



better together

# ATEX<sup>Ex</sup>

**LIFTING AND MOVING WASTEWATER**

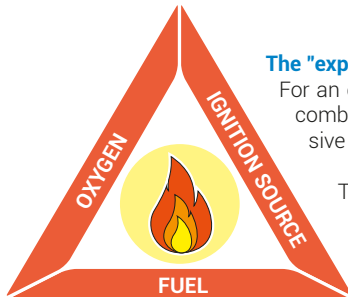
**IN POTENTIALLY EXPLOSIVE ENVIRONMENTS**

APPLICATION BOOKLET

## What is ATEX?

**ATEX** stands for "**AT**mosphere **EX**plosive", that is **explosive atmosphere**.

An "explosive atmosphere" is a mixture with air/oxygen of flammable substances in the gas, vapour, mist or dust state in which the combustion can spread to the unburned mixture after ignition under certain atmospheric conditions.



### The "explosion triangle"

For an explosion to occur, an **ignition source** must be present and the flammable and/or combustible substance must have an **airborne concentration** between the lower explosive limit (LEL) and the upper explosive limit (UEL).

These two parameters identify the explosion range, i.e. the concentration range within which the flammable mixture can explode.

## ATEX Directives

Safety in potentially explosive workplaces is governed at European level by two directives: **ATEX 2014/34/EU** (*product directive*) and **ATEX 99/92/EC** (*social directive*). The first sets out the requirements of the products (including their components) and the second identifies where they can be used.



### ATEX Directive 2014/34/EU

This directive sets out the requirements and procedures for **conformity** assessment of **ATEX equipment** and **identifies the obligations and responsibilities of economic operators** (manufacturers, authorised representatives, importers and distributors) who place it on the European market.

The CE and Ex markings identify the conformity of the equipment with the requirements of the directive.



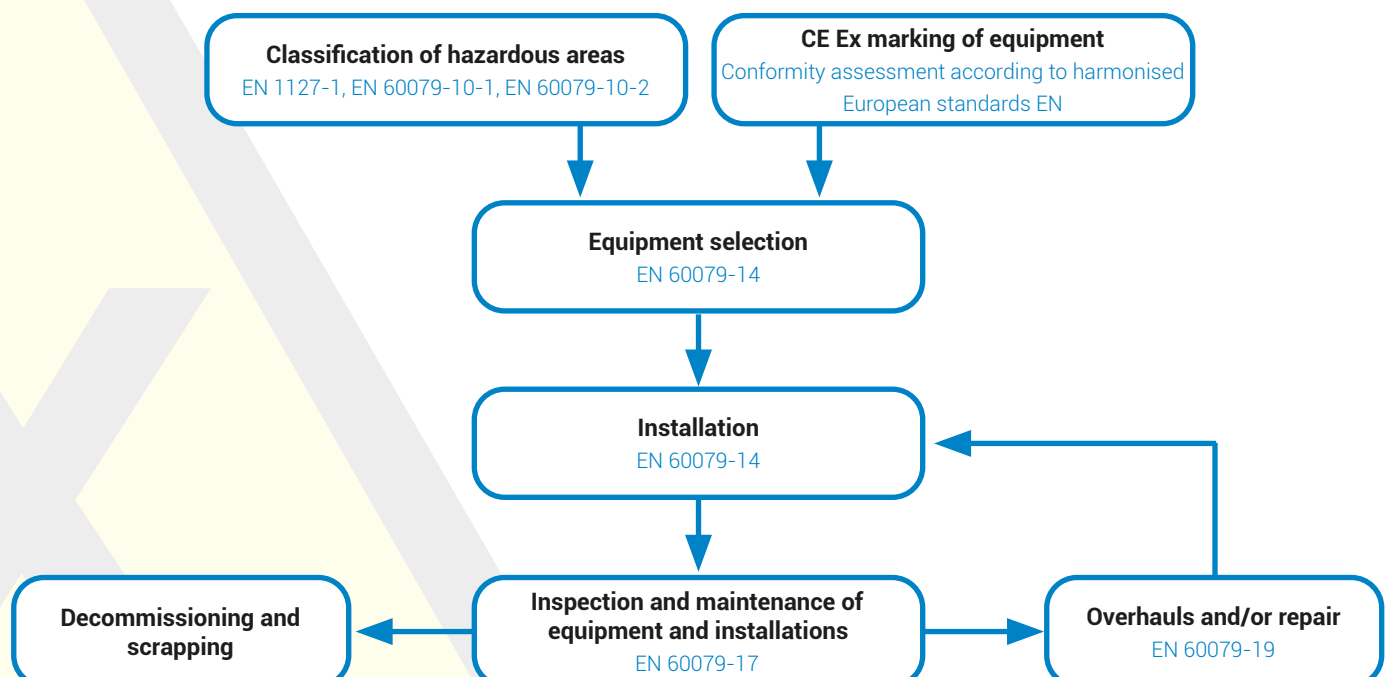
### ATEX Directive 99/92/EC

This directive identifies the **employer's obligations** and indicates the requirements for the **protection of the safety and health of workers** who may be exposed to the risk of explosive atmospheres in the place where the equipment is installed.

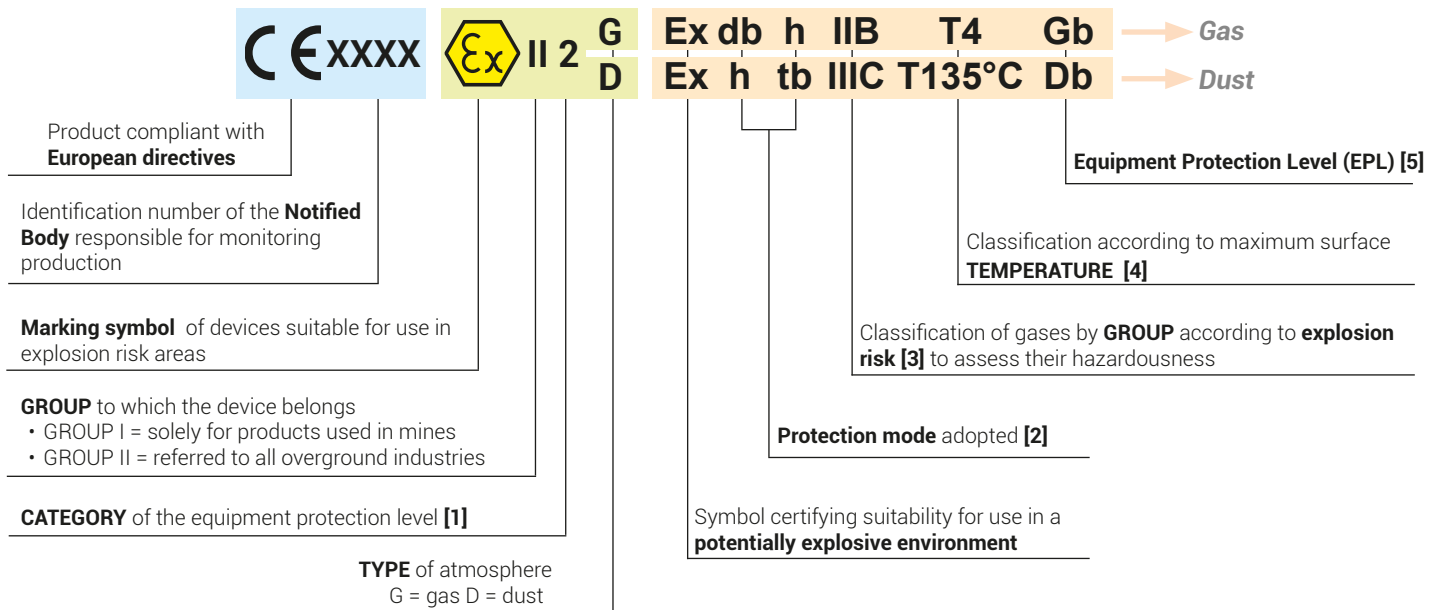
## The EN 60079 series standards

The harmonised standards of the **EN 60079** series are the most relevant technical reference for verifying conformity with ATEX directive requirements. The standards of this series cover a wide range of aspects important for potentially explosive atmospheres: general requirements of equipment, intrinsic safety equipment, various protection methods, characteristics of materials, criteria for designing, selecting and installing systems and electrical components, testing and maintenance, overhauls, repairs and decommissioning.

A system is defined for the classification of areas and the corresponding suitability of the equipment according to the category and the equipment protection level (EPL) guaranteed by the adopted construction methods.



# The ATEX marking string

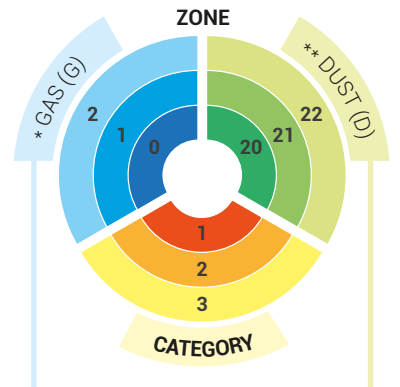


### [1] CATEGORIES IN GROUP II of the equipment protection level

- 1 PERMANENT risk:** VERY HIGH protection level
- 2 OCCASIONAL risk:** HIGH protection level
- 3 UNLIKELY or SHORT LASTING risk:** NORMAL level of protection

### PROTECTION of equipment

Type	Suitable for area:	
	GAS	DUST
<b>1G</b> <b>1D</b>	0	20
<b>2G</b> <b>2D</b>	1	21
<b>3G</b> <b>3D</b>	2	22



**\* GAS (G)**

- **Zone 0** - Area in which it is permanently present
- **Zone 1** - Area in which it is likely
- **Zone 2** - Area in which it is unlikely or of short lasting

The formation of an explosive atmosphere consisting of a mixture of air and flammable substances in the form of gas, vapour or mist.

**\*\* DUST (D)**

- **Zone 20** - Area in which it is permanently present
- **Zone 21** - Area in which it is occasionally likely
- **Zone 22** - Area in which it is not likely

the formation of an explosive atmosphere in the form of a combustible cloud of dust in the air.

### [2] PRODUCTION MODE

**Electrical part**

**GAS**  
**d:** Explosion-proof housing  
**p:** Pressurisation  
 ...

**DUST**  
**t:** Protection by means of housing  
**p:** Pressurisation  
 ...

**RISK index**  
**a:** PERMANENT  
**b:** OCCASIONAL  
**c:** NOT LIKELY

**NON-electrical part**  
**h:** marking code -Ex. Type of protection "c - constructive safety" and/or "b - ignition source control" and/or "k - immersion in liquid"

**Example**  
**db h** = Electrical protection mode by explosion-proof housing (GAS) (d) for occasional frequency hazard (b)  
 Protection mode of the non-electrical part "h"

### [3] Classification of gases by GROUP according to explosion risk

- Group I - Methane
  - IIA - propane
- Group II - GAS explosive atmospheres
  - IIB - ethylene
  - IIC - hydrogen/acetylene
- Group III - DUST explosive atmospheres
  - IIIA - combustible dust
  - IIIB - non-conductive dust
  - IIIC - conductive dust

### [4] Temperature CLASS

Maximum temperature that can be reached (but not exceed) on the surface of the device

	T1 = max. 450°C	T3 = max. 200°C	T5 = max. 100°C
<b>GAS</b>	T2 = max. 300°C	T4 = max. 135°C	T6 = max. 85°C
<b>DUST</b>	T...°C		

### [5] EQUIPMENT PROTECTION LEVEL (EPL)

GAS			DUST		
Zone	Category	EPL	Zone	Category	EPL
0	1G	Ga	20	1D	Da
1	2G	Gb	21	2D	Db
2	3G	Gc	22	3D	Dc

# Zenit solutions for the ATEX world

## ZU Series



### Submersible electric pumps with a motor in Premium IE3 efficiency class

Designed for use in sewage treatment plants, lifting stations in civil, industrial and municipal installations. These devices are suitable for the lifting and handling of sludge, faecal material and clean water, waste water and water fouled with solid or fibrous bodies. The models with ATEX certification are suitable for use in potentially explosive atmospheres as indicated by the -Ex marking string.

### ATEX range

- WET version (submerged installation):  $P_2 = 0.55 - 160$  kW
- DRY version (semi-submersible or dry installation):  $P_2 = 3 - 145$  kW

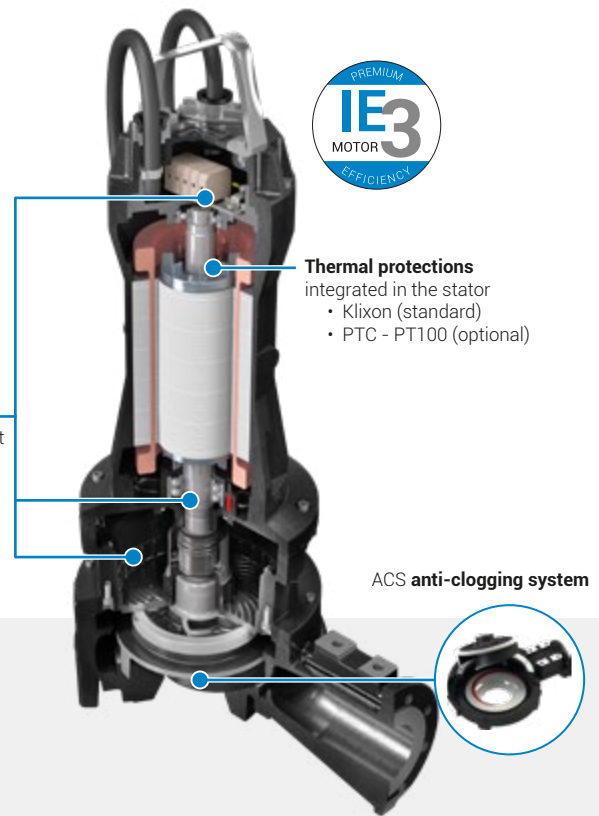


In **DRY version** models, the motor is cooled by a water and glycol mixture that circulates in a special closed circuit.

### Models

- ZUG V** vortex impeller with full free passage
- ZUG CP** with shredding system
- ZUG OC** channel impeller and wide free passage
- ZUG HP** with high head
- ZUG GR** with shredding system

- Water infiltration probes**
- terminal board compartment (optional)
  - motor (optional)
  - oil chamber (standard)



### Specifications

- Cast-iron casing
- Insulation class H (180°C)
- IP 68 protection rating
- AISI 431 drive shaft
- Two SiC mechanical seals in the oil chamber
- DN50 - DN500 delivery

### Marking string

<i>WET version models</i>		<b>2460</b>		<b>Ex db h IIB T4 Gb</b>
<i>DRY version models</i>		<b>2460</b>		<b>Ex db h IIB T4 Gb</b> <b>Ex h tb IIIC T135°C Db</b>

	Product complies with European standards
<b>2460</b>	Identification number of the Notified Body responsible for monitoring production (DNV Nemko Presafe AS)
	Specific explosion protection marking according to Annex II of ATEX Directive 2014/34/EU
<b>II</b>	Electrical equipment for use in potentially explosive atmospheres due to the presence of gas, other than mines
<b>2G</b>	Suitable for potentially explosive atmospheres due to the presence of gases, vapours, mists (G). Installation permitted in ZONE 1
<b>2GD</b>	Suitable for potentially explosive atmospheres due to the presence of gases, vapours, mists (G) and dust (D). Installation permitted in ZONE 1 and ZONE 21
<b>(GAS)</b>	<b>Ex</b> Equipment suitable for use in potentially explosive environment
	<b>db</b> Electrical protection mode used: "db" explosion-proof housing
	<b>h</b> Mechanical protection method used: immersion in liquid "k" and constructive safety "c" (marking -Ex: "h")
	<b>IIB</b> Suitable for Group IIB and IIA gases
	<b>T4</b> Maximum surface temperature 135°C
<b>Gb</b> Equipment with "high" level of protection (EPL Gb), suitable for use in ZONE 1	
<b>(DUST)</b>	<b>Ex</b> Equipment suitable for use in potentially explosive environments
	<b>h</b> Mechanical protection method used: immersion in liquid "k" and constructive safety "c" (marking -Ex: "h")
	<b>tb</b> Electrical protection mode used: "tb" housing
	<b>IIIC</b> Suitable for Group IIIC, IIIB and IIIA dust
	<b>T135°C</b> Maximum surface temperature 135°C
<b>Db</b> Equipment with "high" level of protection (EPL Db, suitable for use in ZONE 21)	

## Grey series

# Grey

### Versatile and compact submersible electric pumps

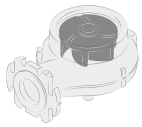
Used for drainage and lifting groundwater and first rainwater, lifting fouled biological liquids and sewage in civil and industrial plants, wastewater treatment plants and process water also containing fibres or filamentous bodies, livestock farms.

The models with ATEX certification are suitable for use in potentially explosive atmospheres as indicated by the -Ex marking string.

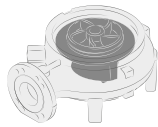
### ATEX range

- WET version only (submerged installation):  $P_2 = 0.55 - 18.5 \text{ kW}$

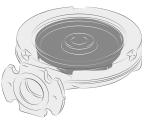
### Models



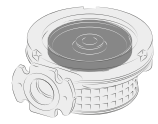
**DGG**  
vortex impeller with full free passage



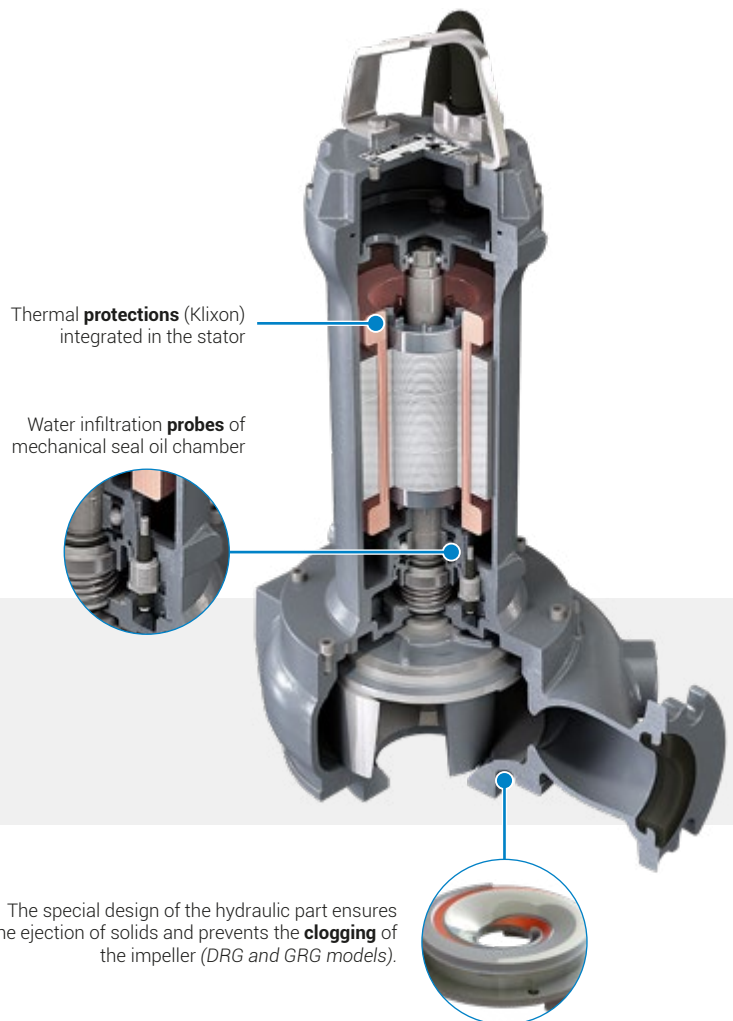
**DRG**  
channel impeller and wide free passage



**GRG**  
with shredding system



**APG**  
with high head



### Specifications

- Cast-iron structure
- Insulation class H (180°C)
- IP 68 protection rating
- AISI 431 drive shaft
- Two SiC mechanical seals in the oil chamber
- DN32 - DN250 delivery

### Marking string



<b>CE</b>	Product complies with European standards
<b>2460</b>	Identification number of the Notified Body responsible for monitoring production (DNV Nemko Presafe AS)
<b>Ex</b>	Specific explosion protection marking according to Annex II of ATEX Directive 2014/34/EU
<b>II</b>	Electrical equipment for use in potentially explosive atmospheres due to the presence of gas, other than mines
<b>2G</b>	Suitable for potentially explosive atmospheres due to the presence of gases, vapours, mists (G). Installation permitted in ZONE 1
<b>Ex</b>	Equipment suitable for use in explosive environments
<b>db</b>	Electrical protection mode used: "tb" explosion-proof housing
<b>h</b>	Mechanical protection method used: immersion in liquid "k" and constructive safety "c" (marking -Ex: "h")
<b>IIB</b>	Suitable for Group IIB and IIA gases
<b>T4</b>	Maximum surface temperature 135°C
<b>Gb</b>	Equipment with "high" level of protection (EPL Gb), suitable for use in ZONE 1



## ZM Series

# Mixer

### Mixers with a motor in Premium IE3 efficiency class

The **ZM (Zenit Mixer) series** of submersible mixers is the most practical and efficient solution for mixing liquids in industrial and municipal wastewater treatment plants, sludge treatment, industrial processes and farming.

The motors in IE3 efficiency class, already applied to the **Zenit UNIQA** range of submersible pumps, reduces running costs with better energy efficiency and limited maintenance.

### ATEX range

- Direct transmission models:  $P_2 = 0.75 - 4.5$  kW
- Reduction gear transmission models:  $P_2 = 4.0 - 7.5$  kW

### Models



#### ZMD

Motor 0.75 - 4.5 kW - 4, 6, 8 poles  
Direct transmission  
Impeller Ø 200, 300, 400 mm



#### ZMR

Motor 4.0 - 7.5 kW - 4 poles  
Transmission with reducer  
Impeller Ø 650 mm

Robust **planetary gearbox** providing high reduction ratios with limited size and weight, transferring high torque and bearing considerable radial loads (*only on ZMR models*).

Water infiltration **probe** of mechanical seal oil chamber

AISI 316 cast steel **propeller**, designed with a special blade profile to obtain high hydraulic efficiency and avoid clogging.

Temperature **sensors**

- Klixon (standard)
- PTC - PT100 (optional)



### Specifications

- Cast-iron structure
- Bearings self-lubricated for life
- AISI 431 drive shaft
- Infiltration monitoring system in sealed compartment and motor
- Two SiC mechanical seals in the oil chamber
- Working temperature up to 40°C (up to 60°C on demand)

### Marking string (\*)



Ex db h IIB T4 Gb

**CE** Product complies with European standards

**2460** Identification number of the Notified Body responsible for monitoring production (DNV Nemko Presafe AS)

**Ex** Specific explosion protection marking according to Annex II of ATEX Directive 2014/34/EU

**II** Electrical equipment for use in potentially explosive atmospheres due to the presence of gas, other than mines

**2G** Suitable for potentially explosive atmospheres due to the presence of gases, vapours, mists (G). Installation permitted in ZONE 1

**Ex** Equipment suitable for use in explosive environments

**db** Electrical protection mode used: "tb" explosion-proof housing

**h** Mechanical protection method used: immersion in liquid "k" and constructive safety "c" (marking -Ex: "h")

**IIB** Suitable for Group IIB and IIA gases

**T4** Maximum surface temperature 135°C

**Gb** Equipment with "high" level of protection (EPL Gb), suitable for use in ZONE 1

## Applications



Accidental damage caused by explosions or uncontrolled combustion with the release of toxic and harmful substances is a serious danger for workers as well as posing a threat to the environment.

The formation of potentially explosive atmospheres is a problem mainly in the industrial sector (chemical, metallurgical, mechanical, food) and energy supplies (gas, oil, coal, etc.) but is also related to all production activities involving the use of combustible materials or flammable gases.

Zenit can offer a wide range of equipment for moving and lifting liquids certified for use in potentially explosive atmospheres with a high level of protection (Group II - Category 2).

### Chemical and manufacturing industry

- Pumping of clear water and wastewater in the chemical and metallurgical sector
- Paint and solvent production plants
- Industrial processes of washing and recirculation in paper mills, tanneries, sawmills and plastics production

Chemical plant in which the lifting of water contaminated by flammable elements required the use of pumps **UNIQA series** with ATEX certification.



### Petrochemical and mining industry

- Transfer of hydrocarbon contaminated liquids into oil production and processing industries
- Lifting of contaminated liquids in extraction plants and oil rigs
- Emptying into unconfined explosion hazard areas even at room temperature due to the presence of flammable vapour clouds

Marine drilling rig for natural gas extraction. The system required the installation of high-efficiency pumps **UNIQA series** in -Ex version for conveying contaminated liquids

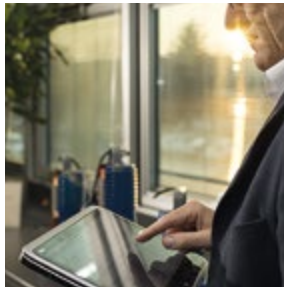


### Biogas and power plants


- Wastewater lifting in biogas plants
- Conveyance of polluting liquids and leachate in waste treatment and disposal processes
- Water treatment plants of power plants in areas at risk of explosive combustion due to pressurised gases for turbine power supply

Biogas production plant equipped with **Grey series** electric pumps in ATEX version installed in environments saturated with flammable vapours.





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