System Freelance 800F
AC 700F Module Description
Data Sheet

Central Processing Unit PM 783F

Detailed data of the CPU (PM 783F)	
CPU	**PM 783F**
Processor	Motorola Power PC (MPC8247)
Program memory (Battery backed up)	2 MB SRAM
Internal memory	8 MB SDRAM, 4 MB FLASH ROM
Typical cycle time for 1000 instructions - Binary - Word - Floating point	 1.667 ms 2.322 ms 3.1250 ms
Max. number of I/O Modules	8
Data backup source	Lithium Battery
Data buffering time at 25°C/ 77°F	Approximately 1.5 years
Battery low indication	warning indication issued about 2 weeks before the battery charge becomes critical
Real-time clock - with battery back-up	 Yes
Multitasking Program execution - cyclic (Equidistant) - cyclic (As fast as possible) - Event driven (Upon any of these events->)	 8 Tasks 1 Task “Run, Stop, Warm start, Cold start, Error“
Serial interface “SER” *(COM1)* - Physical link: - Connection: - Usage:	 - configurable for RS-232 or RS-485 (from 1200 bps to 38400 bps) - pluggable terminal block, spring connection - as Modbus ASCII/ RTU (Master/Slave),
Serial interface “DIAG” *(COM2)* - Physical link: - Connection: - Usage:	 - RS-232 - SUB-D Female connector - for programming/ diagnostics
Onboard network interface	1 x Ethernet (RJ45)
LEDs, LCD display, 8 function keys	for RUN/STOP switch-over, status displays and diagnosis
Certifications	CE, GL, cUL

Central Processing Unit PM 783F

General data of the CPU (PM 783F)	
Current consumption from 24 V DC	80 mA (Max)
Inrush current at 24 V DC	1 A^2s
Max. power dissipation within the module	10 W
Dimensions	
Width x height x depth (CPU without the Terminal Base)	67.5 x 76 x 54 mm / 2.66 x 2.99 x 2.13 inches
Weight (CPU without Terminal Base)	150 g / 5.29 oz.
Mounting position	horizontal or vertical with de-rating (50 % output load, reduction of maximum temperature to 40°C/ 104°F)

Analog Input Module AI 723F

Functionality	
AI 723F: 16 analog inputs, individually configurable for	unused (default setting)
	0...10 V
	-10 V...+10 V
	0...20 mA
	4...20 mA
	Pt100, -50 °C (-58 °F)...+400 °C (+752 °F) 2-wire
	Pt100, -50 °C (-58 °F)...+400 °C (+752 °F) 3-wire, requires 2 channels
	Pt100, -50 °C (-58 °F)...+70 °C (+158°F) 2-wire
	Pt100, -50 °C (-58 °F)...+70 °C (+158°F) 3-wire, requires 2 channels
	Pt1000, -50 °C (-58 °F)...+400 °C (+752 °F) 2-wire
	Pt1000, -50 °C (-58 °F)...+400 °C (+752 °F) 3-wire, requires 2 channels
	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 2-wire
	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 3-wire, requires 2 channels

Functionality	
AI 723F: 16 analog inputs, individually configurable for	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 2-wire
	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 3-wire, requires 2 channels
	0...10 V with differential inputs, requires 2 channels
	-10 V...+10 V with differential inputs, requires 2 channels
	digital signals (digital input)

Technical data	
LED displays	19 LEDs for signals and error messages
Internal power supply	through the expansion bus interface (I/O-Bus)
External power supply	via the terminals ZP and UP (process voltage 24 V DC)
Process voltage	
- Rated value	24 V DC
- max. ripple	5 %
- Protection against reversed voltage	yes

Technical data	
Rated protection fuse on UP	10 A fast
- Electrical isolation	yes, per module
- Current consumption from UP at normal operation	0.15 A
- Inrush current from UP (at power up)	0.050 A^2s
- Connections	Terminals 1.8 - 4.8 for +24 V (UP) and 1.9 - 4.9 for 0 V (ZP)
Max. length of analog cables, conductor cross section > 0.14 mm^2 (~26 AWG)	100 m / 328 ft.
Conversion error of the analog values caused by non-linearity, adjustment error at factory and resolution within the normal range	typ. 0.5 %, max. 1 %
Width x height x depth (without the Terminal Unit)	67.5 x 76 x 54 mm / 2.66 x 2.99 x 2.13 inches
Weight	300 g / 10.52 oz
Mounting position	horizontal or vertical with derating (output load reduced to 50 % at 40°C/ 104°F per group)
Cooling	The natural convection cooling must not be hindered by cable ducts or other parts in the mounting cabinet.

Technical data of the analog inputs	
Number of channels per module	16
Distribution of channels into groups	2 groups of 8 channels each
Connections of the channels I0- to I7- Connections of the channels I0+ to I7+	Terminals 1.0 to 1.7 Terminals 2.0 to 2.7
Connections of the channels I8- to I15- Connections of the channels I8+ to I15+	Terminals 3.0 to 3.7 Terminals 4.0 to 4.7
Electrical isolation	against internal supply and other modules
Configurability	0...10 V, -10...+10 V, 0/4...20 mA, Pt100/1000, Ni1000 (each input can be configured individually)
Channel input resistance	Voltage: > 100 kΩ, current: ca. 330 Ω
Time constant of the input filter	Voltage: 100 µs, current: 100 µs

Technical data of the analog inputs	
Indication of the input signals	one LED per channel
Resolution	Range 0...10 V: 12 bits
	Range -10...+10 V: 12 bits + sign
	Range 0...20 mA: 12 bits
	Range 4...20 mA: 12 bits
	Temperature: 0.1 °C / 0.18 °F
Unused voltage inputs	are configured as „unused“
Unused current inputs	have a low resistance, can be left open-circuited
Overvoltage protection	yes

Technical data of the analog inputs, if they are used as digital inputs	
Number of channels per module	max. 16
Distribution of channels into groups	2 groups of 8 channels each
Connections of the channels I0+ to I7+ Connections of the channels I8+ to I15+	Terminals 2.0 to 2.7 Terminals 4.0 to 4.7
Reference potential for the inputs	Terminals 1.8 to 4.8 (ZP)
Input signal delay	typ. 8 ms
Indication of the input signals	one LED per channel
Input signal voltage	24 V DC
Signal 0	-30 V...+5 V
Signal 1	+13 V...+30 V

Analog Input/Output Module AX 722F

Functionality	
AX 722F: 8 analog inputs, individually configurable for	unused (default setting)
	0...10 V
	-10 V...+10 V
	0...20 mA
	4...20 mA
	Pt100, -50 °C (-58 °F)...+400 °C (+752 °F) 2-wire
	Pt100, -50 °C (-58 °F)...+400 °C (+752 °F) 3-wire, requires 2 channels
	Pt100, -50 °C (-58 °F)...+70 °C (+158°F) 2-wire
	Pt100, -50 °C (-58 °F)...+70 °C (+158°F) 3-wire, requires 2 channels
	Pt1000, -50 °C (-58 °F)...+400 °C (+752 °F) 2-wire
	Pt1000, -50 °C (-58 °F)...+400 °C (+752 °F) 3-wire, requires 2 channels
	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 2-wire
	Ni1000, -50 °C (-58 °F)...+150 °C (+302°F) 3-wire, requires 2 channels
	0...10 V with differential inputs, requires 2 channels
	-10 V...+10 V with differential inputs, requires 2 channels
	digital signals (digital input)
4 analog outputs, individually configurable for	unused (default setting)
	-10 V...+10 V
	0...20 mA
	4...20 mA
4 analog outputs, individually configurable for	unused (default setting)
	-10 V...+10 V

Technical data	
LED displays	19 LEDs for signals and error messages
Internal power supply	through the expansion bus interface (I/O-Bus)
External power supply	via the terminals ZP and UP (process voltage 24 V DC)
Process voltage	
- Rated value	24 V DC
- max. ripple	5 %
- Protection against reversed voltage	yes
- Rated protection fuse on UP	10 A fast
- Electrical isolation	yes, per module
- Current consumption from UP at normal operation	0.10 A output loads
- Inrush current from UP (at power up)	0.020 A^2s
- Connections	Terminals 1.8 - 4.8 for +24 V (UP) and 1.9 - 4.9 for 0 V (ZP)
Max. length of analog cables, conductor cross section > 0.14 mm^2 (~26 AWG)	100 m / 328 ft.
Conversion error of the analog values caused by non-linearity, adjustment error at factory and resolution within the normal range	typ. 0.5 %, max. 1 %
Width x height x depth (without the Terminal Unit)	67.5 x 76 x 54 mm / 2.66 x 2.99 x 2.13 inches
Weight	300 g / 10.58 oz.
Mounting position	horizontal or vertical with derating (output load reduced to 50 % at 40°C/ 104°F per group)
Cooling	The natural convection cooling must not be hindered by cable ducts or other parts in the mounting cabinet.

Technical data of the analog inputs	
Number of channels per module	8
Distribution of the channels into groups	1 group of 8 channels
Connections of the channels I0- to I7-	Terminals 1.0 to 1.7
Connections of the channels I0+ to I7+	Terminals 2.0 to 2.7
Electrical isolation	against internal supply and other modules
Configurability	0...10 V, -10...+10 V, 0/4...20 mA, Pt100/1000, Ni1000 (each input can be configured individually)
Channel input resistance	Voltage: > 100 kΩ, current: ca. 330 Ω
Time constant of the input filter	Voltage: 100 µs, current: 100 µs
Indication of the input signals	one LED per channel
Conversion cycle	2 ms (for 8 inputs + 8 outputs), with Pt/Ni... 1 s
Resolution	Range 0...10 V: 12 bits
	Range -10...+10 V: 12 bits + sign
	Range 0...20 mA: 12 bits
	Range 4...20 mA: 12 bits
	Temperature: 0.1 °C / 0.18 °F
Unused voltage inputs	are configured as „unused“
Unused current inputs	have a low resistance, can be left open-circuited
Overvoltage protection	yes

Technical data of the analog inputs, if they are used as digital inputs	
Number of channels per module	Max. 8
Distribution of channels into groups	1 group of 8 channels
Connections of the channels I0+ to I7+	Terminals 2.0 to 2.7
Reference potential for the inputs	Terminals 1.8 to 4.8 (ZP)
Input signal delay	typ. 8 ms
Indication of the input signals	one LED per channel
Input signal voltage	24 V DC
Signal 0	-30 V...+5 V
Signal 1	+13 V...+30 V

Technical data of the analog outputs	
Number of channels per module	8, all channels for voltage, the first 4 channels also for current
Distribution of channels into groups	1 group of 8 channels
- Channels O0-...O7-	Terminals 3.0...3.7
- Channels O0+...O7+	Terminals 4.0...4.7
Output type	bipolar with voltage, unipolar with current
Electrical isolation	against internal supply and other modules
Configurability	-10...+10 V, 0...20 mA, 4...20 mA (each output can be configured individually), current outputs only channels 0...3
Output resistance (load), as current output	0...500 Ω
Output loadability, as voltage output	max. ±10 mA
Indication of the output signals	one LED per channel
Resolution	12 bits (+ sign)
Unused outputs	can be left open-circuited

Digital Input/Output Module DC 732F

Functionality	
Digital inputs	16 (24 V DC)
Digital inputs/outputs (Configurable)	16 (24 V DC)
High-speed counter	Not Available
LED displays	for signal statuses, errors and supply voltage
Internal power supply	through the expansion bus interface (I/O-Bus)
External power supply	via the terminals ZP and UP (process voltage 24 V DC)

Technical data	
Process supply voltage UP	
- Connections	Terminals 1.8 - 4.8 for +24 V (UP) and 1.9 - 4.9 for 0 V (ZP)
- Rated value	24 V DC
- max. ripple	5 %
- Protection against reversed voltage	yes
- Rated protection fuse on UP	10 A fast
- Electrical isolation	yes, per module
Current consumption	
- internal (via I/O-Bus)	ca. 5 mA at 3.3 V DC
- current consumption from UP at normal operation / with outputs	0.05 A + max. 0.008 A per input + max. 0.5 A per output
- inrush current from UP (at power up)	0.007 A^2s
Max. power dissipation within the module	6 W (outputs unloaded)
Width x height x depth (without the Terminal Unit)	67.5 x 76 x 54 mm / 2.66 x 2.99 x 2.13 inches
Weight (without Terminal Unit)	Approx. 125 g / 4.41 Oz.
Mounting position	horizontal or vertical with derating (output load reduced to 50 % at 40°C/ 104°F per group)
Cooling	The natural convection cooling must not be hindered by cable ducts or other parts in the mounting cabinet.

Technical data of the digital inputs	
Number of channels per module	16
Distribution of the channels into groups	1 group of 16 channels
Terminals of the channels I0 to I7	1.0 to 1.7
Terminals of the channels I8 to I15	2.0 to 2.7
Reference potential for all inputs	terminals 1.9...4.9 (minus pole of the process supply voltage, signal name ZP)
Electrical isolation	from the rest of the module (I/O-Bus)
Indication of the input signals	one yellow LED per channel, the LED is ON when the input signal is high (signal 1)
Input type acc. to EN 61131-2	Type 1
Input delay (0->1 or 1->0)	typ. 8 ms, configurable from 0.1 to 32 ms
Input signal voltage	24 V DC
signal 0	-3 V...+5 V
undefined signal	> +5 V...< +15 V
signal 1	+15 V...+30 V
Ripple with signal 0	within -3 V...+5 V
Ripple with signal 1	within +15 V...+30 V
Input current per channel	
input voltage +24 V	typ. 5 mA
input voltage +5 V	> 1 mA
input voltage +15 V	> 5 mA
input voltage +30 V	< 8 mA
Max. cable length	
shielded	1000 m / 3280 ft.
unshielded	600 m / 1968 ft.

Technical data of the configurable digital inputs/outputs	
Each of the configurable I/O channels can be wired as input or output by the user.	
Number of channels per module	16 inputs/outputs (with transistors)
Distribution of the channels into groups	1 group of 16 channels
if the channels are used as inputs	
- channels I16...I23	terminals 3.0...3.7
- channels I24...I31	terminals 4.0...4.7

Technical data of the configurable digital inputs/outputs	
if the channels are used as outputs	
- channels Q16...Q23	terminals 3.0...3.7
- channels Q24...Q31	terminals 4.0...4.7
Indication of the input/output signals	one yellow LED per channel, the LED is ON when the input/output signal is high (signal 1)
Electrical isolation	from the rest of the module

Technical data of the digital inputs/outputs if used as outputs	
Number of channels per module	max. 16 transistor outputs
Reference potential for all outputs	terminals 1.9...4.9 (minus pole of the process supply voltage, signal name ZP)
Common power supply voltage	for all outputs: terminals 1.8...4.8 (plus pole of the process supply voltage, signal name UP)
Output voltage for signal 1	UP -0.8 V
Output delay (0->1 or 1->0)	on request
Output current	
rated value, per channel	500 mA at UP = 24 V
maximum value (all channels together)	8 A
Leakage current with signal 0	< 0.5 mA
Rated protection fuse on UP	10 A fast
De-magnitization when inductive loads are switched off	with varistors integrated in the module
Switching frequency	
with resistive load	on request
with inductive loads	max. 0.5 Hz
with lamp loads	max. 11 Hz with max. 5 W
Short-circuit proof / overload proof	yes

Technical data of the digital inputs/outputs if used as outputs	
Overload message (I > 0.7 A)	yes, after ca. 100 ms
Output current limitation	yes, automatic reactivation after short-circuit/overload
Resistance to feedback against 24V signals	yes
Max. cable length	
shielded	1000 m / 3280 ft.
unshielded	600 m / 1968 ft.

Technical data of the digital inputs/outputs if used as inputs	
Number of channels per module	max. 16 digital inputs
Reference potential for all inputs	terminals 1.9...4.9 (minus pole of the process supply voltage, signal name ZP)
Input current, per channel	see „Technical Data of Digital inputs“
Input type acc. to EN 61131-2	Type 1
Input delay (0->1 or 1->0)	typ. 8 ms, configurable from 0.1 to 32 ms
Input signal voltage	24 V DC
Signal 0	-3 V...+5 V *
undefined signal	> +5 V...< +15 V
Signal 1	+15 V...+30 V
Ripple with signal 0	within -3 V...+5 V *
Ripple with signal 1	within +15 V...+30 V
Max. cable length	
shielded	1000 m / 3280 ft.
unshielded	600 m / 1968 ft.

* Due to the direct connection to the output, the demagnetizing varistor is also effective at the input. This is why the difference between UPx and the input signal may not exceed the clamp voltage of the varistor. The varistor limits the voltage to approx. 36 V. Following this, the input voltage must range from - 12 V to + 30 V when UPx = 24 V and from - 6 V to + 30 V when UPx = 30 V.

Terminal Base TB 711F (for the CPU PM 783F)

Technical data	
Connection of the 24 V DC process voltage	with a 5-pole removable terminal block
Slots	1 CPU, 1 Communication module (Not Used Currently)
Interfaces	Field I/O -> 1 [I/O-Bus] Serial Ports-> 2 [“SER” (COM1) and “DIAG” (COM2)] Networking -> 1 [Ethernet (RJ45)]
Dimensions	
Width x height x depth (with CPU inserted)	95.5 x 135 x 75 mm / 3.75 x 5.31 x 2.95 inches

Dummy Coupler Module TA 724F

Technical data	
Use	to protect the unused coupler slot from dust and touch
Mounting	On CPU Terminal Base TB 711F
Weight	50 g / 1.76 oz.
Dimensions	135 mm x 28 mm x 62 mm / 5.31 x 1.1 x 2.44 inches

I/O Terminal Unit TU 715F (24 V DC, Screw-type Terminals)

Technical data	
Number of channels per module	32
Distribution of the channels into groups	4 groups of 8 channels each (1.0...1.7, 2.0...2.7, 3.0...3.7, 4.0...4.7), the allocation of the channels is given by the inserted I/O expansion module
Rated voltage	24 V DC
Max. permitted total current	10 A (between the terminals 1.8...4.8 and 1.9...4.9)
Earthing	direct connection to the earthed DIN rail or via the screws with wall mounting
Screw-type terminals	
Type	Front terminal, conductor connection vertically with respect to the printed circuit board

Conductor cross section	
- solid	0.08 mm² to 2.5 mm² (28 AWG to 13 AWG)
- flexible	0.08 mm² to 2.5 mm² (28 AWG to 13 AWG)
- with wire-end ferrule	0.25 mm² to 1.5 mm² (23 AWG to 15 AWG)
Stripped conductor end	8 mm (0.31 inches)
Width of the screwdriver	3.5 mm (0.14 inches)
Fastening torque	0.6 Nm (5.3 Pound Inch)
Degree of protection	IP 20
Dimensions	
Width x height x depth	67.5 x 135 x 30 mm / 2.66 x 5.31 x 1.18 inches
Weight	200 g / 7.05 oz.
Mounting position	horizontal or vertical

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