



SMC SOLUTIONS FOR CONTROLLED
ENVIRONMENT AGRICULTURE

**Control
more. Labour
less. **Grow**
smarter.**

Expertise
Passion
Automation



Controlled Environment Agriculture



Controlled Environment Agriculture (CEA) refers to a modern approach to food production that uses technology to optimise growing conditions within enclosed structures such as greenhouses, vertical farms and growth chambers. By precisely managing factors like light, temperature, humidity, carbon dioxide and nutrient delivery, CEA enables consistent, year-round cultivation with higher resource efficiency and reduced environmental impact, minimising external climate condition reliance.

The Controlled Environment Agriculture (CEA) sector has experienced remarkable growth in recent years, driven by the urgency to secure sufficient food supplies for a rapidly increasing global population in a sustainable, efficient and cost-effective way. Within this sector, the vertical farming market is showing especially strong momentum, with an estimated Compound Annual Growth Rate (CAGR) ranging between 20.2 % and 28.1 % from 2024 to 2032. This upward trend is closely linked to the rise in automated systems for environmental control and the growing adoption of robotic harvesting and packaging technologies.

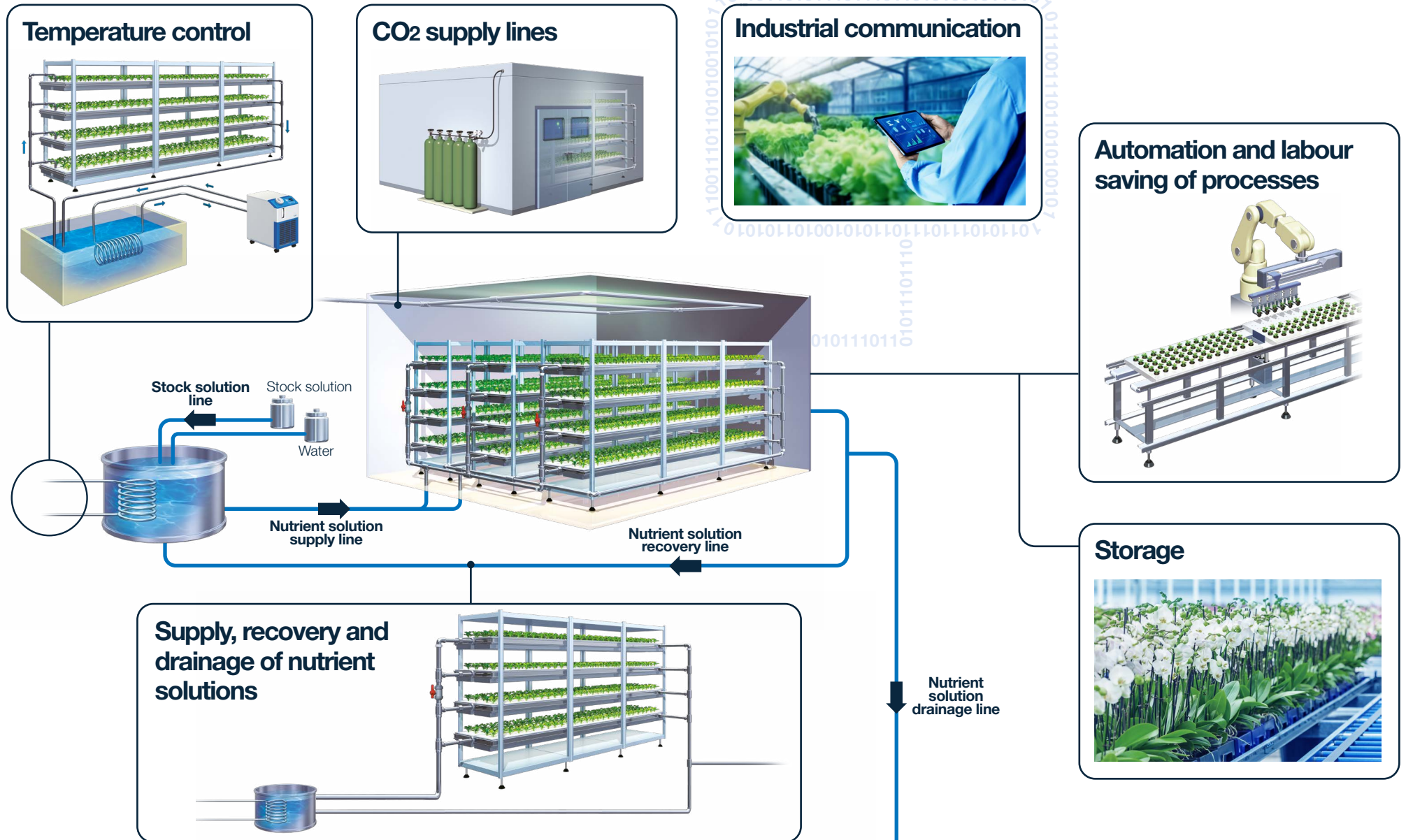
Producers in CEA environments face significant challenges: maintaining precise monitoring of critical parameters while simultaneously ensuring optimised water consumption.

These requirements mean that reliability and accuracy are essential throughout the entire production process.

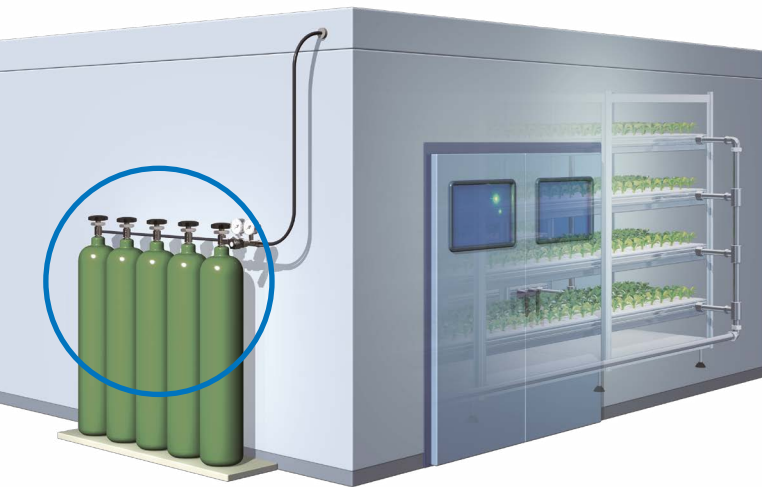
SMC has long been supporting customers in advanced automation industries, providing solutions designed to improve efficiency, safety and process stability. The experience gained in tightly controlled environments positions us as a trusted partner for companies adopting CEA and vertical farming technologies.

In the following pages, you will find an overview of CEA processes along with examples of the solutions that SMC can offer to meet the demands of this market — helping customers enhance productivity, increase sustainability and ensure consistent crop quality.

The CEA process



CO₂ supply lines



Flow control + Pressure control + Dosing control

Flow control

PF2M7(-L) Series +



Digital flow switch

Measure the flow rate of dry air, nitrogen, carbon dioxide or argon up to 200 l/min.

PFCA7 Series +



Air flow controller

Control the flow of dry air, nitrogen, argon or carbon dioxide automatically up to 100 l/min.

Pressure control

ITV1100/2100/3100 Series +



Electro-pneumatic regulator/electronic vacuum regulator

Obtain dynamic control of air pressure with electrical signals.

AP Tech products +



Regulators for ultra high purity/general applications

Regulate the pressure of your lines with these high-purity solutions.

AR-D Series +

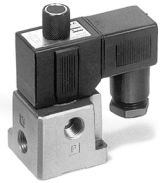


Regulator & regulator with backflow function

Regulate pressures up to 0.85 MPa with this modular-style regulator, connectable to our FRL unit AC-D series.

Dosing control

VT Series +



3-port solenoid valve, direct operated poppet type

Deliver accurate dosing with fast, repeatable actuation.

LVM Series +



2-port solenoid valve for chemical liquids

Dose nutrients with precision using a chemically resistant valve.

JSX Series +



Direct operated 2-port solenoid valve

Ensure consistent, leak-free control of CO₂ flow with stainless-steel construction and IP67 enclosure.

Air preparation filters

SF Series +



Clean gas filter

Protect your CO₂ system with high-efficiency clean-air filtration.

HF2B-SFDA Series +



In-line bacteria removal filter

Achieve sterile-grade CO₂ delivery with ultra-fine hollow-fiber filtration.

Process valves

JSX/JSXD/JSXZ/JSXU Series +



2-port solenoid valve

Ensure consistent, leak-free control of CO₂ flow with stainless-steel construction and IP67 enclosure.

VX2 Series +



Direct operated 2-port solenoid valve

Achieve smooth, efficient CO₂ delivery with high-flow solenoid control.

VDW Series +



Compact direct operated 2-port solenoid valve

Optimise CO₂ delivery using a lightweight, energy-saving design.

VQ20/30 Series +



Pilot operated 2-port solenoid valve for dry air

Enhance CO₂ delivery with a valve built for speed and flow.

AS□2□1FE Series +



Speed controllers, residual pressure exhaust, elbow

Maintain consistent CO₂ dosing using a durable, long-life controller.

AS□FSG Series +



Speed controllers with push-lock & indicator

Opt for corrosion-resistant speed controllers with integrated indicator, available with different configurations.

Piping equipment/others

T/TIA Series +



Nylon tubing

Tubing for air and water, available in metric and inch sizes.

TH/THH Series +



FEP tubing

Fluoropolymer tubing for optimum cleaning of watering systems with chemicals.

TX Series +



Polyethylene tubing

FDA and EU No. 10/2011-compliant tube, with diameters from 4 to 12 mm.

KQ2 Series +



One-touch fitting

Reliable, leak-resistant connections that simplify tubing layout, ensuring stable gas delivery and supporting precise environmental control.

TK Series +



Tube cutter

Cut tubes of 12 mm or less made of nylon, soft nylon, polyurethane and other soft plastics.

Supply, recovery and drainage of nutrient solutions

Nutrient solution supply line (Pressure feed + Flow rate control/temperature control + Process valves)



PF3WB/C/S/R Series +



Digital flow switch manifold for water

Monitor the in/out flow rate of your installation in a centralised way.

PFUW Series +



Clamp-on type flow sensor for liquids

Measure flow rate with a non-invasive ultrasonic flow sensor, with various applicable fluids and without the sensor coming into contact with the fluid to be measured.

JSXZ Series +



Zero differential pressure type, pilot operated 2-port solenoid valve

Stabilise nutrient delivery using a robust, zero-pressure differential valve.

VDW-XF Series +



2-port solenoid valve, compact/lightweight

Achieve efficient, reliable nutrient delivery with compact solenoid control.

LVM Series +



Compact direct operated 2/3-port solenoid valve for chemical liquids

Handle aggressive fertilisers with a robust, corrosion-proof valve.

LVA Series +



High purity chemical liquid valve

Keep your fertigation system reliable with chemically compatible, bubble-free flow control.

LVP Series +



Vinyl chloride air operated valve

Protect nutrient quality using a clean, PTFE-diaphragm valve design.

LSP Series +



Liquid dispense pump, solenoid type

Opt for precise nutrient micro-dosing with a stable, repeatable dispense pump.

PB Series +



Process pump, single acting

Enhance fertigation accuracy using low-contamination pumping technology.

PA Series +



Process pump, double acting

Enhance fertigation uptime with easy-maintenance diaphragm design.

JSXN-X1 Series +



Resin pilot operated 2-port solenoid valve

Control water distribution to automatic watering systems, with improved environmental resistance and flow adjustment function.

Nutrient solution drainage line

LFE-X8 Series +



3-colour display electromagnetic type digital flow switch

Track return-line flow using a stable, repeatable digital stainless steel 304 piping sensor.

LVP Series +



Vinyl chloride air operated valve

Protect nutrient quality using a clean, PTFE-diaphragm valve design.

ISE20B/ZSE20B Series +



High-precision digital pressure/vacuum switch for general fluids

Provide accurate, real-time monitoring of line pressure, helping operators detect blockages, pump irregularities or flow disruptions.

Nutrient solution recovery line

FGF Series +



Bag type industrial filter

Remove foreign matter up to 5 µm and flow rates up to 400 l/min.

FQ1 Series +



Quick change filter

Keep your recirculation loop efficient with fast, tool-free filter maintenance.

VFN2□20N Series +



NAMUR interface 5 port solenoid valve

Deliver dependable switching control for diaphragm pumps, enabling precise flow regulation, fast response and stable operation.

Piping equipment

T/TIA Series +



Nylon tubing

Tubing for air and water, available in metric and inch sizes.

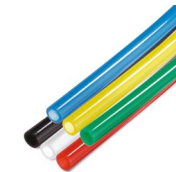
TH/THH Series +



FEP tubing

Fluoropolymer tubing for optimum cleaning of watering systems with chemicals.

TX Series +



Polyethylene tubing

FDA and EU No. 10/2011-compliant tube, with diameters from 4 to 12 mm.

KQG2 Series +



Stainless steel 316 one-touch fitting

Corrosion-resistant, 316 stainless steel connections that ensure hygienic flow paths, secure sealing and long-term durability.

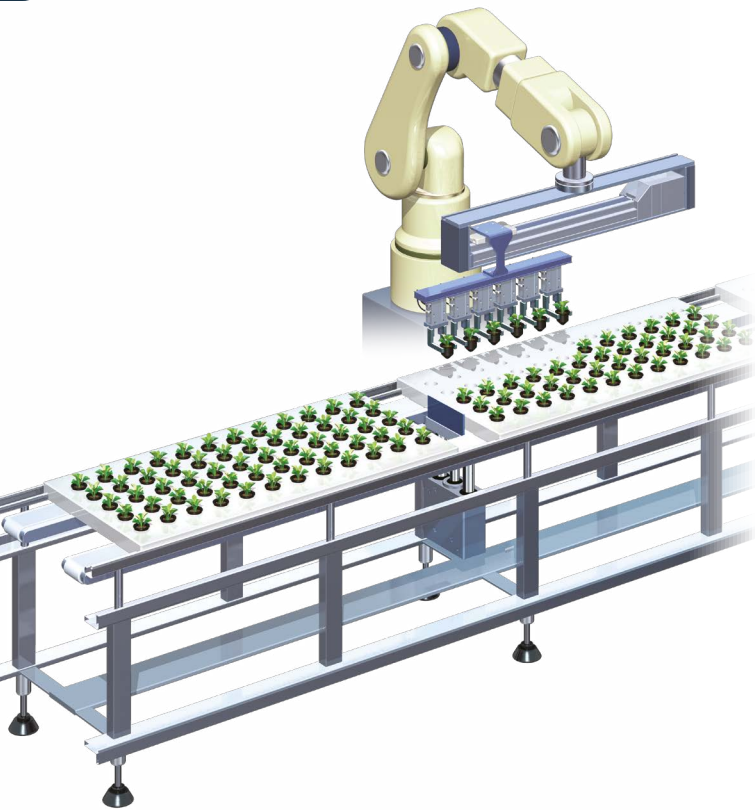
KQ2-G Series +



Stainless steel 303 one-touch fitting

Reliable tube-to-male-thread connections that maintain stable flow, simplify assembly, and support consistent nutrient dosing.

Automation and labour saving of processes



Harvesting

MHZJ2 Series +



Parallel type air gripper with dust cover

Ensure reliable, repeatable gripping of delicate crops and reduce manual handling with the compact gripper with protective dust covers.

RMTA Series +



Tool changer, auto type

Enable fast end-effector swaps and minimise manual intervention, keeping harvesting robots running continuously, with the automatic tool changer.

D-M9NA(V)/D-M9PA(V)/ D-M9BA(V) Series +



Water resistant 2-colour indicator solid state auto switch

Deliver stable position detection, reduce manual checks, and maintain reliable harvesting automation in humid, debris-rich environments.

D-MH2 Series +



IO-Link compatible 2-in-1 auto switch/setup tool

Monitor multiple gripping operation positions using a single switch.

TU Series +



Polyurethane standard tubing, metric size

Flexible, kink-resistant tubing that maintains stable airflow in harvesting tools, reduces maintenance interruptions, and supports smooth, continuous robotic operation.

ZK2-A Series +



Vacuum unit. Ejector system/vacuum pump system

Deliver strong, stable suction for crop picking, reducing manual handling, and keeping automated harvesting tools lightweight and fast with the high-efficiency vacuum unit.

Fittings



Diverse range of connection options, with design that prevents liquid from accumulating after cleaning.

- **Clean design insert fittings**
KFG2H-C Series +
- **EHEDG compliant insert fittings**
KFG2H-E Series +
- **US FDA compliant fittings (stainless steel 316 one-touch fittings)**
KQG2-F Series +
- **US FDA compliant fittings (metal one-touch fittings)**
KQB2-F Series +
- **US FDA compliant fittings (stainless steel 316 insert fittings)**
KFG2-F Series +
- **Miniature fitting**
M/MS Series +

Moving bench

CJ5-S/CG5-S Series +



Stainless steel cylinder

Deliver smooth, corrosion-resistant motion for moving benches, reducing manual repositioning and ensuring reliable operation in humid growing environments.

MY1B Series +



Mechanically jointed rodless cylinder

Provide long-stroke, space-saving bench movement with the rodless actuators, reducing manual transport..

Water resistant cylinders



Deliver precise bench positioning, secure clamping, and reliable stopping functions with robust cylinders and guided actuators.

- **Air cylinder, double acting, single rod**
CG1-Z1, CM2-Z Series +
- **Guide cylinder**
MGG Series +
- **Compact cylinder**
CQ2-Z, CQE Series +
- **Compact guide cylinder**
MGP-Z Series +
- **Rotary clamp cylinder**
MK-Z Series +
- **Stopper cylinder**
RSQ Series +

Directional control valves

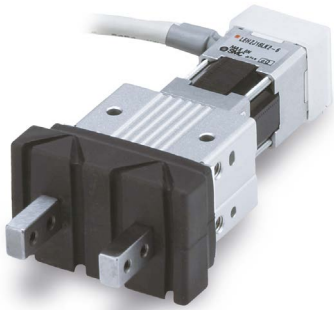


Ensure precise pneumatic control to keep moving-bench systems running smoothly and efficiently with high-performance solenoid valves and clean-design manifolds.

- **5-port solenoid valve**
SY3000/5000/700 Series +
- **Compact 5-port solenoid valve**
JSY1000/3000/5000 Series +
- **Clean design manifold valve**
JSY5000-H Series +

Transplanting, planting and transfer

Electric actuators



Deliver accurate, repeatable motion for transplanting and transfer tasks with high-precision electric actuators, grippers and rotary units, ensuring gentle crop handling, smooth positioning, and reliable operation even in dust- and moisture-prone environments

- **Dust-tight/water-jet-proof**
LEY-X8, LEY-X7, LEY-X5 Series +
- **High rigidity and high precision slider type**
LEKFS Series +
- **Electric gripper with dust cover**
LEHZJ Series +
- **High performance slider type/rod type**
LEFS□F/LEY□F Series +
- **High performance, high rigidity guide rod type**
LEG Series +
- **Rotary type**
LER Series +
- **Motorless** +

Storage



PF3A Series +



3-colour display digital flow switch

Ensure accurate compressed air flow monitoring to maintain optimal storage and ventilation conditions.

IN502-44/45/46 Series +



Air flow controller

Opt for stable and automatic air flow regulation in storage environments with a smart compressed air flow controller.

ITVX Series +



High pressure electro-pneumatic regulator

Ensure efficient pressure regulation in agricultural storage using robust electro-pneumatic control.

IDG-D Series +



Membrane air dryer

Provide moisture-free compressed air to protect storage and ventilation systems.

JSX Series +



2-port solenoid valve

Control diverse fluids such as air, water, oil, etc. Extended service life and improved weather resistance.

VXZ Series +



Zero differential pressure type pilot operated 2 port solenoid valve

Optimise controlled-environment storage conditions by delivering reliable, zero-differential pressure control across a wide range of fluids for stable, automated gas and water management.

NMG Series + Ask our experts



Membrane nitrogen generator

Ensure nitrogen-enriched air purification with only a compressed air supply.

AC-D Series +



Modular FRL units

Match air standardisation requirements with air purity classes certified against ISO8573-1:2010.

Industrial communication



Discover our communication products and industrial solutions tailored to improve efficiency and productivity across modern agricultural operations.



Wireless +

- Air management system
- Wireless system
- Wireless compact remote.



Serial interface +

- Compact fieldbus system for output
- Fieldbus unit for input/output
- Gateway decentralised type fieldbus system.

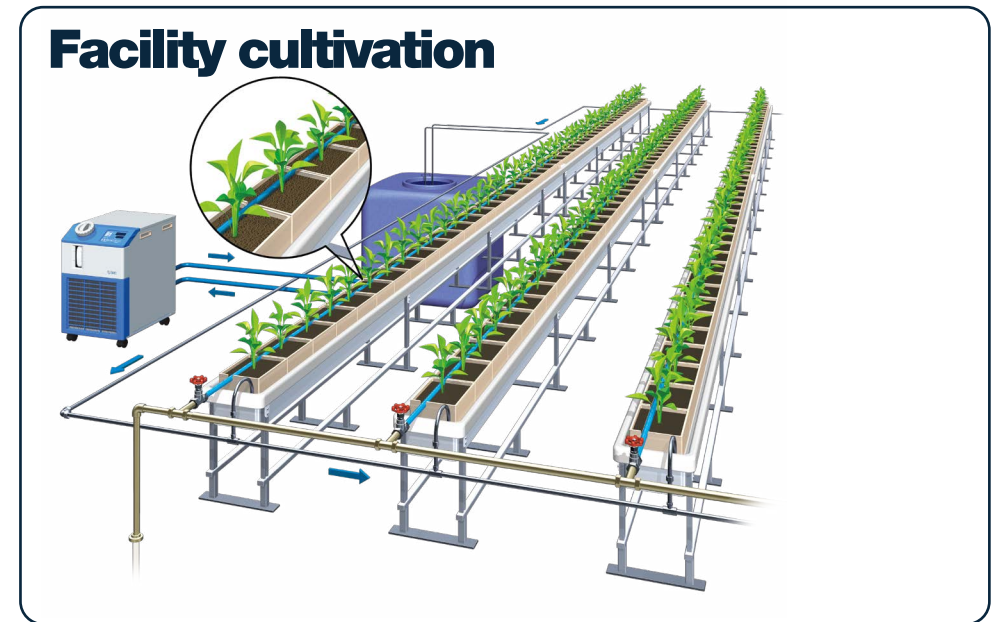
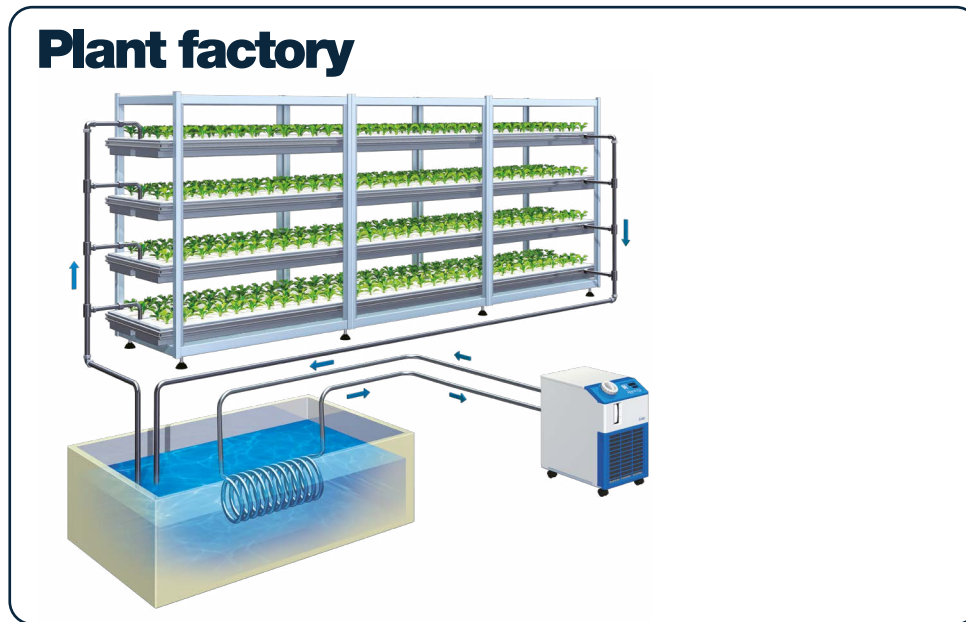


IO-Link +

- Wireless
- Master
- Distributed input/output control
- Solenoid output control
- Pressure control
- Static electricity control
- Flow control
- Electric actuator control
- Vacuum generation/management
- Flow sensors
- Pressure/vacuum sensors
- Position sensors
- Condensation checkers.

Temperature control

Control the temperature of your fluids. Whether it's the nutrient solution in tanks or the partial temperature of cultivation areas, SMC chillers embody technological excellence and a commitment to sustainability, offering customers a comprehensive solution for their cooling requirements.



HRSF Series +



Low GWP refrigerant, standard type circulating fluid temperature controller

HRSC Series +



Non F-gas (CO₂ refrigerant), standard type circulating fluid temperature controller

HRLF Series +



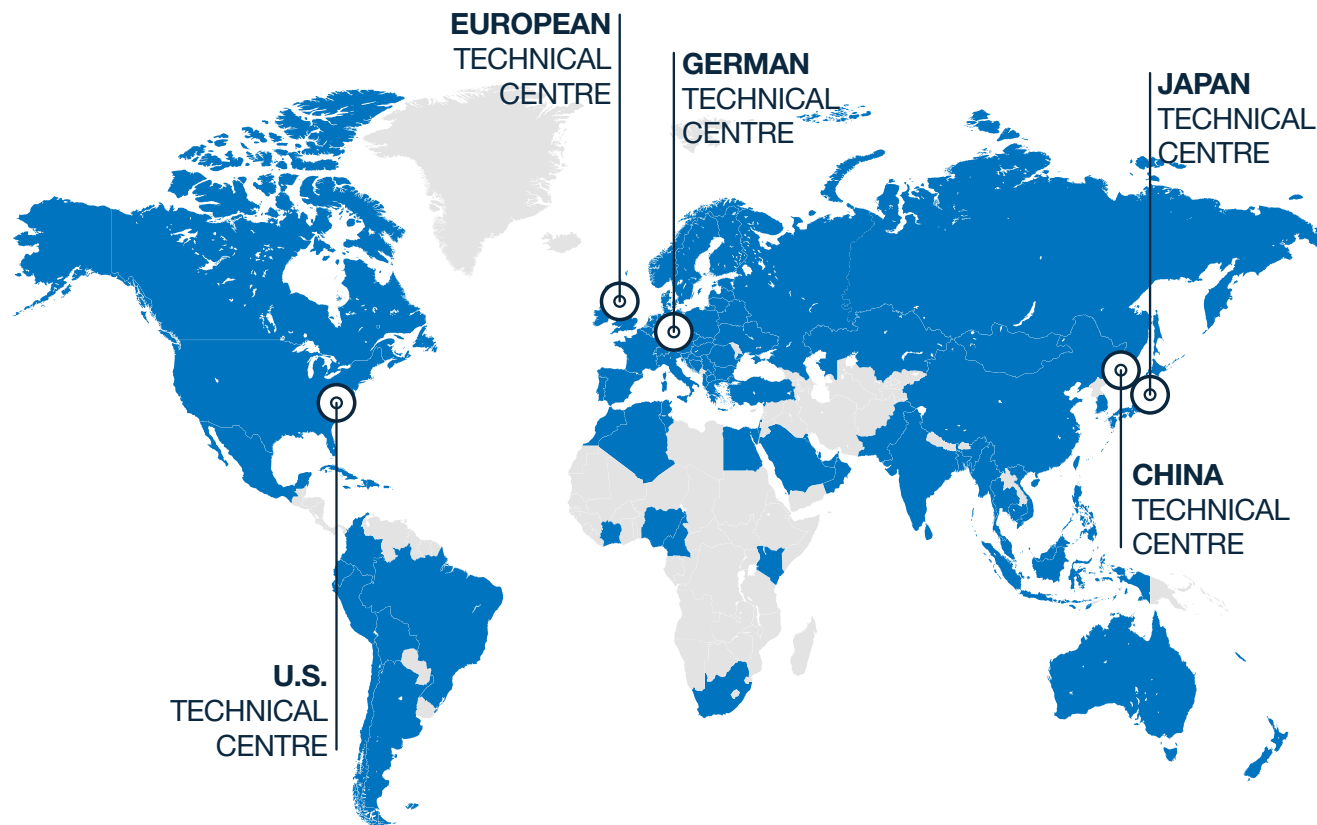
Low GWP refrigerant dual-channel chiller

Our support network

SMC's worldwide commitment

One of the things we do best at SMC is **being close to our customers**. Local support, on a global scale.

With **support** in over **500 locations** across **80 countries** and regions **worldwide**, our sales force of **7000 experts** maintains **close communication with customers**.



SMC Business Continuity Plan

Sustainable growth also means ensuring uninterrupted operations

We are committed to ensuring that SMC is prepared for any emergency and that our business activities will not stop in the event of such circumstances. SMC aims to fulfil our product supply responsibilities and maintain our customers' trust by contributing to both sustainable growth and the expansion of technological innovations.

SMC, as a comprehensive manufacturer of automatic control equipment that supports automation, is able to promptly provide products that meet our customers' needs anywhere in the world.

Production BCP

Ensure customer order fulfilment

Reliable delivery for you thanks to our 9 global logistic centres and 38 production sites worldwide. Moreover, flexibility to rapidly respond to any sudden change in the manufacturing environment.

Finance BCP

Safe & Solid financial base

In the event of an emergency, SMC can provide a safe and solid financial base (with cash, deposits, and equity capital) that will sufficiently cover the working capital and funds needed to rebuild buildings and the equipment required for business continuity. This is done to provide peace of mind to our customers and workers alike.

Information security BCP

Vital data kept safe

Strengthen information security for protection against computer viruses and cyberattacks, plus the installation of data centres to establish a disaster recovery system. Your information is safe with us.

Engineering BCP

Consistent technical support

2,000 engineers at our 5 technical centres around the globe.

Sales BCP

Consistent sales support

7,000 sales engineers worldwide ready to recommend the best solution for you. Over 80 global locations to make sure that wherever you are, we are there too.

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SMC Corporation

1-5-5, Kyobashi,
Chuo-ku, Tokyo
104-0031, Japan
Telephone: 03-6628-3000
<https://www.smcworld.com>

Austria	+43 (0)2262622800	www.smc.at	office.at@smc.com	Greece	+30 210 2717265	www.smchellas.gr	sales@smchellas.gr	Romania	+40 213205111	www.smcromania.ro	office.ro@smc.com
Belgium	+32 (0)33551464	www.smc.be	info@smc.be	Hungary	+36 23513000	www.smc.hu	office.hu@smc.com	Russia	+7 (812)3036600	www.smc.eu	sales@smcru.com
Bulgaria	+359 (0)2807670	www.smc.bg	sales.bg@smc.com	Ireland	+353 (0)14039000	www.smcautomation.ie	technical.ie@smc.com	Slovakia	+421 (0)413213212	www.smc.sk	sales.sk@smc.com
Croatia	+385 (0)13707288	www.smc.hr	sales.hr@smc.com	Italy	+39 03990691	www.smcitalia.it	mailbox.it@smc.com	Slovenia	+386 (0)73885412	www.smc.si	office.si@smc.com
Czech Republic	+420 541424611	www.smc.cz	office.at@smc.com	Latvia	+371 67817700	www.smc.lv	info.lv@smc.com	Spain	+34 945184100	www.smc.eu	post.es@smc.com
Denmark	+45 70252900	www.smcck.com	smc.dk@smc.com	Lithuania	+370 5 2308118	www.smclt.lt	info.lt@smc.com	Sweden	+46 (0)86031240	www.smc.nu	order.se@smc.com
Estonia	+372 651 0370	www.smcee.ee	info.ee@smc.com	Netherlands	+31 (0)205318888	www.smc.nl	info@smc.nl	Switzerland	+41 (0)523963131	www.smc.ch	helpcenter.ch@smc.com
Finland	+358 207513513	www.smc.fi	smc.fi@smc.com	Norway	+47 67129020	www.smc-norge.no	post.no@smc.com	Turkey	+90 212 489 0 440	www.smcturkey.com.tr	satis.tr@smc.com
France	+33 (0)164761000	www.smc-france.fr	supportclient.fr@smc.com	Poland	+48 22 344 40 00	www.smc.pl	office.pl@smc.com	UK	+44 (0)845 121 5122	www.smc.uk	sales.gb@smc.com
Germany	+49 (0)61034020	www.smc.de	info.de@smc.com	Portugal	+351 214724500	www.smc.eu	apoiocliente.pt@smc.com	South Africa	+27 10 900 1233	www.smcza.co.za	Sales.za@smc.com

www.smc.eu

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