



E Compressor 300L



E Compressor 600L



E Compressor 800L

# Usermanual - E Compressor

100% oil free breathing air ATEX Sone 1



3 models : E Compressor 300L, 600L og 800L

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We recommend reading this manual before putting the E Compressor and additional equipment into operation. To ensue correct handling, safe execution and proper maintenance from the beginning.

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## 1 OPERATING INSTRUCTIONS E COMPRESSOR

For operators and users of the E Compressor.

This instruction manual describes the use of the E Compressor to ensure safe operation, optimal efficiency, and long operating time for the equipment. Additionally, the equipment is supplied with a pocket format user manual for the operator to keep during operation. The small user manual describes error codes, explanation, and solutions on how to proceed if an alarm goes off.

The user manual should be available to operators to ensure safe operation and that maintenance is carried out according to instructions.

This manual is common for all E Compressor models. The small «handbooks» as displayed in the pictures below, is unique to each model. The pocket manuals are packed in the aluminum box following the unit.

Repairs should be carried out by a service technician from E Innovation AS, contact us for additional information.

Please let us know the serial number of the E Compressor in your correspondence with us.

**The company reserves the right to make changes to this document without notice.**



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## 1. Introductory Information

### 1.1 General Description

The E Compressor is an oil free, air-cooled breathing air compressor developed for Atex Zone 1. Air is supplied from a suitable area with a flexible hose attached to the air inlet on the compressor. There is a gas detector at the air inlet. The compressed air is filtered in accordance with the requirements of the standard NS EN 12021. The E Compressor is built according to Norsok Z-015 Temporary Equipment, and ATEX zone 1 certified.

### 1.2 Operating Panel

There are four buttons on the operating panel (1) and a digital display (2). The digital display will indicate breathing air values and any kind of errors. A high-pressure manometer 0-400bar (3) to be able to monitor the pressure in the bottle for evacuation air. A manometer 0-10bar (4) for tank pressure and 2-4 x rectus 96 air outlets (5) for two or four users are mounted on the panel.

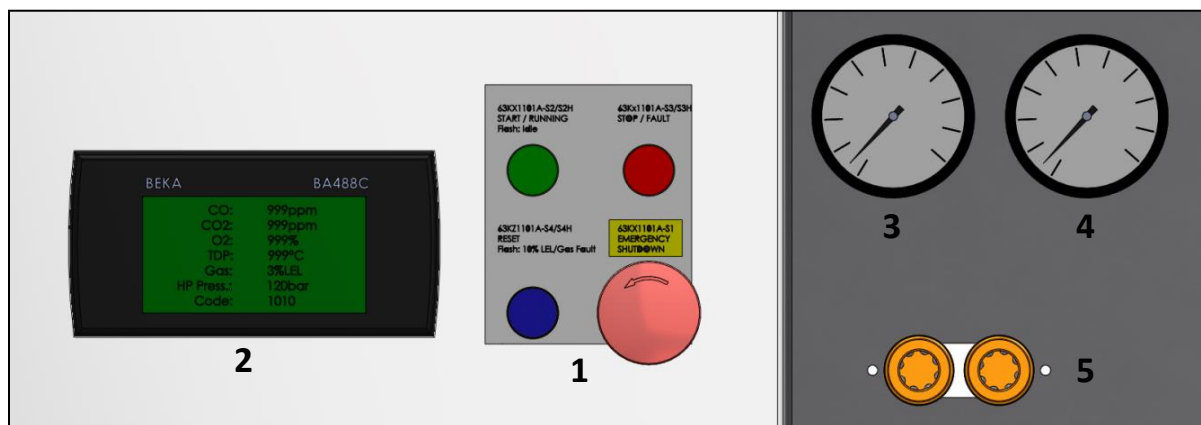


Figure 1 Operation panel

The unit is operated by buttons on the front panel. The digital display shows air quality values and status codes. Any error or deviation of the values are indicated by an error code, a status light and alarm.

## The meaning of light signals in switches on the operating panel

### Green Light:

- ✓ Constantly lit when engine is running
- ✓ The light will flash when the system is powered even when the engine is not running

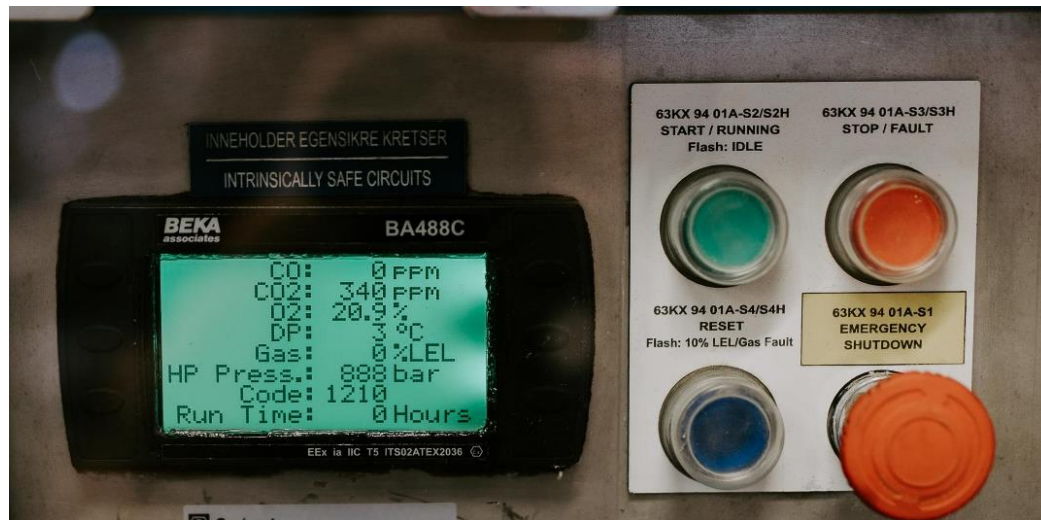
### Red Light:

- ✓ Constantly lit with the following faults
  - Emergency stop activated
  - Gass detector wire break or gas detector fault
  - Gass > 10% LEL detected
  - Engine overload
  - Stop switch activated
  - Temperature sensor detected too high temperature
  - Wirebreak on some of the pressure readers
  - Low pressure on HP evacuation air bottle
  - Alarm from CO-sensor – over 5ppm
  - Alarm from CO<sub>2</sub>-sensor – over 500ppm
  - Alarm from O<sub>2</sub>-sensor – O<sub>2</sub> level is 20,9Vol. % + - 0,5
  - Alarm from DP-sensor – humidity measured in the breathing air
  - Fault in power supply, low current and / or lost phase

### Blue Light:

- ✓ Indicate the following errors
  - Gas 10% LEL detected
  - Dirt / dust on optics for gas detector

## Example of information in the display



Figur 2 Display indicating system status (picture may deviate from your model)

The code value (CODE) indicates the status of the E Compressor. At startup code **1433** shows for approximately 5 minutes. When the system is ready for use, code **1010** is displayed. The first two digits say something about the backup air system, the next two digits indicates the status on other parts of the unit.

## Codes for E Kompressor 300L/600L

### Code key; first two digits in CODE (status of the High-Pressure bottle)

10	HP OK	HP bottle has a minimum pressure of 150bar
12	HP Activated	The high-pressure valve is activated for use
13	HP Low pressure	Pressure too low; should be minimum 150 bar
14	HP Delay	5 minutes start-up time to activate system

### Code key; last two digits in CODE

10	OK
12	Power supply fault
13	Emergency stop (emergency stop activates evacuation air in case of pressure drop below 4bar)
14	Switch / fuse fault
15	Motor overload
16	Gas 10% LEL
17	Gas 30% LEL (only when 30% LEL is activated)
18	CO gives alarm at 5ppm, shutdown at 10ppm over 1 minute duration
19	CO <sub>2</sub> alarm at 500 ppm, shutdown at a value higher than 1000 ppm after 1 min
20	O <sub>2</sub> if the limit has been exceeded 20,9% vol. + - 0,5% vol.
21	DP – atmospheric dew point alarm by -10°C and shutdown at -5°C
22	High temperature on compressor element
23	Dirty optics on gas detector – glass and mirrors have to be cleaned
25	Cable break gas detector
26	Cable break temperature sensor
27	Cable break pressure transmitter- filter
28	Cable break pressure transmitter - tank pressure
29	Cable break pressure transmitter - HP air bottle pressure
30	Pressure drop in filter, too high differential pressure between filter and tank
31	H <sub>2</sub> S (Shutdown >10PPM) (Optional equipment to be ordered separately)
32	Wirebreak H <sub>2</sub> S (Optional equipment to be ordered separately)
33	Purge Delay 5 min
34	Gas Detector 1 min delay

## Codes for E Kompessor 800L

### Code key; first two digits in CODE (status of the High Pressure bottle)

10	HP OK	HP bottle has a minimum pressure of 150bar
12	HP Activated	The high-pressure valve is activated for use
13	HP Low pressure	Pressure too low; must be minimum 150 bar
14	HP Delay	5 minutes start-up time to activate system

### Code key; last two digits in CODE

10	OK
11	Power supply fault
12	Emergency stop (emergency stop activates evacuation air in case of pressure drop below 4bar)
13	Switch / fuse fault
14	Motor overload
15	Gas 10% LEL
16	Gas 30% LEL (only when 30% LEL is activated)
17	CO gives alarm at 5ppm, shutdown at 10ppm over 1 minute duration
18	CO <sub>2</sub> alarm at 500 ppm, shutdown at a value higher than 1000 ppm after 1. min
19	O <sub>2</sub> if the limit has been exceeded 20,9% vol. + - 0,5% vol.
20	DP – atmospheric dew point alarm by -10°C og STOP -5°C
21	High temperature on compressor element1
22	High temperature on compressor element 2
23	Dirty optics gas detector – glass and mirrors have to be cleaned
24	Cable break gas detector
25	Cable break temperature sensor 1
26	Cable break temperature sensor 2
27	Cable break pressure transmitter - filter
28	Cable break pressure transmitter - tank pressure
29	Cable break pressure transmitter - HP air bottle pressure
30	Pressure drop filter, too high differential pressure between filter and tank
31	H <sub>2</sub> S (Shutdown >10PPM)
32	Wirebreak H <sub>2</sub> S
33	Purge Delay 5 min
34	Gas Detector 1 min delay



### 1.3 Air flow

The system is designed for two or four users, depending on the model and choice of masks. The air flow will maintain an average of 300L, 600L or 800L /min at 4,5-6,5 bar pressure.

### 1.4 Filtration of compressed air for breathing air

Six steps for filtering the compressed air:

1. A **cyclone water separator** removes most of the condensed water from the compressed air. Condensed water is automatically drained from the water separator and tank. Drainage valves are controlled by the system PLS.
2. **Grade AA** – High-power particle carbon filter – for removing oil/water mist and foreign particles down to 0.01 micrometers, gives a maximum remaining oil level of 0.01mg/m<sup>3</sup> if area air contains oil.
3. **Grade AC** – Adsorption filter, activated carbon – for removing oil vapor and odor. Downstream air after this step now has a maximum remaining oil level of 0.003mg/m<sup>3</sup> at filtration temperature of 20°C.
4. **Adsorption dryer** – self regenerated material for removing water vapor and at the same time for reducing the CO<sub>2</sub> content before the catalyst step. The drought retains a low dew point by utilizing the cold pressure fluctuation adsorption principle. The cycle time is controlled by means of two solenoid valves.
5. **Grade HC** – Catalytic element – for removal of carbon monoxide CO by oxidation to carbon dioxide CO<sub>2</sub> through chemical sorption and catalysis. The catalyst is maintained active by maintaining a low dew point level prior to this step. This is achieved by means of the integrated adsorption dryer (step 4).
6. **Grade AAR** – dusting – for removing particles and dust to 0.01 micrometers.

#### **Delivered Air quality:**

*Particle removal down to 0.01 micrometers*

*Oil mist less than 0.01 mg/m<sup>3</sup>*

*Oil vapor less than 0.003 mg/m<sup>3</sup>*

*Carbon dioxide less than 500ppm*

*Carbon monoxide less than 2ppm*

## **1.5 Air pressure regulation and evacuation air in the event of an alarm**

The E Compressor delivers air pressure of 4-8 bar at full operation. A pressure transmitter stops the compressor automatically when the internal pressure reaches 8 bar. If it is accidentally detected that the pressure drops below 4 bar, evacuation air will automatically be connected to supplement the users with approx. 20 minutes of breathing air per user (this depends on the type of mask, the user and the situation).

## **2 Installation and mobility**

### **2.1 Mobilization, internal lifting and moving**

Upon delivery, strapped to a euro pallet, the E Compressor should be lifted onboard the vessel in a DNV 2.7-1 certified container, basket or similar. The compressor is certified for internal lifting. The lifting rig supplied, is in accordance with the machine directive. In the workplace, the E Compressor can be rolled on the wheels even through narrow passages with only a 750mm opening. It's important to lock the wheels on the E Compressor when parked.

### **2.2 Installation**

Position the E Compressor air intake to allow for sufficient access to clean air. The air intake should not be placed in the immediate vicinity of exhaust from machines, exhaust fans or other equipment that can generate air pollution. If there is a lot of pollution in the area, use the 15 meter long flexible hose supplied with the equipment to get air from a more suitable area.

## 2.3 Installation

**At the workplace the E Compressor should be installed as instructed**



1. Place the E Compressor in a suitable working area, including ATEX Zone 1. Apply wheel breaks.
2. Earthing terminal is connected to a leveling connection. You will find it located with the HP air bottle.
3. Connect the power plug to a suitable socket.
4. Ensure access to fresh air from a suitable area with the 15m flexible hose (see image above).

### **Start procedure (5 minutes)**

1. Make sure that the HP air regulator is fully open and that there is a minimum of 150 bar pressure on the HP bottle. If the valve is closed or lacks pressure, the E Compressor will not start, nor will it deliver evacuation air.
2. Press the «start» button. The system purges for 5 minutes.

**When the E Compressor is ready for use code 1010 appears in the display.**

3. Connect breathing air hoses and masks. The E Compressor is ready for use. No breathing air hoses must be connected before code 1010 appears on the display.

### **Stop procedure**

1. Close valve on HP bottle
2. Press “Stop”-button  
**“Stop”-button will not activate evacuation air**
3. Disconnect hoses
4. Disconnect power plug
5. Disconnect grounding terminal

## 6. Disconnect the flexible hose

Emergency STOP button is only meant for emergencies, it will activate evacuation air from the bottle(s).



## 3 Safety

In any critical situation, panic and poor judgement, can result in improper use of systems and tools. The E Compressor is designed to be a safe supplier of breathing air in all situations. There is no need for an operator or hose guard to switch to evacuation air in situations of gas, engine failure, power outage or other causes of compressor shutdown. By adhering to the startup procedure, the E Compressor will supply evacuation air automatically.

### 3.1 High Pressure Evacuation air

The E Compressor has an internal reserve for evacuation air of 6,8 liters at 300 bar (two of these bottles in the 800L E Compressor). This evacuation-air will be provided for the users in any emergency as long as the hoses are not cut. When using full masks with a lung demand valve, a full bottle will last about 20 minutes for two users, or 40 mins for one user. With free flow masks the supply will be for a much shorter time, this is all depending on the type of mask used. The E Compressor cannot refill the HP bottle itself. The bottle has to be removed and brought to the fire station or similar for refill.

**IMPORTANT: attention must be paid to the START and STOP procedures. Ignoring these can result in the loss of HP evacuation air.**

- Stopping and removing the power cable is registered as a power failure, therefore hoses and masks must be disconnected before the cable is removed.
- Free flow masks empty the HP evacuation air faster than a full mask with lung demand valve.



Figur 3 Location of regulator for evacuation air.

### 3.2 Breathing air quality

The E Compressor is serviced before it arrives at the destination. Filter change is carried out according to the intervals specified in chapter 6. The service log for filter change can be found in the documentation folder. Spare parts and instructions are in the aluminum box that came with the E Compressor. New filters can be ordered from E Innovation Norge AS.

**IMPORTANT!** It is crucial for the delivery of high-quality breathing air that a air supply hose (flexible hose) is used if there is a high degree of contamination in the work area where the E Compressor is located.

### 3.3 Constant monitoring of CO, CO<sub>2</sub>, O<sub>2</sub> and dew point in breathing air

The E Compressor is equipped with constant monitoring of the breathing air quality. The readings are shown in the display on the operating panel. Due to the characteristics of electromechanical sensors, estimated response time can be up to 20 minutes before exact values will be obtained. This especially applies to the O<sub>2</sub> sensor, which has the longest response time when starting the machine cold.

If any air quality value exceeds the limits set in NS EN 12021 (breathing air standard) the alarm of 95 decibels will be triggered. If the overrun lasts for more than 1 minute, the E Compressor shuts down. The work should then be terminated as the system will be supplying evacuation air from the HP bottle. After evacuation from the workplace, disconnect hoses, “empty” flexible hose for polluted air. Press the blue “reset” button, and the E Compressor will run for 5 minutes to empty the system and you can read in the display if the values have improved. If values does not improve, the supply air hose should be moved to a more suitable area.



**Figure 4** The display shows information on the various parameters measured of the E Compressor. Here shown with values in operation.



### 3.4 Supply air hose and explosive gas detection

The E Compressor comes with a 15 meter x 120 mm flexible supply air hose and a gas detector unit mounted internally in the E Compressor. According to Norsok Z015 the detector is set to 10% LEL for alarm and shutdown.



Figure 5 Simtronics GD10

Gas test point



#### **WARNING!**

It's crucial that the air intake of the flexible supply air hose is located in accordance with Norsok Z-015 in a zone free of contamination. Other things will cause an alarm and possible shutdown of the system.

#### **Notice:**

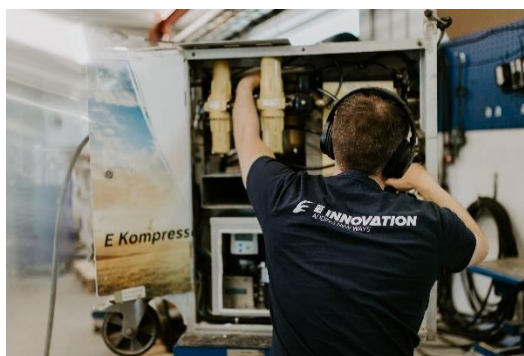
If the E Compressor shuts down due to detected gas, the flexible hose must be disconnected and "emptied" before the E Compressor is restarted. To ensure optimal breathing air quality, the system should run for two minutes with free air flow after the flexible hose is reconnected.

## 4 Technical specifications E Compressor

Technical data E Kompressor	300L	600L	800L
Area classification	Group II Cat. 2G IIB T3 X	Group II Cat. 2G IIB T3 X	Group II Cat. 2G Ex 60079-46 IIB T3 Gb
Temperature	-5 - +40°C	-5 - +40°C	0 - +40°C
Application	EX Zone 1	EX Zone 1	EX Zone 1
Noise	70dB	70dB	70dB
Power Supply	380 - 690 VAC - 50/60Hz - 10A	380 - 690 VAC - 50/60Hz - 13,8A	380 - 690 VAC - 50/60Hz - 25A
Operating pressure / capacity	4 - 8 Bar /300 l/min	4 - 8 Bar / 600 l/min	6,5 - 8 Bar / 800 l/min
Air quality standard	NS EN 12021 and Norwegian Labor Inspection Authority	NS EN 12021 and Norwegian Labor Inspection Authority	NS EN 12021 and Norwegian Labor Inspection Authority
Air quality monitoring	CO, CO <sub>2</sub> , O <sub>2</sub> and Dew Point	CO, CO <sub>2</sub> , O <sub>2</sub> and Dew Point	CO, CO <sub>2</sub> , O <sub>2</sub> and Dew Point
Air outlet connections	2 x Female rectus 96	2 x Female rectus 96	4 x Female rectus 96
Gas detection CH <sub>4</sub>	Yes	Yes	Yes
Gas detection H <sub>2</sub> S	Yes (Optional)	Yes (Optional)	Yes
HP emergency air	6,8 L - 300 Bar komprimert luft	6,8 L - 300 Bar komprimert luft	2 x 6,8 L - 300 Bar komprimert luft
Size: With x length x height	750mm x 1100mm x 1100mm	750mm x 1100mm x 1100mm	750mm x 1560mm x 1100mm
Weight	About 280Kg	About 280Kg	About 280Kg
Lifting	Certified for internal lifting	Certified for internal lifting	Certified for internal lifting
IP Class	56	56	55
Norsok Z-015	Corresponding	Corresponding	Corresponding
ATEX Certified	Yes	Yes	Yes
IECEX Certified	No	No	Yes

## 5 Service and maintenance

The E Compressor require extensive annual maintenance and re-certification. In advance of shipping the E Compressor for service, a new unit will be shipped to avoid any hold up or unwanted termination of ongoing work. No additional cost is associated with this, only the cost of transportation.





## 5.1 Particle filter at air intake

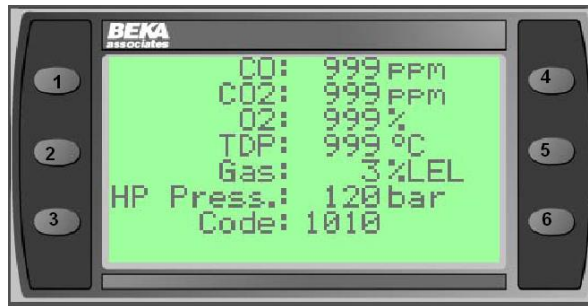
A 30 micron filter is placed at the air intake of the E Compressor. It is recommended to change this **once a month**. Turn the filter housing counterclockwise to open, remove and replace the old filter. Extra particle filters are included in the aluminum box. Log for filter change can be found in the documentation folder.

Figure 6 Particle filter housing removed from the E Compressor



**How to read the operation time in the display:**

- ✓ Operation time will be displayed on the line under Code. This is the interval time.
  - To display the total operating time of the compressor press button 3, then press button 6



**All sequences of pressing buttons must be performed within 2 seconds.**

## 6 Packing E Compressor for shipment / return

To prevent damage during shipment:

- The E Compressor is strapped on a Euro-pallet with two straps. Please put the strap ratchet lock on the side of the machine to avoid damage to the paint and panels. The E Compressor should not be lifted with a forklift without being strapped on a suitable pallet.
- The two lockable wheels should be placed at 90 degrees of direction and locked.
- The power cable is coiled together and laid on top of the E Compressor
- The compressor shall be lifted on board a vessel in a DNV 2.7-1 certified container, basket or similar.
- The equipment is certified for internal lifting with associated lifting rig in accordance with the Machine Directive. Lifting gear is permanently mounted on the compressor and should not be removed.
- **The breathing air hoses shall be closed / connected** when they are packed in the aluminum boxes.



Thank you for reading this instruction manual.