Datasheet
marine

TM-EFDC

Versatile Ethernet I/O unit

The **TM-EFDC** is an Ethernet-based versatile I/O- unit, which can be used in various monitoring and control applications. The unit is designed to be particularly suitable for ship applications, such as Integrated Bridge Systems (IBS) and navigation simulator I/O- systems.

The unit can be used also in industrial and building automation. The unit fulfils the IEC 60945:2002 EMC standard and respective environmental standards.

Properties

The **TM-EFDC** consists of a general purpose I/O part, communication parts, and an ethernet interface. The unit has a built-in power supply unit with 18…36 VDC input range. Two separate power supply sources, with automatic change-over are provided. The power source and monitoring is included in the onboard software.

The I/O part contains 32 digital inputs and 32 digital outputs, 4 analog inputs and 4 analog outputs. The unit contains a reference-voltage source to supply external potentiometers or sensors.

The communication part contains six UART-type serial interface channels with galvanic isolated RS422/RS485 or RS422 drivers. One channel also has an alternative RS232 driver available. There is also one galvanic isolated CAN-Bus channel. The ethernet part integrates a 5- port 10/100 ethernet switch.

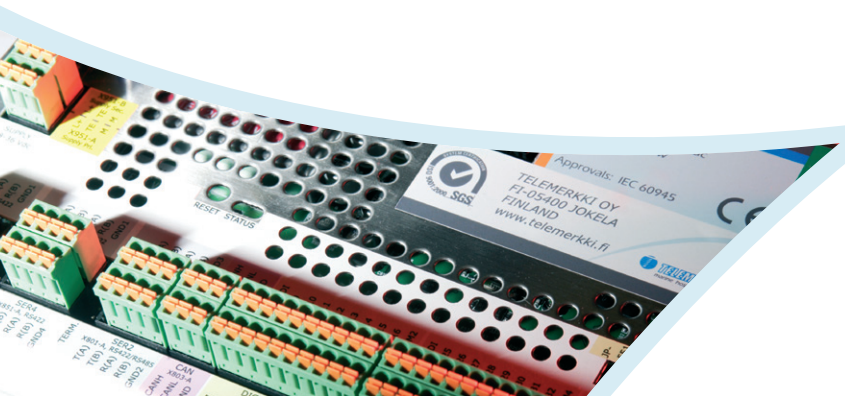
The **TM-EFDC** units can be connected in a chain, without the need of an external ethernet switch (the onboard switch functions as a normal ethernet switch). The setting-up and parameterisation of the TM-EFDC module is performed through the WEB-server, using a normal HTML-browser.

General purpose I/O (remote I/O Server)

Control of the TM-EFDC digital and analogue I/O- parts are available through MODBUS/TCP protocol. The onboard basic software application contains a MODBUS/TCP server and the user can read the digital and analogue input registers and write corresponding output registers through this MODBUS/TCP server function.

The digital outputs can be selected to operate as 0...100% PWM output for example the dimming of the panel pilot lights.

The signal level of the analog inputs and outputs are ±10 volts. The precision of the conversion is 16 bits. Analogue values are presented in a normalized form, optionally either in the area of ±10000 or ±1000‰ (resolution 1 mV or 10mV), corresponding to the signal's ±10 V range.



Company Profile

Telemerkki offers industry-leading mechanical and electrical design and production services. Our service concept includes skilled staff specialised in project production, sophisticated production methods and the control of production and logistics from sales to delivery in accordance with the requirements and needs of our clients. Our service is based on over 35 years of experience and the quality certificates granted by SGS Fimko Oy (ISO 9001-2000 and production EN60439).

The main product branches of our activities are:

- bridge and engine control room consoles of ships
- bridge consoles and equipments related to ship management simulators
- electronics, software and integrated control panels needed for the control of hospital operating theatres
- project-specific device manufacture

Our activities are based on fast lead times and the effective management of the order and delivery process of several simultaneous projects. Product manufacture includes mechanical and electrical project design, client approvals, overall logistics management, sheet metal mechanics, and the testing and manufacture of the electrical device carried out by our electrical engineering department.

The basic values of our activities are responsibility, reliability, quality, efficiency and transparency. By following these values, we offer our clients a flexible, reliable and competitive total delivery, whose purpose is to save the resources of the client for core know-how management.

In the future, we want to offer our clients an even broader aggregate delivery and a production service that also includes products or partial components for the client's systems.

TELEMERKKI

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Communication part (Serial Device server)

The TM-EFDC communication part operates as a serial data communication device server. With this server function, the traffic through the UART (RS422 and RS232) and CAN- ports can be transferred either by UDP or TCP- protocols into the Ethernet-network (LAN).

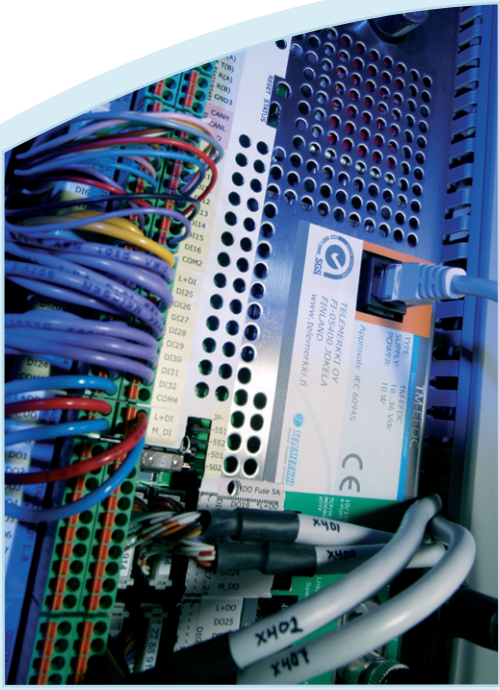
The UART and CAN- controlled transport parameters and the UDP and TCP server properties are set by the HTML browser.

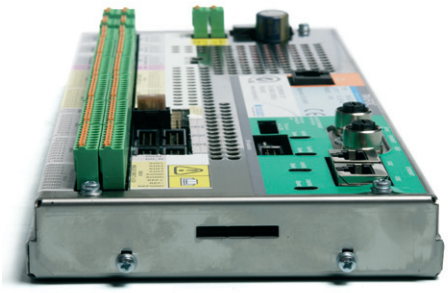
The TM-EFDC unit has two RS422/485 and four RS422 galvanic isolated serial channels. There is also alternatively RS232 line driver available for one serial channel.

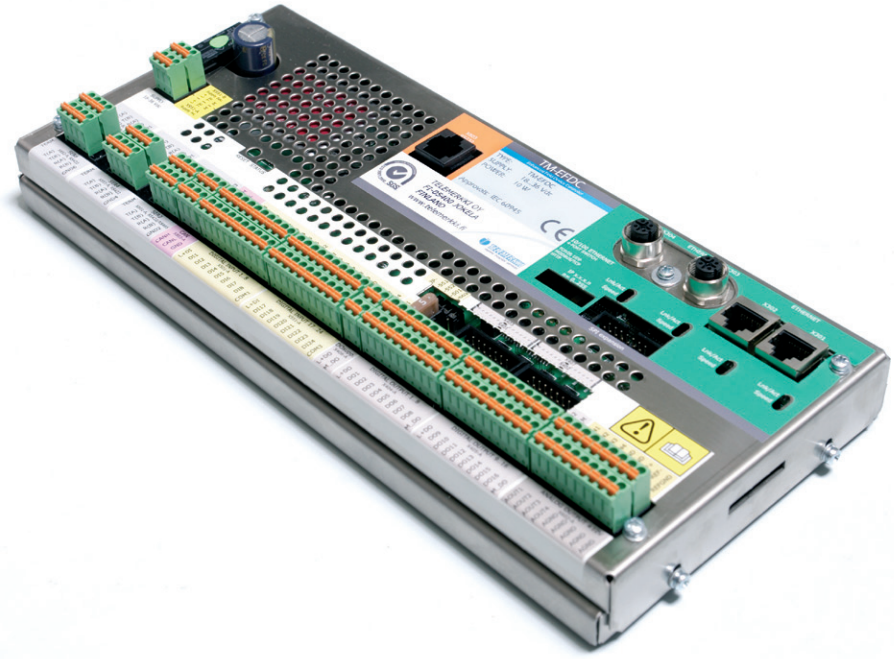
All RS422/RS485 and RS422 Serial channels fully conform to IEC61162-2 standard and also compatible with IEC61162-1 standard devices.

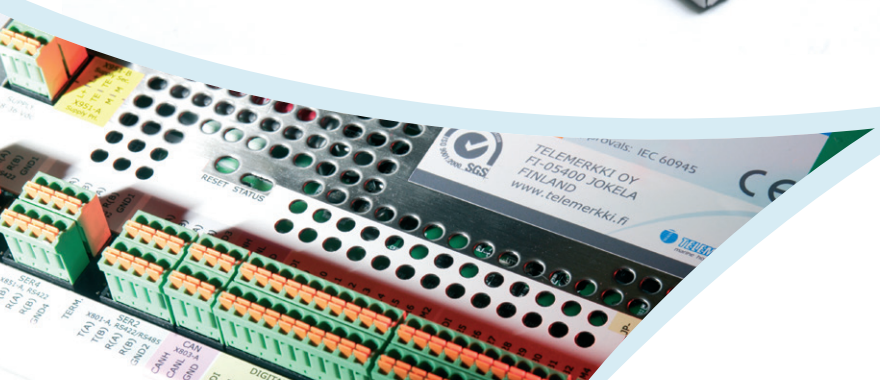
Ethernet Switch

The onboard Ethernet switch is equipped with two normal RJ45 connectors and two M12 connectors. The TM-EFDC application can use standard RJ45 connectors for normal LAN cables or use the Standard M12 plugs for more demanding industry applications.









Applications

- own-ship-interface to ship handling simulators
- data acquisition
- "Peer-to-Peer" –I/O
- industrial automation
- building automation
- alarm systems
- navigation systems (IEC 60945)

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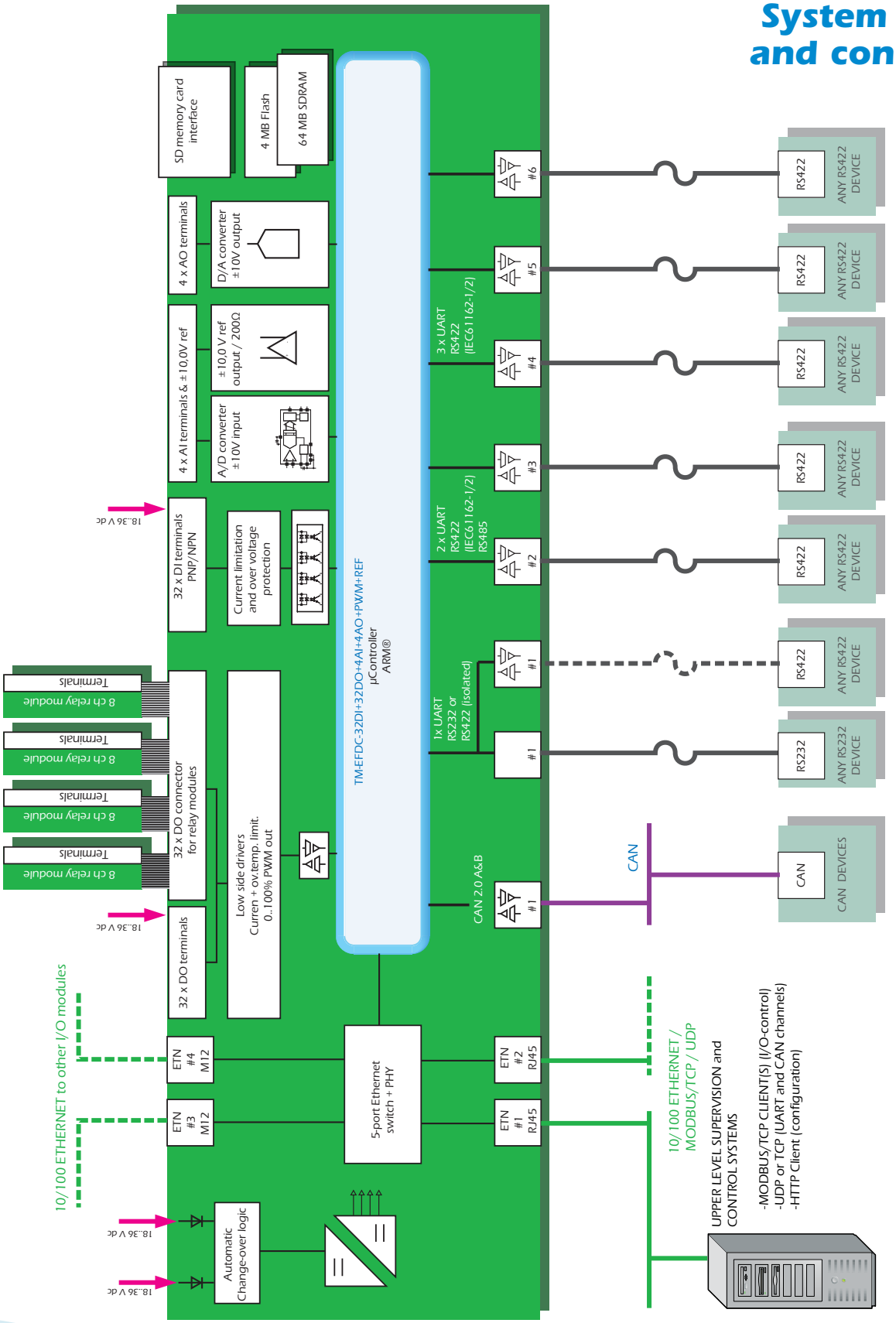
System diagram and connections



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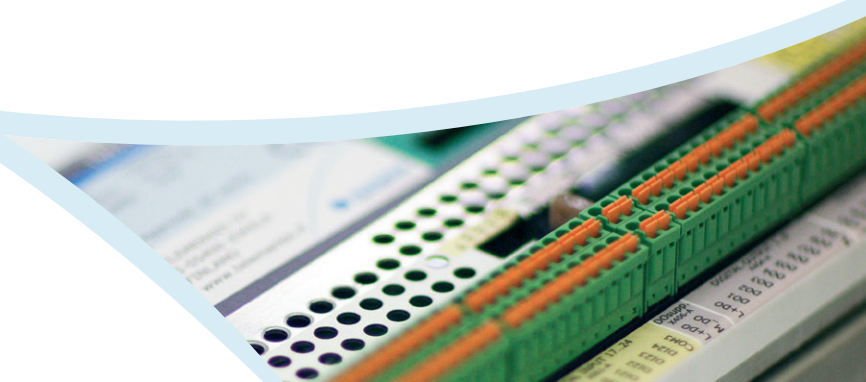

Technical details

General	
Power supply input	24 Vdc (18...36 Vdc) Power requirement 10W (typically 6W). Connections to two separate power sources. Power supply automatic switchover, if the primary input voltage drops below the permitted value. The power supply input state is indicated to the Remote I/O server register. Wiring to spring cage plug-in terminals
Operating temperature	-20...+55°C
Processor	32 bit, 200 or 400 MHz ARM processor
Memory	4 MB FLASH 64 MB SDRAM (32 bit) SD-interface for a memory card
Dimensions and weight	300x128x57 mm (lxwxd), approx.. 1000g
Approvals	IEC 60945:2002 / CE
Options	Fixing options (DIN-rail, direct mounting) / System cabling options, relay modules
Communication	
Ethernet Switch External ports: Protocol	Integrated 5-port 10/100 Ethernet-switch. 2pcs RJ45 and 2pcs M12 (D-coding) connectors Using the UDP or TCP -protocol
Serial UART Channels RS-422/RS-585 RS-422 RS-422/RS-232 Protocol	Totally 6 channels. Wiring to spring cage plug-in terminals Fully conformity to IEC61162-2 standard and compatible with IEC61162-1 standard devices. 2pcs RS422/RS485 full or half duplex channels. Galvanic isolation in both channels 3pcs RS422 channels. Galvanic isolation in both channels One channel with RS-422/RS-232 alternative drivers. RS-422 driver with galvanic isolation. RS-232 available in RJ45 connector. TCP/IP Server and UDP modes to communicate over the Ethernet.
CAN	One CAN bus interface channel. CAN 2.0 A&B versions. With Galvanic isolation.
Remote I/O Server	
Protocol	MODBUS/TCP
Digital inputs Type Signal levels	32 of galvanic isolated digital input channels. Wiring to spring cage plug-in terminal Digital inputs are grouped in 8 inputs PNP/NPN Logic 0: 0 to 5 VDC, Logic 1: 10 to 32 VDC (DI COM to DI) Input resistance 5,6 kΩ
Digital outputs Type Protection	32 output channels. Galvanic isolation from the processor voltages. NPN (open drain FET), maximum load side supply voltage 36 VDC Outputs can also be operated as PWM outputs. Connections are either available as onboard spring cage plug connectors or as Flat cable connectors for connection to relay modules. Short circuit and over heating protection.
Analogue inputs Type Reference voltage output	4 (single ended) input channels. Wiring to spring cage plug-in terminal ±10 V signal range, 16-bit resolution, Input resistance 180 kΩ Buffered ±10 V (±3%) Reference output. Maximum 200 Ω load.
Analogue outputs Type	4 output channels ±10 V signal range 16-bit resolution ±10 mA output current

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