# Freelance 800F
## AC 800F
### Data Sheet

**Control$^{IT}$ is the evolution of control systems into Industrial$^{IT}$:**

Hardware and software components seamlessly integrate process-oriented information into true open applications, improving process control using worldwide-accepted industry standards. Scalable and platform independent products show the evolution path into the IT environment by enhancing your installation.

## Description

AC 800F opens up the flexibility of Fieldbus technology to the user. The AC 800F collects and processes diagnostic and process data from four Fieldbus lines, which may be of different types. It does this in addition to the tasks of a “conventional” process station.

The AC 800F is available in two versions:

- 4 MB static RAM, 4 MB EPROM
- 16 MB synchronous dynamic RAM, 8 MB EPROM

Up to 4 (different) fieldbus modules can be plugged into the AC 800F. The communication with other controllers runs via Ethernet.

The AC 800F optionally provides several levels of redundancy:

- device redundancy with 2 AC 800F
- power supply redundancy (24 V DC)
- Ethernet communication redundancy (standard)
- Cable redundancy for Profibus DP, requires external equipment (RLM01)

The data protection is made via battery back-up by Ethernet or battery modules with appropriate functionality.

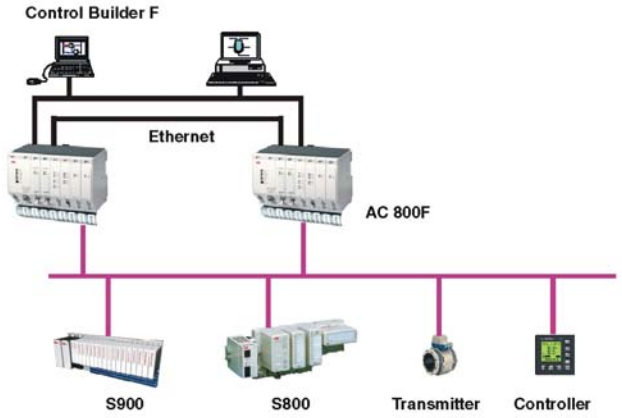
## Features

- Process Station with integrated fieldbus capability
- 4 high-speed fieldbus lines
- Supports different fieldbus types, even simultaneously:
  PROFIBUS-DP, up to 12 MBd
  Modbus
  CAN
  Foundation Fieldbus H1 (with LD800 HSE)
- Easy engineering:
  fully integrated in Control Builder F
- One unified database for field devices shared by the control level and the Human System Interface (HSI)
- Module recognition with factory and operational parameters
- Comprehensive diagnostics for proactive maintenance
- Compact, rugged design
- Front panel connectors
- DIN Rail (C-rail) or wall mounting for easy installation
- Ambient temperature 0-60 °C (32-140 °F) with temperature monitoring
- EMC certification according to EN50082
- Certification:
  CE, NAMUR, CSA, UL, EN61000-6-2.

June 2006

### AC 800F Controller Redundancy

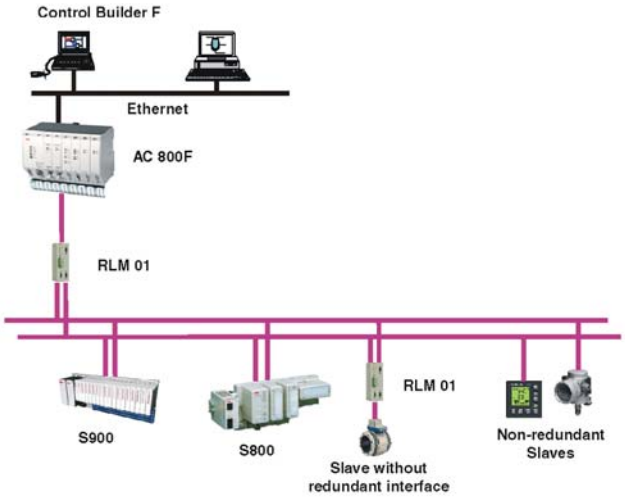
Controller redundancy can be achieved by installing two AC 800F. To ensure quick and smooth takeover by the secondary AC 800F in case the primary AC 800F fails, a dedicated redundancy communications link through the second Ethernet module makes sure that both AC 800F are always synchronized. All inputs and outputs are designed to support redundant operation.




### Profibus Line Redundancy

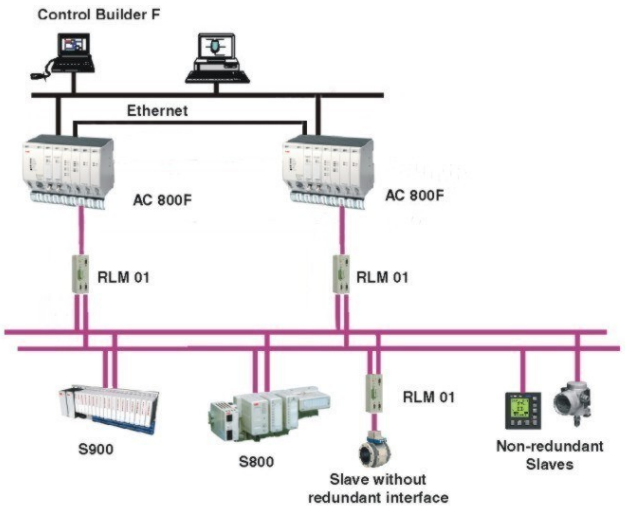
Using the Redundancy Link Module RLM 01 will do the conversion of one simple, non-redundant Profibus line into two reciprocally redundant lines.
You can position the Redundancy Link Module RLM 01 directly after a Profibus module (master), before a bus segment with several slaves or before an individual slave. PROFIBUS stations with redundant couplers can be directly connected to the PROFIBUS set redundant by RLM 01. Stations with only one interface can be optionally assigned to the one or other line.
For technical description dates of the Redundancy Link Module RLM 01 see document 3BDD011600R0201.

An alternative solution to the Profibus line redundancy is to use a Fiber Optic Ring, for example with the OZD Profi 12M module from firm Hirschmann




### AC800F Redundancy together with Profibus Line Redundancy

You can achieve both; controller redundancy and Profibus line redundancy by using two AC 800F with one RLM01 each. This topology combines the advantages of controller redundancy with the one of line redundancy as described in the above paragraphs.



## Compatibility

The table describes the correlation between the software versions and the AC 800F modules in consideration of the basic units PM 803F (16 MB) / PM 802F (4 MB) and the functionality of the established modules.

| | | | | | |
|---|---|---|---|---|---|
| Hardeware | | | PM 802F | PM 803F | |
| Software Control Builder F | | | V6.1, 6.2 | V7.1, 7.2, 8.1 | |
| Established modules | SA 801F | 115/230 V AC | yes | yes | max. 3 Profibus modules FI 830F are supported |
| | SD 802F | 24 V DC | yes | yes | max. 3 Profibus modules FI 830F are supported |
| | EI 801F | 10Base2 | yes | yes | yes, without battery buffering |
| | EI 802F | AUI | yes | yes | yes, without battery buffering |
| | EI 803F | 10BaseT | yes | yes | yes, without battery buffering |
| | FI 810F | CAN-3 | yes | yes | yes |
| | FI 820F | Serial | yes | yes | yes |
| | FI 830F | Profibus | yes | yes | yes |
| | AM 801F | Battery Backup | yes | yes | no |
| New modules | SA 811F | 115/230 V AC | no | yes | yes |
| | SD 812F | 24 V DC | no | yes | yes |
| | EI 811F | 10Base2 | no | yes | yes * |
| | EI 812F | AUI | no | yes | yes * |
| | EI 813F | 10BaseT | no | yes | yes * |
| | FI 840F | FF/HSE | no | yes | yes |
| | AM 811F | Battery Backup | no | yes | yes * |

*) Battery buffering only with EI/AM HW-Index ≥ 2.00 and PM 803F Step2 (3BDH000530R1)

# Basic Unit PM 802F /PM 803F

## Features

- ☐ Super Scalar RISC microprocessor (up to 150 MIPS)
- ☐ 16 K internal CPU cache RAM
- ☐ RAM memory with error detection and correction
  PM 802F: 4 MB static
  PM 803F: 16 MB synchronous dynamic
- ☐ Flash-EPROM
  PM 802F: 4 MB, 32-bit words
  PM 803F: 8 MB, 32- bit words
- ☐ EEPROM, serial, 16 Kbit
- ☐ Monitoring of the temperature inside the device
- ☐ Watchdog
- ☐ 4 slots for fieldbus modules
- ☐ 2 slots for Ethernet communications modules, 32-bit data bus, 100 MBytes/s
- ☐ Battery backup incl. battery watchdog

## Description

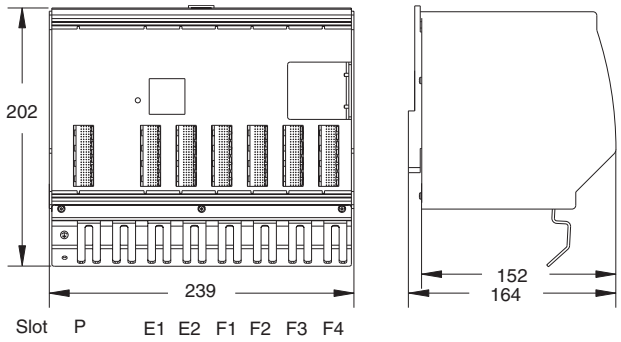
The basic unit, PM 802F and respectively PM803F, cyclically scans signals from the fieldbus sensors via the corresponding fieldbus modules, processes these signals according the application programs installed by the user and sends appropriate signals to the fieldbus actuators via the fieldbus modules.

Controller redundancy can be achieved by installing two AC 800F. To ensure quick and smooth takeover by the secondary AC 800F in case the primary AC 800F fails, a dedicated redundancy communications link through the second Ethernet module makes sure that both AC 800F are always synchronized. All inputs and outputs are designed to support redundant operation.

Data communication between AC 800F, process and operator stations runs over the Ethernet system bus on the first Ethernet module. Data exchange with the engineering station is also carried via the system bus. Engineering station communications can involve new or updated configuration files being downloaded to the process stations, or information about the connected modules being reported back. When fieldbus modules are installed or exchanged, the required configuration information is automatically updated.

Configuration and real-time process data is stored in RAM. To safeguard this data in case of power loss, the RAM power is backed up with batteries located either on the Ethernet modules or on battery modules.

The PM 803F has more memory than the PM 802F and is therefor capable to handle larger projects. Due to increased memory size and different technology the buffering times were reduced.




## Technical Data

| | |
|---|---|
| CPU | Intel 80960HT25/75<br>32-bit RISC Super Scalar processor<br>up to 150 MIPS |
| RAM | PM802F:<br>4 MB static read/write memory<br>battery back up<br><br>PM 803F<br>16 Mbytes synchronous dynamic<br>read/write memory, battery back up |
| I/O scan cycle time | Selectable by configuration. Depends on the capabilities of the fieldbus module |
| Processing time for 1000 instructions | < 1.0 ms for binary and 16 bit arithmetic instructions<br>< 2 ms for fixed point arithmetic instructions<br>< 1.5 ms for 32 bit arithmetic instructions |

Power consumption:

| | | |
|---|---|---|
| Basic unit only: | PM 802F | PM 803F |
| | max. 6.3 W | max. 7.8 W |
| | depending on CPU usage and cycle time | |

| | | |
|---|---|---|
| Power supply | PM 802F | PM 803F |
| 115 - 230 V AC | SA 801F | SA 811F |
| 2 x 24 V DC | SD 802F | SD 812F |

| | |
|---|---|
| Max. power output | see power supply modules |
| Weight | 1.6 kg<br>max. 5 kg (fully assembled) |
| Dimensions | Width 239 mm, 9.4 inches<br>Height 202 mm, 8 inches<br>Depth 164 mm, 6.5 inches |

### Features

- ☐ Input voltage 115 - 230 VAC (self adjusting), output is electrically isolated
- ☐ Power supply outputs provide:
  SA 801 F: 5 V DC / 5 A and 3.3 V DC / 5 A
  SA 811 F: 5 V DC / 5.5 A and 3.3 V DC / 6.5 A
- ☐ Enhanced power-fail prediction and shutdown procedures
- ☐ LED indication for power supply status and operating status of the AC 800F
- ☐ Short circuit proof, current limited
- ☐ 20 ms backup energy for use in the event of primary power failure, according to NAMUR

### Description

The AC 800F modules are supplied with 5 V DC / 5 A and 3.3 V DC / 5 A auxiliary power by the SA 801F or 5 V DC / 5.5 A and 3.3 V DC / 6.5 A by the SA 811F power supply. The power supply has open-circuit, overload and sustained short-circuit protection. The electronically controlled output voltage provides high stability and low residual ripple.

In case of power loss ≥5 ms, the power supply module generates a power-fail signal. This signal is used by the CPU module to shut down operations and enter to a safe state. This is required for a controlled restart of the system and the user application when power is restored. The output voltage remains within its tolerance limits for at least another 15 ms. Altogether a mains voltage drop of 20 ms will be managed.


Fig. SA 801F

### LED Displays

Power

| | |
|---|---|
| Green | Internal supply voltage is available |

Failure

| | |
|---|---|
| Off | Normal status |
| Orange | Self test |
| Flashing orange | Overtemperature occurred during operation |
| Red | Hardware failure of the basic unit |
| Flashing red | Software failure of the system |

Run/Stop

| | |
|---|---|
| Green | Processing active |
| Flashing green | Process was stopped and is now started again |
| Red | Processing inactive |
| Flashing red | Process was active and is stopped now |
| Orange | Self test |
| Off | Software initialization |

| | |
|---|---|
| Prim/Sec | In case of redundancy please see the LED's meaning in manual "Mounting and Installation Instruction". For not redundancy the states are: |
| Orange | Self test |
| Off | Normal status |

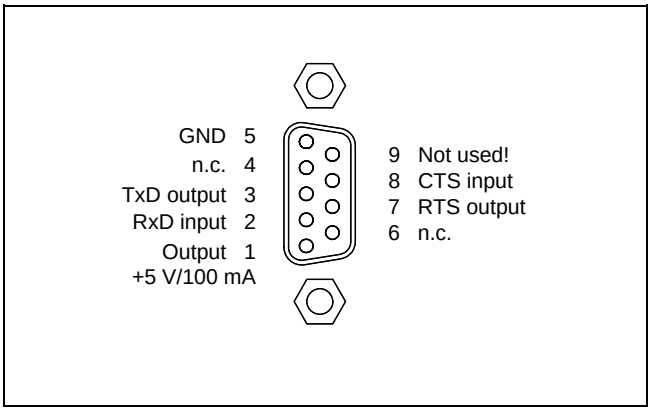
### Operator Controls

| | |
|---|---|
| Run/Stop switch | Connected to LED |
| Toggle Prim/Sec | For redundancy. Toggles between primary and secondary AC 800F (operational on primary AC 800F only, and only if a secondary AC 800F is available) |
| Reset | Reset button press and hold > 4 s for coldstart |

### Front Panel Connections

Power supply
One connector for 115 - 230 VAC input

| | |
|---|---|
| Diag | For diagnostics and optional radio-controlled clock 9-pin male connector |




Pin-assignment diagnostic interface DIAG on SA 801F, SA 811F

**Technical Data SA 801F**

| | |
|---|---|
| Input voltage | Alternating current 115 - 230 VAC<br>Permissible range 90 - 260 V AC<br>Frequency: 50 - 60 Hz (47 - 63 Hz) |
| Input current at nominal load | 230 V AC: 210 mA<br>115 V AC: 411 mA |
| Rated input power | 48 VA |
| Backup energy for the event of power failure | > 20 ms |
| Fuse | Subminiature fuse 2.5 AT, soldered |
| Output voltage | 3.3 V DC (± 3%) typical<br>5 V DC (± 3%) typical |
| Output current | 0.5 - 5 A to 3.3V and 5.0 V |
| Current limit | approx. 6 A<br>Automatic return to normal operation after short circuit |
| Total output power | max. 26.5 W |
| Weight | 0.460 kg |

**Technical Data SA 811F**

| | |
|---|---|
| Input voltage | Alternating current 115 - 230 VAC<br>Permissible range 90 - 260 V AC<br>Frequency: 50 - 60 Hz (47 - 63 Hz) |
| Input current at nominal load | 230 V AC: 275 mA<br>115 V AC: 541 mA |
| Rated input power | 63 VA |
| Backup energy for the event of power failure | > 20 ms |
| Fuse | Subminiature fuse 2.5 AT, soldered |
| Output voltage | 3.3 V DC (± 3%) typical<br>5 V DC (± 3%) typical |
| Output current | 0.5 - 6.5 A to 3.3 V<br>0.5 - 5.5 A to 5.0 V |
| Current limit | approx. 7.5 A<br>Automatic return to normal operation after short circuit |
| Total output power | max. 35 W |
| Weight | 0.460 kg |

### Features

- ☐ Redundant input voltage 24 V DC, provides operation in accordance with NAMUR
- ☐ Power supply outputs provide:
  SD 802F: 5 V DC / 5 A and 3.3 V DC / 5 A
  SD 812F: 5 V DC / 5.5 A and 3.3 V DC / 6.5 A
- ☐ Enhanced power-fail prediction and shutdown procedures
- ☐ LED indication for power supply status and operating status of the AC 800F
- ☐ Short circuit proof, current limited
- ☐ 20 ms backup energy for use in the event of primary power failure, according to NAMUR

### Description

The AC 800F modules are supplied with 5 V DC / 5 A and 3.3 V DC / 5 A auxiliary power by the SD 802F power supply module, resp. with 5 V DC / 5.5 A and 3.3 V DC / 6.5 A by the SD 812F. The power supply has open-circuit, overload and sustained short-circuit protection. The electronically controlled output voltage provides high stability and low residual ripple.

In case of power loss ≥ 5 ms, the power supply module generates a power-fail signal. This signal is used by the CPU module to shut down operations and enter to a safe state. This is required for a controlled restart of the system and the user application when power is restored. The output voltage remains within its tolerance limits for at least another 15 ms. Altogether an input voltage drop of 20 ms will be managed.

### LED Displays

| | |
|---|---|
| Power | |
| Green | Internal supply voltage is available |
| Failure | |
| Off | Normal status |
| Orange | Self test |
| Flashing orange | Overtemperature occurred during operation |
| Red | Hardware failure of the basic unit |
| Flashing red | Software failure of the system |
| Run/Stop | |
| Green | Processing active |
| Flashing green | Process was stopped and is now started again |
| Red | Processing inactive |
| Flashing red | Process was active and is stopped now |
| Orange | Self test |
| Off | Software initialization |
| Prim/Sec | In case of redundancy please see the LED's meaning in manual "Mounting and Installation Instruction".<br>For not redundancy the states are: |
| Orange | Self test |
| Off | Normal status |

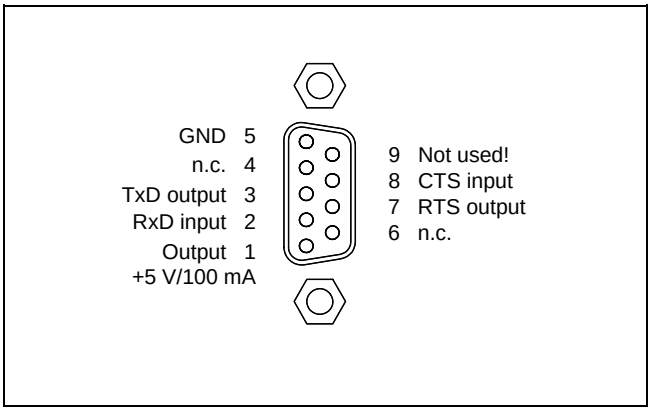

Fig. SD 802F

### Operator Controls

| | |
|---|---|
| Run/Stop switch | Connected to LED |
| Toggle Prim/Sec | For redundancy.<br>Toggles between primary and secondary AC 800F (operational on primary AC 800F only, and only if a secondary AC 800F is available) |
| Reset | Reset button<br>press and hold > 4 s for coldstart |

### Front Panel Connections

| | |
|---|---|
| Power supply | Two connectors for 24 V DC, automatic input selection when used with single power supply |
| Diag | For diagnostics and optional radio-controlled clock<br>9-pin male connector |




Pin-assignment diagnostic interface DIAG on SD 802F, SD 812F

## Power Supply SD 802F / SD 812F

### Technical Data SD 802F

| | |
|---|---|
| Input voltage | 2 x direct current 24 V DC<br>permissible range 19.2 - 32.5 V DC |
| Input current at nominal load | 1.3 A at 24 V DC |
| Rated input power | 31 W |
| Backup energy for the event of power failure | > 20 ms |
| Fuse | For each supply: subminiature fuse 3.15 AT, soldered |
| Output voltage | 3.3 V DC (± 3%) typical<br>5 V DC (± 3%) typical |
| Output current | 0.5 - 5 A |
| Current limit | approx. 6 A<br>Automatic return to normal operation after short circuit |
| Total output power | max. 26.5 W |
| Weight | 0.460 kg |

### Technical Data SD 812F

| | |
|---|---|
| Input voltage | 2 x direct current 24 V DC<br>permissible range 19.2 - 32.5 V DC |
| Input current at nominal load | 1.7 A at 24 V DC |
| Rated input power | 41 W |
| Backup energy for the event of power failure | > 20 ms |
| Fuse | For each supply: subminiature fuse 3.15 AT, soldered |
| Output voltage | 3.3 V DC (± 3%) typical<br>5 V DC (± 3%) typical |
| Output current | 0.5 - 6.5 A to 3.3 V<br>0.5 - 5.5 A to 5.0 V |
| Current limit | approx. 7.5 A<br>Automatic return to normal operation after short circuit |
| Total output power | max. 35 W |
| Weight | 0.460 kg |

# Ethernet Modules EI 801F

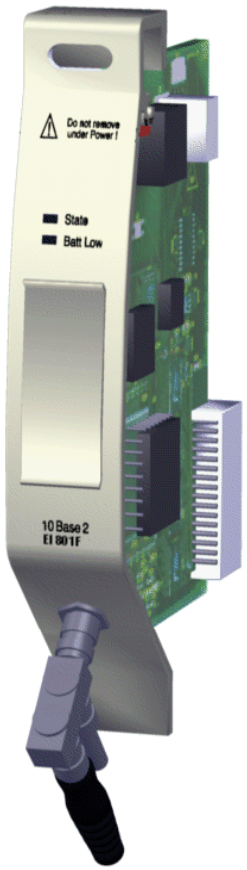
## Features

- ☐ IEEE802.3 Ethernet standard
- ☐ Provides 10Base2 compliant communication
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory

## Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, compliant with 10Base2 (Cheapernet) for thin coax cable installations.




## LED Displays

State

| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either:<br>— module not yet identified (normal for short time during module startup)<br>— error occurred during module test |

Batt. Low

| | |
|---|---|
| Off | Sufficient buffer battery voltage. |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Front Panel Connections

Coax connector

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 2.8 W |
| Thin Ethernet | 10Base2 |

RAM and real-time-clock buffering time

| | PM 802F | PM 803F |
|---|---|---|
| New battery inserted | ≥ 1,5 years | without buffering |
| After “Low” warning | ≥ 10 days | |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |

### Features

- ☐ IEEE802.3 Ethernet standard
- ☐ Provides 10Base5 compliant communication via AUI
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory

### Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, to connect a commercial transceiver with AUI connector (15-pin female plug DIN 41652).

### LED Displays

State

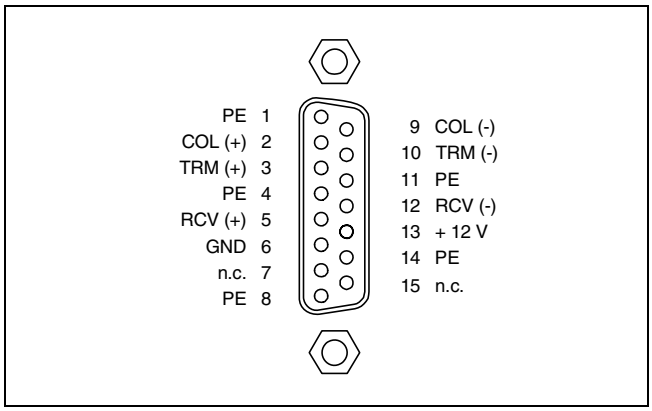
| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either: — normal transitory state after module startup — configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either: — module not yet identified (normal for short time during module startup) — error occurred during module test |

Batt. Low

| | |
|---|---|
| Off | Sufficient buffer battery voltage. |
| Orange | Buffer battery not found or low (insufficient voltage). |

### Front Panel Connections

15-pin SUB-D socket with slide lock for AUI interface




Pin-assignment Ethernet Module EI 802F


### Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 6.2 W (3 W + PIN Transceiver) |
| Full Ethernet | 10Base5 via AUI/10Base5 transceiver and AUI connection |
| Fiber optic cable | 10BaseFL via AUI/FO transceiver and AUI connection |
| Transceiver feeding | |
| Rated voltage | 12 V, ± 5% |
| Current requirement | typ. 250 mA |

RAM and real-time-clock buffering time

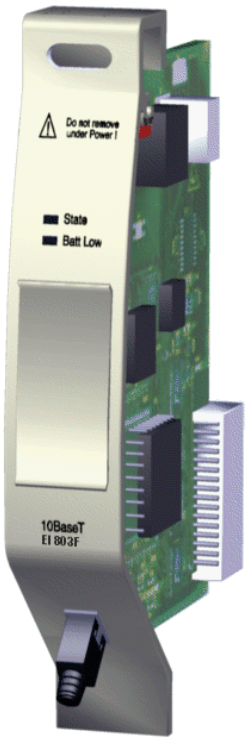
| | PM 802F | PM 803F |
|---|---|---|
| New battery inserted | ≥ 1,5 years | without buffering |
| After “Low” warning | ≥ 10 days | |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |

# Ethernet Module EI 803F

## Features

- ☐ IEEE802.3 Ethernet standard
- ☐ provides 10BaseT compliant communication (10MBit)
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory




## Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, compliant with 10BaseT shielded Twisted Pair (STP, cable category 3, 4 or 5 advanced)

## LED Displays

State

| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either:<br>— module not yet identified (normal for short time during module startup)<br>— error occurred during module test |

Batt. Low

| | |
|---|---|
| Off | Sufficient buffer battery voltage. |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Front Panel Connections

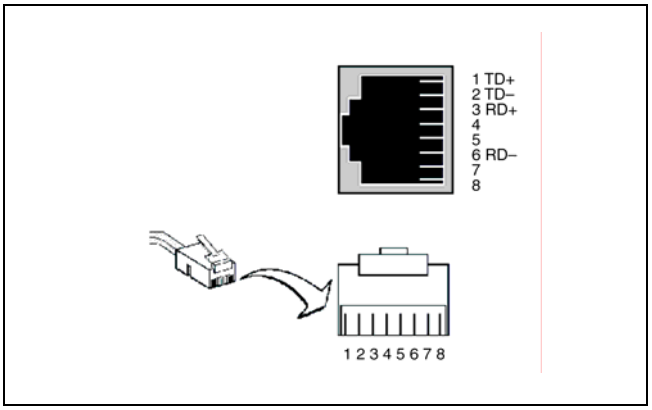
RJ-45 female connector (shielded).There are two integrated LEDs indicating the current communication status. The LEDs are not labeled but can be identified by their color. The upper yellow LED indicates the link state, the lower green LED indicates active communication.

LED 10BaseT link

| | |
|---|---|
| off | No active link. No communication possible. |
| static yellow | Active link. Communication possible. |

LED 10BaseT active

| | |
|---|---|
| off | No communication. |
| flashing green | Active communication. |




Pin-assignment Ethernet module EI 803F

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 1.8 W |
| STP | 10BaseT cable category 3, 4 or 5 advanced |

RAM and real-time-clock buffering time

| | PM 802F | PM 803F |
|---|---|---|
| New battery inserted | ≥ 1,5 years | without buffering |
| After “Low” warning | ≥ 10 days | |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |

# Ethernet Modules EI 811F

## Features

- ☐ IEEE802.3 Ethernet standard
- ☐ Provides 10Base2 compliant communication
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory

## Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, compliant with 10Base2 (Cheapernet) for thin coax cable installations.


## LED Displays

State

| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either:<br>— module not yet identified (normal for short time during module startup)<br>— error occurred during module test |

Battery (PM803F)

| | |
|---|---|
| Off | AC 800F is active, EI 811F not active =>buffering from power supply module<br><br>AC 800F is off (no watchdog of the batteries voltage) =>buffering from battery. |
| Orange | During battery recovery or start-up phase |
| Red | Warning: battery low, no battery inserted, insufficient electrical contact etc. |
| Green | battery inserted and data protection provided. |

Battery (PM802F)

| | |
|---|---|
| Off | Sufficient buffer battery voltage |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Front Panel Connections

Coax connector

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 2.0 W |
| Thin Ethernet | 10Base2 |

RAM and real-time-clock buffering time

| | PM 803F | PM 802F |
|---|---|---|
| New battery inserted | ≥ 10 days | ≥ 1,5 years |
| After “Low” warning | ≥ 5 hours | ≥ 10 days |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |

### Features

- ☐ IEEE802.3 Ethernet standard
- ☐ Provides 10Base5 compliant communication via AUI
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory

### Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, to connect a commercial transceiver with AUI connector (15-pin female plug DIN 41652).

### LED Displays

State

| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on,<br>module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either:<br>— module not yet identified (normal for short time during module startup)<br>— error occurred during module test |

Battery (PM803F)

| | |
|---|---|
| Off | AC 800F is active, EI 812F not active =>buffering from power supply module<br><br>AC 800F is off (no watchdog of the batteries voltage) =>buffering from battery. |
| Orange | During battery recovery or start-up phase |
| Red | Warning: battery low, no battery inserted, insufficient electrical contact etc. |
| Green | battery inserted and data protection provided. |

Battery (PM802F)

| | |
|---|---|
| Off | Sufficient buffer battery voltage |
| Orange | Buffer battery not found or low (insufficient voltage). |

### Front Panel Connections

15-pin SUB-D socket with slide lock for AUI interface

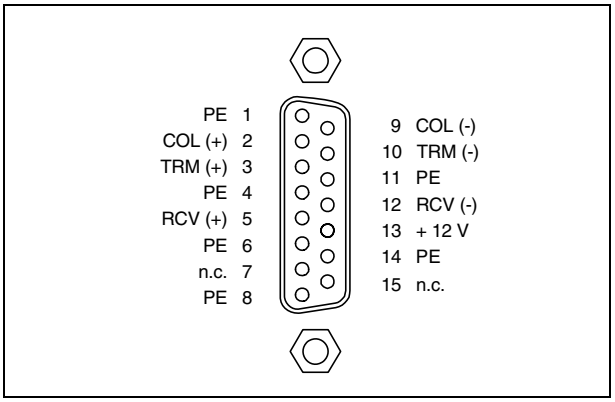

### Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 4.9 W (2.3 W + $P_{IN}$ Transceiver) |
| Full Ethernet | 10Base5 via AUI/10Base5 transceiver and AUI connection |
| Fiber optic cable | 10BaseFL via AUI/FO transceiver and AUI connection |
| Transceiver feeding | |
| Rated voltage | 12 V, ± 5% |
| Current requirement | typ. 250 mA |

RAM and real-time-clock buffering time

| | PM 803F | PM 802F |
|---|---|---|
| New battery inserted | ≥ 10 days | ≥ 1,5 years |
| After “Low” warning | ≥ 5 hours | ≥ 10 days |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |




Pin-assignment Ethernet Module EI 812F

# Ethernet Module EI 813F

## Features

- ☐ IEEE802.3 Ethernet standard
- ☐ provides 10BaseT compliant communication (10MBit)
- ☐ 32-bit data bus
- ☐ Transmission rate 10 MBit/s
- ☐ Direct memory access to main memory, < 4% CPU overhead for operation
- ☐ Optional battery for redundant battery backup of main memory

## Description

These communication modules provide Ethernet communications to the system bus compliant with IEEE802.3 standard.

Communications module, compliant with 10BaseT shielded Twisted Pair (STP, cable category 3, 4 or 5 advanced)


## LED Displays

State

| | |
|---|---|
| Off | No supply voltage, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Orange flashing | Power supply on, module identified; module not connected to proper bus structure. |
| Red | Power supply on and either:<br>— module not yet identified (normal for short time during module startup)<br>— error occurred during module test |

Battery (PM803F)

| | |
|---|---|
| Off | AC 800F is active, EI 813F not active =>buffering from power supply module<br><br>AC 800F is off (no watchdog of the batteries voltage) =>buffering from battery. |
| Orange | During battery recovery or start-up phase |
| Red | Warning: battery low, no battery inserted, insufficient electrical contact etc. |
| Green | battery inserted and data protection provided. |

Battery (PM802F)

| | |
|---|---|
| Off | Sufficient buffer battery voltage |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | max. 1.2 W |
| STP | 10BaseT cable category 3, 4 or 5 advanced |

RAM and real-time-clock buffering time

| | PM 803F | PM 802F |
|---|---|---|
| New battery inserted | ≥ 10 days | ≥ 1,5 years |
| After “Low” warning | ≥ 5 hours | ≥ 10 days |

| | |
|---|---|
| Battery | 3.6 V lithium battery, 950 mAh (not in the delivery) |
| Weight | approx. 0.150 kg (without battery) |

## Front Panel Connections

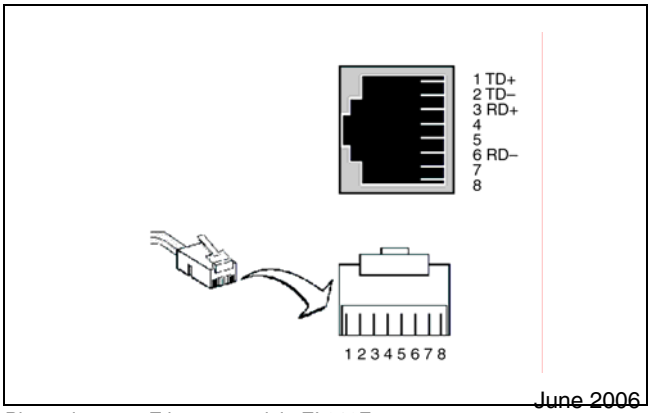
RJ-45 female connector (shielded). There are two integrated LED’s indicating the current communication status. The LEDs are not labeled but can be identified by their color. The upper yellow LED indicates the link state; the lower green LED indicates active communication.

LED 10BaseT link

| | |
|---|---|
| off | No active link. No communication possible. |
| static yellow | Active link. Communication possible. |

LED 10BaseT active

| | |
|---|---|
| off | No communication |
| flashing green | Active communication |




Pin-assignment Ethernet module EI 813F

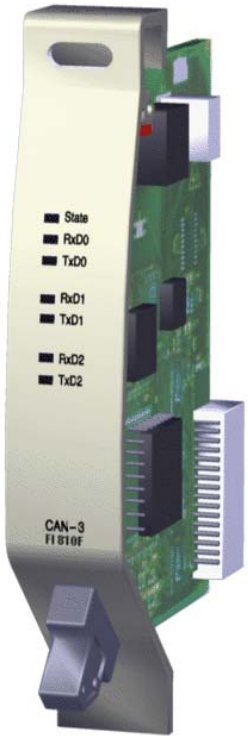
# CAN-3 Module FI 810F

## Features

- ☐ 3-channel CAN modules
- ☐ Transmission rate: up to1 MBd
- ☐ Module can be removed or inserted during operation
- ☐ Redundant operation, with redundant AC 800F

## Description

The FI 810F module provides connectivity to the Freelance 2000 rack I/O. It provides functionality according CAN 2.0 specification and supports baud rates up 1 MBd. All interfaces are electrically isolated and support redundant operation in conjunction with a second AC 800F.
Only one FI 810F module may be connected per AC 800F. The slot of the FI 810F module is preset to F1.




## LED Displays

State

| | |
|---|---|
| Off | No supply power, module is isolated |
| Green | Module is active and working properly |
| Orange | Module has been identified by AC 800F, but has not yet been activated |
| Red | Module powered up, but not yet identified, or an error has occurred |

RxD0

| | |
|---|---|
| Green | Receive data on channel 0 |

TxD0

| | |
|---|---|
| Green | Transmit data on channel 0 |

RxD1

| | |
|---|---|
| Green | Receive data on channel 1 |

TxD1

| | |
|---|---|
| Green | Transmit data on channel 1 |

RxD2

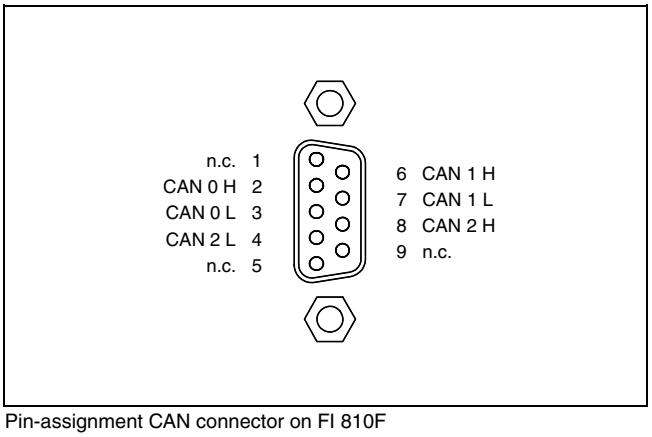
| | |
|---|---|
| Green | Receive data on channel 2 |

TxD2

| | |
|---|---|
| Green | Transmit data on channel 2 |

## Front Panel Connections

| | |
|---|---|
| CAN 3 | 9-pin female connector |




Pin-assignment CAN connector on FI 810F

## Technical Data

| | |
|---|---|
| Rated voltage | 5 V, ± 3% from basic unit |
| Power consumption | 1.6 W - 2.6 W, appending from communication |
| Channel supply: | |
| Raged voltage | 5 V, ± 10% |
| Power consump. per channel | 0.15 W, when idling<br>0.30 W, during communication |
| Weight | approx. 0.145 kg |

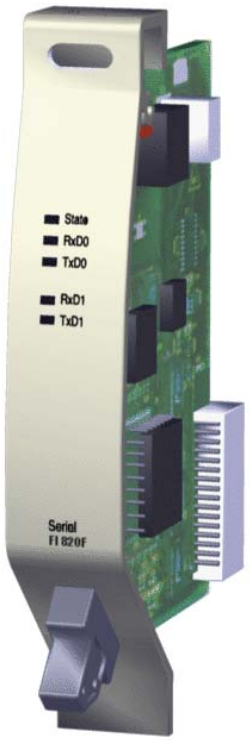
# Serial Module FI 820F

## Features

- ☐ Provides 2 serial interfaces
- ☐ Transmission rates up to 38.4 KBaud configurable
- ☐ Physical interfaces RS485, RS422, RS232 selectable
- ☐ Electrical isolation
- ☐ Module can be removed or inserted during operation
- ☐ Redundant operation, with redundant AC 800F

## Description

The FI 820F module provides connectivity to a variety of serial fieldbuses and serial protocols. Standard protocol is MODBUS By using different connection cables the physical interface can easily be selected: RS485 (half duplex), RS422 (full duplex) or RS232. All interfaces are electrically isolated and support redundant operation in conjunction with a second AC 800F.




## LED Displays

State

| | |
|---|---|
| Off | No supply power, module is isolated |
| Green | Module is active and working properly |
| Orange | Module has been identified by AC 800F, but has not yet been activated |
| Red | Module powered up, but not yet identified, or an error has occurred |

RxD0

| | |
|---|---|
| Green | Receive data on channel 0 |

TxD0

| | |
|---|---|
| Green | Transmit data on channel 0 |

RxD1

| | |
|---|---|
| Green | Receive data on channel 1 |

TxD1

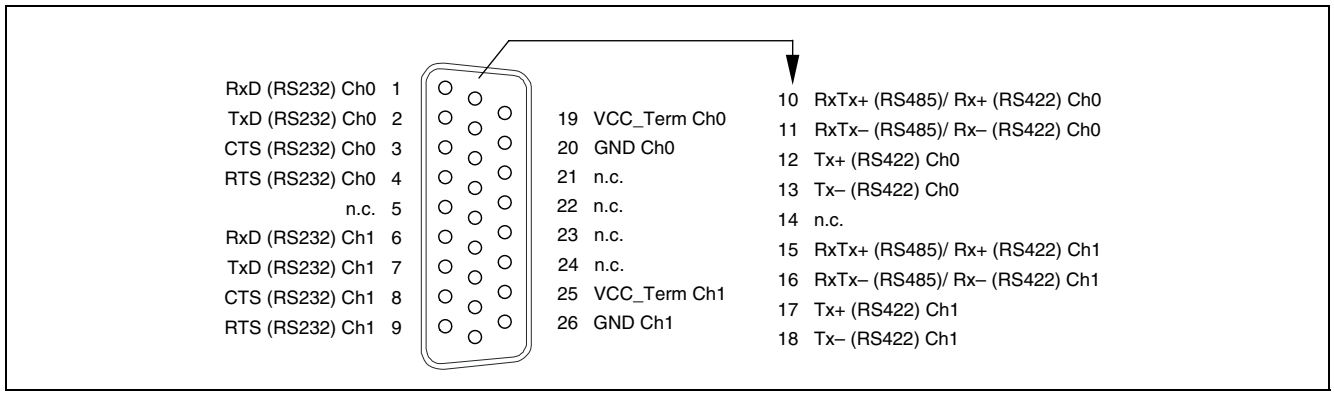
| | |
|---|---|
| Green | Transmit data on channel 1 |

## Technical Data

| | |
|---|---|
| Rated voltage | 5 V, ± 3% from basic unit |
| Power consumption | 1.6 - 2.6 W, appending from communication |
| Channel supply: | |
| Raged voltage | 5 V, ± 10% |
| Power consump. per channel | 0.15 W, when idling<br>0.30 W, during communication |
| Output voltage for termination (Vcc_Term) | |
| Rated voltage | 5 V, ± 10% |
| Max. output current | 20 mA |
| Weight | approx. 0.145 kg |

## Front Panel Connections

Serial 26-pin female connector




Pin assignment serial connector on FI 820F

# Profibus Module FI 830F

## Features

- ☐ PROFIBUS-DP Module (DIN 19245)
- ☐ Transmission rate up 12 MBd
- ☐ supports up to 126 slaves
- ☐ Physical interface: RS485
- ☐ Electrical isolation
- ☐ Shared memory (256 KB) onboard, to minimize the use of basic unit memory.
- ☐ Module can be removed or inserted during operation
- ☐ Redundant operation, with redundant AC 800F


## Description

The FI 830F module interfaces to the Profibus fieldbus. It provides functionality according to the PROFIBUS-DP V1 standard (DIN 19245 amendment 1) and supports baud rates up 12 MBd. The module is the master on the Profibus line and allows connecting up to 126 Profibus slaves. Configuration and parameterization is carried out completely with Control Builder F — no additional external configuration tools are required.

Line redundancy can be achieved using an external device (RLM 01) which drives two Profibus lines in parallel. In conjunction with a second AC 800F the module can also operate in a redundant-master mode without limiting any other feature.

## LED Displays

State

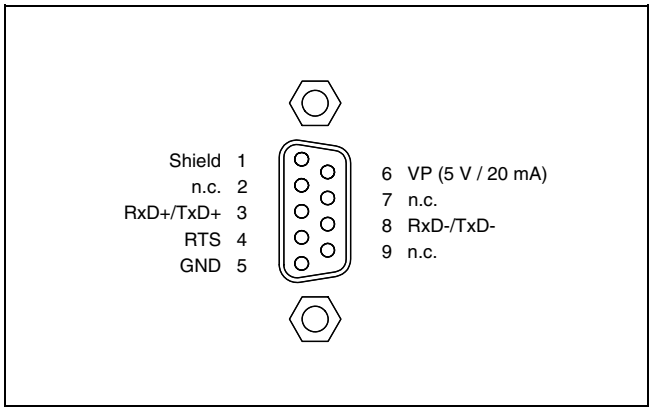
| | |
|---|---|
| Off | No supply power, module is isolated |
| Green | Module is active and working properly |
| Orange | Module has been identified by AC 800F, but has not yet been activated |
| Red | Module powered up, but not yet identified, or an error has occurred |

Busy

| | |
|---|---|
| Off | Module is in passive state on the Profibus. |
| Green | Module has token and, thus, is acting as the master |

## Front Panel Connections

Profibus 9-pin female connector (DIN 41652)




Pin-assignment Profibus connector on FI 830F

## Technical Data

| | |
|---|---|
| Power consumption | In the active state, depends on the communication cycle time: 2.8 W |
| Max. output current | 20 mA for bus termination/repeater supply |
| Output voltage | 5 V, ± 5% |
| Overvoltage protection | +7.5 V / -5 V either transmission line to GND. |
| Weight | approx. 0.150 kg |

### Features

- ☐ ARM-CPU with integrated Ethernet controller, 32-bit data bus, 32-bit address bus
- ☐ Flash EPROM for module CPU and protocol software.
- ☐ Software/firmware update without EPROM exchange.
- ☐ Separate memory for module CPU.
- ☐ Shared memory for data exchange between main processor and module CPU. Data protection by parity check.
- ☐ Automatic detection if 10BaseT or 100BaseTX is connected.
- ☐ Electrical isolation for TP interface
- ☐ ESD protector on RJ45 socket
- ☐ Serial interface/Manchester encoder for generating a serial bit stream
- ☐ EEPROM for configuration data and diagnostic data memory independent from battery buffering.
- ☐ Isolator for electrical isolation of the bus signals
- ☐ RJ45 connector with two link LEDs.

### Description

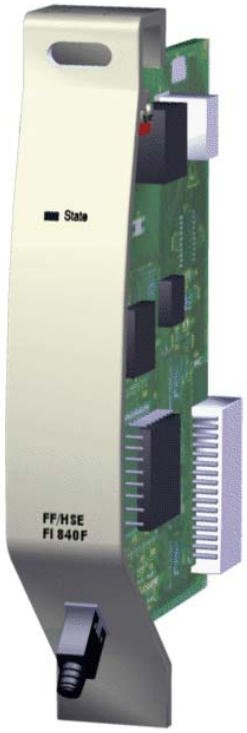
The FI 840F is a high speed ethernet fieldbus module designed for fast data exchange in production engineering with decentralized peripherals.
The FF/HSE module FI 840F is a Fieldbus-Foundation®-(FF)-Master. Using the Control Builder F it is possible to configure diverse Fieldbus Foundation®-devices.

The FF/HSE module FI 840F is designed to connect the AC 800F to a FF/HSE network. It can be mounted on slots F1 ... F4. It is used if high transmission rates are required or shall be made available for future use. FF/HSE wiring is always a point-to-point connection. Therefor a networks with more than two nodes always requires network switches or hubs.

### LED Displays

State

| | |
|---|---|
| off | No voltage applied, module is separated. |
| green | Power on, module is identified and ready for operation according to the configuration |
| orange | Power on,<br>module has been identified by AC 800F,<br>- intermediate state during start-up<br>- configuration mode of the boot loader |
| flashing orange | Power on, module has been identified by AC 800F. Module is not connected to corrected bus physics |
| red | Power on<br>- Module not yet identified (on a short-term basis during start up)<br>- an error has occurred during module test |




### Front Panel Connections

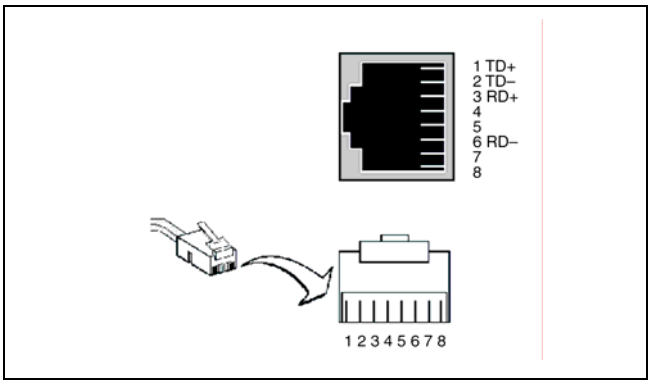
RJ-45 female connector (shielded). There are two integrated LEDs indicating the current communication status. The LEDs are not labeled but can be identified by their color. The upper yellow LED indicates the transmission rate, the lower green LED indicates the communication state.

LED FF/HSE Speed

| | |
|---|---|
| off | Module has detected 10 MBit/s data connection. |
| static yellow | Module has detected 100 MBit/s data connection. |

LED FF/HSE Link

| | |
|---|---|
| off | No active link, neither 10Mbit nor 100 MBit. No communication possible. |
| static green | Active link. Communication possible. No data transfer. |
| flashing green | Active link. Communication possible. |




Pin-assignment FF/HSE module FI 840F

### Technical Data

| | |
|---|---|
| Rated voltage | 5 V ± 3%, 3.3 V ± 3 % and 2.5 V ± 5 % |
| Power consumption in active state | 1.4 W - 2.1 W depending on communications load |
| Module memory | 8 MBytes synchronous dynamic RAM |
| Shared memory | 1 MByte synchronous static RAM used for data exchange between CPU board and module. |
| Firmware memory | 2 MByte Flash EPROM, 32-bit word length, capable of programming in the system and direct programming from AC 800F CPU board |
| EEPROM | Serial 16 kBit EEPROM,<br>write cycles $\geq 10^7$,<br>buffering time $\geq$ 10 years |
| Weight | approx. 0.150 kg |

### Static characteristics

| | |
|---|---|
| Power consumption | max. 2.1 W |
| Medium | 100BaseTx cable, category 5 |
| Max. segment length | 100 m |
| Max. number of nodes per segment | 2 |

### Dynamic characteristics

| | |
|---|---|
| Transmission rate | 10 Mbit/s or 100 Mbit/s |

# Battery Module AM 801F

## Features

- ☐ Provides battery backup for PM802F only
- ☐ Enables redundant battery energy backup on the AC 800F


## Description

The battery module provides for retention of the AC 800F RAM data when the AC 800F is off or has no Ethernet module.
The battery module is used when the AC 800F is used as a stand-alone device, i.e. when it has no Ethernet connection, or when the only existing Ethernet module is to be replaced without the AC 800F loosing its configuration data.

## LED Displays

State

| | |
|---|---|
| Off | No supply power, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Red | Module power supply is on and either:<br>— module not yet identified (normal for short time, during module startup)<br>— error occurred during module test |

Batt Low

| | |
|---|---|
| Off | Sufficient buffer battery voltage. |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | approx. 0.25 W |
| Battery | 3.6 V lithium battery, 950 mAh (included in delivery) |
| Low battery signaling | ≤ 2.4 V |

RAM and real-time-clock buffering time

| | |
|---|---|
| New battery inserted | ≥ 1,5 years |
| After “Low” warning | ≥ 10 days |

| | |
|---|---|
| Weight | approx. 0.150 kg without buffer battery<br>approx. 0.170 kg with buffer battery |

# Battery Module AM 811F

## Features

- ☐ Provides battery backup
- ☐ Enables redundant battery energy backup on the AC 800F

## Description

The battery module provides for retention of the AC 800F RAM data when the AC 800F is off or has no Ethernet module.
The battery module is used when the AC 800F is used as a stand-alone device, i.e. when it has no Ethernet connection, or when the only existing Ethernet module is to be replaced without the AC 800F loosing its configuration data.


## LED Displays

State

| | |
|---|---|
| Off | No supply power, module is isolated |
| Green | Power supply on, module identified and ready to operate as configured. |
| Orange | Power supply on, module identified and either:<br>— normal transitory state after module startup<br>— configuration mode of Boot Loader |
| Red | Module power supply is on and either:<br>— module not yet identified (normal for short time, during module startup)<br>— error occurred during module test |

Battery (PM803F)

| | |
|---|---|
| Off | AC 800F is active, AM 811F not active =>buffering from power supply module<br><br>AC 800F is off (no watchdog of the batteries voltage) =>buffering from battery. |
| Orange | During battery recovery or start-up phase |
| Red | Warning: battery low, no battery inserted, insufficient electrical contact etc. |
| Green | battery inserted and data protection provided. |

Battery (PM802F)

| | |
|---|---|
| Off | Sufficient buffer battery voltage |
| Orange | Buffer battery not found or low (insufficient voltage). |

## Technical Data

| | |
|---|---|
| Rated voltage | 3.3 V / 5 V, ±3%, from CPU board |
| Power consumption | approx. 0.28 W |
| Battery | 3.6 V lithium battery, 950 mAh (included in delivery) |
| Low battery signaling | ≤ 3.2 V |

RAM and real-time-clock buffering time

| | PM 803F | PM 802F |
|---|---|---|
| New battery inserted | ≥ 10 days | ≥ 1,5 years |
| After “Low” warning | ≥ 5 hours | ≥ 10 days |

| | |
|---|---|
| Weight | approx. 0.150 kg without buffer battery<br>approx. 0.170 kg with buffer battery |

## Environmental Conditions

| | |
|---|---|
| Permissible ambient temperature | 0 °C - 60 °C |
| Permissible module internal temperature | 0 °C - 70 °C (temperature monitoring on basic unit) |
| Temperature gradient | In operation: 1 °C/min, according to DIN IEC 68, Part 14/EN 60068-2-14(11.99) |
| Transport and storage temperature | -25 °C - +85 °C |
| Permissible relative humidity | Non-condensing, ≤ 80 % annual average<br>≤ 95 % for 30 days per year maximum |
| Degree of humidity | RH-1, according to EN 61131-2: 1994 (IEC 1131-2) |
| Climatic category | KWF according to DIN 40040 (replaced by EN 60721-3-3 and EN 61709)<br>3K3 according to DIN IEC 721/EN 60721-3-3 |
| Degree of protection | For basic unit with module complement: IP20 |

## Electromagnetic Compatibility (EMC)

Complies with the protection requirements of EMI directive 89/336/EEC of May 1989 and EMVG of Nov. 1992.

| | |
|---|---|
| Interference suppression | According to EN 55022 / 4.1988<br>DIN VDE 0878 Part 22 / 11.89, class B |
| Noise immunity | Basic standard: EN 50082, VDE 0839 - Part 82-2, EN 61000-6-2<br>Tested according to EN61000-4; VDE 0847<br>• Parts 1 to 6,8,11, Degree 3, are met with shielded communication cables<br>• The industrial standard to NAMUR 21 / 8.98 is met |

## Electrical Protection

| | |
|---|---|
| Safety class | II |
| Overvoltage category | II for all connectors, pollution degree 2 |
| Designed according to | IEC 1010-1 (1990 - 09); EN 61010-1 / 3.94 or<br>DIN/EN 61010 - Part 1 / 3.94 (VDE 0411 - Part 1),<br>CSAC 22.2, No. 1010-1 and No. 213 (Class I, Div 2),<br>SIQ (CB Scheme 97NK2421),<br>CSA/NTRL. |
| Module supply power | Extra low voltage with protective separation from other circuits which may be grounded according to DIN VDE 0100, Part 410-1.97/IEC 60364-4-41/10.92 |
| Power supply SA 801F, SA 811F | Safety isolating transformer according to DIN VDE 0551, Part 1 (9.95); EN 60742<br>Optocoupler for protective separation against electrical shock<br>(German standard VDE 0884 / 8.87) |
| Power supply SD 802F, SD 812F | No elec. separation! |

## Shock and Vibration Data

Tested according to DIN IEC 68, Part 2-6, 2-27/EN 60068-2-6, 2-27 (11.99)

**Transport**

| | |
|---|---|
| Shock | 30 g/11 ms/ 3 times to each axis<br>Max. values for the individual modules. The values are valid for correct mounted modules. |

**In operation**

| | |
|---|---|
| Vibration, 3x5 cycles | 2 g/0.15 mm/5 - 150 Hz |

## Power Dissipation for the Calculation of Cooling System

The following table lists the anticipated power dissipation (heat dissipation) of individual AC 800F modules.
The data for the modules contain the combined power consumption from internal and external supply sources. For detailed information see the **Mounting and Installation Instructions, AC 800F** manual.

| Module | | Max. Power Dissipation |
|---|---|---|
| Basic unit | PM 802F | |
| with power supply | SA 801F | 20.8 W |
| with power supply | SD 802F | 10.8 W |
| Basic unit | PM 803F | |
| with power supply | SA 811F | 26.8 W |
| with power supply | SD 812F | 13.8 W |
| Ethernet module | EI 801F | 2.8 W |
| | EI 811F | 2.0 W |
| Ethernet module | EI 802F | |
| Without transceiver supply | | 3.0 W |
| With transceiver supply | | 6.2 W |
| Ethernet module | EI 812F | |
| Without transceiver supply | | 2.3 W |
| With transceiver supply | | 4.9 W |
| Ethernet module | EI 803F | 1.8 W |
| | EI 813F | 1.2 W |
| CAN-module | FI 810F | 2.6 W |
| Serial module | FI 820F | 2.6 W |
| PROFIBUS module | FI 830F | 2.8 W |
| FF/HSE module | FI 840F | 2.1 W |
| Battery module | AM 801F | 0.25 W |
| | AM 811F | 0.28 W |

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