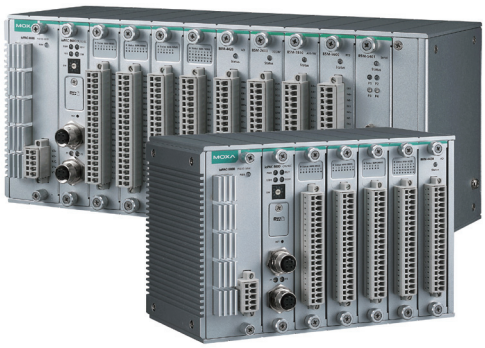
ioPAC 8600 Series

Preliminary

Rugged modular RTU controllers



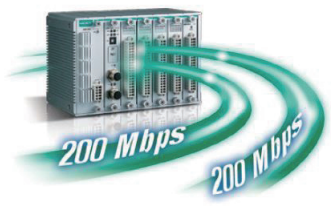
- Modular CPU/Power/Backplane/IO design supporting ioPAC 8500/8600 series I/O modules
- Supports dual power module with dual power inputs
- Supports C/C++ or IEC 61131-3 programming languages with ready-to-run services
- 24 to 110 V power input range and DI/O modules
- Compliant with EN 50121-3, EN 50121-4, and EN 50155 specifications

EN 50155 | cULus LISTED | RoHS | EN 50121 | CE | FC

Overview

The ioPAC 8600 modular RTU controllers are 100% modular, giving users the freedom to choose CPU, power, backplane, communication, and I/O modules. In addition, the ioPAC 8600 enhances the hardware system architecture and key features of the ioPAC 8020 and ioPAC 8500 combined. It also adds an Ethernet bus on the backplane to support Ethernet switch modules. The ioPAC 8600 supports the C/C++ and IEC 61131-3 programming languages and ready-to-run services, including Modbus TCP/RTU, SNMP, data logging, and email alarms to fulfill different customers' requirements. With active tag and MX-AOPC UA Suite data integration software, the ioPAC 8600 series provides a comprehensive solution for data acquisition and control applications in harsh environments.

2-Wire Ethernet Technology



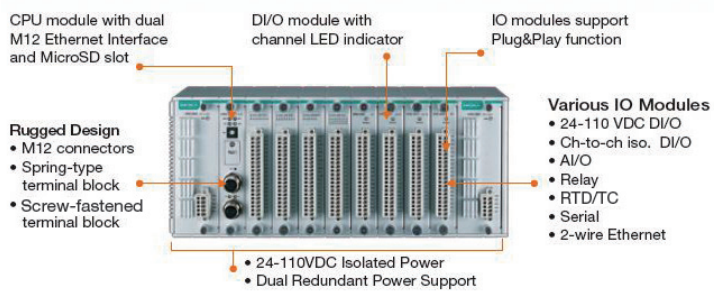
Moxa's 2-wire Ethernet technology offers system integrators an attractive option for upgrading the train's IP network to a 10/100 Mbps* Ethernet backbone with existing 2-wire cable. This innovative 2-wire Ethernet technology supports Ethernet bypass functionality, ensuring that the Ethernet backbone will continue to operate even if one ioPAC is without power. As an added plus, with two 2-wire Ethernet modules in one ioPAC, the network can reach 200 Mbps and provide a redundant architecture.

*Network performance is related to cable quality when using 2-wire technology.

Ready-to-Run Service

Moxa's ioPAC 8600 programmable controllers allow programmers to rapidly configure services (SNMP, Modbus RTU/TCP, E-mail alarm service, etc.) without writing any programs. The ioPAC can reduce the configuration of massively distributed deployments to a few simple mouse clicks, greatly increasing an engineer's productivity.

Compact Integrated Solution



The compact ioPAC 8600 is equipped with universal dual-power inputs that support all railway power voltages, and new channel-to-channel, wide voltage DI/DO modules are available for use in trains that use different power systems. The ioPAC 8600 supports a variety of communication interfaces, including Ethernet, serial, CAN, and MVB*. System integrators can control or monitor sub-systems with the ioPAC 8600, which saves space and has powerful functions to reduce both the system integrator's budget and installation difficulties.

*MVB available by project request.

Specifications

Power Requirements

Input Voltage: 24 to 110 VDC (16.8 to 154 VDC)

Physical Characteristics

Housing: Aluminum

Dimensions:

- 5-slot version: 205.65 x 133.35 x 100 mm (8.1 x 5.25 x 3.94 in)
- 9-slot version: 324.8 x 133.35 x 100 mm (12.79 x 5.25 x 3.94 in)
- 12-slot version: 401.0 x 133.35 x 100 mm (15.79 x 5.25 x 3.94 in)

Weight:

- 5-slot version: 2560 g (5.64 lb)
- 9-slot version: 3690 g (8.14 lb)
- 12-slot version: 4550 g (10.03 lb)

Mounting: Wall-mounting kit

Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 176°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Shock: IEC 60068-2-27

Vibration: IEC 60068-2-6

Altitude: Up to 2000 m

Note: Please contact Moxa if you require products guaranteed to function properly at higher altitudes.

Standards and Certifications

Safety: UL 61010

EMC: EN 55022/24

EMI: FCC Part 15 Subpart B Class A, CISPR 22

EMS:

IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV

IEC 61000-4-3 RS:

80 MHz to 1000 MHz: 3 V/m

1400 MHz to 2100 MHz: 3 V/m

2100 MHz to 2700 MHz: 1 V/m

IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV

IEC 61000-4-5 Surge:

Power: 2 kV (L-PE), 1 kV (L-L);

Signal: 2 kV (L-PE), 1 kV (L-L)

IEC 61000-4-6 CS: 3 V

IEC 61000-4-8 PFMF: 3 A/m

Rail Traffic: EN 50155 (essential compliance*), EN 50121-3-2, EN 50121-4

*Moxa defines "essential compliance" to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.

Note: Please check Moxa's website for the most up-to-date certification status.

Warranty

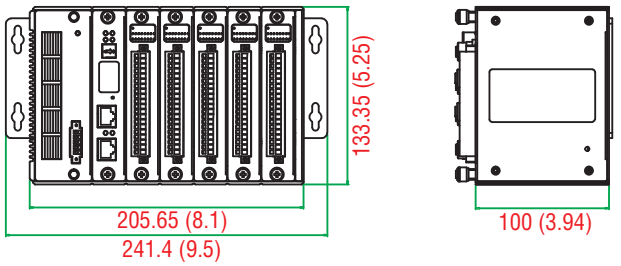
Warranty Period: 5 years

Details: See www.moxa.com/warranty

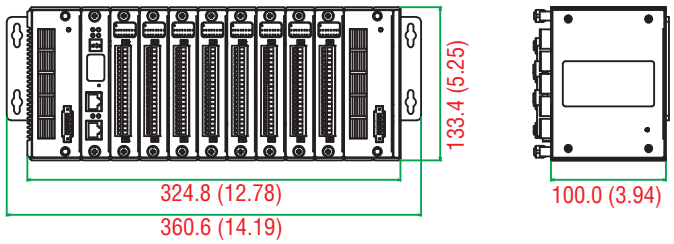
Dimensions

Unit: mm (inch)

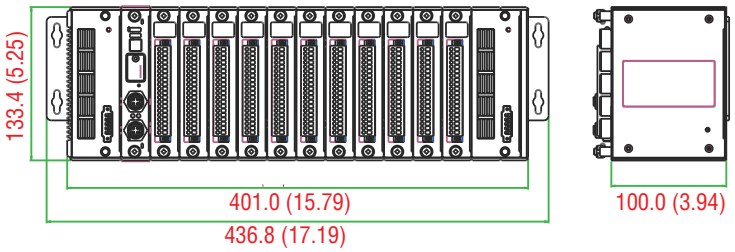
ioPAC 8600 with 5 I/O slots



ioPAC 8600 with 9 I/O slots



ioPAC 8600 with 12 I/O slots



Ordering Information

CPU Modules

ioPAC 8600-CPU10-M12-C-T: ioPAC 8600 CPU module, C/C++ programmable controller, M12 Ethernet ports, -40 to 75°C operating temperature
ioPAC 8600-CPU10-RJ45-C-T: ioPAC 8600 CPU module, C/C++ programmable controller, RJ45 Ethernet ports, -40 to 75°C operating temperature
ioPAC 8600-CPU10-M12-IEC-T: ioPAC 8600 CPU module, IEC 61131-3 programmable controller, M12 Ethernet ports, -40 to 75°C operating temperature
ioPAC 8600-CPU10-RJ45-IEC-T: ioPAC 8600 CPU module, IEC 61131-3 programmable controller, RJ45 Ethernet ports, -40 to 75°C operating temperature

Power Modules

ioPAC 8600-PW10-15W-T: ioPAC 8600 power module, dual power input, 24 to 110 VDC, 15W, -40 to 75°C operating temperature

Backplane Modules

ioPAC 8600-BM005-T: ioPAC 8600 backplane module with 5 slots, -40 to 75°C operating temperature
ioPAC 8600-BM009-T: ioPAC 8600 backplane module with 9 slots, -40 to 75°C operating temperature

I/O Modules (can be purchased separately)

86M-1620D-T: 16 DIs, sink, 24 to 110 VDC, channel LED, -40 to 75°C operating temperature
86M-1832D-T: 8 DIs, sink/source, 24 VDC, ch-to-ch isolation, channel LED, -40 to 75°C operating temperature
86M-2604D-T: 6 relays, form A (N.O.), channel LED, -40 to 75°C operating temperature
86M-2830D-T: 8 DOs, sink, 24 VDC, ch-to-ch isolation, channel LED, -40 to 75°C operating temperature
86M-4420-T: 4 AOs, 0 to 10 V, -10 to 10 V, 0 to 20 mA, or 4 to 20 mA, -40 to 75°C operating temperature
86M-5212U-T: 2-port 2-wire Ethernet switch, -40 to 75°C operating temperature
86M-5250-T: 2 CAN ports, -40 to 75°C operating temperature
85M-1602-T: 16 DIs, sink/source, 24 VDC, dry contact, -40 to 75°C operating temperature
85M-2600-T: 16 DOs, sink, 24 VDC, -40 to 75°C operating temperature
85M-3800-T: 8 AIs, 4 to 20 mA, 16 bits, -40 to 75°C operating temperature
85M-3801-T: 8 AIs, 4 to 20 mA, 16 bits, 40 kHz, -40 to 75°C operating temperature
85M-3810-T: 8 AIs, 0 to 10 VDC, 16 bits, -40 to 75°C operating temperature
85M-3811-T: 8 AIs, 0 to 10 VDC, 16 bits, 40 kHz, -40 to 75°C operating temperature
85M-5401-T: 4 serial ports (RS-232/422/485 3-in-1), -40 to 75°C operating temperature
85M-6600-T: 6 RTDs, -40 to 75°C operating temperature
85M-6810-T: 8 TCs, -40 to 75°C operating temperature
Note: Both 86M modules and 85M modules can be used with the ioPAC 8600 series.
Note: Conformal coating available on request.

Optional Accessories (can be purchased separately)

WK-75: Wall-mounting kit, 2 plates with 8 screws
CBL-M12D(MM4P)/RJ45-100 IP67: 4-pin D-code M12-to-RJ45 CAT5E UTP Ethernet cable, 100 cm, IP67 waterproof
CBL-RJ458P-100: 8-pin RJ45 CAT5 Ethernet cable, 100 cm
CBL-F9DPF1x4-BK-100: Serial console cable
CBL-M44M9x4-50: DB44 to 4-port DB9 female serial cable
85M-BKTES: Empty slot covers (3 per order)

Package Checklist (CPU Module)

- ioPAC 8600 CPU module
- Serial console cable (C/C++ version only)
- Documentation and software CD

Package Checklist (Power Module)

- ioPAC 8600 power module

Package Checklist (Backplane Module)

- ioPAC 8600 backplane module

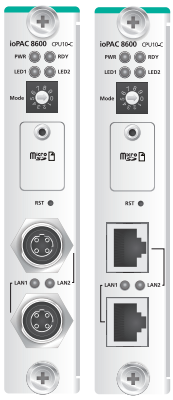
Package Checklist (I/O Module)

- 85M/86M module
- Serial cable: CBL-M44M9x4-50 (85M-5401-T only)

ioPAC 8600 Series Modules

Preliminary

ioPAC 8600-CPU10 Series: 32-bit ARM9 192 MHz CPU



Computer

CPU Type: 32-bit ARM9 192 MHz CPU
OS: Linux
Clock: Real-time clock with super capacitor (retains charge for 7 days)

Memory

SDRAM: 64 MB
Flash: 32 MB (10 MB reserved for user)
FRAM: 128 KB
microSD™ Slot: Up to 32 GB (SD 2.0 compatible)
Note: For units operating in extreme temperatures, industrial-grade, wide-temperature microSD cards are required.

Switches & Buttons

Rotary Switch: 0 to 9
Button: Reset to factory defaults

Ethernet Interface

LAN: 2 x 10/100 Mbps, Ethernet bypass or 2 MACs (IPs), jumper selectable, RJ45 or M12
Protection: 1.5 kV magnetic isolation
Automation Languages: C/C++ or IEC 61131-3
Protocols: Modbus TCP/RTU (master/slave), SNMP, TCP/IP, UDP, DHCP, BOOTP, SNTP, SMTP

Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements

Input Current : 200 mA @ 24 VDC

MTBF (mean time between failures)

Time: 1,032,466 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

ioPAC 8600-PW10-15W/30W-T: Dual-power inputs, 24 to 110 VDC, 15/30 W

Power

Input Voltage: 24 to 110 VDC (16.8 to 154 VDC)
Note: Compliant with EN 50155 at 24/48/60/72/110 VDC
Wattage: 15/30 W
Galvanic Isolation: 3k VDC
Dual-Power Input: Yes

Environmental Limits

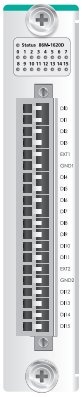
Operating Temperature: -40 to 75°C (-40 to 176°F)

MTBF (mean time between failures)

Time: 1,579,517 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-1620D-T: 16 digital inputs, 24 to 110 VDC, channel LED, sink type



Inputs and Outputs
Digital Inputs: 16 channels
Isolation:
To system:
3k VDC or 2k Vrms

Digital Input
Type: PNP
I/O mode: DI
Logic Definition:
• On: channel voltage > 0.3 x (external power voltage)
• Off: channel voltage < 0.15 x (external power voltage)
Scan Period: 8 ms (typ.)
Scan on Time: 0.5 ms
Debouncing Function: Software disable/enable
Debouncing Time: 1 to 15 ms (software-selectable)
Common Type: 8 points per COM

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block
Channel LED: Yes

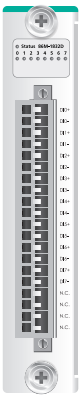
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 12.6 mA @ 24 VDC

MTBF (mean time between failures)
Time: 1,115,244 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-1832D-T: 8 channel-to-channel isolated DIs, 24 VDC, channel LED, sink/source type



Inputs and Outputs
Digital Inputs: 8 channels
Isolation:
To system: 3k VDC or 2k Vrms
Channel-to-channel: 1k VDC

Digital Input
Sensor Type: Wet contact (NPN or PNP)
I/O Mode: DI, counter, or frequency
Wet Contact (DI+ to DI-):
• On: 10 to 30 VDC
• Off: 0 to 3 VDC
Counter Frequency: 5 kHz
Digital Filtering Time Interval: Software selectable (by 0.1 ms)

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

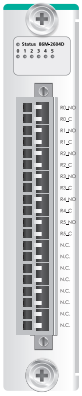
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 12.6 mA @ 24 VDC

MTBF (mean time between failures)
Time: 1,149,108 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-2604D-T: 6 relays, channel LED, form A (N.O.) type



Inputs and Outputs
Relays: 6 channels
Isolation:
To System: 3k VDC or 2k Vrms

Relay
Type: Form A (N.O.)
I/O mode: DO or PWM
Pulse Output Frequency: 0.33 Hz
Contact Current Rating:
Resistive Load: 5 A @ 30 VDC, 250 VAC
Relay On/Off Time: 10 ms (max.)
Initial Insulation Resistance: 1000 mega-ohms (min.) @ 500 VDC
Mechanical Endurance: 5,000,000 operations
Electrical Endurance: 60,000 operations @ 5 A resistive load
Contact Resistance: 100 milli-ohms (max.)

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

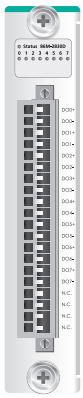
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 127 mA @ 24 VDC

MTBF (mean time between failures)
Time: 4,173,843 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-2830D-T: 8 channel-to-channel isolated DOs, 24 VDC, channel LED, sink-type



Inputs and Outputs
Digital Outputs: 8 channels
Isolation:
To system: 3k VDC or 2k Vrms
Channel-to-channel: 1k VDC

Digital Output
Type: Sink
I/O Mode: DO or PWM
Pulse Output Frequency: 1 kHz
Short Circuit Protection: 750 mA @ 25°C
Over-Voltage Protection: 41 VDC
Over-Current Protection: 2.6 A (4 channels @ 650 mA)
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
Current Rating: 200 mA per channel

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

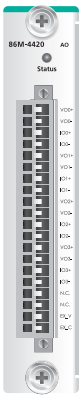
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 76.7 mA @ 24 VDC

MTBF (mean time between failures)
Time: 1,766,037 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-4420-T: 4 analog outputs, 0 to 10 V or -10 to 10 V or 0 to 20 mA or 4 to 20 mA



Inputs and Outputs
Analog Outputs: 4 channels
Isolation:
To system: 3k VDC or 2k Vrms

Analog Output
Resolution: 12 bits
Output range: 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA
I/O mode: Static or Waveform mode
Voltage Output: 10 mA (max.)
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Current Load Resistance:
Internal Power: 400 ohms
External 24 VDC Power: 1000 ohms
Update Rate: Software polling or waveform mode
Waveform Type: Sine, Triangle, Square
Wavemode Frequency: 125 Hz

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current:
94.2 mA @ 24 VDC (voltage)
143.8 mA @ 24 VDC (current)

MTBF (mean time between failures)
Time: 2,409,345 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-5212U-T: 2-port 2-wire Ethernet switch

Ethernet Communication
Interface: Two 2-wire Ethernet ports
Isolation:
To system: 3k VDC or 2k Vrms

Standards
Supported Standards:
100BASE-TX IEEE 802.3u
10BASE-T IEEE 802.3
100 Mbps BroadR-Reach®
10 Mbps BroadR-Reach®

Physical Characteristics
Wiring: CAT 5 standard cable with M12 D-code male connection
Connector: M12 (D-code, female) x 2
Channel LED: Yes

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 578 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 2,498,942 hrs
Standard: Telcordia SR332

EN 50155 c UL us LISTED RoHS EN 50121 CE FC

86M-5250-T: 2 CAN ports, channel LED

Serial Communication
Interface: 2 CAN ports
Isolation:
To system: 3k VDC or 2k Vrms

CAN Bus Communication
Protocols:
CAN 2.0A
CAN 2.0B
CANopen DS301, V4.02
CANopen DS401
Speed: 10/20/50/125/250/500/800 kbps, 1 Mbps
Termination Resistor: N/A, 120 ohms (by DIP)

Physical Characteristics
Connector: DB9 male
Channel LED: Yes

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 60 mA @ 24 VDC

MTBF (mean time between failures)
Time: 3,306,609 hrs
Standard: Telcordia SR332

EN 50155 EN 50121

Common Specifications

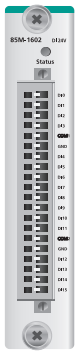
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Shock: IEC 60068-2-27
Vibration: IEC 60068-2-6

Standards and Certifications
Safety: UL 61010
EMC: EN 55022/24
EMI: FCC Part 15 Subpart B Class A, CISPR 22
EMS:
IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
IEC 61000-4-3 RS:
80 MHz to 1000 MHz: 3 V/m
1400 MHz to 2100 MHz: 3 V/m
2100 MHz to 2700 MHz: 1 V/m
IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
IEC 61000-4-5 Surge: Power: 2 kV (L-PE), 1 kV (L-L); Signal: 1 kV (L-L), 2 kV (L-PE)
IEC 61000-4-6 CS: 3 V
IEC 61000-4-8 PFMF: 3 A/m
Rail Traffic: EN 50155 (essential compliance*), EN 50121-3-2, EN 50121-4
*Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

ioPAC 8500 Series Modules

85M-1602-T: 16 digital inputs, 24 VDC, sink/source type



Inputs and Outputs
Digital Inputs: 16 channels
Isolation: 3k VDC or 2k Vrms

Digital Input
Sensor Type: Wet contact (NPN or PNP), dry contact
I/O Mode: DI, Counter or Frequncy
Dry Contact:
• On: short to GND
• Off: open
Wet Contact (DI to COM):
• Off: 0 to 3 VDC
• On: 10 to 30 VDC
Common Type: 8 points per COM
Counter Frequency: 5 kHz

Digital Filtering Time Interval: Software selectable (by 0.1 ms)

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

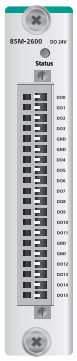
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 363.6 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,132,561 hrs
Standard: Telcordia SR332

RoHS EN 50121 CE FC

85M-2600-T: 16 digital outputs, 24 VDC, sink-type



Inputs and Outputs
Digital Outputs: 16 channels
Isolation: 3k VDC or 2k Vrms

Digital Output
Type: Sink
I/O Mode: DO or PWM
Pulse Output Frequency: 5 kHz
Over-Voltage Protection: 45 VDC
Over-Current Protection: 2.6 A (4 channels @ 650 mA)
Over-Temperature Shutdown: 175°C (typical), 150°C (min.)
Current Rating: 200 mA per channel

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

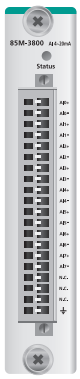
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 257.6 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 792,571 hrs
Standard: Telcordia SR332

RoHS EN 50121 CE FC

85M-3800-T: 8 analog inputs, 4 to 20 mA



Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Analog Input
Type: Differential
Resolution: 16 bits
I/O Mode: 4 to 20 mA (wire off)
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 100 samples/sec
• Per channel: 12.5 samples/sec
Input Impedance: 125 ohms (min.)

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

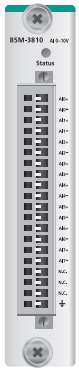
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 318.2 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,512,906 hrs
Standard: Telcordia SR332

RoHS EN 50121 CE FC

85M-3810-T: 8 analog inputs, 0 to 10 VDC



Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Analog Inputs
Type: Differential
Resolution: 16 bits
I/O Mode: 0 to 10 VDC
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 100 samples/sec
• Per channel: 12.5 samples/sec
Input Impedance: 200 kilo-ohms (min.)

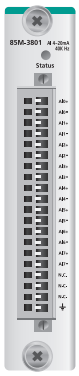
Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 315.2 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,530,690 hrs
Standard: Telcordia SR332

85M-3801-T: 8 analog inputs, 4 to 20 mA, 40 kHz



Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Analog Input
Type: Differential
Resolution: 16 bits
I/O Mode: 4 to 20 mA (wire off)
Historical Data Buffering: 60 KB per channel, 6-second data buffer at 5 kHz
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 40k samples/sec
• Per channel: 5k samples/sec
Input Impedance: 125 ohms (min.)

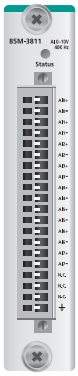
Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 378.8 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,426,112 hrs
Standard: Telcordia SR332

85M-3811-T: 8 analog inputs, 0 to 10 VDC, 40 kHz



Inputs and Outputs
Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Analog Inputs
Type: Differential
Resolution: 16 bits
I/O Mode: 0 to 10 VDC
Historical Data Buffering: 60 KB per channel, 6-second data buffer at 5 kHz
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Sampling Rate:
• All channels: 40k samples/sec
• Per channel: 5k samples/sec
Input Impedance: 20 mega-ohms (min.)

Physical Characteristics
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 378.8 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 1,426,112 hrs
Standard: Telcordia SR332

85M-5401-T: 4 serial ports (RS-232/422/485)

Serial Communication
Interface: 4 RS-232/422/485 ports, software selectable (DB44 female)
Isolation: 3k VDC or 2k Vrms
Note: DB44 to 4-port DB9 cable included in the package.

Serial Communication Parameters
Parity: None, Even, Odd
Data Bits: 7, 8
Stop Bits: 1, 2
Flow Control: RTS/CTS, XON/XOFF
Baudrate: 300 bps to 921.6 kbps

Serial Signals
RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422: Tx+, Tx-, Rx+, Rx-, GND
RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w: Data+, Data-, GND

Physical Characteristics
Connector: DB44 female

Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 375.8 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 596,611 hrs
Standard: Telcordia SR332

RoHS EN 50121 CE FC

85M-6600-T: 6 RTDs

Inputs and Outputs
RTD Inputs: 6 channels
Isolation: 3k VDC or 2k Vrms

RTDs
Input Type:
- PT50, PT100, PT200, PT500 (-200 to 850°C)
- PT1000 (-200 to 350°C)
- JPT100, JPT200, JPT500 (-200 to 640°C)
- JPT1000 (-200 to 350°C)
- NI100, NI200, NI500 (-60 to 250°C)
- NI1000 (-60 to 150°C)
- NI120 (-80 to 260°C)
- Resistance of 310, 620, 1250, and 2200 ohms

Sampling Rate (single channel):
- All channels: 12 samples/sec
- Per channel: 2 samples/sec

Resolution: 0.1°C or 0.1 ohms
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Input Impedance: 625 kilo-ohms (min.)
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

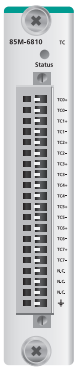
Environmental Limits
Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements
Input Current: 201.5 mA @ 3.3 VDC

MTBF (mean time between failures)
Time: 571,446 hrs
Standard: Telcordia SR332

RoHS EN 50121 CE FC

85M-6810-T: 8 thermocouples



Inputs and Outputs

Analog Inputs: 8 channels
Isolation: 3k VDC or 2k Vrms

Thermocouples

Sensor Type: J (0 to 750°C), K (-200 to 1250°C), T (-200 to 350°C), E (-200 to 900°C), R (-50 to 1600°C), S (-50 to 1760°C), B (600 to 1700°C), N (-200 to 1300°C)
Millivolt Type:
- Mode: ±78.126 mV, ±39.062 mV, ±19.532 mV
- Fault and over-voltage protection: -35 to +35 VDC (power off); -25 to +30 VDC (power on)

Sampling Rate (single channel):
- All channels: 12 samples/sec
- Per channel: 1.5 samples/sec

Resolution: 16 bits
Accuracy:
±0.1% FSR @ 25°C
±0.3% FSR @ -40 and 75°C
Input Impedance: 1 mega-ohm (min.)
Wiring: I/O cable, 16 AWG (max.)
Connector: Spring-type terminal block

Environmental Limits

Operating Temperature: -40 to 75°C (-40 to 176°F)

Power Requirements

Input Current: 175.5 mA @ 3.3 VDC

MTBF (mean time between failures)

Time: 2,324,891 hrs
Standard: Telcordia SR332

Common Specifications

Environmental Limits

Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Shock: IEC 60068-2-27
Vibration: IEC 60068-2-6

Standards and Certifications

Safety: UL 508
EMC: EN 55022/24
EMI: FCC Part 15 Subpart B Class A, CISPR 22
EMS:
IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
IEC 61000-4-3 RS:
80 MHz to 1000 MHz: 3 V/m
1400 MHz to 2100 MHz: 3 V/m
2100 MHz to 2700 MHz: 1 V/m
IEC 61000-4-4 EFT: Power: 1 kV; Signal 0.5 kV
IEC 61000-4-5 Surge: Power: 2 kV (L-PE), 1 kV (L-L); Signal: 1 kV (L-L), 2 kV (L-PE)
IEC 61000-4-6 CS: 3V
IEC 61000-4-8 PFMF: 3 A/m
Rail Traffic: EN 50155*, EN 50121-3-2, EN 50121-4
*Complies with a portion of EN 50155 specifications.

Warranty

Warranty Period: 5 years
Details: See www.moxa.com/warranty