

Modular flexible embedded computer for edge applications in rail & busses

Features

- ARM® Cortex A53 Quad-Core, ARM® Cortex M4F
- 2 GB DDR4; 16 GB eMMC
- 2x 1GB/s Ethernet, 1x USB 2.0, 1x RS232
- Integrated WLAN, LTE, GNSS
- Expandable by modular extension units
- Variable housing 3 slot to 12 slot
- Linux Microservices Platform
- EN 50155 and E1 qualified



Introduction

The modular and flexibly expandable Edge Computer ModuCop *MEC01* is qualified for use in rail and public transport applications. Due to its flexibility MEC01 adapts to a wide range of vehicle interfaces and thus represents the basic platform for numerous onboard applications.

ModuCop consists of the basic units Power Supply (slot 1), CPU unit (slot 2&3) and various intelligent extension units to cover any application specific interface needs, as e.g. MVB. Build-to-order configuration allows application tailored edge devices with one extension (4 slot / 28 HP), 3 extensions (6 slot / 42 HP) or up to 9 extension (12 slot / 84 HP).

MEC01 features an ARM Quad Core offering the computing power to host additional custom applications up to machine learning algorithms in a containerized environment. In addition, a variety of wireless connectivity is provided, enabling both a connection to the cloud and a connection to wireless sensor technology in a vehicle.

The edge computer comes as ONE platform, differencing only by application specific power supply and custom configurations.

ModuCop is available with various software functionality based on Linux operating system (LMP) and is integrated seamlessly in Ci4Rails EdgeFarm cloud services.

Applications

- Condition-based / predictive maintenance
- Board Computer
- Fleet Management
- Advanced driver assistance system
- Ticketing System
- Security Gateway

Software

Integrated Linux Microservices Platform (LMP):

- Yocto based
- Enables remote management incl. Over-the-Air updates)
- Docker container runtime for applications
- KubeEdge Kubernetes cluster support

EdgeFarm Cloud Service integration:

- Device Management support via Edge-Farm.devices
- Distributed Applications support via Edge-Farm.applications

Specifications

System	S100-MEC01- (Rail)	S100-MEC02- (Automotive)
CPU	ARM Cortex A53 Quad Core 1,6 Ghz	
Main Memory	2 GB DDR4	
Storage	16 GB eMMC	
Input / Output (Flexible extensions possible)	2x 1GB/s Ethernet via 8p M12 X-coded 1x USB 2.0 via 4p M12 A-coded 1x RS232 via 5p M12 A-coded	
Wireless	Wi-Fi IEEE 802.11 ac/a/b/g/n via 2x RP-SMA antenna GPS (incl. dead reckoning) via 1x SMA antenna LTE (optional) via 2x SMA antenna LoRaWan (optional) via 1x SMA antenna	
Maintenance (Front accessible)	1x Slot for µSD 2x Nano-SIM Slot 1x USB Service via Type C 1x UART Service via USB Type C	
Power Input	24..110V DC (nom.) (EN 50155:2017 Class S2)	12 / 24V DC (nom.) (ISO 7637-2:2011)
Security	Integrated TPM 2.0	
Miscellaneous	Integrated 6-axis accelerometer	
I/O Extensions		
Extensibility	Modular configuration by I/O extension units 1 extension (4 slot / 28 HP); 3 extensions (6 slot / 42 HP) ; up to 9 extensions (12 slot / 84 HP); Functional extension to MVB, BIN I/O, CAN, IBIS, Serial IF, RT Ethernet (optional)	
Mechanics		
Dimensions (w/o mouting accessories)	Width: 142,3 mm (4 slot); 213,2 mm (6 slot); 426,8 mm (12 slot) Depth: 61,2 mm Hight: 111,5 mm	
Mounting	DIN Rail, wall mounting, 19" rack mounting (see accessories)	
Environmental		
Operating Temperature	-40...+70°C / 85°C (10min) (EN 50155:2017 - OT4 + ST1)	
Storage Temperature	-40...+85°C (EN 50155:2017)	
Humidity	95% (EN 50125-1:2014)	
Altitude	3000 m max. above sea level (EN 50125-1:2014, class AX)	
Shock / Vibration	EN 61373:2010; Cat. 1; Class B	
EMC Emission / Immunity	EN 50121-3-2:2016; EMV 06 (2.0) Class SI; EN 301 489-1 (V2.2.3)	ECE R10 Rev.5
Safety	EN 50155:2017; EN 50153:2014+A1:2017; EN 50124-1:2017; EN 62368-1:2016; EN ISO 13732-1:2008	
Fire&Smoke	EN 45545-2:2013 + A1:2015; HL3	ECE R118
Useful Life	20 years (EN 50155:2017, class L4)	
Pollution Degree	PD2 (EN 50124-1:2017)	
Certifications	CE	UN ECE R10 (E-Mark)

Order Information

Article number	Short	Power Input	Linux Micro-services Platform (LMP)	I/O	Wireless	Maintenance	LTE	LoRaWan	Micro SD card	I/O Extension Slot 4..12
S100-MEC01-	ModuCop Rail	24...110V DC (EN 50155 S2)	✓	2x 1GB/s Eth 1x USB 2.0 1x RS232	Wi-Fi IEEE 802.11 ac/a/b/g/n GPS (DR)	1x µSD Slot 2x µSIM Slot 1x USB Service 1x UART	Opt*	Opt*	Opt*	Opt*
S100-MEC02-	ModuCop Automotive	12/24V DC (TBD)	✓	2x 1GB/s Eth 2x USB 2.0 1x RS232	Wi-Fi IEEE 802.11 ac/a/b/g/n GPS (DR)	1x µSD Slot 2x µSIM Slot 1x USB Service 1x UART	Opt*	Opt*	Opt*	Opt*

Opt*: Optional, configurable via build-to-order

Please [contact](#) us for your specific configuration.

Accessories

S104-ACS01	Startup cable kit, 5p M12 open end; 2x USB cable 4p M12, open end
S104-ACS02	Din Rail mounting kit 35 mm
S104-ACS03	Wall mount brackets
S104-ACS04	19" rack mount brackets
S103-ACS50	Temperature sensor, sealed, 10m, USB2.0
S103-ACS51	Acceleration sensor, sealed, 10m USB2.0
S102-MOD02	LTE (Cat6) Modem m.2

Services

W100-DLM01	Service Device LifeCycle Management (per device / per time)
W200-ALM01	Service Application LifeCycle Management (per device / per time)
W300-ADS01	Application Data Service (per device / per time)
W400-LCM01	Service HW/SW LifeCycle Management
W500-SEC01	Service Cyber Security Actuality
W900-DEV01	Engineering Services
W910-CST01	Consulting Services

Software Article

S700-DAP01-01	SW: Data Analytics Platform
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Application Context — *KNOW YOUR TRAIN*



Data Provision

Provision of data via a technology-independent export to your cloud solution.

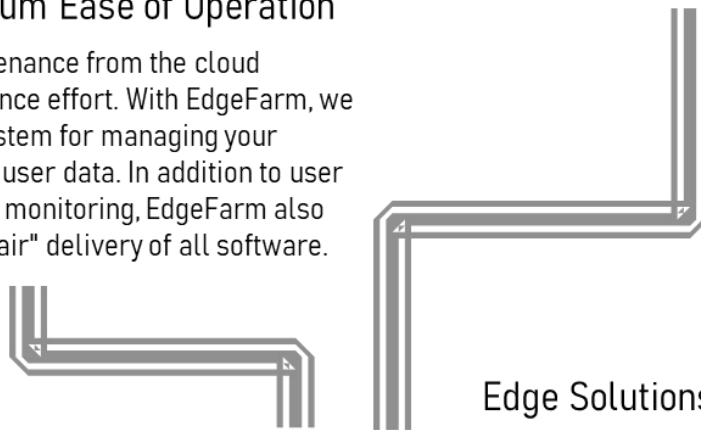


Distributed Applications

Orchestration of multiple containerized applications on Cloud & Edge allow you to dynamically decide where to run which application parts.

EdgeFarm – Maximum Ease of Operation

Fleet-wide remote maintenance from the cloud minimizes your maintenance effort. With EdgeFarm, we offer a cloud-agnostic system for managing your devices, applications and user data. In addition to user management and holistic monitoring, EdgeFarm also offers flexible "over-the-air" delivery of all software.



Edge Solutions

With ModuCop, we offer a modular, Linux-based edge computer platform for use in rail and public transport. Its flexible I/O concept with centralized and decentralized I/O adapts to all vehicle-internal interfaces.

