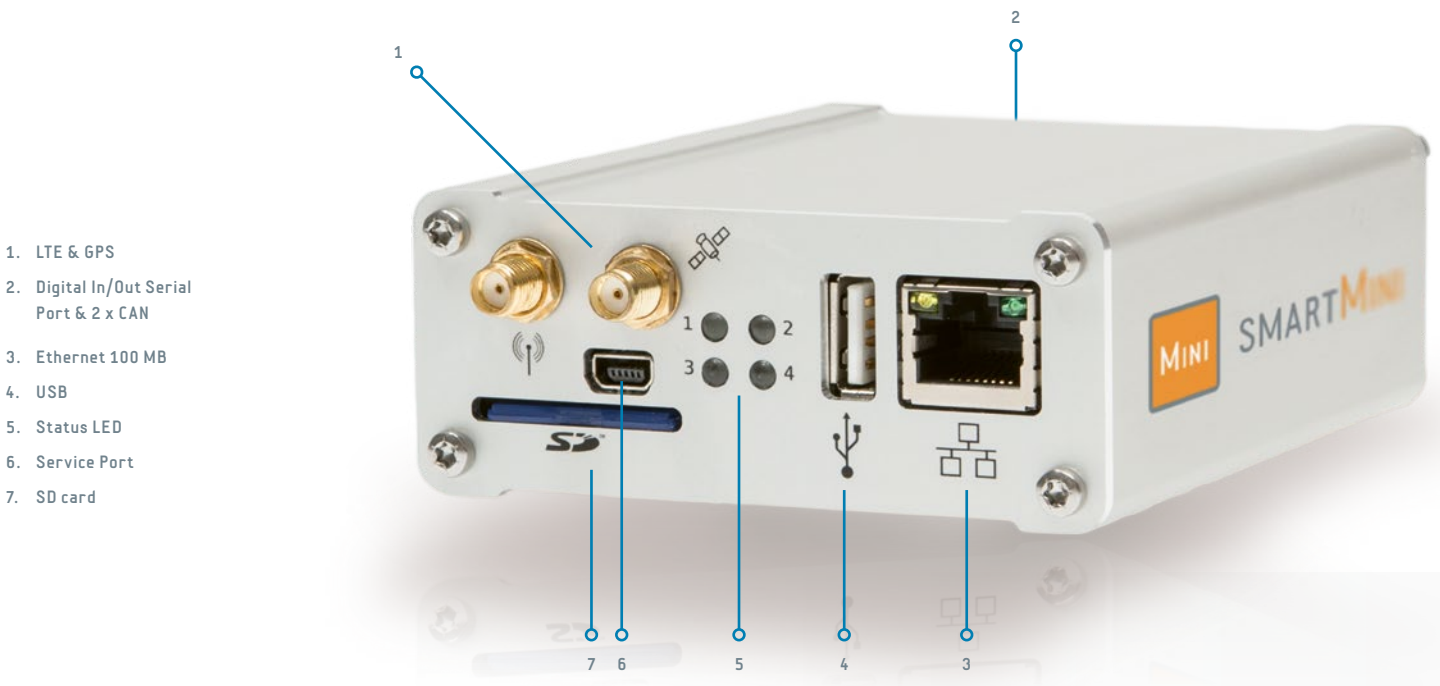


# Scalable Universal IoT Device

The compactly designed **smartMINI** differentiates itself from other devices by its high performance capabilities and robustness. Since it may easily be integrated into existing structures, this system is also particularly suitable for application under difficult instalment and surrounding conditions.



- 1. LTE & GPS
- 2. Digital In/Out Serial Port & 2 x CAN
- 3. Ethernet 100 MB
- 4. USB
- 5. Status LED
- 6. Service Port
- 7. SD card

**SMARTMINI OVERVIEW**

- » Consistent and loss-free data collection
- » Globally stable, fast data transmission
- » Integrable monitoring function
- » Handy, convenient, easy to integrate
- » Extremely robust, temperature resistant between -40°C and +85°C
- » Security concept with watchdog
- » Simple configuration and intuitive handling



## Simple and Smart

Each device provides seamless high-resolution data measurements and compact live data for the dashboard.



Real-time data on any mobile end device



[www.optimeas.de](http://www.optimeas.de)

### MODULAR PRINCIPLE

As a basic device, the smartMINI already functions as a complete IoT data logger with CAN, Modbus TRU/TCP, Ethernet, WIFI, and multiple monitoring in- and alerting outputs. Additional hard- and software modules render the smartMINI into a customized solution. IIII

### INTEGRABLE INTELLIGENCE

Device functions are configured over apps. Standard apps for data collection, alerts at excess values, and remote access are all included amongst the basic features. Apps for application-specific measurement, monitoring, protocol, and

atomization functions can be added at any time. This is achieved over either the PC control software optiCONTROL or over the optiCLOUD. IIII

### LOSS-FREE DATA COLLECTION

The collected data is transmitted in preconfigured time intervals over LTE or Ethernet connections onto the optiCLOUD platform. At the same time, the data is also saved on the device's SD card to protect from data loss when the connection breaks down. All real-time and history data is made available for visualisation purposes and analysis. IIII

### OPTIMEAS SECURITY CONCEPT

- » Redundancy of a real-time linux distribution
- » PowerController with a watchdog function
- » No data-loss in case of power cuts
- » SD card as ring memory
- » Regular and automatic over-the-air updates
- » Encrypted internet transmission via HTTPS and SSL



## TYPICAL USES:

- » Mobile machines, stationary facilities, self-sufficient deployment
- » Condition monitoring, remote diagnosis and teleservice
- » Predictive maintenance
- » Switch and steering tasks
- » Gathering of usage data, smart services
- » Optimisation of business, service, production, and development

## Use Case

### Condition monitoring and teleservice for mobile construction machines Zoomlion Cifa Deutschland GmbH

Cifa's concrete pumps are complex high-tech machines. The renowned manufacturer was searching for a teleservice system to minimize fall-outs and improve their service.

The construction machines were equipped with smartMINI systems that continuously record insightful variables: the support geometry of their masts, the pressure in the pumping unit, the oil temperature, open or closed end switches and other operational data. When disturbances occur, Cifa's service may now diagnose the machines remotely, order spare parts and instruct repair works. Through the differentiated analysis of real-time and history data, error origins may be identified so that pre-emptive maintenance measures may be undertaken. Moreover, Cifa uses the broad data pool for the further development of their concrete pumps. ■■■

Bildquelle: CIFA S.p.A.



*Compared to their competitors optiMEAS already had a final solution for our case. The device optimally satisfies all requirements whilst being small and handy.*

*Martin Worch  
Head of Service, Research and Development  
Zoomlion Cifa Deutschland GmbH*



# Technical Data Sheet

smartMini		
Processor	CPU	NXP i.MX6S7 800 MHz, 1 core
	DMIPS	2000
Memory	RAM	512MB DDR3
ROM	Embedded	4 GB eMMC as RAID and DualBoot for the operating system and firmware
	µSD	Internal, optional emergency operating system
	SD	Externally accessible, buffering and saving of operational and measurement data, robust file system
I/O Ports	Ethernet	10/100 MBps
	USB	USB 2.0, 1x external (overvoltage protection) + 1x internal
	Serial	1x RS232/RS485 (overvoltage protection, available via software)
	CAN 2.0B	2x CAN Bus, 11898-2 (Highspeed-CAN)
	Digital IO	1x digital input 5-36V (insulated, wake-up function), 2x digital output (50mA, insulated)
Wireless	Modem	Integrated 4G/CAT4 modem with QMI with mini SIM (25x15mm)
	GPS	Integrated GPS, GLONASS, BeiDou, Galileo and QZSS (Component variants, up to 10Hz, 2.5m Res.)
Power Supply	Input	9-36V
	Power usage	1W when idle (5W max)
Miscellaneous	RTC	Yes (with Goldcap buffer)
	Watchdog	Yes, separate Microcontroller
	Sensors	Temperature, 3 axis acceleration sensor
	Measurement Input	Supply voltage (1Hz, 12bit, battery monitoring)
	LEDs	4 (power, WAN, GPS, App)
	Dual Boot	2x separate operating system (with watchdog and boot controller)
	Connections	Phoenix Mini CombiCon, RM 3.5mm, USB-A
Surroundings	Security type	IP54 (alternatively IP68)
	Temperature	-40 °C to +85 °C (with dew protection)
Special Norms		EN 50155:2007 certified - Climate §12.2.3, §12.2.4, §12.2.5, - Oscillation IEC61373-9, - Shocking IEC61373-9 - Hissing IEC61373-8 - EMV EN 50121-3-2: 2016, EN 61000-6-4, Fire Prevention EN 45545-2:2016-0 EMV06 disturbance signal for the protection of rail radio frequencies
Expansions		1x internal plug for customer specific expansions
Hardware Expansion Modules (in preparation)		
Battery Monitor	CAN	Battery voltage monitor for 18-76V or 74-160V DC. Connections for current transformers and PT1000, DO for alarm, CAN, additional galvanically separated power supply unit, 24V output.
J1708/J1587	CAN	External module for the implementation of J1708/J1587 on CAN
smartIO 8U, 8I	CAN	External module for the measuring of voltage and currents
smartIO 8TC, 4Pt100	CAN	External module for the measuring of temperature (Thermocouple, 3-Conductor-RTD)
smartIO 4FDMS, 4QDMS	CAN	External module for the measuring of strain gauges in full and quarter bridges
smartIO LVDT, RVDT	CAN	External module for the measuring of LVDT and RVDT sensors
smartIO 2ENC	CAN	External module for the measuring of 2 quadrature encoders or 4 single-track rpm-sensors
Ethernet	USB	External module expanding smartMINI by 2 Ethernet ports, M12
RS232	USB	External module expanding smartMINI by 2 additional RS232 ports, M12 + DSUB15
Customization	USB/CAN/ETH	Customer specific hardware expansions available on demand
Included Software		
OS		Yocto Linux with Kernel 4.4, PREEMPT_RT Realtime Patch, optimized for performance and package size
SDK		Yocto-based SDK in VM with Qt Creator, remote debugging, Python 3.5 (LTS)
IoT Framework		smartCORE (C++ 17, Qt, MQTT, REST, JSON, GRPC, HTTP(S), MODBUS, CANopen)
Cloud Features		Secure over-the-air firmware updates (FOTA), Dashboards
PC Software		optiCONTROL (device configuration), optiVIEW (Data presentation), optiMATOR (automated processing and event search)
Optional Software for data logging and diagnosis requirements		
CAN DBC		Data logger for the collection and interpretation of RAW CAN Data on the basis of DBC files
CAN MTU		Data logger for the integration integration of MTU control units with complete data interpretation
J1939		Data logger on the basis of the J1939 protocol
Distance counter		Records distance travelled, location, and speed
APP		We develop customer specific apps and integrate further communication protocols on demand