OPERATING INSTRUCTIONS

VP15 V7
VP30 V7
VP250/350 V7
VP300/350 V7
VP500/350 V7

1 General

This user manual describes safe and appropriate Operation of the system. Compliance with all specified safety notes and instructions and all local accident prevention regulations and general safety provisions that are valid in the operational area of the machine is imperative.

Before beginning all work on the system, this user manual and particularly the chapter on "Safety" and the corresponding safety notes must be fully read. The contents must be understood.

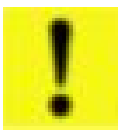
This user manual is part of the system. These instructions should be kept in the immediate vicinity of the system and be accessible at any time for persons working on or with the system. The user manual must always be passed on with the system.

Explanation of Symbols

Important safety-related notes are marked with symbols in this user manual. It is compulsory that the notes provided on work safety are complied with and followed. Take particular care in these cases in order to avoid accidents, personal damage and damage to property.

WARNING! Danger of injury or death!
This symbol identifies notes that may result in an impairment of health, injuries, permanent bodily harm or even death if they are not observed.

WARNING! Hazard of electric current!
This symbol points out a dangerous situation caused by electric currents. Failure to observe these safety notes can result in the risk of major injuries or death. The work to be performed may only be carried out by an inducted electrical specialist.



CAUTION! Damage to property!
This symbol identifies advice; non-compliance may result in damages, malfunctions and / or failure of the system.

Other valid documents

Components from other manufacturers may be installed in the system. These purchased parts have been subjected to risk assessment by the manufacturers. The constructions' conformity with the valid European and international regulations is declared by the manufacturers. The declaration of conformity from these manufacturers, as well as the operating, maintenance and repair instructions on the respective device components are to be considered part of the documentation for this machine. The instructions on safety, setup and installation, operation, repair, dismantling and disposal of the components contained in the manufacturer's documentation must be fully followed by the system operating personnel.

Liability and Warranty

All details and notes in this user manual have been compiled under consideration of the valid regulations, current state of technology and our years of knowledge and experience. This user manual must be carefully read before beginning all work on and with the system.

The manufacturer cannot be held liable for any damage or malfunctions resulting from non-observance of these operating instructions. The text and visual presentations do not necessarily correspond with the scope of supply. Illustrations and graphics are not to scale. In the case of special designs, use of additional order options or due to the latest technological modifications, the actual scope of supply may differ from the details and information as well as the visual presentations described or shown here. Please contact the manufacturer in case of any questions. We reserve the right to technical modifications of our product as part of enhancing its usage properties and further development.

Copyrights

This user manual should be treated confidentially. It is exclusively intended for persons deployed to work on and with the system. All contained data, texts, drawings, pictures and other images are protected under applicable copyright law and further industrial property rights. Any misuse is liable to prosecution. Distribution to third parties as well as reproduction in any kind and form – also of extracts –as well as exploitation and/or notification of the contents are not permitted without prior written approval of the manufacturer. Violations shall give rise to damages. The originator reserves the right to make further claims. We reserve all rights to exercise our industrial property rights

Spare parts

Only use the manufacturer's original spare parts.

CAUTION!

Wrong or faulty spare parts may result in damages, malfunctions or total failure of the system.

In the case of use of any unapproved spare parts, all guarantee, service, compensation for damages and liability claims against the manufacturer, his agents, traders or representatives are not applicable.

Disposal
Unless no other return or disposal agreement has been arranged, the individual components shall be recycled after having been properly disassembled.

- Scrapping of metallic material
- Recycling of plastic components
- Sorting and disposing of other components in accordance with material type.

CAUTION!
Waste from electronic and electrical equipment, electronic components, lubricants and other auxiliary materials are subject to hazardous waste treatment and must be disposed of by specialized companies only!

Safety

The system has been built in accordance with the generally accepted engineering standards valid at the time of development and manufacture and is deemed to be operationally safe. The system may be the source of hazards if it is used by staff who have not been professionally trained, or is used incorrectly or abnormally
This chapter, "Safety", provides an overview of all significant safety aspects for optimum protection of persons as well as safe and trouble-free operation of the system.

Foreseeable correct use
The gas compressor system is suitable as standard for the compression of Nitrogen gas at a a pressure of 5 to 10 Bar to a final pressure of up to 300 bar. Use of this compressor system in other fields of application requires the manufacturer's approval.
Operational safety is only guaranteed if the system is used as intended.

Foreseeable Incorrect use

The compressor station is designed to be operated with compressed air or Nitrogen gas only. In case you intend to use other materials, please contact the manufacturer before doing so.

CAUTION!

Any usage beyond the intended use and/or different type of use of the system is forbidden and is not valid as the intended use.

All types of claims against the manufacturer and/or his authorized representative due to damages caused by unintended use of the system are excluded.
Damage resulting from unintended use is the sole responsibility of the operator.
Intended use also refers to correct compliance with the operating conditions, as well as the details and instructions in this user manual.
The system may only be operated with the parts listed in the scope of supply.

Read the manual
Any person performing work on or with the system must have read and understood these instructions prior to commencing work on the system. This also applies if the person in question has already operated, or received training from the manufacturer on this type of system or a similar type.
Familiarity with the content of the user manual is one of the prerequisites for protecting personnel against hazards and for avoiding errors and hence for operating the system safely and without malfunction. We recommend that the operating company should obtain written confirmation from staff that they are familiar with the user manual.

Changes and Modifications to the System
To avoid hazards and to ensure optimal performance, no modifications, additions or conversions may be made to the system which has not been explicitly authorized by the manufacturer. All pictograms, signs and labelling found on the system must be kept in a good, legible condition and must not be removed. Damaged or illegible pictograms, signs and labelling must be replaced immediately.

Responsibility of the Operating Company
These instructions should be kept in the immediate vicinity of the system and be accessible at any time for persons working on or with the system.
The system may only be operated in a technically appropriate and operationally safe state. The system must be checked for intactness prior to each and any start.
All user manual instructions shall be observed fully and without limitation.

Along with the specified safety notes and instructions in this user manual, the local accident prevention regulations and general safety provisions that are valid in the operational area of the system, as well as valid environmental protection regulations, must be observed and complied with.
The operating company and the company's authorized personnel are responsible for fault-free operation of the system as well as for clear specifications on areas of responsibility for installation, operation, maintenance and cleaning of the system.
The operating company has to ensure that the supply of liquid carbon dioxide is interrupted if the supply of drive air is interrupted.

Requirements of personnel

Only authorized and instructed specialized personnel may work on and with the system. Members of personnel must have received an induction on possible risks.
The term specialized personnel refers to persons who are capable of assessing their work and recognizing the possible risks involved due to their specialist training, knowledge and experience, as well as knowledge of the relevant regulations.
If members of personnel do not have the necessary knowledge, training must be provided accordingly.
The areas of responsibility for work on and with the system (installation, operation, maintenance, repair) must be clearly specified and complied with so that areas of competency are clear from a safety point of view. Only such persons may work on and with the system that can be expected to perform their duties reliably. People who are under the influence of drugs, alcohol or medication that may affect their reactions may generally not work with the system. The valid age and specific job regulations for the site where the system is used must be observed when choosing personnel. The operator must ensure that unauthorized persons are kept at a sufficient distance from the machine. Any changes to the system that affect safety must be immediately reported by staff to the operating company.

Work Safety

Personal damages and damages to property when working with and on the system can be avoided by following the specified safety notes and instructions in this user manual. Non-observance of these notes may result in hazards for persons and damage or destruction of the system.
In the case of failure to comply with all specified safety notes and instructions in this user manual and all local accident prevention regulations and general safety provisions that are valid in the operational area, all liability claims and claims for compensation for damages against the manufacturer or a commissioned agent are excluded

Personal protection equipment

When working on or with the equipment, the following shall be worn:

(To be supplemented by customers internal regulations)

– **Protective clothing**

closely fitting work clothes (low tearing strength, no loose sleeves, no rings and other jewellery etc.)

– **Safety shoes**

to protect feet against heavy falling parts and slipping on flooring that is not skid resistant.

–**Protective goggles**

to protect eyes from flying parts and fluids.

Additional requirement for cleaning work:

– **Working gloves**

to protect against friction, abrasion, puncture and severe injuries of the hands as well as against contact with hot surfaces and substances hazardous to health.

Hazards Originating from the System

The system was subjected to risk assessment. The resulting construction and design of the system corresponds with the current state of technology. The system is operationally safe when used as intended. However, a residual risk always remains!

WARNING!

Pneumatic energy can cause major injuries. In the case of damage to individual components, highly pressurized mediums can escape and lead to physical and/or property damages!

_ Depressurize the system before beginning any work

– Do not remove, modify or put safety installations out of operation.

_ Pressure settings may not be changed beyond the values and tolerance ranges specified in the user manual.

WARNING! Danger of suffocation!

The compressor has dynamically loaded seals, therefore certain leaks are possible. Nitrogen displaces oxygen so the system may not be used in closed rooms and sufficient ventilation must be provided.

WARNING! Hazard of flying particles!

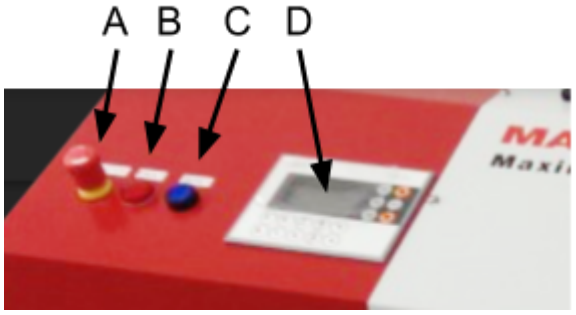
The compressor station can generate very high pressures. Therefore, it is mandatory to maintain a proper safety distance and follow adequate safety precautions.

OPERATING INSTRUCTIONS

Controls

The Maximator UK VP control system is a highly developed programmable logic controller (PLC) and man- machine interface control solution developed for gas preparation equipment. The control system handles all control and monitoring of the equipment.
This manual section includes all the information about how to operate and monitor the equipment,

including:
• system setup - changing settings
• monitoring operation of the equipment
• the alarm system
• logging of data



A - Emergency Stop
B - Alarm Lamp
C - Reset pushbutton
D - HMI

Emergency Stop
Every gas preparation system has at least one emergency stop push button in an easily visible location.

Reset Push Button/Master Relay
The blue reset push button is used to energise the master control relay. The master control relay is a power relay, which provides power to all solenoids and coils controlling the equipment on the unit. Unless the master control relay is energised, the equipment cannot function. When turning on the power, it is always necessary to energise the Master control relay. To energise the master control relay, first ensure the emergency stop push button(s) are released by twisting the red knob until a click is felt. Then press the blue reset button. To check the status of the master control relay, go to the status screen. This will show the relay as either „OFF" or „ON". The relay must be „ON" for the unit to operate correctly. See later this section for more information.

Fault Lamp
An alarm lamp is provided on the front of the control panel. This illuminates to indicate a critical alarm. If the red alarm lamp is lit and not flashing, then there is either a critical alarm or an emergency stop is pressed.

Running the Equipment

How to operate the equipment

Preparing to run – start-up checks
Turn on the power at the main isolator at the rear of the unit. Make sure that the emergency stop pushbutton is released (twist the knob anticlockwise until you hear a 'click'). Press the green 'RESET' button.

Make sure that the gas preparation unit is ready for operation:

- The unit must be commissioned - see installation and commissioning instructions, and contact your CGI distributor or agent for help and advice.
- Inlet LP gas supply must be connected
- The HP receiver isolating valves (where fitted) must be open.
- The HP gas outlet must be connected to the factory distribution system or directly to the gas controllers.
- The compressor oil level must be checked.
- There must be no obstructions to cooling airflows around the equipment, or to the safe rotation of rotating parts. Guards must be in place.

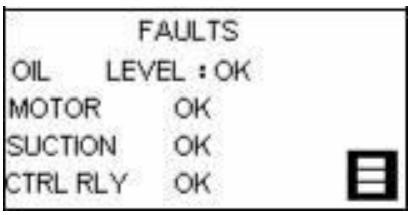
Once the start-up checks have been made, the equipment can be put into operation.

Compressor ON/OFF
To run the Compressor, press 'ON' '4' key. If there are no faults and the Master control relay is energised, the LED will light up, and the compressor will be in Automatic mode. Depending upon the pressure in the HP gas receiver, and if the LP receiver has gas available, the compressor may start cycling, or may be placed in 'Standby'. Check the System Overview screen to check the status of the compressor.

To turn the compressor off press the 'OFF' '9' key.

Reset
The 'RESET' '8' key on the interface panel is different from the green reset pushbutton on the control panel. This key is used to reset the control system after a critical fault.

If a critical fault occurs, such as an oil fault or motor overload, the compressor will be stopped immediately, and the screen will display the fault. The red alarm lamp will light up.



To acknowledge the alarm and reset the control system to allow the compressor to run again, you must press the ‘RESET’ key. If the alarm condition is no longer present, the red alarm lamp will go out, and it will be possible to restart the compressor.

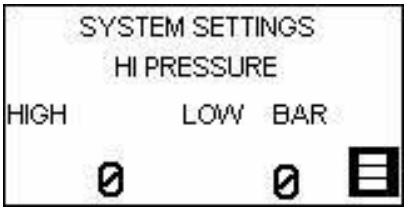
Autovent

The unit is programmed to ensure the compressor must stop every 30 minutes for 1 minute, this ensures that the micro filter element is vented regularly

Setup - Changing System Settings

The status screen is used to change the operating pressures for the system. To view the status screens, press the ‘F1’ key on the keypad. The LED will light. Use the ‘UP and ‘Down’ arrows to navigate through the screens.

System Setup Screens



The system settings screen (see picture) enables the compressor stop and start pressures to be changed. To change the settings, use the **‘ENTER’** key to move the flashing cursor to the required field, press the number buttons to show the correct number and press the enter key again. The maximum compressor stop pressure (HI) is normally 350 Bar, and the minimum for this value is normally 150 Bar. The control system will not allow values outside the preset range to be entered.

The compressor start pressure (LO) must generally be between 5 and 50 Bar below the compressor start pressure. This ‘differential’ is preset at CGI’s factory according to the specification of equipment fitted to the unit. If a number is entered into this field which is outside the preset differential range, the control system will automatically change the value to a value within the preset differential band.

Under certain circumstances, the control system can change the settings entered for the compressor start and stop pressures. These circumstances are as mentioned above, or if the user enters invalid numbers.

Status - Monitoring Operation

There are three system status screens. The first is an overview screen, which shows the current status of the compressor. The second system data screen displays the gas pressures in the low and high pressure systems and the compressor suction vessel. The third screen is shown on the previous page and allows the operator to set the high and low limits. To view the status screens, press the ‘F1’ key on the keypad. The LED will light. Use ‘UP’ and ‘DOWN’ arrows to move between the screens in this group. To return to the main menu press the ‘F3’ key.

System Status Screen

The first system status screen is an overview, displaying the status of the compressor. The text changes to show changes in the status of the equipment.

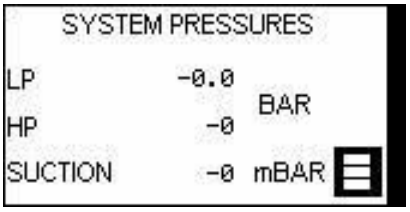
The following messages may be showing:

- **OFF** – displayed when the power is first turned on, if the compressor is not in auto or if an emergency stop button is pushed.
- **Standby-** this means that the compressor is in automatic mode and there is no demand in the high pressure system.
- **Running** – The compressor is running.
- **Starts hold** – The starts limiter is 'ON', and is preventing the compressor from starting because it has started more than the maximum number of times allowed per hour. The compressor will restart shortly.
- **Restart** - Countdown indicating the time remaining until the compressor restarts
- **Suction hold** – The Compressor has stopped because there is not enough pressure in its suction vessel. This normally means that the compressor has used up all of the gas in the LP gas receiver. The compressor will re-start when the pressure in the LP receiver has built up.
- **Alarm** – A critical alarm has forced the compressor to stop. The cause of the alarm must be found and corrected, and the alarm reset before the compressor can be re-started.
- **Autovent** – The compressor is stopped to allow the microfilter to vent, and will restart after a short delay.

System Pressures

The System pressures screen shows the following Gas pressures:

- LP: Low Pressure Inlet Line Pressure in Bar
- HP: High Pressure gas receiver pressure in Bar
- Suction: Compressor suction vessel pressure in mBar.



The values on this screen are actual values, and cannot be changed by the user. To change system settings, use the 'SETUP' screens (see earlier this section for more information).

Alarms

There is one fault/alarm screen. They show the compressor faults and general faults. To view the Fault screens, press the 'F2' key on the keypad.

The Faults/Alarm screen is used to indicate the status of the alarm system. In the event of a critical alarm, the appropriate alarm screen will automatically display the fault, making it easier for the user to see why the critical fault has occurred.

Non-Critical Alarms

Non-Critical alarms are system alarms which may stop equipment from running, but which can be reset automatically by the control system. These faults are faults which the control system can handle, and include:

- Low suction pressure - Normally caused by the LP gas inlet supply running low. The control system will hold the compressor off until there is enough gas pressure at the gas inlet (Normally 4 Barg)
- Starts hold - The compressor is held off for an appropriate time.

Critical Alarms

Critical alarms are those which require intervention from the user. They cannot be reset automatically by the system, either because they need the user to manually reset something (e.g. motor overload), or because to automatically reset the fault could lead to a serious failure. Critical alarms require the user to remove the cause of the fault, and reset the control system using the 'RESET' key on the interface panel. Critical alarms include:

- Oil Fault - critical low oil pressure.
- Gas Temperature - Gas outlet from the compressor is too high (Units with temperature monitoring only)
- High Suction pressure - The suction vessel pressure has become high enough to risk damaging the compressor.
- Motor overload - The overload has tripped and must be manually reset.
- Emergency stop - The user has pressed an emergency stop pushbutton and the master control relay has been de-energised.
- The screen shows the alarm condition of the compressor. As mentioned above, the appropriate screen will automatically be shown in the event of a critical alarm:
- Oil Press - Shows **'Normal'** if OK, **'Low'** if not
- Motor - Changes from '**OK**' to '**Overload**' to show a motor overload condition

It also shows the suction condition of the compressor and the status of the master control relay:

- Suction - Shows 'Normal' when OK, 'Holding' when waiting for the LP gas receiver to re-fill, and 'High' to show a critical high suction pressure.
- Ctrl Relay - Shows 'OFF' or 'ON'. 'ON' means that the master control relay is energised and the system can run.

System Data - Logging of Information

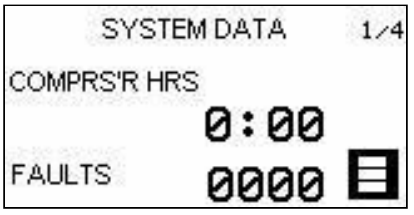
There are four system data screens. These screens show the total numbers of faults and other data for the system.

The first two system data screens show general information. The screens three and four show compressor information.

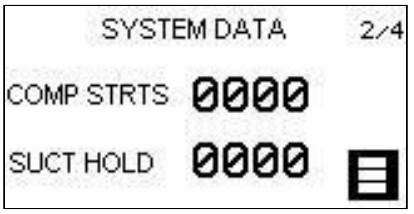
To view the System Data screens, press the ‘F3’ key on the keypad. The LED will light. Use ‘UP’ and ‘DOWN’ to move between the screens in this group.

Compressor Information

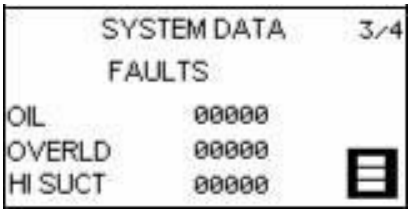
Screen 1
Compressor running hours
Number of faults (total)



Sreen 2
Total number of compressor starts
Number of suction hold events



Screen 3
Total number of oil faults
Total number of motor overload faults Total number of High Suction faults



Screen 4
Total number of Suction Holding Alarms
Total number of Start hold alarms