

EDS® Water Management

Understanding the core processes of the water cycle

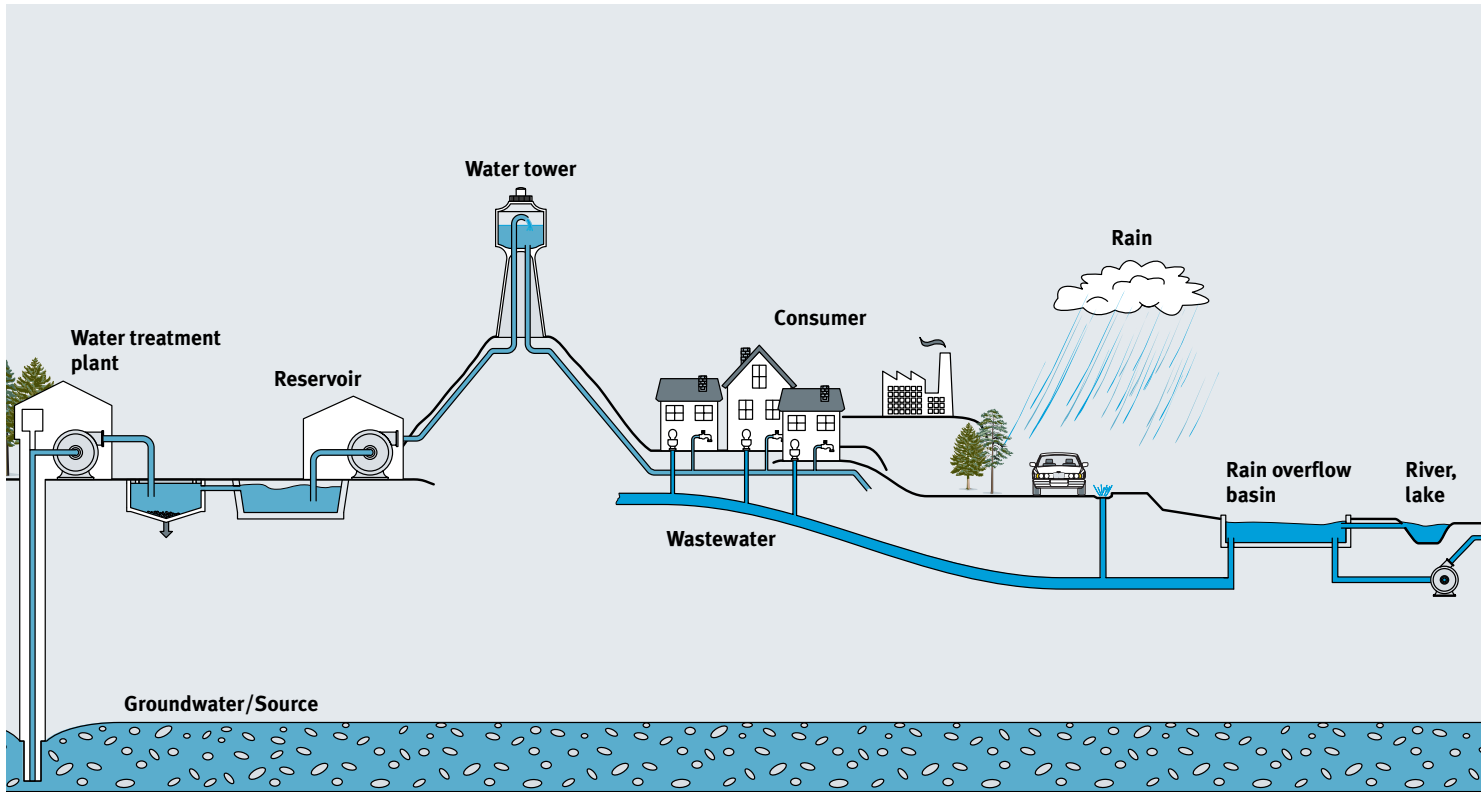
FESTO



EDS® Water Management

Discovering the water circuit

New



Clean water for everyone: With modern technology!

Complex systems require responsible operation, as the applications have far-reaching effects on humans, the plant and the environment.

The different EDS® Water Management stations prepare users optimally for these varied tasks and systems with state-of-the-art technology.

Teaching the water circuit: In a small space!

Experience the complexity of corporate working processes from administration, technology and science in just a few square metres.

All stations are mobile and compact enough to fit on a table-top.



Experience process control engineering

One click in the control room needs to be thought through, as a switching signal changes the system functions invisibly to the operator. The effects often appear hours later. In the worst case, they can result in water pollution or wasted energy and resources.

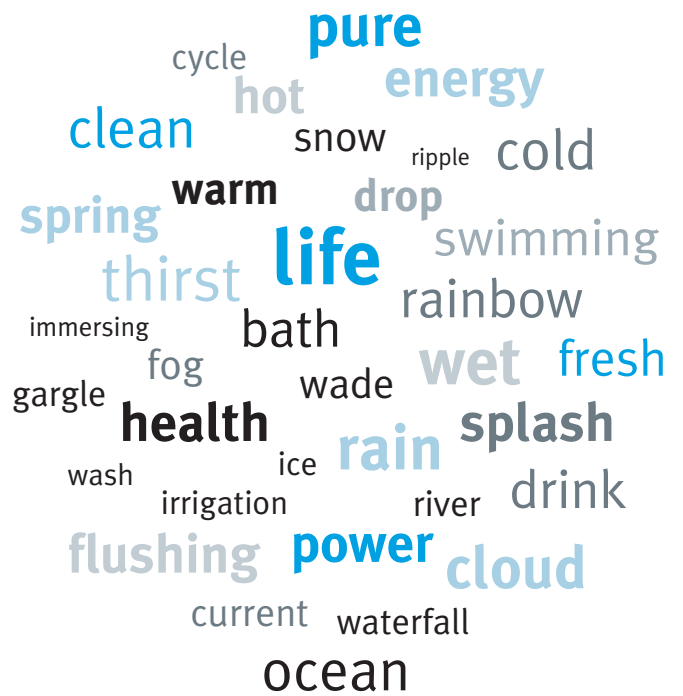
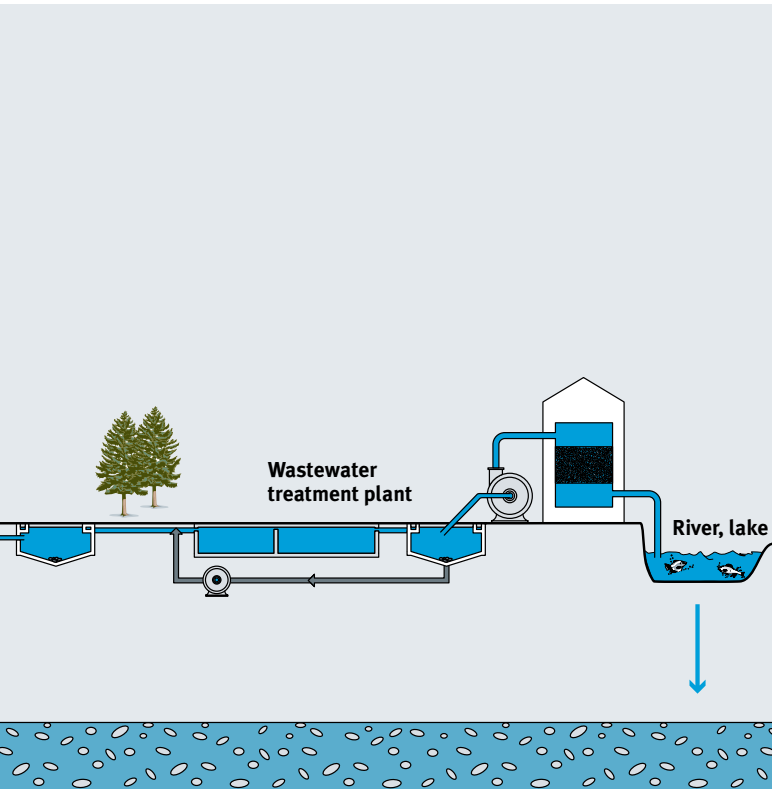
EDS® Water Management allows you to experience the effects directly and rapidly.



Setup times and operating costs – Less is more

Add water, start PCs and software – and you're ready to start water circuit training.

Plastic granules are used as the soiled load and can be air-dried and re-used after utilisation – reducing the operating costs of the training system to water and electricity.



Basic water circuit system

With the basic water circuit system, comprising the four main stations, you are ideally equipped to get to know the world of process command, measurement and control technology.

If you operate the stations individually, up to three students can work on the following learning areas:

- Plant engineering, process and laboratory technology
- Electrical engineering
- Automation/process control engineering and administration



Control test in the laboratory

Laboratory control tests are required to verify the in-line measurement technology of process engineering systems.

EDS® Water Management is the ideal addition for combining your new knowledge directly with your laboratory, applying scientific skills.

General training content

- Controlling, regulating and monitoring physical variables such as levels, flows and pressure
- Technical/physical functions of sensors and actuators as well as wiring, adjustment and parameterisation
- Analysing controlled systems, parameterising and optimising regulators
- System operation, maintenance, troubleshooting and repair
- Plant engineering
- Optimisation and energy monitoring
- Electronic data processing
- Reading and interpreting process flowcharts, electrical and pneumatic circuit diagrams

Hardware, software, teachware, training

For ideal training – The workbooks with theory sections and exercise scenarios are perfectly customised for the stations. There are digital training programs on many topics for presentation or self-learning phases. A wide range of training courses is available for training staff.

EDS® Water Management offers the required planning documents, e.g. electric and pneumatic circuit diagrams, process flowcharts, data sheets and operating instructions. All documents comply with European standards.



Water purification station

Water = Drinking water?

New



Function

The station represents a basic logic function of water treatment in the form of a water storage system with an overflow rim. A groundwater tank with a submersible pump is required for operation.

Focal points include:

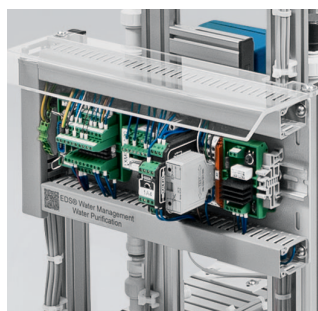
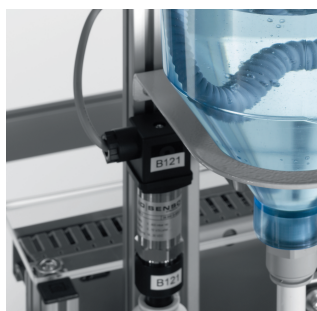
- Setting flow rate values for volume control
- Level measurement via analogue pressure measurement
- Level sensing via capacitive proximity sensors

The training documents reveal how a flocculation reaction is implemented by adding a flocculant, and how sedimentation can occur in spite of the flow.

Drinking water and chlorine

Chlorine is used worldwide to preserve drinking water. Overmetering not only increases the plant operator's costs unnecessarily, it also pollutes the environment and endangers the consumers. The additional chlorine measurement package with manual metering technology is a 1:1 training scenario for online chlorine measurement. This allows you to learn how to operate a chlorine metering system, and react to malfunctions and optimise the system.

[X]



Water purification station**8024504**

The station is fully assembled, wired and tested.

Main components

3 l tank, including an overflow rim, capacitive proximity sensor, float switch, impeller flow sensor, pressure sensor, 2/2-way solenoid valve, non-return valve, electric connection board, aluminium profile plate.

Including control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, accessory set and "Getting Started" technical documentation.

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Water supply tank/ground water	8024503
1x Tabletop power supply unit → Page 239	

Recommended accessories:

1x Additional chlorine measurement package	8025419
1x DC wattmeter	573261
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658

General training content

→ Page 445

Learning content for project work

- Function of an overflow rim
- Analogue level measurement via a pressure sensor
- Capacitive proximity sensor for level querying
- Basic processes of precipitation, flocculation and sedimentation

Training content with water supply tank

- Activation of a pump for flow control
- Regulation variants with capacitive sensors for level control

Training content with additional chlorine measurement package

- Measuring chlorine content
- Effects of excessive or insufficient chlorine metering

Technical data

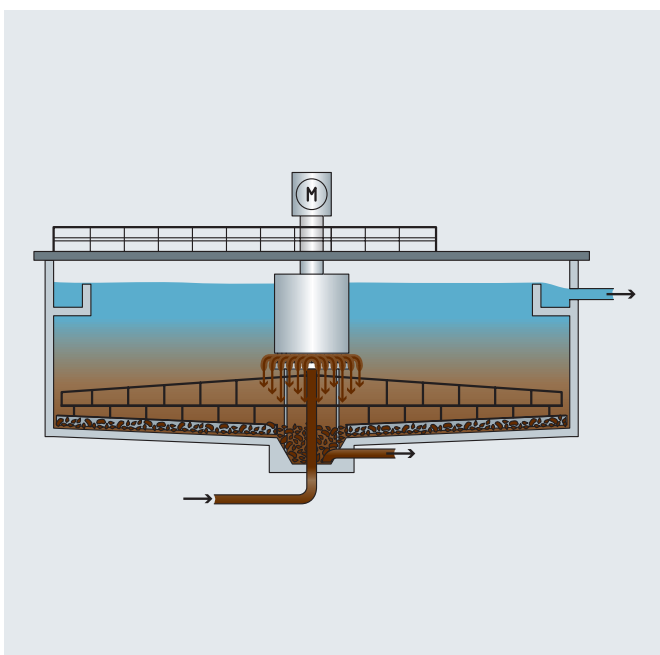
- Water (10 – 15 l)
- Power supply: 24 V DC
- 3 digital inputs
- 3 digital outputs
- 4 analogue inputs
- 1 analogue output
- Dimensions (H x W x D): 355 x 1100 x 400 mm

Recommended training media

- Workbook Water purification → Page 76



- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set → Internet

**Water supply tank/ground water**

Main components:

- Systainer with T-LOC system, 30 l
- Adapter for piping connectors
- Submersible pump
- Prefilter
- Float switch
- Water sieve
- Mobile roller system

Order no. **8024503**

**Additional chlorine measurement package**

Optional extension for the water treatment station: Measurement of free chlorine. This package is equipped with a dropping funnel, a membrane-covered, amperometric measuring cell and an indicator that can be parameterised. The measuring cell functions within an operating range of 4 to 9 pH.

Order no. **8025419**

Water supply station

To the very last drop ...

New



Function

The station deals with water storage and distribution via an elevated container, e.g. a water tower. The elevated container is filled via a pump, which can be operated in open- or closed-loop control mode. Water is withdrawn via valves. The process command software configures its switching characteristics. Depending on the withdrawal characteristics, feedback to the pump controller and shock loads for wastewater transport can result.

Balancing the water quantity provided with the water quantity delivered is another focus. In many water supply systems, leakages are a significant waste, and elimination by trained personnel is highly important.

Training by simulating a leakage using a valve, and subsequent location of the leakage are useful exercises.

[X]



Water supply station**8024505**

The station is fully assembled, wired and tested.

Main components

3 l tank, capacitive proximity sensor, float switch, impeller flow sensor, ultrasound sensor, centrifugal pump, 2/2-way solenoid valve, 2-way ball valve with pneumatic semi-rotary drive, electric connection board, aluminium profile plate.

Including control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, accessory set and “Getting Started” technical documentation.

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239	
1x Compressor → Page 240	
1x Compressor accessories	102725

Recommended accessories:

1x Water supply tank/ground water	8024503
1x DC wattmeter	573261
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658

General training content

→ Page 445

Learning content for project work

- Setting the pump to open- and closed-loop control mode and determining the effect on the delivery rate
- Determining the interaction between pressure and flow rate in a piping system
- Controlling the water supply via various valve types and showing the effects of shock loads
- Finding water losses in distribution networks and showing problems in leakage detection
- Measuring/controlling levels with ultrasound sensors
- Understanding and applying the function of pneumatically driven valves and fittings

Technical data

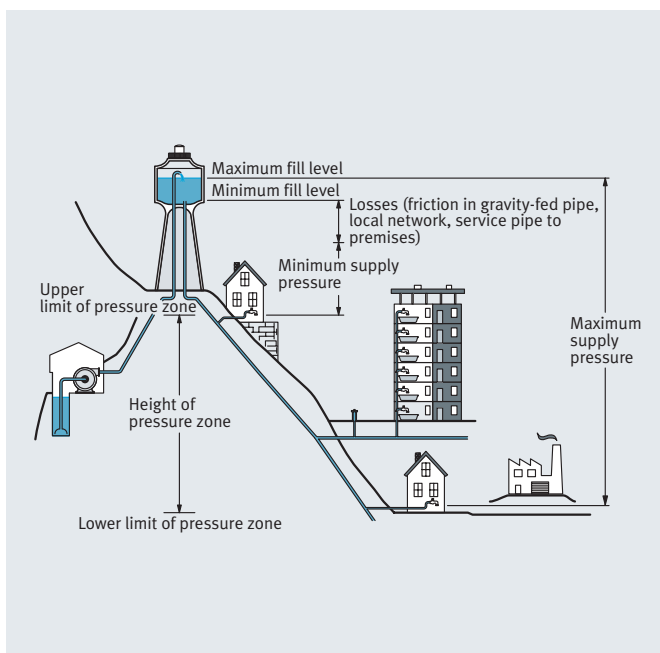
- Operating pressure: 4 – 6 bar (50 l/min)
- Water (10 – 15 l)
- Power supply: 24 V DC
- 5 digital inputs
- 7 digital outputs
- 4 analogue inputs
- 1 analogue output
- Dimensions (H x W x D): 55 x 1200 x 400 mm

Recommended training media

- Workbook Water Supply → Page 76



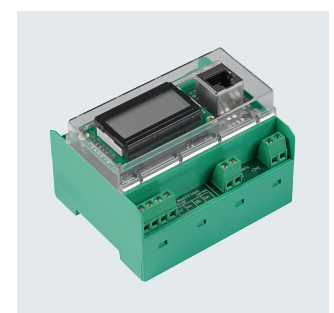
- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set → Internet

**Water supply tank/ground water**

Main components:

- Systainer with T-LOC system, 30 l
- Adapter for piping connectors
- Submersible pump
- Prefilter
- Float switch
- Water sieve
- Mobile roller system

Order no. 8024503

**DC wattmeter**

The DC wattmeter is a smart meter for training facilities with a 24 V DC power supply and up to 120 W power consumption. All measured values can be read out via data transmission with the integrated Ethernet port. Power consumption is read out as an analogue signal within a range of either 0 to 10 V DC or 4 to 20 mA.

Order no. 573261

Wastewater transport station

Water becomes wastewater

New



Function

The “wastewater transport” station teaches control technology for wastewater disposal and the associated processes. It comprises four sub-areas:

- Feeding device for supplying a soiled load
- Sewage pipe section with branch
- Tank with overflow rim as a rain retention and sedimentation basin
- Tank as a primary settlement tank for the biological stage and the option of starting sludge removal via a pneumatically automated fitting.

Plastic granules are used as the soiled load and can be air-dried and re-used after utilisation. Flooding due to rainfall or problems transporting solids can be simulated realistically.

The fluids are supplied to the primary settlement tank via a pump. A flow meter records the flow rate, which is configured via a motor control system of the pump or a proportional media valve.

The media valve functions based on the principle of a pneumatically activated constriction-hose valve. The throttle opening can be configured via air pressure with a proportional pressure regulator valve. That allows the effects on energy efficiency and the flow control quality to be shown clearly.

[X]



Wastewater transport station **8024506**

The station is fully assembled, wired and tested.

Main components

3 l tank, including overflow rim, 1 l tank, gravity duct, capacitive proximity sensor, float switch, magnetic-inductive flow sensor, ultrasound sensor, centrifugal pump, proportional media valve, proportional pressure regulator valve, pneumatic slide, metering screw for metering solids, electric connection board, aluminium profile plate.

Including control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, 1x accessory set with sedimentation granules and “Getting Started” technical documentation.

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239	
1x Compressor → Page 240	
1x Compressor accessories	102725

Recommended accessories:

1x Water supply tank/ground water	8024503
1x Sedimentation granules	8037688
1x DC wattmeter	573261
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658

General training content

→ Page 445

Learning content for project work

- Transporting solid matter in a sewer system using different flow velocities
- Effects of exceeding the hydraulic capacity
- Naming the basic mechanisms that make flushing necessary
- Functions of a rain overflow basin
- Basic functions of sedimentation in a flow basin
- Level measurement with an ultrasound sensor
- Functions of pneumatically driven valves and fittings

Technical data

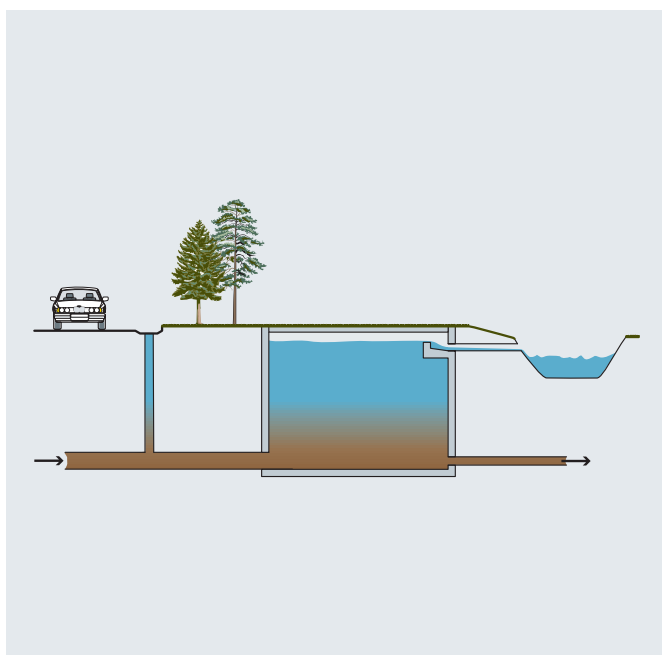
- Operating pressure: 4 – 6 bar (50 l/min)
- Water (10 – 15 l)
- Power supply: 24 V DC
- 5 digital inputs
- 5 digital outputs
- 4 analogue inputs
- 2 analogue outputs
- Dimensions (H x W x D): 1200 x 1200 x 400 mm

Recommended training media

- Workbook Wastewater transport → Page 76



- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set → Internet



Water supply tank/ground water

- Main components:
- Systainer with T-LOC system, 30 l
 - Adapter for piping connectors
 - Submersible pump
 - Prefilter
 - Float switch
 - Water sieve
 - Mobile roller system

Order no. 8024503



Compressor

Oil-lubricated, extremely quiet (45 dB (A)) compressor. Ideally suited for use in classrooms. With pressure regulator and water separator.

230 V	91030
100 – 120 V	565440

Wastewater treatment station

More than just sludge treatment

New



Function

The station maps the physical functions of wastewater treatment after the sludge treatment and contains an aeration tank and a secondary settlement tank. Plastic granules are used as the soiled load and can be air-dried and re-used after utilisation. The sludge return has a flow measurement system with an adjustable pump for setting and monitoring the sludge return ratio.

The oxygen feeding on the station functions using an electrically adjustable compressed air diaphragm pump. Combined with the available oxygen sensor, there is also an option of extending the oxygen feeding system to a control circuit.

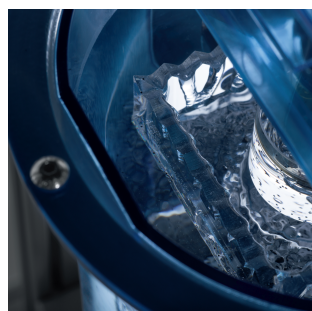
Economical oxygen regulation

Adding oxygen to water is not only relevant in the wastewater sector, but also in fish breeding or bioreactors.

In order to guarantee energy-optimised oxygen feeding, in-line oxygen measurement is required and must be combined with the oxygen feeding actuator in a control circuit. That avoids unnecessary energy use and possible biochemical malfunction.

EDS® Water Management forms a neutral learning environment on the subject of oxygen feeding regulation. Periodic addition of sodium sulphite (Na_2SO_3) to the upstream supply water causes a continuous oxygen consumption, thus simulating the oxygen demand of bacteria eating up organic substances in a real biological treatment of wastewater.

Handling with real wastewater is too complex and therefore not planned.



Wastewater treatment station**8024507**

The station is fully assembled, wired and tested.

Main components

3 l tank, including an overflow rim, 10 l tank, ventilation system, capacitive proximity sensor, float switch, magnetic-inductive flow sensor, centrifugal pump, 2/2-way solenoid valve, electric connection board, aluminium profile plate.

Including control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, accessory set with sedimentation granules and "Getting Started" technical documentation.

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239

Recommended accessories:

1x Additional oxygen measurement package	8025418
1x Water supply tank/ground water	8024503
1x Sedimentation granules	8037688
1x DC wattmeter	573261
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658

General training content

→ Page 445

Learning content for project work

- Behaviour of flakes at different flow velocities and different solid loads
- Hydraulic overloading of a wastewater treatment plant and the consequences
- Basic function of aerobic water treatment
- Function of sludge return
- Analogue level measurement via a pressure sensor

Training content with additional oxygen measurement package

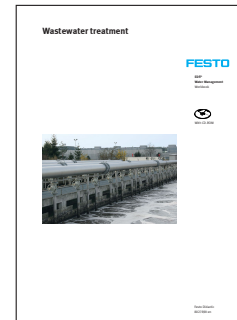
- Measuring the quantity of dissolved oxygen
- Showing the advantages of continuous measurement/control of the oxygen content

Technical data

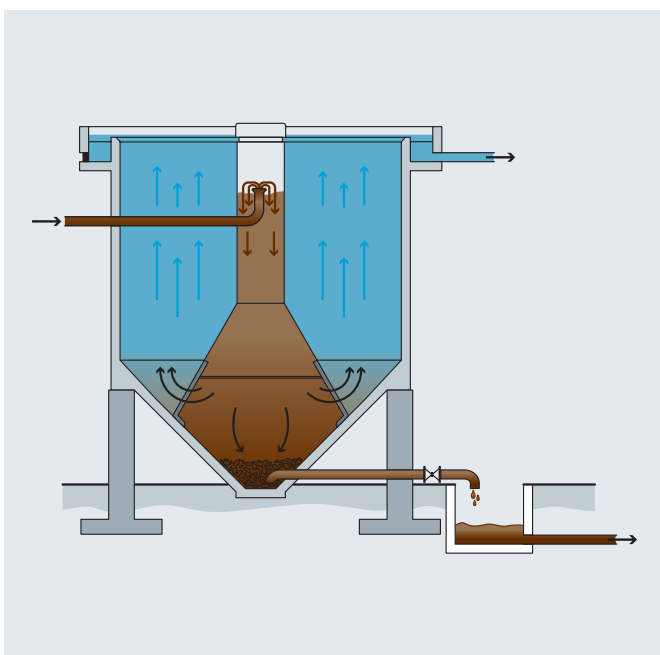
- Water (10 – 15 l)
- Power supply: 24 V DC
- 5 digital inputs
- 5 digital outputs
- 4 analogue inputs
- 2 analogue outputs
- Dimensions (H x W x D):
710 x 900 x 400 mm

Recommended training media

- Workbook Wastewater Treatment
→ Page 77



- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set
→ Internet

**Water supply tank/ground water**

Main components:

- Systainer with T-LOC system, 30 l
- Adapter for piping connectors
- Submersible pump
- Prefilter
- Float switch
- Water sieve
- Mobile roller system

Order no. 8024503

**Additional oxygen measurement package**

Optional extension for the wastewater treatment station. Measuring cell for dissolved oxygen with integrated optoelectronics. Measuring principle: Oxygen-dependent luminescence.

Order no. 8025418

Sand filtration station

For the tough jobs

New



Function

This station focuses on the filtration processes for separating solids frequently used in drinking and sewage technology. As in nature, the sand layers are used to retain the undissolved and suspended pollutants via deep-bed filtration as it trickles through. The pollutants are trapped in the sand layer and are deposited as filter cake. With time, the permeability decreases, the water level above the sand layer rises and is recorded via sensing. The sensor signal shuts off the inlet and starts the backwash process.

Parameterisation of the filtration process is configured on the PC via the enclosed software, such as the change of the backwash time or the pressure adjustment of the purge air to break up the filter cake.

The structure of the different filter layers with quartz sand and quartz gravel in different grain sizes and corresponding monitoring of the cleaning performance through the transparent filter housing is a special aspect.

[X]



Sand filtration station **8024508**

The station is fully assembled, wired and tested.

Main components

3 l tank, including overflow rim, capacitive proximity sensor, float switch, magnetic-inductive flow sensor, centrifugal pump, 4.75 l sand filter unit, proportional media valve, proportional pressure regulator valve, pneumatic valve terminal with 5/2-way solenoid valves, non-return valve, pressure sensor, electric connection board, aluminium profile plate, 1x quartz sand and quartz gravel.

Including a water supply tank/ground water, control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, accessory set and "Getting Started" technical documentation.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239	
1x Compressor → Page 240	
1x Compressor accessories	102725

Recommended accessories:

1x DC wattmeter	573261
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658
1x Quartz sand and quartz gravel	8039989

General training content

→ Page 445

Learning content for project work

- Separation of pollutants via a quartz sand and quartz gravel layer
- Deep-bed filtration and structure of a filter cake
- Measurement of pressure loss via the sand filter
- Automated filter process and sand filter backwashing
- Parameterising the process steps
- Functions of pneumatically driven valves and fittings
- Creating a Micheau diagram

Technical data

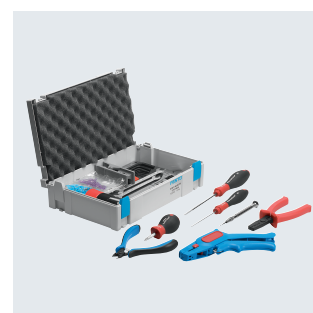
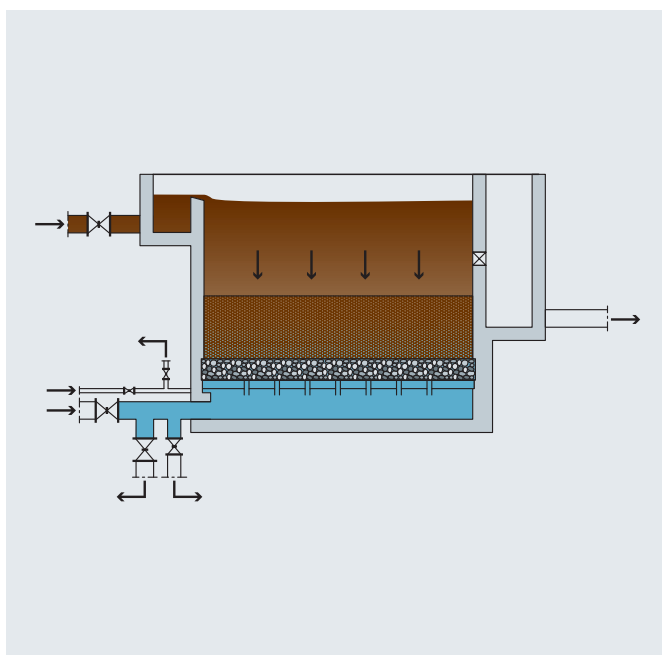
- Operating pressure: 4 – 6 bar (50 l/min)
- Water (10 – 15 l)
- Power supply: 24 V DC
- 6 digital inputs
- 8 digital outputs
- 4 analogue inputs
- Dimensions (H x W x D): 355 x 1350 x 400 mm

Recommended training media

– Workbook Rapid sand filtration



- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set → Internet



Tool set

The tool set is an aid to easy working on stations. A practical mini-systainer includes: → Page 421

Order no. 539767



Quartz sand and quartz gravel

Used in treating drinking and wastewater as a natural filter material. The filter medium is delivered in various grain sizes to optimise sand filtration.

Order no. 8039989

Membrane filtration station

For the finer things

New



Function

Membrane filtration is highly topical in modern water treatment. Depending on the pore size, the principle is used in water treatment.

Drinking water and wastewater treatment in the form of microfiltration and ultrafiltration is another area of application. The objective of both methods is retaining pathogenic germs, for example. The differences between the cross-flow and dead-end filtration operating modes are covered.

The membrane filtration station maps both processes. In cross-flow operation, the trans-membrane pressure is set for optimal filter performance. The inflows to and outflows from membrane filters can be measured and thus the performance of the membrane can be determined.

The backwash process takes place automatically if the filter performance is insufficient. Backwashing uses system filtrate created previously. The pressure resistance test checks the functionality of the membrane.

Other typical applications include:

- Reverse osmosis for seawater desalination
- Process water treatment in the pharmaceutical industry
- Steam generation in power stations

[X]



Membrane filtration station 8024509

The station is fully assembled, wired and tested.

Main components

3 l tank, including overflow rim, 3/2-way ball valve, membrane filter unit, capacitive proximity sensor, float switch, magnetic-inductive flow sensor, pneumatic valve terminal with 3/2-way solenoid valves, 5/2-way solenoid valve, membrane pump, proportional media valve, proportional pressure regulator valve, pressure sensor, electric connection board, aluminium profile plate.

Including control system with FluidLab®-EDS® Water Management, EasyPort, connecting cables, accessory set and “Getting Started” technical documentation.

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239	
1x Compressor → Page 240	
1x Compressor accessories	102725

Recommended accessories:

1x Water supply tank/ground water	8024503
1x DC wattmeter	573261
1x Membrane filter unit	On request
1x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658

General training content

→ Page 445

Learning content for project work

- Membrane filtration operating modes like filtration and back-washing
- Presentation of the theoretical basic principles of various membrane filtration (micro-, ultra-, nanofiltration and reverse osmosis)
- Process engineering differences between the cross-flow and dead-end filtration
- Automated integrity test for quality testing the membrane via pneumatic actuation and monitoring
- Effect of the transmembrane pressure on the filter performance
- Functions of pneumatically driven valves and fittings

Technical data

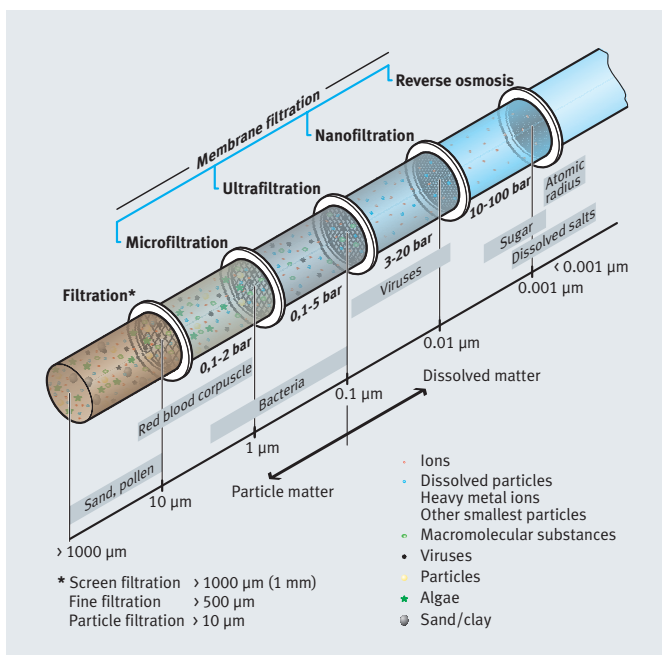
- Operating pressure: 4 – 6 bar (50 l/min)
- Water (10 – 15 l)
- Power supply: 24 V DC
- 8 digital inputs
- 8 digital outputs
- 4 analogue inputs
- 2 analogue outputs
- Dimensions (H x W x D): 710 x 1250 x 400 mm

Recommended training media

– Workbook Membrane filtration



- Workbook Monitoring, Control and Optimisation
- Workbook Energy Optimisation
- WBT Open- and Closed-Loop Control
- WBT Process Automation
- Water supply technology training set → Internet
- Sewage technology training set → Internet



Water supply tank/ground water

Main components:

- Systainer with T-LOC system, 30 l
- Adapter for piping connectors
- Submersible pump
- Prefilter
- Float switch
- Water sieve
- Mobile roller system

Order no. 8024503



Membrane filter unit

Interchangeable filter unit with a pore size of 0.02 µm. Including connections to the pipe system and blanking plug.

Order no. On request

Basic water circuit system

Fully equipped – Four becomes one!

New



Function

Efficiency and economy are not only in demand in the water sector – save time and money with the basic system. The basic water circuit system, comprising all necessary water supply and disposal stations which also function independently of one another.

Use in a control room

The students initially control the individual stations in manual override using a simulation box.

The included EasyPorts are then used to control and observe the stations via the control software.

One PC, to which all four EasyPorts are connected, controls the complete system.

For perfect classes

The workbooks with theory sections and exercise scenarios are perfectly customised for the stations and guarantee ideal class preparation.

The learning system components map real processes, making the exercises interesting and informative.

[X]

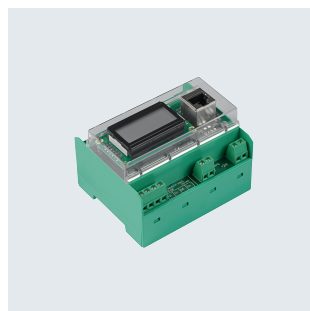
Additional oxygen measurement package



Additional chlorine measurement package



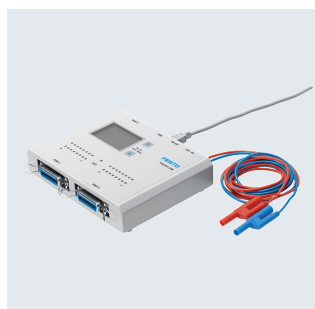
DC wattmeter



Water supply tank/ground water



EasyPort



Simulation box, digital/analogue



Basic water circuit system **8024501**

The basic system stations are fully assembled, wired and tested.

The water circuit basic system contains:

- 1x Water treatment station
- 1x Water supply station
- 1x Wastewater transport station
- 1x Wastewater treatment station
- 1x Water supply tank/ground water including cables
- 1x Additional chlorine measurement package
- 1x Additional oxygen measurement package
- 1x Digital/analogue simulation box, including cables
- 4x EasyPorts including cables
- 4x FluidLab®-EDS® Water Management Control Software
- 4x DC watt meters

For single operation, a water supply tank/ground water (order no. 8024503) is required.

Necessary accessories, also order:

1x Tabletop power supply unit → Page 239	
1x Compressor → Page 240	
1x Compressor accessories	102725

Recommended accessories:

3x Water supply tank/ground water	8024503
5x Trolley with plate	8039990
1x Tool set	539767
1x Pipe and tubing cutter	7658
Commissioning service	On request

General training content

→ Page 445

Learning content for project work

All training content of the individual stations apply. It is supplemented with the following training content:

- Showing dependences in a water circuit
- Increasing the degree of complexity by networking systems
- Identifying interactions of hydraulic flow and delivery rate beyond the limits of the station
- Getting to know the importance of different pressure zones in a water supply network

Technical data

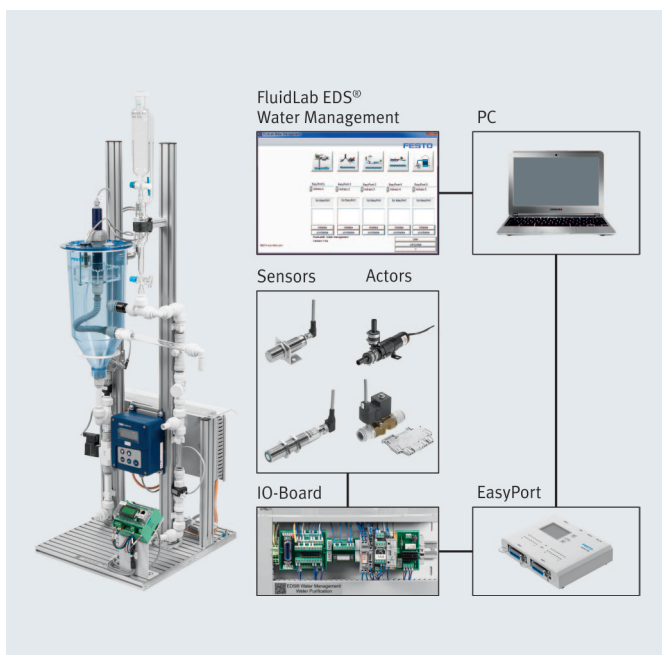
- Operating pressure: 4 – 6 bar (50 l/min)
- Water (30 – 40 l)
- Power supply: 24 V DC
- Dimensions (H x W x D): 2760 x 1150 x 400 mm

Recommended training media

- Workbooks EDS® Water Management
- Water Treatment
 - Water Supply
 - Wastewater Transport
 - Wastewater Treatment
 - Monitoring, Control and Optimisation
 - Energy Optimisation
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- WBT Open- and Closed-Loop Control
- WBT Process Automation



Trolley with plate

Stable sheet steel construction with table plate. Dimensions (W x H x D including rollers to bottom edge of profile plate): 700 x 770 x 700 mm

Order no.	8039990
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Compressor

Oil-lubricated, extremely quiet (45 dB (A)) compressor. Ideally suited for use in classrooms. With pressure regulator and water separator.

230 V	91030
100 – 120 V	565440

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