Maintmaster® OEE Technical White Paper

Welcome to Maintmaster OEE! Maintmaster OEE is a leading tool for measuring and improving operational efficiency. This white paper presents the technical aspects of Maintmaster OEE as delivered by Maintmaster. We continuously improve our solutions, so specifications may change over time. The latest version is always available on our website.

What Maintmaster OEE Does

Maintmaster OEE enables you to extract, visualize, contextualize, and analyze actionable data from your manufacturing processes. This empowers operational improvement teams to make data-driven decisions that enhance productivity and maintain competitiveness.

Getting Started with Maintmaster OEE

Maintmaster OEE is delivered as a fully managed service using state-of-the-art public cloud hosting on Microsoft Azure. Customers typically do not need to purchase or provide server capacity, nor install software locally—unless specific hardware or software is required for integration with equipment PLCs. Maintmaster handles installation and updates seamlessly.

The user interface is entirely web-based and accessible from any modern device with internet access.

A new Maintmaster OEE deployment usually includes an onboarding project, during which a Maintmaster specialist helps with setup, configuration, and initial analysis. Customers can continue to rely on Maintmaster Support for technical or user-related assistance after onboarding.

System Architecture

Maintmaster OEE uses a hybrid edge–cloud architecture to securely collect, process, and transmit OEE data.

Components:

- SmartBox (Edge Device) – Interfaces with production equipment (PLCs, sensors) to collect digital and analog data, preprocess it, and securely transmit it over MQTT. For certain onsite PLC integrations, a thin local server may be used to preprocess and send data to Azure.
- Azure IoT Hub – Central message broker for secure device-to-cloud communication and scalable telemetry ingestion.
- Azure Stream Analytics / Functions – Real-time processing and transformation of incoming telemetry.
- SQL MI – Persistent storage for long-term analytics and application data.
- Application Server – Provides secure user access to processed OEE data, with authentication and a responsive interface for desktop, tablet, and mobile devices.
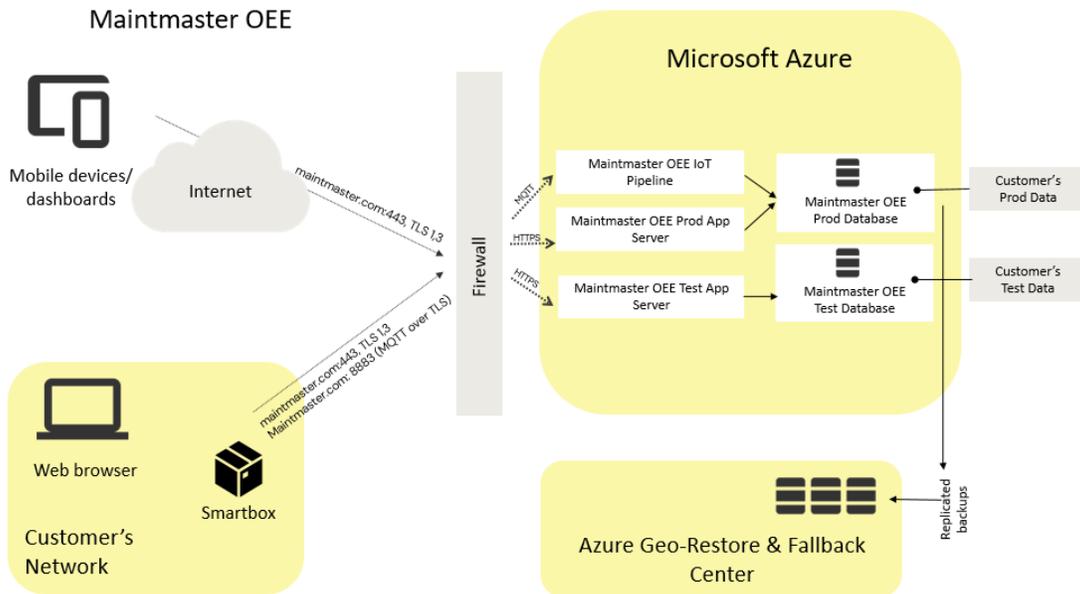
Fig 1. Maintmaster OEE Architecture Diagram

Hosted by Microsoft Azure

Maintmaster trusts Microsoft Azure for its secure and reliable cloud platform. Azure meets leading international and industry compliance standards, including ISO 27001, HIPAA, FedRAMP, SOC 1, and SOC 2. Maintmaster leverages these features to operate, secure, and monitor OEE services.

By default, Maintmaster OEE is hosted in Azure North Europe (Ireland) with Azure West Europe (Netherlands) serving as the fallback region. Backups are replicated to the fallback region, ensuring business continuity in the event of a failure in the primary region.

Maintmaster's hosting partners, operating under the same restrictions as Microsoft's staff, manage the production environment under Maintmaster supervision. These partners work within the same jurisdiction as the hosted systems. Customers are notified at least 30 days in advance of any significant change to the hosting model.

Security of Your Data

- Microsoft Azure – Industry-leading compliance certifications.
- Network security – Data is encrypted during transmission using TLS 1.3+ wherever possible.
- Encrypted at rest – All data is encrypted using Azure Database encryption (AES-256).
- Privacy security – Passwords are stored irreversibly and are never accessible to Maintmaster staff.
- Backup – Point-in-time restore for at least 35 days for production data plus long-term distributed backups retained for at least 12 months.
- Disaster recovery – Complete environment recovery plans, including backups, are maintained off-site.

- Data handling – Maintmaster personnel never access customer data without explicit consent, such as during a support request. Data never leaves the designated region without customer approval.
- Principle of Least Privilege – Access to services and customer data is strictly limited to the few authorized personnel necessary for support and maintenance.
- Single tenant – Maintmaster OEE is a single tenant solution, which means that each customer has their own servers and databases. This makes information leaks across customers even more unlikely.

Measuring Operational Efficiency with Maintmaster OEE

Accurate and automatic measurement of production efficiency requires data collection from the production environment. Maintmaster OEE supports three primary methods for real-time data acquisition:

- Manual data entry into the Maintmaster OEE system.
- Automatic event stamping via status light relays.
- Automatic data gathering via PLC integration.

Your onboarding specialist will guide you in setting up the appropriate data collection approach. Any required local hardware or software is provided by Maintmaster. All collected data is transmitted securely to Maintmaster OEE servers in Azure for processing.

Availability of Maintmaster OEE

Maintmaster OEE provides 99.9% uptime outside scheduled maintenance windows. Maintenance windows are limited to 8 hours and occur no more than once per quarter. Maintmaster platform support is available 24/7/365 for both application and infrastructure assistance.

Backups

Maintmaster uses Microsoft Azure SQL as the foundation for database management. Point-in-time restore is available along with weekly and monthly backups for long-term retention.

Backup retention by tier:

	Sandbox/Test	Team Edition	Standard	Enterprise
Point in time restore	7 days	35 days	35 days	35 days
Weekly backup	-	4 weeks	4 weeks	4 weeks
Monthly backup	-	6 months	6 months	6 months
Yearly Backup	-	(Week 1) for 1 Year	(Week 1) for 1 Year	(Week 1) for 1 Year

Monitoring Your Maintmaster OEE

Maintmaster continuously monitors system performance, availability, and user interaction. This monitoring helps us comply with SLAs, respond quickly to issues, and proactively improve our services.

Managing Your Maintmaster OEE

System updates are managed by Maintmaster's platform team and can be applied on request or automatically. If an update involves significant UI changes requiring operator training or prior testing, a sandbox environment can be provided.

Configuration is typically managed by users with Administrator privileges. Settings can be delegated to administrative groups, ensuring that roles such as OpEx leads only access relevant modules.

Basic user access levels:

- Admin
- User
- Read-Only

Entra and SSO

Authentication can be configured using Microsoft Entra ID (formerly Azure AD) and SAML2 for secure identity exchange across domains. Authentication levels, groups, and user hierarchies can be managed using Entra group associations.

Maintmaster OEE User Accounts

User accounts can be set up for form-based authentication or Single Sign-On (SSO). Accounts can be administered centrally through an IdP or configured by a system administrator. Password policies can be tailored to meet organizational security requirements.

Platforms and Technologies

Maintmaster OEE supports all modern web browsers and is compatible with mainstream versions of Android and iOS platforms.

Appendix 1: Measuring Hardware

For accurate measurement and presentation of operational data, Maintmaster may provide an external hardware device—the Maintmaster OEE SmartBox IoT Module—during onboarding.

The Maintmaster OEE SmartBox supports MQTT for secure integration with Azure IoT Hub, configured with the appropriate hostname, Device ID, and credentials (X.509 certificates or SAS

tokens). It also supports integration with Kepware servers for JSON telemetry over MQTT (port 8883). The Smartbox comes pre-configured with the ability to authenticate against the MQTT server. All communication is done over TLS 1.2+.

The SmartBox includes six input channels: four opto-isolated digital inputs for high-speed pulse counting and machine status acquisition, and two analog inputs for process variables such as temperature, pressure, or line speed.

Network Requirements: Outbound port 8883 (MQTT over TLS).

Technical Specifications:

Features	Maintmaster OEE SmartBox	
Input Channels		
Compatible Analog Signals	0-5 V, 0-10 V, 0-20 mA, 4-20 mA	
Analog Input Resolution	15 bits	
Analog Channels Input Impedance	mA: 15 Ω + 1.5 V C: 1MΩ	
Accuracy	0.15 % (F.S.)	
Digital Input	**Logical Level**	Logical level "0": <0.5V Logical level "1": >3V
	Maximum Voltage	30 V
	Input Impedance	270 kΩ
	Input Current @ 30 Vcc (Typical)	0.15 mA
	Maximum Frequency (Square Wave)	Dry Contact < 10Hz PNP: 3 kHz NPN: 3 kHz
	Minimum Pulse Length	Dry Contact 50 ms PNP: 150 µs NPN: 150 µs
Digital Output	2 digital NPN outputs Maximum current that can be switched at the output: 700 mA	
Buffer Capacity	• 7000 logs with 1 analog input enabled. • 1800 logs with 2 analog inputs enabled and the 6 digital inputs in Count mode.	

Appendix 2: Data transmitted

In order to do the OEE computations, the following data is transmitted to the OEE service in Azure via your OEE smartbox device:

- Production data (counts, alarms etc.).
- OEE events (Availability, Performance, Quality).
- Downtime reasons and root cause hierarchies.
- Shift and operator context.