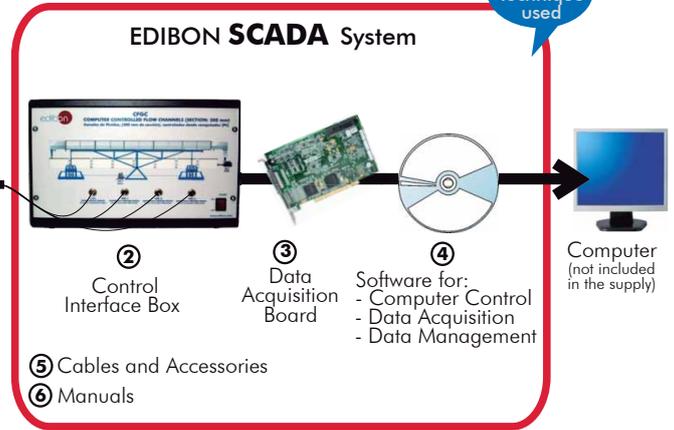




① Unit: CFGC. Computer Controlled Flow Channels (section: 300 x 450 mm)



\*Minimum supply always includes: 1 + 2 + 3 + 4 + 5 + 6 (Computer not included in the supply)

Available Versions:

- CFGC300/5. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 5 m.
- CFGC300/7. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 7.5 m.
- CFGC300/10. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 10 m.
- CFGC300/12. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 12.5 m.

Key features:

- ▶ **Advanced Real-Time SCADA.**
- ▶ **Open Control + Multicontrol + Real-Time Control.**
- ▶ **Specialized EDIBON Control Software based on Labview.**
- ▶ **National Instruments Data Acquisition board (250 KS/s , kilo samples per second).**
- ▶ **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**
- ▶ **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**
- ▶ **Capable of doing applied research, real industrial simulation, training courses, etc.**
- ▶ **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**
- ▶ **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- ▶ **Designed and manufactured under several quality standards.**
- ▶ **Optional CAL software helps the user perform calculations and comprehend the results.**
- ▶ **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

**OPEN CONTROL  
+  
MULTICONTROL  
+  
REAL TIME CONTROL**

**www.edibon.com**  
Products  
Products range  
Units  
8.-Fluid Mechanics & Aerodynamics

For more information about Key Features, click here:



ISO 9000: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)

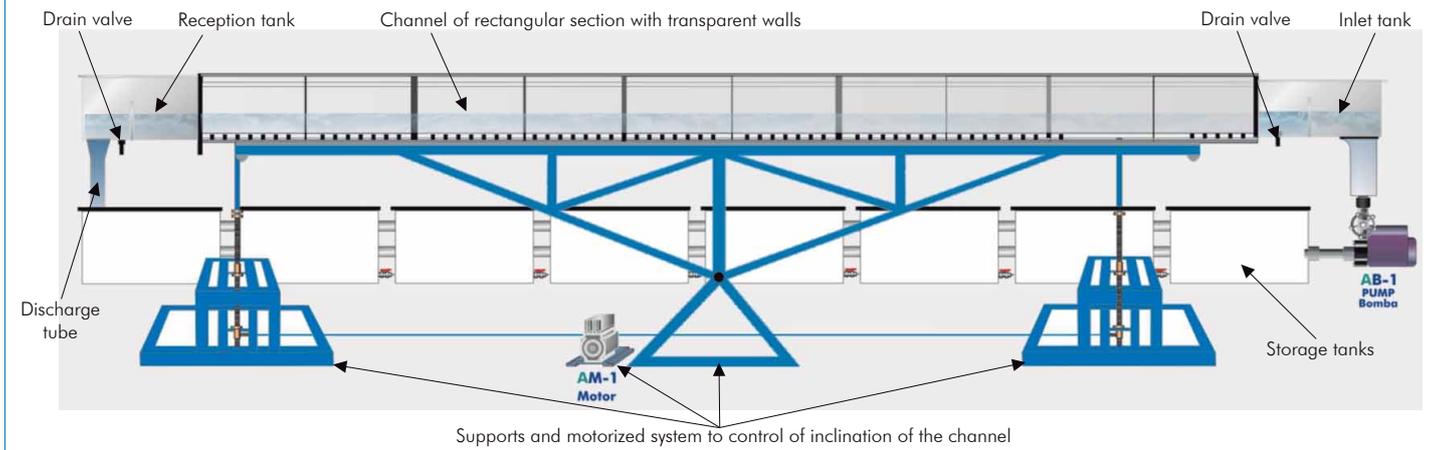


Certificates ISO 14000 and ECO-Management and Audit Scheme (environmental management)



Worlddidac Quality Charter Certificate (Worlddidac Member)

Example: CFG300/12 Version





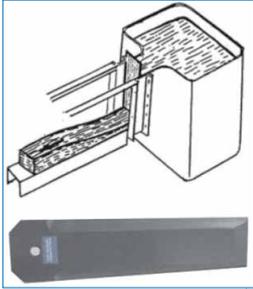
CFGCTP. Pitot tube and manometer board



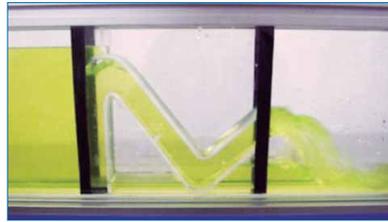
CFGCRM. Level gauge for measurement of the water height (hook and point gauge)



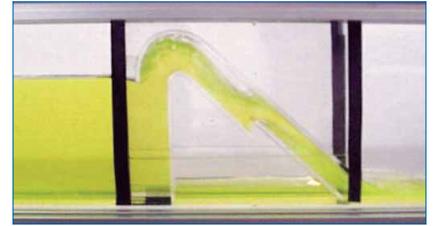
CFGCVDG. Broad and thin crested weirs



CFGCCVR. Vertical flat gate and radial gate



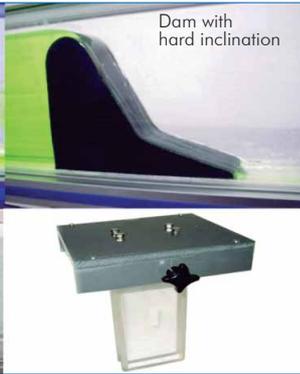
CFGCSDL. Syphon spillway



CFGCSDS. Air regulated syphon



Dam with launching pad

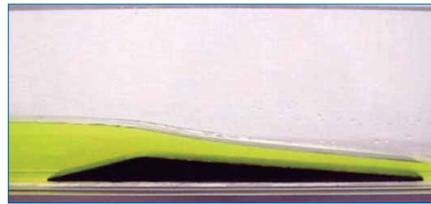


Dam with hard inclination

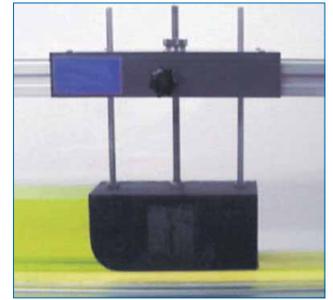


Dam with soft inclination

CFGCPVP. Dams spillway and flow splitters (3 different models of dams)



CFGVCV. Crump weir



CFGCCA. Culvert fitting



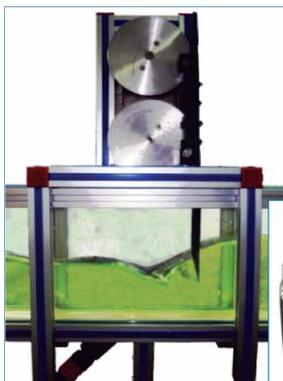
CFGCVEN. Venturi flume



CFGCLPR. Artificial roughened bed (3 different models)

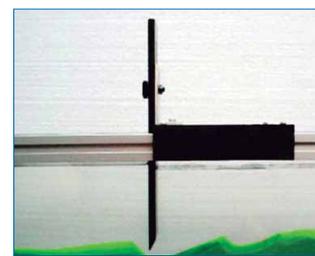


CFGCTVC. Venturi tube, with pressure transducers, converter and differential pressure digital indicator for input flow measurement



CFGCGO. Wave generator

wave generator speed control



CFGCPR. Adjustable undershot weir

**Items supplied as standard**

**①CFGC. Unit:**

**Metallic structure and supports in painted steel. Main metallic elements in stainless steel. Channel of rectangular section with transparent walls.**

There are several channel versions to chose:

- CFGC300/5. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 5 m.
- CFGC300/7. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 7.5 m.
- CFGC300/10. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 10 m.
- CFGC300/12. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 12.5 m.

**The channel is assembled on supports, with a motorized (electric motor) system to control the inclination of the channel, computer controlled.**

**Storage tanks. (Number of tanks in function of the Channel version). Capacity of each tank : 400 l. approx.**

**Impulsion pump, with variable speed, computer controlled. (Power of the pump in function of the Channel version).**

**Inlet tank, with drain valve.**

**Reception tank, with drain valve.**

**Flow control valves.**

**Pipes.**

**Flow measurement system.**

**Pressure sensors.**

**Wide range of accessories available.**



CFGC. Unit

**Available accessories:** (not included in the standard supply)

- CFGCTP. Pitot tube and manometer board.
- CFGCRM. Level gauge for measurement of the water height (hook and point gauge).
- CFGCVDG. Broad and thin crested weirs. (One broad weir and 2 thin weirs).
- CFGCCVR. Vertical flat gate and radial gate.
- CFGCSDL. Syphon spillway.
- CFGCPVP. Dams spillway (3 different models) and flow splitters.
- CFGCCA. Culvert fitting.
- CFGVCV. Crump weir.
- CFGCVEN. Venturi flume.
- CFGCSDS. Air regulated syphon.
- CFGCFS. False floor sections. (2 different models).
- CFGCPLR. Artificial roughened bed. (3 different models).
- CFGCTVC. Venturi tube, with pressure transducers, converter and differential pressure digital indicator for input flow measurement.
- CFGCGO. Wave generator.
- CFG CPR. Adjustable undershot weir.

**②CFGC/CIB. Control Interface Box:**

**Control interface box with process diagram in the front panel** and with the same distribution that the different elements located in the unit, for an easy understanding by the student. All sensors, with their respective signals, are properly manipulated from -10V. to +10V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors. Single cable between the control interface box and computer.

**The unit control elements are permanently computer controlled**, without necessity of changes or connections during the whole process test procedure.

**Simultaneous visualization in the computer of all parameters involved in the process.**

**Calibration of all sensors involved in the process.**

**Real time curves representation about system responses.** Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses.

**All the actuators' values can be changed at any time from the keyboard** allowing the analysis about curves and responses of the whole process. Actuators and sensors values and their responses are displayed on only one screen in the computer.

**Shield and filtered signals to avoid external interferences.**

**Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.** Real time computer control for pumps, compressors, resistances, control valves, etc.

**Open control** allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously. **Three safety levels, one mechanical in the unit, other electronic in the control interface and the third one in the control software.**



CFGC/CIB

**③DAB. Data Acquisition Board:**

PCI Data acquisition board (National Instruments) to be placed in a computer slot. Bus PCI.

**Analog input:** Number of channels= 16 single-ended or 8 differential. **Resolution= 16 bits**, 1 in 65536.

**Sampling rate up to: 250 KS/s (Kilo samples per second).**

**Input range (V) = ±1.0V.** Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.

**Analog output: Channels=2. Resolution= 16 bits**, 1 in 65536. Max. output rate up to: 833 KS/s.

**Output range(V) = ±1.0V.** Data transfers=DMA, interrupts, programmed I/O.

**Digital Input/Output: Channels=24 inputs/outputs.** D0 or DI Sample Clock frequency: 0 to 1 MHz.



DAB

**④ CFGC/CCSOF. Computer Control + Data Acquisition + Data Management Software:**

Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen.

**Compatible with the industry standards.**

Registration and visualization of all process variables in an automatic and simultaneous way.

**Flexible, open and multicontrol software**, developed with actual windows graphic systems, acting simultaneously on all process parameters.

**Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second.**

**Calibration system for the sensors involved in the process.**

**It allows the registration of the alarms state and the graphic representation in real time.**

Comparative analysis of the obtained data, after the process and modification of the conditions during the process.

**Open software, allowing to the teacher to modify texts, instructions. Teacher's and student's passwords** to facilitate the teacher's control on the student, and allowing the access to different work levels.

**This unit allows the 30 students of the classroom to visualize simultaneously all results and manipulation of the unit, during the process, by using a projector or an electronic whiteboard.**



CFGC/CCSOF

**⑤Cables and Accessories**, for normal operation.

**⑥Manuals:** This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

**\* References 1 to 6: CFGC + CFGC/CIB + DAB + CFGC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.**

**Additional and optional items to the standard supply**

PLC. Industrial Control using PLC (7 and 8):

**⑦ PLC-PI. PLC Module:**

Circuit diagram in the front panel.

Front panel:

**Digital inputs(X) and Digital outputs (Y) block:**

**16 Digital inputs**, activated by switches and 16 LEDs for confirmation (red).

**14 Digital outputs** (through SCSI connector) with 14 LEDs for message (green).

**Analog inputs block:**

**16 Analog inputs** (-10V. to + 10V.) (through SCSI connector).

**Analog outputs block:**

**4 Analog outputs** (-10V. to + 10V) (through SCSI connector).

**Touch screen:**

High visibility and multiple functions.

Display of a highly visible status.

Recipe function.

Bar graph function.

Flow display function.

Alarm list.

Multi language function.

True type fonts.

Back panel:

Power supply connector.

Fuse 2A.

RS-232 connector to PC.

USB 2.0 connector to PC.

Inside:

Power supply outputs: 24 Vdc, 12 Vdc, -12 Vdc, 12 Vdc variable.

**Panasonic PLC:**

**High-speed scan of 0.32 μsec.** for a basic instruction.

**Program capacity of 32 Ksteps**, with a sufficient comment area.

Power supply input (100 to 240 V AC).

DC input: 16 (24 V DC).

Relay output: 14.

**High-speed counter.**

**Multi-point PID control.**

**Digital inputs/outputs and analog inputs/outputs Panasonic modules.**

Communication RS232 wire, to computer (PC).

**⑧ CFGC/PLC-SOF. PLC Control Software:**

For this particular unit, always included with PLC supply.



PLC-PI

**Items available on request**

**⑨ CFGC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).**

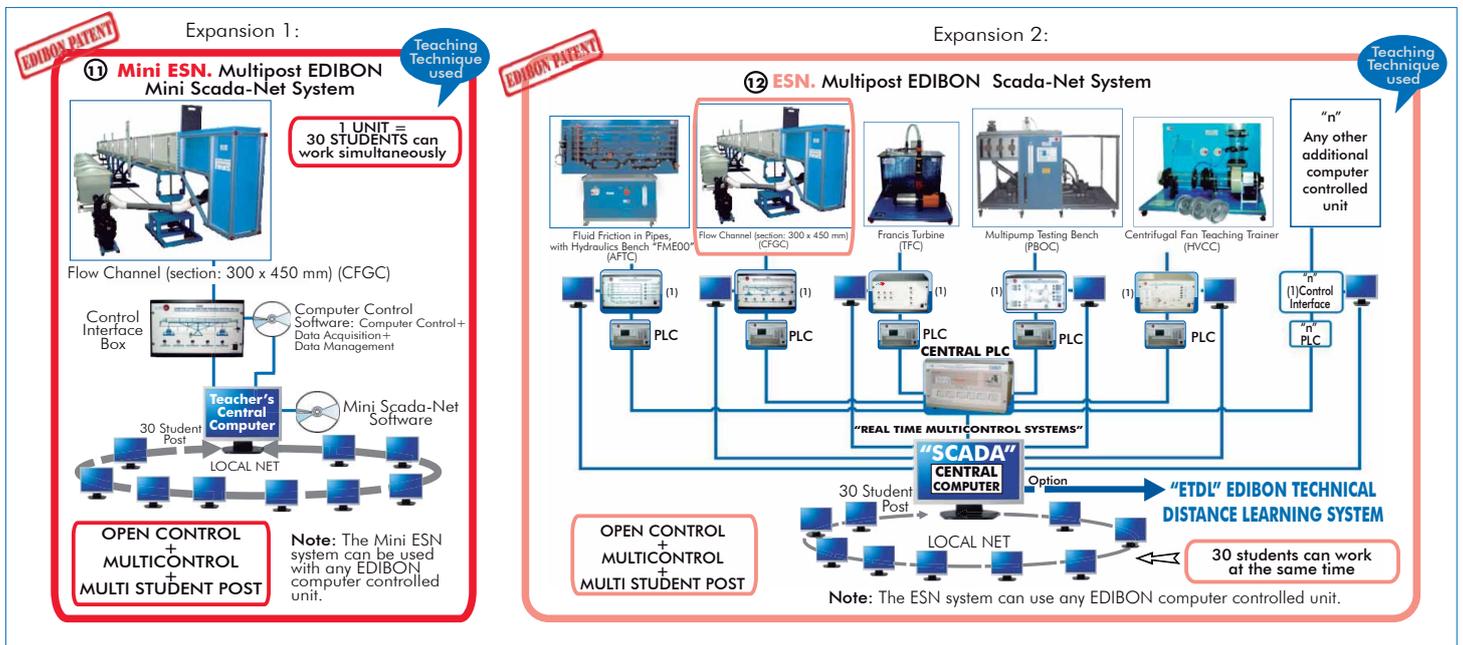
**⑩ CFGC/FSS. Faults Simulation System.**

## EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the unit: (in function of the accessories used)

- 1.- Measurement of the water height and the velocity along the channel.
  - 2.- Measurement of the flow with weirs of thin wall.
  - 3.- Measurement of flow with changes in the channel section.
  - 4.- Measurement of flow using Venturi flume.
  - 5.- Control of the flow by gates.
  - 6.- Level control using syphons.
  - 7.- Flow on overflow dams.
  - 8.- Flow among the pillars of a bridge.
  - 9.- Connection of a channel to a culvert.
  - 10.- Characterization of the hydraulic jump.
  - 11.- Profiles of the water free surface.
  - 12.- Investigation of flow and supercritical flow states.
  - 13.- Measurement of water levels.
  - 14.- Discharge processes on an underwater weir.
  - 15.- Amount of energy in flows in open channels.
  - 16.- Function of a syphon weir.
  - 17.- Flow rate and drain coefficients of a syphon weir.
  - 18.- Pipe flows.
  - 19.- Comparison of overflow and syphon weirs.
  - 20.- Observation of the throw of the water.
  - 21.- Generation of different flow states by damming the down-stream water.
  - 22.- Observation of the flow under an undershot weir:
    - Observation of hydraulic motion on discharge.
  - 23.- Relationship between dam height and discharge.
  - 24.- Observation of discharges under a radial gate:
    - Observation of hydraulic motion on discharge.
  - 25.- Hydrostatic pressure on a weir.
  - 26.- Investigations on waves.
  - 27.- Behaviour of structures in rough sea.
  - 28.- Applying and understanding Manning's formula.
  - 29.- Understanding sub- and super-critical flow
  - 30.- Learning how to apply force-momentum and steady flow energy equations to simple flow situations.
  - 31.- Investigation of the transition from running to shooting flow.
- Other possible practices:
- 32.- Filling of the Pitot tube.
  - 33.- Filling of the venturi meter with analog output.
  - 34.- Calculation of water flow.
  - 35.- Use of level gauge for measurement of the water height.

### POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS



## ORDER INFORMATION

### Items supplied as standard

Minimum configuration for normal operation includes:

- ① Unit: CFGC. Computer Controlled Flow Channels (section: 300 x 450 mm).
  - Available versions to chose:
    - CFGC300/5. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 5 m.
    - CFGC300/7. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 7.5 m.
    - CFGC300/10. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 10 m.
    - CFGC300/12. Computer Controlled Flow Channel (section: 300 x 450 mm), length: 12.5 m.
- ② CFGC/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ CFGC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

### Additional and optional items to the standard supply

- PLC. Industrial Control using PLC (7 and 8):
- ⑦ PCL-PI. PLC Module.
  - ⑧ CFGC/PLC-SOF. PLC Control Software.
  - ⑨ CFGC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
  - ⑩ CFGC/FSS. Faults Simulation System. (Available on request).

#### Expansions

- ⑪ Mini ESN. Multipost EDIBON Mini Scada-Net System.
- ⑫ ESN. Multipost EDIBON Scada-Net System.

**\* IMPORTANT: Under CFGC we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.**

## REQUIRED SERVICES

- Electrical supply.
- Water supply and drainage.
- Computer (PC).

## AVAILABLE ACCESSORIES

- CFGCTP. Pitot tube and manometer board.
- CFGCRM. Level gauge for measurement of the water height (hook and point gauge).
- CFGCVDG. Broad and thin crested weirs. (One broad weir and 2 thin weirs).
- CFGCCVR. Vertical flat gate and radial gate.
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- CFGCCA. Culvert fitting.
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- CFGCVEN. Venturi flume.
- CFGCSDS. Air regulated syphon.
- CFGCFS. False floor sections. (2 different models).
- CFGCPLR. Artificial roughened bed. (3 different models).
- CFGCTVC. Venturi tube, with pressure transducers, converter and differential pressure digital indicator for input flow measurement.
- CFGCGO. Wave generator.
- CFGCPR. Adjustable undershot weir.

## AVAILABLE VERSIONS

Offered in this catalogue:

- CFGC300/5. **Computer Controlled Flow Channel (section: 300 x 450 mm), length: 5 m.**
- CFGC300/7. **Computer Controlled Flow Channel (section: 300 x 450 mm), length: 7.5 m.**
- CFGC300/10. **Computer Controlled Flow Channel (section: 300 x 450 mm), length: 10 m.**
- CFGC300/12. **Computer Controlled Flow Channel (section: 300 x 450 mm), length: 12.5 m.**

Offered in other catalogues:

- CFG300/5. **Flow Channel (section: 300 x 450 mm), length: 5 m.**
- CFG300/7. **Flow Channel (section: 300 x 450 mm), length: 7.5 m.**
- CFG300/10. **Flow Channel (section: 300 x 450 mm), length: 10 m.**
- CFG300/12. **Flow Channel (section: 300 x 450 mm), length: 12.5 m.**
  
- CFC80/2. **Computer Controlled Flow Channel (section: 80 x 300 mm), length: 2.5 m.**
- CFC80/5. **Computer Controlled Flow Channel (section: 80 x 300 mm), length: 5 m.**
  
- CF80/2. **Flow Channel (section: 80 x 300 mm), length: 2.5 m.**
- CF80/5. **Flow Channel (section: 80 x 300 mm), length: 5 m.**

\*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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Issue: ED01/13  
Date: May/2013

REPRESENTATIVE: