

Digital Compressor Controller

for control

Model R1 - Single Compressor

Model R2 - Duplex Compressor

Hardware up to version v3.0

Software up to version 17.0915

Model R1



Model R2



SAM Controllers

www.SamControllers.com

North Carolina, USA

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Controller Overview

The Digital Compressor Controller (DCC) is an advanced and smart technology that controls air compressors in the most controllable and tractable environment available. The advanced Digital Compressor Controller provides precision compressor control, control of aux valves, cycles, timings and logging performance data with minimum and maximum machine temperatures.

Cascading of the Upstream and Downstream compressors allows to control them as a Slave and receive a command from Master to help achieve desired pressure faster.

While controlling a Duplex compressor, Controller allows to run two available compressors at certain conditions in dual mode, providing double the flow rate in the most economical way. At same time, controller will do a time usage balance for both compressors, to do a controllable asset management.

With multiple selectable display screens shows valuable details about your compressor for maintenance, use and statistics.

Overall, the digital Compressor Controller ensures longevity of the connected equipment, and over period of time will save operational cost and help to prevent uncontrollable events. In addition, it will store the most critical equipment usage parameters, such as temperatures, sensors failures, and precision running time and their cycling.

Multiple compressor controllers, Display status, Compressor City controllers, advance communication options, recording functions, WiFi and MODBUS interfacing are available as custom built systems. Visit www.SAMcontrollers.com for further details.

Safety

Please follow all directions during installation and usage of The Compressor Controller to prevent damages and injuries.

- ❖ Read this manual in its entirety prior to attempting installation.
- ❖ Use with a redundant control device attached
- ❖ Carefully Ground all associated equipment and all their components according to local Codes, to prevent any damages and electric shock.
- ❖ Before connecting to power, please check carefully all connections and all voltages.
- ❖ Do not modify or attempt to open Digital Compressor Controller – there are no serviceable parts inside.
- ❖ Do not use outdoor or in wet conditions - It can damage the electronic components within the unit and cause unintended function that could result in property damage, injury or death. Use only approved protection enclosure that is rated for electronic and electric equipment.
- ❖ When connecting wires, make sure all terminals are tightened and properly installed. Use soldering with tin on all stranded wires. Improper connections could cause fire, equipment damage, injury and or death.
- ❖ All equipment needs to be located in appropriate area for installation, with safety precautions to be undertaken by a qualified and licensed person.
- ❖ Do not exceed any operating parameters.
- ❖ When cleaning on the Compressor Controller, do not use any solvents, oil, etc.
- ❖ Do not use a Digital Compressor Controller in presence of flammable or explosive gases, excessive moisture, dripping condensation, or direct sunlight.
- ❖ Install the Compressor Controller in a way to prevent any vibration and shocks that could be transmitted to the Compressor Controller.
- ❖ All Sensors and output devices need to be connected with correct polarity, single and proper shielding and grounding where is required. Inappropriate and incorrect connection may damage sensor or Controller, or both and will void the warranty.

Please note: setting, sizes, components, the contents of this and other material could be changed, at any time without notice.

THIS PRODUCT CAN CAUSE SERIOUS INJURY OR DEATH IF NOT USED IN ACCORDANCE WITH THE FOLLOWING SAFETY INSTRUCTIONS. THIS MANUAL CAN NOT ANTICIPATE EVERY POSSIBLE CIRCUMSTANCE THAT MIGHT INVOLVE A POTENTIAL HAZARD. THE WARNINGS, CAUTIONS, DANGERS, AND SAFETY SUGGESTIONS ARE THEREFORE NOT INCLUSIVE. AS THE OWNER YOU ARE RESPONSIBLE FOR THE SAFE OPERATION OF THIS EQUIPMENT. ALWAYS MAKE SURE THAT ANYONE USING THIS EQUIPMENT HAS READ THIS MANUAL AND FOLLOWS THE SAFETY WARNINGS TO HELP PREVENT THE POSSIBILITY OF PERSONAL INJURY TO THE OPERATOR OR ANYONE ELSE. IF ANY OPERATING PROCEDURE, INSTALLATION, MAINTENANCE, OR WORK METHOD NOT SPECIFICALLY RECOMMENDED IS USED, YOU MUST SATISFY YOURSELF THAT IT IS SAFE FOR YOU AND OTHER PERSONS. YOU MUST ALSO ENSURE THAT THE PRODUCT WILL NOT BE DAMAGED OR MADE UNSAFE BY THE PROCEDURE YOU CHOSE.

In the event that an injury does occur, please seek medical attention at once since the equipment may cause injuries that are not initially recognized.

Use proper electrical power. Connect unit to a dedicated circuit of the proper voltage, proper rated circuit breaker, and wired with the proper wire size and number of conductors. Use supply Wires suitable for above 110°C Ensure that all connections are properly tightened. Improper connections could result, causing damage, injury, or death of the equipment operator. This machine must be connected in accordance with the National Electric Code (NEC) Article 422-4 - Ed-31, Except as provided for in NEC 90-4. This machine must be properly grounded to avoid fatal electrical shock in the event of an electrical malfunction. A ground connector screw should be fastened into the chassis to facilitate supplemental grounding as permitted by NEC 250-91.

! DANGER Do not connect any other equipment to the electrical circuit serving this unit. Do not replace a fuse or circuit breaker with one of a higher rating without being certain the wire size is adequate to handle the increased electrical load. Keep all electrical connections dry and off of the ground. Observe all local and national codes for the installation and use of this type of equipment. Please use the following criteria for wire selection. • 3 to 25 Feet from Main Power Source - At least the same size wire. • 25 to 50 Feet from Main Power Source - At least one wire size larger. • 50 to 100 Feet from Main Power Source - At least two wire sizes larger. • 100 to 150 Feet from Main Power Source - At least three wire sizes larger. If the wire size being used is too small, the voltage drop will be high, and this will cause the motor to draw excessive current and overheat or fail. If there are any questions or problems with the electrical system being used please, do not hesitate in calling a local qualified electrician. Wear proper protective clothing and equipment. Wear full eye protection (preferably a face shield) while operating this product. The pressurized spray from the air compressor can cause severe injury to the eyes. It also may contain irritants, particles or caustic chemicals.

Do not operate with protective covers or guards removed. The Compressor Controller unit may start and stop the air compressor, drain or release valve automatically when

Do not operate with any electrical panels or covers opened. Operating this unit with any of the electrical panels or covers opened may expose high powered electrical connections and/or components which may come in contact with the operator. Contact with high powered electrical equipment by a person could result in serious injury or death.

Do not operate this unit with any of the safety controls bypassed. This unit was designed with safety in mind. Never allow anyone to bypass, modify, or alter anything on this unit. If any parts appear to be dysfunctional, do not operate the unit and immediately contact a qualified technician.

Do not operate or install any components rated less than the maximum operating pressure of the air compressor.

The pressurized spray from the drain valve, unloader valve and air compressor can cause serious injury or death if sprayed at people, animals, or any living thing. It can inject air and/or harmful particles and chemicals into the skin and other soft tissues, and this can cause serious injury or death. If an accident occurs and the spray appears to have penetrated the skin, even if the injury appears to be minor, seek medical care immediately. Do not treat as a simple cut. Be prepared to tell a physician what

particles and/or chemicals you are using. For treatment instructions, have your physician contact the nearest regional poison information center for more information.

Unplug or disconnect unit before cleaning or servicing. To help prevent the risk of injury or death as a result of shock or electrocution or entanglement while this product is being cleaned, serviced, or repaired, electrical power must be removed. Unplug or disconnect the power cord or "lock out" the switch box that supplies power. For more details, please refer to U.S. Department of Labor, Occupational Safety and Health Administration, Regulation 29 CFR 1910.147, Control of Hazardous Energy Source (lockout/tagout).

Only qualified personnel should attempt any electrical repairs or trouble shooting on the equipment. Serious injury or death could result from improper repairs and/or trouble shooting.

Never modify or alter this unit. For your own safety as well as others, never allow this unit to be altered or modified. Modifying or altering equipment to operate in a fashion other than its original design may cause serious injury or death. Never exceed the factory pressure or temperature rating of the system. Be sure that all accessory equipment and system components meets or exceeds the pressures, specifications and temperatures of this unit.

Do not operate unit with damaged or worn hoses, fittings, clamps, or spuds. Always check the connection hose, control hoses, fittings, clamps, and spuds prior to operation. Replace all damaged or worn items with one which meets or exceeds the specifications of the original equipment. The use of an improper hose, fitting, clamp, or spud may cause the hose, fitting, clamp, or spud to rupture which could result in serious injury or death or damage to property.

Do not repair damaged hoses or fittings. Replace all damaged hoses and/or fittings with ones which meet or exceed the specifications of the original equipment. Do not use the hose if cuts, leaks, abrasions, bulges, or coupling damage is evident. Never remove any hose or fitting while the unit is on. The risk of fluid injection is present.

Do not operate near flammable or combustible materials. This product is not intended for use in locations where fire or explosion hazards may exist due to the presence of flammable vapors, liquids or gases, or combustible dusts or fibers.

Do not remove any airline or receiver connections before relieving air pressure in the entire air system and receiver tank(s). Always relieve the air pressure in the entire system and in the receiver tanks before removing any airlines or receiver connections.

Do not operate at pressures, temperatures and rotational speeds in excess of the air compressor and connected equipments manufacturers recommendations.

Have the receiver tank(s) inspected for corrosion and/or damage periodically. Always ensure that the tanks are drained daily or after each use. If the receiver or any air lines develop leaks, immediately replace them. There is a risk of a violent tank or air line explosion which can cause damage to property and can injure or kill people nearby. All pressure vessels should be inspected once every year or more often depending on use. To find your state pressure vessel inspector, look under Division of Labor and Industries in the government section of a phone book. Never make modifications, weld, drill into, or attempt any repairs to compressor tanks. If modifications are necessary, take the tank to an A.S.M.E. certified coded pressure vessel shop that can perform these modifications. The shop will need an ASME "R" stamp. Never make adjustments and/or parts substitutions to alter the factory set operating pressures, temperatures, and volumes.

Do not use in flammable or combustible atmosphere. This product is not intended for use in locations where fire or explosion hazards may exist due to the presence of flammable vapors, liquids or gases, or combustible dusts or fibers.

Do not permit untrained personnel to maintain or make repairs on this unit. Only qualified personnel should be permitted to make any type of repairs to this unit. Improper repairs may cause this unit to malfunction which could result in serious injury or death to the operator, repair person, or bystander.

Do not leave loose parts, rags, tools, and other foreign matter on the compressor, drive system, or fan blade. Loose parts, rags, tools, and other foreign matter can become entangled in the unit or be expelled from the machine at a high rate of speed. This can result in damage to the machine or serious injury or death to the operator, repair person, or bystander.

All local code requirements for pressure vessels should be investigated to assure all requirements have been met. Pressure vessels such as the receiver may require additional ASME code stamping to meet local code(s).

Always wear hearing protection when operating or working near the unit. This unit is capable of producing noise that can be hazardous and can cause hearing loss. In order to avoid hearing loss, always wear hearing protection when operating or working near the air compressor.

Do not pull on the hose to move the unit, untangle knots, or any other excessive pulling stress.

Always release the system pressure prior to service, storage, daily shutdown, and/or disconnecting the hose or from the unit. Always release pressure prior to service, storage, daily shutdown, and/or disconnecting the hose from the unit. Pressure contained within the unit could be released unexpectedly and could cause injury.

Never leave an operating machine unattended. Always shut off the machine and relieve the system pressure before leaving the unit. Never leave an operating machine unattended.

For portable (movable) equipment, to reduce the risk of electric shock or injury, do not expose to rain. Store indoors.

For stationary equipment, to reduce the risk of electric shock or injury, use indoors only.

Do not use below garage floor or grade level.

Never allow children or any unauthorized persons to operate the unit. Allow only personnel trained in the use of the equipment to operate the unit. Never allow children or unauthorized personnel to operate the unit.

Keep all persons at a safe distance when the machine is being operated.

Never exceed the pressure rating of air tools, spray guns, air operated accessories, tires and other inflatables could cause them to explode or fly apart. Exceeding the pressure rating of air tools, spray guns, air operated accessories, tires and other inflatables could cause them to explode or fly apart. Always follow the manufacturers recommendations and never exceed the maximum allowable pressure ratings. Never use the compressor to inflate small low pressure objects such as children's toys, footballs, basketballs, etc.

Warranty Information

Compressor Controller Limited Warranty:

This warranty is limited to Air Compressors Controllers distributed by:
Compressor Controller Group / Sam Controllers

1911 NC HWY 902 W
Pittsboro, NC 27312

Limited Warranty

Compressor Controller, Sam Controllers, Umbrella Technologies, Inc. Its partners, employees, contractors and associates are hereby referred to as “Compressor Controller” and/or “CCG”.

CCG will repair or replace, free of charge, to the original retail customer who purchased a Compressor Controller Model R1 or R2 from an authorized dealer, distributor or distributor’s dealer in North America. This warranty does not transfer to subsequent owners. CCG will repair or replace, at its option, any parts of the Compressor Controller that are proven by an authorized service center to be defective in material or workmanship under normal use during the applicable warranty time period as stated below.

This limited warranty covers the cost of the replacement parts and labor for all defects when installed by an authorized service center. Transportation charges are the responsibility of the customer. Any part replaced under warranty becomes the property of CCG.

All parts replaced under warranty will be considered as part of original product, and any warranty on those parts will expire coincident with the original product warranty.

Limited Warranty periods:

- Non-commercial / Non-rental (personal use by a retail customer): 1 year parts and labor
- Commercial / Rental (usage for income, business use): 1 year parts and labor

The limited warranty period begins on the date of retail purchase by the original purchaser.

disclaimers, Limitations of remedies & exclusions: This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

Disclaimer of other Warranties

To the fullest extent permitted by applicable law, this limited warranty is exclusive and expressly in lieu of any and all other warranties, including, without limitation, any implied warranties of merchantability or fitness for a particular purpose or any other implied warranties that may arise from the course of dealing or usage of the trade. CCG hereby disclaims and excludes all other warranties. To the extent that CCG products are consumer products under applicable federal and state law with respect to any customer, the duration of any implied warranties (including but not limited to implied warranties of merchantability or fitness for a particular purpose) are limited to the shortest duration permitted by applicable law or the Limited Warranty period provided herein, whichever is longer.

Limitations of remedies

CCG shall not be liable to customer, or anyone claiming under customer, for any other obligations or liabilities, including but not limited to, obligations or liabilities arising out of breach of contract or warranty, negligence or other tort or any theory of strict liability, with respect to the air compressor, compressor controller and or CCG acts or omissions or otherwise. To the fullest extent permitted by applicable law, CCG shall not in any event be liable for incidental, compensatory, punitive, consequential, indirect, special or other damages, including but not limited to loss of use, loss of income, loss of time, loss of sales, injury to personal property, or liability customer incurs with respect to any other person, or any other type or form of consequential damage or economic loss.

Customer Support: (919) 442-8787

In addition to the foregoing disclaimers, limitations and terms, this limited warranty shall not apply to and does not cover accessories, nor does it cover products that are in any way subject to any of the following:

1. Improper setup, installation or storage.
2. Lack of proper maintenance and service.
3. Accident, damage, abuse or misuse.
4. Abnormal operating conditions or applications.
5. Repair or modification by customer or any third party without written consent of CCG.
6. use under operating conditions or in applications not recommended by CCG.
7. Normal wear.
8. The use of accessories or attachments not recommended by CCG.
9. Acts of God.

The application of these exclusions will be determined at the sole discretion of CCG.

Warranty registration with CCG. is required on all products. you can mail the enclosed registration form.

For all customer service inquiries call CCG Customer Service at (919) 442-8787
or visit compressorcontroller.com

Revision History

December, 2016 : Manual Revision v001, Software v04.0, Hardware V01.0

March, 2017: Manual Revision v004, Software v06.0, Hardware V02.0

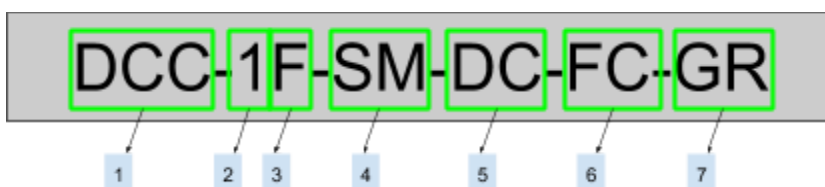
February, 2018: Manual Revision v005

September, 2018: Added hardware version 3.0 and software version 17.0915 updates

Product Ordering Information

Digital Compressor Controller (DCC) are manufactured in two main models – Model R1 for Single Compressor Control; and Model R2 for Duplex Compressor Control, with available options, see the part number and ordering information below for more information:

Compressor Controller Part Number Example: **DCC-1F-SM-DC-FC-GR**



Options:

<i>Number</i>	<i>Standard Options</i>	<i>Extended Options</i>
1	DCC - Product Family Identifier	DCC - Product Family Identifier
2	1 - Single Pump 2 - Dual/Duplex Pump	
3	F – Front LED indicators	F - Back panel LED Indicators
4	SM – Slave_Master Control enable NC – No Control	
5	DC – Drain Valve Control NC – No Drain Valve Control	
6	FC – Cooling Fan Control NC – No Fan Control	
7	GR – Green LCD display BL – Blue LCD display	

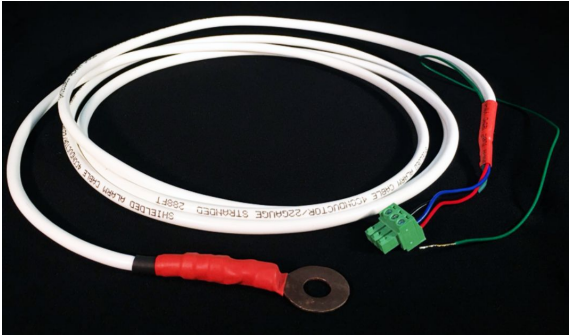
Components

Part Number	Description	Cable length, ft	Quant.in R1 Kit	Quant. in R2 Kit
<i>PRESS18200</i>	Digital Pressure Sensor 1/8 thread NPTM Working Pressure Range: 0-160 PSI Don Not Exceed Pressure: 250 PSI	1ft *	1	1
<i>DEDHT11</i>	Environment Temperature & Humidity Sensor	0.7ft *	1	1
<i>DTB360</i>	Compressor Pump Temperature bolt-in Sensor	6ft *	1	2
<i>BDC12</i>	Buzzer Alarm, DC voltage only	0.7 ft *	1	1
<i>SWKCN1</i>	10A 125V AC / 6A 250V AC Round Rocker Switch: 0.78 Inch hole Installation	NA	1	1
<i>STP110-220</i>	110-220VAC / 12VDC 1A Power supply	NA	1	1
<i>STP1212-277</i>	200-277VAC / 12VDC 1A Power supply	NA	-Option-	-Option-
<i>STP1224-240</i>	95-240VAC / 12VDC 2A Power supply	NA	-Option-	-Option-

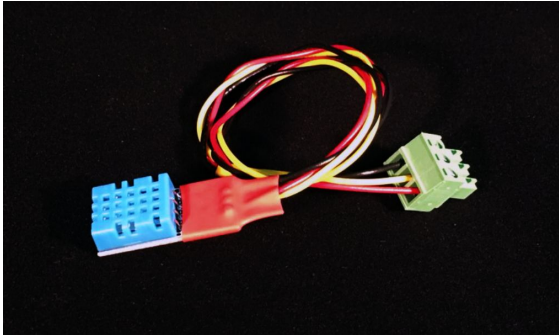
* Custom lengths are available, contact your distributor or the Compressor Controller factory for further information.

Note: Use only factory components, 3rd party components may cause unintended function, damage or injury and will void the warranty.

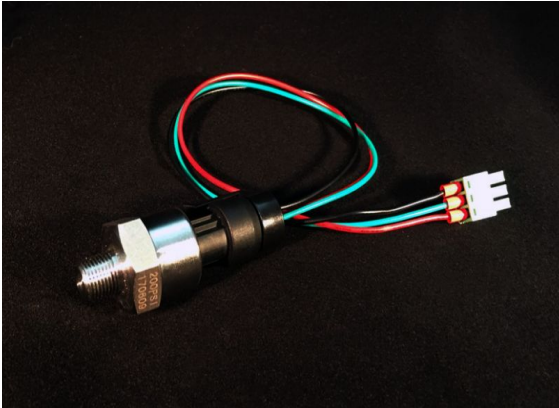
Component Pictures:



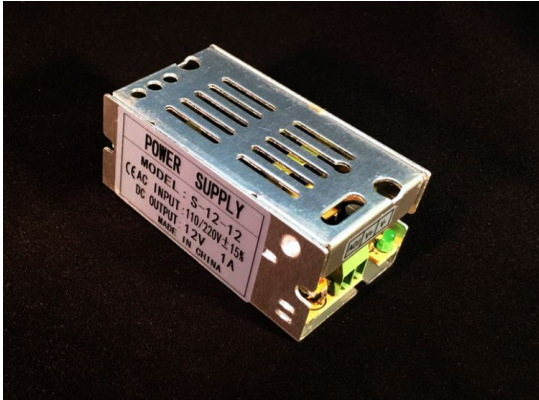
Bolt on Pump Temperature Sensor - **DTB360**



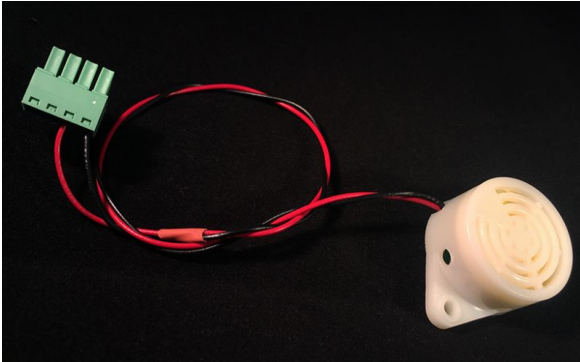
Environment Temperature & Humidity Sensor - **DEDHT11**



Digital Pressure Sensor 1/8 thread NPTM - **PRESS18200**



110-220VAC / 12VDC 1A Power supply - **STP110-220**



Buzzer Alarm, DC voltage only - **BDC12**



AC Round Rocker Switch - **SWKCN1**

Package Contents

Model R1: For Single Compressors:



Model R2: For Duplex Compressors:



Theory of operation

The Digital Compressor Controller (DCC) is based on the ATmega328 digital microprocessor, this is a low-power, CMOS 8-bit microcontroller based on the AVR® enhanced RISC architecture. By executing instructions in a single clock cycle, the ATmega328 achieves throughputs close to 20MIPS. This design includes a Real-Time clock with a precision +/-1ppm oscillator.

Along with EEPROM and enhanced data acquisition, this controller allows to store the latest and accumulated parameters throughout the compressor's lifetime.

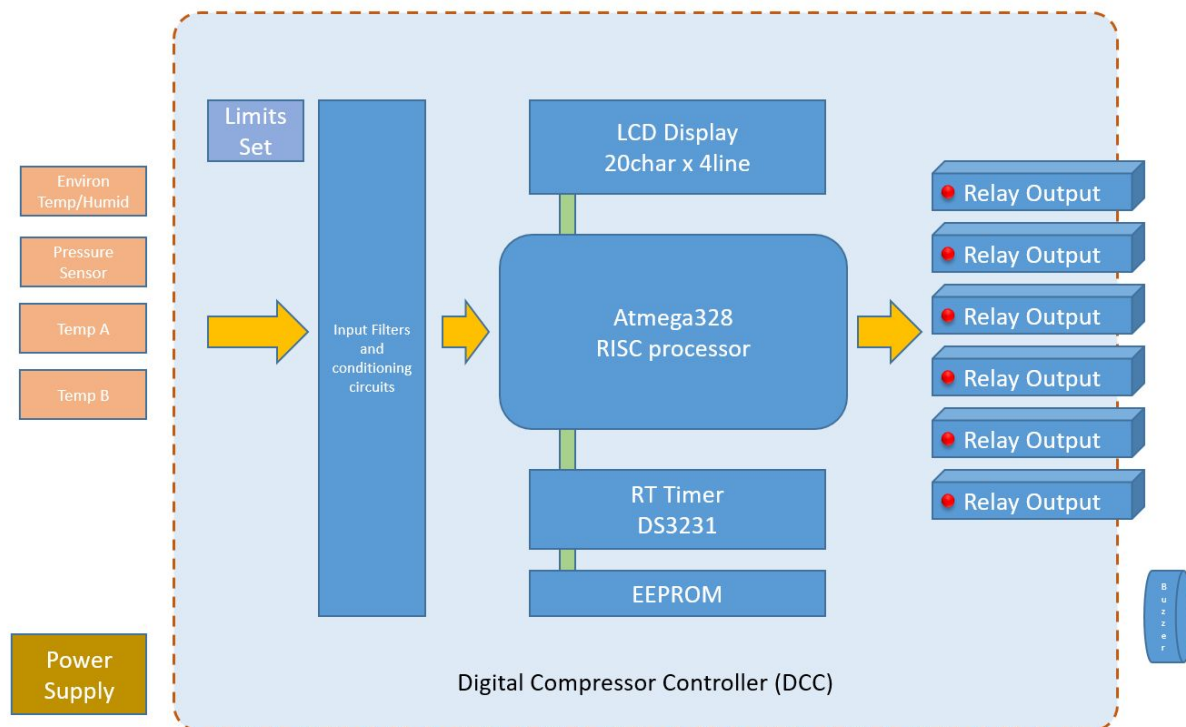


Fig.1 Digital Compressor Controller Block Diagram

AI based software embedded within the controller allows seamless and smooth operation, all connections to and from Digital Compressor Controller (DCC) are simple and relatively easy to debug. The system is composed of inputs (sensors) and outputs (relay and audio outputs):

Sensors:

- **Environmental Temperature/Humidity sensor** – This is a 3 wire sensor that incorporates digital self-calibration technologies with relatively fast response times.

- **Pressure sensor** – This is a stainless-steel rigid Industrial grade sensor with factory laser calibration and status reporting functionality.
- **Temp A and Temp B** – These are digital self-calibrating sensor, with precision analog output.

Output:

- **Relay outputs** – The relay connectors have a 6A 250V AC rated output connections. For convenience in integration of the compressor controller unit, all output Relays are configured as NC-COM-NO, this allows the Compressor Controller to be used in any number of application and use case scenarios. NOTE: The Relays are not intended to drive the Compressor or other AC loads directly! Please use an appropriate Contactor, Power relays in variable speed drives.
- **Buzzer** – is intended as an indicator for operator attention and will indicate the start of compressor operation and each compressor cycle. If you setup requires a different or louder alarm, you can use the additional relay rated to 12V and the appropriate amperage to be used for adding an additional or secondary alarm.

Power Supply – is a switchable universal power supply with 12V DC 1A rating of 95 VAC to up to 277V AC input . Power supply has an open frame in IP21 protection frame and should be mounted to the inside of a waterproof enclosure if used outdoors.

Basic Specifications

Parameter	Component	Details	Comments
Power	Input Power	12V DC , 2W, 0.2A typical	
CPU	ATmega328p	Low-power, CMOS 8-bit microcontroller, AVR® enhanced RISC	20MIPS
Display	LCD 20x4	LED backlight, Green or Blue color	
Sensors	Ambient Temp/Humidity	20..90%±5%RH, 0..50°C±2°C	Digital, self calibr.
	Temperature	-40..+125°C, ±2°C, linear ±0.5°C	Analog, self calibr.
	Pressure sensor	Digital, factory calibrated, with analog output	
Relay Output	AC or DC	10A 250VAC	
Installation	IP21 only	Indoor or Sealed enclosure for outdoor	
Environment Temp.	Operational	-10..+60°C	
	Storage	-20..+80°C	
Humidity	Operational	10..85%RH, no condensation allowed	
Ventilation	Cooling	convectional, or forced air	
Dimensions	Overall	7.1W x 5.4H x 2.3D	
	Installation	6.6W x 4.7H typical opening	

Connection to the Compressor

While, all possible installation scenarios could be significantly different, this information below is specific to a single pump compressor.

This is a standard (typical) Compressor setup diagram, with a standard air pressure switch installed.

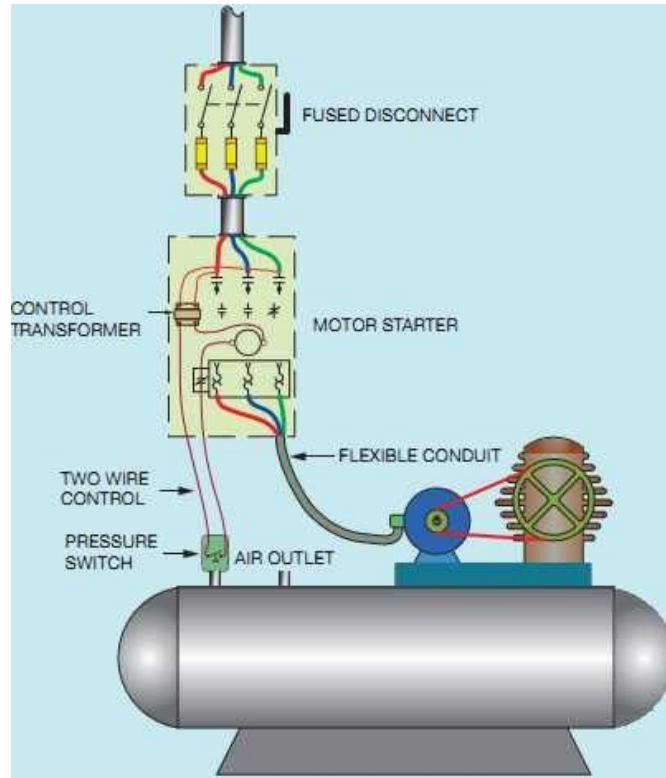


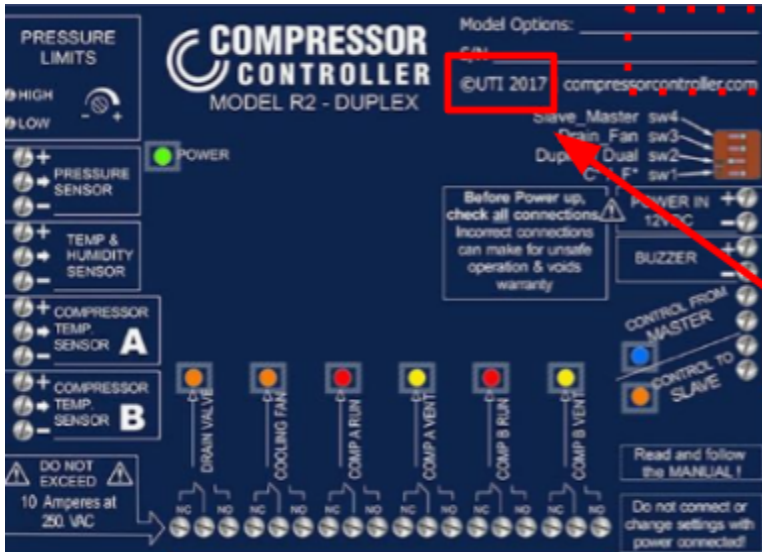
Fig.2 A Typical Compressor Setup.

Power coming from Disconnect/Fuse combination, connected to a Motor Starter, where a Pressure switch functions as a Start/Stop switch. Most of the time within the Motor Starter box you will find an Overcurrent protection and also low voltage Control transformer that provides power for the Motor Starter. Pressure Switch, when pressure in the tank will drop less than a mechanical set in Pressure Switch, mechanical contact will energize Motor starter. As soon as the pressure in the Tank reaches the High limit, contact in the Pressure Switch will be open and Motor Starter will be disengaged. In this typical setup, you can spare most of the parts and replace your mechanical Pressure Switch with the Digital Compressor Controller Model R1, where two wires will be connected to Compressor Relay instead of the mechanical Pressure switch you can mount the Digital Pressure sensor ([Part Number PRESS18200](#)) on the same port.

Identifying hardware and software version of the the compressor controller:

Hardware: To identify the hardware version look on the back of the Compressor Controller, versions 2 will not have a version number written at the top right corner, Model will depict the model number at the top right at pictured below:

Version 2:



No Version Number

2017 copyright

Version 3:



Hardware revision number for version 3 and higher

Software: the determination of the software version of the compressor controller can be found during the power on cycle of the Compressor Controller, this is an example screen depicting the software version number:



Software Version number during startup

Digital Compressor Controller Front Panel Layout

Front Panel Model R1 for version 2 hardware only

LED Indicators
The LEDs on the front panel indicate which controller functions are enabled and/or disabled. The LEDs are installed on the front and are optional for the back panel.

Display
The display provides status information for the air compressor:
Line 1: Current PSI
Line 2 & 3: Cycles by pressing Display Change Button (see right of diagram).
Line 4: Set points for allowable pressure for compressor starts and stops

Compressor City™ communication indicator
The LED indicators light up when receiving or sending commands to the other compressor controllers.

Display Change Button
This button will change the status displayed on the screen. Sample display screens are below:

MAXIMUM AND MINIMUM OPERATING TEMPERATURES

Pres. 152 PSI
Max Temp. 42°
Min Temp. 6°
On/Off 125 / 145 Psi

CURRENT TEMPERATURES

Pres. 152 PSI
Ambient Temp. 18°
Compressor Temp. 36°
On/Off 125 / 145 Psi

COMPRESSOR CYCLE TIME AND HOUR METER

Pres. 135 PSI
Cycled :23
TotTime :184.9h
On/Off 125 / 145 Psi

The displays can be customized including adding displays that show electrical costs of compressors, maintenance countdowns, and more. Visit compressorcontroller.com for more information.

MADE IN U.S.A. PRODUCT
COMPRESSOR CONTROLLER
Revision - June '17
CompressorController.com
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Front Panel Model R2 for version 2 hardware only

LED Indicators
The LEDs on the front panel indicate which controller functions are enabled and/or disabled. The LEDs are installed *either* on the front or the back panel.

Display
The display provides status information for the air compressor:
Line 1: Current PSI
Line 2 & 3: Cycles by pressing Display Change Button (see right of diagram).
Line 4: Set points for allowable pressure for compressor starts and stops

Compressor City™ communication indicator
The LED indicators light up when receiving or sending commands to the other compressor controllers.

Display Change Button
This button will change the status displayed on the screen. Sample display screens are below:

DUPLEX COMPRESSORS CYCLE AND HOUR COUNT FOR EACH PUMP

Pres 119 PSI dual
0|27 0|30 a
4.87 5.00 min
On/Off 100 / 120 Psi

MAXIMUM AND MINIMUM OPERATING TEMPERATURES

Pres 119 PSI dual
Ambient 24°C *18%
ttmp 26°C ttmp 26°C
On/Off 100 / 120 Psi

CURRENT TEMPERATURES

Pres 119 PSI dual
tmax: 29°C tmin: 53°C
tmin: 24°C tmin: 24°C
On/Off 100 / 120 Psi

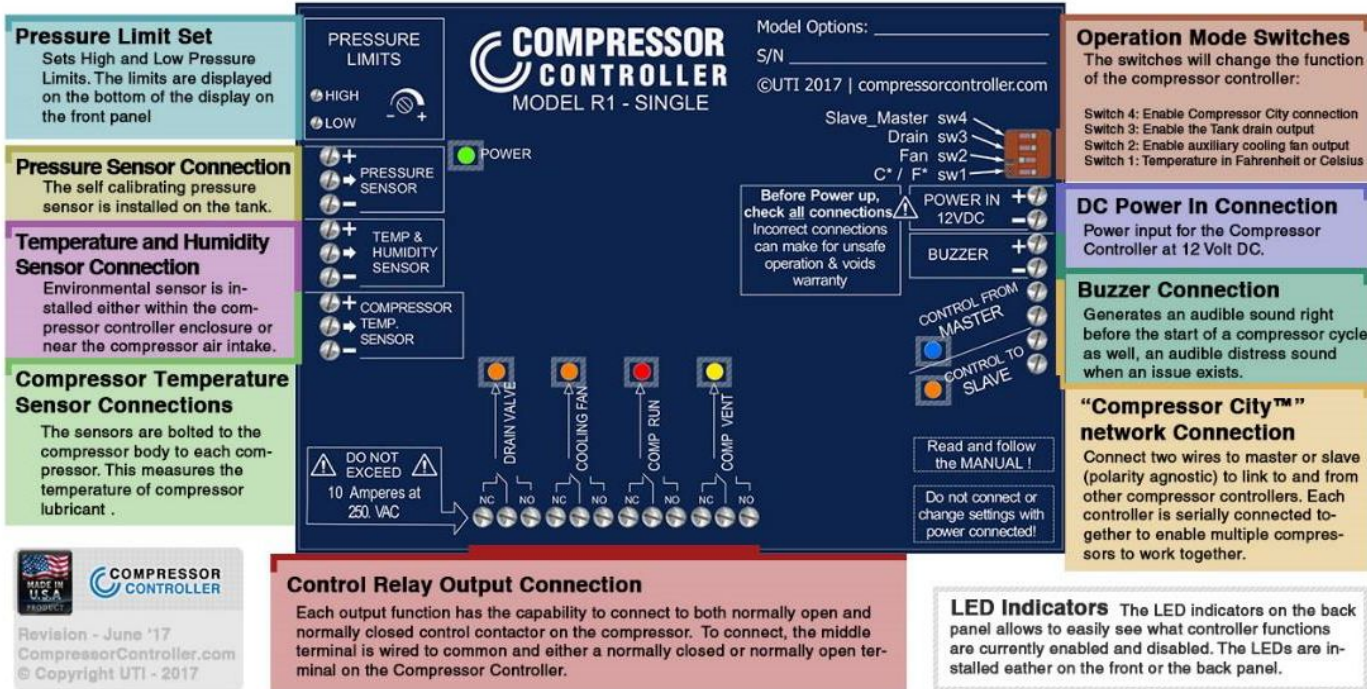
COMPRESSOR CYCLE TIME AND HOUR METER

Pres 119 PSI dual
0|27 0|30 a
4.87 5.00 min
On/Off 100 / 120 Psi

The displays can be customized including adding displays that show electrical costs of compressors, maintenance countdowns, and more. Visit compressorcontroller.com for more information.

MADE IN U.S.A. PRODUCT
COMPRESSOR CONTROLLER
Revision - June '17
CompressorController.com
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Back Panel Model R1 for version 2 hardware only



Back Panel Model R2 for version 2 hardware only

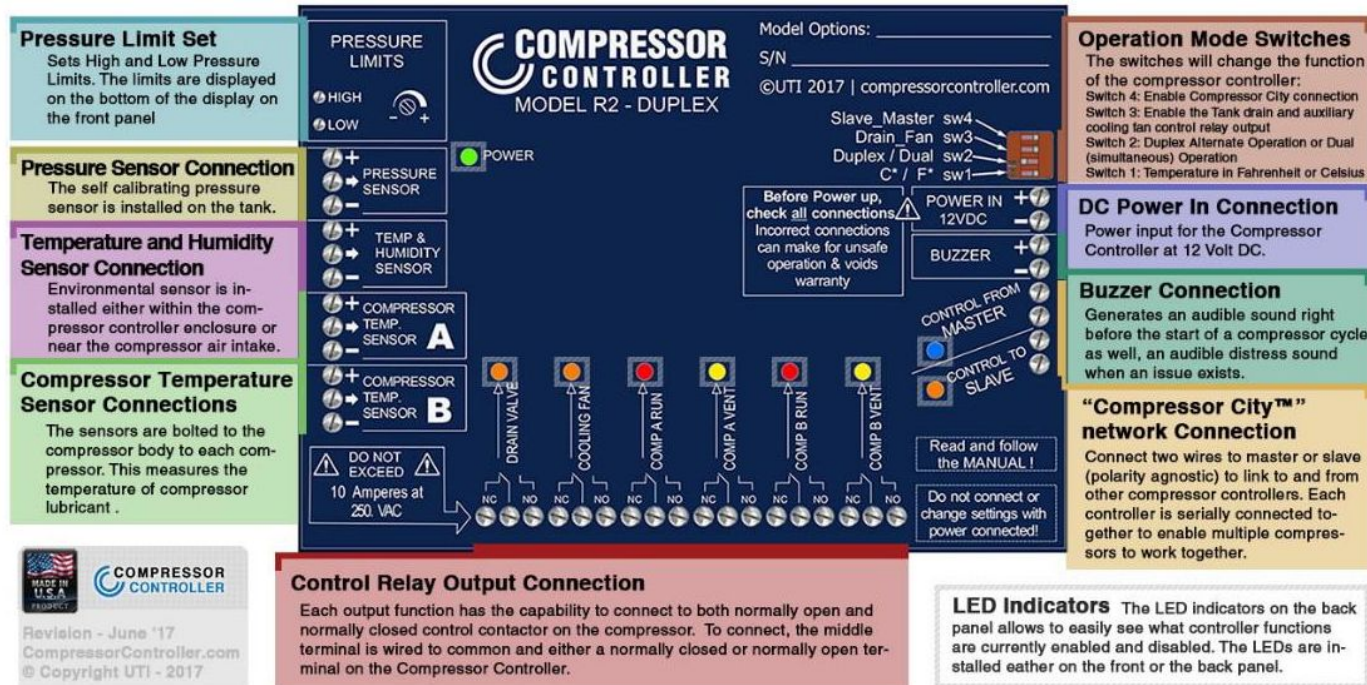


Fig.4 Digital Compressor Controller Back view hardware revision v 2.0

Back Panels for R1 and R2 for version 3 hardware

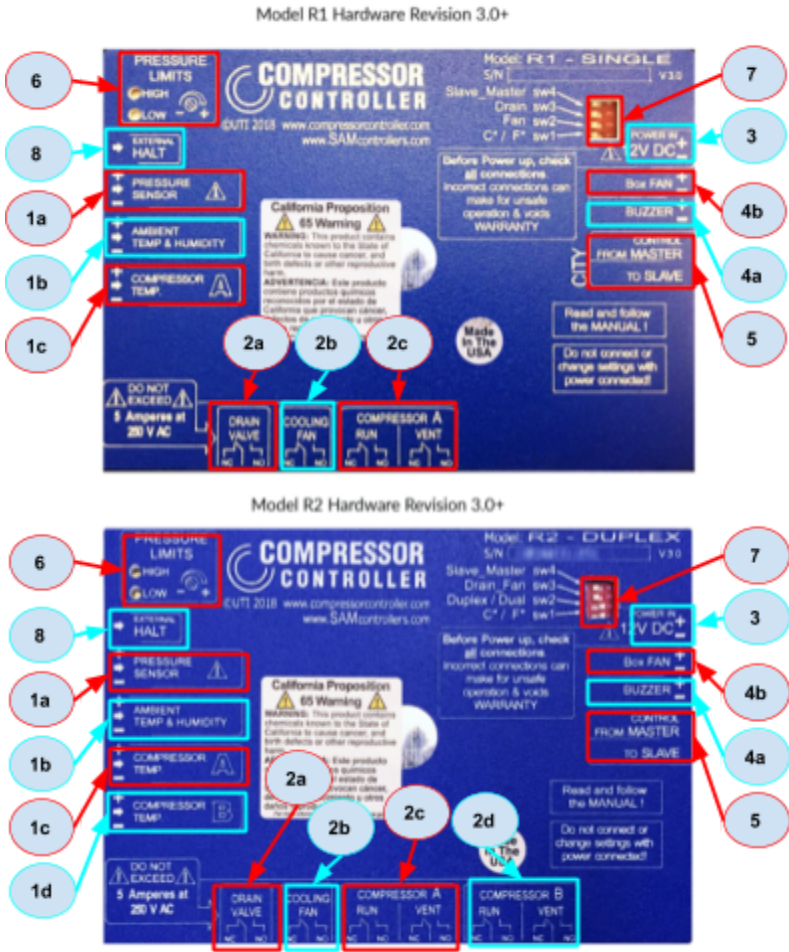












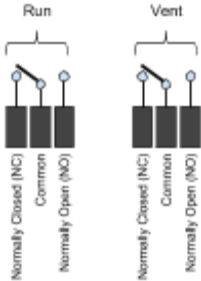



Fig.4b Digital Compressor Controller Back view hardware revision v 3+

Description of Back panel Elements

1. Input Sensors: Connection Direction → when facing the back panel as in Fig. 4b.		
1a	<p>Pressure Sensor Connection (3 Wire) For Connecting Part Number: <i>PRESS18200</i></p>	<p>Red (+)  Green (signal)  Black (-) </p>
1b	<p>Environment Temperature and Humidity Sensor Connection (3 Wire) For Connecting Part Number: <i>DEDHT11</i></p>	<p>Red (+)  Yellow (signal)  Black(-) </p>
1c	<p>Compressor Pump Temperature Sensor (A) Connection (3 Wire + 1 Ground Wire) Sensor need be install in the lover portion of the cylinder, preferably on the cylinder bolt attachment to the crankcase. Use grease or thermal-conductive paste on both surfaces of the sensor eye to assure thermal-conductivity.</p> <p>For Connecting Part Number: <i>DTB360</i></p>	<p>Red(+)  Blue (signal)  Black (-)  Green Wire (Ground) </p>
1d	<p>Compressor Pump Temperature Sensor (B) Connection Used in Model R2 (Duplex) (3 Wire + 1 Ground Wire) Same installation procedure as 1c. In a Duplex setup, Install temperature sensors on each compressor in approximately the same location, this will allow the internal Compressor Controller algorithm to identify problems more accurately. .</p> <p>For Connecting Part Number: <i>DTB360</i></p>	 <p>Pump Temp. Sensor Pump Installation Example</p>

<p>2. Relay Output group Connection Direction ↑ when facing the back panel as in Fig. 4b. The relays connections are rated (together with contacts) for up to 5A at 250VAC – do not exceed these parameter to assure longevity and smooth operation. In addition, to protect output circuit, internal fuses have been incorporated within the internals of the Compressor Controller, they are designed to Off-Open in extreme parameters. If the output has become completely inoperable, please contact the distributor/factory for warranty or repair information. Each relay consist of two outputs - with Normally Open (NO) and Normally Closed (NC) contacts, and Common wire, expanding the installation and operation options.</p>		
2a	<p>Drain Valve Connection: This Connects to an Normally Closed electric solenoid that is attached to the drain pitcock at the bottom of the pressure tank.</p>	
2b	<p>Supplemental Cooling Fan Connection (Optional): This fan is typically added to the pump to provide additional cooling. In case of Duplex compressor, usually installed two fans, but they will be controlled at same time, to ensure longevity of operation.</p>	
2c	<p>Compressor Motor (A and B) Run (Start) Connection and Vent Connection: This is a connection to the pump motor starter and that pump Normally Open electric solenoid unloader valve. In case of VFD this output will be used to control Start and Stop contacts on VFD with Common serialy connected to its power source</p>	

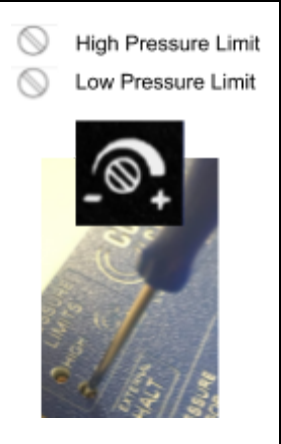
Note: *NO contacts is normally open i.e. the contacts are normally open and close when the switch is actuated. "Common", which would be the terminal that is shared between both switches. NC contacts is normally closed i.e. the contacts are normally closed and open when the switch is actuated.*

<p>3. Controller Power In Connection (12V DC) - Connection Direction ← when facing the back panel as in Fig. 4b. Use extreme caution and attention when connecting the power paying special attention to the correct polarity. Measure voltages before connection, to assure error-free installation. <u>Do not connect to over or under voltage power, or connect to AC !. Disconnect power from power supply, before connecting to Controller.</u></p>	
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<p>4a. Audible External Alarm Buzzer - Connection Direction ← when facing the back panel as in Fig. 4b. Buzzer alarm is intend to be serve as an audible alarm during operation and other critical events. This should be installed out of direct sunlight and water, It is recommend to install Buzzer on the bottom of the enclosure. The buzzer has two wires: Red for positive and Black for negative. Do not connect this output to any other buzzer or audio device*: Damage may result. For Connecting Part Number: STP110-220 <i>* As an operator option, this output may be used to drive an 12V 100mA relay to an additional accessory.</i></p>	
<p>8b. Box Fan connection (Optional) – Connection Direction ← when facing the back panel as in Fig. 4b. This option is only available on hardware revision 3.0 and newer. This is a connection for fan that is intended to be used within the same enclosure that the Compressor Controller is installed in, to provide supplemental cooling within the enclosure. The output is to be used for a 12V DC Case fan that does not exceed 1.5watts. If a larger fan is required an external relay can be used with this output. Do not overload the Box Fan output connection, it could permanently damage internal Compressor Controller components and void the warranty.</p> <p>A second pair of output on same connector group is design to control a Box Fan to provide a temperature control for the enclosure fan. Output is design for 1.2W at 12V DC output. If you have a bigger fan a group of fans you plan to use, you can connect an appropriate relay to this output to control that fans. <u>Do not connect bigger or other voltage fans to this output - it will damage the controller.</u></p>	

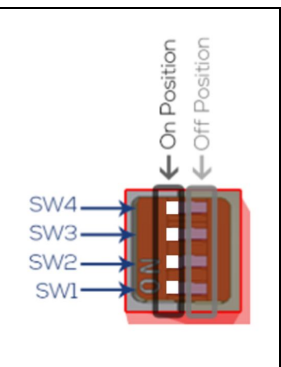
<p>5. External Control / Compressor City – Connection Direction ← when facing the back panel as in Fig. 4b. this is designed to receive a control signal from the Master Compressor Controller (Slave input) and allows it to send a signal to the Slave controller (Master Output). This designed only for control or to be controlled by a similar Digital Compressor Controller model R1 or R2 (DCC model product line) Read further details about this connection in the Remote Operation Chapter. Here is shown one wire diagram for typical connection:</p> <p>Master Compressor often the larger air compressor Slave a typical installation is the smaller air compressor</p>	
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6. TrimPots – set the High and Low pressure limits of the Compressor. Incorrectly setting too low or too high can cause energy waste and serious damage if the ratings are above the threshold of the air compressor and equipment. Please consult your air Pump vendor that the set limits inside the equipment are within operation limits. The factory setting for Compressor Controller are 100 PSI for Low and 120 PSI for High. If the bandgap of 20 PSI is not optimal for your operation, adjustments can be made accordingly. Typically, when operated in humid air, consumption of air would be increased, which will make compressor starts more often, so you need increase a difference between Low and High pressure (bandgap).

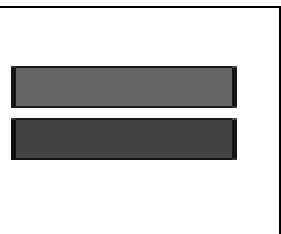


7. Operation Mode switches – there are 4 selectable switches that allow to change the operation parameters of the Controller. Operate these switches only when all power to the Compressor Controller and Compressor is turned OFF. Mishandling of this switches under Controller power may cause damage to the controller and connected equipment.

See the [Configuring DIP Switches](#) section in this manual for further information and the functionality description for each switch.



8 - Hault Connection (Optional) – Connection Direction ← when facing the back panel as in Fig. 4b. This option is only available on hardware revision 3.0 and newer. If the two connections are closed (connected to one another) the Compressor Controller will enter a halt state that will prevent the air compressor from starting and will stop the compressor if it is actuated. To reset this condition reset the power to the compressor controller.



Prior to Installation

The Compressor Controller is used with wide variety of compressors, motors, expansion tanks, ect.. so every installation is going to be unique. This manual provides guidance for the most basic and typical setup. It is recommended that you overview all installation variations in the framework of this manual, and carefully plan your specific setup to assure the safe and efficient operation of your air equipment. To conduct the installation and have a successful outcome - first you need to strategize the whole conversion or proper design of your newly designed and assembled Compressor set. It is important to remember and follow this installation manual and follow all local and national electrical codes, as well as meet any Environmental protection requirements. While the Compressor Controller is designed and manufactured to our highest standards - the manner it is installed and used can significantly impact long term usage, stability and longevity of all connected equipment. This installation Manual and suggestions, are designed for professionals who are appropriately licensed and knowledgeable in electrical and pneumatic systems. If you have any doubts or unclear about the description, please consult with specialist, or contact Compressor Controller support.

Remember , Compressors and Compressed air systems are inherently dangerous and may cause serious injury or death. Pay attention to details and carefully **plan** your actions and steps with drawings, diagrams and notes prior to proceeding.

Follow the plan and record any and all changes in the plan. All changes need to be carefully considered and verified that they do not affect any other parts of the compressor, electrical or installation in an undesired or unsafe way - ensuring that they meet any minimal/code or other applicable operating requirements.

Some considerations are the electrical strength of the cabling, insulation, waterproofing, connectors, etc. All stranded wires must be with accordance to the IPC/WHMA-A-620B and any applicable local and national standards prior to connection. Measure, inspect and mechanically test each and every connection !

All assembling work should be sectioned into small parts that can be executed and verified at each step. Do not allow for problems pile-up – it will be difficult to resolve and verify all problems at once.

Remember, you are dealing with electrical, rotating machine and compressed air, this system stores a vast amount of energy! All ACME and Electrical codes, along with local codes need to be completely complied with.

Verification and stages tests of all assembled components are required. We highly recommend to have a specialist observe your project, who is familiar with all components, codes and compliance responsibilities.

This installation kit, may not include all parts required for your specific installation. For instance you need to order appropriate to your compressor and power supply: Vent valve and Drainage valve, Power contactor or SSR for your motor, enclosure, etc. View all technical and operating details on all installation components prior to beginning the installation.

Compressor Components in details

Compressor Controller (supplied in kit)

The Compressor Controller is a self contained unit with available connection to sensors, its power supply and output relays. The Controller requires to dissipate ~10 Watts - so the mounting and enclosure requirements need to be considered accordingly.

AC/DC Power Supply (supplied in kit)

A power supply is supplied with most kits, it is intended for powering the Compressor Controller. This power supply has been tested before shipment for at least 1 hour under a 1 Amp load to assure guaranteed performance. The power supply needs to be installed with a provisions of ventilation to prevent overheating. When you connect the power an in-line fuse of 0.5A needs to be added serially connected with the Power switch. To illuminated switch when controller is energized you need supply a Neutral line to third contact.

Enclosure

Appropriate selection of the installation, wiring and usage of all elements is crucial to your long term investment. You need to select all components before the practical installation, order them, and install before you connect them and test them.

One of most important are your controller enclosure. In one instance we would recommend to use an plastic box, with enough internal space to install controller, its power supply, Ambient sensor, Buzzer and Main Power Switch. And make sure this plastic are meet your usage requirements, for instance for outside usage, you need to use an UV hardened plastic, v.s. indoor one.

On another installation a same box would be combine an Solid State Relay (SSR), which you appropriate select to your electric motor, with appropriate heat sink, to control your compressor motor. In Duplex compressor setup, perhaps one would be using an VFD to control motors, to improve overall setup efficiency, and perhaps Controller will be setup in same box where VFDs and other components will be reside. Do not forget appropriate ventilation, suited the heat generated by VFDs and other parts, assuming you will have some possible heat from sun or compressor cooling air. Enclosure shall be mounted on the shock absorption technique, which is common art for familiar specialists.

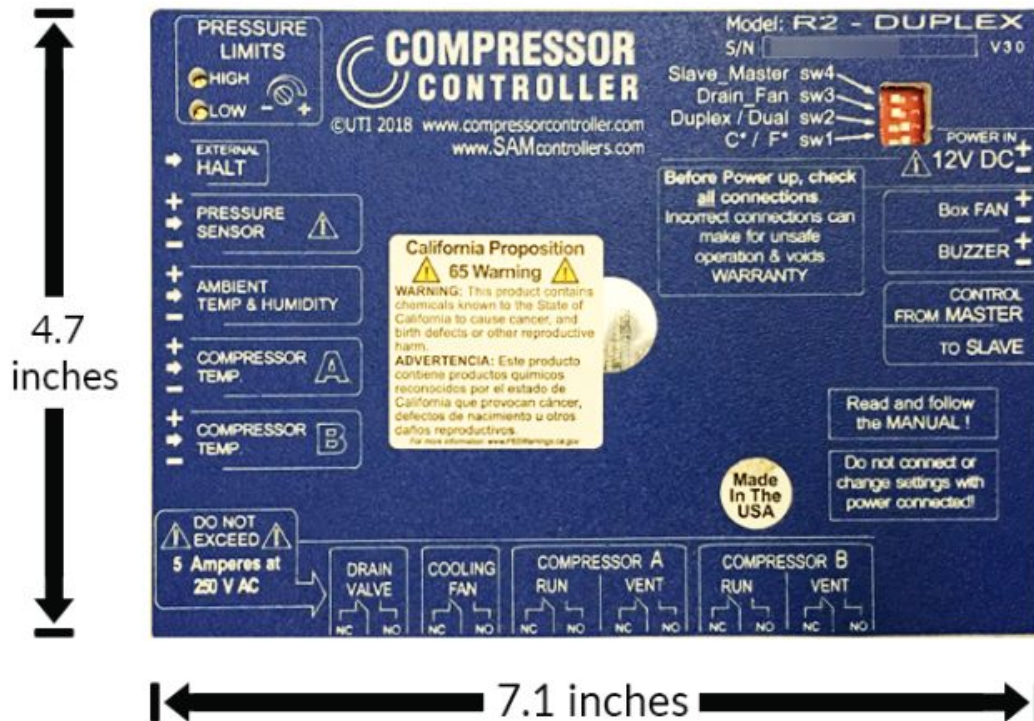
Select appropriate control Box size, where you will place a Digital Compressor Controller on a front panel, its power supply and other planned components for your setup. Size need to be to provide enough convection or forced air cooling for all components under usage circumstances. For instance, if your setup planned to be used outside, on South temperature variations, special cooling may require. On the opposite circumstances, if it is cold environment and possible water splashes, need to have an appropriate protection against.

Controller are design for installation for the IP21 environment – please read details here:

https://en.wikipedia.org/wiki/IP_Code.

Your Controller box need to be design for whatever you plan to be install the Controller, please follow this rule !

Back



Side A

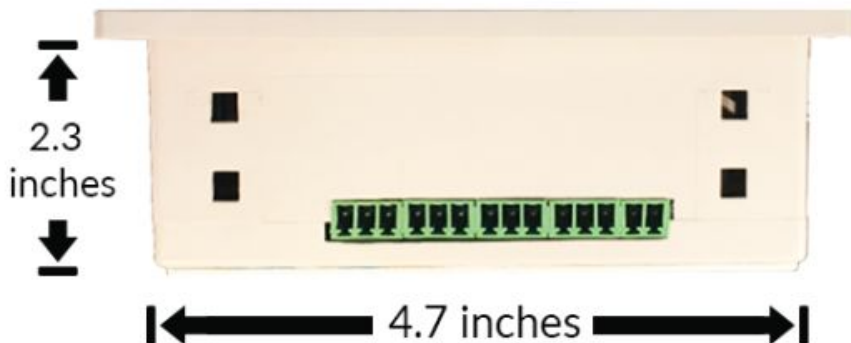


Fig.5 Installation dimension for the Compressor Controller.**Fig.6 recommended installation clearance for the Compressor Controller in the enclosure .**

On front or mounting surface you need to have minimum opening of 4.67in x 6.50in, where is maximum are advised not more than 4.80in x 6.65in opening could be used.

Also, during the consideration of the installation dimensions, please meet minimal distances to the wall or side obstacles statue on the above figure. But rule of thumb would be – allow a free air circulation or install additional ventilation options in your Control Box. It is essential, if you setup will be install on open outside space, to have an clear plastic cover door with seal, to prevent water come to controller, switches, etc. - water, sun, snow, etc. damages are not covered by provided warranty. However, we can help with repair.

Secure install and use supplied hardware to secure in place the Controller. All secure hardware need to be used on all four corners, and appropriate tight. Overnighting at some cases cause enclosure damages, which are not covered by warranty, and will cause the warranty expiration. Loose installation, will case a securing hardware fail and Controller may repositioned during operation, shortages, equipment damages and or serious injuries. Secure appropriate! Use a thread lock on all possible vibration installation.

After secure installation of Controller, make all necessary connection, as you plan.

Verify all connections and check Grounding and voltages.

Connect your Compressor motor only (!) after you absolutely assure all above.

All setups are different, but you need remember about safety, weather protection and ergonomics to use.

Enclosure Box Fan

Dependent on your installation details, and installation plan, you need to install an Enclosure Box Fan, which will mitigate temperature inside your enclosure. All components, include relays, switches, power supply, controller , etc. has a certain level of heat dissipation, so remove heat from enclosed space it is important. On another instance, you may consider to use a force of the compressor pumps motors fans to cool your enclosure, if you design call for VFD, to avoid an additional Fan. But an additional cooling Fan would be best option. Please consult with us.

Starting with version 3.0 of hardware, controller has an active Box Fan control, base on controller internal temperature. Output is design for 12V 1.2watt casing fan. If you plan to use a bigger fan, you can use an relay controlled by this output to control bigger fan with different voltage. Do not overload Box Fan output, it could permanently damage internal components and void warranty. Please consult with us on details.

Compressor Temperature sensor (supplied in kit)

Pressure sensor (supplied in kit)

Our Stainless Steel Digital sensor are supplied for the installation completely tested, calibrated and intend to work in 0..160PSI, however a maximum tolerated pressure are 200psi. Do not install on heated or wet places, if so, please use appropriate covers. Sensor supplied in the installation kit are Male-1/8" NPT thread and need to be install on

expansion tank at place where mechanical pressure switch usually installed. Installation usually combined with a safety valve and mechanical pressure gauge. Prevent any debris block a sensor hole. Use an appropriate techniques when dealing with NPT thread installation – use vibration proof dope (blue) and sealant tape as appropriate.

Ambient Temperature and Humidity sensor (supplied in kit)

DTH11 sensor (blue plastic enclosure on small board, with mounting hole and three wires) are self-calibrated digital sensor with a wide range tolerance. This sensor need to be install, where a direct sun or water drops or splashes will be prevented by installation technique. Intention to measure ambient temperature and ambient humidity. This data are used to calculate and maintain the algorithms inside the Controller working properly, so installation are required to be complete correctly. We recommend to mount this sensors on the bottom panel of your enclosure, away from sun, streaming cooling air, and shall not be under any water.

HALT Input

Starting with hardware v3.0, controller equipped with HALT input. This input is design to accept any dry contact input. When is open - it is normal operation of the Controller. When it is closed - will trigger a HALT condition status and generate ERROR 99. To reset this error, need to clear hardware HALT conditions, contacts need to be open, and need to cycle power (Power OFF) for the controller.

Vent Valve

Vent valve are not supplied in the Basic Kit and need to be purchased separately by considering your compressor parameters and connecting thread. A typical valve, we recommend, need to be Normally Open (NO) 2way electrically actuated valve with a final orifice allow slow bleeding air during venting your air compressor. Typical customer use an 1/8 NPT 110VAC valve and connecting to the expansion tank check valve. Typical venting time shall be around 5..7 sec after compressor is Stopped – you need to install proper orifice to accomplish this time. Other installation would be connect that valve to the compressor head discharge, if it is equipped. Please advise with your compressor vendor guideline for venting procedures.

For instance, on 5HP compressor running on single phase, and 80gallons receiver with 120psi required pressure, was installed 110VAC NO 1/8NPT electric solenoid (Grainger Item # 39P476)

(<https://www.grainger.com/product/REDHAT-Solenoid-Valve-39P476>) and plug (Grainger Item # 6AYZ7)

(<https://www.grainger.com/product/GRAINGER-APPROVED-Brass-Countersink-Plug-6AYZ7?breadcrumbCatId=2133&functionCode=P2IDP2PCP>) with 1/16” drilled one hole to satisfy 5sec air bleeding.

Drainage Valve

Drainage Valve need to be selected according to biggest opening in your expansion tank, on the bottom of the tank. That opening are intend to be drain via a manual or electrically actuated process. We recommend to use the maximum available diameters for that, and on typical 120gal tank would be used 3/4NPT valve with at least 20mm opening, while on the bottom will be used 1/2”NPT elbow and pipe. Such installation, prevent any clogging and provides effective drainage procedures. Exhaust port you can connect to 3/4” PEX pipe connected to your drainage water collection tank. We recommend on discharge line install removable orifice which will control amount of discharged air. Rule-of-thumb, you need to have not more than 1..4psi pressure drop in expansion tank after each drain discharge. This orifice need to be periodically clean, to prevent discharge line clogging.

On installation of 5HP compressor running on single phase, and 80 gallons receiver with 120psi required pressure, was installed 110VAC NO 1/4NPT electric solenoid (Grainger Item # 4ELH3) (<https://www.grainger.com/product/REDHAT-Solenoid-Valve-4ELH3>). Was connected to the drainage collection tank with 1"PEX line and, on the end of the line was installed Plug (Grainger Item # 10A578) (<https://www.grainger.com/product/ZURN-PEX-Polyalloy-Test-Plug-10A578?breadcrumbCatId=21805&functionCode=P2IDP2PCP>) with 3 x 1/8" drilled holes to satisfy pressurize air consumption during drainage.

Compressor Pump Lubricant

Please save the environment! Do not discharge to the environment directly. Consult with compressor vendors for details to handle that discharged water properly.

As an additional measure, please use ECOSAFE lubricants whatever is possible. They been proven to spillage and environmentally safe, while provide excellent lubrication and slugged-free operation for years. Contact Chelsea Kovanda at American Chemical Technologies Inc. ckovanda@americanchemtech.com (704) 902-5192

Cooling Fan

Most compressors setups, naturally do not have an AUX cooling fan, which is preventing proper cooling and lead to reducing your compressor life and cause reduction of compressed air quality. Based on our research, we strongly recommend to use an external electric Cooling Fan, which will improve your air compressor and intercooler efficiency, reduce lubricant temperature and as a result reduce a water and lubricant contaminants in compressed air. An 5HP compressor may require cooling Fan with 100..200CFM with diameter similar to compressor pump flywheel, to effectively provide cooling to the pump. Could be installed on either side of the pump, coaxially to pump. Please make this Fan working in same direction as your flywheel pump pushing air, usually it is from flywheel to pump direction. Please advise with your Compressor pump vendor for further information.

For most common setups, you need to find an appropriate diameter, installation place and size of the fan. We recommend advice with your compressor vendor.

Compressor controller will trigger Cooling Fan when temperature of the compressor crankcase will warm above 4C from start temperature and will continue cooling till temperature will not drop below 140F (60C). This improve life span for compressor lubricants.

Electric Motor Contactor

A typical installation of any air compressor are required to have an appropriate size contactor, and additional protection circuits i.e. Overcurrent, Overvoltage, Phase controller, etc.. On some setups would be used an substitution of the contactor with Solid State Relay (SSR), mounted on appropriate heat sink. For selection of appropriate SSR, you need to take your electric motor maximum running current and multiply on 12, to accommodate a start-up current. Voltage for SSR shall be at least 1.2 times of required motor voltage. Consult your compressor vendor to determine appropriate size of SSR and its heat sink. We are definitely recommend to use protection circuits i.e. Overcurrent, Overvoltage, Phase controller, etc.

Wiring and wire connection

When dealing with electrical equipment always guide with NEC and all local codes to be compliant. In addition, we recommend to use a soldering connections where is practical possible, to prevent oxidation and further malfunction. Use appropriate wire gauge and insulation materials during installation. Advise with your compressor manufacturer.

Give us a call if there is unclear of need to be verified. We here to help your successful installation.

Preparation Before installation

Please locate and determine an Enclosure for the Digital Compressor Controller (DCC) and locate all components needed for installation. You may consider a following components, you may need in addition for the Digital Compressor Controller to make a successful installation:

- Contactor Power Relay to control your compressor (S). Output specification need to match or exceed requirements for your loads. Consult your Electric motor vendor for details. Or you may consider to use:
- VFD – Variable Frequency Drive to control a load and Start/Stop regimes of your Electric Motor – compressor pair in most economical way.
- Vent Valves – our Digital Compressor Controller allow control separately up to one Vent Valve per compressor. A Valve will be activated as soon as temperature of the compressor will be above environmental temperature to allow compressor easy cold start.

Pressure Limit Set

To set a pressure limits, please use two Trimmer Potentiometers , located on the back of the controller. You need to use 3mm or similar, flat screwdriver to set pressure. From factory Controller come with Min limit set to 100 PSI and High limit set at 120 PSI.

During Pressure Limit Set Please remember the following operation limitations:

- Minimal pressure limit could not set less than 30 PSI;
- Maximum pressure limit could not set more than 190 PSI;
- Difference between Minimal and Maximum pressure could not set less than 10 PSI.

If you desire different initial settings, or require a different target pressure sensor – please contact factory for special order.

Installation Steps in short

This short description are not intend in complete, and serve just as a reminder list on your bench. You can print this portion with diagram to improve your installation experience.

1. The Compressor Controller comes as a Do It Yourself kit that allows you to cater the form and functionality to your specific business situation. The enclosure does not come with the kit and some of the auxiliary functions discussed in this video require additional components such as valves and fans. Make certain that you have all of the necessary components for the functionality that you desire prior to installation.
2. Once you have found the appropriate enclosure for your compressor, it must be prepared. Cut a hole in the enclosure and install the Controller, power switch, and the power supply. Cut holes for all planned cable entries and install the appropriate NEC approved fittings. On the bottom of Enclosure cut holes and install the Ambient Temperature/Humidity sensors and buzzer.
3. **To advance on next step, Make sure the Power is OFF and the expansion tank is empty**
4. Choose a location on the tank platform or mounting armature that is not in the way of any potential repair or maintenance procedures and securely mount the enclosure.
5. Remove the pressure switch. Check the connection pipe for debris and rusting and replace if necessary. If you must replace the pipe, we suggest replacing with a brass pipe which will help prevent rusting and maintain an appropriate environment for the sensor. Leave the safety pressure release valve and pressure gauge in place.
6. Install the pressure sensor taking special care not to apply the wrench pressure to the sensor body during installation.
7. Install the Temperature sensor, by mounting under a bolt where your Compressor cylinder is attached to the body of the Compressor. If you have a two stage compressor, mount it on the first stage cylinder.
8. The Compressor Controller is designed to work with a variety of valves and auxiliary equipment depending on the functionality desired. Each of these components is specific to your compressor setup and do not come with the Compressor Controller kit.
9. Install the Vent, Normally Open Valve. We recommend a $\frac{1}{4}$ " NPT or $\frac{1}{8}$ " NPT valve with an orifice. Check with your compressor manufacturers for specific recommendations.

10. Install the Drainage, Normally Closed Valve. We recommend using the maximum size for the elbow, piping and valve itself, to provide a clear pathway for debris and condensate drainage.
11. As an additional measure, a Cooling Fan can be installed to cool the compressor pump faster..
12. Once all the sensors and valves (and fan) have been installed, everything can then be wired. Wire all sensors, low voltage parts and the power supply to the Controller. Test each connection, then wire the output relay and perform a final test.
13. After all connections are checked and verified, connect the power source to the compressor and turn it on for the first time. We advise to check the oil level and quality and check the belts to ensure proper tension.
14. Now, go back to work. The Compressor Controller is fully operational. Pay attention to alerted by the buzzer and on the LCD screen.

Installation Steps: The Details

- Follow a preparation steps, and planning for your installation and obtain all necessary parts for installation;
- Prepare projected diagram for wire connections and if you not feel comfortable invite an specialist familiar with art. Remember to install provided Main Power switch in series to your Power Supply AC wires, to have a complete power OFF when you need. This switch become your main power switch for new setup.
- Prepare all collected parts for installation, prepare enclosure by cutting the hole for Controller, and install in the front of enclosure Controller itself, Power switch, and on back panel Power Supply. Cut entries holes for all planned cable entries and install appropriate NEC approved fittings. On the bottom of Enclosure Cut holes and install with glue or screws Buzzer and Ambient Temperature/Humidity sensor, so direct sunlight or water splashes will not affect the performance.
- **Make sure Power is OFF !**
- **Empty your expansion tank** and disconnect tank from supply line, to assure back pressure will not start to build-up in the tank.
- Mount your Enclosure to the Tank Platform or mounting armature. Make sure is secure, and do not effect by further maintenance and equipment adjustment on the Tank platform. Do not block air cooling pathway, and your future service operation for the electric motor and Compressor Pump. Make sure it is do not on the way to change belts or tension procedures. Installation shall allow cables freely, without stretch to access to the Enclosure.
- With empty expansion tank, remove existing pressure switch and check a place where it was installed for debris. Often pipe from the tank is the subject for moisture and carbon collection, so clean that pipe inside or replace as is required. An iron connection pipe (usually it is ¼" NPT x 3..6 inch long, dependent on whole setup) we recommend to replace with brass, which is clear the better choice for long run, to prevent rust grove inside and cause pressure sensor malfunction. On top of the connection pipe usually installed a cross with safety pressure release valve and Pressure gage. We recommend to keep both of them for addition safety precaution, as per specs from compressor set producer.
- Pressure Sensor are ⅛" NPT thread and if you need , you may need to use an appropriate thread reducer. With appropriate techniques of sealing pipe threads, install pressure sensor and be

carefully do not apply wrench pressure to its body, to prevent internal damages, which are not covered by warranty.

- Guide Pressure sensor wire to the Enclosure with appropriate support to the tank platform. Make entry to the Enclosure and make sure you have extra to perform wiring. Add as required with standard techniques, with appropriate insulation and color match techniques.
- Install a Temperature sensor, by installing under an appropriate bolt where your Compressor cylinder attached to the body of the Compressor. If you have two stage Compressor, better to install on first stage cylinder then on second stage, since it is much more accurate represent a dynamic for overall Compressor temperatures. Make sure you use appropriate technique to seal that bolt connection and provide a same torque as factory specify. Do not perform this on HOT cylinder - it will incorrectly torque.
- Guide Temperature sensor wire to the Enclosure with appropriate support to the tank platform. Make entry to the Enclosure and make sure you have extra to perform wiring. Add as required with standard techniques, with appropriate insulation and color match techniques.
- Make wiring to your Electric Motor contactor with appropriate wire gauge and standard NEC compliant techniques. Please check a voltage and current for primary coil for the contactor and compare to the Controller relay specifications, to be sure your not exide the limitations. In some instances it may required to have an intermedia relay to drive a contactor, in cases of High horsepower electric motor installation. Please check carefully.
- In some instances, for further savings, we are recommend to go with Solid State Relay (SSR) installed on the appropriate heatsink with natural or fan driven installation. Rule of thumb when you select SSR for your installation use at least 1.5 times of voltage for the motor rating, and 8 to 15 times of the current motor ratings, to accommodate startup conditions. SSR will provide much smooth and consistent start, not dependent on weather, humidity and further reduce your compressor setup losses. As another measure of improved setup, would be use an VFD, which will significantly expand your usage and savings, while prevent equipment malfunction. Please advise with your compressor manufacturer.
- Valves and AUX equipment :
 - Install Vent, Normally Open Valve. We recommend to use $\frac{1}{4}$ "NPT or $\frac{1}{8}$ "NPT valve with an orifice. Orifice need to be selected dependent on your Compressor total displacement. Usually correctly selected orifice provide about 5 seconds to complete bleed air from the Compressor heads after compressor stops. Please advise to your compressor manufacturer.

-
- Install Drainage, Normally Closed Valve. Usually it is from ¼" NPT to ¾" NPT sized tank opening on the bottom. We recommend to use a maximum size for the elbow, piping and valve itself, to provide a clear pathway for debris and water condensate drainage. Install properly sized orifice on the end of drainage pipe, which need to be periodically cleaned and serviced. Connect valve output to appropriate collection tank, where you compressor condensate and oil traces will be settled. Please provide an appropriate collection for the waste condensate, according to National and Local rules and restrictions. An inappropriate handling could be cause civil and criminal penalties. We recommend to use an evaporation methods commonly used to the industries. Please advise with Compressor equipment installer.
 - As an additional AUX output, Controller offers to connect an Cooling Fan. We recommend to install such, appropriate sized Cooling Fan to your intercooler and Compressor Pump cooling pathway to further improve you Compressor performance and meet the weather temperature fluctuation. Please check a maximum current and voltage requirements for the Fan and compare to Controller output relay specification, and if necessary install an additional power relay to connect Fan properly.
 - So after install all components and secure them, you are ready to perform wiring.
 - There is two portions for the successful wiring: (1) Wire all sensors and low voltage part and power supply to the Controller, and test; (2) Wire Output relay and perform a final test. Please use pre-teened all wire ends, to assure uncompromised connection and minimize weather effect for long term.
 - **First do all low-voltage side and power test.** To wire all sensors, and low voltage components, please look carefully on provided marking on each cable and individual wires. Please carefully follow the marking on the Controller body for the connections:
 - Pressure sensor - **3 wires** : - + Power (Red), - Power (Black), Signal (Blue or Green). For long cables we recommend to use a shielded wire, and shield connection need to be done at enclosure common Ground (Green).
 - Temperature sensor - **3 wires + Ground** : - + Power (Red), - Power (Black), Signal (Blue), enclosure common Ground (Green),
 - Ambient Temp/Humidity - **3 wires** : - + Power (Red), - Power (Black), Signal (Yellow or Blue or Green or White),
 - Buzzer - **2 wires** : - + Power (Red), - Power (Black),

- Power from provided Power supply - **2 wires** : - + Power (Red), - Power (Black).

Check all connections and make sure all is connected.

Turn OFF and make sure is OFF a compressor Main Disconnect.

Connect Power supply to the AC (or whatever power supply rated for) with serially connected 0.5A fuse and a switch. Check all connections and wires for errors, etc. Switch need to be in OFF position at this time. Make sure all low-voltage components are connected at this time and Relay Outputs are disconnected from controlling circuits.

Connect compressor Main Disconnect and turn ON controller Power switch - it shall power your controller for the first time for the test. Please look on the "Power your Controller" section for details.

Check sequentially all screens and make sure all sensors are wired correctly, Buzzer will activated a few times during starting sequence and will confirm a correct wiring. Do not pay attention on output LED and activated outputs - you will see outputs will be activated and you will hear clicking of the relays - it is normal.

After all sensors sensors are confirmed wired correctly, turn Power OFF and disconnect compressor Main Disconnect.

- **Second, after all low voltage side is tested and verified, connect all outputs.** Wire all Outputs to the Controller. Please note, all Output relay are provided with Normally Open and Normally Closed options, allow to accommodate all your specific wiring needs. Please check all your planned wiring diagram against all connections you made, at least twice to make sure all is done correctly.
- If you not feel comfortable with your skills in above steps, invite an specialist, who familiar with art do a job correctly.
- Check oil level in air Pumps and if need to be replace or add. Check your belts, and replace with appropriate brand and install with specific tension. Check electric motor lubricants as appropriate.
- After all connections are checked, and verified, and Controller Power switch are OFF position, connect your compressor Main Disconnect.
- Power up the Compressor Controller. Controller will go thru own testing procedures and a three beeps will notify, all your compressor operation are under the control of the Compressor Controller. Since your air expansion tank is empty, Controller will start pumping air, control vent valve, drainage, etc.

Single Compressor Setup

A Single Compressor setup elements shown on Fig.6 diagram.

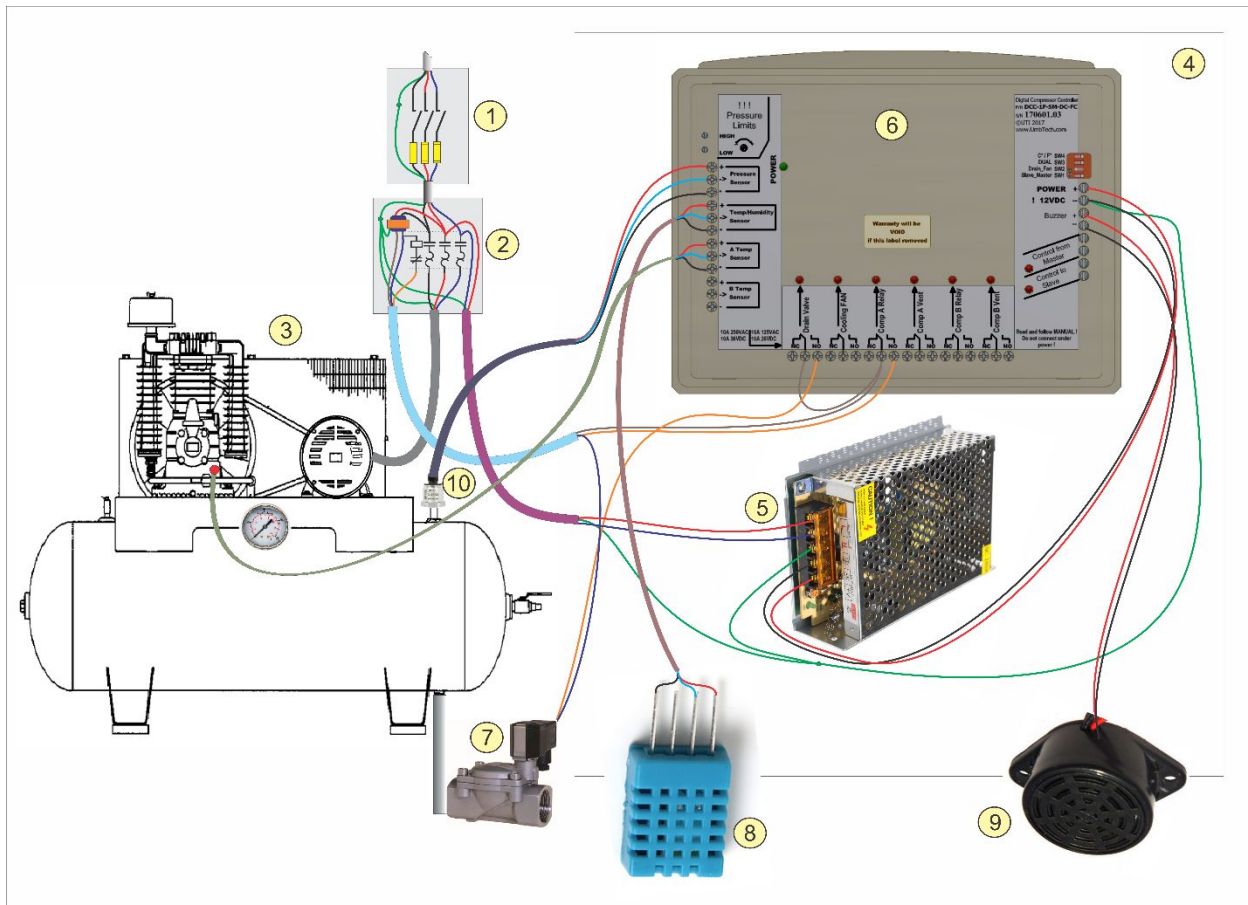


Fig.6 A typical Control circuit connection for Single R1 version

Power coming to Fused disconnect (1) and sequentially to Motor Starter with Over Current Protection with Control Transformer (24VAC) (2). From there power wires is connected to the Compressor Motor with appropriate Grounding (3) (gray cable).

Power and Grounding coming to Control Box (4) (purple cable), where you can add an additional power switch as desire. Power supply (5) is Grounded and connected to Line and Neutral wire with in-line fuse for 0.5A (not shown), where output of 12VDC connected to Digital Compressor Controller (DCC)(6). Please pay attention to the DC proper polarity and correct grounding.

(ATTENTION) -> All wiring need to be done according to local codes by professional !

(ATTENTION) -> All wiring need to be done while power is disconnected !

Control cable (light blue color) are connected to Control Transformer output and connected to controlling coil of magnetic Motor Contactor (Starter) via Over Current Protection relay.

24VAC could be used to other circuits' control, such as Drain Valve, or Vent Valve, dependent on your desire setup and purchased model of the Digital Compressor Controller.

On some installation, our customers some time decide to avoid installation of Vent valve and Drain valve. We strongly recommend to use Drain valve (7) along with Vent Valve, to significantly reduce water content in the compressed air. Some installer are reporting up to 70% reduction ! Digital controller has specifically designed to control them appropriately and significantly reduce total Power consumption and start-up current. Reduction of water is the first step to SAFETY !

For measure environmental Temperature and Humidity need to be connected sensor (8) and for audible alarm Buzzer (9). Both of them need to mount outside the Control Box (4) in water and sun protected area, where bottom of the Control Box (4) would be one of possibility.

Special attention need to pay to Pressure Sensor (10) installation. Sensor need to be installed on at least 4 inch or longer sampling tube on top of the tank, to prevent possible water splashing and excessive condensation. In some extreme cases, a filter and longer piping would be recommended. Please pay attention to set a thread with liquid seal and teflon tape. Use only appropriate sized wrench and do not overtighten, it may damage the body of the sensor, which is not covered with warranty. Contact us for replacement.

If your Compressor experience vibrations, we recommend to install sensor on shock absorption manner. Please consult your Compressor vendor for details on installation.

If your compressor equipped with Electric Vent Valve, or you decide to install one, our Digital Compressor Controller equipped with active relay control allow to control one. You can use 24VAC power from Control Transformer or you can select other working voltage Valve and it is own power supply. Consult an Electrician for details.

Please ask question if any would rise at this time.

Single and Duplex Controller Settings

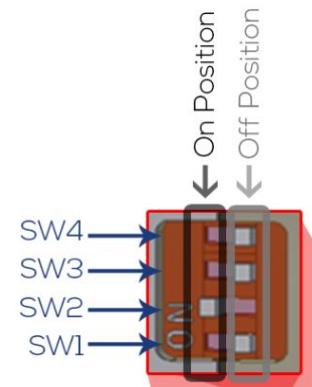
From the factory, The Controller is shipped fully programmed, tested and pressure limits are set to:

Low Pressure Limit – 100psi

High Pressure Limit – 120psi

Please consult your compressor manufacturer and consider your application when setting high and low pressure limits. As pressure limits that are set too close to each other will result in rapid compressor cycling and setting pressure limits that are far away from each other will result in wide pressure fluctuations that may affect operations.

The Compressor controller uses digital sensors and approaches to determine pressure much more precisely than mechanical switches. As a result, the set pressures will not fluctuate due to temperature, spring wear contact dirt. ect..



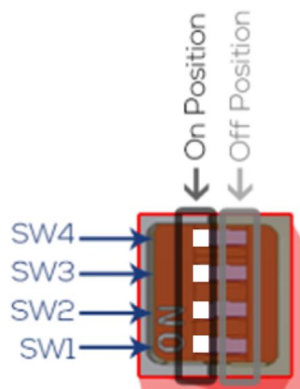
Configuring DIP Switches

The four DIP switches, located on the back panel of the model R1 and R2 controllers Change the function and properties of the compressor controller as according to the charts below.

Do not apply power until all DIP switch settings have been made.

Model R1 SINGLE Compressor Controller

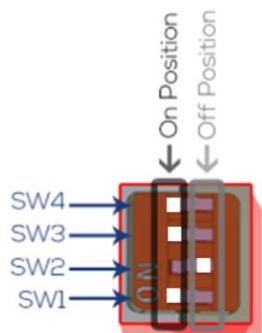
	Description	OFF position	ON position
SW1	Temperature units (C / F)	Celsius (C)	Fareinghite (F) <i>Controller shipped with SW1 in ON position.</i>
SW2	Fan operation	OFF <i>Fan operation is OFF</i>	ON <i>Fan operation is Active. Controller shipped with SW2 in ON position.</i>
SW3	Drain operation	OFF <i>Drain operation is OFF</i>	ON <i>Drain operation is Active. Controller shipped with SW3 in ON position.</i>
SW4	Slave / Master Operation	Dis-Allowed <i>Controller will not sense remote signal NOR produce control signal output</i>	Allowed <i>Controller will sense remote signal AND produce control signal output. Controller shipped with SW4 in ON position.</i>



Model R2 DUPLEX Compressor Controller

	Description	OFF position	ON position
SW1	Temperature units (C / F)	Celsius (°C)	Fahrenheit (°F) <i>Controller shipped with SW1 in ON position.</i>
SW2	Simultaneous Dual compressor*	OFF <i>Duplex compressors will only alternate , but will not run together On first line of LCD display “alt.” indicate Altered mode of operation. Controller shipped with SW2 in OFF position.</i>	ON* <i>Duplex compressors will alternate , and will run dual if pressure still dropping and it is less than 5PSI of Low Limit On first line of LCD display “dual” indicate dual mode of operation when is required</i>
SW3	Drain / FAN operation	OFF <i>Both Drain and Fan operation is OFF</i>	ON <i>Both Drain and Fan operation is Active Controller shipped with SW3 in ON position.</i>
SW4	Slave / Master Operation	Dis-Allowed <i>Controller will not sense remote signal NOR produce control signal output</i>	Allowed <i>Controller will sense remote signal AND produce control signal output. Controller shipped with SW4 in ON position.</i>

NOTE (*) For DUAL operation, please check with your electrician for double power requirements – when two of your Duplex Compressors will turn ON simultaneously will require twice more power than for alternating Duplex compressors.



Limitations of Operation

A set of following limitations are incorporated in to controller to protect your assets. Please contact salesman in case if those parameters are desire to change and to make a special order.

Max Compressor Running Time set at 30min.

Will trigger a permanent HALT status until cause will be investigated and Compressor Controller rest via Power-OFF.
Will record count of each event.

Max Compressor Temperature set at 250F (120C)

Will trigger a permanent HALT status until cause will be investigated and Compressor Controller reset via Power-OFF. Will record count of each event.

Please refer to API 618 standard and your compressor documentation to select an appropriate lubricant and observe operation limitation.

Max Compressor Start Temperature set at 194F (90C)

Will prevent Start of compressor until compressor body will cool off to under set temperature. Will display "Compressor Too HOT" in second line and make periodical beep. Do not required reset – as soon as condition is clear, compressor will run as usual.

In case of DUPLEX compressor setup, will not run HOT compressor, just only compressor which body below set temperature. If both compressors body temperature above set value, nether will run, till conditions are cleared.

Activation of Slave Compressor Link

While compressor are ON and pressure in the systems still continue dropping, this feature will activate Slave compressor controller.

Compressor Ventilation Valve

Will be activated (closed) if Compressor body temperature will be 1C degree above compressor start temperature, or above 2C ambient temperature

This is design to prevent excessive condensation in compressed air and as result water trapped in to compressor lubricant. Our research shown this results in over 50% reduction of water condensate in compressor lubricant and in the expansion tank.

Fan activation set at 4C above ambient temperature

This feature allow to run an additional Fan when it is needed to improve compressor casing. Will run only if appropriate Switch is activated (ON) on the back of your controller (SW2 for Single, SW3 for Duplex controller).

This output will be activated only when compressor(s) are running, but will OFF only when temperature of compressor body drop below 140F (60C). This improve life span for compressor lubricants.

Drain Valve

Drain activation set automatically at computed possible level of expected condensation, based on typical 5HP compressor and 120gal receiver tank.

This feature allow significantly reduce cost of drainage of condensed water, trap in to your receiver tank. Algorithm has target wide practical range, but you shall contact sales representative to explain your setup differences. Will run only if appropriate Switch is activated (ON) on the back of your controller (SW3 for Single, SW3 for Duplex controller).

Just to be aware, if Controller are powered, this output would be activated any time and need to be made all necessary precautions.

When Drain valve is activated, a double beep would be announced before activation of the valve, and a single beep will indicate a successful drainage complete.

Overnight Drain activation

In addition to above standard computed drainage procedures, Compressor Controller incorporate an overnight drainage procedures, when expansion tank are completely cooled and most of the moisture are condensed on its walls and collected at lowest spot of the tank. Controller will activate drain valve after midnight local time for a few seconds to make a complete drainage. Duration and quantity of cycles will be compute based on computed tank size and accumulated water volume. When Drain valve is activated, a double beep would be announced before activation of the valve, and a single beep will indicate a successful drainage complete.

Power LOST during compressor working cycle

This event will require user action to continue process, during next Power UP. Press and hold Display button for 10sec to continue. It is not required to Power-OFF a controller. This will clear error status automatically.

LCD backlight will turn OFF in about 3 minutes but beep will continue infinity. As soon as DISP button pressed, LCD backlight will be up and Controller loading/starting process go as usually.

LCD display backlight set for about 3 minutes

When compressor perform working cycle, or any external event acquire, such as compressor controller activated as a Slave, or Display button depressed, LCD display backlight will be activated for all time of working cycle and as soon as cycle finished , display will be ON for another about 3 minutes and after go to save mode – Backlight is OFF. To activate light press Display button. If Error or Run Time Protection will acquire, Lights will be activated for about 3 minutes.

Change hour meter Display Minutes to Hours after 150 minutes running time

This feature will change Minute's format to Hours format on the LCD display, as soon as set time interval will acquire. It is help to prevent big number to display. Internally, count of time done at 1mS interval, to improve overall accuracy for maintenance reason.

Rupture of Air Network was detected

On Display appear message:



```
Catastrophic RUPTURE
NN* Cont.> DISP
Confirm > POWER OFF
E R R O R E55
```

(*where NN are an error counter)

If DISPLAY button will be pressed, math behind will consider it is normal operation conditions and will increase a trigger threshold for future analytic for given customer setup.

If Customer will power OFF a Controller, analytics will have confirmation for the event and keep trigger a “Rupture” conditions at same level of air loss rate.

This feature specifically designed to prevent a sudden and unexpected air loss, which is would be a pipe or other connected equipment event. This will prevent compressor out of running on open air network, save money and significantly increase a safety margin in operation environment.

Internal Timer (RTC)

While we design this world innovative Compressor Controller, we keep in mind you, our customer, who shall have less efforts to maintain own assets. Small comparison – when horses was on street and people do not know the greatest invention of motorized vehicle, they always argue with vehicles sales man – we have bag full of oat and we do not know how to handle gasoline J. Time goes by... Think about leaving without that step forward, to have manure everywhere, and extended parking lots with water basins next to the mall... Got the point? Moreover, you do not really looking under hood, as earliest driver spend 20minutes before every short trip to start car...

So, our design virtually do not require maintenance and will keep precision time for you to maintain your time records, and run compressor with great precision. Batteries what keep your clock precision are Lithium-Ion Rechargeable and will work for over 10 years. We expect, in normal circumstances, according to chip factory, time accuracy shall be better than 1s per month (oscillator Accuracy $\pm 2\text{ppm}$ from 0°C to $+40^{\circ}\text{C}$). But even it will be slightly off, a general terms of time keeping for your compressor time – it still accurate to the last seconds. Nevertheless, please remember, our controller count your compressor operation in seconds!

Also, FYI, due to compilation time, initially clock are set with about 20sec off in relations to Atomic standard, but it is better than you ever need.

True Compressor run alteration for Duplex controller

Compressor Controller has an advanced embedded algorithm for true alteration for the next compressor to run, based on variety of parameters, such as pumping performance in past, current temperature current Ambient temperature and humidity, air consumption, etc. So, do not surprise if suddenly after pump “A” running again pump “A” - that is based on current operation circumstances. Controller target to have even distribution of the running time in equal running conditions with accuracy to 5 min difference. What is does mean ? For instance if one pump run hotter due to naturally occurred demand, Controller will avoid run that pump in demanding pumping cycles to allow that pump cool to even conditions with other pump. In another circumstances, one pump with other equal conditions, run longer, so during pump selection for next cycle, that pump will skip own turn, to allow work longer another pump, to balance a net hours. This advance strategy allow to maintain a same wear level for the assets, prolonging life and reduce maintenance expenses.

Pressure Limit settings

From factory delivery, a Low limit set at 100psi and High limit at 120psi. Please pay attention to this settings and advise your user manual for the compressor or advise to the compressor vendor or producer to set this limits. This

limits are crucial (!!!) to safety of operation of the compressor, motor and rest of connected equipment i.e. Expansion tank, intercooler, valves, etc.

If you need to change those settings, please remember: (1) Low pressure limit could not be set less than 30psi ; (2) High pressure limit could not be set above 190psi and (3) Minimum difference (Delta) always will be not less than 10psi. It is standard settings for most Industrial and Commercial compressors in the industries.

However, if you need other settings, please contact us for details.

Remark on pressure bandgap settings

With digital Compressor Controller you are definitely master of your air demand. Bandgap and especially Lower limit would be possible to set at the minimum requirement level, provide you direct savings and reducing wear of the air network equipment, decreasing condensation.

With a upper limit reduction you will definitely reduce your electric bill. Each single PSI in the air network take about \$1 a day. In non-digital controller world you will waist that money. With Digital controller, in most common installation, a reduction provision usually over \$20 to \$100 a working week, based on usage circumstances.

On another hand, if you see your compressor cycling often to full-fill your air demand, drainage, fast operating tools, etc. You will naturally notice that, since you can observe and record your compressor setup running performance - you are not left in the dark. So, perhaps the upper limit of the pressure, based on your demand need to be increase.

Some of the installation circumstances will require to increase a expansion tank volume to decrease a running cycles a day. Please call us with your case explanation, we have an expertise to help you save your operation expenses with Digital Compressor Controller.

Error Code List

Software in the Controller able to detect a various critical situations and will generate ERROR status display. A following list represent a current version Error list.

01 – Pressure Sensor Error – Low Output - Broken Wire, No Power, Disconnected, Sensor failure

02 – Pressure Sensor Error – High Output - Over Pressure, Sensor failure

Both this errors are displayed on screen #4 – a quality of the pressure sensor and its condition, and connection to controller are extremely important for overall operation safety, so sensor are check for integrity over 20 times a minute. Do not attempt to replace sensor with other brand and other producer, use only OEM sensor from your diller or buy directly from www.SAMcontroller.com .

We have cover wide range of working pressures sensors, please contact representative for your needs.

Please note, if Pressure sensor or it is cable, connection, power, etc. malfunction or failure, Controller will not operate and Error status will be generated. Repair any problems before operation.

03 – Compressor Over Temperature Protection – Temperature of the body of the Compressor exede 90C during work cycle – Protection for further destroying of the internal components. Compressor will not run, until temperature will be less than 60C.

After Error acquire, controller will go to permanent HALT stage, while will make short beep for attention.

04 – Compressor Over Time Protection – last working cycle was longer then 30min.

After Error acquire, controller will go to permanent HALT stage, while will make short beep for attention.

09 – HALT – Software induced protection HALT

There is several problems which may cause this Error. A second line from top are contain a 5 characters which are identifying the potential problem code. This is very rare, but possible event, specifically designed to protect your setup components. Please contact a Controller distributor/Producer with picture of the HALT screen to get details and possible solution for this issue.

55 – Rupture Event in air network are detected. This is detection of sudden unexpected air usage, which are similar or it is a pipe or connected air equipment malfunction. Analytics behind this triggering event are design to save thousands of dollars and increase safety margin.

From this point of detection are two way to continue : (1) By pressing DISPLAY button, customer describe current triggering as a normal event of standard operation, and advise for the algorithm to consider this as a normal operation and do not trigger in similar instances of air usage; (2) By Power OFF customer CONFIRMING this event are equipment or air network catastrophic failure and Controller will keep this level of air usage as a catastrophic level and any consumption at this level or over this level will be triggered in future as Catastrophic behavior.

99 – Emergency STOP (outside HALT signal received) – V3.0 incorporate an dry contact Input for a variety of external emergency procedures to initiate a complete Controller STOP stage:

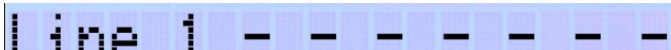
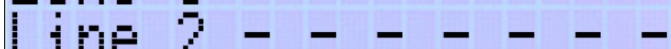
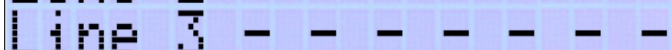
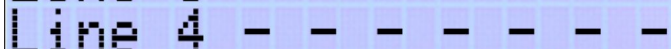
- One or many Phase voltage lost at any time – you need to use an Phase detector
- Motor Overcurrent during run – Current sensor with set a max current
- Compressor Flywheel is not rotating – lost belt traction or belt Rupture
- External Emergency event

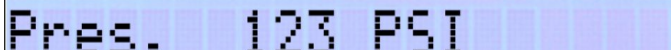
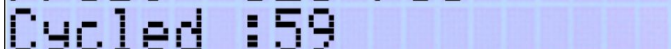


All connected relays and equipment will be OFF stage and you will see a blinking RED light at CITY indicators. If this light are steady RED with periodic beep, it does meant event is not cleared and need to be check all connected equipment listed above

Display Screens - SINGLE Compressor Controller / Model R1 v3.0 (v17.915)

The compressor controller incorporates various analytics strategies, and to display them you need to go through a numerous screens to see a results of that, such as temperature, humidity, pressure control, switches status. By sequentially pressing DISP button, you will cycle through this 7 screens in normal operation. Screens are not available when the Compressor Controller is in Error status.

Display screen definition key:

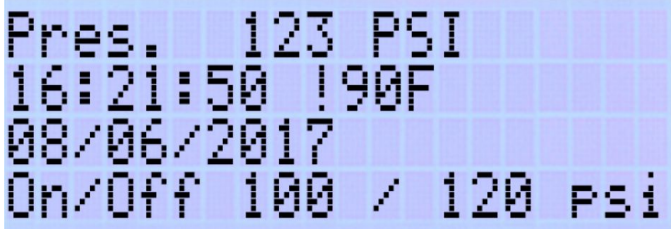
Title of screen, numerical order of appearance when pressing the disp button, description of screen.	
	←1 Line 1 information
	←2 Line 2 information
	←3 Line 3 information
	←4 Line 4 information

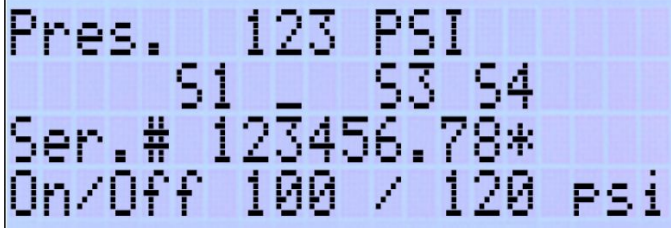
Main Screen (first screen) - default screen, after Controller is powered on	
	←1 Current Pressure Reading, PSI, will be shown on all sequentials screens. In very Right position in this line, will be appear blinking heart, displaying Compressor is working.
	←2 This many times your compressor cycled, since controller installed
	←3 Total working time for your compressor, since controller installed
	←4 Low and High pressure settings, PSI, will be shown on all sequentials screens

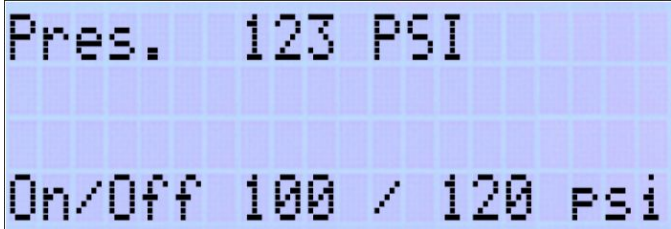
Second Screen - Ambient conditions for Temp and Humidity	
<pre> Pres. 123 PSI Ambient 75F *19% PumpTemp 80F On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Current Ambient Temperature and (*) Ambient Humidity
	←3 Current Compressor Pump Temperature
	←4 Low and High pressure settings, PSI

Third Screen - Min/Max temperatures on Compressor	
<pre> Pres. 123 PSI Max Temp. 120F Min Temp. 71F On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Max Temperature Compressor Pump ever run since installation
	←3 Min Temperature Compressor Pump ever run since installation
	←4 Low and High pressure settings, PSI

Forth Screen - pressure sensor errors summary	
<pre> Pres. 123 PSI Pres. Sensor Errors L= 0 / H= 1 On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Pressure Sensor Errors
	←3 Low count for possible cable breakage or High for shortages, or if it is consistent, perhaps sensor itself has internal problems and need to be replaced, consult with Customer Service
	←4 Low and High pressure settings, PSI

Fifth Screen - internal precision timer and internal Controller temperature	
	←1 Current Pressure Reading, PSI
	←2 Current time and Internal Controller (enclosure) Temperature
	←3 Current Month, Date, Year
	←4 Low and High pressure settings, PSI

Six Screen - Switches status and serial number	
	←1 Current Pressure Reading, PSI
	←2 Switches Status – S1, S3, S4 is ON, S2 is OFF
	←3 Factory Serial Number
	←4 Low and High pressure settings, PSI

Sevens Screen - empty	
	←1 Current Pressure Reading, PSI
	←2 Empty string / factory internal numbers and settings
	←3 Empty string / factory internal numbers and settings
	←4 Low and High pressure settings, PSI

Display Screens - DUPLEX Compressor / Model R2 v3.0 (v17.915)

The Duplex compressor controller incorporates various analytics strategies, and to display them you need to go through a numerous screens to see a results of that, such as temperature, humidity, pressure control, switches status. By sequentially pressing DISP button, you will cycle through this 7 screens in normal operation. Screens are not available when the Compressor Controller is in Error status.

Display screen definition key:

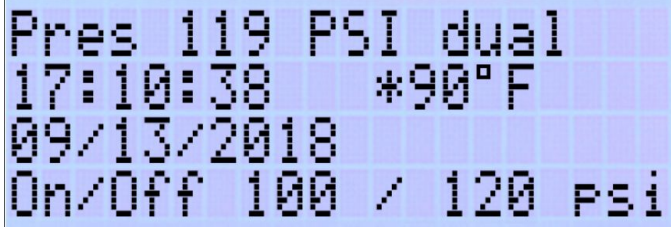
Title of screen, numerical order of appearance when pressing the disp button, description of screen.	
	←1 Line 1 information
	←2 Line 2 information
	←3 Line 3 information
	←4 Line 4 information

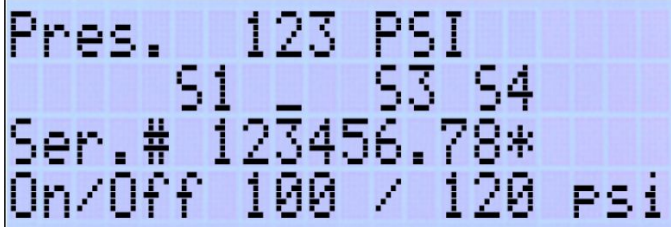
Main Screen (first screen) - default screen, after Controller is powered on	
	←1 Current Pressure Reading, PSI, will be shown on all sequentials screens. Note “alt.” represent alteration only mode, and “dual” represent a dual mode, when two compressors could work simultaneously. Control by SW2 “Duplex/Dual”. In very Right position in this line, will be appear blinking heart, displaying an Compressor is running.
	←2 This many times your compressor cycled, since controller installed, “A” and “B” representation for A and B compressors. Arrow next to compressor letter will flashing if that compressor is running.
	←3 Total working time for A and B compressors, since controller installed. When compressor running time
	←4 Low and High pressure settings, PSI, will be shown on all sequentials screens

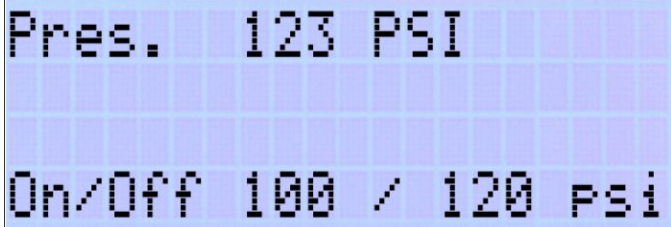
Second Screen - Ambient conditions for Temp and Humidity	
<pre> Pres 119 PSI dual Ambient 24°C *18% @tmp 26°C @tmp 26°C On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Current Ambient Temperature and (*) Ambient Humidity
	←3 Current Compressor Pump Temperature for the A and B compressors
	←4 Low and High pressure settings, PSI

Third Screen - Min/Max temperatures on Compressor	
<pre> Pres 119 PSI dual @mx: 98° F @mx: 105° F @mn: 10° F @mn: 25° F On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Max Compressor Pump A and B temperatures ever run since installation
	←3 Min Compressor Pump A and B temperatures ever run since installation
	←4 Low and High pressure settings, PSI

Forth Screen - pressure sensor errors summary	
<pre> Pres. 123 PSI Pres. Sensor Errors L= 0 / H= 1 On/Off 100 / 120 Psi </pre>	←1 Current Pressure Reading, PSI
	←2 Pressure Sensor Errors
	←3 Low count for possible cable breakage or High for shortages, or if it is consistent, perhaps sensor itself has internal problems and need to be replaced, consult with Customer Service
	←4 Low and High pressure settings, PSI

Fifth Screen - internal precision timer and internal Controller temperature	
	←1 Current Pressure Reading, PSI
	←2 Current time and Internal Controller (enclosure) Temperature
	←3 Current Month, Date, Year
	←4 Low and High pressure settings, PSI


Six Screen - Switches status and serial number	
	←1 Current Pressure Reading, PSI
	←2 Switches Status – S1, S3, S4 is ON, S2 is OFF
	←3 Factory Serial Number
	←4 Low and High pressure settings, PSI

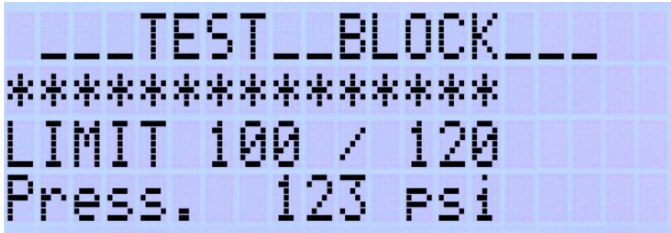
Sevens Screen - empty	
	←1 Current Pressure Reading, PSI
	←2 Empty string / factory internal numbers and settings. You may need this info when calling factory.
	←3 Empty string / factory internal numbers and settings. You may need this info when calling factory.
	←4 Low and High pressure settings, PSI

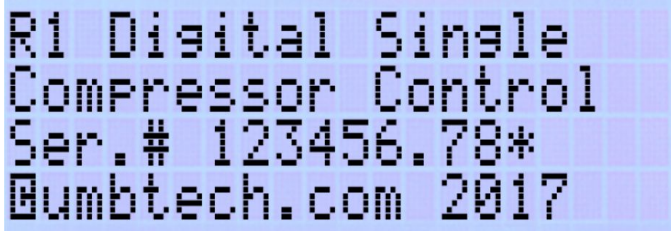
Display common Screens - for SINGLE and DUPLEX Compressor Controller / Model R1, R2

This screens are common for both versions of the controllers, and Error reportings.

During start up you may see this screens, which are :

PowerUp screen	
	←1 Current Pressure Reading, PSI
	←2 Empty string
	←3 Last Error code experienced in previous runs, which has been reset
	←4 Loaded Software version

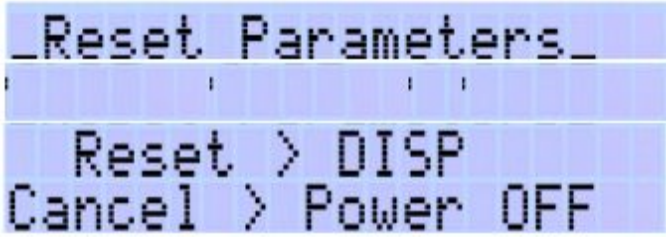
Initialization Screen	
	←1 Test Block Message text: Init, Memory, IO, Loading environment
	←2 Progress bar
	←3 Current Pressure Limit set
	←4 Current Pressure reading , will be replaced with "READY" message tell you all IO connections are tested and working environment are successfully loaded and tested

Copyright Screen	
	←1 This is model R1 Single Digital
	←2 Compressor Controller
	←3 Factory Serial Number
	←4 Copyright

At this time you will hear 3 beeps, confirming, Compressor Controller taking control of the Compressor and Compressor Pumps, Valves, Fans may start any time. In addition tree LCD backlight blinks and buzz warning will confirm, Compressor may start run now.

Reset Operational Parameters


Some operational parameters, such as Rupture control algorithm, errors etc. may be reseted. If you press and hold DISP button during “Power ON”, relies button when you will hear long buzzer signal. A following screen will displayed:

Reset Rupture Parameters screen	
	←1 Reset parameters Screen indication
	←3 To RESET press DISP button
	←4 To CANCEL – Turn OFF power

Release DISP button as soon as you see this message. If you press DISP button again, a operational parameters will be reset to initial factory conditions. This is does not affect Hour meter and Cycles counting.

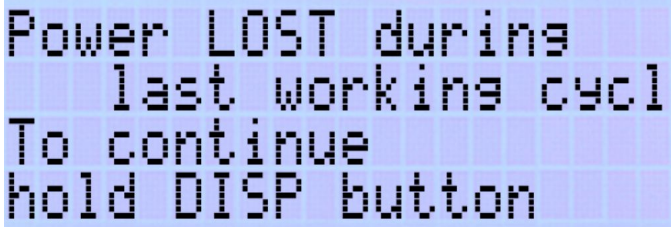
If you decide to do not reset operational parameters, simply cycle Power.

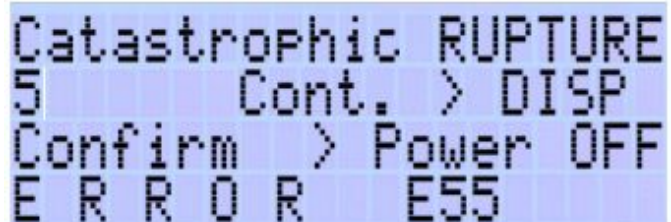
In case of errors or system messages events, you may experience following screens:

Power Supply possible problems screen	
	<p>←1 Power supply are at wrong power settings, or source power are incorrect</p> <p>You need immediately turn OFF controller and check all incoming power and power supply output while disconnect power line from Controller.</p> <p>It is important message and need to be handle with all seriousness. If problem persist, consult with installer, or call factory. Required Power OFF to restart.</p>

When Compressor Controller powered, it will perform a Power consistency and stability. If this is not satisfy to programmed criterias, will HALT here and will required Power cycling in order to restart process. This conditions could be troubleshoot with multimeter. Measure Power supply output without controller connected to Power supply - it shall be close to 12V DC +/- 2%. If not, power supply need to be tested. If it is so, disconnect power supply and wait 1min. Connect Compressor Controller and measure Power supply output with Controller connected. Power shall be close to 12V DC +/- 2%. If it is not so, or DC power is disappear completely, check carefully your wiring. You may cross “+” and “-” or this wires has an shortage. Compressor controller has build-in protection, but remember all protection has own limits - do not taste a fate, it could void warranty.

Power lost during last working cycle screen

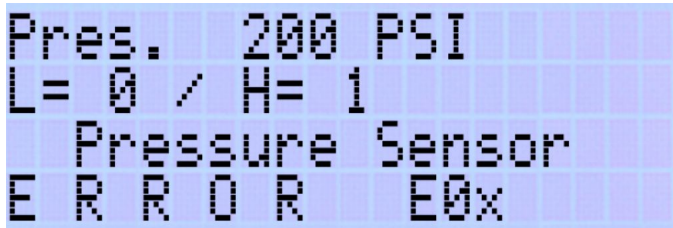
Power lost during last working cycle	
	<p>←1-4 Power lost during last working cycle, to continue press and hold DISPLAY button. Release when hear short beep.</p> <p>Before continue with Controller operation, please look carefully on all compressor components, expansion air tank, compressor lubrication, pipes integrity, valves, check motor drive belts, electric motor lubrication, etc. If any of those parts or components are damaged or missing, operation may damage rest of assembly or it could be unsafe to run !!! Repair before operation!</p>

Rupture Detected Screen	
	<p>←1 Catastrophic Rupture of Air network or abnormal air usage are detected</p>
	<p>←2 Error counter since installed To Continue press DISP button for algorithmical engine to find a better detection level.</p>
	<p>←3 Confirm Rupture and keep at same detection level, Power OFF controller. It will continue detection at established level</p>
	<p>←4 Error Number displayed – E55</p>


Continue, by pressing DISP button will inform algorithmical engine this event was a normal working operation and at similar occurrence it is not necessary to trigger rupture event, so it will initiate internal engine to find a better detection conditions.

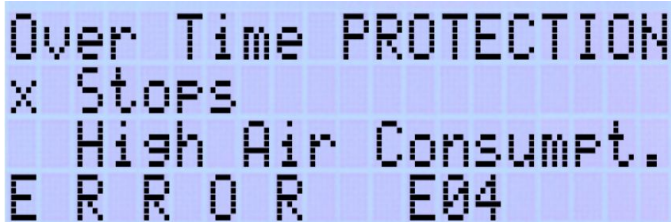
In opposite, by Power OFF, you will confirm the rupture event and algorithmical engine will operate within established parameters to detect future Rupture events.

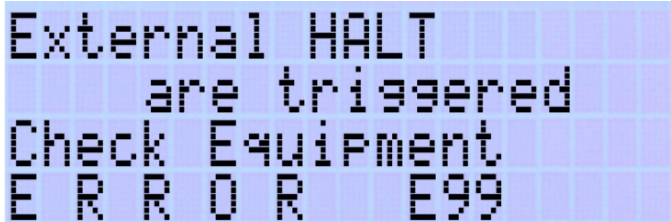
Before power your compressor setup after an Rupture event, all components need to be verified and tested for integrity, since rest components in the system are at same age with ruptured component. It is specially important moment to complete in full, for further SAFETY operation.

Pressure Sensor Error Detected screen	
	←1 Current Pressure reading help you do debugging and test the system
	←2 Low count for possible cable breakage or shortages, or if it is consistent, perhaps sensor itself has internal problems and need to be replaced
	←3 Error Source
	←4 Pressure sensor Error E0x Required Power OFF to restart.

If you receive this error during first Power On - you may want to check all wiring. Pressure sensor has 3 wires and Black wire need to connect to the ground marked “-” on the connector, Red wire goes to the positive power output, marked “+” on the connector, and signal (would be GREEN or BLUE or YELLOW wire) goes to the “input” (market ar an arrow) on the connector. For troubleshooting you may use a multimeter and test voltage between “+” and “-” connector outputs without connected Pressure sensor and after you connect Pressure sensor - in both cases it shall be close to 5V DC. If voltage is not same check carefully your wiring, if no voltage in both cases, consult factory. With air system no pressure, you shall read about 0V DC between “-” and pressure sensor output (would be GREEN or BLUE or YELLOW) wire. If system has a pressure, reading would be proportional to the sensor output, but always less than 4.5V DC. If measured voltage over 4.5VDC, most likely wiring problems. If you could not troubleshoot problems - call factory for advice or help.

Over Temperature Error Detected screen	
	←1 Compressor Over Temperature are detected
	←2 x Stops (such errors) are account since installation
	←3 Possible Cause: Long Compressor Run – check your air consumption, expansion air tank, compressor lubrication, pipes integrity, valves, etc.
	←4 Error code reading Required Power OFF to restart.

Over Time Error Detected screen	
	←1 Compressor Over running Time are detected
	←2 x Stops (such errors) are account since installation
	←3 Possible Cause: High Air Consumption – check your air consumption, expansion air tank, compressor lubrication, pipes integrity, valves, check motor drive belts, electric motor lubrication, etc.
	←4 Error code reading Required Power OFF to restart.

HALT event Detected screen	
	←1-4 An external HALT condition are detected One of signal source equipment components send a HALT signal – check your air consumption, expansion air tank, compressor lubrication, pipes integrity, valves, check motor drive belts, electric motor lubrication, etc.
	Error code reading Requires Power OFF to restart.

Dependent on your equipment setup, HALT signal may come from your local or remote components. So all reasons to such signal need to be verified carefully and all causes need to be removed before system will be repowered. It is
is
may be a SAFETY matter and need to take in to serious consideration.

Power On

First time POWER ON

After all components are installed, secure and wire properly, you can test Power ON. You need to disconnect Compressor Controller all outputs located on the bottom, e.i. connections goes to power components - Drain Valve, Fan, Compressors Run controls and Vent Valves. This will assure avoiding any unwanted heavy components failures, in case you done some mistakes in wiring sensors, and low power equipment.

Please do not presside to next step, unless you disconnect control outputs !

Since you done so, please apply power to Compressor Controller.

Controller goes through internal checks, Power check, Input/Outputs integrity, all memory and program integrity will be perform at this time. Please note, a Box Fan, Drain Valve and Fan output activates during this initial test to assure they are functioning and actively connected, which is important for the operation. If pressure sensor are connected incorrectly or malfunctioned an Error screen will be shown and until the Pressure sensor issue not fixed, Compressor Controller will not advance to another stage. On the Error screen will be displayed current pressure reading and failure error description. Compressor Controller require Power cycle in order to restart operation.

If all is check successfully, "READY" will be displayed and next screen will be showing model number, Serial number, and Copyright information. Multiple beeps will notify, the Controller take a complete control of the equipment and motor(s) or valves may start any time.

After that, controller will go to the "default" screen, which will shown a current pressure, mode for Duplex Controller and if a current pressure reading is under a lowest set point, will be activated compressor Run output relay. This status will confirm by Red Run LED and on the upper corner will be appear an "heart beat". Check ambient temp and humidity and pump temperatures indications via advancing through the screens - it will assure you install and wire sensors correctly. If you see some inconsistency with wiring guidelines and display showing parameters - you may do a wiring check. If any doubt, consult factory.

If it is so, you successfully wire your inputs and now you ready to test your Compressor Controller outputs.

Please POWER OFF to do a next step !

So, connect your outputs for Drain Valve, FAN if installed and Vent Valve(s). Check connections.

Power on Controller and see how the Valves, Fan operate. It shall go Darin Valve initial test and Fan test. Also, Box Fan will be test cycle. If it is all as expected, you may look through all screens to confirm all sensors are functioned and consistently perform own functions.

If it is so, you successfully wire your Drain and Fan control and now you ready to test your Compressor Controller compressor Pumps outputs.

Please POWER OFF to do a next step !

At this moment, We at factory, Assume your Compressor Pump control has been tested independently and relays/contactors/SSR/VFD performed as expected. All belts and mechanical components are installed properly and has been tested successfully. If it no, please do so, and verify all mentioned components are “good to go”.

So, connect your Run outputs. Check connections and wiring.

Power ON your Compressor Controller and look through initial screens and see how all components are performed. Compressor Controller shall Run Compressor pumps and pressure shall rise consistently.

While Compressor Pup(s) are cold, you will see for prolong time Vent Valves will be open, to vent moisture and they will be activated only after Compressor Pump temperature will reach certain criteria. At this time you may see or notice a big or small Compressor Pump, expansion tank or armature (piping) air leakages - turn Power OFF and repair or fix the problem as required. Confirm repair by sequential runs.

So, at this moment you have a great amount of knowledge and experience an installation and troubleshooting. You Compressor running with Compressor Controller. All as expected and you may need to do a final touch on :

- drainage piping, by routing water condensate to the collection reservoir. Please protect our environment by collecting and proper disposal of the condensate. This condensate consist of traces or mix of the Compressor Pump lubricants, rust and water and MUST to be disposed with a local or federal code !
- Grounding and lightning protection. Check your grounding and make sure it is at code requirements or better. Good practice to install an additional grounding rod next to power equipment to provide further lightning protection. Check with electrician and local code.
- In most cases during upgrade you closely dealing mechanical and electric equipment and their components - check for the consistency and perhaps necessary maintenance steps. In most cases an lubricant in your Compressor Pump was never and long time ago was replaced and “milky” look confirming that. Find an appropriate replacement and/or add to the required level. Proper disposal of the lubricants are required !

Daily/Monthly routine

Look through the LCD screens and be familiar on informatics what you got. Notice Cycle and Hours on tha pumps and their temperatures. On smaler expansion tanks and specificity of your usage, you may consider to widening a Pressure Bandgap, to reduce Cycling and lost air due to drainage. On bigger expansion tanks you may narrow bandgap and even lower a target pressure, due to much more accurate follow the target pressure with Digital Compressor Controller.

To prepare for the next Pump lubricants change note the highest and lowest operated temperatures and consult with your lubricant supplier diller - they will definitely appreciate information on the temperature gap and advise a better lubricant for next change. All geographical locations has own specificity on the Compressor Pump operation and now you have a much solid information on how you run to select a better lubricant.

Feedback

We love to hear from you and help you to go through installation process and your usage experience. Please do not hesitate to contact us and submit your feedback.

APPENDIX 1

Valve Selection Guide

Locating the Unloader Valve:

The unloader valve is located somewhere in the line between the compressor and the compressor tank. There are many differences in the types of unloader valves and they vary greatly between compressor manufacturers. Typically there are two main types of valves: Mechanical and Electrical.

It is often part of the pressure switch assembly. It will, in many cases, be opened by the pressure switch as the switch operates, or it could be built as a centrifugal switch on the Pump axes.

When the air in the compressor air tank reaches the cut out set point and the pressure switch switches off the power to the compressor's electric motor, that movement toggles the unloader valve to open and relief the air pressure in the pump overhead.

The purpose of the unloader valve, regardless of its shape or location on the compressor or if it is mechanically / electrically operated, is to unload the air trapped within the air compressor pump before and after the compressor runs.

How the unloader valve works

Compressor Start: Before an air compressor starts the pump must be unloaded as starting the compressor with pressure in the pump is much like starting a car that is in gear.

Compressor Stop: After a compressor stops the compressed air remaining in the pump overhead is released into the atmosphere through the unloader valve.

Typically unloader valves are configured to be normally open (when no energy is applied to the valve it remains open)

How compressor Controller manages the unloader valve

The Compressor Controller Model R intelligently actuates the air compressor unloader valve to maximize air compressor efficiency, quality and longevity.

Compressor Start: When the compressor starts the unloader valve is opened until the compressor pump is warmed up to perform optimally (Typically taking less than 10 seconds)

The unloader valve is then closed and the air compressor begins compressing air. This method of unloader valve control is proprietary to the Compressor Controller Model R and provides the following benefits:

Lowers the peak current when starting compressors

Reduces oil-water contamination in the pump

Lowers the amount of condensate that enters the storage tank

Increases the life of the compressor

Compressor Stop: After the compressor reaches the cut out set point, the motor is shut off and the unloader valve is opened, draining and unloading the pump.

Unloader valve selection to use with the Compressor Controller

There are various types of electrically operated valves used in industries. For the installation with Compressor Controller we suggest to install a solenoid type valve with the same voltage as you compressor.

If your compressor has an electrically operated unloader valve it is possible to connect it to the Compressor Controller. Make certain that the power and pressure requirements are compatible.

If your air compressor has an integrated mechanical unloader valve it is not necessary to remove it, it can be left in place and an electronically operated valve can be added.

Unloader Valve Plug

The plug that is installed into the drain valve should have an orifice size so the pressure release / air purge after the compressor has run should take about 5 seconds.

There are many electrically operated valves used in industries. To this installation we are suggest to install solenoid for operation voltage that is available within your installation, to avoid use of transformer or separate power supply. You need to look on your Compressor pump unloader setup and chose a correct installation steps. You can opt to reuse a same fittings, and install valve in end of the line.

For instance, on 5HP compressor running on single phase, and 80 gallons receiver with 120 PSI required pressure, was installed 110VAC NO $\frac{1}{8}$ NPT electric solenoid (Grainger Item # 39P476) (<https://www.grainger.com/product/REDHAT-Solenoid-Valve-39P476>) and plug (Grainger Item # 6AYZ7) (<https://www.grainger.com/product/GRAINGER-APPROVED-Brass-Countersink-Plug-6AYZ7?breadcrumbCatId=2133&functionCode=P2IDP2PCP>) with 1/16" drilled one hole to satisfy 5sec air bleeding.

On installation of 5HP compressor running on single phase, and 80 gallons receiver with 120 PSI required pressure, was installed 110VAC NO $\frac{1}{4}$ NPT electric solenoid (Grainger Item # 4ELH3) (<https://www.grainger.com/product/REDHAT-Solenoid-Valve-4ELH3>). Was connected to the drainage collection tank with 1" PEX line and, on the end of the line was installed Plug (Grainger Item # 10A578) (

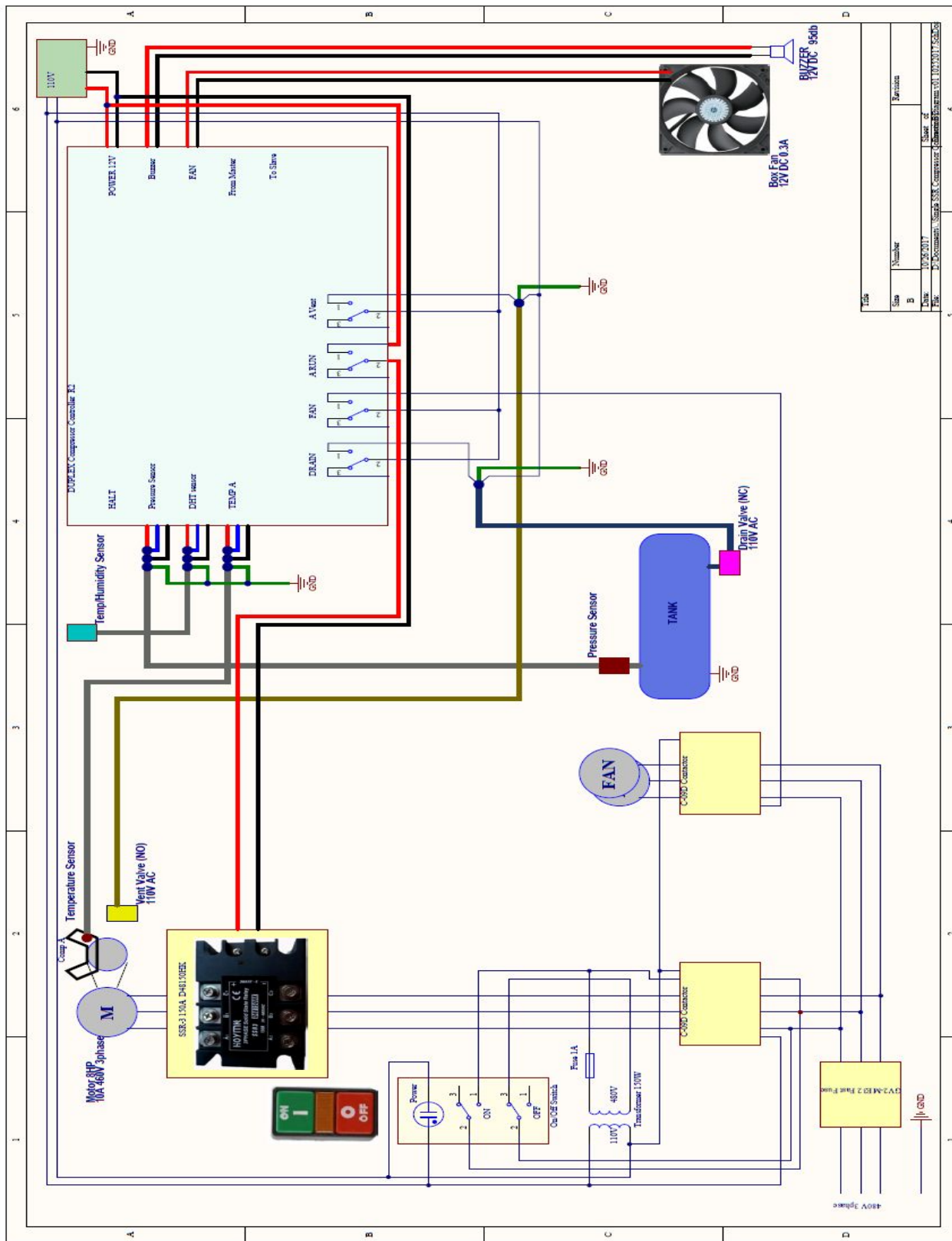
<https://www.grainger.com/product/ZURN-PEX-Polyalloy-Test-Plug-10A578?breadcrumbCatId=21805&functionCode=P2IDP2PCP>) with 3 x 1/8" drilled holes to satisfy pressurize air consumption during drainage.

Need help selecting the best unloader valve for your application? Send us your specifications and details on your setup requirements and we can help you select the right valve.

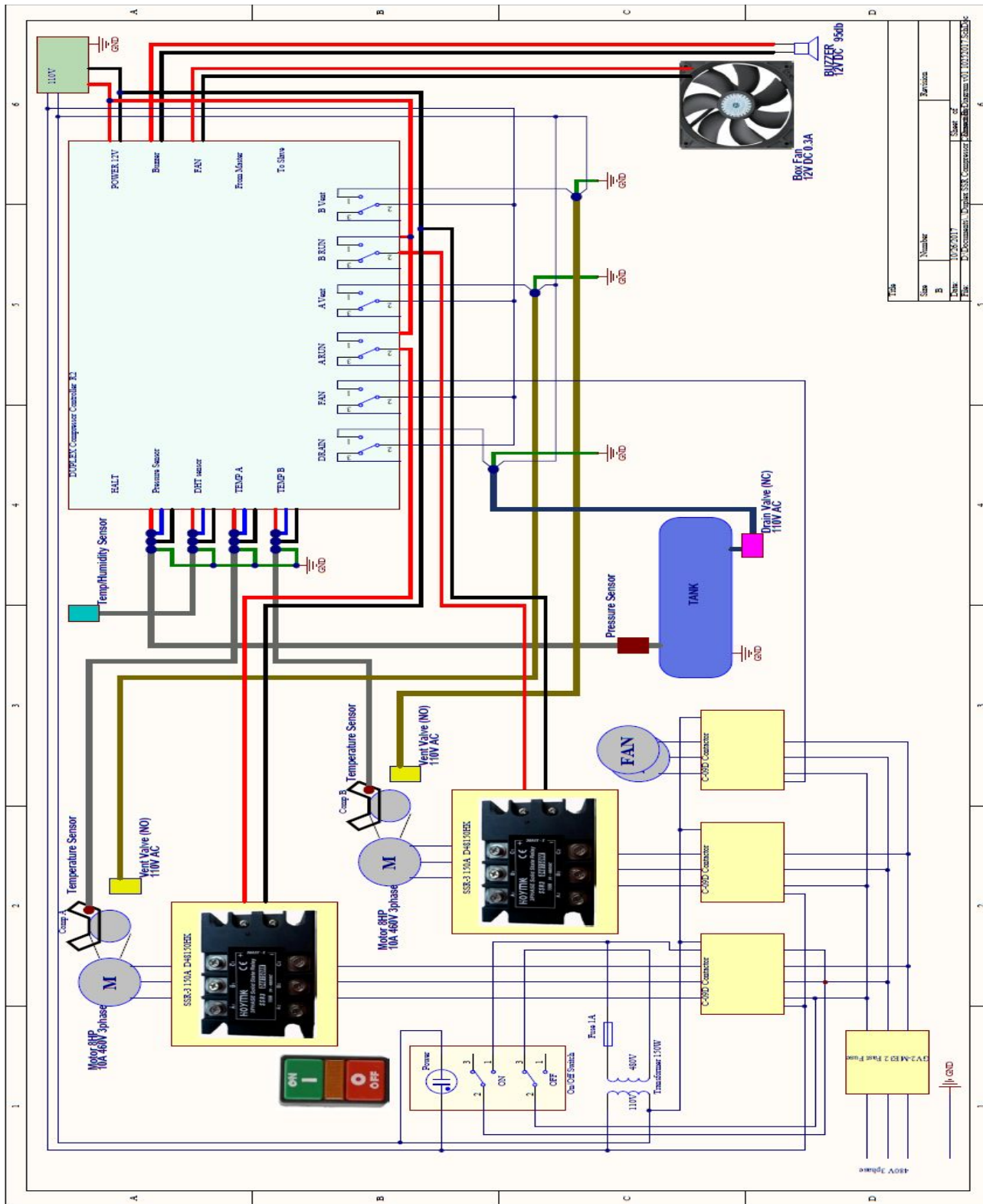
APPENDIX 2

Here is a few example do demonstrate a typical components connection for Single and Duplex Compressor Controller setup. This is only example, and we are encourage you, to make your own plan and draw your installation diagram with all planned components - it will help you to reduce time and installation errors, improve safety.

As an extend of the connection diagram, you can take one of this examples and do modifications as you need for you specific setup.



Sample Connection Diagram for Model R1 Compressor Controller



Rev	Number	Description
1	1	Initial Issue
2	2	Revised
3	3	Revised
4	4	Revised
5	5	Revised
6	6	Revised

Sample Connection Diagram for Model R2 Compressor Controller

APPENDIX 3

Panels components

Panels for Model R1 for version 2 only

Model R1



R1 Front Panel

LED Indicators
The LEDs on the front panel indicate which controller functions are enabled and/or disabled. The LEDs are installed on the front and are optional for the back panel.

Display
The display provides status information for the air compressor:
Line 1: Current PSI
Line 2 & 3: Cycles by pressing Display Change Button (see right of diagram).
Line 4: Set points for allowable pressure for compressor starts and stops

Compressor City™ communication indicator
The LED indicators light up when receiving or sending commands to the other compressor controllers.

Compressor Status Indicators
The LED lights up when a valve is operated and when the compressor is running.

Fan And Drain Indicators
LEDs light when the auxiliary cooling fan is active and when water in the tank is being drained.

The diagram shows the front panel with a central LCD display showing: Pres. 135 PSI, Cycled : 23, TotTime : 184.9h, On/Off 125 / 145 psi. Below the display are several indicators: CITY (FRON MASTER / TO SLAVE), COMP (VALVE / RUN), and two Fan/Drain indicators. A yellow 'DISP.' button is also shown.

Display Change Button
This button will change the status displayed on the screen. Sample display screens are below:

MAXIMUM AND MINIMUM OPERATING TEMPERATURES
Pres. 152 PSI
Max Temp. 42°
Min Temp. 6°
On/Off 125 / 145 psi

CURRENT TEMPERATURES
Pres. 152 PSI
Ambient Temp. 10°
Compressor Temp. 36°
On/Off 125 / 145 psi

COMPRESSOR CYCLE TIME AND HOUR METER
Pres. 135 PSI
Cycled 23
TotTime : 184.9h
On/Off 125 / 145 psi

The displays can be customized including adding displays that show electrical costs of compressors, maintenance countdowns, and more. Visit compressorcontroller.com for more information.

R1 Back Panel

Pressure Limit Set
Sets High and Low Pressure Limits. The limits are displayed on the bottom of the display on the front panel

Pressure Sensor Connection
The self-calibrating pressure sensor is installed on the tank.

Temperature and Humidity Sensor Connection
Environmental sensor is installed either within the compressor controller enclosure or near the compressor air intake.

Compressor Temperature Sensor Connections
The sensors are bolted to the compressor body to each compressor. This measures the temperature of compressor lubricant.

The diagram shows the back panel with various connection points: PRESSURE LIMITS (HIGH/LOW), PRESSURE SENSOR, TEMP & HUMIDITY SENSOR, COMPRESSOR TEMP SENSOR, and four COMP TEMP sensors. It also shows Model Options (S/N, ©UTI 2017), Slave/Master switches, Drain/Fan switches, and a BUZZER connection. A warning states 'DO NOT EXCEED 10 Amperes at 250 VAC'.

Operation Mode Switches
The switches will change the function of the compressor controller:
Switch 4: Enable Compressor City connection
Switch 3: Enable the tank drain output
Switch 2: Enable auxiliary cooling fan output
Switch 1: Temperature in Fahrenheit or Celsius

DC Power In Connection
Power input for the Compressor Controller at 12 Volt DC.

Buzzer Connection
Generates an audible sound right before the start of a compressor cycle as well, an audible distress sound when an issue exists.

"Compressor City™" network Connection
Connect two wires to master or slave (polarity agnostic) to link to and from other compressor controllers. Each controller is serially connected together to enable multiple compressors to work together.

Control Relay Output Connection
Each output function has the capability to connect to both normally open and normally closed control contactor on the compressor. To connect, the middle terminal is wired to common and either a normally closed or normally open terminal on the Compressor Controller.

LED Indicators
The LED indicators on the back panel allows to easily see what controller functions are currently enabled and disabled. The LEDs are installed either on the front or the back panel.

Panels for Model R2 for version 2 only

Model R2



R2 Front Panel

LED Indicators
The LEDs on the front panel indicate which controller functions are enabled and/or disabled. The LEDs are installed either on the front or the back panel.

Display
The display provides status information for the air compressor:
Line 1: Current PSI
Line 2 & 3: Cycles by pressing Display Change Button (see right of diagram).
Line 4: Set points for allowable pressure for compressor starts and stops

Compressor City™ communication Indicator
The LED indicators light up when receiving or sending commands to the other compressor controllers.

Display Change Button
This button will change the status displayed on the screen. Sample display screens are below:

DUPLEX COMPRESSORS CYCLE AND HOUR COUNT FOR EACH PUMP

Pres.: 135 PSI
Cycles: 23
184.9h / 122.7h
On/Off: 125 / 145 psi

MAXIMUM AND MINIMUM OPERATING TEMPERATURES

Pres.: 152 PSI
Max Temp.: 42°
Min Temp.: 6°
On/Off: 125 / 145 psi

CURRENT TEMPERATURES

Pres.: 152 PSI
Ambient Temp.: 16°
Compressor Temp.: 36°
On/Off: 125 / 145 psi

COMPRESSOR CYCLE TIME AND HOUR METER

Pres.: 135 PSI
Cycled: 123
TOTTime: 1184.9h
On/Off: 125 / 145 psi

The display can be customized including adding displays that show electrical loads of compressors, maintenance countdowns, and more. Visit compressorcontroller.com for more information.

Compressor Status Indicators
For each compressor the LED lights up when a valve is operated and when the compressor is running.

Fan And Drain Indicators
LEDs light when the auxiliary cooling fan is active and when water in the tank is being drained.

R2 Back Panel

Pressure Limit Set
Sets High and Low Pressure Limits. The limits are displayed on the bottom of the display on the front panel.

Pressure Sensor Connection
The self-calibrating pressure sensor is installed on the tank.

Temperature and Humidity Sensor Connection
Environmental sensor is installed either within the compressor controller enclosure or near the compressor air intake.

Compressor Temperature Sensor Connections
The sensors are bolted to the compressor body to each compressor. This measures the temperature of compressor lubricant.

Operation Mode Switches
The switches will change the function of the compressor controller:
Switch 4: Enable Compressor City connection
Switch 3: Enable the Tank drain and auxiliary cooling fan control relay output
Switch 2: Duplex alternate Operation or Dual (simultaneous) Operation
Switch 1: Temperature in Fahrenheit or Celsius

DC Power In Connection
Power input for the Compressor Controller at 12 Volt DC.

Buzzer Connection
Generates an audible sound right before the start of a compressor cycle as well, an audible distress sound when an issue exists.

"Compressor City™" network Connection
Connect two wires to master or slave (polarity agnostic) to link to and from other compressor controllers. Each controller is serially connected together to enable multiple compressors to work together.

Control Relay Output Connection
Each output function has the capability to connect to both normally open and normally closed control contactor on the compressor. To connect, the middle terminal is wired to common and either a normally closed or normally open terminal on the Compressor Controller.

LED Indicators
The LED indicators on the back panel allow to easily see what controller functions are currently enabled and disabled. The LEDs are installed either on the front or the back panel.

Appendix 4

Q&A:

1: Can you speculate what would cause a "compressor too hot" error on the temp sensor? The controller is showing 160C & saying error comp to hot, yet the compressor hasn't even run yet should be same as ambient. Wiring looks good, though I'd like to take resistance measurements of the sensor, just don't know what the range should be. This would be my thoughts in order to isolate the error to the controller or sensor.

This could be simple wiring issue. Check your wires first. Check your power supply voltage output - it should be 12V

Also please check connections to the DTB360 temperature sensor.

The wires should be connected to the controller in following order:

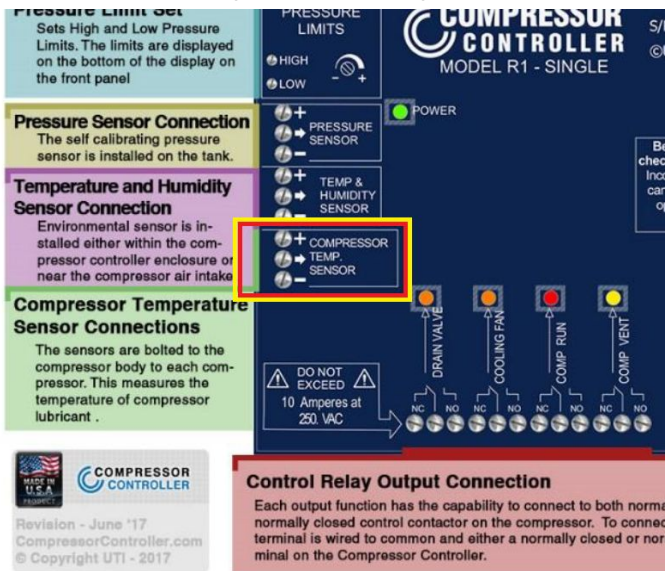
Green - connect to the ground of the enclosure, where the Power supply is grounded.

Black - connect to the Common mark on controller "-" Compressor Temperature Sensor connection

RED - connect to the Power mark on controller "+" Compressor Temperature Sensor connection

Blue - connect to the Input mark on controller "->" Compressor Temperature Sensor connection

The location on the back panel of the compressor controller:



After all input connection, while all output relays still disconnected from compressor motor, power on the controller and using a multimeter:

1) check voltage between "-" and "+" Compressor Temperature Sensor connection - it should be around 5V.

2) check voltage between "-" and "->" Compressor Temperature Sensor connection - it should be around 500mV to 750mV at ambient temperature - 750mV at 25C.

The range of the sensor output is from 100mV to 2.0V which is represented as -40C to +125C

Please let us know what do you measure