

robotron[®]

Smart Energy Platform

ALL-IN-ONE SOLUTION FOR INTELLIGENT
METER DATA MANAGEMENT



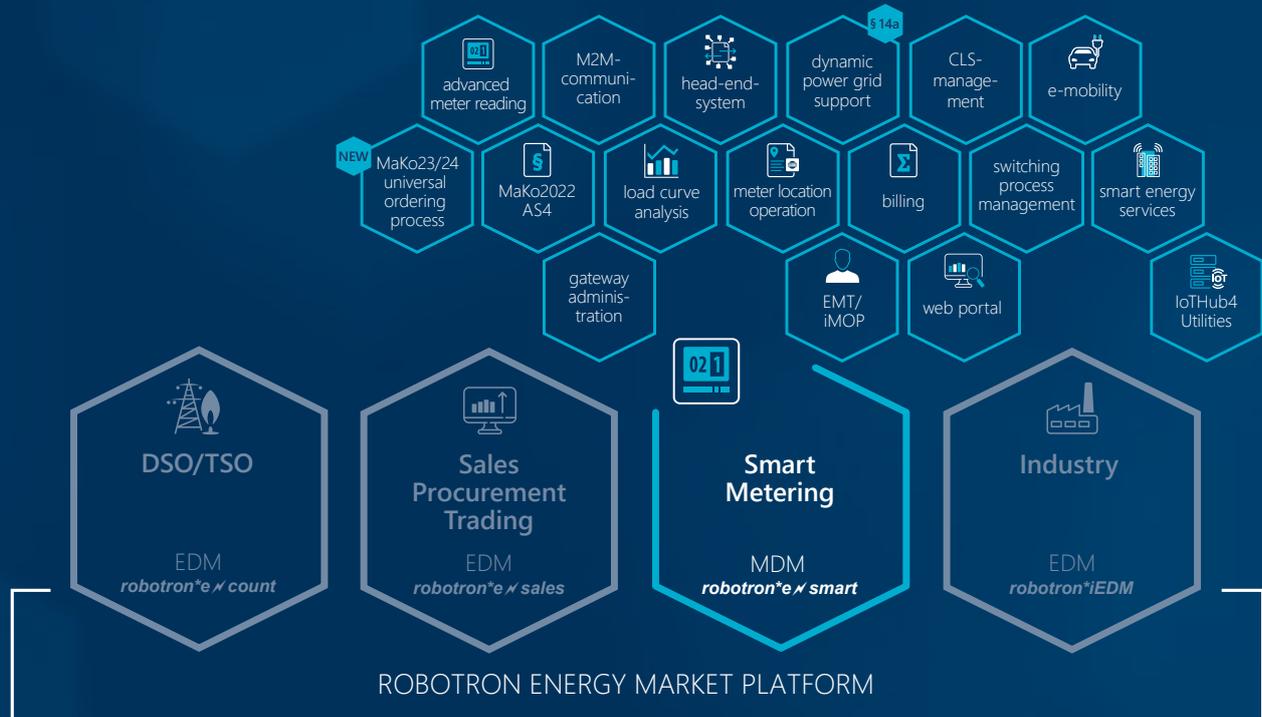
SMART METERING

High-Performance Software Solutions for Smart Processes

Specialization in the **management** and **evaluation of large amounts of data** and **decades of experience** in the energy industry are reflected in the **performance** of our software solutions.

With this expertise, we have developed a **unique service portfolio** that covers all market roles and is continuously optimized. The **Robotron Energy Market Platform** maps all market processes in an interface-free, cross-commodity, automated and interoperable manner.

Smart Solutions for Innovative Meter Location Operation



Complete Solution for Meter Location Operation

The rollout of smart metering systems and the changes to established market processes between the players in the energy market are accompanied by far-reaching changes to the IT landscape for all market participants. To meet the dynamic requirements, we offer a comprehensive platform for basic and competitive metering point operation with **robotron**e*/smart** in combination with **Robotron-IoTHub4Utilities** and **robotron*SwitchingServer**.

This includes advanced meter reading with **robotron**e*/collect**, measurement data reception from smart metering systems, processing of short-cycle measurement data relevant to the network and market, through to value-added services and Smart Grid Control Solutions. A key component is the market-leading Gateway Administration System **robotron*GWA-Manager**.

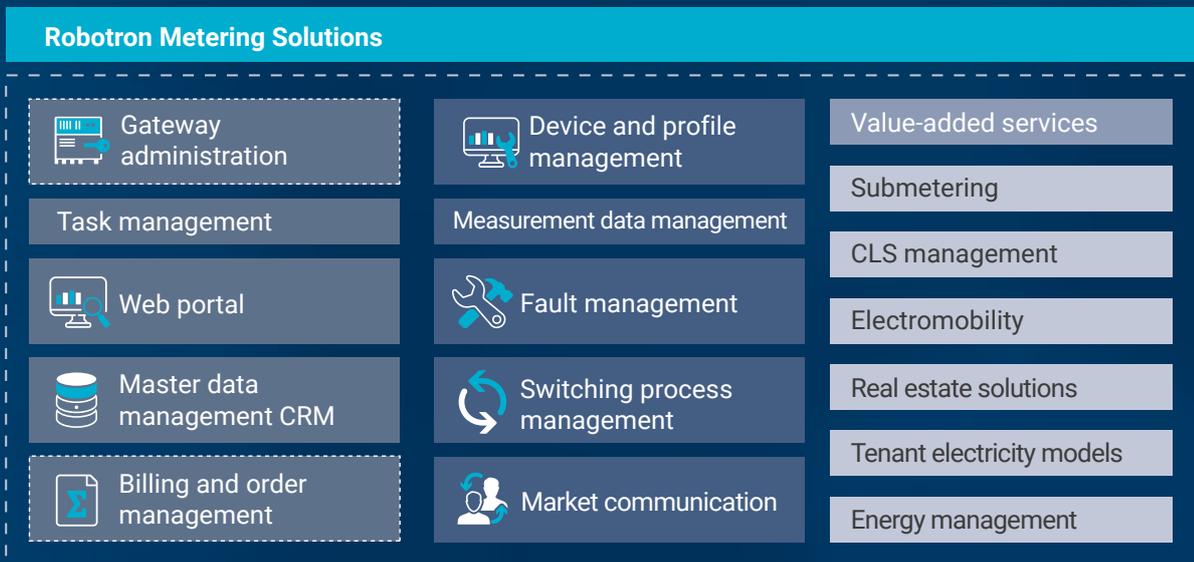
- ✓ Connection of a large number of ERP systems via standardized interfaces
- ✓ Generic interface to GWA systems as well as fully comprehensive system solutions via **robotron*GWA-Manager**
- ✓ Connection of workforce management systems and orchestration of order and work tasks via the central task management system Robotron AM+.
- ✓ Fully integrated multi-tenant solutions
- ✓ Measurement data reception for regulated measurement data (TAF1, TAF2, TAF6 and TAF7), the extension by TAF9, TAF10, TAF14 and further IoT sensor technology with **Robotron-IoTHub4Utilities**

Highly Automated Process Management:

- ✓ Comprehensive modular world for efficient handling of all meter location operation processes
- ✓ Complete life cycle management and market processes for hardware devices

With the platform, all meter location operation functions including market communication and billing can be implemented efficiently and from a single source.

All system solutions comply with the respective applicable legal framework conditions and are based on the current technical guidelines of the Federal Office for Information Security (BSI). Furthermore, the architecture, implementation and operation of all system components are designed for IT protection in accordance with the Federal Office for Information Security Standard and DIN EN ISO 27001.



METER DATA MANAGEMENT

from the Meter to the End Customer

With **robotron**e* smart**, you get a holistic, freely scalable measurement data management solution for all smart metering processes. As a fully integrated solution, **robotron**e* smart** covers the complete process chain of meter data management from the meter to data provision for billing and market partners in an interface-free manner.

Thanks to the modular design, individual modules are optimally integrated into existing system environments. Smart metering with **robotron**e* smart** enables the intelligent control of generation and consumption components in addition to the timely acquisition and evaluation of measurement data.

Suitable Solutions for All Market Roles

Meter operators, network operators and suppliers take over essential smart metering processes.

Meter Operator

The meter operator is responsible for setting up and operating the meter locations. They use the integrated device management as well as the uniform administration of important device parameters and configuration profiles – independent of the device manufacturer. The automated synchronization of device master data with external systems facilitates data maintenance and represents the complete device history.

robotrone* smart** collects the measurement data, processes it and passes it on to the respective market partners. The presentation of this consumption data takes place in a suitable Web Portal. The rollout and service at the meter locations is optimized by connecting workforce management systems or their support through corresponding modules. Special modules support the automated handling of the new processes for meter location operation billing.





Line functions are displayed compactly and in a configurable overview.

Time Series and Meter Reading Management

Time series, meter readings and consumption data are stored in a high-performance time series management system with historization, versioning and archiving functions.

Plausibility Check

With *robotron***e** smart*, the plausibility of imported load curves and meter readings is checked. The status of the measured values and their deviation from individually configurable limits are checked. Additional checks (also in SQL) can be stored for load curves.

Substitute Value Generation

With *robotron***e** smart*, manual and automatic substitute value generation for load curves, meter readings and consumption data is possible.

Various methods for substitute value generation, such as interpolation, copying of historical measured values or copying of values from comparison meters are available.

The methods can be **configured individually** and processed **automatically** one after another. Independently of the automated methods, values can also be overwritten manually in the system.

ADVANCED METER READING

Perfectly Integrated

robotrone* collect** covers an essential functional module of measurement data processing – advanced meter reading as a direct connection to the metering system.

When reading meters, the solution supports both push and pull operation via all common transmission protocols. Functions for time synchronization, firmware updates and tariff switching/remote locking are available, regardless of the meter manufacturer.

In addition to the integrated technical device management, a wide range of process monitoring options is also available. By using **robotron**e* collect**, you save not only the interface between Advanced Meter Reading and Measurement Data Management (MDM), but also the redundant data storage of the meter data in both systems.

Basic Functions of **robotron**e* collect**:

- ✓ Automatic, manufacturer-independent measurement data acquisition with support of all common transmission protocols
- ✓ Measurement data management and processing
- ✓ Reading control with monitoring and post-recording
- ✓ Integrated device management
- ✓ Device parameterization and control functions (single and mass operation)
- ✓ System integration

robotrone* collect**: Define individually which information you want to see in the configurable dashboard.



TASK MANAGEMENT

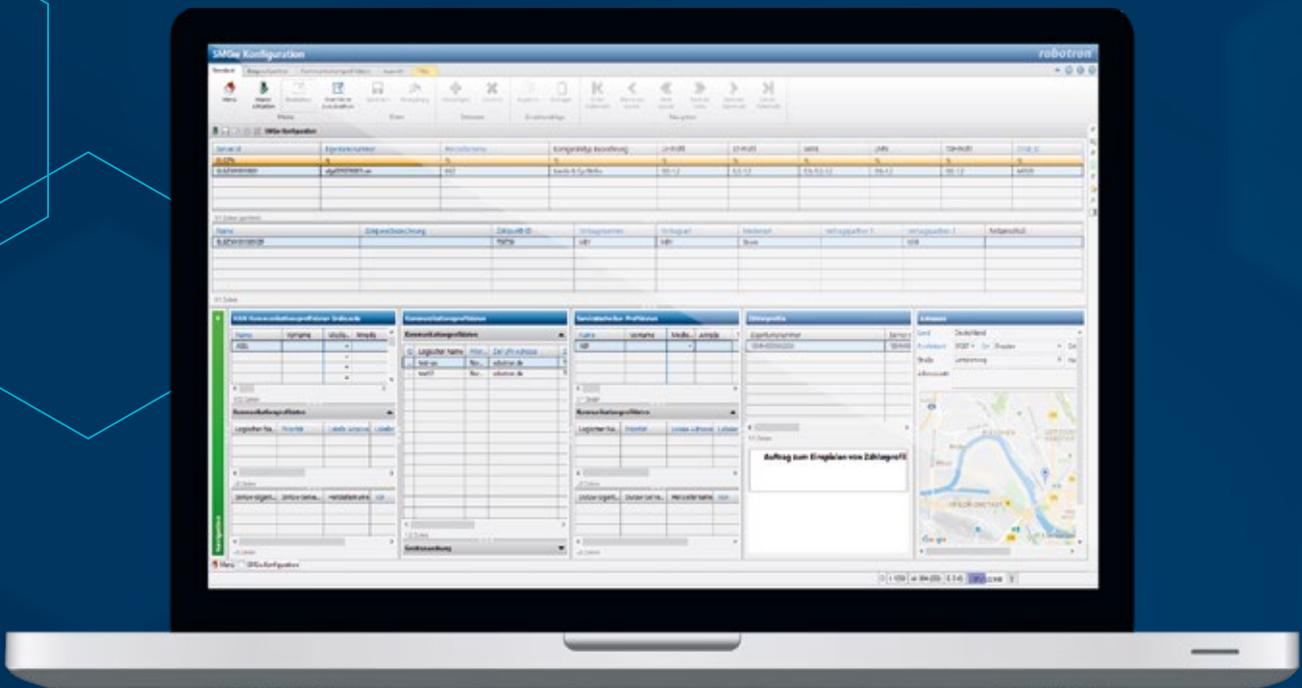
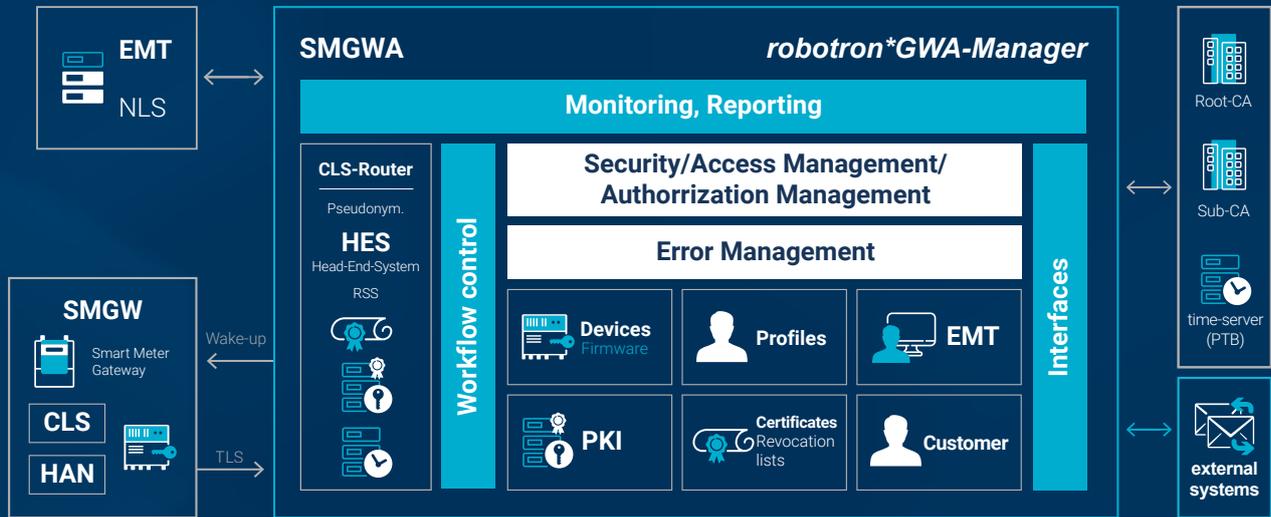
with the Integrated AM+ Module

Our portfolio offers an integrated module for managing tasks in connection with the Robotron Energy Market Platform and **Robotron-IoTHub4Utilities**:

- ✓ Manual creation of tasks
- ✓ Automated creation of tasks via interfaces and integrated e-mail tool
- ✓ Assignment of objects (e. g. meters, SMGW, metering point/meter location, profiles, customers and faults) of the Robotron Energy Market Platform and the **Robotron-IoTHub4Utilities** to tasks
- ✓ Processing of tasks as a workflow with status transitions including automatic status synchronization
- ✓ Maintenance of task areas/types and classification of tasks
- ✓ Maintenance of the task status as well as consideration of the configuration feedbacks
- ✓ Document storage (manual)
- ✓ Personalization of tasks
- ✓ Comprehensive authorization, role and access concept
- ✓ Task templates
- ✓ Browser-based processing of tasks and integration into Robotron Energy Market Platform via MaskSideds

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116006	21.09.2012	offen	Maskito-Automat	Stamm-Maskito	normal	St.	St.
116008	21.09.2012	offen	Maskito-Automat	Stamm-Maskito	normal	St.	St.
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IT Landscape for Smart Meter Gateway Administration



The master data management visualizes the structure of the master data including the associated dependencies.

GATEWAY ADMINISTRATION

Secure Configuration of Your Metering Systems

The **robotron*GWA Manager** optimally covers the functions for implementing the GWA processes and comprehensively fulfills the tasks of the gateway administrator. The focus of this system solution is on high performance and security in the handling of administration processes in conjunction with optimum connection of the market partner systems.

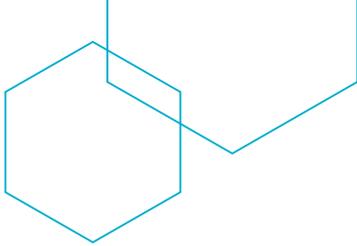
With its integrated master data management, the **robotron*GWA Manager** ensures the assignment of authorized users and roles of the respective market partner according to the (later) mapping in the smart meter gateway. The integrated certificate and key management ensures signed and encrypted communication including signature verification as well as decryption of smart meter gateway messages.

Core Functions at a Glance:

- ✓ Gateway administration tool according to **BSI TR-03109 IT-Grundschutz and DIN EN ISO 27001**
- ✓ **Public Key Infrastructure** – Integration into SM-PKI structures by CeMaS (Certificate Management Service)
- ✓ **Integrated certificate management** with key management and automatic revocation list comparison
- ✓ Effective and comprehensive **monitoring and fault management**
- ✓ Comprehensive **market partner and authorization management** with integrated automated market communication
- ✓ **Profile management** according to BSI TR-03109 including historization
- ✓ Can be used as a **manufacturer-independent, multi-tenant service platform**
- ✓ Powerful **device management with firmware management** and monitoring/updating of firmware according to specifications of the Physikalisch-Technische Bundesanstalt and information from the manufacturers
- ✓ Flexible adaptation of process flows via **configurable workflow control**
- ✓ Suitable for **mass data processing** due to high degree of automation and optimized database processes
- ✓ Integration of the powerful and scalable **head-end system robotron*SwitchingServer** as BSI-compliant communication platform including wake-up call, Smart Grid Control Solutions routing and pseudonymization of measurement data
- ✓ Connection to external **device or workforce management** systems for optimized device installation and replacement processes
- ✓ Support of the use cases from BSI TR-03109-6

Interfaces and Data Exchange

Robotron solutions provide high-performance interfaces for data exchange between Gateway Administration and Meter Data Management. The data formats are permanently kept up to date. Both commissioning processes and regular operation are supported by automatic master data exchange with source systems (e. g. SAP-IM4G). Automated data transfer from an electronic delivery note is implemented, as is the direct interface to various peripheral systems.



HEAD-END-SYSTEM

Universal Communication Center for Smart Metering

The communication center, **robotron*SwitchingServer** supports existing systems for measurement data processing in meeting current and future communication and security requirements. It can be optimally integrated into existing infrastructures as a stand-alone component or supplements **robotron*e⁴smart** or **robotron*GWA Manager** with a powerful head-end system.

As a manufacturer-independent system solution, **robotron*SwitchingServer** communicates not only with the new smart meter gateways but also with first generation smart meters. This ensures an easy entry into the new world of smart metering systems.

BSI-Compliant Reception and Distribution of Measurement Data for EMP

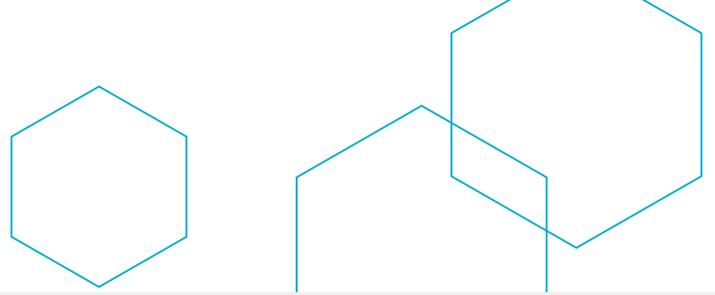
For smooth reception of the measurement data, the **robotron*SwitchingServer** ensures not only TLS communication with automated decryption and signature verification, but also completeness check and post-request management via the interface to the gateway administrator. The required interfaces to the public key infrastructure (HSM, CA, time server) as well as the management of the corresponding certificates and profiles are integrated. The order management with authorization administration enables the tenant-specific distribution of the measurement data to the further processing systems (e.g. existing EDM and billing systems).

The integration into the MDM/EDM solutions of the Robotron Energy Market Platform ensures highest performance as well as simple data management and enables comprehensive monitoring of the complete process chain. **robotron*SwitchingServer** is designed as a universal head-end solution and can be extended at any time to include functional modules, e.g. for CLS management or real-time measurement data reception and processing.

Digitization of Energy Grids – with Smart Meters to the Smart Grid

The control of feed-in and consumption components in the energy grids to remedy critical grid conditions is one of the key issues when it comes to implementing the energy transition. The basis for this is the recording of the grid status via smart metering systems. CLS management is then used to control EEG feed-in systems and consumers via a secure communication infrastructure.

The **robotron*SwitchingServer** and **Robotron-IoTHub4Utilities** service and communication platforms provide a universally applicable, manufacturer-neutral connection between the field level and the grid components and the backend systems.



The modularly configurable functionalities of the system solution provide optimal answers to the requirements of the respective market players and their use cases.

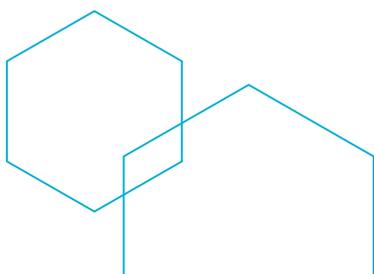
- ✓ Collection, processing and provision of network status data in real time
- ✓ Control of consumption facilities according to § 14a
- ✓ CLS management
- ✓ EEG feed-in control
- ✓ Replacement of circular control
- ✓ Control of charging infrastructure for e-vehicles
- ✓ Sub-metering

Simple integration into existing system landscapes

- ✓ Central management and administration of the control infrastructure with support for the system-relevant device processes.

- ✓ Integrated authorization and priority management guarantees the shared, secure use of control infrastructures by different market players.
- ✓ Simple system integration thanks to configurable standard interfaces with various technologies and protocols.
- ✓ Direct connection of grid control systems via common communication protocols
- ✓ Support of the relevant market communication interfaces
- ✓ Universal ordering process (ordering measurement and control configuration; authorizations)
- ✓ BDEW API (ad-hoc control via API – web service)
- ✓ Operating models available on-premises or as a cloud service

The functions for distribution system operators, metering point operators, aEMTs or control box admins can be implemented either as separate system solutions or, if required, in a combined overall solution.



ROBOTRON-IoTHub4Utilities

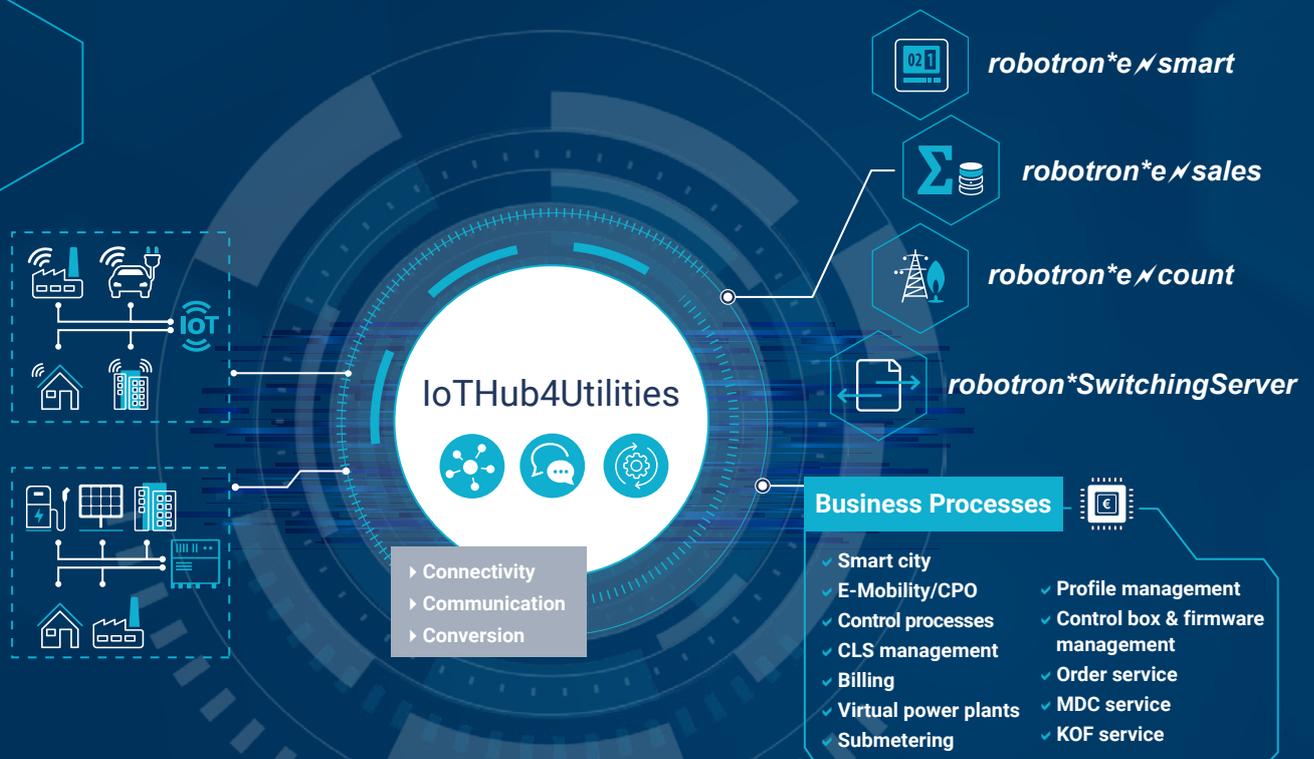
Service Platform for IoT data management

The increasing digitalization of energy industry processes is placing new demands on intelligent data management and creating a multitude of new opportunities for innovative IoT applications. Consumption data in the energy industry is also increasing with the deployment of smart metering systems. New fields of application for controlling, switching, regulating as well as value-added services, such as submetering and electromobility, can be enabled via the platform.

In addition, there is data from network operations, from various IoT sensors and actuators, and new communication technologies, such as LoRaWAN. The data from these data sources enables numerous new business areas and require flexible communication and service platforms for maximum availability, real-time capability and data security.

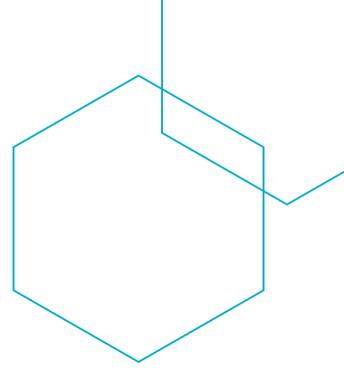
Intelligent Communication and Service Platform for IoT Data

- ✓ Real-time data reception and dispatch
- ✓ Receiving, dispatching and converting data from various sensors as well as data sources to relevant customers and IT systems
- ✓ Base platform for further use cases in the energy market and beyond
- ✓ Realization of new business processes beyond regulatory requirements of the energy industry
- ✓ Standardized mapping and future-proof integration of services and business processes



INTEGRATED BASIC SYSTEM

One Core – Many Functions



Robotron's Meter Data Management Systems already offer a wide range of process-supporting functions in their core functionality.

Basic Functions

In addition to multi-commodity capability, the EDM core forms the basis for the high-performance storage of master and transaction data. This has already been impressively demonstrated in multiple mass data tests as well as in many installations in productive use. Cross-system process automation and control, free grouping options for EDM content, the mapping of any tariff information and a Europe-wide public holiday calendar are also already part of the core functions.

Market Communication

Communication automation reduces the daily workload involved in exchanging data with other market participants. All import and export activities are organized by networking the company-wide communication platforms. The import of various network fee databases for electricity and gas is also carried out via communication automation. Compliance with the latest security and signature regulations applies to all use cases.

Visualization Tools

Individual load curves, group sums, control energy time series, Z-factors, temperatures, pressure ratios, price time series, solar irradiation, time series of any kind – all these data can be conveniently visualized and analyzed with various tools. Thus, key figures such as moving average, cumulative line, duration curve (peak and off-peak), forecast quality and many more can already be determined in the graph.

Many Calculation Options

A comprehensive formula editor enables free compilations of mathematical and statistical calculations of time series. The assignment to calculation jobs offers an automated execution, which is logically linked and result-controlled. The calculations are executed depending on the data quality of the incoming time series with regard to status and/or plausibility parameters.

Individual Evaluations

In order to keep an eye on all events that occur and to be able to efficiently process the results of calculations and analyses, the system offers numerous evaluation options. In addition to predefined queries and standard reports, users can compile their own evaluations. The „Excel Reports“ module makes it possible to convert existing, static Excel evaluations of any complexity into dynamic Excel evaluations with database access. Searching for raw data in the system and manual copying into Microsoft Excel is no longer necessary. This reporting process can also be automated on a job-controlled basis.

Flexible Administration

The system has a comprehensive range of tools for the administration of individual or group user rights, Archiving functions, logging, monitoring options, tenants, time-controlled jobs and much more. These can be set up and managed variably, depending on requirements, both generally and specifically for special tasks.

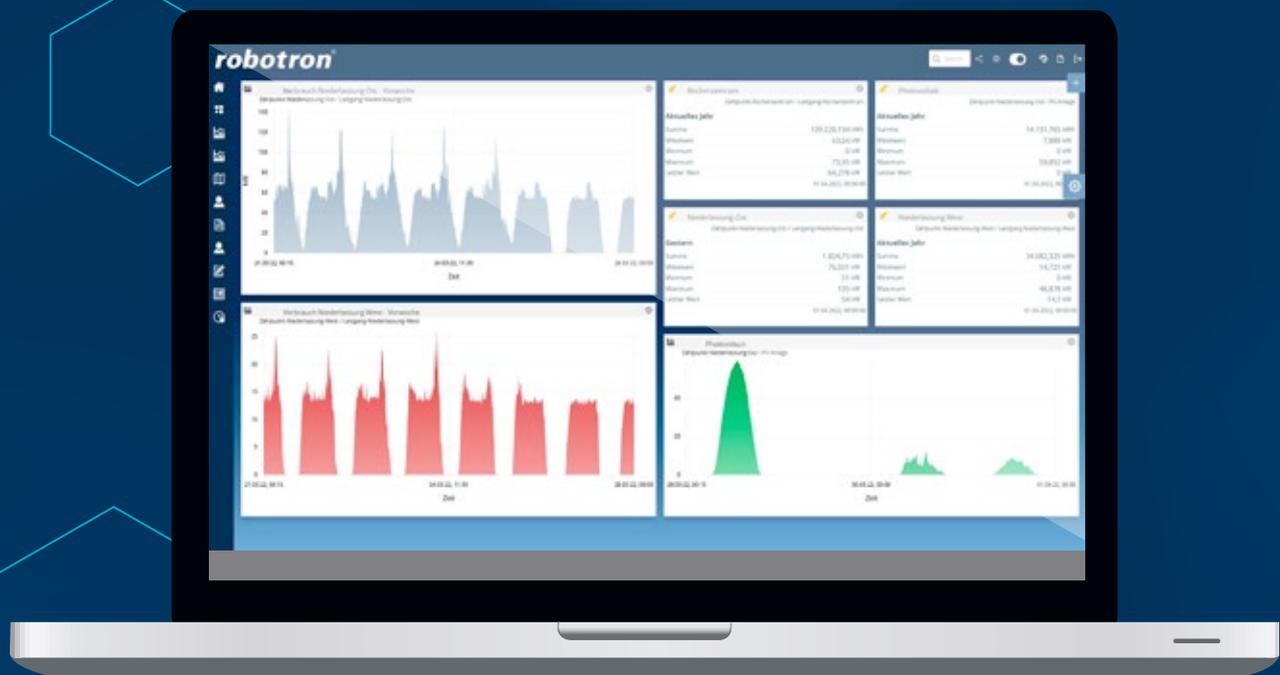
MOBILE OVERVIEW

Smart Metering on the Go

With the modularly developed **robotron*Webportal**, you can provide energy data from **robotron*e \mathcal{N} count**,

robotron*e \mathcal{N} sales or **robotron*e \mathcal{N} collect** online for your private and business customers. The **robotron*Webportal** is flexibly configurable for the corresponding user group, regardless of the market role you operate in. Functionalities in smart metering are:

- ✓ Self-registration procedure
- ✓ Configuration of the Smart Meter Gateway for HAN interface
- ✓ Display for smart meter properties
- ✓ Verification of calibrated smart meter readings



robotron*Webportal: From load profile analysis to MDM functionalities – a wide range of application options on all end devices.

OUR SERVICES

Your Partner from Planning to Operation

✓ **Cloud Solutions:**

Robotron is your innovative service provider for software solutions from the **Robotron Energy Cloud** (SaaS, BPO) and offers modular services for optimal business processes (IaaS, PaaS, BPaaS).

✓ **Projects and Customer Support:**

Benefit from the use of selected modules of the Robotron Energy Market Platform and the extensive experience of our experts. With our flexible and standardized products, we achieve short project runtimes and rapid productive use of your systems.

✓ **Integration:**

The products of the Robotron Energy Market Platform are mostly integrated in a heterogeneous system world as a central data hub. Users of our software can therefore draw on a broad spectrum of realized interfaces and methods as well as extensive project experience.

✓ **Training:**

The **Robotron Training Center** offers a wide range of courses on the Robotron Energy Market Platform. The course participants are taught knowledge and

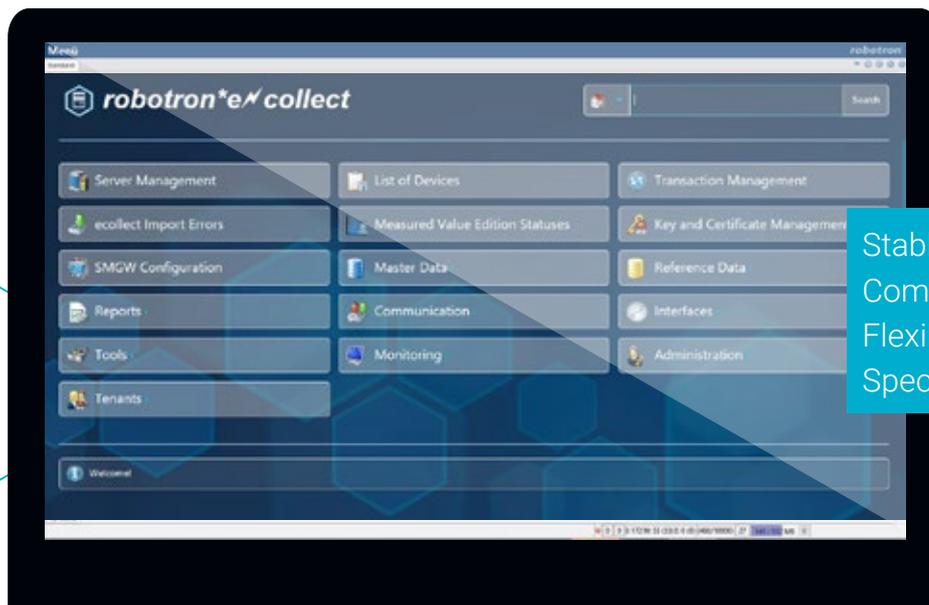
skills for the efficient use of Robotron products, according to their respective tasks.

✓ **Services and Support:**

As a product manufacturer and operator, we offer you comprehensive support for all aspects of Robotron products. We provide support in planning, setting up and operating harmonizing infrastructures. Sophisticated service-level agreements for operation and service of the products ensure the continuous performance of the systems around the clock. Certified administrators and consultants reliably facilitate your daily operation of the applications with highly specialized services.

✓ **Robotron EDM Appliance:**

With the Robotron EDM Appliance (REA), we provide you with a fully preconfigured, optimized and highly available complete system. The software you require individually from the wide range of the Robotron Energy Market Platform is combined with the necessary hardware to suit your needs.



Stable
Comfortable
Flexible
Specialized

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