**Project: Gardabani WWTP**

**FLOTTWEG DECANTER X5E-4/454 Xelletor with SP4.12**



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# Technical description



**Separation Task:**

Dewatering of primary sludge without digestion

Feed rate: 45 m³/h

Concentration inlet: 4%

Volatiles content: <68%

Dry solid after dewatering: 25%

**Item 1 Dewatering decanter centrifuge**

### 1 off FLOTTWEG decanter centrifuge X5E-4/454 Xelletor with SIMP-DRIVE® SP 4.12

For highest and most efficient possible dewatering of sludge.

Horizontal, cylindrical/conical solid bowl centrifuge **in super-deep pond design with open scroll**, for the continuous dewatering of sewage sludge.

The clarified liquid phase flows to the cylindrical end of the bowl. The dewatered solids are conveyed to the conical end of the bowl where they are discharged through ports via centrifugal force.

**Technical data:**

 Bowl ID 570 mm

Diameter/length ratio 1 : 4 Cone angle 17.5°

 Volume approx. 400 ltr.

 Length/width/height approx. 4100 x 1550 x 1200 mm

 Weight approx. 5400 kg

 Bowl speed 3250 rpm (variable)

 Max. acceleration factor ≥ 3340 x g

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| Differential speed  | 0.5 - 10 rpm (variable)  |
| Nom. scroll torque   | 13000 Nm  |
| **Scroll design**  | **Flottweg Xelletor** Lattice structure based open super-deep pond scroll design. Flottweg Xelletor is the latest state of the art design in decanter scroll engineering. The scroll design merges the infeed chamber and pond surface, thus those parts form one unity. Thereby feed flow will be gently applied directly on the pond surface which leads to lower energy and polymer consumption  |

###  Recuvane® System

Thanks to the special construction of the RECUVANE**®** system the centrate can be discharged in a specific way allowing to recover kinetic energy. This energy is utilized to support the main drive. This can reduce the consumed power for the main drive motor by 10 to 20% depending on the pond depth and the suspension.

### Materials

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| Product wetted  | Cast **duplex** stainless steel 1.4463  |
| supporting bowl parts:  | with improved grade (equal to SAF 2205)  |
| Scroll:  | Cast stainless steel  |
|   | 1.4408 and 1.4571 / 1.4404  |
|   | (equal to CF-8M and 316 Ti / 316 L )  |
| Other product wetted  | stainless steel 1.4571 / 1.4404 or similar  |
| component parts:  | (equal to 316 Ti / 316 L )  |
| Belt guard:  | chrome steel, powder-coated  |
| Other, not product wetted component parts:    | carbon steel, painted  |
| **Drive system**  | **Flottweg SIMP-DRIVE®**  |
| Bowl drive  | Electric motor with V-belt drive. Initial and operating speed settings via frequency inverter (Inverternot included in this item – please see item Control panel, if it is part of the offer).  |

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| Scroll drive **Wear Protection**  | Co-rotating, multi-stage planetary gear with electric motor and V-belt drive. A special coupling step within the gear enables entirely independent operation of the scroll drive from the bowl drive. The gear is easily accessible, and is mounted away from the bearing blocks and the process area. Differential speed and overload cut-out are electronically controlled by scroll torque feedback via an analogue signal from the frequency inverter (Inverter and control not included in this item – please see item Control panel, if it is part of the offer).  |
| Scroll flight:  | The leading edges of the scroll flight are protected with heat applied tungsten carbide spray  |
| Bowl inside:  | Tack-welded stainless steel strips in longitudinal direction  |
| Bowl outside:  | Tungsten carbide stripes  |
| Solids discharge:  | Ports are protected with hard metal wear bushings  |
| Solids housing:   | Protected with PU-liner  |
| Feed area: | Wear reduced acceleration zone due to plunged lattice structure.  |

All wear bushings, hard metal wear segments, and wear liners in the solids housing are replaceable on site.

**Lubrication**

### Automatic central grease lubrication system

The automatic central grease lubrication system supplies grease to both rotor main bearings via a progressive distributor. The lubricant supply is monitored by a sensor on the progressive distributor. The lubricant quantity will be determined by the duration of working intervals. The supply bin has a capacity of 2 kg and is equipped with a level sensor.

The scroll bearings are sealed-for-life.

### Housing

Horizontally segmented housing

Cover sealed with a shaped flexible gasket

### Sealing system

Both shaft ends of the rotor are sealed with labyrinth seals.

Scroll bearings are provided with slide ring seals.

Static seals: NBR

### Sound insulation

The centrifuge is provided with sound insulation.

The rotor cover is double-walled and filled.

### Painting

in accordance with Flottweg specification "Surface protection for Flottweg Decanters" colour RAL 5007 – brilliant blue colour RAL 7011 – iron grey

colour RAL 9006 – white aluminium

**Covers**

Drive belt guard is designed in accordance with EN guidelines.

### Rotor base

Welded carbon steel design with rubber isolators mounted underneath the rotor base to dampen vibration induced movement.

### Instrumentation

Differential and bowl speed

Main bearing temperature

Vibration

### 1 off Electrical drive motor for bowl

 Design: in accordance with European Guidelines

 IEC 60034

 Rated output: 45 kW

 Voltage/frequency: 400 V / 50 Hz

 Speed: 1500 min-1

 Enclosure: IP 55

 Temperature protection: 3 PTC-thermistor sensors

 Starting: frequency converter

 (not included in this item)

### 1 off Electrical drive motor for scroll

 Design: in accordance with European Guidelines

 IEC 60034

 Rated output: 15 kW

 Voltage/frequency: 400 V / 50 Hz

 Speed: 1500 min-1

 Enclosure: IP 55

 Temperature protection: 3 PTC-thermistor sensors

 Starting: frequency converter

 (not included in this item)

###  Tools

Standard tool in tool box for regular service and operation works. Standard mounting/dismantling device (bearing puller)

**Lubrication material**

Lubrication material for first replacement filling of the offered unit.

**Item 2 Control Panel**

1 off **Module control cabinet**

 **a. Basic configuration**

###  Electrical control cabinet

 Dimensions (WxHxD): 1200 x 1800 x 500 mm

 Base height 100mm

 Housing: Painted carbon steel RAL 7035

 Operating voltage: 400 V / 50 Hz

 Control voltage: 24 VDC / 230 VAC

 Power feed: TN-C (L1, L2, L3, PE )

 Cable entry: from below

 Protection class: IP54

###  Building and testing regulations

 Electrical equipment: DIN EN 60204-1

 Low voltage directive: 2014/35/EU

 Electromagn. compatibility directive: 2014/30/EU

###  List of components

 Control cabinet housing: ELDON

 Control: ET 200SP CPU 1510-F

 (Programmcode Siemens TIA)

 IO-System: SIEMENS ET200SP

 Contactors: EATON

 Emergency stop module: PILZ

###  Other electrical control cabinet components

 Indicator lamps: "control voltage ON" / "fault indication active"

 Overspeed monitoring (safety function)

 Vibration monitoring (safety function)

 Spare connection (230 VAC) for signal horn or flash light

 Control differential speed

**b. Main components**

 Frequency converter type: ABB ACS 580

###  Drives

 1x Decanter Bowl-Drive 45 kW

 1x Decanter SIMP-Drive 15 kW

 1x Solids diverter gate (elektr. mit "AUMA"-Antrieb) 0,4 kW

###  Machine equipment

 1x Autom. grease lubrication (Decanter) 0,75 kW

 1x SIMP-Drive air cooled

 1x Measurement Decanter (Speed monitoring, vibration)

 1x Bearing temp. Decanter

###  Plant equipment

 1x motor-driven valve Feed 24 V

 1x motor-driven valve Solids Diverter 24 V

### c. Signal exchange

 Type: Dry contact

 Output: Common alarm signal

 Release product feed

 Request solids output

 4 programmable contacts

 Input: Discharge OK

 External start

 Product feed operation Fault polymer station Fault flocculant min. Release centrate

 1 programmable contacts

### d. Control cabinet ventilation

 To properly cool the control cabinet a filtered fan is installed in

the door. This blows surrounding air directly into the control cabinet. An appropriately-sized outtake filter is provided to return the heated air to the surrounding environment.

 Temperature range required: 5 - 30 °C

 For other temperature ranges or special environmental conditions (SO4 or H2S pollution, salty atmosphere) a control cabinet ventilation is not allowed.

### e. Remote Access (eWON COSY)

 Installation of a Hardware Remote Access. Access to network only with permission by customer. An unauthorized access by Flottweg or a third party is not possible. The Remote Access can be disconnected at any time by an electrical contact (actuated by the Touch Panel).

 Access mode: WLAN

1. **Operator panel**  Touch Panel Line F 12"

 

 Display: 12'' wide screen (16:9)

 Display surface: plastics front

 Protection class: IP65

 Surrounding conditions:

 Temperature: 0°C - 40°C

 UV-consistent: no

 ATEX Area 1 / 2: no

 Extended vibrational resistance: no

1. **Connection to a BUS system**  Available BUS connection: Profibus

 Communication type: 64 Byte read and 64 Byte write

 *The following signals will be provided as read data:*

 Analog messages (REAL-data): Bowl speed

 Differential speed

 Scroll torque

 Power consumption bowl

 Bearing temperature

 Number of revolutions

 Vibration

 Emptying times

 Energy consumption

 Bit messages (BOOL-data): Relevant alarms

 *The following signals will be provided as write data:*

 Analog messages (REAL-data): Bowl speed

 Bit messages (BOOL-data): Start / Stop Decanter

 Deviation from standard signal exchange only after consultation and at extra costs!

 **Additional documentation will be provided in the control panel**  Following documentation will be provided in a printed form.

 Optionally this documentation can be provided electronically in .pdf format

 1 x Wiring diagram and control panel layout

 1 x Parts list of all devices

 1 x Terminal layout

 1 x Parameter lists for configured devices 1 x Functional description of operator panels if provided by Flottweg

 1 x Operating manual

 1 x Cable list (as necessary)

### Appendix: General information about the offered cabinet

 **Environmental requirements (control cabinet):**

 Temperature: Depends upon cabinet cooling

 No direct sunlight

 Installation: Indoor

 Limits according to EN 60721-3-3 class 3C2 (chemically-active):

 SO2 Sulphur dioxide: < 0,37 cm³/ m³ (ppm)

 H2S Hydrogen sulfide: < 0,36 cm³/ m³ (ppm)

 NH3 Ammonia: < 4,2 cm³/ m³ (ppm)

 NOx Nitrogen oxides: < 0,52 cm³/ m³ (ppm)

 **Limits according to EN 60721-3-3 class 3K3 (climatic):**

 Low relative humidity: 0,05

 High relative humidity: 0,85

 Low absolute humidity: 1 g/m³

 High absolute humidity: 25 g/m³

 Low barometric pressure: 70 kPa

 High barometric pressure: 106 kPa

 **Limits according to EN 60721-3-3 class 3M1 (mechanical):**

 Displacement: 0.3 mm (from 2 to 9 Hz)

 Acceleration: 1 m/s² (bei 9 bis 200 Hz)

 **Notes regarding electromagnetic compatibility (EMC):**

 The equipment is qualified for use in an industrial environment according to EN 61800-3 category C 3.2 CE. It is not intended for use in a public low-voltage network that also supplies residential areas. residential areas.

 High-frequency interference is to be expected if it is used in such a network. Additional interference suppression measures may be required.

 Requirements for the power supply:

 Power quality according to **DIN EN 61000-2-4**

 Overvoltage resistance according to **DIN VDE0100 Part 443A (Cat. II)**

 **Terminal connections / exemptions:**

 The main power feed to the control cabinet and the connections to the terminals are not included in this offer. Verification and acceptance of the electrical installation at the customer site will be according to the local regulations and are the responsibility of the customer.

 Specific requirements, such as remote connection, customer-requested devices, stainless steel or fiberglass housing, different paint colors, conductor colors and customer review of design, can also be taken into account; please contact us for further technical and commercial considerations.

**Item 3 Flexible connectors**

### 1 off Flexible connectors for

* Sludge feed piping
* Centrate discharge piping

Condensate drain

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| **Item 5**  | **Packing, freight and insurance**  |
|   | **CIP Gardabani** – INCOTERMS **2020, ICC**.  |
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| **Item 7**  | **Solids diverter gate**  |
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| 1 off  | **Solids diverter 8307.1**  |
|   | **Actuator drive AUMA-Norm SA07.6, 0,4kW (400V/50Hz)**  |

during flushing procedure and start or slowdown of the centrifuge, liquid may flow over on solids discharge. To avoid recontamination of dry solids, we recommend the use of our solids diverter.

###  For further information please see

