Nuvair®

Compressed Gas Solutions

Operation Manual
MCH36 Silent Touch

Notes:

If you have any questions on this equipment, please contact Technical Support at:

Nuvair
1600 Beacon Place
Oxnard, CA 93033 USA

Phone: +1.805.815.4044
Fax: +1.805.486.0900
Email: info@Nuvair.com

Hours: Monday through Friday
8:00 AM to 5:00 PM Pacific Time

⚠ Warning

This Operation Manual contains important safety information and should always be available to those personnel operating this equipment. Read, understand, and retain all instructions before operating this equipment to prevent injury or equipment damage.

Every effort was made to ensure the accuracy of the information contained within. Nuvair, however, retains the right to modify its contents without notice.

Under Nuvair's system of continuous improvement, certain components may be updated or changed as higher quality or more efficient parts and assemblies become available.

Nuvair will make every effort to update manuals as parts and functional aspects change. However, the look or location of components on your product may differ from those in this manual if improvements have been made that do not affect functionality or operational procedures.

Units pictured may also be equipped with different options than those on your product. In this case, the basic operational and maintenance guidelines will still apply.

If you have problems or questions after reading the manual, stop and call Nuvair at +1.805.815.4044 for information.

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Separate Manuals Included:

Compressor Parts Manual

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1.0 Introduction

This manual will assist you in the proper set-up, operation, and maintenance of the Nuvair MCH36 compressor packages. Be sure to read the entire manual. Throughout this manual we will use certain words to call your attention to conditions, practices or techniques that may directly affect your safety. Pay particular attention to information introduced by the following signal words:

⚠ Danger

Indicates an <u>imminently</u> hazardous situation which, if not avoided, will result in serious injury or death.

⚠ Warning

Indicates a potentially hazardous situation which, if not avoided, could result in serious personal injury or death.

⚠ Caution

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

⚠ Notice

Notifies people of installation, operation or maintenance information which is important but not hazard-related.

1.1 Required Operator Training

This manual must be read carefully and in its entirety.

- All compressor operators / maintenance personnel must read this entire manual with due care and attention and observe the instructions/information contained herein.
- Company owners ensure that the operator has the required training for operation of the compressor and that he/she has read the manual.

1.2 Important Information for the User

The information/instructions for compressor use contained in this manual concern the **Nuvair MCH36 Series**.

- The instruction manual must be read and used as follows:
- Read this manual carefully; treat it as an essential part of the compressor.
- The instruction manual must be kept where it can readily be consulted by compressor operators and maintenance staff.
- Keep the manual for the working life of the compressor.
- Make sure updates are incorporated in the manual.
- Make sure the manual is given to other users or subsequent owners in the event of resale.

- Keep the manual in good condition and ensure its contents remain undamaged.
- Do not remove, tear or re-write any part of the manual for any reason.
- Keep the manual protected from damp and heat.
- If the manual is lost or partially damaged and its contents cannot be read it is advisable to request a copy from the manufacturer.

1.3 Foreword

The regulations/instructions for use contained in this manual constitute an essential component of the supplied compressor.

These regulations/instructions are intended for an operator who has already been trained to use this type of compressor. The contained information is necessary and essential to efficient and proper use of the compressor.

Hurried or careless preparation leads to improvisation, which is the cause of accidents.

Before beginning work, read the following suggestions carefully:

1) Before using the compressor, gain familiarity with the tasks to be completed and the admissible working position.
2) The operator must always have the instruction manual to hand.
3) Plan all work with due care and attention.
4) You must have a detailed understanding of where and how the compressor is to be used.
5) Before starting work make sure that safety devices are working properly and that their use is understood; in the event of any doubts do not use the compressor.
6) Observe the warnings given in this manual with due care and attention.
7) Constant and careful preventive maintenance will always ensure a high level of safety when using the compressor. Never postpone repairs and have them carried out by specialized personnel only; use only original spare parts.

1.4 Assistance

Nuvair technicians are at your disposal for all routine/unscheduled maintenance work. Please forward your request for assistance to **Nuvair** by sending a fax or e-mail to:

Phone: +1.805.815.4044
Fax: +1.805.486.0900
Email: info@Nuvair.com

1.5 Responsibility

Nuvair considers itself exonerated from any responsibility or obligation regarding injury or damage caused by:

- Failure to observe the instructions contained in this manual that concern the running, use and maintenance of the compressor.
- Violent actions or incorrect maneuvers during use or maintenance of the compressor.
- Modifications made to the compressor without prior written authorization from Nuvair.
- Incidents beyond the scope of routine, proper use of the compressor

⚠ Warning

Maintenance and repairs must only be carried out using original spare parts and qualified technicians. Nuvair cannot be held liable for any damages caused by failure to observe this rule. The compressor is guaranteed as per the contractual agreements made at the time of sale. Failure to observe the regulations and instructions for use contained in this manual shall render the warranty null and void.

1.6 Purpose of the Machine

This high-pressure compressor has been designed and built for the purpose of producing breathing air by drawing it from the surrounding environment. The surrounding environment air must be free from any harmful fumes or contaminates. The air is pulled through an intake air filter, compressed, and passed through breathing air filtration before it is stored in tanks constructed to contain air at high pressure. The compressor can also be used for the pumping of gases:

- Nitrogen
- Helium
- Nitrox mixtures up to 40%

Any other use is inappropriate. The manufacturer cannot be held liable for any personal injury or damage to objects or the machine itself caused by improper use.

⚠ Danger

- **Use only tested, certified storage tanks: do not exceed the working pressure indicated on them.**
- **Use the compressor in areas free from dust, risk of explosion, corrosion, and fire.**
- **Improper use could have serious consequences for the user.**
- **Do not disconnect the hose from the fittings or the clamp when under pressure.**
- **Change the air purification filters regularly as described in section 13.0.**
- **Drain the condensate regularly as illustrated in section 13.2: Condensate Discharge.**
- **The power must be disconnected and locked out before carrying out any cleaning or maintenance tasks.**
- **Never pull a plug out by tugging the cord. Make sure the cord is not bent at a sharp angle and that it does not rub against any sharp edges. Use of extensions is not advised.**
- **Never operate the compressor when the power cord is damaged, or the power supply covers/guards are removed.**
- **All routine and unscheduled maintenance tasks must be carried out with the compressor at a standstill, the electrical power supply disconnected or locked out and all lines are depressurized.**
- **After switching off the compressor wait about 30 minutes before carrying out any maintenance tasks to prevent burns.**
- **The high-pressure flex hose that connects to external components must be in good condition, especially in the areas near the fittings.**
    - **The plastic sheath that covers the pipe must not show any signs of abrasion otherwise damp could get in, corrode the steel braid and weaken it.**
    - **The hose must be changed periodically (yearly) or when it shows signs of wear.**
    - **Failure to observe this rule could seriously endanger the users' safety.**

- **Make sure the minimum bending radius of the hose is no less than 250 mm (9.8 inches).**

To ensure maximum working efficiency, Nuvair has constructed the compressor with carefully selected components and materials. The compressor is tested prior to delivery. Continued compressor efficiency over time will also depend on proper use and maintenance as per the instructions contained in this manual.

All the components, connections and controls used in its construction have been designed and built to a high degree of safety to resist abnormal strain or in any case a strain greater than that indicated in the manual. Materials are of the finest quality; their introduction and storage in the company and their utilization in the workshop are controlled constantly to prevent any damage, deterioration, or malfunction.

⚠ Danger

Before carrying out any work on the compressor each operator must have a perfect understanding of how the compressor works, know how to use the controls, and have read the technical information contained in this manual.

- **It is forbidden to use the compressor under conditions or for purposes other than those indicated in this manual and Nuvair cannot be held liable for breakdowns, problems or accidents caused by failure to observe this rule.**
- **Check that the fittings provide a proper seal by wetting them with soapy water: Stop the compressor and eliminate any leaks immediately when detected.**
- **Do not attempt to repair high pressure tubes by welding them or while the compressor is running.**
- **Do not empty storage tanks completely—not even for long term storage—as this practice allows damp air to get in and eventually corrode the tank.**
- **It is forbidden to tamper with, alter or modify, even partially, the systems and equipment described in this instruction manual, especially as safety guards and safety symbols are concerned.**
- **It is also forbidden to carry out work in any way other than that described or to neglect the illustrated safety tasks.**
- **The safety information and the general information given in this manual are very important.**

1.7 Where the Compressor May be Used

The compressor must only be used in environments having the characteristics described in the following table:

Area of Machine Use: Essential Data Table		
Temperature Ambient		Minimum: +14°F (+14°C); Maximum: +104°F (+40°C)
Air Humidity		Maximum: 80%
Tolerated Weather Conditions	rain hail snow	None
Maximum Tilt Angle (bank)		15%

Check that the area in which the compressor is to be positioned is adequately ventilated: good air exchange (more than one window) with no dust and no risk of explosion, corrosion, or fire.

If ambient temperatures exceed 113°F (45°C), air conditioning will be required.

Make sure that lighting in the area is sufficient to identify every detail (such as the writing on the info plates/stickers); use artificial lighting where daylight alone is insufficient.

When pumping nitrox, ambient temperature maximum is +100°F (+38°C) and maximum fill pressure is 3600 psi (250 bar).

1.8 Running and Testing the Compressor

Each compressor is carefully tested prior to delivery. A new compressor must nevertheless be used with caution during the first five (5) working hours to complete proper break-in of its components. If the compressor is subject to an excessive workload during initial use, its potential efficiency will be prematurely compromised, and functionality soon reduced.

During its initial use, open the high-pressure outlet and allow the compressor to run up to the pressure maintaining valve (PMV) setting of about 2000 psi (138 bar).

After the first 25 hours carry out in addition to the scheduled maintenance the following tasks:

- Change the compressor oil.
- Change the oil filter.
- Check and adjust nuts and bolts.

⚠ Warning

When changing the oil filter, inspect the filter element and check for any deposits. If metal or carbon deposits are present, locate the source before restarting the compressor.

2.0 Safety Warnings

Nuvair has taken extreme care in providing you with the information you will need to operate this system. However, it is up to you to carefully read this manual and make the appropriate decisions about system safety.

⚠ Warning

This equipment is used to provide breathing air or nitrox for the purpose of life support. Read this manual in its entirety. Failure to heed the warnings and cautions contained in this document may result in severe injury or death.

⚠ Warning

The equipment you will be using to compress air or nitrox will expose you to both low and high-pressure gas. Gas, even under moderate pressures, can cause extreme bodily harm. Never allow any gas stream to be directed at any part of your body.

⚠ Warning

Any pressurized hose can cause extreme harm if it comes loose or separates from its restraint (or termination) while under pressure and strikes any part of your body. Use appropriate care in making and handling all gas connections.

⚠ Warning

Do not use any form of mineral oil or synthetic lubricant not rated for the compressor in this system. Use only the recommended compressor lubricant. Never mix the compressor lubricant with other lubricants. The use of improper lubricants can lead to fire or explosions, which may cause serious personal injury or death.

2.1 Safety and Operation Precautions

Because a compressor is a piece of machinery with moving and rotating parts, the same precautions should be observed as with any piece of machinery of this type where carelessness in operations or maintenance is hazardous to personnel. In addition to the many obvious safety precautions, those listed below must also be observed:

1. Read all instructions completely before operating any compressor or nitrox system.
2. For installation, follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Administration (OSHA) standards.
3. Electric motors must be securely and adequately grounded. This can be accomplished by wiring with a grounded, metal-clad raceway system to the compressor starter; by using a separate ground wire connected to the bare metal of the motor frame; or other suitable means.
4. Protect all power cables from contacting sharp objects. Do not kink power cables and never allow the cables to contact oil, grease, hot surfaces, or chemicals.
5. Make certain that power source conforms to the requirements of your equipment.
6. Pull main electrical disconnect switch and disconnect any separate control lines, if used, before attempting to work or perform maintenance. “Tag Out” or “Lock Out” all power sources.
7. Do not attempt to remove any parts without first relieving the entire system of pressure.
8. Do not attempt to service any part while System is in an operational mode.
9. Do not operate the System at pressures more than its rating.
10. Do not operate compressor at speeds more than its rating.
11. Periodically check all safety devices for proper operation. Do not change pressure setting or restrict operation in any way.
12. Be sure no tools, rags or loose parts are left on the Compressor System.
13. Do not use flammable solvents for cleaning the Air Inlet Filters or elements and other parts.
14. Exercise cleanliness during maintenance and when making repairs. Keep dirt away from parts by covering parts and exposed openings with clean cloth or Kraft paper.
15. Do not operate the compressor without guards, shields, and screens in place.
16. Do not install a shut-off valve in the compressor discharge line, unless a pressure relief valve, of proper design and size, is installed in the line between the compressor unit and shut-off valve.
17. Do not operate in areas where there is a possibility of inhaling carbon monoxide, carbon dioxide, nitrogen, or flammable or toxic fumes.

18. Be careful when touching the exterior of a recently run electric, gasoline, or diesel motor - it may be hot enough to be painful or cause injury. With modern motors this condition is normal if operated at rated load - modern motors are built to operate at higher temperatures.
19. Inspect unit daily to observe and correct any unsafe operating conditions found.
20. Compressed air can be a serious hazard. Always use caution. Never direct air stream at any part of the body as this can cause injuries.
21. Compressed air from this machine must not be used for food processing or breathing air without adequate downstream filters, purifiers and controls and periodic air quality testing.
22. Always use an air pressure-regulating device at the point of use, and do not use air pressure greater than marked maximum pressure.
23. Check hoses for weak or worn conditions before each use and make certain that all connections are secure.

The user of any compressor or nitrox system manufactured by Nuvair is hereby warned that failure to follow the preceding Safety and Operation Precautions can result in injuries or equipment damage. However, Nuvair does not state as fact or does not mean to imply that the preceding list of Safety and Operation Precautions is all-inclusive, and further that the observance of this list will prevent all injuries or equipment damage.

2.2 High-Risk Areas of Compressor

Some areas of the compressor pose a level of operator/bystander risk that were not possible to eliminate at the design stage or for which safeguards could not be provided without compromising the functionality of the compressor. Users must be aware of these hazards and potential injury associated with each area.

⚠ Danger

To prevent accidents and injuries, all operators must be aware of the potential high-risk areas (Figure 2) of the compressor unit:

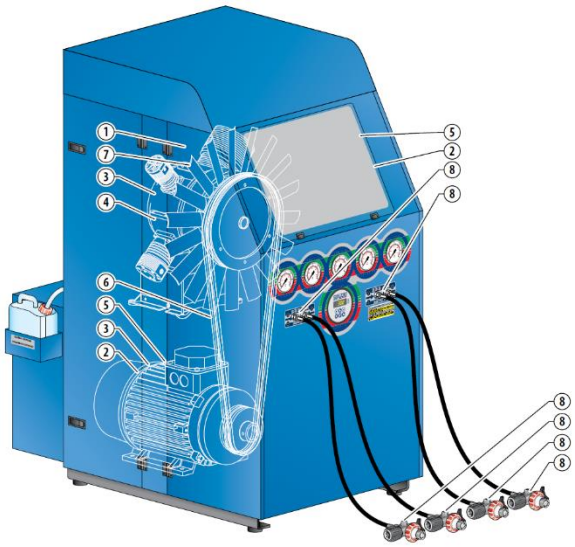


Figure 1. High risk areas of compressor unit.

1. Air contamination. Danger of contaminating produced air due by exposing the air intake to exhaust fumes or lubricating oil vapors.
2. Electrical dangers. Use the machine with suitable environmental protections, especially against water and humidity.
3. Heat-related dangers. Use the machine with suitable safety devices and after switching off the machine, wait 30 minutes for the machine to cool down before carrying out maintenance work.
4. Noise. Danger deriving from noise emitted by the compressor.
5. Fire risk.
6. Entanglement. Risk of being crushed, dragged or entangled by transmission belts.
7. Impact. Danger of impact/abrasion with the cooling fan.
8. Impact. Danger operator injury or death if high-pressure hoses fail.

3.0 Compressor Layout

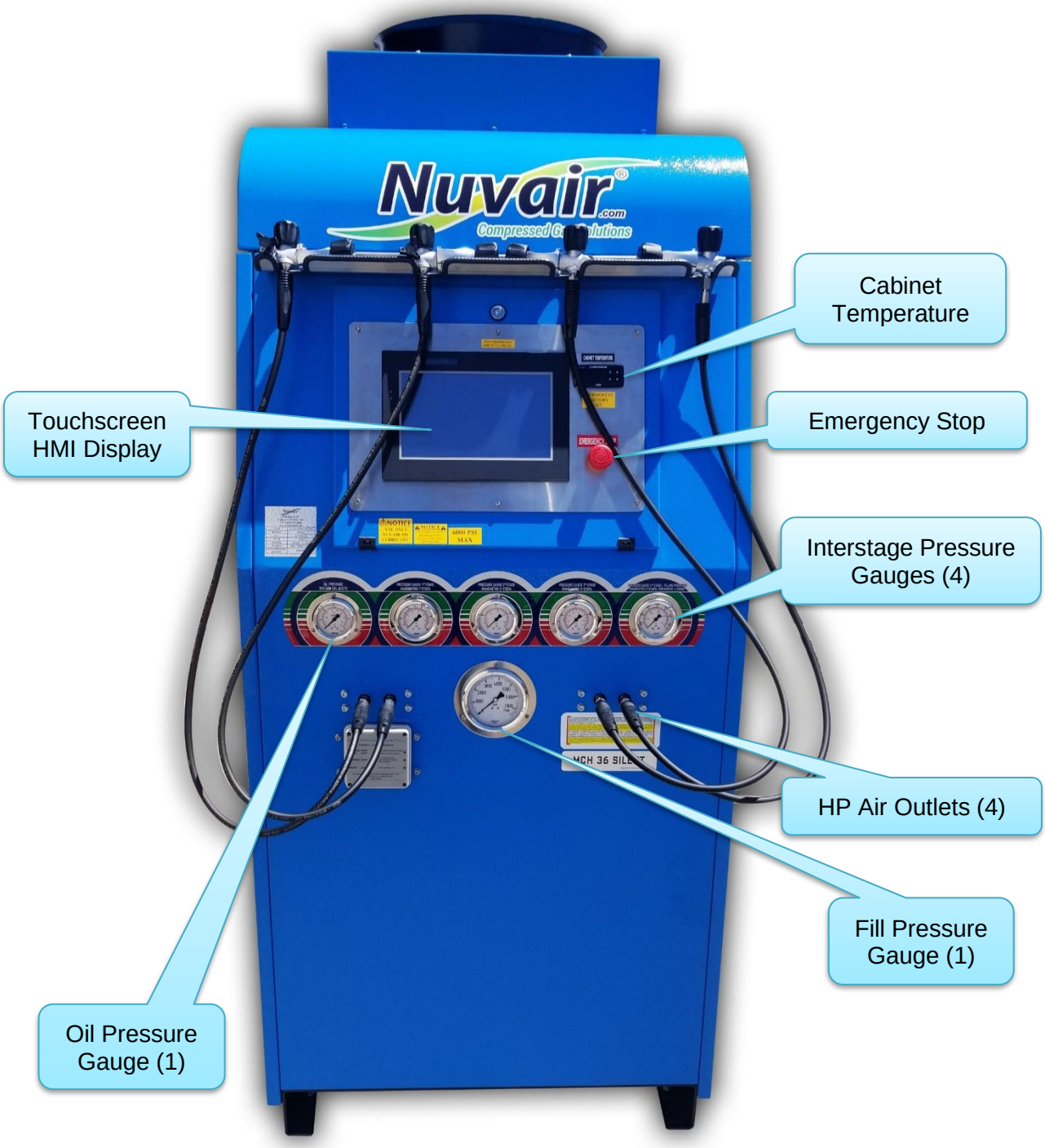


Figure 2. The Nuvair MCH36 Silent Touch Compressor.

4.0 Start Guide & Dashboard Use

The Nuvair *MCH36 Silent Touch* is equipped with an HMI (Human Machine Interface) touchscreen system controller called the *Dashboard*. The Dashboard allows users to monitor compressor activity, identify alarm events. Please refer to the Quick Start Guide (4.1) for an overview of Dashboard operations.

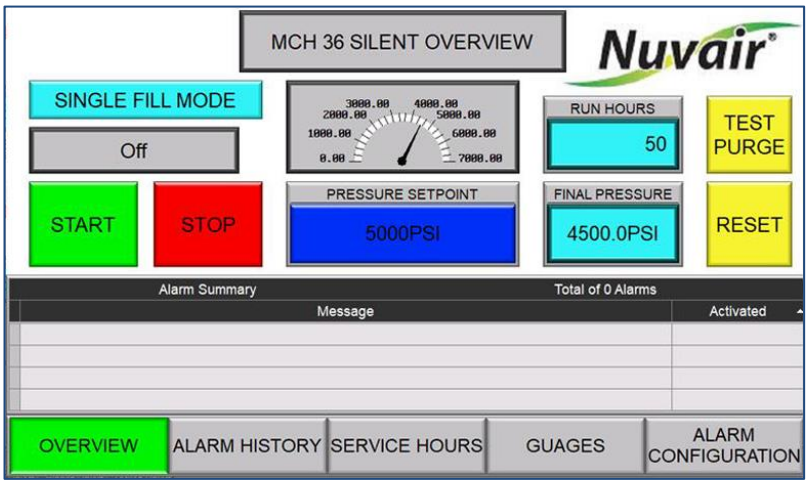


Figure 3. Dashboard overview screen.

4.1 Quick Start Guide

1. Turn compressor power on.
2. Select the blue box under “PRESSURE SETPOINT” (Figure 3) and the Pressure Setpoint screen appears (Figure 4).
3. Input desired shutdown pressure and press “ENT” (green box). The Pressure Setpoint (the pressure at which the compressor will shut down in psi) is displayed in the blue box.
4. Decide if the compressor should shut off after the pressure setpoint is reached one time or if it should restart automatically when internal pressure drops below 600 psi of the pressure setpoint.
5. If “SINGLE FILL MODE” is displayed in the in the upper-left corner (Figure 3), the compressor will not restart. If “AUTO RESTART MODE” is displayed, the compressor will automatically restart when the internal pressure drops.
6. Press the green “START” button to start the compressor.
7. Press the red “STOP” button to stop the compressor at any time.
8. At any time while the compressor is running, auto drains can be tested for proper operation by pushing the yellow “TEST PURGE” button.
9. If an active alarm is present, it will display in the “Alarm Summary” box (Figure 2). Once the alarm is rectified, press “RESET” to clear the alarm. The compressor can be used as normal after resetting the alarm.

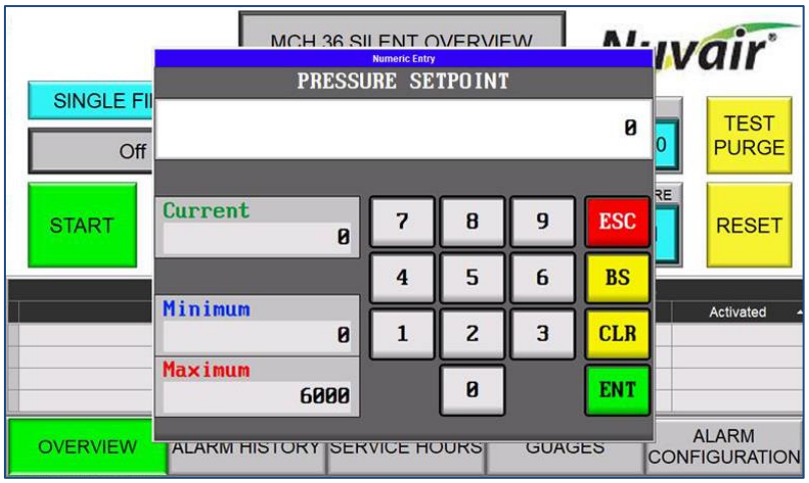


Figure 4. Pressure Setpoint input screen.

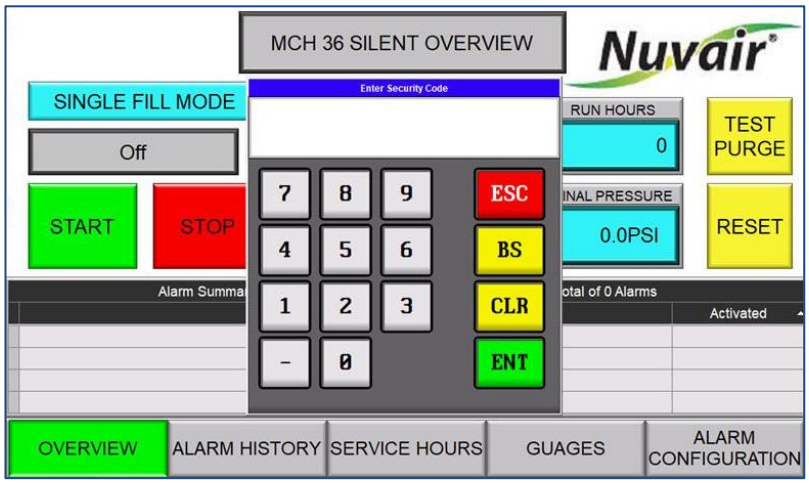


Figure 5. Security Code input screen.

4.2 Overview Screen

The overview screen (Figure 3) provides the general status and operation of the compressor. Using this screen, the compressor functions include:

- Start (green “START” button)

- Stop (red “STOP” button)
- Fill Mode (SINGLE FILL MODE or AUTO RESTART MODE, described in Section 4.1).
- Run Hours (displayed as total hours)
- Final Pressure (or “output pressure” in both digit and gauge display)
- Test Purge (testing of auto drains, described in Section 4.1).
- Reset (resets all settings to factory defaults)
- Alarm Summary (indicating alarm type and time activated)

Other screens can be selected by pressing one of the five buttons in the bottom ribbon (Alarm History, Service Hours, Gauges, and Alarm Configuration). Each screen is defined below.

To access advanced settings of the Dashboard and to prevent unauthorized changes to critical settings, a security code is sometimes required. To access secured settings, enter the *-digit security code in the security code input screen (Figure 5).

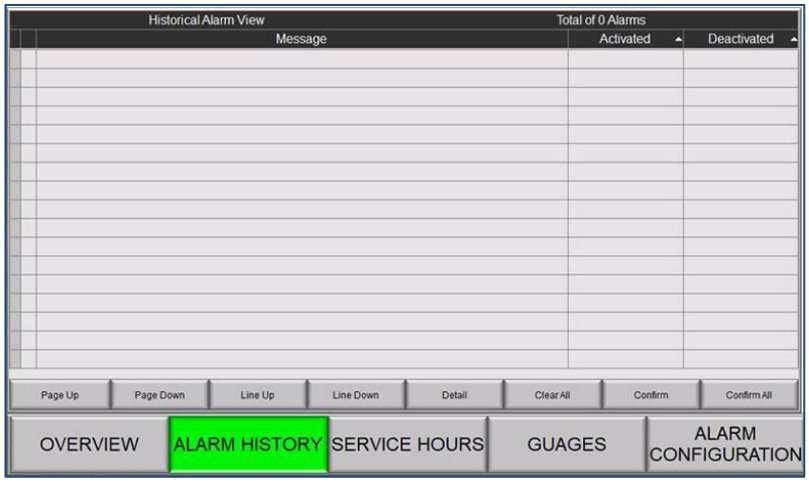


Figure 6. Alarm History screen.

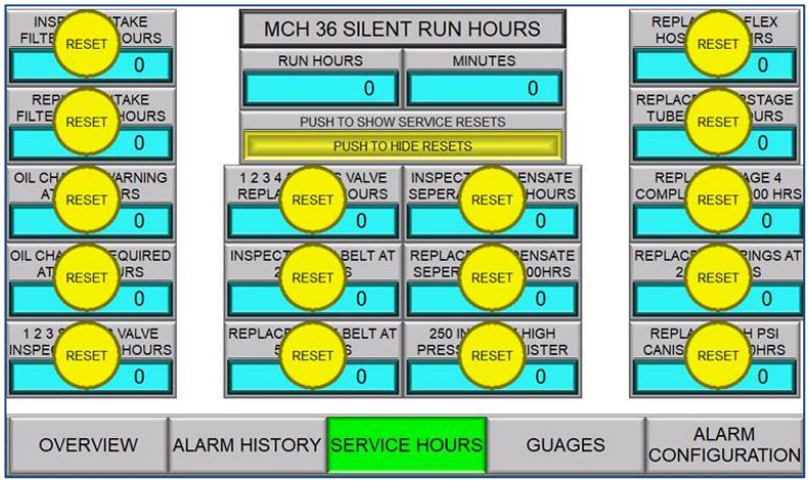


Figure 7. Service Hours screen showing reset buttons.

4.3 Alarm History Screen

This page is a record of alarm or service events (Figure 6). The alarm event type will be noted, when the alarm activated, and when the user clears or “deactivates” the alarm. Service events will record the date it was reset.

4.4 Service Hours Screen

This screen shows non-resetting total RUN HOURS (in both hours and minutes), along with 16 service timers (Figure 8).

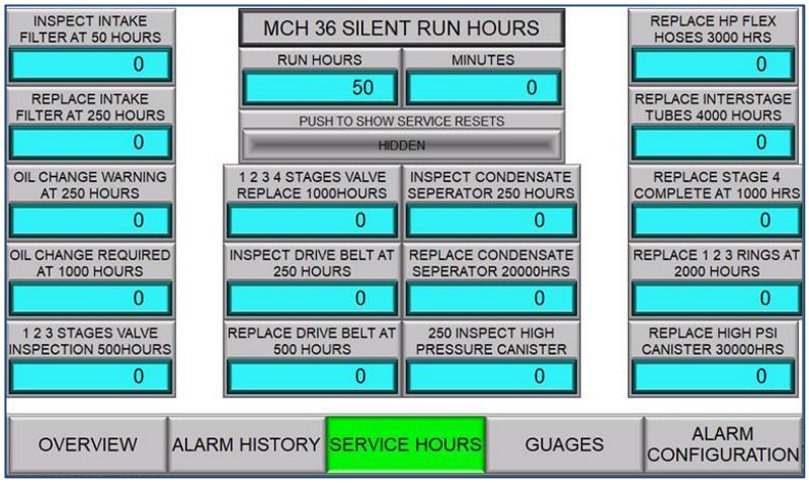


Figure 8. Service Hours screen.

The service timers can be reset at any time by pushing the “HIDDEN” button below “PUSH TO SHOW SERVICE RESETS.” This activates “RESET” buttons for each timer (Figure 7). Press the desired service timer reset for one second; the specific timer will reset.

Return to the normal screen by pressing the yellow “PUSH TO HIDE RESETS” button.

4.5 Gauges Screen

The gauges screen shows interstage pressures (first, second, third, and fourth stages) and final (output) pressure, both numerically and in a gauge format to illustrate desired pressure ranges (Figure 9).

The green pressure range is the normal operating pressure; yellow is below the normal pressure range, and red is above normal.

Auto drain timers (delay, open time, and countdown timer to auto drain cycle) are also displayed on this page.

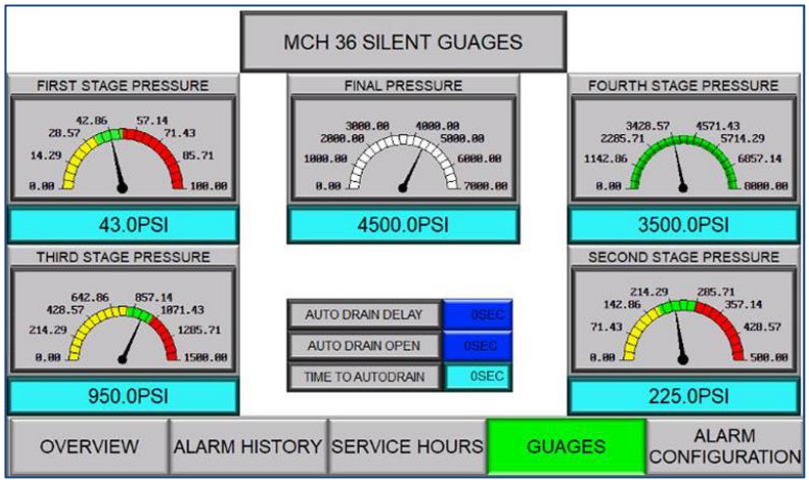


Figure 9. Gauges screen.

4.6 Alarm Configuration Screen

The alarm configuration screen allows users to enable, disable, and configure individual system alarms (Figure 10). Some component alarms have sub-alarms that can also be individually programmed, enabled, and disabled.

As an example, the 3rd STAGE PRESSURES alarm has four sub-alarms including LO, LOLO, HI and HIHI. These alarms and others are further described in Section 4.7.

On the following pages are expanded descriptions of Dashboard functions and alarm states.

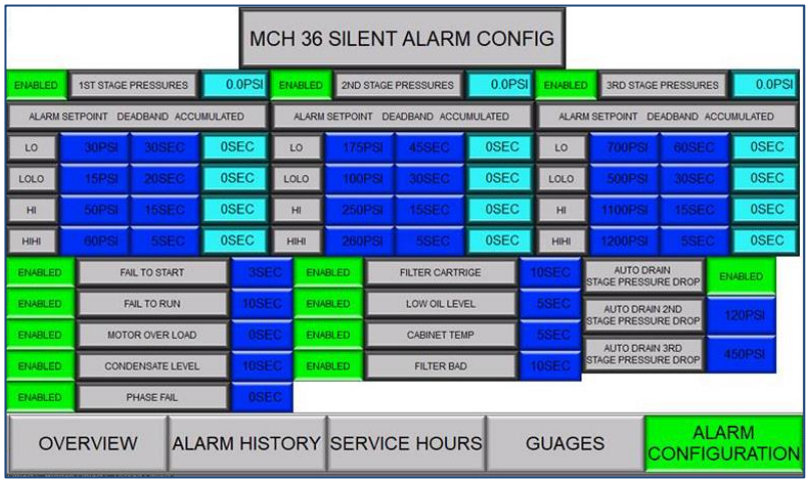


Figure 10. Alarm Configuration screen.

4.7 Alarm Events and Descriptions

The *MCH36 Silent Touch* dashboard has 55 different alarm states. Each alarm condition has a unique name and associated definition. Alarm names and definitions are factory set.

When an alarm event threshold is reached, the button color turns yellow and the system will either (a) sound an alarm, and/or (b) shut down the compressor. The alarm event is logged and will display in the Alarm History screen (Figure 6) and under the Alarm Summary section of the Overview screen (Figure 3).

Alarm events and definitions include:

123 VLV INSPC RESET
First, second, and third stage valve inspection alarm has been reset.

1234 VLV REPLACE RESET
First, second, third, and fourth stage replace valves alarm has been reset.

1ST STAGE PSI HI
The first stage temperature is high and requires evaluation. Alarm sounds.

1ST STAGE PSI HIHI
The first stage pressure is critically high. The system shuts down immediately and sounds an alarm.

1ST STAGE PSI LO
The first stage pressure is low and requires evaluation. Alarm sounds.

1ST STAGE PSI LOLO
The first stage pressure is critically low. The system shuts down immediately and sounds an alarm.

2ND STAGE PSI HI
The second stage temperature is high and requires evaluation. Alarm sounds.

2ND STAGE PSI HIHI
The second stage pressure is critically high. The system shuts down immediately and sounds an alarm.

2ND STAGE PSI LO
The second stage pressure is low and requires evaluation. Alarm sounds.

2ND STAGE PSI LOLO
The second stage pressure is critically low. The system shuts down immediately and sounds an alarm.

3RD STAGE PSI HI
The third stage temperature is high and requires evaluation. Alarm sounds.

3RD STAGE PSI HIHI
The third stage pressure is critically high. The system shuts down immediately and sounds an alarm.

3RD STAGE PSI LO
The third stage pressure is low and requires evaluation. Alarm sounds.

3RD STAGE PSI LOLO
The third stage pressure is critically low. The system shuts down immediately and sounds an alarm.

AUTO DRAIN FAIL ALM
Check auto drain function. Auto drain failed to drop significant pressure.

CABINET TEMP ALM
The cabinet temperature has exceeded safe levels. The compressor will shut down immediately and sounds an alarm.

CONDENSATE LEVEL ALM
Condensate level high. Alarm sounds.

DRIVE BELT INSPC RESET
Inspect drive belt alarm has been reset.

DRIVE BELT REPLACE RESET
Replace drive belt alarm has been reset.

ESTOP ALM
Check emergency stop push button. The system shuts down with the E-Stop button is pushed and alarm sounds.

FAIL TO RUN ALM
Compressor should be running but is not. Alarm sounds.

FAIL TO START ALM
Compressor should start but did not. Alarm sounds.

FILTER BAD ALM
After 250 hours of runtime, breathing filters change is required. Alarm sounds.

FILTER CARTRIGE ALM
Breathing air filter needs replacing in 3-10 hours of additional runtime. Alarm sounds.

INSPC COND SEPERATOR RS
Inspect condensate separator alarm has been reset.

INSPC HI PSI CANISTER RS
Inspect high-pressure canister alarm has been reset.

INSPECT COND SEPARATOR
Inspection of condensate separator required. Alarm sounds.

INSPECT DRIVE BELT
Inpection of drive belt required and replace as needed alarm. Check associated fittings required. Alarm sounds.

INSPECT HP FILTER CAN
Inspection of high-pressure filter canister required. Alarm sounds.

INSPECT INTAKE FILTER
Inspection of intake filter required. Replace as needed. Alarm sounds.

INTAKE FILTER CHANGE
Replacement of intake filter required. Alarm sounds.

INTAKE FILTER INSP RESET
Inspection of intake filter alarm has been reset.

INTAKE FILTER REPLACE RS
Replacement of intake alarm has been reset.

LO OIL LEVEL ALM
The compressor oil level is low. The system shuts down immediately and sounds an alarm.

MOTOR OVER LOAD ALM
Motor overload sensor activated. The system shuts down immediately and sounds an alarm.

OIL CHANGE REQUIRED
After 250 hours of runtime, compressor oil change is required. Alarm sounds.

OIL CHANGE REQUIRED RS
Oil change required alarm has been reset.

OIL CHANGE WARN RESET
Oil change warning alarm has been reset.

OIL CHANGE WARNING
Oil change required in 3-10 hours of runtime. Alarm sounds.

PHASE FAIL ALM
The compressor rotation is incorrect. The system shuts down immediately and sounds an alarm.

REPLACE 123 PISTON RINGS
First, second, and third stage piston ring replacement required. Alarm sounds.

REPLACE 123 RINGS RESET
First, second and third stage piston ring replacement alarm has been reset.

REPLACE 4 COMPLETE
Fourth stage piston and cylinder replacement required. Alarm sounds.

REPLACE 4TH STAGE RS
Replace fourth stage piston and cylinder alarm has been reset.

REPLACE COND SEPARATOR
Condensate separator replacement required. Alarm sounds.

REPLACE COND SEPERATOR R
Condensate separator replacement required alarm has been reset.

REPLACE DRIVE BELT
Drive belt replacement required. Alarm sounds.

REPLACE HI PSI CAN RS
High-pressure filter canister replacement alarm has been reset.

REPLACE HP FILTER CAN
Replacement of high-pressure filter canister required. Alarm sounds.

REPLACE HP FLEX HOSE RS
High-pressure flex hose replacement alarm has been reset.

REPLACE HP FLEX HOSES
Replacement of high-pressure flex hoses required. Alarm sounds.

REPLACE INTERSTAGE TUBE R
Replacement of interstage cooler tubes alarm has been reset.

REPLACE INTERSTAGE TUBES
Replacement of interstage cooler tubes is required. Alarm sounds.

VALVE SERVICE 123 INSP
Inspection and replacement as necessary of first, second, and third stage valves required. Alarm sounds.

VALVE SERVICE 1234 REPLC
Replacement of first, second, third, and fourth stage valves required. Alarm sounds.

4.8 Nuvair Page

This page is locked and only for qualified technical support to enable and disable alarms.

5.0 General Safety Rules

The compressor must only be used by qualified personnel. They must fully understand the arrangement and function of all the controls, instruments, indicators, warning lights and the various information labels.

5.1 Protective Clothing

All operators must use accident prevention items such as gloves, hard hat, eye goggles, accident prevention shoes and ear defenders against noise (Figure 11).

Figure 11. Protective clothing examples.

5.2 Emergency Equipment

Make sure first aid supplies and a fire extinguisher rated for use on electrical equipment is nearby. In the United States, extinguishers with a Class C rating are designed for use with fires involving energized electrical equipment.

5.3 Checks and Maintenance

When work is being performed on the compressor, apply “DO NOT USE” signs on all sides of the compressor to prevent accidental startup of a compressor undergoing repair/maintenance (Figure 12).

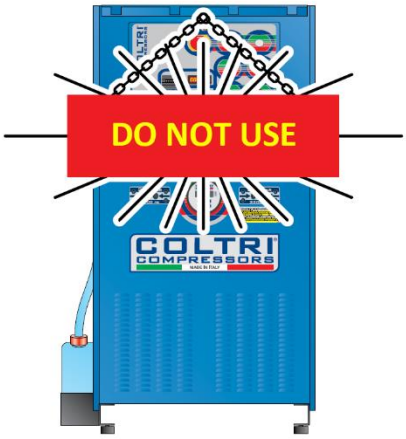


Figure 12. “Do Not Use” sign.

Inspect the compressor carefully every day it is used as per the checklist given in this manual.

6.0 Safety Information Labels: Location & Description

Safety information labels are affixed to various parts of the compressor unit. Understand the meaning of each label and follow any instructions given on any label.

1. General operation warning label: “Do not use the compressor without having first read the instruction manual supplied with the machine and observed the instructions. The user shall pay all necessary attention and adopt appropriate control devices, safety and protection for vessels which have indicated, on the test certificate, maximum working pressure lower than that indicated on compressor.”
2. Condensate discharge information label. Indicates position of condensate discharge valve. To discharge the condensate, see section 13.16.
3. Lubricating oil information label. Check oil level daily before starting the compressor. See section 9.1. Only use compressor oil authorized by the manufacturer. See section 13.8.
4. Oil drain label. Indicates the position of the lubricating oil drain taps. See section 13.8.
5. Air filtration cartridge change information label. To change the filter element, see section 0.
6. Cooling fan direction of rotation information label. When using the machine for the first time each day, check that the fan rotates in the direction indicated by the arrow. On a three-phase electric motor compressor, if the fan rotates against the direction of the arrow, invert two of the three phases on the main power lead. See section 14.2.

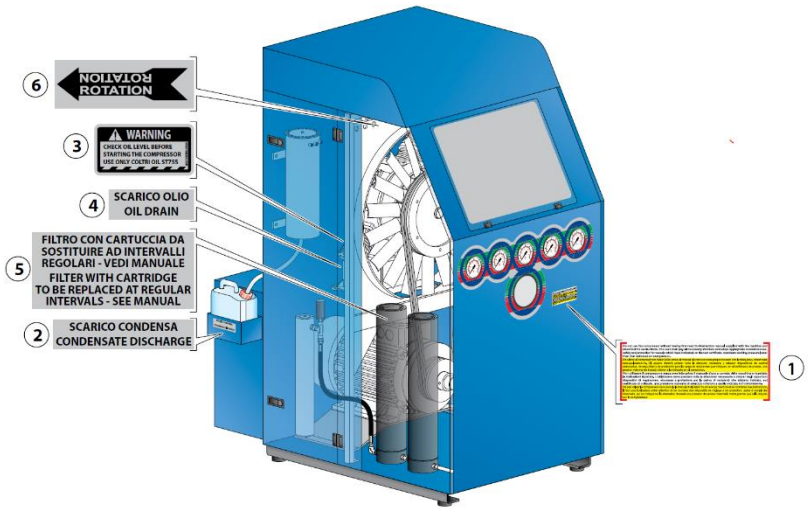


Figure 13. Safety information label locations.

7.0 System Components

- Coltri MCH36 High Pressure Air Compressors
  - 4 Cylinder, 4 Stage, Air Cooled
- Three-Phase 20 hp Electric Motor
  - 208-230V / E3 / 60Hz
  - 380-415V / E3 / 50 Hz, or
  - 440-460V / E3 / 60 Hz
- Human Interface Dashboard with Touchscreen
- Enclosed Configuration for Reduced Sound Levels
- (4) Fill Hoses
- Hour Meter
- Emergency Stop (E-stop) Button
- Interstate Pressure Gauges
- (3) Condensate Separators on Each Compressor
- Stainless Steel Interstage Cooling Tubes
- Low Pressure Oil Pump with Filter
- Oil Level Sight Gauge and Oil Pressure Gauge
- Automatic Condensate Drains
- Loadless Start
- Low Oil Shutdown Switch
- Final Stage Head
- High Temperature Switch set at 350°F
- PRESEC Visual Filter Element Moisture Indicator System
- (2) CAN-35 Filtration Towers
  - 60,000 cu ft
- Aluminum frame with isolation vibration mounts

Lubricant:

- Nuvair 455™ Food Grade Lubricant (standard for breathing gas compressors)
- Nuvair 751™ Diester Based Lubricant (optional for industrial gas compressors)

8.0 Compressor Specifications

Compressor Models	**Coltri MCH36**	
Charging Rate Filling an 80 cu ft tank from 500 psi	227 SCFM (764 L/min) Total Charging Rate: 22.5 SCFM (637 L/min)	
Maximum Operating Pressure	6000 psi (414 bar)	
Pumping Unit RPM	1250	
Number of Stages	4	
Lubrication	Pressure Lubrication, capacity 1.1 gal (4 L)	
Oil Pressure	**cold** **routine use** **minimum pressure**	58 psi (4 bar) 21.75 psi (1.5 bar) 14.5 psi (1 bar)
Air Quality	Grade E	

⚠ Caution

Ambient room temperature should never exceed +104°F (40°C) during operation of the compressor system. Operation at higher temperatures may lead to system damage and malfunction.

8.1 Unpacking and Installation

- Please read all information supplied before physically installing the compressor system.
- Unpack the system and remove from the pallet. Visually inspect the system to make sure there has been no damage during shipping. If damaged, please call Nuvair to file a damage report. Please take photos and supply detailed information about the damage.
- Place the system in a permanent location allowing a minimum spacing of 39 inches (1 m) from adjacent walls and inches 59 inches (1.5 m) from ceiling (Figure 14).
- Select a location where ambient room temperature complies with stated requirements.
- Make sure the installation space is well ventilated.

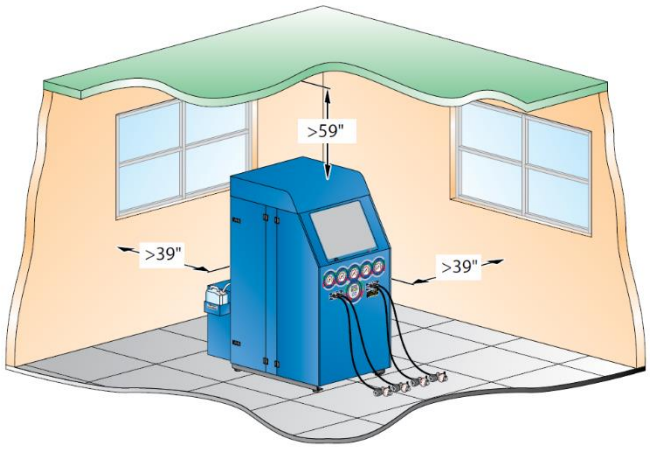


Figure 14. Illustration of proper positioning.

8.2 Air Intake Extension Connection

If the compressor is installed in an area without the necessary ventilation requisites described in section 8.1, it will be necessary to install an air intake extension leading in from outdoors or a place with the required ventilation requisites.

- The extension, supplied as an optional, must be connected to the intake connector (“a,” Figure 15).
- Connect extension pipe to fitting.
- Pass the pipe through the hole on the side panel (“b,” Figure 15).
- Fit the supplementary intake filter on the extremity of the extension pipe.
- Position the end of the extension with the air intake filter in a properly ventilated area sheltered from weather and exhaust fumes.

Figure 15. Air extension connection diagram.

- Point the air intake against the wind.
- Check that there are no kinks or breaks along the pipe. If it is damaged replace it.

8.3 Electrical Connection

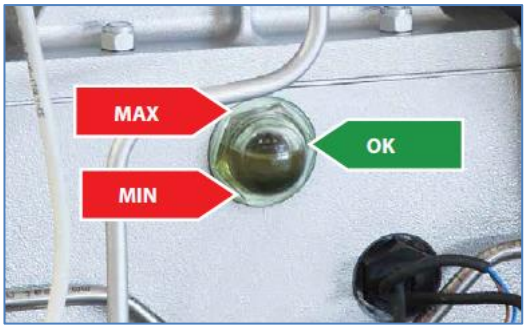
- Please read all information supplied before connecting electricity to the compressor system.
- You should hire a licensed electrician to install any electric compressors purchased from Nuvair.
- The compressor is delivered with raw leads ready to be installed into a junction box.
- In the event a plug is needed, Nuvair recommends that the licensed electrician doing the install determines the plug necessary.
- An efficient compressor grounding system is an essential compressor safety requisite.
- Make sure your electrician follows approved and compliant standards for your location.

9.0 Checks for the Start of Each Working Day

Inspect the exterior of the compressor (couplings, pipes, pneumatic components, etc.) and check for any oil leaks. Replace parts where necessary or contact **Nuvair**.

9.1 Lubricating Oil Level Check

Check that the level of lubricating oil is within acceptable limits (i.e., between minimum and maximum on the oil level viewer). Note that an excessive quantity of oil can leave deposits on the valves while too low a level prevents proper lubrication and could cause compressor seizure.



If the oil level is not within the minimum and maximum limits of the oil level viewer, top up or drain as described in section 13.6, “Checking and Changing the Lubricating Oil & Filter.”

9.2 Check Refill Hoses

Inspect the refill hoses and make sure there are no cuts, holes, abrasions, leaks etc. If necessary, replace with new hoses.

9.3 Check the Safety Valves

The final safety valve (a typical safety valve is shown in Figure 16) protects storage tanks and the compressor from excessive pressure; the valve setting is made at the time of compressor testing. The safety valve is factory adjusted to 6000 psi (414 bar) or 6454 psi (445 bar), depending on customer specifications.

Figure 16. Safety valve example.

The safety valve must be tested every 250 working hours of the compressor. To check the safety valve:

- Set the pressure to a pressure higher than that of the valve setting.
- After attaching all fill whips to tanks, start the compressor with the tank valves closed.
- Using the final pressure gauge, note when the safety valve trips to ensure the valve activates at the maximum working pressure.

⚠ Caution

Tampering with the safety valve to increase the pressure setting is strictly forbidden. Tampering with the safety valve can seriously damage the compressor, cause serious injury to personnel, and renders the warranty null and void. Should the safety valve fail to work properly, contact Nuvair Technical Support.

9.4 Storing Technical Documentation

The use and maintenance manual and its appendices must be stored carefully and must always be kept where they can be accessed easily for immediate review.

⚠ Warning

This Operation Manual contains important safety information and should always be available to those personnel operating this equipment. Read, understand, and retain all instructions before operating this equipment to prevent injury or equipment damage.

The Operation Manual is an integral part of the compressor and must always be handed over in the event of a change in ownership.

10.0 Control Panel

Descriptions here are for control components not associated with the Dashboard touchscreen. By design, functions of certain control panel components are also monitored by the Dashboard. Certain exceptional events will result in the Dashboard alarming. Critical alarms will result in compressor shutdown. Refer to section 4.0 for additional information on Dashboard use.

10.1 Gauge Matrix

The gauge matrix (Figure 17) is described below, from top row—left to right—and the bottom (final pressure) gauge. The compressor front panel has a total of six (6) mechanical gauges. The Nuvair MCH36 Silent Touch model monitors all gauge pressure readings electronically in the Dashboard where alarms and shutdowns are programmed in by the factory.

Figure 17. Oil, interstage, and final pressure gauges.

Oil Pressure
This gauge indicates the pressure inside of the lubricating oil circuit. Oil pressure is also monitored by the Dashboard. If no oil pressure or a high pressure reading occurs, switch off compressor and contact Nuvair.

Oil Pressure	58 psi (4 bar) 21.75 psi (1.5 bar) 14.5 psi (1 bar)	**Cold** **Routine Use** **Minimum Pressure**

1st Stage
This gauge indicates the pressure inside the first compression stage.

2nd Stage
This gauge indicates the pressure inside the second compression stage.

3rd Stage
This gauge indicates the pressure inside the third compression stage.

Fill Pressure
This gauge indicates the pressure as it exits the compressor. If the pressure fails to reach the pressure switch set pressure, switch off the compressor and contact Nuvair.

10.2 Cabinet Temperature

Adjacent to the Dashboard is a small LED panel indicating the current cabinet temperature. The thermostat is factory set.

10.3 Emergency Stop

Adjacent to the Dashboard is a large, red, mushroom-shaped pushbutton. Press this button in case of an emergency. All compressor functions cease immediately and the Dashboard alarm sounds.

10.4 PRESEC System

The PRESEC system's is a visual filter element moisture indicator system. Its wired probe is connected to the compressor's final filter tower and provides visual indicators of the moisture level in the filter element based on electrical conductivity of the moisture. The PRESEC three LED display (Figure 18) is mounted below the compressor's high-pressure fill whip connections and indicates multiple levels of filter element saturation and system status:

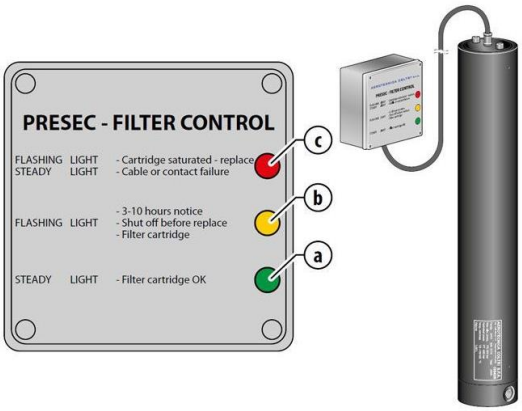


Figure 18. PRESEC Filter Control.

- Steady Green Light (a): System is operational; cartridge OK (15-20 mg/m³ water vapor content).
- Flashing Yellow Light (b): Pre-alarm. Element is near its service life and will need replacement soon (20-25 mg/m³ water vapor content).
- Flashing Red Light (c): Alarm. Element is exhausted and must be replaced immediately (>25 mg/m³ water vapor content).
- Steady Red Light (c): Alarm. The filter element is missing, or the filtering system is interrupted due to contact or cable failure. Compressor turns off and cannot be turned on again without inserting a new element and/or determining the source of the alarm.
- While the yellow light pulses (b), the steady green light (a) will illuminate because the filter element is not completely saturated.
- If no LEDs illuminate, the PRESEC is not powered or has another type of electrical fault.

Note: "Filter element saturation" occurs when a filter element can no longer absorb sufficient water vapor to produce air/gas that complies with recognized air/gas standards. The PRESEC indicator changes to flashing red at 25 mg/m³, which is the maximum allowable high pressure breathing air water vapor content per European Breathing Air Standard EN12021:2014 for compressors charging high-pressure cylinders greater than 200 bar (2900 psi).

11.0 Pressure Controls

The compressor is equipped with two types of automatic start/stop systems:

- Pressure Switch: Shuts down the compressor at a set pressure.
- Dial-A-Pressure Switch: Allows the operator to dial in a pressure for the compressor to automatically shut off at when the pressure is reached during the filling process.

12.0 Tank Refill Procedure

⚠ Notice

During refill, the operator must be in the work area. During the tank refill phase, it is advisable to submerge tanks in cold water to reduce the drop in pressure that accompanies tank cooling.

⚠ Warning

During tank refill, those not involved in the refill procedure must maintain a safety distance of at least 9 feet (3 meters). Also, it is forbidden to disconnect the hoses from the fittings or the high-pressure out connection while the machine is under pressure.

If an emergency situation occurs during refill, shut down the compressor immediately by pressing the Emergency Stop button. The compressor is equipped with a safety system that automatically shuts down the system when:

- An overpressure event occurs and the safety valve activates without shutting down the compressor.
- The pressure setting on the pressure switch has been reached.
- The electrical power supply is temporarily interrupted.
- The electric motor overload switch is tripped.

Following an emergency shutdown always make sure the cause of the emergency has been eliminated before proceeding with another refill.

⚠ Danger

Should tanks show evident signs of internal or external corrosion, do not refill them even if they have been tested.

⚠ Warning

Use only tested tanks (as proven by a test stamp and/or certificate). The working and tank refill pressures are stamped on the tanks themselves. It is forbidden to refill them at a pressure greater than that indicated.

Different fill valves are available at the time of purchase. Variations include INT (Yoke), DIN232, DIN300, and SCBA. To refill tanks, follow procedures described below and as illustrated in Figure 19:

- Check that tanks to be refilled are in good condition.
    - Tanks must be inspected as required by local law and have evidence (stamped or label) attesting to said certification or inspection.
    - Conduct a visual inspection of the tank/s exterior.
- Check that fill whips and associated fittings are in good condition.
- Set the desired fill pressure in the Dashboard.
- Fit the hose connector (a) to the fill valve (b).
- Screw in the fill valve knob (c) until it is tightened.
- Check that the bleed valve (f) is closed by rotating it clockwise.
- Open the valve (d) by rotating it counterclockwise.
- Start the compressor.
- Open the valve (e) by rotating it counterclockwise.

- Once refilling has been completed wait for automatic shutdown of the compressor with the pressure switch.
- Close valves (d) and (e) by rotating them clockwise.
- Open the bleed valve (f) by rotating it anticlockwise until all the residual air in the whip has been expelled.
- Unscrew the fill valve knob (c) by rotating it counterclockwise.
- Disconnect the tank fill valve.

Never drain a tank completely, not even for seasonal storage or long periods of inactivity. Pressure prevents internal damage caused by moisture intrusion.

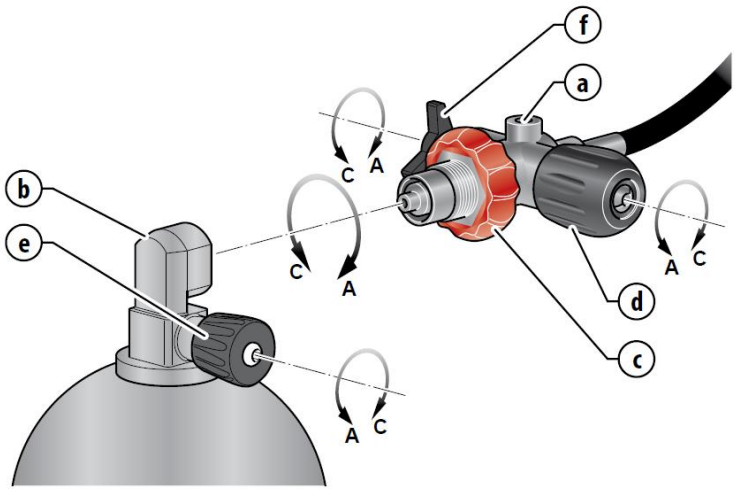


Figure 19. Tank refill illustration (DIN valve pictured).

13.0 Maintenance

13.1 Foreword

To obtain the best possible performance from the compressor and ensure a long working life for all its parts it is essential that personnel follow the use and maintenance instructions with extreme diligence. It is thus advisable to read the information below and consult the manual every time an inconvenience arises. For further information, please contact Nuvair:

Phone: +1.805.815.4044 **Email:** info@Nuvair.com

⚠ Danger

Do not carry out these tasks if the compressor has just shut down and is hot; wait for the compressor to cool. All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the wall socket.

⚠ Danger

Depressurize the entire compressor circuit before carrying out any maintenance tasks. To depressurize the compressor, open the drain valve (a, Figure 20).

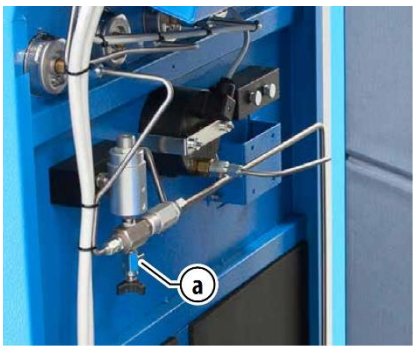


Figure 20. Opening drain valve depressurizes system.

13.2 General

- Proper preservation of the compressor requires thorough cleaning.
- This type of refill station, designed and built according to the most advanced technological criteria, requires only minimum preventive and routine maintenance.

- Before carrying out any maintenance tasks, run checks and/or controls on the compressor, switch off the compressor, remove the plug from the mains socket.
- The residual pressure present in the compressor and all lines must be released.
- During disassembly and reassembly of the compressor, always use suitable wrenches/tools so as not to damage the relevant components.
- Loosen stiff parts with a copper or plastic mallet.
- When refitting parts make sure they are clean and lubricated sufficiently.
- Compressor maintenance tasks must only be carried out by authorized personnel and recorded in the Service Log of this manual.

13.3 Unscheduled Work

Unscheduled work involves repairs and/or replacement of the mechanical parts of one or more compressor components. This work normally needs to be done after some years of use. If substantial modifications are made, the manufacturer cannot be held liable for any dangers that might arise. This work must be carried out by a Nuvair approved mechanic.

13.4 Scheduled Maintenance Table

Maintenance interval times are for typical use and may vary based on the conditions under which the compressor is used.

Before Every Use		**Hours**											
Hourly Maintenance		**5**	**25**	**50**	**100**	**250**	**500**	**1000**	**2000**	**3000**	**4000**	**5000**	**20,000**
Condensate Container Discharge	○	○				●							
Air Intake Filter				○		●							
Lubricating Oil Level Check	○												
Lubricating Oil & Filter					**	●*							
Automatic Shutdown Check	○												
1st, 2nd, 3rd Stage Valves							○	●					
4th Stage Valves								●					
Condensate Separator & Filter						○							●
Hyperfilter Complete						○							
Separator Filter Element Cleaning								○					
1st, 2nd, 3rd Stage Segments									●				
4th Stage								●					
HP Flex Hoses				○						●			
Fitting/Hose Leak Check						○							
Safety Valve						○						●	
Coolers Tube											●		
Transmission Belt Wear & Tension						○	●						
Water & HP Oil Separator											●		

○ Checking and cleaning ● Change

* Nuvair recommends oil changes every 250 hours of runtime, or once per year, whichever is less.

** Change oil every 100 hours when compressor is used with nitrox.

Annual Maintenance	Years			
	1	5	10	15
Air Intake Filter	●			
Lubricating Oil & Filter Change	●			
Condensate Separator & Filter				●
Hyperfilter Complete				●
Separator Filter Element Cleaning	○			
HP Flex Hoses		●		
Safety Valve			●	
Transmission Belt Wear & Tension	●			

○ Checking and cleaning ● Change

13.5 Troubleshooting

Problem	Cause	Solution
The electric motor does not start	• Phase missing	• Check fuses or condenser
Rotation speed and flow rate decrease	• Motor power too low • The belt slips	• Check the motor and the line • Restore drive belt tension
The flow rate diminishes without RPM decreasing	• Valves not working • 4th stage piston worn • Fittings loose / leaking seals • Intake filter clogged • Intake extension kinked • Piston or piston rings worn	• Contact technical support • Contact technical support • Check for leaks with soapy water and eliminate them • Replace filter • Straighten, use stiffer pipe • Contact technical support
Air smells of oil	• Cartridge filter exhausted • Piston rings worn • Condensate not being drained	• Replace filter • Contact technical assistance • Check auto drains and manually drain more often
Compressor overheats	• Direction of rotation wrong • Cooling tubes dirty • Incomplete valve closure (causing overload of another stage) • Poor Ventilation	• Check direction of rotation • Clean cooling tubes • Contact technical support • Contact technical support

13.6 Checking and Changing the Lubricating Oil & Filter

During the compressor initial break-in period, the original oil filter and lubricating oil must be changed at the 25-hour runtime mark. After the initial change of lubricants and filter the oil and oil filter must be changed every 100 hours of use or annually, whichever comes first.

HP Compressor Lubricant: Only use lubricants rated for use with nitrox, such as Nuvair 455™ or Nuvair 751™. **Never mix compressor lubricants.** Nuvair compressors are shipped with Nuvair 455 synthetic food grade lubricant (for breathing air use) or Nuvair 751 (for industrial use).

⚠ Warning

Use only the specified Nuvair lubricants in this system. The use of incompatible lubricants presents a risk of fire and/or explosion and may result in system damage. This can lead to severe personal injury and death.

⚠ Danger

Do not carry out these tasks if the compressor has only just shut down; wait for the compressor to cool. Pressure must be drained before opening LP fill plug.

Any oil spilt during the oil/filter change could cause personnel to slip; wear protective garments and anti-slip footwear and remove traces of oil immediately.

Both oil and filter are classified as special wastes and must therefore be disposed of in compliance with the anti-pollution laws in force.

All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the main socket.

13.7 Checking the Oil Level

The oil level must be checked every five (5) working hours of the compressor. The oil level must be between the minimum and the maximum shown on the oil level viewer (Figure 21 and Figure 22).

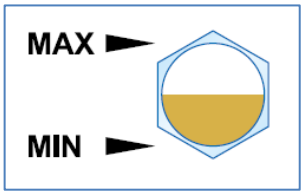


Figure 21. Oil level viewer.

If the oil level is above the maximum level:

- Position a receptacle under the drain hose (Figure 23) so that the oil flows into the exhausted oil receptacle.
- Open the drain valve (a, Figure 22) and let the oil flow out until the oil level returns within the maximum and minimum limits.
- Close the drain valve.

If the oil level is below the minimum level:

- Open the top fill plug (b, Figure 22).
- Top off with oil until the level returns within the maximum and minimum limits.
- Close the fill plug.

⚠ Caution

After running the compressor, the lubricant will be very hot. Take care when removing the drain plug and draining the lubricant to avoid burns.

⚠ Notice

Recommended nitrox compressor lubricant is changed when the first 25 hours of use is reached, then change lubricant in 100-hour cycles or annually.

⚠ Caution

Wear gloves when handling compressor lubricant. If contact with skin is made, wash the skin surface with soap and water.

⚠ Caution

Always wear goggles when handling compressor lubricant. These materials can cause eye irritation. If you accidentally get lubricant into your eyes, flush with fresh water for 15 minutes and contact a physician if irritation develops.

⚠ Caution

Compressor lubricant should be recycled after use at a licensed facility in accordance with Federal, State, and local regulations.

13.8 Changing the Lubricating Oil and Filter

The lubricating oil must be changed every 250 working hours or annually.[1] Every time the lubricating oil is changed the oil filter must be changed also.

To change the oil:

- Position a used oil receptacle with a capacity of at least 1.2 gal (5 L) under the drain valve (a, Figure 22) so the oil flows into the receptacle. If necessary, use the supplied oil drainpipe (d, Figure 23), connecting the pipe fitting to the condensate drain tap (a, Figure 22).
- Open the top plug (b, Figure 22).
- Remove the plug (i, Figure 22), open the tap (a) and drain all the oil.
- Unscrew the filter (c, Figure 22) being sure to recover the oil inside it.
- Replace the filter (c) with a new one.
- Wet the gasket (g, Figure 22) of the filter with a little oil and firmly tighten the filter manually.
- Close the drain valve (a).
- Remove the top-up plug (b).
- Fill the oil sump with 3.5 L (0.92 gal) of oil from top oil plug (see “7.6.1 Oil table”).
- Close the oil top plug (b).
- Switch on the compressor and run it depressurized for 30 seconds.
- Switch off the compressor and remove the plug from the main power supply.
- Check the oil level (h, Figure 22); if the oil level is not within the allowed limits top up or drain off.

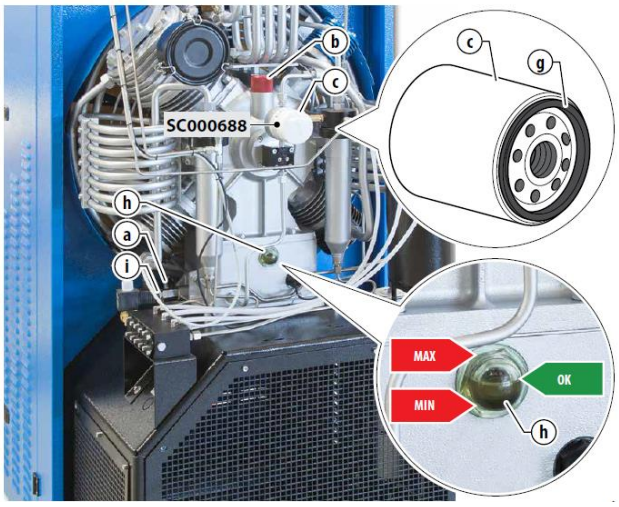


Figure 22. Checking and changing lubricating oil.

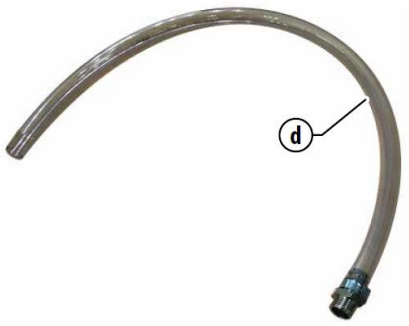


Figure 23. Oil drain hose.

[1] According to Coltri specifications, a new compressor using synthetic lubricants can operate up to 1000 hours between oil changes. At Nuvair, we prefer to have oil changed every 250 hours (or once per year, whichever interval is less) unless you are taking advantage of an oil analysis program that confirms the oil is still good.

- Replace the plug (i).

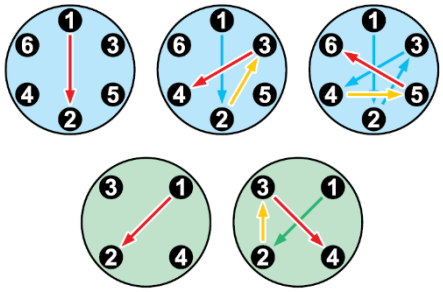
13.9 Tightening Torque Values

The table below shows tightening torques for bolts or hexagonal-head or cylindrical-head recessed hexagonal bolts and screws, except for specific cases indicated in the manual.

Pipe connections (swivel nuts, compression fittings) should be finger tight plus an additional 1/2 turn.

Tightening Torque Values	
Thread	**Maximum Torque**
M6 - 1/4”	**10** Nm (**7** ft-lb)
M8 - 5/16”	**25** Nm (**18** ft-lb)
M10 - 3/8”	**45** Nm (**32** ft-lb)
M12 - 1/2”	**75** Nm (**53** ft-lb)
M14 - 9/16”	**120** Nm (**85** ft-lb)
M16 - 5/8”	**200** Nm (**141** ft-lb)

6 Bolt and 4 Bolt Torque Sequence



13.10 Changing the Air Intake Filter

After putting the compressor into service, the intake filter must be changed after the first 50 working hours.

The air filter must then be changed every 250 working hours or annually.

Rotate the filter cartridge inside the filter housing 90° every 50 hours.

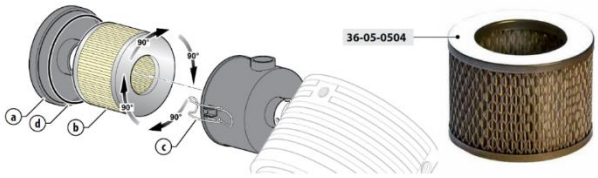


Figure 24. Rotating the air intake filter.

Change the air filter by following these steps (as illustrated in Figure 25):

- Open clips (c) and remove the air filter cover (a).
- Remove the air filter cartridge (b).
- Replace the cartridge with a new one.
- Replace the O-ring (see “d” Figure 24) with a new one.
- Reclose the cover (a) and close the clips (c).

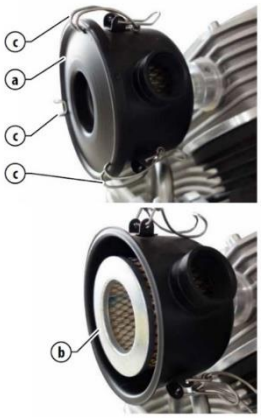


Figure 25. Air filter.

⚠ Danger

Do not carry out these tasks if the compressor has just shut down and is hot; wait for the compressor to cool. All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the wall socket.

⚠ Notice

If the compressor is used in a dusty environment, the filter change interval should be reduced to every 50 hours, or more frequently as required.

13.11 Transmission Belts

Belt tension must be checked monthly. The transmission belts must be replaced every 500 working hours of the compressor.

⚠ Danger

Do not carry out these tasks if the compressor has just shut down and is hot; wait for the compressor to cool. All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the wall socket.

13.12 Checking Transmission Belts

To check for proper transmission belt tension (g, Figure 26) exert a pressure of approximately 22 lb (10 kg) on the belt; check the belts do not flex by more than 1 cm (0.39 in) with respect to its original position. Should they flex more than this, the belts must be replaced.

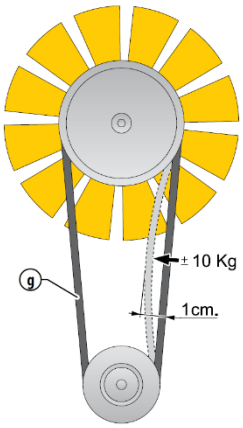


Figure 26. Transmission belt tension.

13.13 Changing Transmission Belts

To replace the transmission belts, proceed as follows (see Figure 27):

- Insert a screwdriver (a) between the first belt (b) and the pulley (c) of the cooling fan (d).
- Rotate the fan (d) counterclockwise until the belt comes out of the pulley groove.
- Repeat the procedure on the second belt.
- Change the belts with new ones. Make sure the belt model and length are the same. Check that the characteristics of the new belt are identical to those of the old one.
- Insert the new belt on the internal groove of the electric motor pulley (e).
- Insert the belt on the internal groove of the fan pulley while simultaneously turning the fan by hand until the belt slips perfectly into the groove of the pulley.
- Check that the belt is inserted perfectly in the grooves of the two pulleys and that belt tension is correct.
- Insert the second belt and carry out the same procedure described for the first belt.

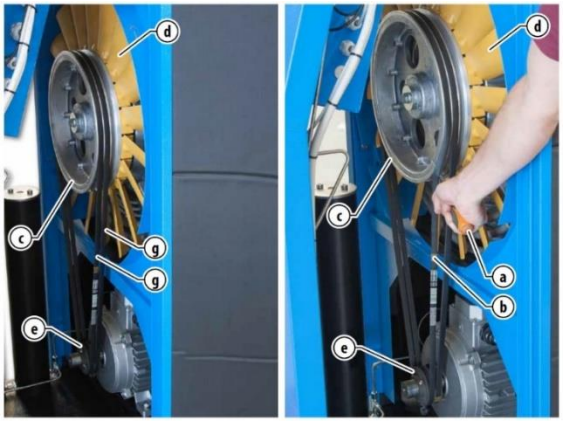


Figure 27. Changing the transmission belt.

If belts (g) tension is not correct contact Nuvair for technical assistance.

13.14 Changing Air Filtration Cartridges

Correct filtering system component maintenance ensures that the quality of the air exiting the compressor complies with the international breathing air standards.

The air filtration elements (cartridges) must be replaced at intervals calculated on the characteristics of the environment in which the compressor is located. To calculate these intervals, refer to the table below.

Figure 28. Filter canisters.

The filter cartridge must be replaced before the air develops an unpleasant smell, when the PRESEC System (section 0) indicates filter saturation, or when the litmus test paper mounted inside the cartridge element (as illustrated in **Error! Reference source not found.**) turns white or a color other than blue.

The *MCH36 Silent Touch* compressor comes standard with one (1) drying filter (SKU NUV65677) and one (1) breathing air filter (SKU NUV65247). Do NOT use any substitute. Change filter elements every 60,000 cubic feet of air pumped. If the compressor system is operated in high humidity and/or high temperature, filter elements must be changed more often. See section 20.2 for details on filter element "life factors."

⚠ Caution

If the compressor is used in an environment where CO (carbon monoxide, or "exhaust fumes") may be present, a special tri-chemical filter element (containing a CO catalyst) must be used and can be supplied on request.

- Shut down the compressor system.
- Open and leave open the drain valve (Figure 20) to vent all pressure from the circuit.
- Use the wrench (a, Figure 29) to apply leverage on the screw heads (b) of the plug (c) and rotate counterclockwise. If a filter wrench (SKU TL-033) is not available, a large screwdriver can be used to unscrew the filter plug.
- Remove the filter plug (c).
- Remove the first cartridge (d1) and the second cartridge (d2) and replace with new cartridge elements. Place pressure on each cartridge to seat the element fully into the canister.
- Replace the O-ring (e) on the plug (c) every time the filter is changed.
- Reinstall cap to canister by rotating clockwise and tightening with screwdriver or cap wrench (a).
- There are sealing O-rings (e-f) on the plug and the filter cartridge. If these O-rings deteriorate, the air is released via the venting hole (g).
- If you notice any venting from this hole replace the O-rings. When replacing the O-rings observe the precautions described at the start of the section.
- Close the drain valve (Figure 20).

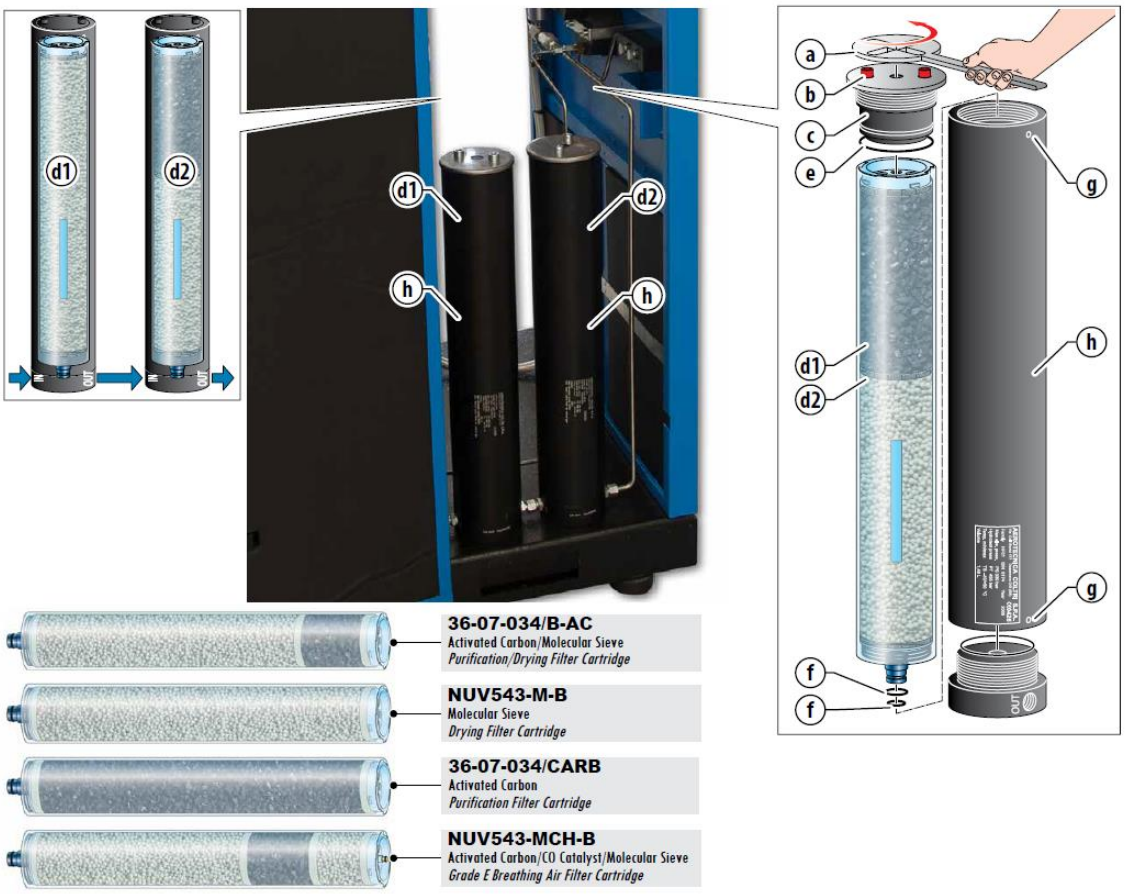


Figure 29. Air filter changing diagram.

⚠ Danger

Do not carry out these tasks if the compressor has just shut down and is hot; wait for the compressor to cool. All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the wall socket.

⚠ Warning

Be sure that all pressure has been relieved from the system prior to opening any filtration canister. Failure to vent pressure from the system prior to opening the canister can lead to serious personal injury or death. Difficulty turning the filter cap may indicate there still is pressure in the filter canister.

⚠ Caution

If the compressor is in an area where there is high humidity and high heat, the life of all filtration elements may be as little as 35% of rated operating capacity. Check the compressor manual and appendix for details on Filter Element Life Factors.

13.15 Temperature Effect on Filter Life

This Filter Replacement Frequency Calculation Table is based on total hours of compressor runtime. The table values are based on pressure maintenance valve calibrated to 2900 psi (200 bar). Higher pressures will affect overall performance. Filter Replacement "Life Factors" are discussed in section 20.2.

Filter Temperature		Filter Duration (in hours)
°F	°C	Total Compressors Hours
104	40	21
86	30	35
68	**20**	**54**
50	10	81
32	0	150
23	-5	238

⚠ Warning

The active carbon filters are classified as special waste once the compressor has been used to make air. They must be disposed of in compliance with the local antipollution standards in force.

13.16 Condensate Discharge

An outflow of condensate water with lubricating oil is normal during refills: the quantity will depend on the level of humidity in the air. The condensate must be disposed of as per your local "Waste disposal" rules.

⚠ Notice

The condensate tank must be drained at the end of every working day or every 2 to 3 hours of operation. The compressor condensate must be drained every 5-10 minutes of operation.

The Dashboard operates the condensate discharge "auto drain" automatically. Users can set the auto drain timer in the Dashboard. The yellow TEST PURGE button (Figure 3, page 16) should be pressed every day to make sure that the auto drain is working properly.

The condensate is collected in a tank (Figure 30); periodically check this tank to prevent overfill and consequent leakage of the condensate liquid. The tank is equipped with a sensor that will alarm if the condensate tank is overfull. Once drained, the alarm can be reset in the Dashboard.

To empty the tank, remove the condensate drain hose, disconnect the sensor, and empty the tank. Reverse the process to reinstall the tank components and put the can back in its housing.

An outflow of condensate water with lubricating oil is normal during refills: the quantity will depend on the level of humidity in the air. Condensate must be disposed of according to the instructions shown in section 15.4, Waste Disposal.

Figure 30. Condensate tank.

13.17 Changing Flex Hoses

The hoses must be changed periodically (every 5 years or every 3000 hours) or when they show signs of abrasion/wear/damage. The bending radius of the hoses must not be less than 250 mm (9.8 in).

⚠ Danger

Do not carry out these tasks if the compressor has just shut down and is hot; wait for the compressor to cool. All maintenance work must be carried out with the compressor OFF and the power supply lead unplugged from the wall socket.

⚠ Danger

Depressurize the entire compressor circuit before carrying out any maintenance tasks. To depressurize the compressor, open the drain valve (a, Figure 20).

Tank refill pressure is very high. Therefore, before refilling the tanks check that hoses are correctly connected and in good condition. Check also that the valves on any unused hoses are closed properly to prevent the dangers associated with hose whipping.

When the tanks are being refilled, unauthorized personnel must remain at a distance of at least 3 meters (10 feet). It is strictly forbidden to disconnect the hoses from the fittings or refill valve when the machine is under pressure.

To change the tank refill hoses, proceed as follows:

- Disconnect the bottle refill hoses by unscrewing the fittings (17 mm wrench).
- Replace the old hoses with new ones.
- Screw the hoses onto the connectors (a, Figure 31).
- Use a dynamometric wrench to tighten the hoses on the compressor with a torque of 15 Nm.

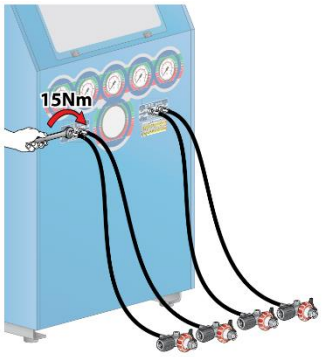


Figure 31. Tank refill hose change.

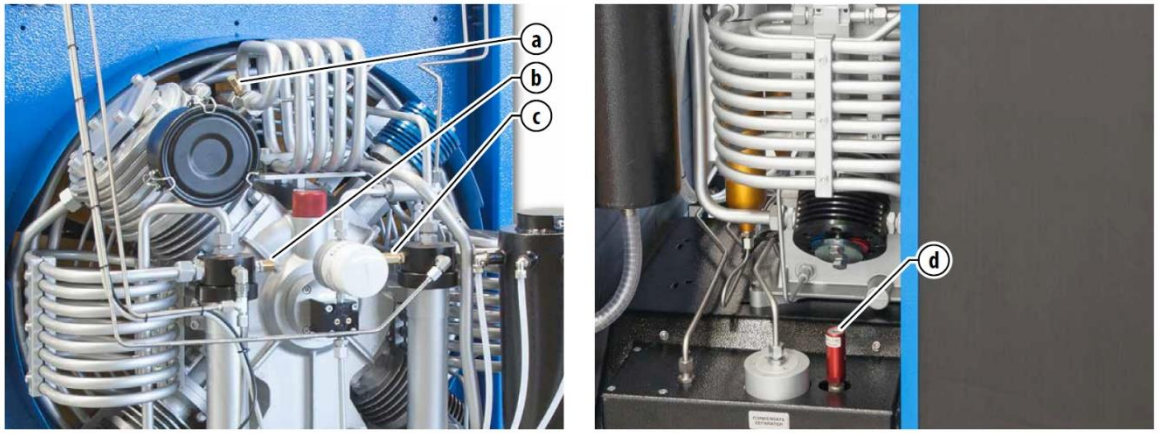
13.18 Safety Valves

The safety valves must be replaced every 10 years or 5000 hours. There are four safety valves installed on the compressor. Each safety valve is set to the pressure value shown in Figure 32.

⚠ Danger

Tampering with the safety valve to increase the pressure setting is strictly forbidden. Tampering with the safety valve can seriously damage the compressor, cause serious injury to personnel and renders the warranty null and void.

Should safety valves fail to work properly, contact Nuvair for technical assistance.



a	b	c	d
5 bar / 73 psi	22 bar / 319 psi	100 bar / 1450 psi	232-300-330-420 bar / 3300-4300-4700-6000 psi

Figure 32. Safety valve locations.

14.0 Power Requirements

⚠ Warning

Never use extension cords to provide power to your compressor system. The system must be properly wired according to national and local electrical codes by a qualified electrician. Improper wiring may lead to fires, which can cause serious personal injury or death.

Electrical wiring and connections should be made by a qualified electrician in accordance with all national and local electrical codes. Check all system specifications provided in this manual when working on the compressor system the main breaker at the power source must be “locked out” in the off position.

14.1 Amperage System Load

Voltage	Phases	Hertz	Amperage	Horsepower	Kilowatts
208-230	3	60	48	20	15
380-415	3	50	29	20	15
440-480	3	60	25	20	15

14.2 Rotation Check

Always turn on (bump) starter and run motor very briefly to check for proper direction of rotation. A sticker (Figure 33) indicates proper rotation direction. A directional arrow is also stamped into the fan cover.

Figure 33. Rotation direction label.

⚠ Notice

Operation in reverse direction for extended periods of time will cause a reciprocating compressor to run hot and perform poorly and may cause permanent damage.

15.0 Storage

Should the compressor not be used, it must be stored in a dry sheltered area at an ambient temperature of between +32°F and +104°F (0°C and +40°C). Store the compressor away from sources of heat, flames or explosive.

15.1 Stopping the Machine for a Brief Period

If you do not intend to use the compressor for a brief period proceed with general cleaning. Once the compressor has cooled down you should wipe off dirt, dust and moisture on the compressor and the surrounding area.

15.2 Stopping the Machine for an Extended Period

If you do not intend to use the compressor for a long period, extract the active carbon filter cartridge. Run the compressor for a few minutes without actually filling tanks so as to flush out all the residual condensate. Stop the compressor, disassemble the intake filter, restart the compressor and spray a few drops of oil into the air intake hole so that a light film of lubricant is aspirated and penetrates the interior of the compressor. Stop the compressor and refit the air intake filter. Clean the external parts: eliminate any moisture, salt, or oil deposits. Protect the compressor from dust and water by storing it in a clean, dry place. Switch off the machine via the main switch and remove the plug from the mains power socket. Proceed with a thorough general clean of all machine parts. During machine downtimes it is advisable to run the compressor for 20 minutes every 15 days.

15.3 Dismantling and Putting the Compressor Out of Service

Should you decide not to use the compressor or any of its parts any longer you must precede with its dismantling and putting it out of service. These tasks must be carried out in compliance with the standards in force.

⚠ Warning

Should the compressor, or a part of it, be out of service its parts must be rendered harmless so they do not cause any danger.

⚠ Warning

Bear in mind that oil, filters, or any other compressor part subject to differentiated waste collection must be disposed of in compliance with the standards in force.

15.4 Waste Disposal

Use of the compressor generates **waste** that is classified as **special**. Bear in mind that residues from industrial, agricultural, crafts, commercial and service activities not classified by quality or quantity as urban waste must be treated as special waste. Deteriorated or obsolete machines are also classified as special waste. Special attention must be paid to active carbon filters as they cannot be included in urban waste: observe the waste disposal laws in force where the compressor is used. Bear in mind that it is compulsory to record loading/unloading of exhausted oils, special wastes and toxic-harmful wastes that derive from heavy/light industry processes. Exhausted oils, special wastes and toxic-harmful waste must be collected by authorized companies. It is especially important that exhausted oils be disposed of in compliance with the laws in the country of use.

⚠ Notice

Disassembly and demolition must only be carried out by qualified personnel. At every stage of demolition observe the safety regulations contained in this manual carefully.

15.5 Dismantling the compressor

Dismantle the compressor in accordance with all the precautions imposed by the laws in force in the country of use. Before demolishing request an inspection by the relevant authorities and relative report. Disconnect the compressor from the electrical system. Eliminate any interfaces the compressor may have with other machines, making sure that interfaces between remaining machines are unaffected. Empty the tank containing the lubricating oil and store in compliance with the laws in force. Proceed with disassembly of the individual compressor components and group them together according to the materials they are made of the compressor mainly consists of steel, stainless steel, cast iron, aluminum and plastic parts. Then scrap the machine in compliance with the laws in force in the country of use.

16.0 Instructions for Emergency Situations

16.1 Fire

In the event of fire, use a CO_2 extinguisher in compliance with the relevant standards in force. Contact the fire department.

17.0 Maintenance Register

17.1 Customer Service

Customers continue to receive assistance after the purchase of a compressor. To this end **Nuvair** has created a customer service network covering the entire country.

17.2 Scheduled Maintenance

The scheduled maintenance program is designed to keep your compressor in perfect working order. Some simple tasks, described in this manual, can be carried out directly by the customer; others, instead, require that the work be carried out by trained personnel. For the latter we recommend you always contact our office. This section provides a simple tool with which to request assistance and register completed scheduled maintenance work. Start-up and maintenance checks/tasks, once completed by our qualified technician, are registered in this maintenance chapter by way of an official stamp, signature, and inspection date; the number of working hours is also registered. The maintenance schedules/coupons easily let you know when our assistance service should be contacted to carry out work.

17.3 Using the compressor under heavy duty conditions

Where compressors are used in particularly difficult conditions (high levels of pollution, presence of solid particulate in suspension etc.), scheduled maintenance tasks must be carried out more frequently as per the advice given by our assistance network.

17.4 Nuvair Customer Care Contact

Telephone: +1.805.815.4044
Fax: +1.805.486.0900
E-mail: info@Nuvair.com
Web: www.Nuvair.com/

18.0 Spare Parts List

Compressor System Components	Type	Part Number
Compressor Lubricant, Food Grade (nitrox compatible)	Nuvair 455 (1 gal)	9406
Compressor Lubricant, Industrial Grade	Nuvair 751 (1 gal)	9403
High Pressure Air Filter Elements	Drying Filter Cartridge Breathing Air Filter Cartridge	NUV65677 NUV65247
Air Intake Filter Element		36-05-0504
Oil Filter	Spin On	SC000688
Transmission Belt		A90

19.0 Service Log

Date	Technician Name	Service Performed

20.0 Appendix

20.1 Supply and Breathing Air Specifications

All supply and breathing air must meet the following requirements of CGA G-7.1-1997. Supply air delivered to the Membrane System must be purified to meet Grade D or E quality, and periodic air quality testing to assure compliance is recommended. All breathing air for diving produced by the downstream compressor must be purified to meet Grade E quality, and periodic air quality testing to assure compliance is mandatory.

Item	Grade D	Grade E
Oxygen	19.5-23.5%	20-22%
Carbon Dioxide (maximum)	1000 PPM	1000 PPM
Carbon Monoxide (maximum)	10 PPM	10 PPM
Hydrocarbons (maximum)	Not specified	25 PPM
Water Vapor (maximum)	Not specified	Not specified
Dew Point (maximum)[1]	Not specified	Not specified
Oil & Particles (maximum)[2]	5 mg/m³	5 mg/m³
Odor	None	None

Notes: [1] Dew point of supply air must be >10ºF (6ºC) colder than coldest ambient air expected.
[2] Supply air delivered to the membrane system must contain <0.003 PPM oil vapor.

All breathing nitrox produced for diving must be purified to meet these same requirements, except for oxygen content. Nitrox oxygen content must measure within ±1% O_2 of the specified value of the mixture using a properly calibrated oxygen analyzer (i.e., nitrox produced with a target content of 32% O_2 must measure in the range of 31-33% O_2). Periodic air quality testing to assure compliance is mandatory.

20.2 Filter Element Life Factors

Breathing air filter element life is typically rated by manufacturer based on an air temperature of 80ºF at the filter inlet. Under normal operation this temperature is +12ºF (+5ºC) warmer than the ambient air, resulting in an equivalent ambient temperature rating at +68ºF (+20ºC).

To determine element life at a different ambient temperature, multiply the rated life by the life factor listed below:

Filter Temperature	Ambient Temperature	Filter Element Life Factor
53ºF (12ºC)	41ºF (5ºC)	2.6 × Life
62ºF (17ºC)	50ºF (10ºC)	1.8 × Life
71ºF (23ºC)	59ºF (16ºC)	1.35 × Life
80ºF (27ºC)	**68ºF (20ºC)**	**1 × Life**
89ºF (32ºC)	77ºF (25ºC)	0.8 × Life
96ºF (36ºC)	84ºF (29ºC)	0.55 × Life
105ºF (41ºC)	93ºF (34ºC)	0.45 × Life
114ºF (46ºC)	102ºF (39ºC)	0.35 × Life

21.0 Nuvair Compressor System Warranty

Nuvair extends a limited warranty, which warrants the compressor system to be free from defects in materials and workmanship under normal use and service for a limited period. All other Original Equipment Manufacturer (OEM) components used in the system are warranted only to the extent of the OEM's warranty to Nuvair. Nuvair makes no warranty with respect to these OEM components, and only warrants the workmanship that Nuvair has employed in the installation or use of any OEM component. This warranty is not transferable.

Nuvair will, at its discretion and according to the terms as set forth within, replace or repair any materials which fail under normal use and service and do not exhibit any signs of improper maintenance, misuse, accident, alteration, weather damage, tampering, or use for any other than the intended purpose. Determination of failure is the responsibility of Nuvair, which will work together with the customer to adequately address warranty issues. When any materials are repaired or replaced during the warranty period, they are warranted only for the remainder of the original warranty period. This warranty shall be void and Nuvair shall have no responsibility to repair or replace damaged materials resulting directly or indirectly from the use of repair or replacement parts not approved by Nuvair.

Maintenance Items

Any materials which are consumed, or otherwise rendered not warrantable due to processes applied to them, are considered expendable and are not covered under the terms of this policy. This includes maintenance and consumable items listed as part of a suggested maintenance program included with system documentation.

Return Policy

Application for warranty service can be made by contacting Nuvair during regular business hours and requesting a Return Material Authorization (RMA) number. Materials that are found to be defective must be shipped, freight prepaid, to the Nuvair office in Oxnard, California USA. Upon inspection and determination of failure, Nuvair shall exercise its options under the terms of this policy. Warranty serviced materials will be returned to the customer via Nuvair's preferred shipping method, at Nuvair's expense. Any expedited return shipping arrangements to be made at customer's expense must be specified in advance.

Limitation of Warranty and Liability

Repair, replacement, or refund in the manner and within the time provided shall constitute Nuvair's sole liability and the purchaser's exclusive remedy resulting from any nonconformity or defect. Nuvair shall not in any event be liable for any damages, whether based on contract, warranty, negligence, strict liability or otherwise, including without limitation any consequential, incidental, or special damages, arising with respect to the equipment or its failure to operate, even if Nuvair has been advised of the possibility thereof. Nuvair makes no other warranty or representation of any kind, except that of title, and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, are hereby expressly disclaimed. No salesman or other representative of Nuvair has authority to make any warranties.

Additional Record of Changes

It is the responsibility of the owner of this product to register their ownership with Nuvair by sending the warranty card provided to Nuvair. This card is to establish registration for any necessary warranty work and as a means of communication that allows Nuvair to contact the user regarding this product.

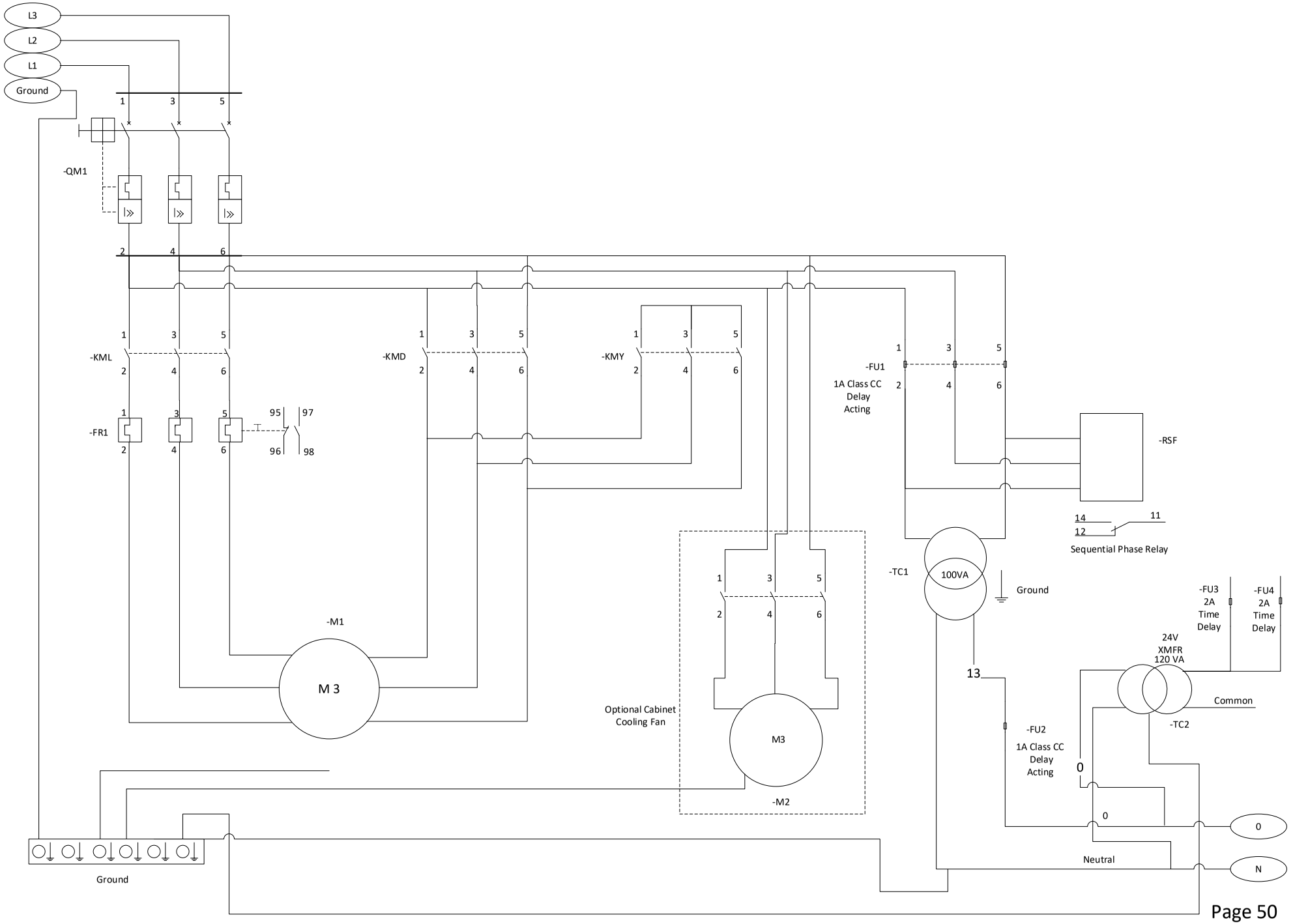
The user must notify Nuvair of any change of address by the user or sale of the product. All changes or revisions to this manual must be recorded in this document to ensure that the manual is up to date.

Change Date	Description of Change

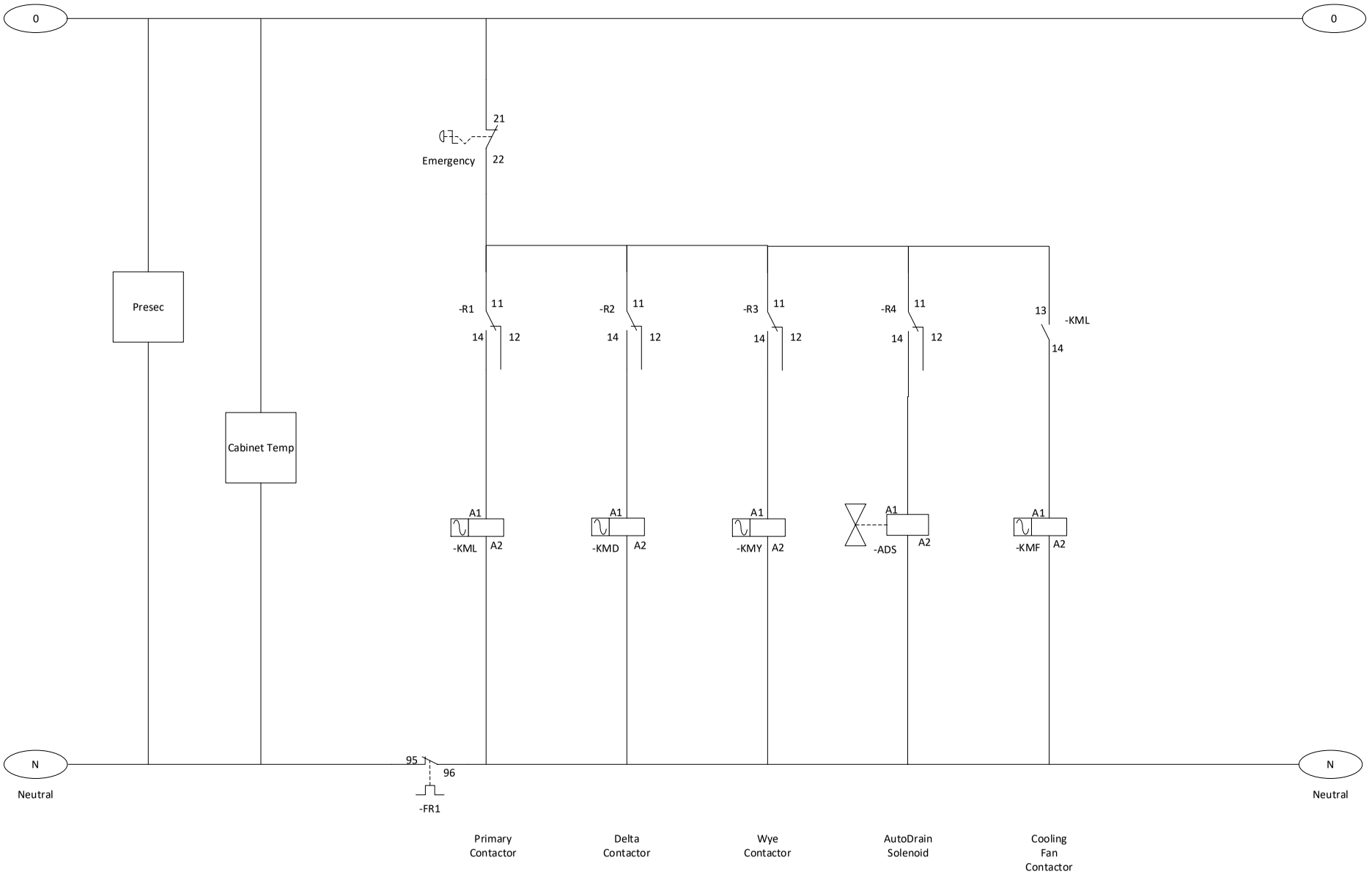
22.0 PLC Wiring Schematics

(PLC wiring schematics on the following pages)

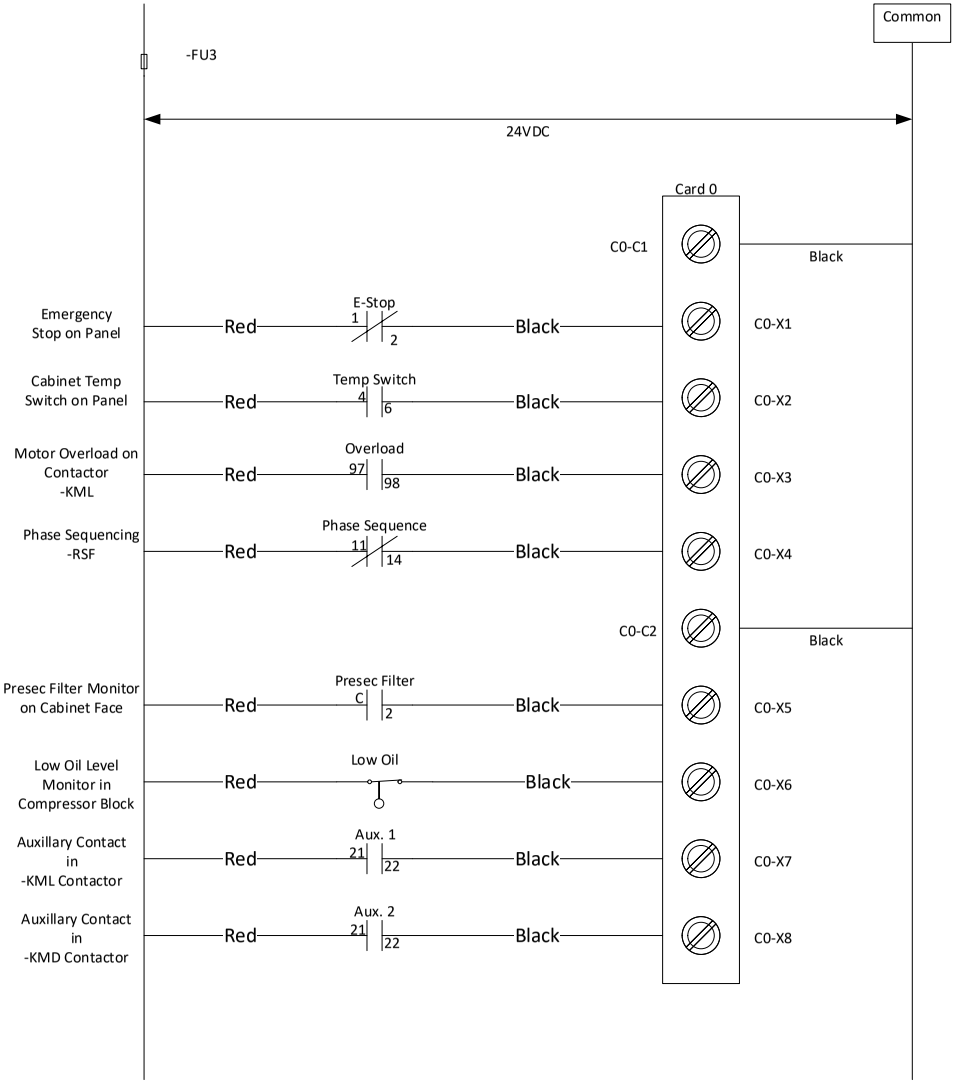
Electronic Touch Screen MCH 36 Primary Wiring

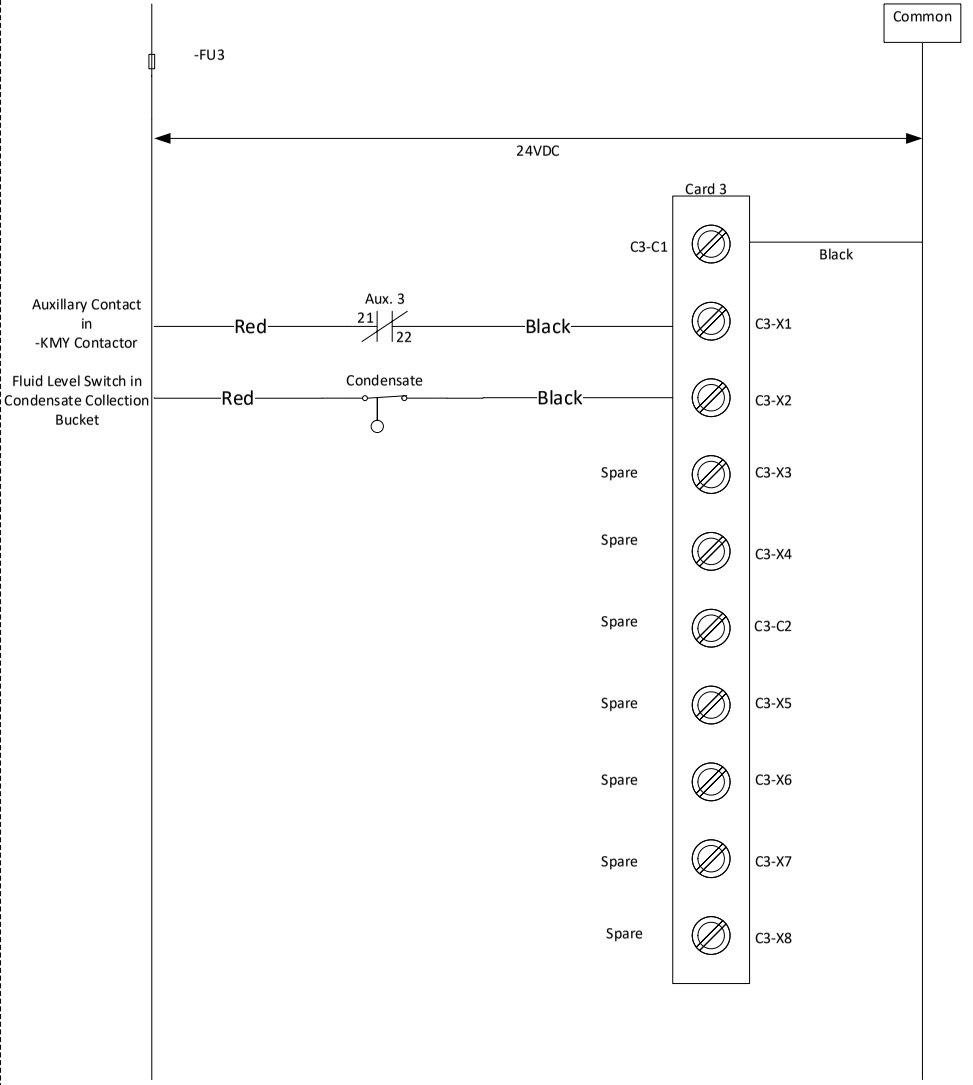


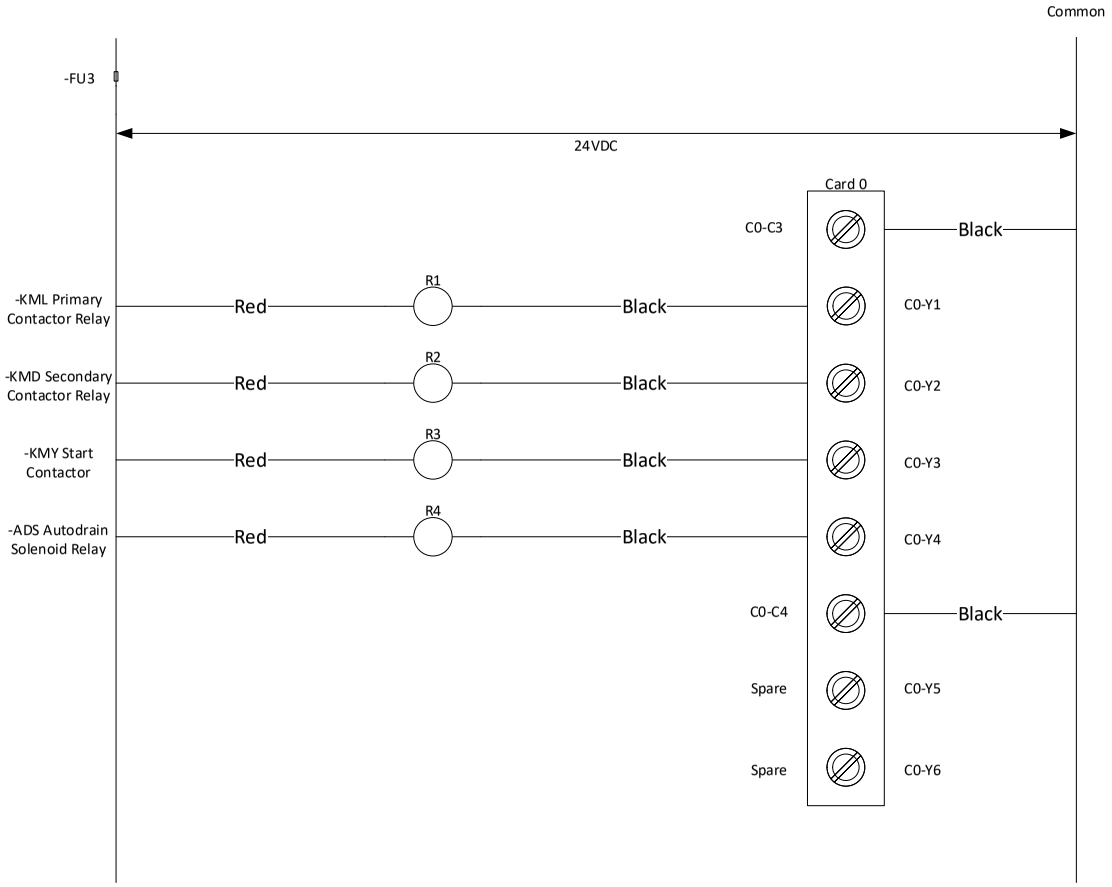
Electronic Touch Screen MCH36 Control Wiring



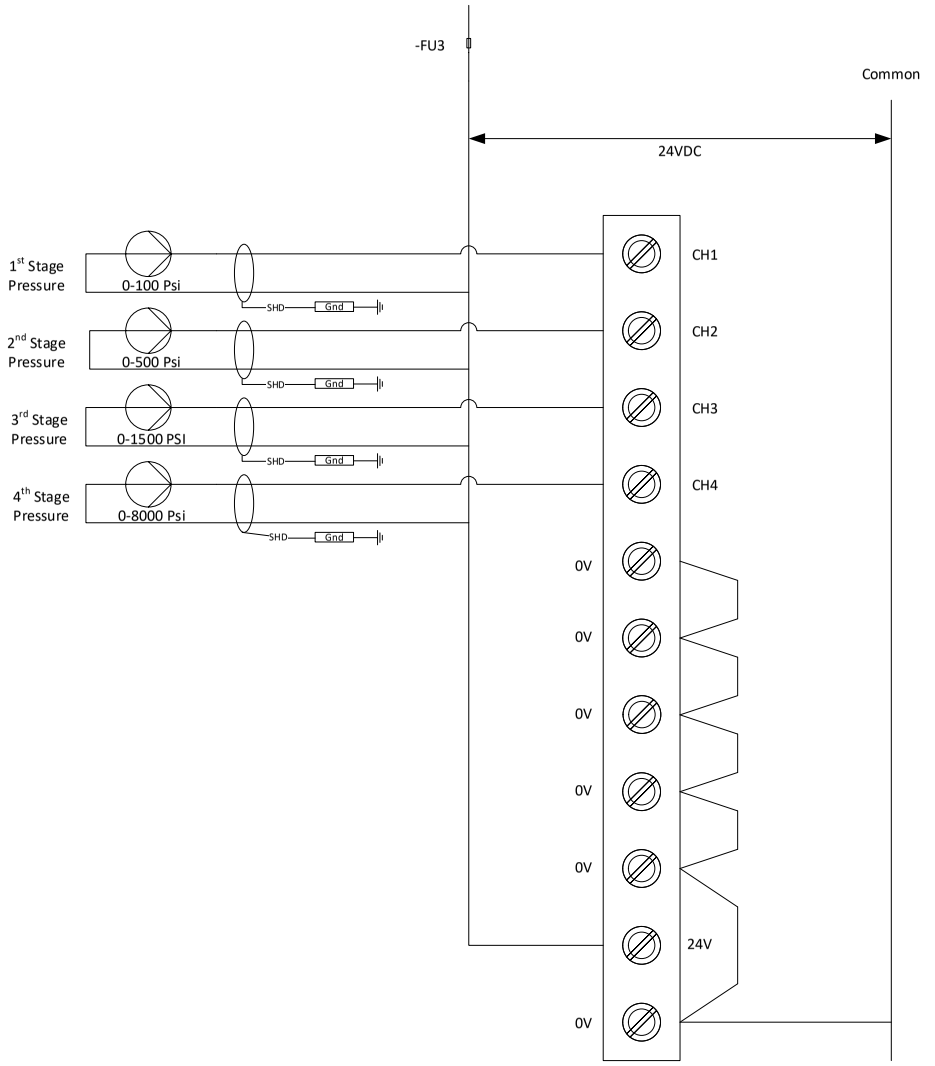
Electronic Touch Screen MCH 36 Digital Inputs

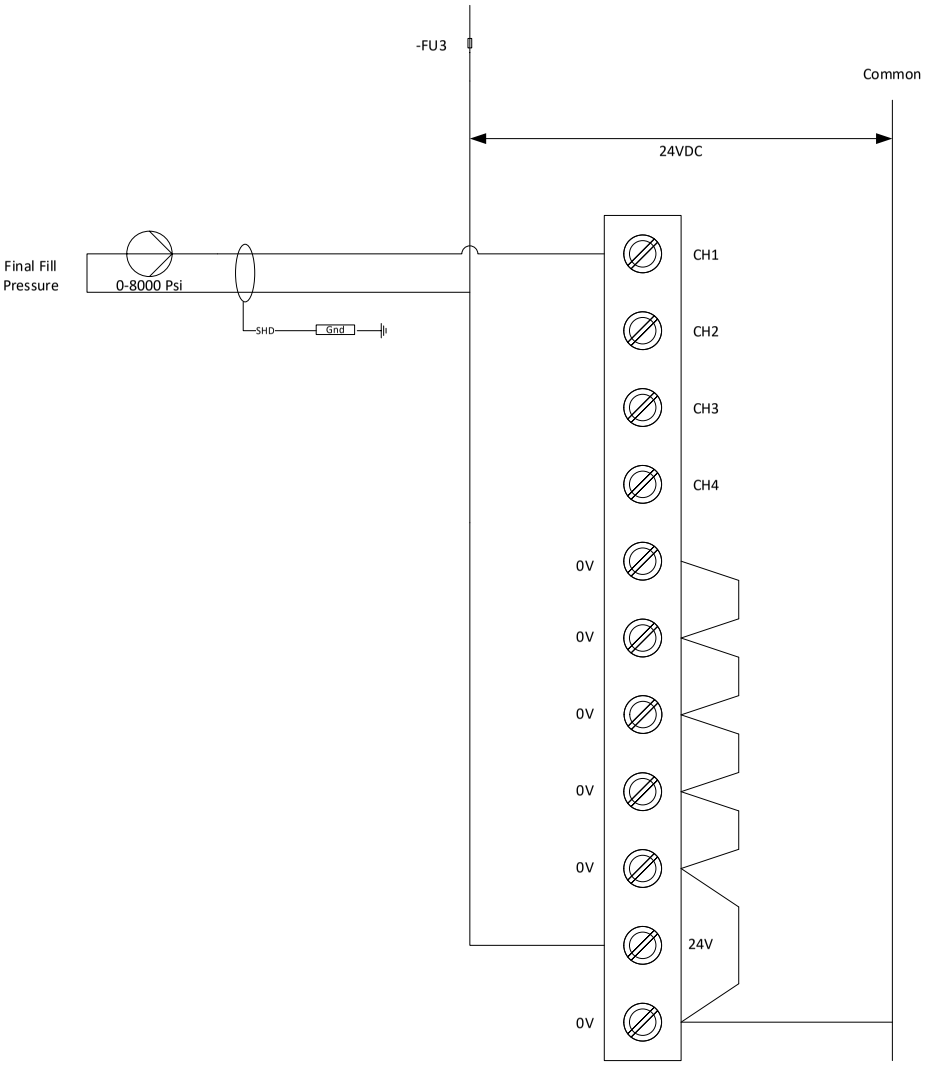





Common
-FU3
24VDC
Card 0
C0-C3
Black
-KML Primary Contactor Relay
R1
Red
Black
C0-Y1
-KMD Secondary Contactor Relay
R2
Red
Black
C0-Y2
-KMY Start Contactor
R3
Red
Black
C0-Y3
-ADS Autodrain Solenoid Relay
R4
Red
Black
C0-Y4
C0-C4
Black
Spare
C0-Y5
Spare
C0-Y6

Electronic Touch Screen MCH 36 Transducers





Electronic Touch Screen MCH 36 Component List

Identifier	Qty.	Unit	Item Descriptiom	Manufacturer	Part Number
QM1	1	Ea	Automatic Breaker Switch	Siemens	3RV2742-5LD10
KML	1	Ea	Motor Contactor	Siemens	3RT2028-1AL20
FR1	1	Ea	Motor Overload	Siemens	
KMD	1	Ea	Motor Contactor	Siemens	3RT2028-1AL20
KMY	1	Ea	Motor Contactor	Siemens	3RT2027-1AL20
TC2	1	Ea	24 VDC Power Supply	Rhino	PSB24-120S
RSF	1	Ea	Phase Sequencer	Carlos Gavasi	DPA51CM44
TC1	1	Ea	Control Transformer	Italweber	OCM032040M898
KMF	1	Ea	Fan Contactor	Fuji Electric	SC-02-220VAC
FU1	1	Ea	3 Phase Class CC Fuse Holder	Siemens	3NW75330HG
FU2	1	Ea	1 Phase Class CC Fuse Holder	Siemens	3NW75130HG
R1	1	Ea	24 Volt Relay	Allen Bradley	700-HLT1Z-24
R2	1	Ea	24 Volt Relay	Allen Bradley	700-HLT1Z-24
R3	1	Ea	24 Volt Relay	Allen Bradley	700-HLT1Z-24
R4	1	Ea	24 Volt Relay	Allen Bradley	700-HLT1Z-24
HMI	1	Ea	10 Inch HMI Display	Automation Direct	EA9-T10WCL
CTS	1	Ea	Cabinet Temperature Switch	Ascon Technologic	R-38
ESS	1	Ea	E- Stop Switch		HY57B
PLC	1	Ea	Programmable Input Controller	Click	C0-00DR-D
PLC2	2	Ea	Analog Input Module	Click	C0-04AD-1
PLC3	1	Ea	Discrete Input Module	Click	C0-08ND3
FU3	1	Ea	Micro Fuse Holder	Konnect-It	KN-F10

Nuvair
Phone +1.805.815.4044
Fax +1.805.486.0900
Address 1600 Beacon Place
Oxnard, CA 93033 USA
Email info@nuvair.com
Website www.Nuvair.com

Rev. 05.2021
SKU 8044-PLC