



Multi-function Digital Manifold Gauge Set Operation Manual



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1. Safety and environment

- I. About this manual
Precautions for using
1. Please read the manual carefully before using the unit. Pay special attention to caution and warning, in case of causing injury and damaging the unit
II. Take this manual in hand in order to read it anytime.
III. Please hand it over the later users.

Symbol and its meaning	
Symbols	meanings
	WARNING! May causes a severe injury CAUTION! May causes a slight accident that would lead the equipment damage > The precautions would be taken
	NOTICE: Basic information or detail information
1. ... 2. ...	OPERATION: A multi-step operation must operate step by step
> ...	OPERATION: Optional step
== ...	Result
■...■	Sample Item

- II. Safety specification
> Don't operate the instrument if its shell, power unit or power line are damaged.
> Do not measure the electrical parts by hand touch.
> Do not put this instrument and chemical solvent together. Do not use any desiccant.
> Only according to this manual to maintain and repair the instrument. Only use our company's original parts.
> The object and environment may be threatened from risk. Be sure to pay attention to comply with the local safety specification when implement measures.
> If the instrument is fall off or bumped by machine, it can also causes the damage of charging hoses and control valve. You may not judge the damage from surface. For security, please change new charging hose in time or you can send it back to our company to repair it.

- III. Protect the environment
> According to the legal laws and regulations to deal with the rechargeable battery and used battery.
> Before the end of its lifetime, send the unit to a separate space that is used to collect the electronic appliance and electronic equipments or you can send it to Local distributor or dealer.
> Refrigerant gas is harmful to the environment. Please pay attention to comply with the environment regulations.

2. Technical manual

- I. Usage
1. RA2013 is a electronic manifold gauge, used for the maintenance of refrigerating system and heat pump. This instrument only provide for the professors to use.
II. RA2013 replaces the mechanical instrument pipe, thermometer and pressure-temperature graph depends on its unique function. It applies to testing and monitoring pressure and temperature.
III. RA2013 is compatible with many non-corrosive refrigerants, water and Glycol; however, it's incompatible with ammonia refrigerant.
iv. Do not use it in a dangerous environment where would be exploded.

II. Technical data	
Characteristics and parameters	data
Measured parameters	Pressure: psikPa/bar/inHg Temperature: °F/°C Vacuum: Micron/KPa
Temperature probe	2
Cycle measurement	0.33s
Connector	compression fitting: 3/7/16UNF
Measurement Range	low pressure: 0-30bar High pressure: 0-50bar Temperature: -59~240°C Vacuum degree: 0-100kPa
Overload	754psi, 52bar, 5200kp, 5.2MPa
Accuracy	pressure: ±0.5% of full scale Temperature: ±0.5°C Vacuum degree: ±5Micron
Optional refrigerant	R134a,R14,R141B,R143A,R152,R170,R21,R218,R22,R227,R245,R290, R32,R401A,R401B,R401C,R402A,R402B,R403B,R404A,R405A,R406A,R407A,R407B, R407C,R408A,R409A,R409B,R410A,R410B,R411,R411A,R411B,R412A,R413A,R414A,R415A, R417A,R50,R500,R501,R502,R503,R504,R507,R507A,R508A,R508B,R509A,R600A,R744,R11, R113A,R114,R115,R116,R12,R123,R123A,R124,R125,R13
Measured medium	measured medium: 68types Immeasurable medium: R717 and other ammonia refrigerants
Environmental conditions	working temperature:5~125° F/-15~50° C Storage Temperature: ±0.5°C Environment humidity:10~90%F
Shell	Material: ABS/PA/TPE Size: 190 x 140 x80mm Weight: 800g(without batteries)
Characteristics and parameters	DATA
Power	6*1.5v AA rechargeable batteries Lifetime: 150hours(No backlight)
Screen	LED , 0.56 (response time)
Warranty	1 year

3 Product descriptions

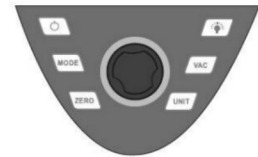
Display element and control element



冷媒压力: refrigerant pressure
测量温度: measuring temperature
压力单位: pressure unit
温度单位: temperature unit
温度差: temperature difference
温度夹子: temperature clip
视液镜: sight glass
1/4" SAE, 低压侧, 用于连接软管; 1/4" SAE, low-pressure side, connect charging hose.
1/4" SAE, 高压侧, 用于连接软管; 1/4" SAE, high-pressure side, connect charging hose.
1/4"SAE, 用于连接制冷剂瓶. 1/4" SAE, connect gas cylinder

Key Instructions

Picture of operation panel



KEY	Instruction
	Power key :Press for more than two seconds, into the measurement screen
	Mode key: Press this key, the picture shows the mininum pressure, the mininum temperature difference and the minimum temperature from the start to this time. To press the mode key again, the picture shows the maximum pressure, the maximum temperature difference and the maximum temperature from the start to this time; To press the key at third time, shows the average pressure, the average temperature difference and the average temperature from the start to this time.
	If there is pressure is shown on the main interface before operation of the unit, press the key to zero
	Press this key turn on the LCD light, that would be turn off automatically after 10minutes
	Press this key to switch vacuum interface
	To switch between the vacuum unit and the temperature unit.
	i .Turn the button to select different pressure units ii Short press this button, the main interface and vacuum interface shows in a stopped State "Hold", short press again, the order is canceled. iii. Press it for more than 2 seconds, the main interface of the refrigerant type "R" appear flash, Turn the knob to choose refrigerants (68 kinds), press the key again, confirm the refrigerant.

4 Initial operations

I Install the battery or rechargeable battery

1. Open the hanging hook, then open the battery cover (card lock).
2. Install the batteries or rechargeable batteries(6*1.5v), please do not make wrong polarity.
3. Push back the batteries' cover.

- i If not use the unit for a long time, remove the batteries.
- i Before use the unit, rechargeable batteries should be checked if fresh or run out.

II Start the unit

- press key and hold on for 2s ~3s
-The Initialization phase
• Turn on each part of screen(response time: 2s)
-Open the measurement screen

III Reset

- As per the step of the key instruction (P04)
- Confirm it after all choice is completed

IV Operation Knob

In terms of refrigeration flow path, this unit just likes a normal 3-way manifold gauge,

The pressure could be read by open or close the valve

>Open the valve: to turn the knob counterclockwise;

>Close the valve: to turn the knob clockwise.

	Warning!
Tighten the control valve Only by hand.	
Please remember that do not use any tools to tight the valve, in order to avoid the damage of the thread.	

5 Product Operations

I Measuring preparation

- i Connect the temperature probe

	Before or after operating of the unit, please connect the temperature probe, and then test the temperature.
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- ii The surface temperature probe

-Please remember to connect the surface temperature probe (As per accessory list)

- iii Pressure adjustment

-Affected by the altitude, or under abnormal conditions, the pressure reading is not show "zero".

In this case, it is necessary to press the zero key 1 seconds, the reading would be zero.

iv connect charging hose

	Make sure that the refrigerant hose is good before operation.
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- ✓ turn off the knob.
1, connect the charging hose to the unit, the blue hose for the low side, the red hose for the high side.
2, then connect the charging hose to the gas cylinder.

	WARNING If the unit drops onto the ground or hit, the inner hose or inner valve maybe damage, furthermore it would damage inside 1, for the sake of security, please sends the unit to local distributor or LAX for test. 2, therefore, once the instrument drops onto the ground or hit, you should check the condition which is described above.
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- v Refrigerant setting
1, press the button for 3s until the word "R" (on front of the refrigerant.) is blinking, then you can choose the gas kinds by turning the button.
2, press the button again to set.

II Measuring operation

	WARNING High pressure, high temperature low temperature or poisonous refrigerant may cause injury! > Wear safety glasses and safety gloves. > Hung and fix the unit on the suspension part while using. > Before using, check all the connectors, to make sure whether they are in good condition. Do not use any tool to connect the hose, just Only by hand (the Max torque is 5.0NM/3.7ft*lb) > To obey to the specified range (0-50bar), please pay special attention while use R744, cause it need system works in high pressure.
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I Measurement

- ✓ Measuring preparation

1. Pressing on the unit

2. Reading the measurement figures.

	Important notice Vacuuming the system by a recovery machine or a vacuum pump is necessary , if the system has been opened or overturn of pressure caused by leakage. In this case, Repairing the leak system firstly, then test if leakage or vacuum status or not before charging.
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- i i Diagnose the pressure and temperature of the system

1. opening the system, it will need some time for initial and stabilize the reading
2. make sure all the valves are closed
3. Connecting the charging hose to the unit right

- iii Filling the refrigerant

1. Make sure all the valves are closed
2. Open the air conditioning system and the unit
3. Connect the yellow hose to the refrigerant cylinder.
4. Open the refrigerant cylinder valve, and open the low side valve slowly , start charging(To be sure to charging the appropriate refrigerant, Please kindly note to use LX36575 digital scale to charging precisely)
5. Close the cylinder valve after charging. It will spend some time to make sure the refrigerant flows out from the hoses and unit.

6. Close the low side valve and charging valve and remove the hose from the system

- iv Vacuuming (see figure A)

1. Press the power button for 3 seconds to initialize it.
2. press the vacuum button and choose the appropriate unit
3. Close all the valves. The yellow hose connects to the system and the blue hose connects to the vacuum pump.
4. Open the vacuum pump and low-side knob , then vacuuming it

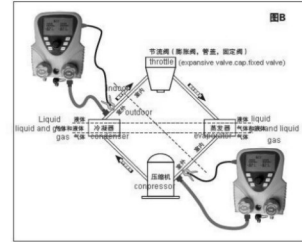
Notice: vacuum display will close automatically within 30seconds. So restart it by press the power button or vacuum button. It needs 3 to 5 seconds to initialize and vacuum data display(Please restart the instrument if the pressure, temperature or vacuum has been worked for a long time)



	Importance To connect the vacuum pump to the system directly when testing a leakage 1 less than 1000Microns in high Vacuum status. To use a copper pipe (with hosepipe) and high vacuum shut-off valve if need extra connecting.
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- v Measurement about overheating and supercooling (see figure B)
Overheating: It means the differences between the actual temperature after the refrigerant leaving evaporator (sensor temperature) and the boiling temperature in evaporator.
After the refrigerant boiling, the temperature keep heating up, 1 up, the temperature that exceeds the boiling is the degree of overheating. If under the worst circumstances (underloading fixed valve system), the refrigerant must be evaporated completely when it nears by the ending of evaporator. In this case, to prevent the liquid refrigerant from entering into compressor is necessary.
The manufacturer of refrigerant system provides graph data that is the degree of superheat under the condition of indoor humidity's temperature and outdoor air temperature.
To measure overheating is the most useful to repair fixed valve system and judge the quantity of recharging the refrigerant and the proper operating environment.
If the degree of overheal is too high while others figure are normal, means to charge the refrigerant. On the contrary, reduce the refrigerant.

Supercooling: It means that the differences between the refrigerant boiling temperature in condenser and the actual temperature when the refrigerant leaves condenser. The degree of supercooling is the temperature under the boiling temperature. Under the worst circumstances the degree in underloading TXV would be lower.
If the degree is down too fast, the liquid will backflow into the compressor and damage it. In the system with expansion valve (TXV), the degree of supercooling is the most useful information of charging status. The purpose of this design is to ensure the constant degree of superheat. A suitable filling capacity can extend the system's lifetime and ensure the system's work efficiency.



	Be careful using and wear safety glasses To obey the introduction when using or installing the instrument
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- vi The goal of overheating and undercooling
According to manufacturer specifications, warning and suggestion, to confirm overheating (standing valve system) or undercooling (related to different systems) needs outdoor air temperature, indoor temperature and manufacturer's diagram including overheating and undercooling.
You can use a thermo-hygrometer to measure the temperatures both indoor and outdoor.
To approach the entrance of the evaporator as close as possible to measure the indoor temperature;
To approach the entrance of the condenser as close as possible to measure the outdoor temperature

6 Product maintenance

I Clean the instrument

>The unit may be cleaned with a shop towel moistened with water;
Do not use cleanser or solvent of any kinds. A mild detergent is allowed.

II Keep the screwed clean

>Keep t screwed pipe fitting clean, wipe off grease and some other adhesive dirty with a moistened towel.

III Wipe off the residual oil

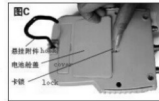
>Use a compressor to blow away all the residual oil in the valve systems carefully.

III Ensure the measurement accuracy

We'd be pleasure of serve you as your wishes
>To examine the unit at fixed period (a year), and obey the pressure range
> To calibrate the unit at fixed period (a year)

IV Change batteries/rechargeable batteries(Figure C)

- >Turn off the unit
1. turn over the hook, loosen the lock and take down the batteries' cover
2. Remove the old batteries/ rechargeable batteries, install the new batteries /rechargeable batteries into battery socket.
3. Close the batteries' cover and lock it



V Change valve or valve position controller.

	Warning! Forbid to replace the valve or knob personally without direction. If broken, please send it to local distributor to repair or replace.
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7 Tips and help

Problem	causes/solution
The batteries almost run out	1. Turn the unit off >Change battery
Turn the unit off automatically	1. Low battery >Change battery 2. System's self-protection of power saving > Restart the unit
Blinking "Hd"	Exceed the measurement range >Obey to the permitted measurement range

8 Accessories

Item	name
201301	Temperature measuring clips
201302	3*1.5m charging hoses (red, yellow, and blue)
201303	Quick coupler
201404	Exhaust valve core
201305	Settled hook