAN node number switch). A unique node number assignment is especially important with online communication via a CAN network (INA2000 protocol).
The runtime system version is already preselected by the user's project settings. Pressing **< Back** opens a dialog box which allows you to change the runtime system version. With **Next >** you can return to the dialog box used to define the CAN parameters.
- 8) The download procedure is started by pressing **Next >**. The progress is shown in a message window.

- 9) The operating mode switch must be turned to 4 when the download procedure is completed.
- 10) Turn PLC off and then on again.
- 11) The PLC is now ready for use.

Runtime System Update

When updating the runtime system (online runtime system update) the following procedure must be carried out:

- 1) An online runtime system update is only possible, if the processor is in RUN mode. To do this, the operating mode switch must be turned to 4.
- 2) Switch on the supply voltage.
- 3) Establish online connection (online cable) between programming device (PC or Industrial PC) and the CP360. An online runtime system update is only possible using the CPU interfaces.
- 4) Start B&R Automation Studio™:
- 5) Start the update procedure by calling the **Services** command from the **Project** menu. Select **Transfer Operating System...** from the menu shown. Follow the instructions from B&R Automation Studio™.
- 6) A dialog box is shown where you can set the CAN baud rate, CAN ID and the CAN node number (the CAN node number set here is only relevant, if an interface module does not contain a CAN node number switch). A unique node number assignment is especially important with online communication via a CAN network (INA2000 protocol). The runtime system version is already preselected by the user's project settings. Pressing **< Back** opens a dialog box which allows you to change the runtime system version. With **Next >** you can return to the dialog box used to define the CAN parameters.
- 7) The update procedure is started by pressing **Next >**. The update progress is shown in a message window.
- 8) When the update procedure is complete, the online connection is automatically established again.
- 9) The PLC is now ready for use.

An operating system update is not only possible through an online connection, but also through a CAN network, serial network (INA2000 protocol) or an ETHERNET network, depending on the system configuration.