

CS CLEAN  
SOLUTIONS

## Product Information and Specifications

# CLEANSORB® FABLINE FX Series

Models: CS070FX, CS100FX, CS200FX



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## CLEANSORB® FABLINE FX Series

The FABLINE FX series offers the interruption-free advantage of a CLEANSORB dual-column model, but with a lower floor space requirement. These two attributes make it the CLEANSORB model of choice for high volume manufacturing. The main absorber column of the CLEANSORB FX series is backed-up by a smaller maintenance column, allowing the main column to be purged and changed out without the need to halt production or bypass the scrubber. Available in three different column sizes, the “FLEX” design also allows the system to be configured without the back-up column, making it ideal for pilot-line or other low-volume production requirements where column replacement can be more easily scheduled. Inlet pipework, valves and fittings are mounted as a single compact assembly, allowing easy access for maintenance work.

Optional configurations include: Temperature-controlled heating to minimise deposition of condensable solids at the system inlet; Infrared temperature monitoring of both absorber columns for process chemistries which use energetic materials.

Operating modes and system status can be selected or visualized via a touchscreen display at the front of the cabinet. Inert gas purging and leak-testing of the absorber column and gas lines are both automated. Several modes of remote interfacing are available, including USB, Ethernet, FTP, NTP and OPC.

### CLEANSORB® Service and Support

- High quality refillable stainless steel absorber columns, ADR/ DOT approved for chemical road transport
- Worldwide network of local service partners for column refill and associated logistics
- Service contracts for annual preventive and general on-site maintenance

### CLEANSORB® Dry Bed Chemisorber Technology

- Safe conversion of hazardous gases to stable solids at ambient temperature
- Unsurpassed gas removal to ppm levels and below
- Passive operating principle, does not require electricity, heating, etc.
- Low facilities requirement, inexpensive installation, simple to operate
- No hidden costs for 3ph power, fuel lines, D.I. water or acid drain
- Low maintenance: no specialized on-site service personnel required
- Waste gas bound in dry, compact form: not transferred to waste water

**Important!**

Our products are configured and specified on the basis of the process data provided in written form by you. These process details are taken to be accurate and complete. Future alterations to these process details must first be clarified with CS CLEAN SOLUTIONS AG prior to further operation of the products.

Before requesting a system recommendation or quotation, please ask your authorized CS CLEAN SOLUTIONS sales and service partner to provide you with a Process Definition sheet so that we can recommend a model and configuration which is optimized for your process.

Unless otherwise agreed upon in writing, the warranty on newly-manufactured products is for a period of 12 months following shipment. It does not extend to consumables, parts which are subject to wear or adverse climatic conditions, or components exposed to corrosive media.



**A CLEANSORB FABLINE FX system with its main and backup columns.**

Available Models	Column Size
CLEANSORB CS070FX	1 x 70 Liter + 1 x 25 Liter
CLEANSORB CS100FX	1 x 100 Liter + 1 x 25 Liter
CLEANSORB CS200FX	1 x 200 Liter + 1 x 25 Liter

Operating Modes	Active Component	Performance specification
Process operation	C1 (main column)	Typically < TLV value of hazardous gases
Short Maintenance	C2 (back-up column)	> 95% removal of hazardous gases
Over-Pressure (alarm)	Bypass line	None – abnormal operating condition
Remotely-triggered Bypass	Bypass line	None – Mini-Absorber cartridge not fitted

**Basic System Components and Configuration**

<b>Housing</b>	Powder-coated steel cabinet as enclosure for the absorber column, the system electronics and components. Double-winged front door, with handle and keylock. Header connection on roof and air intake slits for cabinet extraction. Bolt-holes for anchoring.
<b>Cleaned Gas Outlet</b>	Outlets from main-, back-up column and over-pressure bypass manifolded into one combined outlet connection.

<p><b>Absorber Columns</b></p>	<p><b>One main absorber column, C1.</b> Available sizes: <b>CS070SA, CS100SA</b> or <b>CC200SA</b>. Absorber column and ADR-authorized transport vessel with UN code number. Constructed from corrosion-resistant 316L stainless steel. Incorporating:</p> <ul style="list-style-type: none"> <li>- Caster wheels on base;</li> <li>- Swagelok® quick connector, Ø 3mm, for capacity endpoint sampling;</li> <li>- Integrated ball valves at column inlet and outlet, DN40 ISOKF;</li> <li>- Hand lever tool for opening and closing of ball valves.</li> </ul> <p><b>One backup (maintenance) column, C2.</b> Type: CLEANSORB column, model <b>CC025SA</b>. Absorber column and ADR-authorized transport vessel with UN code number. Mounted at rear of cabinet. Constructed from corrosion-resistant 316L stainless steel. Ø 250mm. Incorporating:</p> <ul style="list-style-type: none"> <li>- Integrated ball valves at column inlet and outlet, DN40 ISOKF;</li> <li>- Swagelok® quick connector, Ø 3mm, for capacity endpoint sampling;</li> <li>- Hand lever tool for opening and closing of ball valves.</li> </ul>
<p><b>Pipework and Components</b></p>	<p>Internal gas lines constructed with solid 316L stainless steel piping and flexible bellows tubing.</p> <p>Two Pressure transducers, Ex compliant, -500 ~ + 500 mbar (-7.25 ~ +7.25 psi), to enable independent monitoring of inlet pressure, as well as automatic pressure-decay leak test, for both main and back-up columns.</p> <p>Two gas sampling cocks, one each at system inlet and outlet, Swagelok® Quick Connect port, Ø 6mm.</p> <p>Internal column bypass line, DN40 with two 3/2-way- and one 2/2-way pneumatic valves. Opens if over-pressure set-point is exceeded, to route gas past the column.</p> <p>Assembly of pressure regulators, flowmeters and ball valves to enable automated (PLC-controlled) inert gas purging of absorber column and gas lines.</p> <p>Assembly of pressure regulators, flowmeters and ball valves to enable automated (PLC-controlled) pressure-decay leak testing of absorber column and gas lines.</p> <p>Inductive “Column in Place” switch. Proximity switches to monitor position of critical valves. Pressure switches to monitor supply pressure of CDA and N2.</p>
<p><b>Endpoint Detection</b></p>	<p>Electrochemical gas sensor to indicate when the main absorber column has reached its capacity endpoint.</p> <p>Timer-controlled piston pump for gas sampling to endpoint detector.</p> <p>Two selectable sampling points:</p> <ol style="list-style-type: none"> <li>1. To detect endpoint prior to gas breakthrough at column outlet (typically at 90 % of column capacity);</li> <li>2. At column outlet.</li> </ol> <p>The purpose of the endpoint detection sensor is to signal end of column lifetime only. The endpoint detector is not a substitute for a life safety monitor! It is recommended that separate gas detection be installed to independently monitor the outlet ducting from the scrubber.</p>

<b>Operating Panel and Controls</b>	<p>Touch screen operating panel at front of system. Color-coded flow chart schematic to indicate status of valves. Touch screen activation/ deactivation of:</p> <ul style="list-style-type: none"> <li>- Maintenance bypass (via Backup column)</li> <li>- Endpoint sampling unit</li> <li>- Inert gas purge</li> <li>- Automated pressure decay leak test.</li> </ul> <p>Screen display of system inlet pressure.</p> <p>PLC-controlled electronics with on-screen and buzzer status signals for:</p> <ul style="list-style-type: none"> <li>- Mains power</li> <li>- Bypass Open/ Closed</li> <li>- Inlet Pressure Warning/ Alarm</li> <li>- Column in Place</li> <li>- Column Capacity Endpoint</li> <li>- Leak-test status.</li> </ul> <p>Remote signaling available via:</p> <ul style="list-style-type: none"> <li>- USB port</li> <li>- Ethernet port</li> <li>- Volt-free contacts</li> </ul> <p>(FTP, NTP, OPC, USB disabled, available as options).</p> <p>Parameter history logging of sensor signals and system events. Up to 10,000 stored measurement cycles downloadable for diagnostics purposes. USB interface, Ethernet connector and hardwired volt-free contacts.</p>
<b>Signal Tower</b>	Signal tower for external display of status, warnings and alarms as green, amber or red lights. Roof-mounted on cabinet.
<b>Documentation</b>	Operating manual in English or German language with customer-specific specifications.

## Available Options

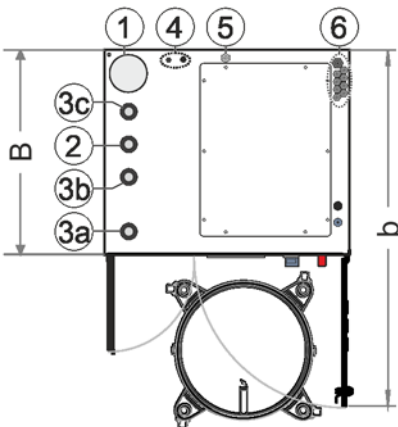
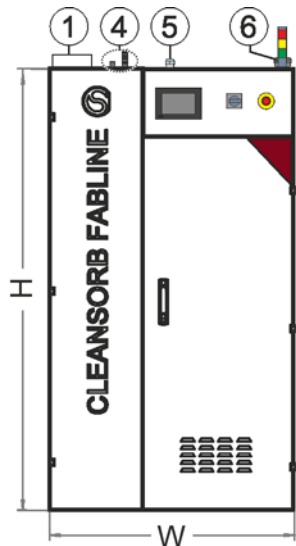
<b>Without Backup/ Maintenance Column</b>	CLEANSORB FABLINE FX configured with main column and over-pressure bypass line only – Without backup column.
<b>Second Endpoint Detector</b>	Second electrochemical gas sensor to indicate when the column has reached its capacity endpoint based on detection of different gas to that of first endpoint detector. Output signals from both gas sensors are combined to show a single collected Endpoint warning at the operating panel.
<b>Over-Pressure Bypass Options</b>	<p><b>Mini-Absorber Cartridge</b> Integrated into bypass line, for short-term containment of gas release during bypass operation.</p> <p><b>External Bypass Trigger</b> Input contact for trigger signal from customer process tool. Opens bypass line and isolates absorber column for a pre-defined duration. Typically used to allow chamber pump-down or similar short-duration high flows of non-hazardous inert gas. Important: this option is only available following a safety review of the individual process application. This option is not permitted for bypass lines with a Mini-Absorber cartridge fitted.</p>
<b>Separate Outlets for Cleaned Gas</b>	3 separate outlet connections for main column, back-up (maintenance) column and over-pressure bypass
<b>Ex-Compliant Components</b>	All gas wetted components and sensors ex-compliant.
<b>Temperature Monitoring</b>	<p><b>Temperature switch</b> Fitted at the cabinet extraction header of the CLEANSORB system. Generates an alarm signal and initiates inert gas cooling if column temperature exceeds maximum permitted value.</p> <p><b>Temperature Monitoring (IR Array) – Main Column only</b> Backwall-mounted array of infrared sensors to monitor temperature profile of main absorber column. Generates an alarm signal and initiates inert gas cooling if column temperature exceeds maximum permitted value.</p> <p><b>Temperature Monitoring (IR Array) – Main and Backup columns</b> 2 backwall-mounted arrays of infrared sensors to monitor temperature profile of both absorber columns. Generates an alarm signal and initiates inert gas cooling if column temperature exceeds maximum permitted value.</p>
<b>Inlet Heating</b>	<p><b>Inlet Line to Main Column</b> Integrated heating jacket to reduce deposition of condensable solids in system inlet piping and components. Incorporates two temperature-controlled heating sections. This option is only selectable following a review of the individual process application and temperature requirements.</p> <p><b>Inlet Lines to Main and Backup Columns</b> (As above, for both columns)</p>

<b>Power Supply Options</b>	Power supply: 120 VAC / 50/60 Hz / 1 Phase (UL) Power supply: 230 VAC / 50/60 Hz / 1 Phase (CE) Power supply: 120 VAC / 50/60 Hz / 1 Phase (CE) Power supply: 230 VAC / 50/60 Hz / 1 Phase (UL)
<b>Mains Switch</b>	Without mains switch  With mains switch
<b>SEMI Test Compliance</b>	Without SEMI test compliance  Compliance with SEMI test report
<b>Signal Tower Options</b>	Without signal tower  <b>Local Signal Tower</b> Signal tower for indication of system status, warning and alarm states. Light stack with green, amber and red LEDs. Roof-mounted on cabinet.  <b>Remote Signal Tower</b> Signal tower for indication of system status, warning and alarm states. Light stack with green, amber and red LEDs. Supplied with 30 m cable for remote installation.
<b>Communication Options</b>	<b>RN1: USB, Ethernet and hardwired VFC</b> Readout of system parameters via: 1 x USB port 1 x Ethernet port 1 x set of hardwired volt-free contacts  <b>RN3: FTP, NPT functionality</b> Readout of system parameters in Ethernet protocol via an FTP or NTP server. (Includes RN1).  <b>RN4: SMTP functionality, incl. RN1</b> Allows communication of system parameters via e-mail.  <b>RN5: OPC functionality</b> Readout of system parameters in Ethernet protocol via an OPC server. (Includes RN1)  <b>RN6: Complete communication package</b> Comprising FTP, NTP and OPC functionality, incl. RN3 and RN5  <b>RN7: Ethernet and hardwired VFC</b> Readout of system parameters via: 1 x Ethernet port 1 x set of hard-wired volt-free contacts. The USB port is deactivated.
<b>Facilities (N2, CDA) Connections</b>	Facilities connections <b>Metric</b>  Facilities connections <b>Imperial</b>

**System Specifications**

Series **CLEANSORB® FABLINE**

Models **CS070FX, CS100FX, CS200FX**



**1 Connection for cabinet air extraction**

stub OD 150 x 52.5 mm (6" x 2") for  $\phi$ 150 mm tubing;  
 negat. pressure (required): > 2.7 mbar (0.04 psi)

**2 System inlet connection**

DN40 ISO-KF (recessed)  
 5...120 °C (41...248 °F); -100...+100 hPa  
 total vol. flowrate, incl. inert carrier/pump/dilution gases:  
 < 150 slm (CS070FX/CS100FX), < 250 slm (CS200FX)  
 concentration of treated gases (corrosive/toxic/pyrophoric):  
 < 2 %, further permitted gases: dry inert gas

**3 System outlet connection**

a) main column: outlet concentrations at TLV; DN40 ISO-KF (recessed);  
 5...70 °C (41...158 °F)  
 ~ -500 Pa (-0.07 psi) relative to pressure at system inlet required  
 b) backup column (option): >95 % cleaned; DN40 ISO-KF (recessed);  
 5...70 °C (41...158 °F)  
 ~ -500 Pa (-0.07 psi) relative to pressure at system inlet required  
 c) safe state (option: with Mini-Absorber): 0 % cleaned;  
 DN40 ISO-KF (recessed); same as inlet temperature  
 ~ -500 Pa (-0.07 psi) relative to pressure at system inlet required  
 option: manifold for one collected outlet leading to position b)

**4 Power**

Single phase, 120 or 230 VAC (configured according to local requirements),  
 50/60 Hz

**5 Nitrogen supply**

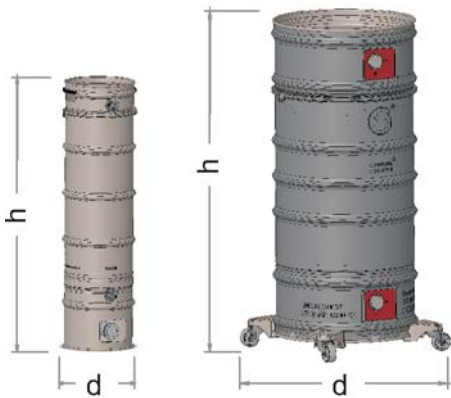
pneumatic: Swagelok® 6 mm or 1/4"; 6...7 bar (85...100 psi)  
 purge gas: Swagelok® 6 mm or 1/4"; 6...7 bar (85...100 psi)

**6 Signals**

volt-free contacts for reliable interruption of (process) gas supply;  
 see also "Communication Interfaces" below

Model	H	W	B	b
CS070FX	1800 mm (70.9 in) + signal tower 160 mm (6.3 in)	1000 mm (39.4 in)	850 mm (33.5 in)	1470 mm (57.9 in)
CS100FX	"	"	"	"
CS200FX	"	"	"	"
Gross weight (cabinet)		approx. 270 kg (595 lb)		





backup column



main column

Column	h	d	D	weight
CC025A optional backup column	830 mm (3.7 in)	260 mm (10.2 in)	260 mm (10.2 in)	max. 40 kg (88 lb)
CC070SA main column in CS070FX	1100 mm (43.3 in)	715 mm (28.1 in)	400 mm (15.7 in)	max. 96 kg (212 lb)
CC100SA main column in CS100FX	1350 mm (53.1 in)	715 mm (28.1 in)	400 mm (15.7 in)	max. 122 kg (269 lb)
CC200SSA main column in CS200FX	1350 mm (53.1 in)	875 mm (34.4 in)	560 mm (22.0 in)	max. 300 kg (661 lb)

Pressure drop over column  
 at max. volumetric flow      max. 10 mbar (0.145 psi)

**Pressure Monitoring**

Pressure switch	safety device, installed at inlet piping; switches system to safe state @ 250 mbar
External port	D-SUB 9-pin miniature female connector
Pressure sensors	pressure connection with internal diaphragm; installed at inlet piping; option: Ex compliant sensors
Pressure range	-500...+500 mbar (-7.25...+7.25 psi)

**Heating for System Inlet Piping (option)**

Heating elements	electrical trace heating with special insulation
Temperature range	up to 120 °C (248 °F), PID control with safety shutdown

**Temperature Monitoring in Cabinet (option)**

Temperature sensor	version 1: thermo couple, located in cabinet air extraction; vers. 2: IR temperature measuring device for main column vers. 3: IR temp. measuring device for both columns
Temperature range	0 - 100 °C (32...212 °F)

**Endpoint Detection of Main Column Capacity**

Gas sensor                      electrochemical cell, available for most gas species;  
 option: two gas sensors for different gas species

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Manufacturer                      Bionics or MST

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**Communication Interfaces**

Interface type                      TCP/IP

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Ports                                  RJ45 (Ethernet)  
 USB 2.0, Type A (full speed 12 Mbit/s)

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Functionalities (optional)      FTP (File Transfer Protocol)  
 NTP (Network Time Protocol)  
 OPC (Open Platform Communications)

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Usage                                  FTP: export of tool data and log-files  
 NTP: synchronization of time and date  
 OPC: communication with remote process control system

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**Volt-free Contacts for External Evaluation**

Outputs                              signal HPM Off (HPM: Hazardous Process Material)  
 signal All Gas Off (NTG: Non-Toxic Gas)

All contacts fail to open.  
 For SEMI S2 compliant versions, the signals HPM Off and All Gas Off are provided with a reliability of SIL2 and must be processed externally for safety reasons.

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Electrical Specification              24 VDC max., 3 A

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Usage                                  signals for the remote process control system

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**Remote Bypass Control (option)**

Signals                              input: BYPASS REMOTE CONTROL (switch to bypass)  
 output: BYPASS OPEN VERIFIED (bypass is open)

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Usage                                  route gas through CLEANSORB system's bypass (no gas treatment) with a max flow of 1000 slm

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Restrictions                          Option not available with Mini-Absorber

### Anchoring of the Cabinet

Location of anchoring points	bolts can be set in at the four corners, bottom of cabinet
Heavy load dowels	tractive force $\geq$ 270 kg (595 lb) per dowel
Bolts	max. $\varnothing$ 12 mm ( $\sim$ 1/2 in)
Washer	outer $\varnothing$ 70 mm ( $\sim$ 2 3/4 in); thickness 6 mm ( $\sim$ 1/4 in)


### Storage Conditions for Absorber

- temperature range 5...25 °C (41...77 °F)
- max. 80 % rel. humidity (non-condensing)
- under clean, dry conditions, in upright position
- protected from uni-directional heating and sunlight
- protected from unauthorized access.

 Contact the manufacturer CS CLEAN SOLUTIONS AG, if a different specification is required.

### On-site Conditions for System Operation

Temperature range	5 ... 30 °C (41 ... 86 °F)
Humidity	80 % relative humidity (non-condensing!)
Installation site	indoors; lighting > 270 lux, mechanical ventilation
Altitude	max. 1000 m (3280 ft) above sea level
Floor space	absolutely level; according to DIN 18202

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