

ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/AZT6C-EN REV. E

Aztec 600 Color

Color analyzer



Measurement made easy

Reliable on-line monitoring of color for the optimization of coagulation processes

Reliable color measurement

- automatic 2-point calibration
- analysis of up to 3 sample streams

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

The Aztec 600 Colorimetric range

The Aztec 600 Colorimetric series of analyzers from ABB are a range of compact, yet reliable, on-line 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 that are simple-to-operate and maintain and capable of measuring up to 3 sample streams.

The following parameters are available in the Aztec 600 Colorimetric range:

- aluminum
- ammonia
- color
- iron
- manganese
- phosphate

Aztec 600 Color analyzer

The Aztec 600 Color analyzer has been designed specifically for the measurement of color through the drinking water treatment process for coagulation optimization.

It offers reliable and accurate on-line analysis of the color of surface waters and treated waters up to 500 Hazen units.

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.

Users of this system also benefit from the Aztec 600 Color's low maintenance requirements, ease of use, auto-calibration, adjustable measurement frequency 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 data analysis software.

Applications

Typical applications for the Aztec 600 Color are:

- assessment of coagulation effectiveness
- optimizing color removal for D/DBP rule compliance
- predictive coagulant control based on raw water color
- monitoring the efficiency of carbon filtration
- monitoring of final water for verification that process targets have been met

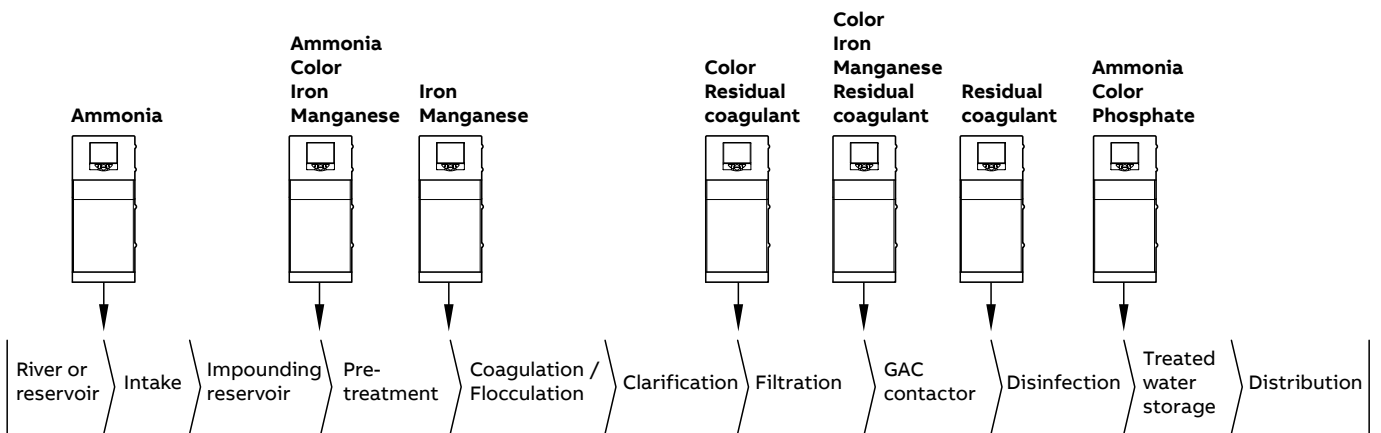


Figure 1 Cost-effective on-line colorimetric analysis to improve drinking water quality and treatment efficiency

Natural organic matter in surface waters

Natural organic matter (NOM) is a complex and heterogeneous mixture of organic substances produced from vegetative decay processes that create problems for water treatment plants tasked with producing drinking water of a consistent high quality.

In waters free of industrial pollution, the majority of NOM originates from the soils. These aquatic humic substances are mainly derived from decomposing plants and animals and color the water from yellow to brown. They also provide a substrate for bacteria and fungi, that, if not removed during the treatment process, can contribute to excess microbial growth in the water distribution system. This in turn can lead to secondary problems such as disease, fouling, poor taste and odor.

It is important to remove humic substances prior to chlorination, as any remaining NOM will react with the added chlorine to create undesirable disinfection by-products (DBPs) such as trihalomethanes.

User benefits of on-line color monitoring

The daily challenge faced by many water treatment operators is to maximize the removal of natural organic matter, while ensuring adequate microbial control.

For compliance with the Disinfectant / Disinfection By-Product (D/DBP) Rule, utilities are using modified conventional processes, such as enhanced coagulation and softening, in order to achieve higher Total Organic Carbon (TOC) removal. Implementation of these processes are difficult without reliable, on-line analysis.

On-line color analysis provides an early warning of changes to the treatment process that allows 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 can be missed.

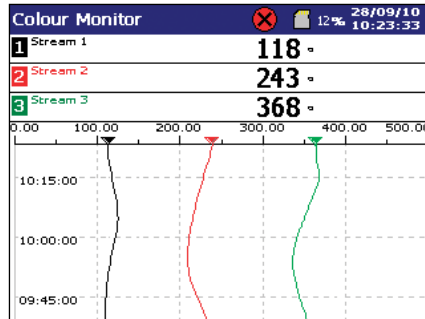
The Aztec 600 on-line color monitor provides water treatment operators with a cost-effective tool for quick and accurate assessment of treatment performance in real time. Studies have demonstrated that by achieving a color removal goal, the TOC removal requirement for the D/DBP rule can be met.

Overview of the Aztec 600 Color analyzer

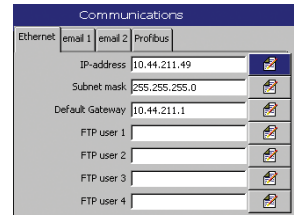
Easy-to-use Windows-based menu system



Graphical results trending

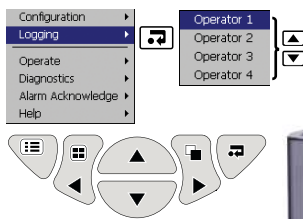


Flexible communications



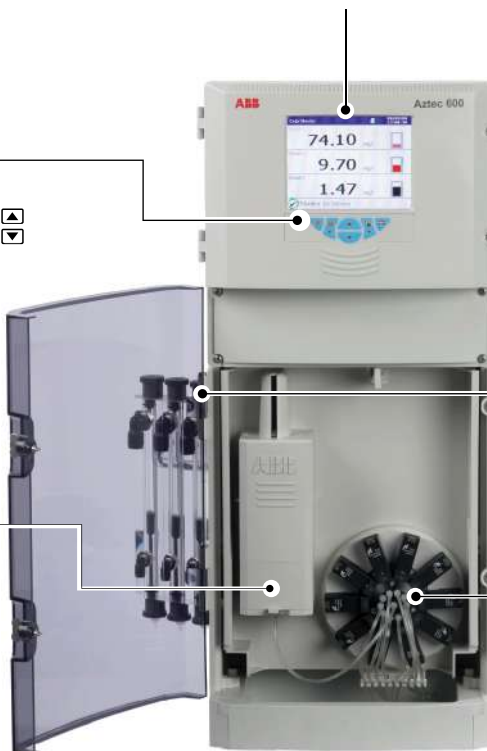
- Ethernet connectivity
- 6 mA outputs
- 10 alarm relays (configurable)
- Profibus DP v1.0
- SD memory card
- Process data trends

Simple navigation



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



Single- or multi-stream options

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

Simplified fluid handling

- Single piston pump draws in precise volumes through a valve manifold into the optical measuring cell
- Piston movement provides mechanical cleaning the measurement cell

Reliable measurement

The Aztec 600 Color analyzer has been designed for ease-of-use and maintenance simplicity, while offering the benefits of flexible communication and advanced data acquisition.

The Aztec 600 Color can measure up to 12 samples per hour. A fully-programmable multi-stream option is available, providing up to 3-stream capability with user-programmable stream sequencing.

Measuring principle

The absorbance of the sample is measured at 400 nm and expressed as a color corresponding to the Platinum-Cobalt Scale (Pt-Co) or Alpha-Hazen Scale.

The Hazen color scale was introduced in 1892 by chemist Allen Hazen as a way to evaluate pollution levels in water. It is now used extensively in the water industry. It compares the water color to known concentrations of platinum-cobalt, ranging from 0 at the light end of the scale to 500 at the darkest.

1 mg/l Pt-Co is often referred to as 1 Hazen unit and is equivalent to the color produced by 1mg platinum/L in the form of the chloroplatinate ion.



Figure 2 Change in river-water color through the coagulation process

'True color' measurement

For analytical purposes 'true color' may be described as that due to dissolved matter. 'Apparent color' is that which is seen in the presence of suspended matter in the sample.

Turbidity can seriously affect color determination as the 'apparent color' will be much higher than the 'true color'. To obtain the true color intensity in these circumstances it is necessary to filter the sample prior to the analyzer.

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 multi-stream measurement across different samples without cross contamination. The sample is then drawn into the measurement head where the absorbance is measured before being expelled to waste.

To ensure accuracy and reliability, the Aztec 600 Color analyzer performs a 2-point calibration automatically using a zero color standard and a 50 Hazen color standard. The analyzer also performs a zero compensation measurement periodically to account for any optical variations (for example, cell fouling) when measuring manganese-rich waters.

The Aztec 600 Color 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.

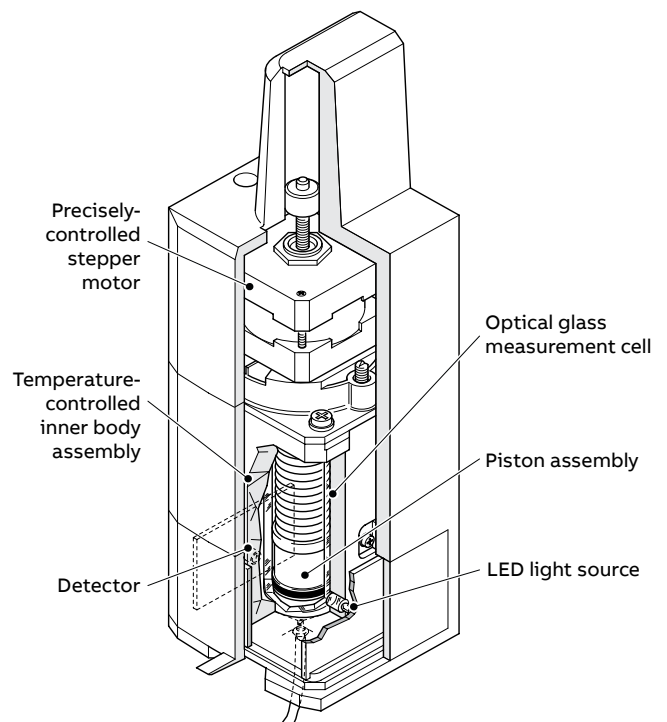


Figure 3 Measuring head detail

Simple to operate

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

The comprehensive range of available menu screens is simple-to-access using the 6 membrane keys.



Figure 4 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 5 Communications window

Simple to maintain

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

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 usage

Solution	Average consumption
Color standard	5 liters every 180 days
Zero color standard	10 liters every 60 days

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® 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 analyzer.
- Using ABB's data file transfer scheduler program, data files from multiple analyzers 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.

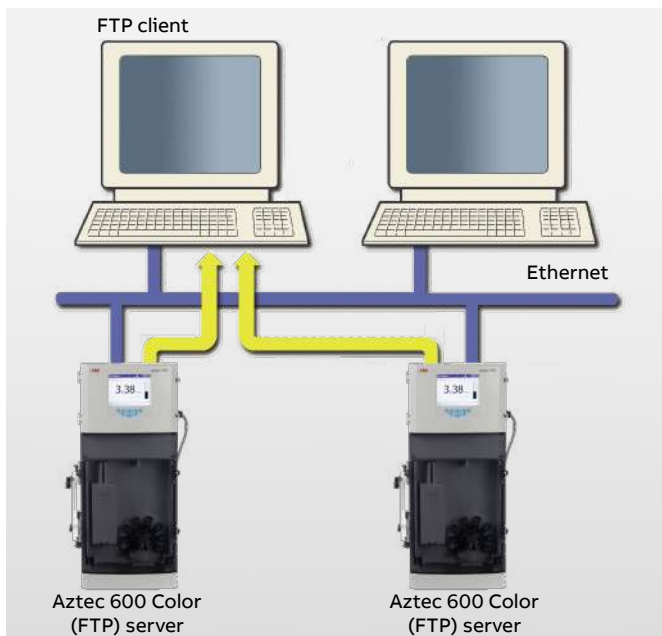


Figure 6 Aztec 600 FTP server

Embedded web server

The Aztec 600 Color has an embedded web-server that provides access to web pages created within the analyzer. The use of HTTP (Hypertext Transfer Protocol) enables standard web browsers to view these pages.



- 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 analyzer 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.

E-mail notification

Via the Aztec 600 Color's built-in SMTP client, the analyzer is able to e-mail notification of important events. E-mails 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 Color can be equipped with Profibus DP V1.0 to enable full communications and control integration with distributed control systems.

Specification

Measurement

Units

- Hazen units
- Pt-Co units

Range

- 0.00 to 500 Hazen units
- 0.00 to 500 mg/L Pt-Co

Chemical method

Color

Measurement of water color by absorbance at 400 nm expressed in Hazen scale or Platinum-Cobalt scale

Self-cleaning

Programmable automatic chemical rinsing – piston cleaned every measurement

Measurement mode

Batch measurement

User-selectable 1 to 12 measurements per hour

Sample streams

Single or up to 3 streams – sequencing is programmable

Measurement performance

Accuracy¹

- 0 to 300 Hazen $<\pm 2\%$ of reading² or ± 0.5 Hazen (whichever is the greater)
- 300 to 500 Hazen $<\pm 5\%$ of reading²

Repeatability

$<\pm 1\%$ of reading³ (at 20 % of span)

Resolution

0 to 10 Hazen – 0.01 Hazen
 10 to 100 Hazen – 0.1 Hazen
 100 to 500 Hazen – 1 Hazen

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.

Zero compensation frequency

User-selectable 1 to 12 hour frequency

Environmental data

Ambient operating temperature

5 to 40 °C (41 to 104 °F)

Ambient operating humidity

Up to 95 % RH non-condensing

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 microns (0.004 in) in diameter or larger may require pre-filtration.

Maintenance

Routine service interval

12 months

Display

- Color, TFT, liquid crystal display (LCD) with built-in backlight and brightness adjustment
- Diagonal display area:
 - 145 mm (5.7 in)
 - 76800 pixel display*

* A small percentage of the display pixels may be either constantly active or inactive. Max. percentage of inoperative pixels $<0.01\%$.

Dedicated operator keys

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

¹ Maximum measured error across full measurement range.

² Tested in accordance with IEC 61298 Parts 1-4 : Edition 2.0 2008-10.

³ Tested in accordance with BS ISO 15839 : 2003.

...Specification

Mechanical data

Ingress protection – wet section

- Case:
 - IP31**
- Critical components:
 - IP31

Sample connections

Inlet:	6 mm OD push-fit x ¼ in BSP elbow
Outlet:	10 mm OD push-fit x ¾ 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 multi-stream 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 multi-stream 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 (non-inductive)	1250 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

Multi level security Operator and configuration password or security switch

Storage

Removable Secure Digital (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

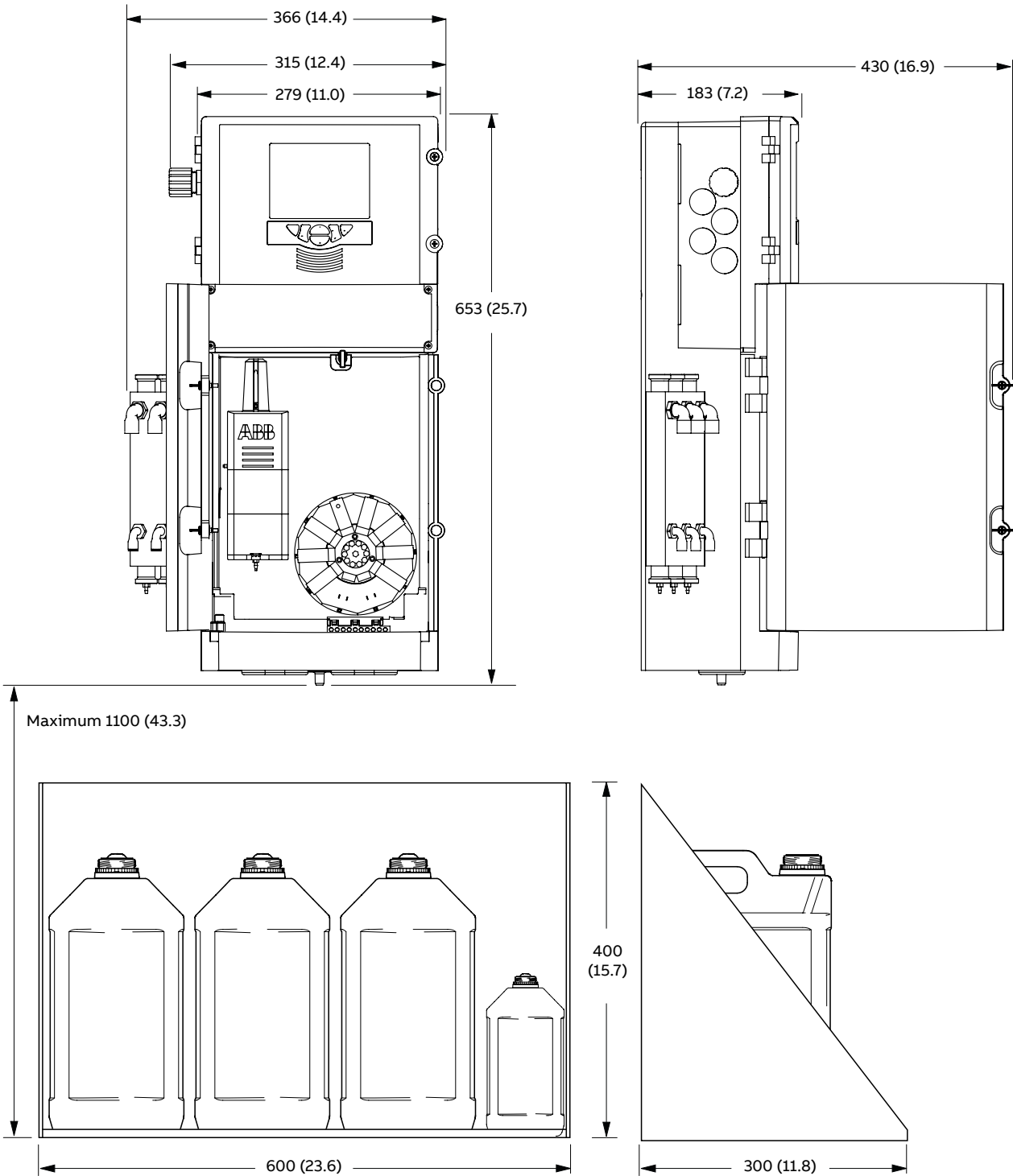
Emissions & immunity

Meets requirements of IEC61326 for an industrial environment

** Not evaluated for UL or CB

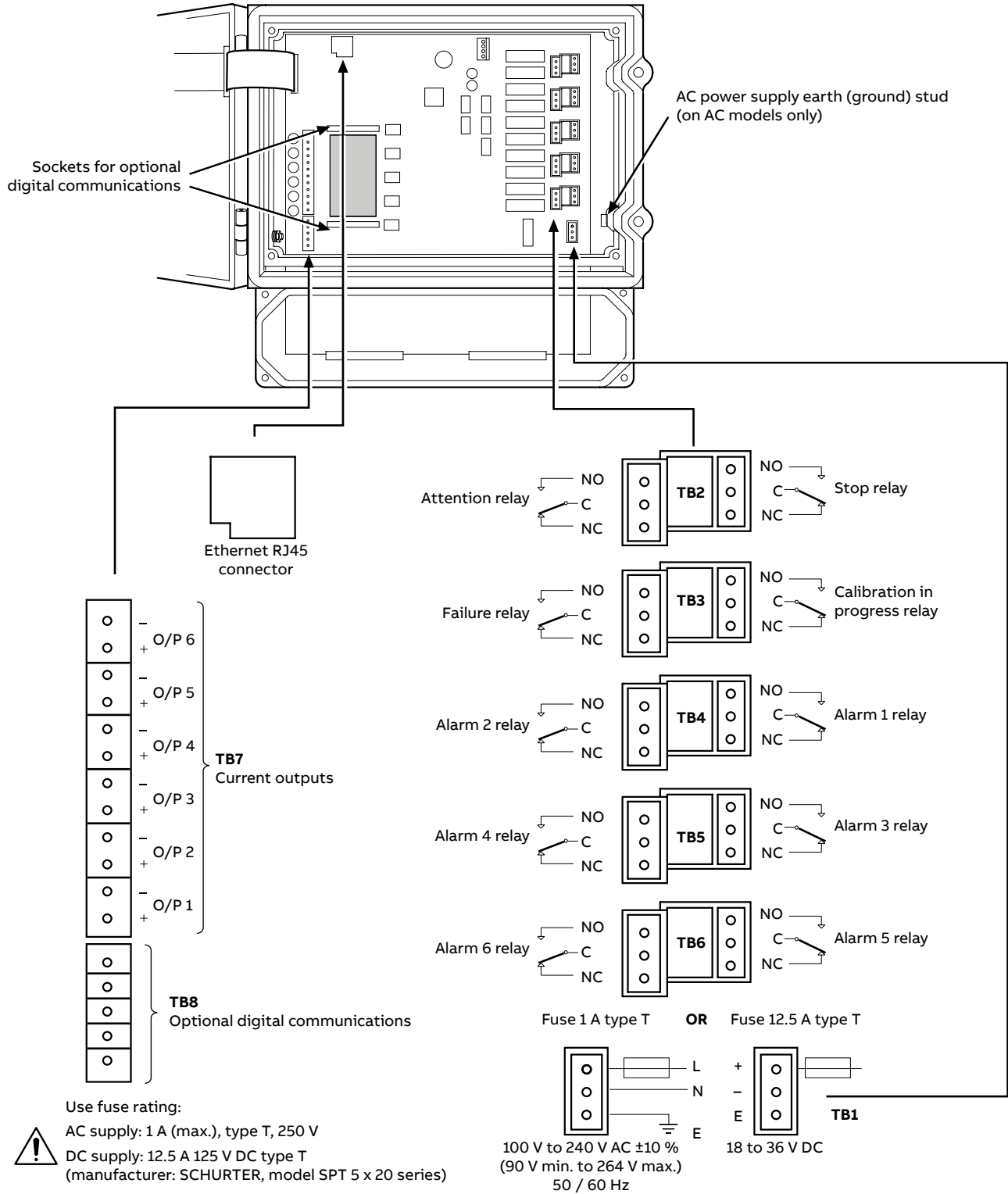
Overall dimensions (shown with optional reagent tray)

Dimensions in mm (in)



Overall dimensions of Aztec 600 analyzer and optional reagent support tray

Electrical connections



Ordering information

Aztec 600 Color analyzer	AW637/	X	X	X	X	X	0	X	X
Range									
0 to 500 Hazen	5								
Number of streams									
Measuring 1 stream			1						
Measuring 1 stream with additional valve for cleaning			2						
Measuring 3 streams			3						
Communications									
None						0			
Profibus DP V1.0						1			
Enclosure									
Standard							0		
Power supply									
90 to 264 V AC / 50 to 60 Hz							0		
18 to 36 V DC							1		
Reserved								0	
Manual									
English									1
French									2
Italian									3
German									4
Spanish									5
Polish									8
Certification									
None									0
Certificate of calibration									1

Accessories

Reagent support tray (stainless steel) – part no. 03-0051-A

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Sales



Service



Software



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