TESO
AUTOMATION PRODUCTS FOR RAILWAY

The perfect solution for railway sub-system control and monitoring. 20 years experience in HVAC, doors, fire protection, lighting and toilets.

proTESO
PROGRAMMABLE CONTROLLERS FOR RAILWAY
PC1 Series Programmable Controllers

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COMMUNICATION GATEWAYS FOR RAILWAY
Communications Gateways

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I/O EXPANSION MODULES FOR RAILWAY
I/O Expansion Modules

iecTESO
IEC61131-3 PROGRAMMING SOFTWARE FOR RAILWAY
Programming Software



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oem
TECHNOLOGY SOLUTIONS

Automation products for railway

overview

OEM Technology Solutions are the designers and manufacturers of the Teso automation products for railway. OEM are in the business of providing solutions to the Rail Technology market, with a secondary market focus on the application of core rail technology capabilities into the wider transportation sector.

Specialising in the design and development of high technology products since 1993, OEM Technology Solutions combines technology, and innovative engineering and design services to provide turnkey solutions for our clients.

OEM Technology Solutions services include user requirements analysis, product specification, electronic hardware and software development, mechanical design and manufacture, production and testing, documentation and long term support.

index

capabilities

- Design and development to railway and transportation standards
  - Electronics (EN50155)
  - Software (EN50128)
  - Mechanical
- Integration/verification/ validation
- Manufacturing and production
- Custom designs

products

Control and monitoring systems for:

- HVAC
- Doors
- Fire protection
- Lighting
- Toilets

PC1 series programmable controllers

OEM Technology Solutions PC1 range of programmable controllers have been designed and manufactured to meet the most demanding control and monitoring applications particularly in the rail and associated transportation industries.

The PC1 controllers are low profile and are housed in rugged enclosures. Each comes with adequate mounting points and optional DIN mounting clips. All controllers are equipped with an Ethernet port for connection to the Local Area Network. Control and monitoring data maybe passed between controllers or onto the management system. The controllers have been designed to operate on a wide range of supply voltage and in demanding environmental conditions, making them ideal for rail and wider transport applications. The I/O on each controller may be extended by connecting addition I/O Expansion Modules to the RS485 port. I/O Expansion Modules are available in a range of configurations including analogue and digital inputs and outputs.

The internationally recognized *iecTeso* IEC61131-3 programming system makes configuring and programming the controllers simple. The use of graphical languages ensures that long term maintenance is not an issue.

programmable controller • feature matrix

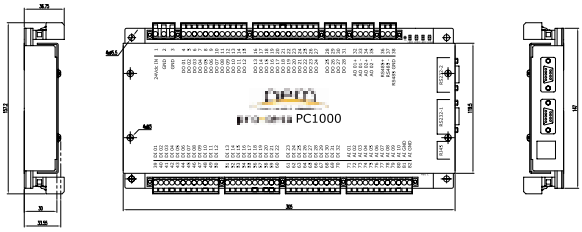
Description	PC1000	PC1100	PC1200	PC1300	PC1400	PC1600	PC1700
							
Input Voltage	+18 to +32 VDC	+18 to +32 VDC	+18 to +32 VDC	+18 to +32 VDC	+10 to +60 VDC	+18 to +32 VDC	220 to 255VAC
Current	250mA at 24VDC	250mA at 24VDC	250mA at 24VDC	250mA at 24VDC	250mA at 24VDC	250mA at 24 VDC	10mA at 240 VDC
Environmental	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	-20°C to +70°C,	-20°C to +70°C
Humidity	5% to 95%	5% to 95%	5% to 95%	5% to 95%	5% to 95%	5% to 95%	5% to 95%
Processor Speed	29.4 / 44.2 MHz	29.4 / 44.2 MHz	29.4 / 44.2 MHz	29.4 / 44.2 MHz	29.4 / 44.2 MHz	44.2 MHz	5 MHz
SRAM Memory	512K data	512K data	512K data	512K data	512K data	512 K program and 512 K data	3968 bytes
FLASH Memory	512K	512K	512K	512K	512K	512 K	64K
Serial FLASH Memory	16 MB NAND	16 MB NAND	16 MB NAND	16 MB NAND	16 MB NAND	32 MB NAND	No
Battery	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Watchdog	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Digital Inputs	32 x High or low Side	16 x High or low Side	8 x High or low Side	4 x High or low Side	2 x High 6x Low Side	16 x High or low Side	No
Digital Outputs	28 x MOSFET	18 x MOSFET	12 x MOSFET 3 x Relay (NO)	4 x Relay	8 x 500ma 24VDC	18 x low Side MOSFET	5 x Relay (NO)
Quadrature Encoder	No	No	No	No	2	1	No
Analogue Inputs	10 x 12-bit 0 to +10 VDC 0 – 20mA NTC Thermistor	6 x 12-bit 0 to +10 VDC 0 – 20mA NTC Thermistor	5 x 12-bit 0 to +10 VDC 0 – 20mA NTC Thermistor	4 x 12-bit 0 to +10 VDC 0 – 20mA NTC Thermistor	3 x 12-bit (Diff) 0 to +30 VDC 2 x 11-bit (single) 0 to +5 VDC	6 x 12-bit 0 to +10 VDC 0 – 20mA NTC Thermistor	1 x 12-bit NTC Thermistor
Universal Inputs (Configured as Digital or Analogue)	No	3 0 to +10 VDC 0 – 20mA NTC Thermistor	4 0 to +10 VDC 0 – 20mA NTC Thermistor	No	No	3 0 to +10 VDC 0 – 20mA NTC Thermistor	No
Analogue Outputs	2 x 10-bit 0 to +10 VDC 0 – 20mA	No	No	No	No	No	No
Programmable LEDs	3 Red/Green	1 Red/Green	1 Red/Green	1 Red, 1 Green	1 Red, 1 Green	4 Red/Green	5 Red, 1 Green
LCD Display Interface	Serial	Serial	Serial	Serial/Parallel	8 bit Serial	Serial, 4x20 char LCD	Serial
Programmable Push Button	No	No	No	Yes	No	No	No
Serial Communications	2 x RS-232 1 x RS-485	2 x RS-232 1 x RS-485 1 x RS-485	1 x RS-232 1 x RS232/RS485	4 x RS-232 1 x RS-485	3 x RS-232 1 x RS-422	2 x RS-232 1 x RS-485	1 x RS-232
Ethernet	1 x 10/100 Mbps	1 x 10/100 Mbps	1 x 10/100 Mbps	1 x 10/100 Mbps	1 x 10/100 Mbps	1 x 10/100 Mbps	No
Modbus	Yes – Master / Slave	Yes – Master / Slave	Yes – Master / Slave	Yes – Master / Slave	Yes – Master / Slave	Yes – Master / Slave	No
Enclosure	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Aluminium
Size	305 x 140 x 34	200 x 140 x 34	160 x 120 x 37	194 x 80 x 38	215 x 75 x 34	200 x 147 x 34	160 x 110 x 39
Terminations	Plug / socket	Plug / socket	Plug / socket	Plug / socket	Nylon "mini-fit"	Plug / socket	Screw Terminals
Compliance	EN50155	EN50155	EN50155	EN50155	EN50155	EN50155	AS/NZS 60950.1:2003.
EMC Testing	IEC1000-4-4 EN50155	IEC1000-4-4 EN50155	IEC1000-4-4 EN50155	IEC1000-4-4 EN50155	IEC1000-4-4 EN50155	IEC1000-4-4 EN50155	IEC61000-4-4 EN50155
I/O Expansion	Yes	Yes	Yes	Yes	Yes	Yes	No
Programming	ISaGRAF IEC61131-3 Dynamic C	ISaGRAF IEC61131-3 Dynamic C	ISaGRAF IEC61131-3 Dynamic C	ISaGRAF IEC61131-3 Dynamic C	ISaGRAF IEC61131-3 Dynamic C	ISaGRAF IEC61131-3 Dynamic C	Configurable via Console Port or C Programmable

PC1000 programmable controller

The *proTeso* **PC1000 Programmable Controller** is ideal for projects with lots of I/O. The PC1000 comes standard with 32 digital inputs, configurable in banks of eight as pull up to 24VDC or pull down to 0VDC.

The 28 digital outputs are designed for the toughest installations. Each are 35V Low-Side N-Channel MOSFET drivers and can sink 1A at 24VDC over the temperature range -40°C to +70°C.

Analogues are not forgotten on this controller with 10 inputs available on board, each channel can be individually configurable as 0 to +10 VDC, 0 – 20mA or NTC Thermistor (optimised for 2K ohm resistance at 25°C ambient). Outputs have a resolution of 10-bits and each channel can individually be configured as 10 to +10 VDC or 0 – 20mA.



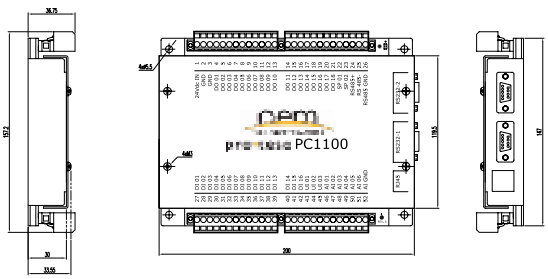
Description	PC1000	PC1030
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)	
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity	
Processor Speed	29.4 MHz	44.2 MHz
SRAM Memory	512K data	512K program and 512K data
FLASH Memory	(2 x 256K)	512K
Serial FLASH Memory	None	16 MB NAND Flash
Enhanced Memory	None	Option for 128MB
Battery	Data RAM and RTC battery backed via 950mAH battery	
Watchdog	CPU hardware watchdog	
Digital Inputs	Thirty Two (32) – Configurable in banks of eight as pull up to 24V or pull down to 0V	
Digital Outputs	Twenty Eight (28) – 35V Low-Side N-Channel MOSFETdriver output Each output can sink 1A at 24VDC over the temperature range -40°C to +70°C	
Analogue Inputs	Ten (10) – Resolution 12-bit. Each channel individually configurable as: 0 to +10 VDC or 0 – 20mA NTC Thermistor (optimised for 2K ohm resistance at 25°C ambient)	
Analogue Outputs	Two (2) – Resolution 10-bit Each channel individually configurable as: 0 to +10 VDC or 0 – 20mA	
Serial Communications	Two (2) x 5-wire RS-232 ports via DB-9 connectors One (1) x 2-wire RS-485 port via plug/socket connector	
Ethernet	None	One (1) – Ethernet port 10/100 Mbps via RJ-45 socket
Protocols	Modbus RTU Serial (Slave)	Modbus RTU Serial and TCP/IP (Master and Slave)
Enclosure	Anodised Aluminium	
Size	305mm x 140mm x 34mm	
Terminations	Plug / socket cage clamp connectors – V0 flammability rating – Cage clamping range maximum 1.5mm^2 machine tool (MTW)	
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.	
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7	
I/O Expansion	Analogue and digital I/O expansion modules connected via the RS485 port	
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C	

PC1100 programmable controller

The *proTeso* **PC1100 Programmable Controller** provides flexibility by incorporating universal inputs that can be analogue or digital. Added to the existing I/O configuration this added flexibility ensures that the PC1100 fits the application exactly.

By combining the existing 6 analogue inputs with the 3 universal inputs a total of 9 analogue inputs may be achieved. The analogues have the same specification as the PC1000.

The PC1100 is also configured with 16 digital inputs and 18 digital outputs all with the same specification as the PC1000 Programmable Controller.



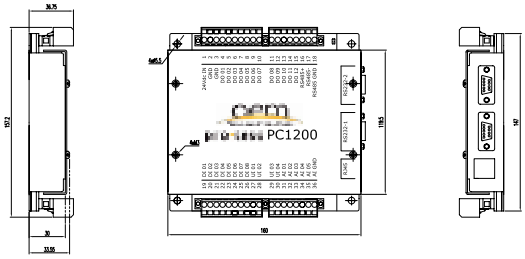
Description	PC1100	PC1130
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)	
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity	
Processor Speed	29.4 MHz	44.2 MHz
SRAM Memory	512K data	512K program and 512K data
FLASH Memory	(2 x 256K)	512K
Serial FLASH Memory	None	16 MB NAND Flash
Enhanced Memory	None	Option for 128MB
Battery	Data RAM and RTC battery backed via 950mAH battery	
Watchdog	CPU hardware watchdog	
Digital Inputs	Sixteen (16) – Configurable in banks of eight as pull up to 24V or pull down to 0V	
Digital Outputs	Eighteen (18) – 35V Low-Side N-Channel MOSFET driver output Each output can sink 1A at 24VDC over the temperature range -40°C to +70°C	
Analogue Inputs	Six (6) – Resolution 12-bit. Each channel individually configurable as: 0 to +10 VDC or 0 – 20mA NTC Thermistor (optimised for 2K ohm resistance at 25°C ambient)	
Universal Inputs	Three (3) each channel individually configurable as: digital input as per the above specification or analogue input configurable as 0 to +10 VDC, NTC Thermistor or 0 – 20mA (via an external resistor)	
Serial Communications	Two (2) x 5-wire RS-232 ports via DB-9 connectors One (1) x 2-wire RS-485 port via plug/socket connector	
LED	One (1) – programmable LED	
Ethernet	None	One (1) – Ethernet port 10/100 Mbps via RJ-45 socket
Protocols	Modbus RTU Serial (Slave)	Modbus RTU Serial and TCP/IP (Master and Slave)
Enclosure	Anodised Aluminium	
Size	200mm x 140mm x 34mm	
Terminations	Plug / socket cage clamp connectors – V0 flammability rating – Cage clamping range maximum 1.5mm^2 machine tool (MTW)	
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.	
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7	
I/O Expansion	Analogue and digital I/O expansion modules connected via the RS485 port	
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C	

PC1200 programmable controller

The *proTESO* **PC1200 Programmable Controller** provides less I/O but maintains the flexibility by incorporating universal inputs that can be analogue or digital.

By combining the existing 5 analogue inputs with the 4 universal inputs a total of 9 analogue inputs may be achieved. The analogues have the same specification as the PC1000 and PC1100.

The PC1200 is also configured with 8 digital inputs and 12 digital outputs all with the same specification as the PC1000 and PC1100 Programmable Controllers.

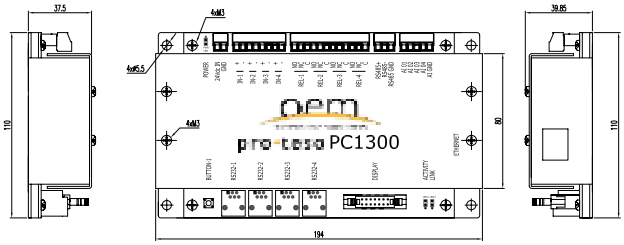


Description	PC1200	PC1220	PC1230
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)		
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity		
Processor Speed	29.4 MHz	44.2 MHz	
SRAM Memory	512K data	512K program and 512K data	
FLASH Memory	(2 x 256K)	512K	
Serial FLASH Memory	None	None	16 MB NAND Flash
Enhanced Memory	None	Option for 128MB	
Battery	Data RAM and RTC battery backed via 950mAH battery		
Watchdog	CPU hardware watchdog		
Digital Inputs	Eight (8) – Configurable in banks of eight as pull up to 24V or pull down to 0V		
Digital Outputs	Twelve (12) –35V Low-Side N-Channel MOSFET driver output. Each output can sink 1A at 24VDC over the temperature range -40°C to +70°C		
Analogue Inputs	Five (5) – Resolution 12-bit. Each channel individually configurable as: 0 to +10 VDC or 0 – 20mA NTC Thermistor (optimised for 2K ohm resistance at 25°C ambient)		
Universal Inputs	Four (4) each channel individually configurable as: digital input as per the above specification or analogue input configurable as 0 to +10 VDC, NTC Thermistor or 0 – 20mA (via an external resistor)		
Serial Communications	One (1) x 5-wire RS-232 ports via DB-9 connector One (1) x 2-wire RS-485 port via plug/socket connector One (1) configurable RS-232/RS-485 Port via DB-9 connector		
LED	One (1) – programmable LED		
Ethernet	None	One (1) – Ethernet port 10/100 Mbps via RJ-45 socket	
Protocols	Modbus RTU Serial (Slave)	Modbus RTU Serial and TCP/IP (Master and Slave)	
Enclosure	Anodised Aluminium		
Size	160 mm x 120 mm x 37 mm		
Terminations	Plug / socket cage clamp connectors – V0 flammability rating – Cage clamping range maximum 1.5mm² machine tool (MTW)		
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.		
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7		
I/O Expansion	Analogue and digital I/O expansion modules connected via the RS485 port		
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C		

PC1300 programmable controller

The *proTESO* **PC1300 Programmable Controller** is perfect for applications with lots of communications requirements. The PC1300 comes with 5 serial ports configured as 4 x RS232 and 1 x RS485. It also incorporates Ethernet 10/100Base-T.

Four (4) relay outputs with both normally open and normally closed contacts provide flexibility and isolation. These are matched with 4 x digital inputs and 4 x analogue inputs. The PC1300 also includes an 8-bit LCD bus to connect directly to low cost LCDs.

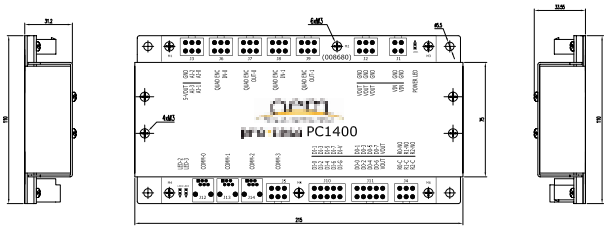


Description	PC1300
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity
Processor Speed	29.4 MHz
SRAM Memory	512K data
FLASH Memory	(2 x 256K)
Serial FLASH Memory	None
Enhanced Memory	None
Battery	Data RAM and RTC battery backed via 950mAH battery
Watchdog	CPU hardware watchdog
Digital Inputs	Four (4) – Jumper selectable pull up or pull down, referenced to 5 or 15 volts
Digital Outputs	Four (4) – Dry contact relay outputs NO, NC, COM. 24VDC at 2 Amps
Analogue Inputs	Four (4) – Resolution 12-bit. Each channel individually configurable (in factory) as: 0 to +10 VDC or 0 – 20mA or NTC Thermistor (optimised for 2K ohm resistance at 25°C ambient)
Serial Communications	Four (4) x 5-wire RS-232 ports via modular connector One (1) x 2-wire RS-485 port via plug/socket connector
LCD Display Interface	14 way header for connecting industry standard LCD character display
LEDs	Two (2) – Activity and Link status indicators for Ethernet interface
Push Button	One (1) – programmable push button input
Ethernet	None
Protocols	Modbus RTU Serial (Slave)
Enclosure	Anodised Aluminium
Size	194 mm x 80 mm x 38 mm
Terminations	Plug / socket screw connectors, modular for comms ports and 0.1" DIL header for LCD display. V0 flammability rating. Wire size to 1.5mm²
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C

PC1400 programmable controller

The *proTeso* **PC1400 Programmable Controller** provides an assortment of I/O interfaces for those difficult applications where equipment interfaces are not always straight forward. High and low side digital inputs, relay and transitor driver outputs, differential and single ended analogue inputs. The PC1400 comes with four serial ports and 1 x Ethernet 10/100Base-T.

Using the two quadrature inputs of the PC1400, the controller is able to calculate both position and direction of rotation.

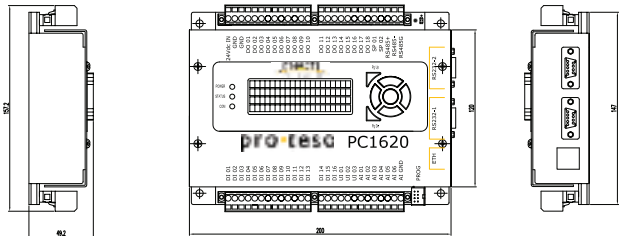


Description	PC1400
Input Voltage	+10 to +60 VDC
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity
Processor Speed	29.4 MHz
SRAM Memory	512K data
FLASH Memory	(2 x 256K)
Serial FLASH Memory	None
Enhanced Memory	None
Battery	Data RAM and RTC battery backed via 950mAH battery
Watchdog	CPU hardware watchdog
Digital Inputs	Eight (8) – 2 isolated banks. Bank 1 – Two (2) pull down. Bank 2 – Six (6) pull up.
Digital Outputs	Eight (8) open collector outputs, 500mA @ 24V DC
Relay Outputs	3 Dry contact relay outputs, Normally Open, 5A @ 24V DC
Analogue Inputs	Three (3) – 1 x differential AI-0 & AI-1, range : 30V (12 bit) 2 x single ended AI-2, AI-3, range : 5V (11 bit)
Quadrature Encoder	2 Quadrature decoder input channels (RS-422 / R485)
Serial Communications	Three (3) x RS-232 ports (comm-0 to comm-2) One (1) x 2-wire RS-422 / RS-485 port (comm-3)
LEDs	1 power LED. PC1400 Two (2) – programmable indicator LEDs PC1410 Ethernet link & activity LEDs
Ethernet	None
Protocols	Modbus RTU Serial (Slave)
Enclosure	Anodised Aluminium
Size	215 mm x 75 mm x 34 mm
Terminations	Nylon "mini-fit" connectors 6 & 10 way, modular for comms ports
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C

PC1600 programmable controller

The *proTeso* **PC1600 Series** are "tough, smart and very, very flexible" multi-function, multi-purpose Programmable Controllers with an extensive range of I/O, communications ports and data storage and manipulation capabilities.

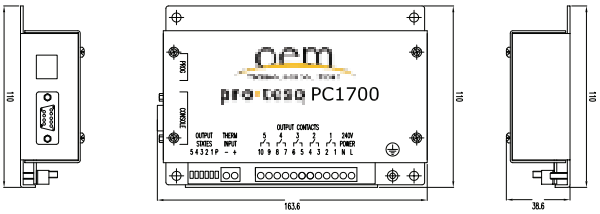
The PC1600 Series have been designed to operate in tough industrial environments, and are ideal for environmental monitoring, SCADA systems, energy management and control, data-logging, distributed control systems and transportation monitoring and control applications.



Description	PC1600 Board only	PC1610 Enclosure	PC1620 Enclosure and LCD
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)		
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity		
Processor Speed	44.2 MHz		
SRAM Memory	512K program and 512K data		
FLASH Memory	512 kB		
Serial FLASH Memory	32 MB NAND		
Backup Battery	Data RAM and RTC battery backed via 950mAH battery		
Real Time Clock	Yes. 1 second resolution		
Watchdog	CPU hardware watchdog		
Digital Inputs	Sixteen (16) – Configurable in banks of eight as pull up to 24V or pull down to 0V		
Digital Outputs	Eighteen (18) - 35V Low-Side N-Channel MOSFET driver output Each output can sink 1A at 24VDC over the temperature range -20°C to +70°C		
Analogue Inputs	Six (6) – Resolution 12-bit. Each channel individually configurable as: 0 to +10 VDC or 0 – 20 mA or NTC Thermistor (optimised for 10K ohm resistance at 25°C ambient)		
Universal Inputs	Three (3) – Resolution 12 bit. Each channel individually configurable as: Digital input as per the above specification or Analogue input configurable as ±10 VDC, 0 to +10 VDC, NTC Thermistor or 0 – 20mA (via an external resistor)		
Ethernet	One (1) – Ethernet port 10/100 Mbps via RJ-45 socket with Link and Activity LEDs		
Serial Communications	One (1) 3-wire RS232 Port via DB9 connector. One (1) 7-wire RS232 Port via DB9 connector. One (1) 3-wire RS485 Port via plug/socket connector		
LCD	N/A	N/A	Four (4) lines of twenty (20) characters with LED backlight (with on/off control)
Keypad	N/A	N/A	Seven (7) keys (left, right, up, down, OK, page up, page down)
LED	N/A	N/A	Four (4) – programmable LEDs
Enclosure Material	Anodised Aluminium Plate	Anodised Aluminium Enclosure	Anodised Aluminium Enclosure
Size	200mm x 147mm x 1.6mm	200mm x 147mm x 34mm	200mm x 147mm x 47mm
Protocol Support	Modbus TCP/IP (Master and Slave)		
Terminations	Plug / socket cage clamp connectors – V0 flammability rating – Cage clamping range maximum 1.5mm2 machine tool (MTW)		
Compliance	EN50155:2007 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.		
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7		
I/O Expansion	Analogue and digital I/O expansion modules connected via the RS485 port using Modbus RTU protocol. Refer to the IO.Teso Expansion Modules		
Programming	ISaGRAF V5 – IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C		

PC1700 programmable controller

The *proTeso* **PC1700 Programmable Controller** is a cost effective five (5) stage thermostat suitable for industrial and commercial application for optimum air conditioning control.



Description	PC1700
Input Voltage	200 to 255Vac
Environmental	Operational -20°C to +70°C, 5% to 95% Relative Humidity
Processor Speed	PIC18F2620 @ 19.66 MHz
SRAM Memory	3968 bytes
FLASH Memory	64 kB
EEPROM Memory	1024 bytes
Backup Battery	None
Real Time Clock	None
Watchdog	CPU hardware watchdog
Relay Outputs	Five (5) – SPST NO Relay Outputs Dry Contacts Each output rated to switch 8A @ 250VAC (resistive load) or 5A @ 30VDC
Analogue Inputs	One (1) – Resolution 12-bit configured for NTC Thermistor. (optimised for 10K ohm resistance at 25°C ambient)
Serial Communications	One (1) x PIC programming port via RJ12 (Prog) One (1) x 3-wire RS-232 ports via DB-9 connector (Console)
LED	Five (5) – LEDs (Red) indicate status of Relay Output Coils One (1) – LED (Green) programmable.
Enclosure	Aluminium – IP20
Size	160mm x 110mm x 39mm, 420 grams
Terminations	Screw Terminals – V0 flammability rating – Clamping range maximum 2.5mm2 machine tool (MTW)
Compliance	AS/NZS 60950.1:2003
EMC Testing	Fast Electrical Transient Burst. All Relay Outputs, Analogue Input and Communications Ports comply with IEC61000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate (as per EN50155 Section 10.2.7)
Programming	Configurable via Console Port or C Programmable

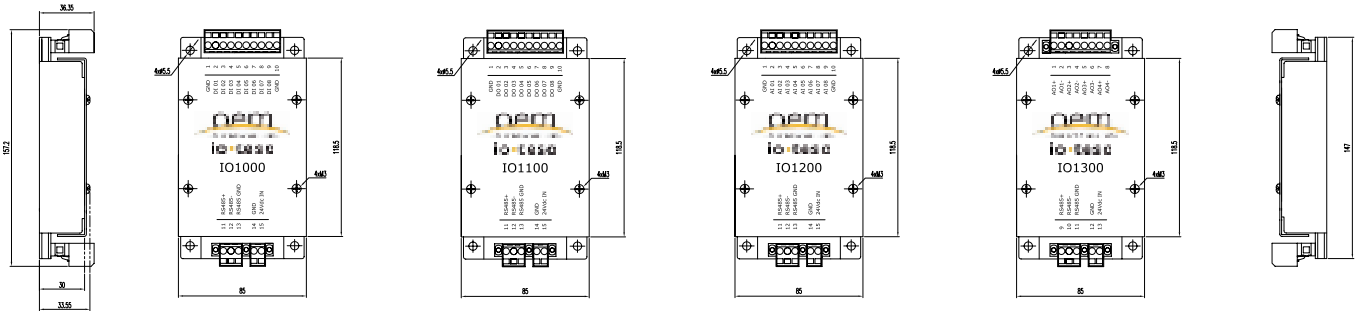
ioTeso I/O expansion modules

I/O EXPANSION MODULES FOR RAILWAY

The *ioTeso* **I/O Expansion Modules** are a flexible way to increase the I/O density of the ProTeso range of Programmable Controllers. The I/O expansion modules offer a range of alternate types and configurations such as analogue 0-10V, 4-20ma, optical inputs and relay outputs.

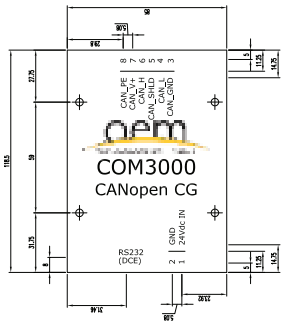
The *ioTeso* **I/O Expansion Modules** connect to the programmable controller via the multidrop RS485 network. Each module has a unique identifier to permit as many as 32 I/O modules to reside on the one RS485 expansion network.

Description	IO1000	IO1100	IO1200	IO1300
Input Voltage	+18 to +32 VDC (Nominal 24 VDC at 250mA)			
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity			
Digital Inputs	Eight (8) – Configurable as pull up to 24V or pull down to 0V	None		
Digital Outputs	None	Eight (8) – Each output can sink 1A at 24VDC	None	
Analogue Inputs	None		Eight (8) – 12-bit 0 to +10 VDC or 0 – 20mA NTC Thermistor 2K	None
Analogue Outputs	None			Four (4) – 10-bit 0 to +10 VDC or 0 – 20mA
Serial Communications	One (1) x 2-wire RS-485 port via plug/socket connector			
Protocols	Modbus RTU Serial (Slave)			
Enclosure	Anodised Aluminium			
Size	158mm x 85mm x 37mm			
Terminations	Plug / socket cage clamp connectors – V0 flammability rating – Cage clamping range maximum 1.5mm2 machine tool (MTW)			
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.			
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7			
Programming	IEC61131-3 (SFC, FBD, LD, ST, IL, FC) or Dynamic C from Master Controller			



Communications gateways

COM3000 CANopen communications gateway



The *comTESO* **COM3000 CANopen Communications Gateway** (CANopen CG) is an advanced serial to CANopen gateway. The COM3000 is a low cost, high performance device that is used for connecting RS-232 devices to CANopen – it is perfectly suited for adding-on to existing PLC's or programmable controllers and for the creation of slave CANopen controllers for existing applications.

The device provides the complex implementation of the CANopen standards DS301 and DS401. On the CANopen bus side, the COM3000 CANopen CG simulates a CANopen slave node with protocol support for up to 256 digital inputs and 256 digital outputs, or 32 analogue inputs (8 bit) and 32 analogue outputs (8 bit). The Tx and Rx PDO's can also be programmed to combine those AI's, AO's, DI's and DO's as required.

Description	COM3000	COM3010	COM3020	COM3030
Input Voltage	+18 to +32 VDC			
Environmental	Operational -40°C to +70°C 5% to 95% Relative Humidity			
CANopen options	2 Transmit & 2 Receive PDOs	Galvanically Isolated 2 transmit & 2 Receive PDOs	4 Transmit & 4 Receive PDOs	Galvanically Isolated 4 transmit & 4 Receive PDOs
CANopen port	Quantity one (1) CANopen communications port, implementing the CiA draft standards. DS301 Version 4.0 and DS401 Version 2. Transmit and Receive PDOs configurable as: • 64 digital inputs, 64 digital outputs, 4 analogue inputs and 4 analogue outputs or • 128 digital inputs and 128 digital outputs Node identifier set via Dip switches in the range of 1-127 or programmable from host. All CANopen specific PDO transmission types supported. These are: Synchronous, Asynchronous, Event driven, Cyclic, Acyclic, Remote frame dependent. Event timer and inhibit timer features for all transmit PDOs. Configurable for Node guarding, Life guarding and Heartbeat. CANopen baud rate set via DIP switches for 10, 20, 50, 125, 250, 500, 800, 1000 kb/sec			
RS232 port	Quantity one (1) RS-232 communications port. RS-232 baud rate set via DIP switches in the range of 2400 – 76900 bps			
LEDs	Quantity one (1) Status LED/CANopen Run LED. Quantity one (1) CANopen Error LED.			
Enclosure	Anodised Aluminium 147mm long x 85mm wide x 34mm high without connectors 158mm long x 85mm wide x 37mm high with vertical connectors			
Terminations	Plug / socket cage clamp connectors for CAN bus and DC input voltage – UL94V-0 flammability rating – Cage clamping range maximum 1.5mm² machine tool (MTW). DB9 Female connector for RS-232 port			
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.			
EMC Testing	Fast Electrical Transient Burst. All DI, DO, AI and Serial Ports comply with IEC1000-4-4, Level 4 Criteria A, 2 kV voltage peak 5 kHz repetition rate as per EN50155 Section 10.2.7			

COM3100 Serial galvanic isolators

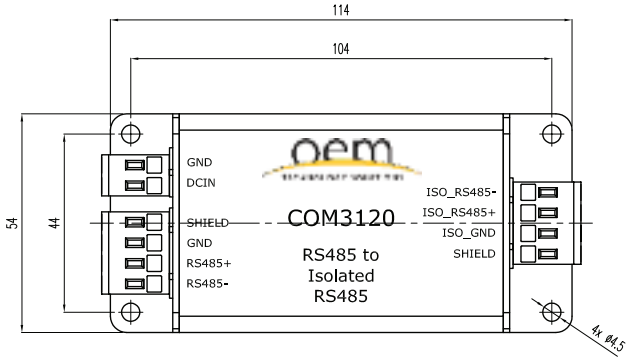
Description	COM3100 RS232 input and RS232 output	COM3110 RS232 input and RS485	COM3120 RS485 input and RS485
Input Voltage	+14.4VDC to +33.6VDC Nominal 24 VDC		
Environmental	Operational -40°C to +85°C		
Humidity	5% to 90% Relative Humidity		
RS232	Baud Rate supported up to 115kbit/sec. Signals supported: TXD, RXD, RTS, CTS, GND		
RS485		Baud Rate supported up to 115kbit/sec. Signals supported: RS485+, RS485-, GND	
Enclosure	Anodised Aluminium		
Size	118.35mm x 54mm x 25mm		114mm x 54mm x 25mm
Compliance	Compliance to application of Direct Transient as per IEC61000-4-5 to +/-2kV with performance Criteria A. Compliance to application of Transient Burst as per IEC61000-4-4 to +/- 2kV with performance Criteria A.		

The *comTESO* **COM3100 Serial Isolators** provide galvanic isolation for RS232 and RS485 networks.

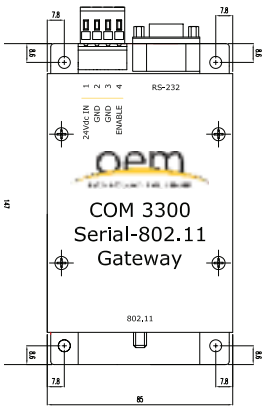
The COM3100 provides a galvanically isolated interface between a RS232 input (PLC Side) and RS232 output (Field Side). The RS232 input (PLC Side) is not galvanically isolated from the power supply. The RS232 output (Field Side) is galvanically isolated from the power supply.

The COM3110 provides a galvanically isolated interface between a RS232 input (PLC Side) and RS485 output (Field Side).

The COM3120 provides a galvanically isolated interface between a RS485 input (PLC Side) and RS485 output (Field Side).



COM3300 RS232 to WiFi gateway



Description	COM3300 – RS232 to WiFi 802.11b Communications Gateway
Input Voltage	+16.8 to +32 VDC (Nominal 24 VDC
Current	250 mA (when transmitting or receiving)
Environmental	Operational -30°C to +75°C
Humidity	5% to 90%
Serial ports	Quantity one (1) RS-232 port for serial communications
Transceiver Enable	Volt free contact digital input to enable and disable the 802.11b transceiver. Closed contact = enable, Open contact = disable.
WiFi	IEEE 802.11b, 2.4 GHz, Up to 11 Mbps with automatic fallback, Modulation: CCK (11/5 Mbps), DQPSK (2 Mbps), DBPSK (1 Mbps), Transmit power 16 dBm typical, receive sensitivity -82 dBm @ 11 Mbps
LEDs	Power, Link Activity, Network Activity
Enclosure	Anodised Aluminium
Size	• 147mm long x 85mm wide x 34mm high without connectors or antenna • 164mm long x 85mm wide x 34mm high with horizontal connectors and without antenna
Terminations	• 2 way Plug / socket connector for DC input voltage • 2 way plug / socket connector for Enable / Disable input • DB9 Male connector for RS-232 port • RP-SMA Jack antenna connector
Compliance	EN50155:1996 – Compliance with Visual Inspection, Performance Test, Cooling Test, Dry Test, Supply Related Surge and Transient Susceptibility Test, Transient Burst Susceptibility Test and Vibration, Shock and Bump Test.
EMC Testing	Fast Electrical Transient Burst. Serial Ports comply with IEC1000-4-4, Level 4 Criteria A. 2 kV voltage peak 5 kHz repetition rate (as per EN50155 Section 10.2.7).
Regulatory Approvals	FCC, Part 15 Class B; EN55022, Class B; EN61000-3-2 and EN61000-3-3; ICES-003, Class B; VCCI, Class II; AS 3548 CISPR 22; FCC Part 15 Subpart C Section 15.247; IC (Industry Canada) RSS-210 Issue 5 Section 6.2.2(o); EN300 328; EN301 489-3; UL 60950-1; EN60950 (European Union); CSA C22.2, No. 60950; EN55024

The *comTESO* **COM3300** is a serial RS232 to Wireless 802.11b gateway.

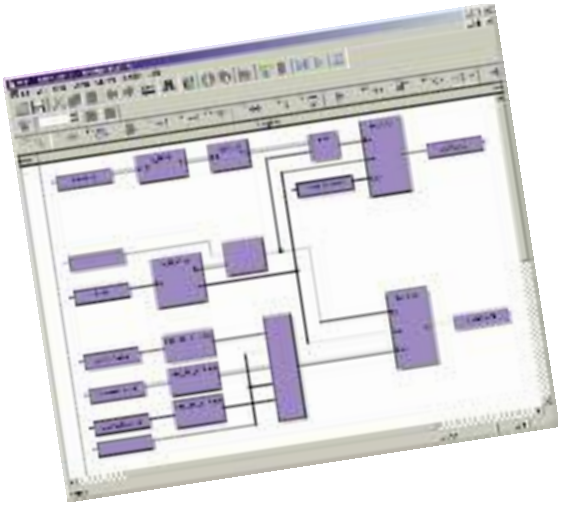
A network of COM3300s can be configured with a private 802.11 network to connect multiple RS232 devices to a central PC or laptop. This has been used to connect to remote maintenance interface ports (HVAC, doors, brakes) in difficult to get-to locations.

iecTESO Programming software

iecTESO **Programming software** is the PC based development package that is used to program PC1 range of products.

iecTESO is a Windows based software development environment to fully support all IEC61131-3 PLC languages:

- Sequential Function Chart (SFC)
- Function Block Diagram (FBD)
- Ladder Diagram (LD)
- Structured Text (ST)
- Instruction List (IL)



product features

Scaleable	The *iecTESO* Programming Workbench for the PC1 product range is available in 32, 128 and 256 I/O licences.
Allows Customisation	The *iecTESO* Workbench allows users to create their own Function Blocks to help protect their software and optimise their application.
Enhanced Development Tools	The development environment includes on-line debugging, program simulation and complex variable declaration.
Communications Capability	Modbus TCP, Modbus Serial, IPTCom, MVB, Flexity/UDP, LONWorks, CANopen, WiFi, 3G, RS232, RS485, HDLC RS485.

Applications

train HVAC controls

The Heating, Ventilation and Air Conditioning (HVAC) control system within an onboard railway application needs to be reliable, accurate and resistant to shock and vibration. Rail passengers demand comfort whether the temperature is extremely hot or cold outside the vehicle. The train saloon should be a place of comfort and relaxation. The engineers at OEM Technology Solutions are experts at understanding the requirements of rail HVAC control systems and have applied innovative techniques in the design of our electronic hardware and associated firmware for the controller. The result is a complete range of HVAC controllers suitable for the railways industry. All controllers have been designed to comply with the strict railway standard EN50155 for electronic equipment used on rolling stock.

train location server

Our customer required an EN50155 compliant train location server to integrate into their existing tram fleet. The requirement was for a high reliability controller to provide a GPS location, to extract data from the existing ticketing machine and the existing odometer and to communicate position and passenger data to and from a shore based computer using 3G cellular communications. Our proTESO range of programmable controllers was the perfect choice for this application as all the electronic building blocks were available off-the-shelf. The product development involved software development of the low level drivers and design and manufacture of a custom 19" enclosure.

train door controls

The proTESO range of Programmable Controllers was selected for an external train door control and safety override solution. Our customer required a railway compliant and certified product and the support of a company with railway industry experience for the provision of software development services to the EN50128 standard. OEM Technology Solutions was chosen for this train door control project as we complied with all of our customer's requirements.
The door controller system provides the necessary dual communications system architecture via the combination of Ethernet and RS485.

train toilet controls

Train toilet systems are essential for intercity and high speed trains for passenger comfort. As a result, the train toilet control system must be highly efficient and reliable to ensure minimal water usage and water recycling wherever possible. The toilet control system is responsible for delivering high pressure water to clean the toilet and removal of waste via a vacuum system. The proTESO Programmable Controller has been chosen by a train toilet sub-system supplier because of its ease of programming, its modular nature, and because of its extensive suite of TCMS interfaces – including Ethernet, MVB, CANopen and LONWorks. This allows the base proTESO controller to be used for all of our customer's toilet control system applications and additional I/O or TCMS interfaces added on a project by project basis as needed.

key customers

- Bombardier Transportation
- Alstom Transport
- Siemens Mobility
- Hyundai Rotem
- Kawasaki Heavy Industries
- Downer EDI Rail
- United Group Limited Rail
- Stadler Rail
- Thales Australia
- Lockheed Martin
- Knorr Bremse
- Faiveley Transport
- Noske Kaeser
- Vossloh Kiepe
- EVAC
- Tyco Traffic and Transportation
- Yarra Trams
- Transdev
- Railcorp
- Pacific National
- Australian Railroad Group

awards

- Australian Technology Showcase, NSW Patrons Award for Export Achievement – 2011
- Engineers Australia – Control Systems and Communications 2008
- Engineers Australia – Software and Embedded Systems 2008

quality approvals

- QMS ISO9001:2008
- EMS ISO14001:2004
- OHS AS18001:2007

industry references

- Shanghai Metro Line 12, Line 16, China
- Rio Metro, Rio Supervia, Brazil
- Bangalore Metro, India
- Macau LRT, Macau
- Wuhan Line 2, China
- Waratah Trains, DownerEDI Rail, Sydney, Australia
- MTRC West Island, Hong Kong
- School Zone Signs, Sigtec/ RMS, NSW, Australia
- Turbostar, Bombardier Transportation, UK
- Onboard Bus Computer, Tyco/RMS, NSW, Australia
- TTY, Taipei, Kawasaki Heavy Industries, Taiwan
- MBTA, Hyundai ROTEM, Boston, USA
- Electronic Speed Limit Sign, Dept Transport / Tyco Traffic, VIC, Australia
- KL Kelena Jaya, Bombardier Transportation, Kuala Lumpur, Malaysia
- Tango Variobahn, Stadler, Germany
- Desiro DMU, Siemens Transportation Systems, UK
- Tangara Upgrade, Railcorp, Sydney, Australia

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