

Modular flexible embedded computer for edge applications in rail & buses

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 qualified and E1 prepared



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 EdgeFarm.devices
- Distributed Applications support via EdgeFarm.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 1x 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 Height: 111.5 mm	
Mounting	DIN Rail, wall mounting, 19" rack mounting (see accessories)	
Environmental		
Operating / Storage Temperature	-40...+70°C / 85°C (10min) (EN 50155:2017 - OT4 + ST1) / -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 S1; 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 ISO 13732-1:2008	EN 62368-1:2016;
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 1x nSIM Slot 1x USB Service 1x UART	Opt*	Opt*	Opt*	Opt*
S100-MEC02-	ModuCop Automotive	12/24V DC (ISO 7637 -2:2011)	✓	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 1x nSIM 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 kit: 240V AC Power Supply 90W with M12 5-pin A-coded female connector; 2x Ethernet Adapter Cable 8-pin X-coded (male) to RJ45 (plug); 2x RJ45 Gender Changer; 1x GPS Antenna (SMA); 1x LTE Antenna (SMA); 1x WLAN Antenna (RP-SMA)
S104-ACS02	Din Rail mounting kit 35 mm
S104-ACS03	Wall mount brackets 4 slot
S104-ACS04	Wall mount brackets 6 slot
S104-ACS05	Wall mount brackets 12 slot
S104-ACS06	19" rack mount brackets 4 slot
S102-MOD03	LTE (Cat6) Modem m.2
S102-MOD04	microSDHC Card, 16 GB, Class 10
S102-MOD05	microSDHC Card, 32 GB, Class 10

Services

W100-DCS01	Service EdgeFarm.devices
W200-APP01	Service EdgeFarm.applications (per device / per time)
W300-DAT01	Service EdgeFarm.data (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
W920-TNG01	Training Services

Application Context — *KNOW YOUR TRAIN*



Data Provision

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

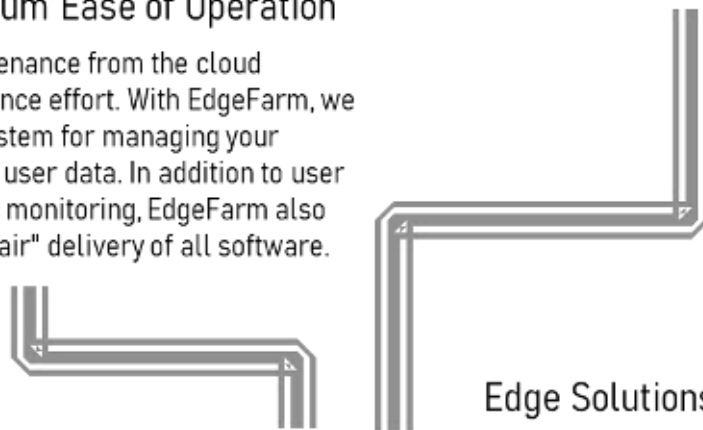


Distributed Applications

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.

