

ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/AZT6P-EN REV. K

# Aztec 600 Phosphate

## Phosphate analyzer



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## **Measurement made easy**

Reliable, online monitoring of phosphate for potable water applications

### **Reliable phosphate measurement**

- automatic 2-point calibration
- automatic sample dilution to maximize range
- automatic background color compensation
- analysis of up to 3 sample streams
- extended digestion time for wastewater applications

### **Easy to operate**

- familiar Windows™ menu system
- built-in context-sensitive help
- data trending and analysis

### **Easy to maintain**

- self-cleaning measurement cell
- simple-to-perform annual service
- helpful maintenance diagnostics screens

### **Full communications**

- web and FTP enabled for easy data file access, remote viewing, and configuration
- email capability
- optional PROFIBUS® DP V1.0



## Introduction

The Aztec 600 colorimetric series of analyzers from ABB are a range of compact yet reliable online colorimetric analyzers for the key parameters in water treatment.

They combine the unique Aztec fluid handling system with the latest electronics platform, featuring Windows menu-driven software, to create a range of analyzers simple to operate and maintain, capable of measuring up to three sample streams.

The Aztec 600 Phosphate analyzer has been designed specifically for the measurement of phosphate in both potable water and municipal wastewater effluents. It offers reliable and accurate on-line analysis of phosphate up to 50 ppm PO<sub>4</sub>.

All the sample and chemical fluid handling for measurement, mixing and disposal is controlled precisely by the patented Aztec fluid handling system that cleans the measuring cell with every movement.

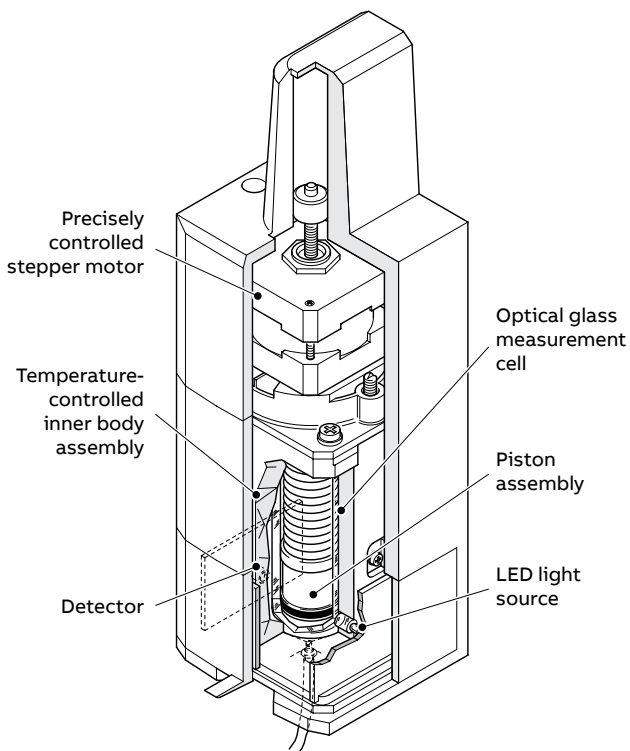


Figure 1 Measuring head detail

Users of this system also benefit from the Aztec 600 Phosphate's low maintenance requirements, ease of use, autocalibration, adjustable frequency of measurement, and proven chemistry methodology.

Process data, as well as the content of alarm and audit logs, can be saved to a removable SD™ card for record keeping and analysis using ABB's DataManager Pro data analysis software.

## User benefits of online phosphate monitoring

The task of managing the quantity of water resources and the quality of drinking water today is unimaginable without online instrumentation that helps water utilities manage, treat, and deliver drinking water to consumers.

Online monitoring provides plant operators with an early warning of any changes to the treatment process, enabling operational decisions to be made in near real-time. This level of process control is not possible with manual testing alone, where potentially important events that occur between less frequent manual sampling can be missed.

### Users of the Aztec 600 Phosphate analyzer benefit from:

- Improvements in process control
  - enables operational decisions to be made in near real-time.
- Improvements in process reliability
  - detect process failures before they affect the quality of the water leaving the plant
- Process optimization for water quality
  - increased plant efficiency
- Potential capital and operating cost reductions
  - reduction in chemical and energy usage
- Continual monitoring of remote or unstaffed sites
  - improved response times and reduced visits saving money and time whilst lowering carbon footprint
- Improved reporting
  - analyzer audit trail data can be used to assure customers and regulators of process efficiency and consistent product quality

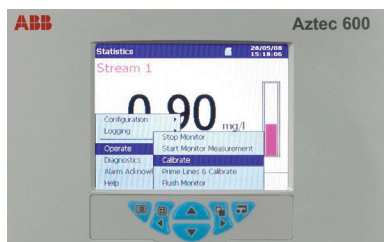
### Applications

Typical applications for the Aztec 600 Phosphate are:

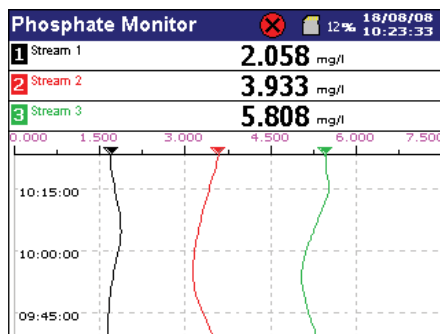
- Reducing the plumbosolvency of water supplies (how readily they dissolve lead):
  - monitoring of final water phosphate levels to ensure correct orthophosphate dose
- Phosphate discharge compliance from municipal wastewater plants:
  - monitoring of final effluents to ensure adequate phosphate removal

## Overview of the Aztec 600 Phosphate analyzer

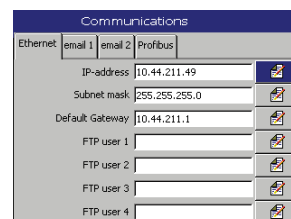
### Easy-to-use Windows-based menu system



### Graphical trending of results

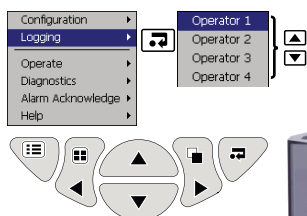


### Flexible communications



- Ethernet connectivity
- 6 mA outputs
- 10 alarm relays (configurable)
- PROFIBUS DP v1.0
- SD card
- Process data trends

### Simple navigation



### Single or multistream options

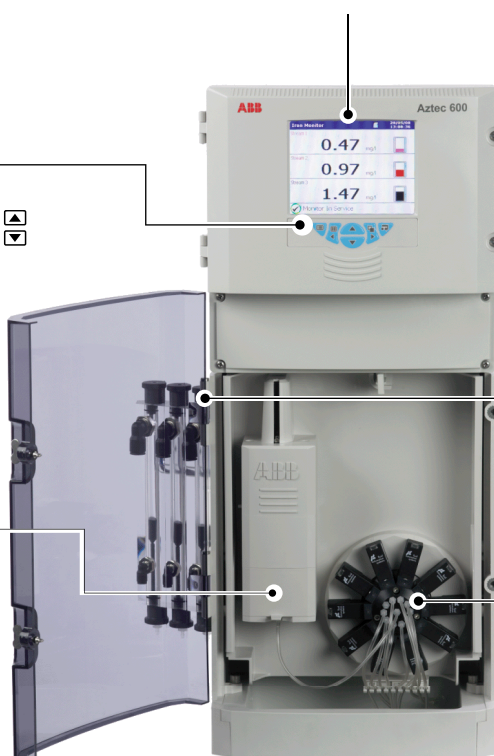
- Integrated side sample pot for ease of plumbing
- Magnetic sample flow switch alarms when sample is not present

### Advanced optics

- Automatic LED intensity adjustment at every calibration – eliminates drift and compensates for any cell fouling
- Temperature-controlled for optical stability
- Automatic 2-point calibration
- Automatic sample dilution to maximize measurement range
- Background sample color compensated for

### Simplified fluid handling

- Single piston pump draws in precise volumes of reagents and samples through a valve manifold into the optical measuring cell
- Air is used in the chemical sequence for mixing and purging the reagents and sample
- Piston movement provides mechanical cleaning of the measurement cell





## Reliable measurement

The Aztec 600 Phosphate is an online colorimetric analyzer. It has been designed for ease-of-use and maintenance simplicity, while offering the benefits of flexible communication and advanced data acquisition.

The Aztec 600 Phosphate can measure up to four samples per hour using the industry standard molybdate blue chemical method.

A fully programmable multistream option is available, providing up to 3-stream capability with user-programmable stream sequencing.

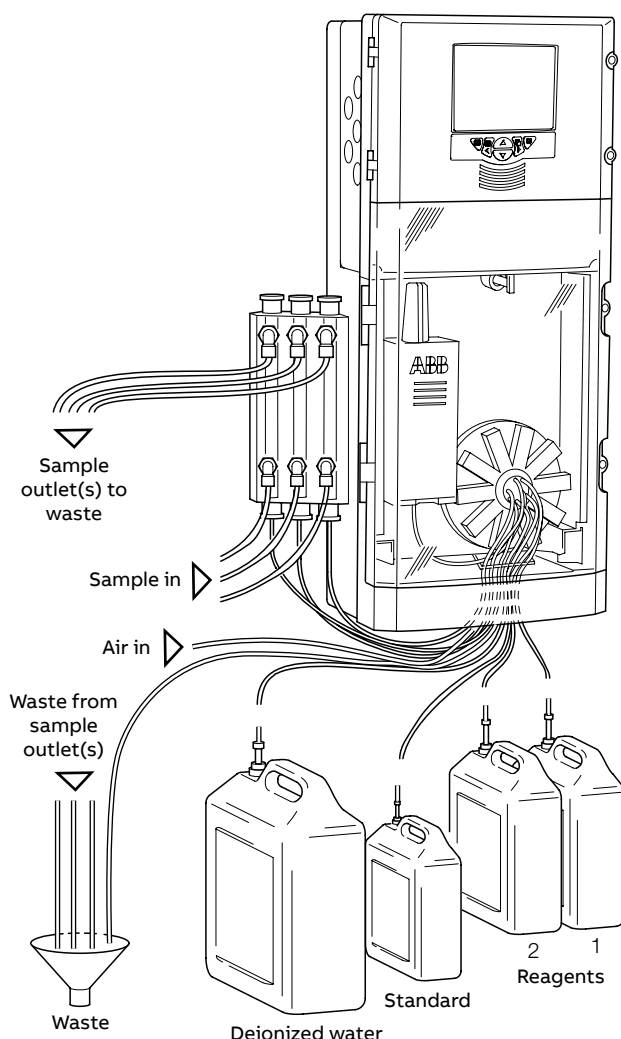


Figure 2 Example of multistream installation

### Fluid handling

A single piston pump provides all the sample and chemical fluid handling for measurement, mixing, and disposal. The pump is stepper motor-controlled for repeatability and precision.

This 'motorized syringe' approach has the added benefit of wiping the optical cell on every movement of the piston, resulting in a highly efficient automatic cleaning process.

This is particularly important when measuring waters where optical contamination can be a real issue without having stringent automatic cleaning.

### Measurement technique

The optical cell is rinsed thoroughly with sample before measurement, eliminating dead zones and enabling multistream measurement across different samples without cross-contamination.

To correct for any natural coloration of the sample, the background absorbance of the sample is measured prior to the addition of any color-forming reagents to provide a sample blank.

Instead of using a mechanical stirring system, the piston and optical sensor is utilized further by drawing in air after the sample and reagents are introduced. This provides turbulence and efficient mixing without any of the cost and maintenance drawbacks of mechanical and electrical mixing systems.

The Aztec 600 Phosphate analyzer has the capability to enable an automated chemical cleaning routine. This programmable rinse routine enables a separate acid/alkali or biocide to be drawn through the sample tubing and optical cell.

### Extended digestion

In wastewater applications, where forms of phosphate other than 'reactive' are present, a version of the analyzer is available with extended reaction time. This version extends the measurement cycle, allowing for improved detection of condensed phosphates and/or labile organic phosphates.

In addition, the analyzer is equipped with an improved side sample pot, which is able to cope with higher solids content that are typically found in wastewater applications.

## Simple to operate

The powerful and user-friendly Windows menu driven software enables users to operate the analyzer with the minimum amount of training.

The comprehensive range of available menu screens is simple to access using the six membrane keys.

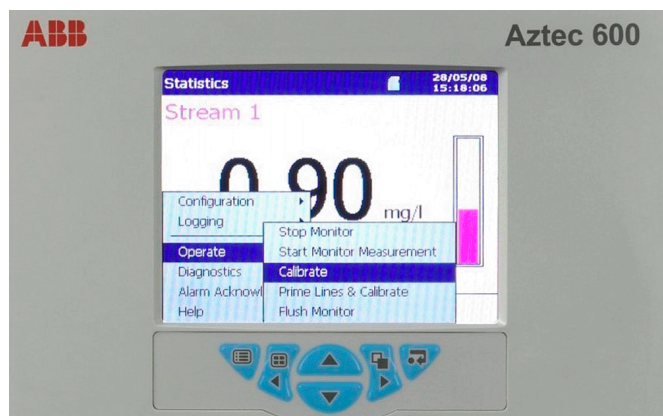


Figure 3 Windows-based interface

These menus include data logging and graphical trending screens, operation command screens, full setup configuration screens, and a range of self-diagnostics (including full calibration and operating status screens).

Historical logs provide operators with access to alarm data and audit trail data. Process data and historical logs are archived securely to a removable SD card.

All information is displayed clearly on the easy-to-read 145 mm (5.7 in) color LCD display and is available in a range of languages.



Figure 4 Communications window

## Simple to maintain

The Aztec 600 colorimetric range is designed to be as maintenance-free as possible. The inherent product design and autocalibrating features reduce the amount of maintenance required to external cleaning of sample lines, changing of reagents and annual servicing.

Table 1 Service schedule

Period	Schedule
12 monthly	Replace piston assembly and sample tubing
24 monthly	Replace valve diaphragms, piston assembly and monitor tubing

All parts are provided in convenient maintenance kits.

### Solution replacement

The Aztec 600 Phosphate analyzer uses a total of approximately 25 mL of sample, per analysis: 7.5 mL for the actual measurement and the remainder for cell rinsing. The automatic 2-point calibration substitutes the sample with the calibration solutions at the same amount.

Above 10.0 ppm PO<sub>4</sub>, the Aztec 600 Phosphate dilutes samples automatically with deionized water to maximize the measurement range. The dilution ratio between sample and deionized water is user-configurable between: 1:1, 1:2, 1:3, and 1:4.

Table 2 Dilution ratio between sample and deionized water

Dilution ratio	Approximate volume of deionized water used per measurement
1:0	0 mL
1:1	12.5 mL
1:2	16.5 mL
1:3	19 mL
1:4	20 mL

A standard set of reagents consists of two reagents (5 L of each) and a high standard (2.5 L). The reagent usage depends on how many samples per hour are being measured.

Table 3 Reagent usage

Samples per hour	Duration of reagent set (days)
4	60
3	80
2	120
1	240

## Flexible communications

### Ethernet ready

The Aztec 600 provides 10BaseT Ethernet communications via a standard RJ45 connector and uses industry-standard protocols TCP/IP, FTP, and HTTP. The use of standard protocols enables easy connection into existing PC networks.

### Data file access via FTP (File Transfer Protocol)

The Aztec 600 features FTP server functionality. The FTP server in the analyzer is used to access its file system from a remote station on a network. This requires an FTP client on the host PC. Both MS-DOS® and Microsoft® Internet Explorer version 5.5 or later can be used as an FTP client.

- Using a standard web-browser or other FTP client, data files contained within the analyzer's memory or memory card can be accessed remotely and transferred to a PC or network drive.
- Four individual FTP users' names and passwords can be programmed into the Aztec 600. An access level can be configured for each user.
- All FTP log-on activity is recorded in the audit log of the instrument.
- Using ABB's data file transfer scheduler program, data files from multiple instruments can be backed-up automatically to a PC or network drive for long-term storage, ensuring the security of valuable process data and minimizing the operator intervention required.

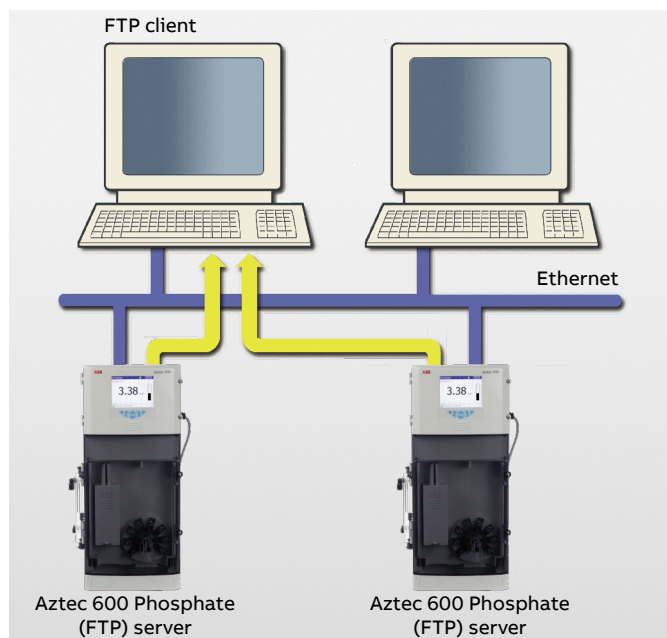


Figure 5 Data file access via FTP

### Embedded web server

The Aztec 600 Phosphate has an embedded web server that provides access to web pages created within the analyzer. The use of HTTP enables standard web browsers to view these pages.

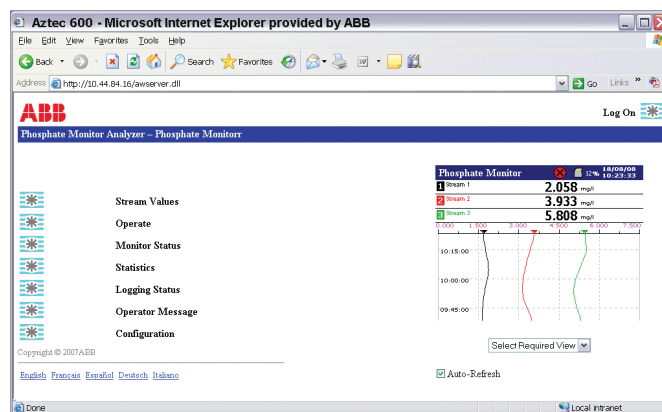


Figure 6 Embedded web server

- Accessible through the web pages are the current display of the analyzer, detailed information on stream values, reagent and solution levels, measurement status and other key information.
- The audit and alarm logs stored in the analyzer's internal buffer memory can be viewed on the web pages.
- Operator messages can be entered via the web server, enabling comments to be logged to the analyzer.
- The web pages and the information they contain are refreshed regularly, enabling them to be used as a supervision tool.
- The analyzer's configuration can be selected from an existing configuration in the internal memory or a new configuration file transferred to the instrument via FTP.
- The analyzer's real-time clock can be set via the web server. Alternatively, the clocks of multiple analyzers can be synchronized using ABB's File Transfer Scheduler software.

### Email notification

Via the Aztec 600 Phosphate's built-in SMTP client, the analyzer is able to email notification of important events. Emails triggered from alarms or other critical events can be sent to multiple recipients. The analyzer can also be programmed to email reports of the current measurement status or other parameters at specific times during the day.

### PROFIBUS

The Aztec 600 Phosphate can be equipped with PROFIBUS DP V1.0 to enable full communications and control integration with distributed control systems.



## Specifications

### Measurement range

#### Phosphate

Autoranging	0.05 to 50 ppm PO <sub>4</sub>
	0.0016 to 16.3 ppm PO <sub>4</sub> -P
Undiluted range	0.05 to 10 ppm PO <sub>4</sub>
	0.0016 to 3.26 ppm PO <sub>4</sub> -P
Diluted range	10 to 50 ppm PO <sub>4</sub>
	3.26 to 16.3 ppm PO <sub>4</sub> -P

### Chemical method

#### Phosphate

Phosphomolybdenum blue

#### Background color correction

Compensated at the measurement wavelength

#### Self-cleaning

Programmable automatic chemical rinsing – piston cleaned every measurement

### Measurement mode

#### Batch measurement

User-selectable 1 to 4 measurements per hour<sup>1</sup>

#### Sample streams

Single or up to 3 streams – sequencing is programmable

### Measurement performance

#### Accuracy<sup>2</sup>

<±5 % of reading<sup>3</sup> or ±0.005 ppm  
(whichever is the greater)

#### Repeatability

<Max. ±5 % of reading<sup>4</sup> or ±0.030 ppm  
(whichever is the greater)

#### Resolution

0.001 ppm or 1 ppb

#### Measurement units

mg/L, ppm, ppb, µg/L

#### Calibration

2-point, automatic calibration, with the option of manual initiation. The interval between automatic calibrations manually selectable from four times a day to once per week.

### Environmental data

#### Ambient operating temperature

5 to 45 °C (41 to 113 °F)

#### Ambient operating humidity

Up to 95 % RH noncondensing

#### Sample temperature

1 to 40 °C (32 to 104 °F)

#### Sample flow

Continuous, 200 to 500 mL/min

#### Sample pressure

5 psi maximum

#### Sample limitations

Samples containing particles 100 µm (0.004 in) in diameter or larger may require prefiltration

### Maintenance

#### Routine service interval

12 months

#### Reagent consumption

0.75 mL of each reagent per measurement

### Display

- Color, TFT, liquid-crystal display (LCD) with built-in backlight and brightness adjustment
- Diagonal display area: 145 mm (5.7 in) 76,800 pixel display<sup>5</sup>

#### Dedicated operator keys

- Group select/left cursor
- View select/right cursor
- Menu key
- Up/Increment key
- Down/Decrement key
- Enter key

<sup>1</sup> When extended digestion is selected (AW636/X.X.X.X.X.1), the batch measurement will be reduced.

<sup>2</sup> Maximum measured error across full measurement range.

<sup>3</sup> Tested in accordance with **IEC 61298 Parts 1-4 : Edition 2.0 2008-10**.

<sup>4</sup> Tested in accordance with **BS ISO 15839 : 2003**.

<sup>5</sup> A small percentage of the display pixels may be either constantly active or inactive. Max. percentage of inoperative pixels <0.01 %.

## Mechanical data

### Ingress protection

IP31<sup>1</sup>

### Sample connections

Inlet: 6 mm OD push-fit × ¼ in BSP elbow  
 Outlet: 10 mm OD push-fit × ⅜ in BSP elbow

### Dimensions

Height 653 mm (25.7 in)  
 Width 366 mm (14.4 in) max.  
 Depth 183 mm (7.2 in) door closed  
 430 mm (16.9 in) door open  
 Weight 15 kg (33 lb)

### Materials of construction

Electronics enclosure 10 % glass loaded polycarbonate  
 Main enclosure Noryl®  
 Lower tray 20 % glass loaded polypropylene  
 Door Acrylic

## Electrical

### Power supply ranges

- 100 to 240 V max. AC 50/60 Hz ±10 %  
 (90 to 264 V AC, 45/65 Hz)
- 18 to 36 V DC (optional)

### Power consumption

75 W max. – AC  
 100 W max. – DC

## Analog outputs

### Single and multistream analyzers

6 isolated current outputs, fully assignable and programmable over a 0 to 20 mA range  
 (up to 22 mA if required)

## Alarms/relay outputs

### Single and multistream analyzers

One per unit:

- Stop relay
- Attention relay
- Failure relay
- Calibrate relay

Six per unit:

- Fully user-assignable alarm relays

### Rating

Voltage	250 V AC	30 V DC
Current	5 A AC	5 A DC
Loading (noninductive)	1,250 VA	150 W

## Connectivity/communications

### Ethernet connection

Web server with FTP For real-time monitoring, configuration, data file access and email capability

### Communications

PROFIBUS DP V1.0 (optional)

## Data handling, storage and display

### Security

Multilevel security Operator and configuration  
 Password or security switch

### Storage

Removable SD card

### Trend analysis

Local and remote

### Data transfer

SD card or FTP

## Approvals, certification and safety

### Safety approval

cULus

### CE Mark

Covers EMC & LV Directives  
 (including latest version EN 61010)

### General safety

- EN61010-1
- Overvoltage Class II on inputs and outputs
- Pollution category 2

## EMC

### Emissions & immunity

Meets requirements of IEC61326 for an Industrial Environment

<sup>1</sup> Not evaluated for UL or CB.

## Dimensions

Dimensions in mm (in)

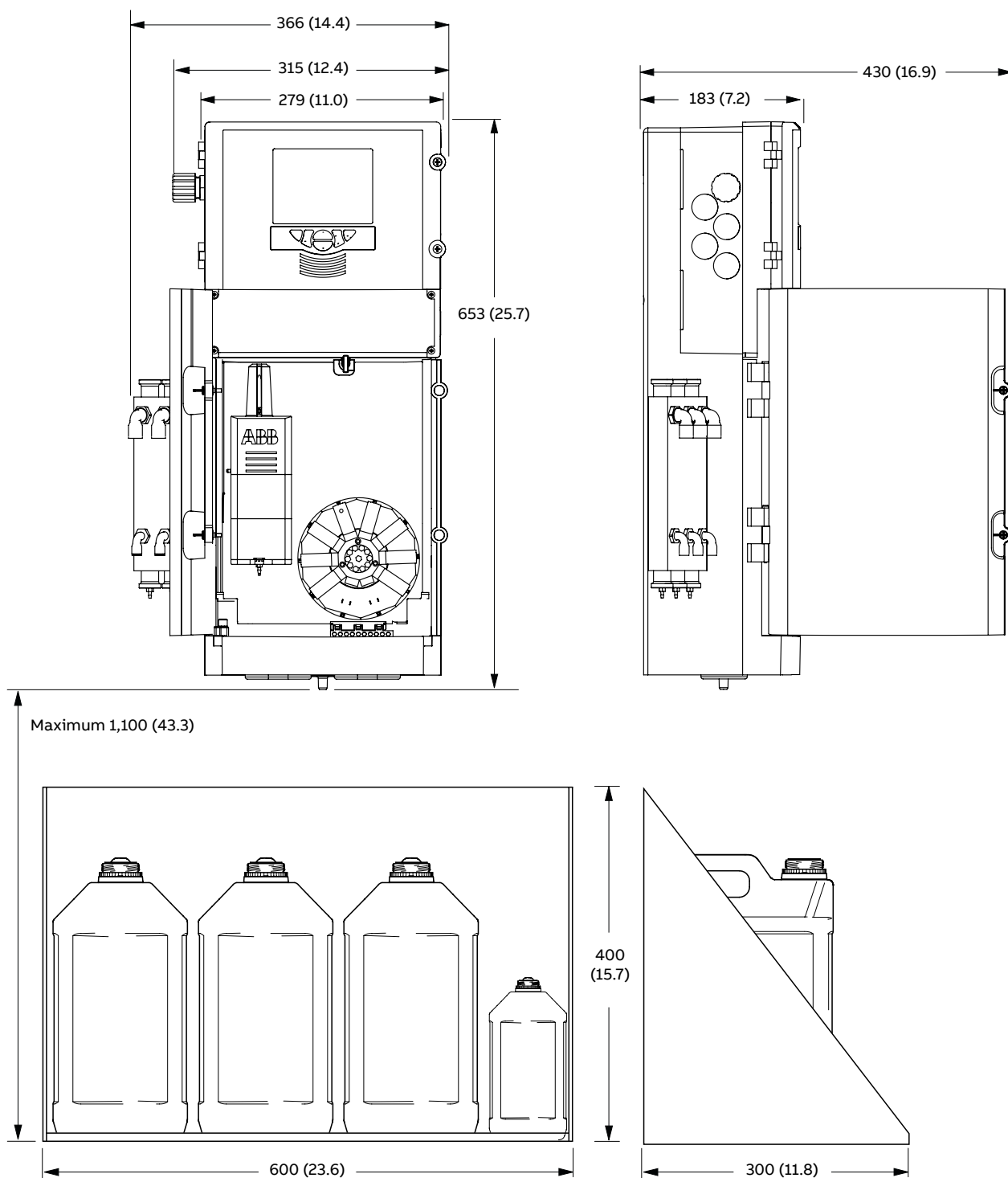


Figure 7 Overall dimensions of Aztec 600 analyzer and optional reagent support tray



## Electrical connections

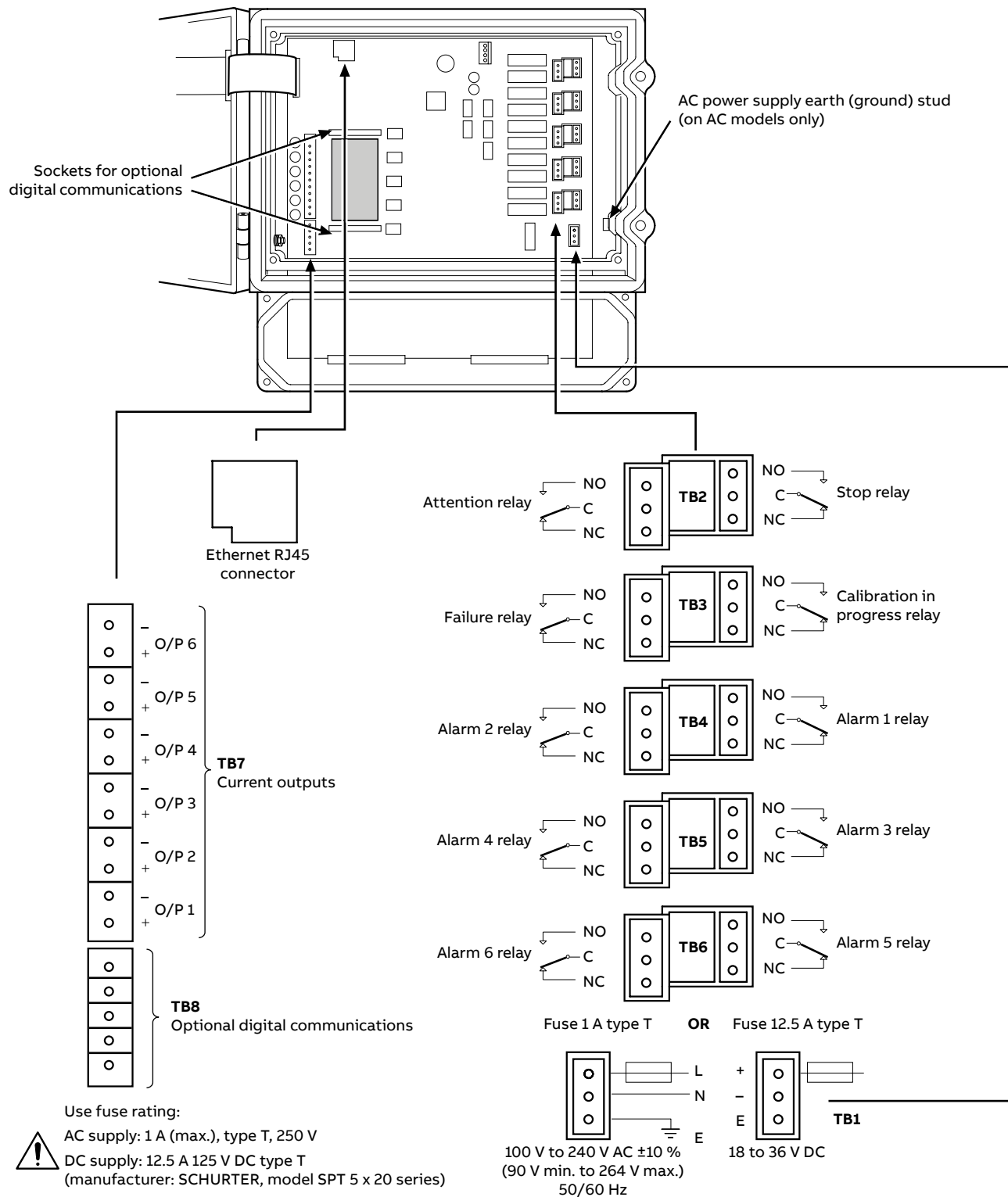


Figure 8 Electrical connections

## Ordering information

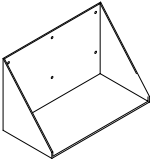
Aztec 600 Phosphate analyzer	AW636/	X	X	X	X	X	X	X	X
<b>Range</b>									
0.05 to 50 ppm PO <sub>4</sub>	5								
<b>Number of streams</b>									
Measuring 1 stream		1							
Measuring 1 stream with additional valve for cleaning		2							
Measuring 3 streams		3							
<b>Communications</b>									
None			0						
PROFIBUS DP V1.0			1						
<b>Enclosure</b>									
Standard				0					
<b>Power supply</b>									
90 to 264 V AC / 50 to 60 Hz					0				
18 to 36 V DC					1				
<b>Extended digestion – for wastewater applications<sup>1</sup></b>									
Not required							0		
Required <sup>2</sup>							1		
<b>Instruction manual</b>									
English								1	
French								2	
Italian								3	
German								4	
Spanish								5	
Portuguese								7	
Polish								8	
<b>Certification</b>									
None									0
Certificate of calibration									1

<sup>1</sup> Contents includes wastewater software and wastewater side sample pot.

<sup>2</sup> Only available with AW636/51 or AW636/52 (1 stream, or 1 stream with additional valve for cleaning).



Accessories

Part number	Description	
03-0051-A	Reagent support tray (stainless steel)	

Sales



Service



Software





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## Acknowledgements

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- Noryl is a registered trademark of SABIC Innovative Plastics IP B.V.
- PROFIBUS is a registered trademark of PROFIBUS Nutzerorganisation e.V.
- SD is a trademark of SD-3C LLC.



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