Section 2 Functional Description

Processor Unit - General

PM851 is equivalent to PM856 unless stated otherwise.

PM861A and PM864A are equivalent to PM861 and PM864 respectively, unless stated otherwise.

The processor unit (except PM891) consists of two parts:

- Processor unit,
  PM851/PM851A/PM856/PM856APM860/PM860A/PM861/PM861A/PM864/PM864A/PM865/
  PM866, equipped with power supply and CPU-boards

The PM865 processor unit is prepared for High Integrity applications. When used for non-High Integrity applications, it is equivalent to the PM864 processor unit.

- Base plate, TP830, with a unit termination board.

The PM891 processor unit is a monolithic unit equipped with power supply and CPU-boards, and unit termination.

The CPU board contains the microprocessor and the RAM-memory. The memory holds an executable version of the firmware, the controller system configuration and an application program.

The processor unit also has an optical ModuleBus used for connecting additional clusters of S800 I/O, and a connector housing for a plug-in backup media (Secure Digital card for PM891, and Compact Flash card for other processor units).

PM8xx Unit (Except PM891)

The base plate of PM8xx unit (except PM891) has two RJ45 Ethernet ports (CN1, CN2) for connection to the Control Network, and two RJ45 serial ports (COM3, COM4). One of the serial ports (COM3) is an RS-232C port with modem control signals, whereas the other port (COM4) is isolated and used for the connection of a configuration tool.

Note that a PM851/PM851A is restricted to one Ethernet (CN1) port, thus redundant Ethernet is not available.

Both the electrical ModuleBus and the communication expansion bus (CEX-Bus) connectors are mounted on the base plate. The built-in electrical ModuleBus can be used in single CPU configuration for connecting one cluster of S800 I/O units directly to the base plate (maximum number of units per cluster is 12). However, an additional seven clusters (each comprising up to 12 units) can be added to the optical ModuleBus.

Note that no redundant modules are supported on the built-in electrical ModuleBus.

The CEX-Bus is used for extending the on-board communication ports with communication interface units. It is also possible to use redundant communication interfaces on the CEX-Bus. The CEX-Bus Interconnection unit BC810 is used to increase the availability on the CEX-Bus by dividing it into separate segments.

All base plates are provided with a unique Ethernet address which provides every CPU with a hardware identity. The address can be found on the Ethernet address label attached to the TP830 base plate, as shown in Figure 3 on page 25.

Table 1 shows the differences between PM891 and other PM8xx controllers.

Table 1. PM891 and other PM8xx controllers - Differences

Feature	PM8xx	PM891
CPU	MPC86x Microprocessors running between 48MHz to 133MHz	MPC8270 Microprocessor running at 450 MHz
TP830 Baseplate	Yes	No
Connection to S800 IO units	Electrical Modulebus and Optical Modulebus	Optical Modulebus only
Internal Battery	Yes	No
Redundancy Link	One RCU Link (only applies to PM861, PM864, PM865 and PM866)	RCU Control Link and RCU Data Link
COM3 port	Yes	No
Backup media	Compact Flash	Secure Digital
Replaceable internal fuse	Yes	No

Processor Unit - Redundancy

Processor unit redundancy is available. In this case, the controller contains two processor units, each including memory for system and application software. One unit is acting as primary, the other is backup (hot stand-by). The primary processor unit controls the process. The backup stands by to take over in case of a fault in the primary. The changeover is done bumplessly and in less than 10 ms. During the changeover, the process outputs are frozen.

Section 4 Hardware Components

PM8xx Processor Unit - Single Configuration



This topic does not apply to PM891. See PM891 Processor Unit - Single Configuration on page 58.

The processor unit consists of two parts:

- Processor unit (PM851/PM851A/PM856/PM856A/PM860/PM860A/PM861/PM861A/ PM864/PM864A/PM865/PM866), with CPU and Power Supply boards
- Base plate (TP830), housing the unit termination board

The CPU board contains the microprocessor and RAM memory, a real-time clock, LED indicators, INIT push button, and a CompactFlash interface.

The main function of the power supply board is to generate isolated, short circuit proof +5 V and +3.3 V supplies, for the CPU and I/O units. The board also contains opto-isolated RS-232C drivers / receivers for the service port, together with a back-up battery holder for memory / real time clock, (RTC).

The termination board, housed in the TP830 base plate, is where the majority of the external connections are attached. It is grounded to the DIN rail by means of the metallic components of the housing. The termination board is provided with: screw terminals for power supply (L+, L-); redundant power supply monitoring (supervision signals SA, SB); RJ45 connectors for the control network, serial port and service port; connectors for the electrical ModuleBus and the CEX-Bus. All units on the CEX-Bus and the electrical ModuleBus are powered by the 24 V d.c. connected to the base plate. The CN1 and CN2 ports are used for connection of

Processor Unit - Redundant Configuration

Processor unit redundancy is available. In this case, the controller contains two processor units, each including memory for system and application software. The primary processor unit controls the process. The backup stands by to take over in case of a fault in the primary. The changeover is done bumplessly and in less than 10 ms. During the changeover, the process outputs are frozen.

PM8xx (Except PM891)

The PM861/PM864/PM865/PM866 has an RCU Link Connector for connection of the RCU Link Cable TK851, see Figure 3 on page 25. In a redundant system, the two processor units are linked together with the RCU Link Cable. Both processor units are also connected to the same CEX-Bus, using either the TK850 CEX-Bus extension cable or through BC 810. Any one of the two can control the expansion units, see Figure 19 on page 61.

Table 4. Processor Unit - PM8xx and TP830

Item	Value
CPU	• **PM851/PM851A/PM856/PM856A/PM860/ PM860A/PM861** MPC860 Microprocessor running at 48 MHz. • **PM864/PM865** MPC862 Microprocessor running at 96 MHz. • **PM866** MPC866 Microprocessor running at 133 MHz. • **PM891** MPC8270 Microprocessor running at 450 MHz.
Memory	• **PM851/PM856/PM860** 2 MBytes flash PROM (firmware storage). 8 MBytes SDRAM • **PM851A** 2 MBytes flash PROM (firmware storage). 12 MBytes SDRAM • **PM856A/PM860A** 2 MBytes flash PROM (firmware storage). 16 MBytes SDRAM • **PM861** 2 MBytes flash PROM (firmware storage). 16 MBytes SDRAM • **PM864** 2 MBytes flash PROM (firmware storage). 32 MBytes SDRAM

Table 4. Processor Unit - PM8xx and TP830 (Continued)

Item	Value
Memory *(Continued)*	• **PM865** 4 MBytes flash PROM (firmware storage). 32 MBytes SDRAM • **PM866** 4 MBytes flash PROM (firmware storage). 64 MBytes SDRAM • **PM891** 16 MBytes flash PROM (firmware storage) 256 MBytes of DDR2 SDRAM with integrity check
Internal Battery	Lithium Battery 3.6 V, 950 mAh. Battery memory back up time is: • **PM851/PM856/PM860** a minimum of 48 hours. • **PM851A/PM856A/PM860A** a minimum of two weeks. • **PM861/PM864** a minimum of 36 hours. • **PM861A** a minimum of 118 hours. • **PM864A/PM865** a minimum of 235 hours. • **PM866** a minimum of 158 hours.

Table 4. Processor Unit - PM8xx and TP830 (Continued)

Item	Value
Protective Rating	IP20 according to EN60529, IEC 529.
Port CN1, CN2 Connector: RJ45 (Only CN1 for PM851/PM851A)	Ethernet Communication: Communication speed, 10 Mbit/s (half duplex) Signal levels, IEEE802.3, 10 Base T **PM891**: CN1 + CN2 (built in,10/100Mbit/s), Ethernet ports (IEEE 802.3u, 10 Base-T/100Base-Tx).
Port COM3 Connector: RJ45	COM3, Serial Communication: Communication speed selectable in steps from 75 to 19200 baud. 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 9600, 19200 baud. Signal levels, RS-232C Full modem support **Protocol specific restrictions apply.** **PM891 does not have a COM3 port.**
Port COM4 Connector: RJ45	COM4, Serial Communication to Control Builder Communication speed 9600 baud Signal levels, RS-232C
Electrical ModuleBus	I/O capacity 1 S800 I/O base cluster with up to 12 S800 I/O-units with a total of up to 192 S800 I/O-signals. **PM891 does not have an electrical ModuleBus**

Table 4. Processor Unit - PM8xx and TP830 (Continued)

Item	Value
Optical ModuleBus	I/O capacity 7 S800 I/O clusters each with 12 units totaling up to 1344 I/O-signals. (One S800 I/O cluster for PM851/PM851A) **PM891**: Max of 7 S800 I/O clusters with twelve non-redundant or six redundant modules (i.e. 7x12 = 84 modules). Redundant and non-redundant modules can be mixed.
CEX-Bus	Max. 12 communication interfaces, in any configuration, can be connected. (Max. one CEX module for PM851/PM851A)
Supply Current and Fuses for Buses	**ModuleBus** Maximum supply current 1 A.@ 24 V Fuse 2 A (fast). Maximum supply current 1.5 A @ 5 V **CEX-Bus** Maximum supply current 2.4 A.@ 24 V Fuse 3.15 A (fast). See Figure 53 on page 129
Redundant Power Supply Status	Inputs designated SA, SB Max input voltage 30 V d.c. Min. input voltage for high level 15 V d.c. Max input voltage for low level 8 V d.c.
Supply Requirements	Supply voltage (L+, L-), 24 V d.c. Allowed variation, 19.2 - 30 V d.c.

Table 4. Processor Unit - PM8xx and TP830 (Continued)

Item	Value
Current Consumption 24V (excl. ModuleBus and CEX-Bus).	• **PM851/PM851A/PM856/PM856A/PM860/ PM860A** typical 180 mA. • **PM861** typical 250 mA. • **PM864/PM865** typical 287 mA. • **PM866** typical 210 mA. • **PM891** typical 660 mA.