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_IDDs _IDDes

PowerMeasurement
Service Description

Abstract

The PowerMeasurement_SD defines a microservice that provides electrical power measurements from the ore feeder or conveyor motor subsystem within the AI control and optimization system. This service offers standardized and secure access to live power data, supporting monitoring, optimization, and predictive control in an industrial environment.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
2 (9)

Contents

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
3 (9)

1 Overview

The **PowerMeasurement_SD** defines a microservice that provides electrical power measurements from the ore feeder or conveyor motor subsystem within the AI control and optimization system. This service offers standardized and secure access to live power data, supporting monitoring, optimization, and predictive control in an industrial environment.

The rest of this document is organized as follows. In Section 2, we describe the abstract message operations provided by the service. In Section 3, we end the document by presenting the data types used by the mentioned operations.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
4 (9)

1.1   Significant Prior Art

This service builds on existing Arrowhead-compliant measurement services and standard industrial communication models. Its structure and communication model follow the Eclipse Arrowhead framework conventions for service interoperability and data exchange [1].

1.2   How This Service Is Meant to Be Used

The service is intended to be used by supervisory or AI optimization systems to retrieve real-time or aggregated power readings from connected field devices. Typical consumers include:

- AI-based control optimizers that adjust process parameters.

- Data acquisition systems for energy usage monitoring.

- Local control loops verifying power levels for motor safety.

1.3   Important Delimitations and Dependencies

The PowerMeasurement_SD assumes:

- A valid Arrowhead service registry and authorization core system are available [1].

- Communication occurs within a trusted local cloud [1].

- Token-based security (Arrowhead Token / JSON Web Token) is implemented by both provider and consumer [1, 2].

Dependencies include the **PowerMeasurement_IDD** interface definition and the associated **PowerSensor_SysD** subsystem.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
5 (9)

2 Service Interface

This section describes the interface operations provided by the **PowerMeasurement** service. In particular, each subsection names an abstract operation, an input type and an output type, in that order. The input type is named inside parentheses, while the output type is preceded by a colon. Input and output types are only denoted when accepted or returned, respectively, by the interface in question.

All abstract data types named in this section are defined in Section 3.

The following interface operations are available.

2.1 GetPowerMeasurement

PowerMeasurement_IDD

The `GetPowerMeasurement` operation provides the latest electrical power measurement from the PowerSensor subsystem.

Purpose: To supply real-time voltage, current, and calculated power data to authorized consumer systems for monitoring, optimization, and control.

Input: None.

Output: `PowerMeasurement_IDD` — the current power measurement data structure.

Error handling: If a request cannot be processed, the service may return standard Arrowhead error codes such as [1]:

- **400 Bad Request** — Invalid or missing request parameters.

- **401 Unauthorized** — Authentication or token validation failed.

- **500 Internal Server Error** — Sensor or communication failure.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
6 (9)

3 Information Model

Here, all data objects that can be part of something the PowerMeasurement Service provides to the hosting System are listed in alphabetic order. Each subsection begins with the *struct* keyword, which is used to denote a collection of named fields, each with its own data type. As a complement to the explicitly defined types in this section, there is also a list of implicit primitive types in Section 3.2.

3.1 struct PowerMeasurement_IDD

The following data structure defines the content of the PowerMeasurement_IDD returned by the service.

Field	Type	Description
timestamp	DateTime	Time when the measurement was taken.
voltage	Float	Measured voltage in volts.
current	Float	Measured current in amperes.
power	Float	Calculated electrical power in watts.
unit	String	Measurement unit, e.g., `"W"`.
sensorId	String	Identifier of the PowerSensor providing data.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
7 (9)

3.2   Primitives

Types and structures mentioned throughout this document that are assumed to be available to implementations of this service. The concrete interpretations of each of these types and structures must be provided by any IDD document claiming to implement this service.

Type	Description
DateTime	Pinpoints a specific moment in time.
Float	Numeric representation for real-valued measurements.
String	Textual identifier or unit name.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
8 (9)

4 References

[1] "Eclipse arrowhead framework documentation," Eclipse Arrowhead Project, 2024, https://eclipse-arrowhead.github.io/.

[2] M. Jones, J. Bradley, and N. Sakimura, "Json web token (jwt)," RFC 7519, 2015, https://www.rfc-editor.org/rfc/rfc7519.

Document title
PowerMeasurement
Date
2025-10-15

Version
1.0
Status
RELEASE
Page
9 (9)

5 Revision History

5.1 Amendments

No.	Date	Version	Subject of Amendments	Author
1	2025-10-15	1.0	Initial PowerMeasurement_SD created for AI-driven ore feeder and conveyor system.	ricbli-7

5.2 Quality Assurance

No.	Date	Version	Approved by
1	2025-10-15	1.0	–