FREELANCE 2019

Freelance DCS

Product Catalog



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 803F • power supply SA 811F • power supply SD 812F	 • 26.8 W • 13.8 W
Ethernet module 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 811F	0.28 W

System Communication

Bus type	Max. length	Application	Standard	Transmission rate
Twisted Pair (TP)	5 x 100 m 5 x 400 m for shielded TP	Control network connection of Freelance operator stations (for operation and observation), engineering station and controllers	DIN/ISO 8802 Part 3 (IEEE 802.3) 10BASE-FL	10 MBit/s
Fiber optic (FL)	4500 m		DIN/ISO 8802 Part 3 10BASE-FL (IEEE 802.3)	10 MBit/s
Thin-Ethernet (Cheapernet)	5 x 185 m		DIN/ISO 8802 Part 3 (IEEE 802.3) 10BASE2	10 MBit/s
Control network Full-Ethernet (Yellow Cable)	5 x 500 m for Coax, 50 m for AUI		DIN/ISO 8802 Part 3 (IEEE 802.3) 10BASE5	10 MBit/s
Station bus (CAN-Bus)	80 m, 400 m	Station bus and as connection to I/O units	ISO/DIN 11898	500 KBit/s for 80 m 100 KBit/s for 400 m

Fieldbus modules

The AC 800F uses the fieldbus modules to collect and process real-time and diagnostic data. Up to four fieldbus modules can be mounted into one AC 800F.
The fieldbus modules have the following tasks and characteristics:

- Electrical isolation between the process and the Controller
- Status LEDs for each module
- Independent fault detection and fault signaling
- Connection of the fieldbus segments and subnets

Details of the fieldbus modules			
Type	Channels	Function	Max. number of modules per controller
CAN module	3	Connection of up to 5 Freelance I/O racks	1
Serial module	2	RS232 / RS422 / RS485 configurable for MODBUS, IEC 60870-5-101 Telecontrol protocol	4
PROFIBUS module	1	Full-value PROFIBUS DPV1 Master	4
FF-HSE module	1	For the connection of up to 10 LD 800HSE Linking Devices with 10/100 MBaud autosense twisted pair connection	4

Ethernet modules

Controllers, operator stations, and engineering stations communicate with each other via the Ethernet based control network.

Ethernet modules for the control network		
Type	Channels	Function
Ethernet module EI 813F	1	Twisted pair connection 10 base T for connection to hubs or switches

Linking devices

As the AC 800F is equipped with high-speed connections to both PROFIBUS (PROFIBUS DP) and FOUNDATION Fieldbus (FF-HSE), the slower buses of the two fieldbus technologies (PROFIBUS PA and FF-H1) can be connected using intelligent linking devices. These devices allow to connect several slow buses to one fast bus, with the advantage that a lot more field devices can be connected to an AC 800F station than when the slow fieldbuses are connected directly.

PROFIBUS DP / PA linking device
The PROFIBUS Power Hub is an interface between the PROFIBUS DP and the PROFIBUS PA. Combining a PROFIBUS Power Hub with a field barriers and segment protectors makes it possible to connect field devices to a control system, which are located in intrinsic safe areas. The field barriers and segment protectors can be connected to the non-intrinsically safe outputs (trunks) of PROFIBUS Power Hub. PROFIBUS Power Hub is a device from Pepperl+Fuchs.

FOUNDATION Fieldbus linking device LD 800HSE EX
FOUNDATION Fieldbus (FF) is a fieldbus protocol based on international standards and designed for applications in the manufacturing industry, process automation and buildings automation. FF defines two communication profiles, H1 and HSE. The H1 profile, with a transmission rate of 31.25 kbit/s, is preferably used for direct communication between field devices in one link (H1 link).

The HSE profile, which is based on standard Ethernet and typically features a transmission rate of 100 Mbit/s, serves a backbone for the connection between H1 links. The LD 800HSE EX connects the HSE Ethernet with the field devices on the H1 link side. They serve as a gateway between the field devices on the H1 link and the HSE subnet. The LD 800HSE EX is also designed for redundancy.

FOUNDATION Fieldbus linking device LD 810HSE EX
The new LD 810 HSE EX module for DIN rail mounting with 4 H1 links and one HSE connector. The module itself needs external 24 VDC power supply. H1 links must be powered separately. The Linking Device LD 810HSE Ex is not suitable for replacing just one of the LD 800 Linking Devices in a redundant pair.

In new installations use only LD 810 HSE EX modules together. Redundancy cable for LD 810HSE Ex can be made by the end customer directly and need not be ordered through ABB.

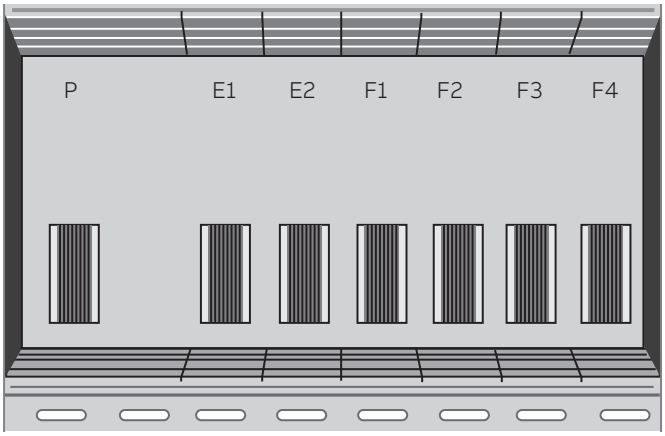
Fieldbus infrastructure

To protect fieldbus segments and links, appropriate fieldbus barriers can be used. For H1 links, power conditioners have to provide sufficient current. Furthermore proper network switches should be used to connect AC 800F FF modules and several LD 800HSE EX.

3.4.3 AC 800F redundancy concept

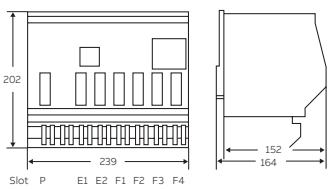
Name	Short description	Article no.
AC 800F – 16 MB, 115 / 230 VAC	With Ethernet 10BaseT, PROFIBUS module and Base Unit PM 803F Incl. standard system test, battery SB 808F, mains cable TK 807F (open end). Slot assignment: P = SA 811F, E1 = EI 813F, F3 = FI 830F, E2, F1, F2, F4 = Front panel. Compliant to cULus by using mains cable TK 809F (3BDM000212R1). Freelance V7.1SP2a or higher is mandatory.	3BDH000103R1
AC 800F – 16 MB, prepared for redundancy, 24 VDC	With Ethernet 10BaseT, PROFIBUS module and Base Unit PM 803F Incl. standard system test, 2 batteries SB 808F, 2 mains cable TK 802F (open end). Slot assignment: P = SD 812F, E1, E2 = EI 813F, F3 = FI 830F, F1, F2, F4 = Front panel. Freelance V7.1SP2a or higher is mandatory.	3BDH000133R1

AC 800F Housing with slot assignment



3.4.4 AC 800F, base unit PM 803F

Name	Short description	Article no.
PM 803F	Base Unit 16 MB, battery-buffered RAM Without operating system. The operating system has to be loaded during software installation. With special Contact Ledge RW 855F. Software V7.1SP2a or higher is mandatory. Restrictions: The performance of PM 803F is 5 - 10% below the performance of PM 802F (Classic).	3BDH000530R1



The basic unit PM 803F, cyclically scans signals from the fieldbus lines 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 using two AC 800F, see also “3.4.2 AC 800F redundancy concept” on page 36. To ensure quick and smooth takeover in milliseconds 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, the engineering and operator stations runs via the

control network. Engineering station communications can involve new or updated configuration files being downloaded to the controller, 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 the controllers. 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.

Features:

- Super Scalar RISC microprocessor (up to 150 MIPS)
- 16 K internal CPU cache RAM
- RAM memory with error detection and correction
  - 16 MB synchronous dynamic
- Flash-EPROM
  - 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, 10 Mbits/s
- Battery backup incl. battery watchdog
- G3 compliant Z variant available

Technical data

Technical data PM 803F	
CPU	CPU Intel® 32-bit RISC Super Scalar processor up to 150 MIPS
RAM	16 MB synchronous dynamic 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	0.78 ms for binary instructions 0.78 ms for word instructions 1.09 ms for floating point instructions
Power consumption	Basic unit only: max. 7.8 W depending on CPU usage and cycle time
Power supply	SA 811F: 115 - 230 VAC SD 812F: 24 VDC
Max. power output	See power supply modules
Weight	1.6 kg / 3.3 lbs max. 5 kg / 11 lbs (fully assembled)
Dimensions	Width: 239 mm (9.4 inch) Height: 202 mm (8 inch) Depth: 164 mm (6.5 inch)

3.4.5 Power supply

Ethernet modules

Name	Short description	Article no.
SA 811F	Power Supply 115 / 230 VAC To use together with PM 802F or PM 803F. Freelance V7.1SP2a or higher is mandatory.	3BDH000013R1



The AC 800F modules are supplied with 5 VDC / 5.5 A and 3.3 VDC / 6.5 A by SA 811F. 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 of connected outputs of Remote I/Os. 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.

Features:

- Input voltage 115 - 230 VAC (self adjusting), output is electrically isolated
- Power supply outputs provide: 5 VDC / 5.5 A and 3.3 VDC / 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
- G3 compliant Z variant available.

Technical data

Technical data SA 811F	
Input voltage	Alternating current 115 - 230 VAC Permissible range 90 - 260 VAC Frequency: 50 - 60 Hz (47 - 63 Hz)
Input current at nominal load	230 VAC: 275 mA 115 VAC: 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 VDC (± 3%) typical 5 VDC (± 3%) typical
Output current	0.5 - 6.5 A to 3.3 V 0.5 - 5.5 A to 5.0 V
Current limit	Approx. 7.5 A Automatic return to normal operation after short circuit
Total output power	Max. 35 W
Weight	0.460 kg, 1.014 lbs

SD 812F

Name	Short description	Article no.
SD 812F	Power Supply 24 VDC To use together with PM 802F or PM 803F. Freelance V7.1SP2a or higher is mandatory.	3BDH000014R1



The AC 800F modules are supplied with 5 VDC / 5.5 A and 3.3 VDC / 6.5 A by 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..

Features:

- Redundant input voltage 24 VDC, provides operation in accordance with NAMUR
- Power supply outputs provide: 5 VDC / 5.5 A and 3.3 VDC / 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
- G3 compliant Z variant available

Technical data

Technical data SD 812F	
Input voltage	24 VDC, 2 redundant inputs permissible range 19.2 - 32.5 VDC
Input current at nominal load	1.7 A at 24 VDC
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 VDC (± 3%) typical 5 VDC (± 3%) typical
Output current	0.5 - 6.5 A to 3.3 V 0.5 - 5.5 A to 5.0 V
Current limit	Approx. 7.5 A Automatic return to normal operation after short circuit
Total output power	Max. 35 W
Weight	0.460 kg, 1.014 lbs

LED displays

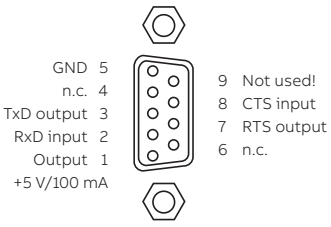
LED	Status	Description
Power		Internal supply voltage is available
Failure	Off	Normal status
	Orange	Self test
	Flashing orange	Overtemperature occurred during operation
	Red	Hardware failure of the basic unit
	Flashing red	Software failure of the system
Run/Stop	Green	Processing active
	Flashing green	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 LEDs description in the manual “Mounting and Installation Instruction AC 800F”. For non-redundancy the states are:	
	Orange	Self test
	Off	Normal status

Operator controls

Control	Description
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

Control	Description
Power supply	Two connectors for 24 VDC, automatic input selection when used with single power supply
Diag	For diagnostics and optional radio-controlled clock 9-pin male connector



3.4.8 Coated and G3 compliant hardware

G3 compliant components are protected with a special coating against corrosive gases.

The following Freelance ISA71.04 G3 compliant components can be ordered under the same conditions as any ordinary Freelance component. G3 compliance for AC 800F requires exclusively use of –Z components. AM 810F-Z serves for closing unused slots and the behind system plug.

G3 compliant components are identified by “Z“ added to the module name, for example AC 800F-Z-4 MB.

Base units

Name	Short description	Article no.
PM 803F-Z	Base Unit 16 MB, battery-buffered RAM Coated and G3 compliant version. Without operating system. The operating system has to be loaded during software installation. With special Contact Ledge RW 855F. Software V7.1SP2a or higher is mandatory. Restriction: The performance of PM 803F-Z is 5 to 10% below the performance of PM 802F-Z (Classic).	3BDH000530Z1

Power supplies

Name	Short description	Article no.
SA 811F-Z	Power Supply 115/230 VAC Coated and G3 compliant version. To use together with PM 802F-Z or PM 803F-Z. Software V7.1SP2a or higher is mandatory.	3BDH000013Z1
SD 812F-Z	Power Supply 24 VDC Coated and G3 compliant version. To use together with PM 802F-Z or PM 803F-Z. Software V7.1SP2a or higher is mandatory	3BDH000014Z1

Ethernet interface module

Name	Short description	Article no.
EI 813F-Z	Ethernet Module 10BaseT (Twisted pair) Coated and G3 compliant version. To use together with PM 802F-Z or PM 803F-Z. Battery not included. Software V7.1SP2a or higher is mandatory.	3BDH000022Z1

Fieldbus interface modules

Name	Short description	Article no.
FI 810F-Z	Fieldbus Module, 3 channel CAN module. Coated and G3 compliant version. To use together with PM 802F-Z or PM 803F-Z for rack I/O.	3BDH000030Z1
FI 820F-Z	Fieldbus Module, Serial (2 channel) Coated and G3 compliant version. To use together with PM 802F-Z or PM 803F-Z.	3BDH000031Z1
FI 830F-Z	Fieldbus Module, PROFIBUS-DP Coated and G3 compliant version. To use together with PM 803F-Z.	3BDH000032Z1
FI 840F-Z	Fieldbus Module, FF HSE Coated and G3 compliant version. To use together with PM 803F-Z. Software V7.1SP2a or higher is mandatory.	3BDH000033Z1

Auxiliary modules

Name	Short description	Article no.
AM 810F-Z	Cover Module G3 compliant station assembly requires AM 810F-Z for covering unused slots.	3BDH000030Z1
AM 811F-Z	Battery Module Coated and G3 compliant version. To use together with PM 803F-Z Without battery SB 808. Software V7.1SP2a or higher is mandatory.	3BDH000050Z1

3.4.9 Accessories

3.4.9.1 Battery modules and holder

Name	Short description	Article no.
SY 809F	Battery Holder Without battery SB 808F.	3BDH000042R1
SB 808F	Battery for RAM buffering, 2 pcs.	3BDM000199R1

AC 800F battery module

Name	Short description	Article no.
AM 811F	Battery Module To use together with PM 803F Without battery SB 808. Freelance V7.1SP2a or higher is mandatory.	3BDH000050R1