

ANSI/ASABE S632-1 JUN2018

Precision Agriculture Irrigation Language: Core Concepts, Processes, and Objects



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Approved June 2018 as an American National Standard

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Developed by the X632 Committee. Approved as an ASABE standard and ANSI June 2018.

Keywords: Controllers, Irrigation, Sensors, System Integration

0 Introduction

The need to feed a growing global population with limited resources, in the context of ever-increasing regulatory pressure, supply-chain interest in traceability and sustainability, and market price volatility, requires principled decision-making regarding the usage of crop inputs such as water, fertilizers, and crop protection. Better decision-making requires the capture and sharing of a variety of data across multiple hardware and software platforms; a necessary condition for this greater *interoperability* is the rapid deployment of standard formats for data exchange in agricultural field operations, and irrigation is no exception.

Current irrigation technologies allow growers to use water and fertilizers more efficiently, while maintaining or increasing their yield. It is especially useful in fields where the soil is not uniform. Precision irrigation technology relies upon the capture and analysis of multiple sets of data from various pieces of equipment and databases to support analysis, planning, operations and reporting of results. Exchange of information between these devices is a normal and necessary process for effective use of the devices when employing them for irrigation management. A standardized communication method between inputs for the system and the control devices is needed to maximize the utility, application and desired outcome of advanced, precision irrigation methods and applications. Data exchange standards that enable the free flow of data are fundamental in allowing growers and vendors alike to manage data and to make better decisions that use less water and energy resources while protecting harvest yield. Among the benefits they provide there are two that are noteworthy:

- Data exchange standards facilitate broader (i.e., more technologies) and more comprehensive (i.e., greater level of detail and precision) systems integration. This is achieved by reducing development and maintenance costs for data handling systems.
- The standards promote reliable system interoperation: standards-compliant tools are expected to work together; the end user benefits by having confidence that two products from different sources will work together as expected.

1 Purpose and Scope

This Standard enables the exchange of weather, soil moisture, and other relevant data, currently stored in a variety of proprietary original equipment manufacturer (OEM) formats, in an industry-wide format that can be used by irrigation data analysis and prescription programs. The goal is to standardize data formats for irrigation equipment, including, but not limited to, weather stations, soil-moisture sensors and irrigation control systems, soils data, GIS data, and other agricultural irrigation-related information impacting irrigation methods and applications.

1.1 The scope of the Standard is based on two major irrigation data processes:

1. Observations are the field, atmospheric, plant, or other *in situ* measurements that apply to irrigation management. This includes weather stations, soil moisture sensors, or crop-related sensing. This work is an agricultural implementation of the ISO 19156 standard for observations and measurements (ISO, 2011).