ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/ACL421-EN REV. C

CHLOROSTAR™ SENSOR

Chlorine panel system

ENGINEERED
TO OUTRUN



MEASUREMENT MADE EASY

Convenient panel system for confident chlorine measurement in municipal and industrial water and wastewater applications

Easy integration
- All-in-one design featuring the necessary equipment to operate continuous online chlorine monitoring
- Simplified commissioning requirements
- Factory tested and ready to install

Flexibility
- Optional measurement parameter such as pH, ORP, free chlorine or total chlorine
- Sample handling module for convenient grab sample port, flow detection and flow control
- Steady-Flow stirrer module for ultra-low flow conditions (down to 1 L/h [0.26 galUS/h])
- Pressure regulator valve available for applications above 4 bar (60 psi)

Measurement confidence
- Stable measurement with optional pH compensation and drift alarm notification
- Optional dual measurement verification for improved measurement insight

Introduction

Chlorine is a common and useful measurement used in a wide range of disinfection schemes. To achieve accurate and reliable results with minimal intervention, careful equipment and installation requirements need to be considered.

ABB's ChloroStar Sensor panel system makes measurement easy with a convenient, all-in-one panel system making installation and operation simple and less time-consuming, while delivering accurate and reliable chlorine data.



01 ChloroStar Sensor panel system

The ChloroStar panel

Part of the ChloroStar family of products, the ChloroStar panel features a durable powder-coated steel panel that includes:

- ChloroStar Sensor (ACL420),
- InFlow Multi-Cell (AZA100),
- Dual-channel AWT420 transmitter.

Each panel can be customized to include features like low-flow capability with the Steady-Flow module, additional measurement parameters (pH, ORP, free/total chlorine) or a pressure regulator all with the aim of providing adaptability to a wider range of applications.

Applications

The ChloroStar Sensor measures free and total chlorine in a wide range of applications requiring disinfection monitoring and control.

Due to its three-electrode, membrane-based design, the sensor excels in applications susceptible to light fouling without the need for additional hardware for sample conditioning, or for total chlorine monitoring.

The ChloroStar Sensor is designed for applications such as:

- Municipal and industrial water and wastewater,
- Food and beverage,
- Distribution monitoring.

Easy integration

The ChloroStar Sensor panel system was designed with the end-user in mind by making installation and operation simple and easy.

All ChloroStar panels come with pre-assembled and pressure-tested tubing, connectors and valves from the factory, saving time and cost with installation and commissioning.



02 Panel mounting and cable entry points

The panel can be installed with four conveniently located mounting points and includes soft-edge cable entry points keeping the working area clear of unnecessary wiring.

Flexibility

We understand that customers face unique challenges which might require a degree of flexibility with their measurement solutions.

The ChloroStar Cell panel offers several customizations making it suited for a wider range of applications.

Improved stability
Chlorine measurement is susceptible to fluctuation in sample flow rate and pressure often resulting in unstable and inaccurate results.

ABB's ChloroStar Sensor panel is equipped with a sample handling module (Figure 04) capable of controlling the flow rate via needle valve. In addition, an optional pressure regulator (Figure 03) can be equipped to reduce the effects of sudden process changes and extend the operating pressure of the panel above 4 bar (60 psi).



03 Pressure regulator kit

Convenient sample analysis
Improved insight into chlorine measurement can make the difference in dependable and reliable results.

The ChloroStar Sensor panel offers a convenient grab sample port on the InFlow Multi-Cell to allow for quick and easy sample collection vital in measurement verification.

When samples are collected, verification can be performed using ABB's EZTest Handheld Chlorine calibrator for accurate and reliable results, on-the-go, removing the need for benchtop or remote testing.



04 Sample handling module



05 EZTest 100 handheld chlorine calibrator

For additional information on the EZTest 100 handheld calibrator, refer to the product data sheet: DS/AWQ101.

Minimal waste
One of the challenges faced when measuring chlorine are low-flow conditions. Installations trying to minimize sample waste will struggle in keeping chlorine sensors from drifting, having to choose between measurement accuracy and sample loss.

The InFlow Multi-Cell is capable of dealing with low-flow conditions with the Steady-Flow stirrer module, which agitates the sample around the sensor, minimizing measurement drift capable of maintaining accuracy down to 1 L/h (0.26 galUS/h).



06 Steady-Flow module

The unique Steady-Flow module allows samples measurements to run as low as 1 L/h (0.26 galUS/h), drastically reducing the amount of sample required without impacting measurement drift and stability

Measurement confidence

The ChloroStar Sensor panel comes equipped with the AWT420 universal multi-channel transmitter. This platform offers unique features for chlorine measurement which improve measurement confidence and accuracy.



07 AWT420 universal multi-channel transmitter

pH compensation
Chlorine measurement is susceptible to variations in pH, especially at higher pH values. Traditionally, customers would either buffer the sample to control changes in pH, but this requires additional hardware like pumps and chemicals to control the level of pH.

When the ChloroStar Sensor panel is equipped with an additional pH sensor, the dual-channel AWT420 transmitter is able to compensate the chlorine reading by use of an internal algorithm, ensuring measurement accuracy without the use of additional pumps or reagents.

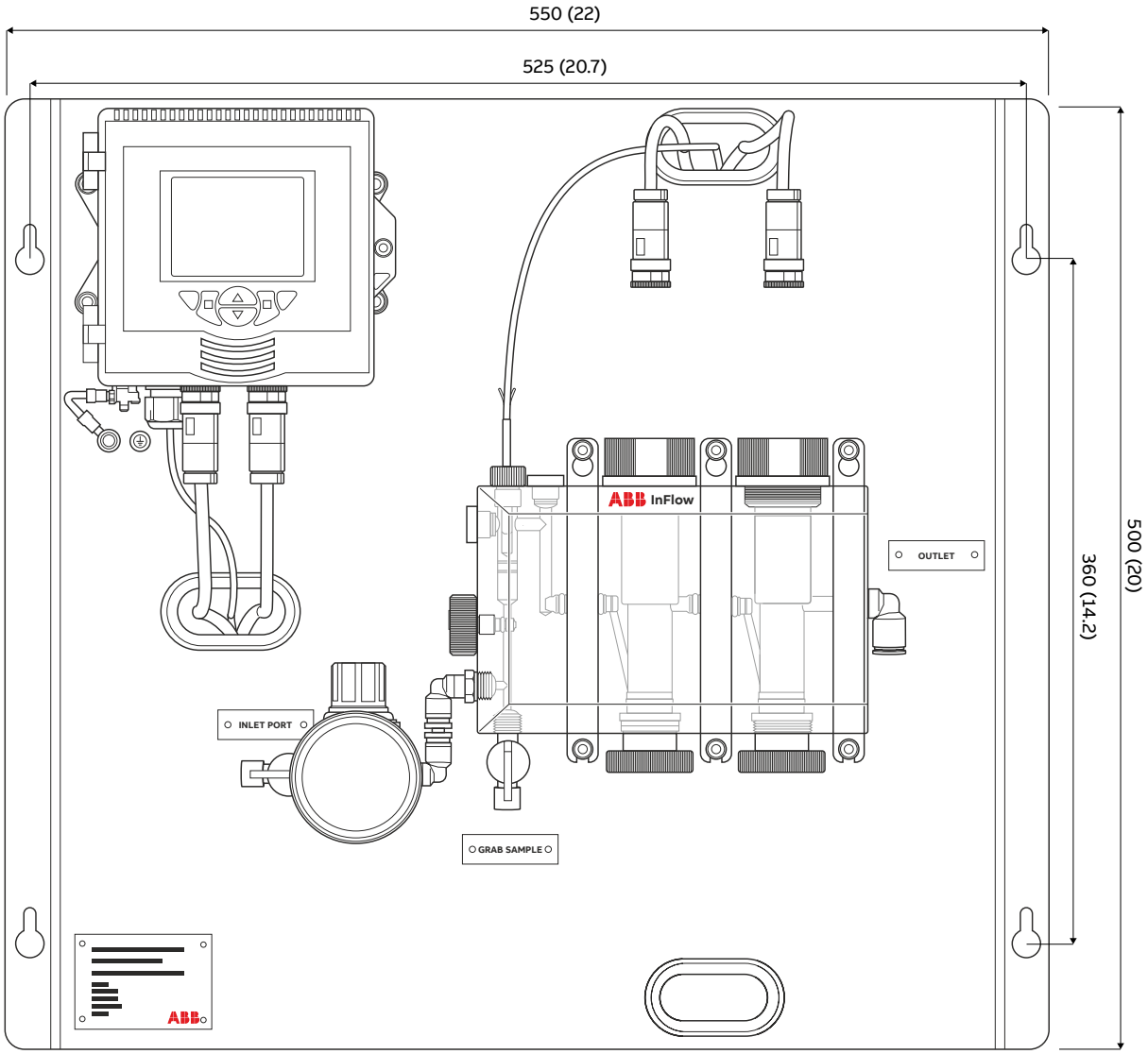
pH drift alarm
As chlorine measurement is influenced by pH variants, the AWT420 allows users to provide notification of any drift by a user-defined level, when using an additional pH sensor. This provides advanced warning for any corrective actions to be taken ensuring measurement accuracy.

Dual verification
Drift in chlorine measurements can be difficult to identify. Changes in the process or in the sensor can contribute to drift.

Dual-verification allows customer to select an additional chlorine measurement which can be monitored against another chlorine sensor notifying you when drift between the two inputs exceeds a certain level.

Dimensions

All dimensions in mm (in).



08 ChloroStar Sensor panel system dimensions

Note:
The mounting holes use M6 bolts.

Specifications

Measurement range
0.1 to 20 ppm (mg/L)
Measurement technology
3-electrode membrane-covered amperometric cell
Measurement interval
Continuous

Measurement performance

Accuracy
±1.5 % of the reference test (DPD) per ppm deviation from the grab sample point at stable pH*
Repeatability
0.05 ppm (mg/L)
Limit of detection
0.03 ppm (mg/L)
pH range
4 to 11
Response time
T90: 140 s

Environmental data

Ambient operating temperature
0 to 60 °C (32 to 140 °F)
Sample operating temperature
0 to 50 °C (32 to 122 °F)
Minimum sample flow rate
1 L/h (0.26 galUS/h) (with low-flow module)
10 L/h (2.6 galUS/h) (without low-flow module)
Maximum sample pressure
4.5 bar (65 psi) without pressure regulator
8 bar (116 psi) with pressure regulator

Maintenance

Maintenance intervals
- Electrolyte replacement:
  Recommended every 3 months (dependent on process)
- Membrane replacement:
  Recommended every 6 months (dependent on process)

Calibration
- Single or two-point manual calibration
- Comparison to lab-based method

Wetted materials

- PTFE
- Gold
- Stainless steel
- PVDF
- Acrylic
- Silicone rubber

Mechanical data

Ingress protection
IP66

Approvals, certification, and safety

EPA Method 334.0
Measurement is compliant with EPA method 334.0
CE Mark
Covers EMC & LV directives (including latest version of EN61010)
EMC
Meets the requirements of IEC61326 for an industrial environment
ATEX/IECEx
Refer to hazardous area supplement, INF/ANAINST/014

Dimensions

Overall dimensions
550 × 500 mm (22 × 20 in)

* Accuracy depends on the accuracy of the chemical test used to calibrate the sample. It is recommended that the sensor is used within 1 ppm or 20 % of the set point.

Ordering information

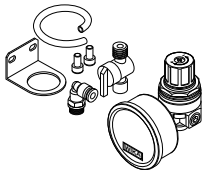
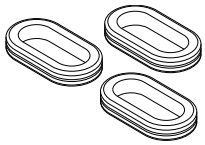
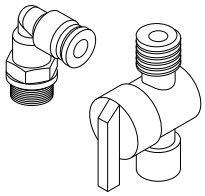
ACL421 ChloroStar sensor panel system	**ACL421/**	**A1**	**XX**	**XX**	**XX**	**XX**	**Options**
AWT420 transmitter type							
AC version			A1				
DC version			D1				
Channel 1							
Free chlorine (digital chlorine electrode, 3 m EZLink cable)				C1			
Total chlorine (digital chlorine electrode, 3 m EZLink cable)				C2			
Channel 2							
Without					Y0		
Free chlorine (digital chlorine electrode, 3 m EZLink cable)					C1		
Total chlorine (digital chlorine electrode, 3 m EZLink cable)					C2		
100 E ORP (analog ORP electrode, PT100, 3 m tinned cable)					C3		
100 E pH (analog pH electrode, PT100, 3 m tinned cable)					C4		
100 GP-D ORP sensor (digital ORP electrode, 3 m EZLink cable)					C5		
100 GP-D pH sensor (digital pH electrode, PT100, 3 m EZLink cable)					C6		
Steady-Flow adapter							
Without						Y0	
Single						S1	
Dual*						S2	

Optional ordering codes	
Pressure regulator	
High pressure – max. 8 bar (116 psi)	P1

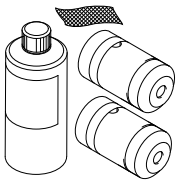
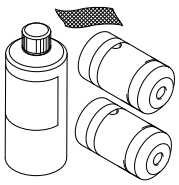
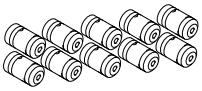
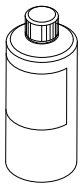
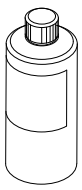
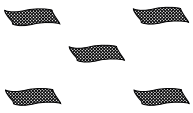
* Only available when Channel 2, options C1 or C2 are selected.

Spares and accessories

PANEL ACCESSORIES

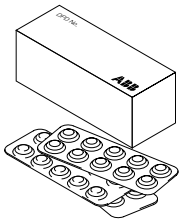
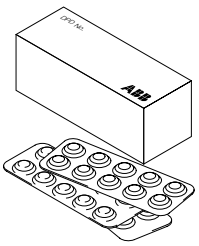
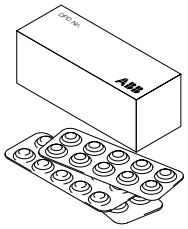
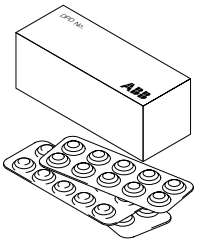
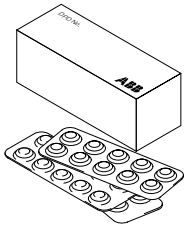
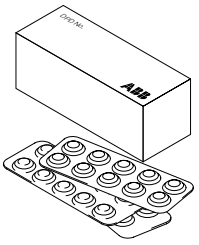
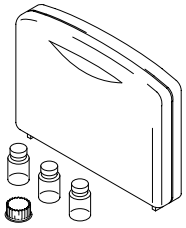
Part number	Description	
3KXA080000L0019	Pressure regulator upgrade kit	
3KXA080000L0029	Edge trim kit	
3KXA080000L0035	Plumbing kit (excl. tubing)	

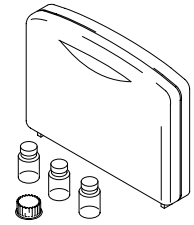
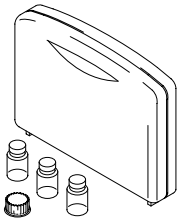
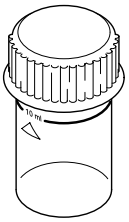
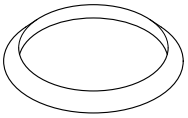
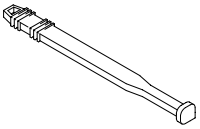
CHLOROSTAR SENSOR ACCESSORIES

Part number	Description	
3KXA843401L0001	Annual Maintenance kit (Total)	
3KXA843401L0002	Annual Maintenance kit (Free)	
3KXA843401L0003	Membrane Pack 10 Off	
3KXA843401L0004	Electrolyte (Total) – 125mL	
3KXA843401L0005	Electrolyte (Free) – 125mL	
3KXA843401L0008	Polishing strips (qty 5)	

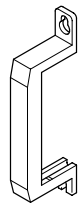
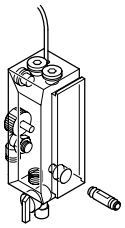
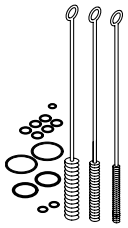
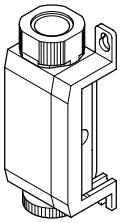
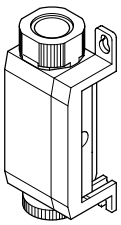
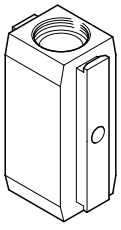
...Spares and accessories

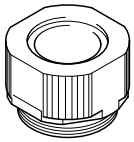
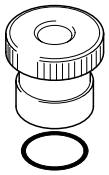
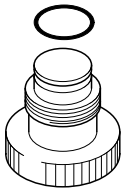
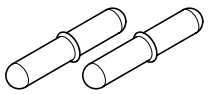
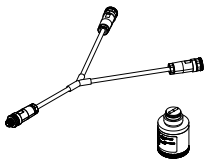
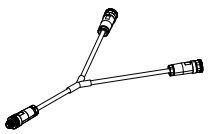
EZTEST HANDHELD CALIBRATOR ACCESSORIES

Part number	Description	
3KXA843402L0001	DPD 1 tablet (pk 100)	
3KXA843402L0002	DPD 4 tablet (pk 100)	
3KXA843402L0003	DPD No. 1 HR (pk 100)	
3KXA843402L0004	DPD No. 3 HR (pk 100)	
3KXA843402L0005	Vario chlorine free-DPD/ F10 (pk 100)	
3KXA843402L0006	Vario chlorine total-DPD/ F10 (pk 100)	
3KXA843402L0007	Reference standard kit tablet/liquid set 0/0.2/1.0 mg/L	

Part number	Description	
3KXA843402L0008	Reference standard kit table/liquid set 0/1/4 mg/L	
3KXA843402L0009	Reference standard kit powder set 0/0.2/1.0 mg/L	
3KXA843402L0010	Cells with cap (pk 12)	
3KXA843402L0011	Sealing rings (pk 12)	
3KXA843402L0012	Cleaning cloth for vials	
3KXA843402L0013	Crushing rod (pk 10)	

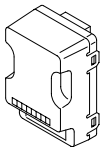
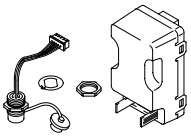
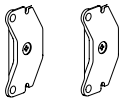
INFLOW MULTI-CELL ACCESSORIES

Part number	Description	
3KXA080000L0001	Flow cell bracket (qty 1)	
3KXA080000L0002	Flow control module – Metric	
3KXA080000L0004	Flow cell maintenance kit	
3KXA080000L0005	Sensor module addition metric – ¾ in	
3KXA080000L0006	Sensor module addition metric – PG13.5	
3KXA080000L0009	Sensor module replacement	

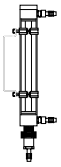
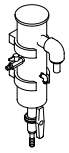
Part number	Description	
3KXA080000L0010	Compression fitting ¾ in	
3KXA080000L0011	PG13.5 adapter	
3KXA080000L0012	Steady-Flow module	
3KXA080000L0013	Sensor blanking plug	
3KXA080000L0014	Magnetic pill (× 2)	
3KXA080000L0016	Steady-Flow module upgrade kit	
3KXA080000L0017	Steady-Flow module replacement cable	

...Spares and accessories

AWT420 TRANSMITTER ACCESSORIES

Part number	Description	
3KXA877420L0014	AWT420 pH/ORP module	
3KXA877420L0015	AWT420 EZLink module	
3KXA877420L0016	Wall-mount kit	

SAMPLE HANDLING ACCESSORIES

Part number	Description	
7997 500	De-bubbler assembly	
01-0107-A	Sample header pot	

Trademarks

- ChloroStar is a trademark of ABB Limited.
- EZLink is a trademark of ABB Limited.

Additional information
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