

Electronic Controller for Compressor Racks

XC706M

Instructions Manual



INDICE

1.	GENERAL WARNING	3
	Please read before using this manual	3
	Safety Precautions	3
2.	GENERAL DESCRIPTION	3
3.	USER INTERFACE	4
3.1	Compressors Section	4
3.2	Displaying, setting and modifying the normal and reduced set point	5
3.3	Programming	6
3.4	How to display the status of the outputs	6
3.5	How to disabled an output during a maintenance session.	6
3.6	Displaying running hours of loads	7
3.7	Alarm section	7
4.	HOT KEY FOR PROGRAMMING	8
4.1	DOWNLOAD (from the "Hot Key" to the instrument)	8
4.2	UPLOAD (From the instrument to the "Hot key")	9
5.	LIST OF PARAMETERS	9
5.1	Configuration parameters - compressor section	9
5.2	Operative parameters - compressors section	11
5.3	Relations amount parameters	13
6.	TYPE OF REGULATION	13
6.1	Dead band	13
6.2	Proportional Band	14
7.	MOUNTING & INSTALLATION	15
8.	ELECTRICAL CONNECTIONS	16
8.1	Probes connection	16
9.	RS485 SERIAL LINK	16
10.	TECHNICAL FEATURES	16
11.	ALARM LIST	17
11.1	Types of alarms and signalling managed	17
11.2	Alarm muting	18
11.3	Alarm conditions – summary table	18
12.	WIRING CONNECTIONS	19
12.1	Digital inputs and outputs	19
13.	PARAMETERS – DEFAULT VALUES	21

1. GENERAL WARNING

1.1 Please read before using this manual

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

1.2 Safety Precautions

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "DIXELL s.r.l." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- Fit the probe where it is not accessible by the end user.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. General description

The XC706M controller is thought to manage compressors in a system such as a pack.

The compressors can be simple, multistage or with different capacities.

Control is by means of a neutral zone or proportional band and is based on the pressure or temperature sensed in the LP suction (compressors) circuits. A special algorithm balances the run hours of the compressors to distribute the work load uniformly.

The controllers can convert LP pressure and display it as temperature.

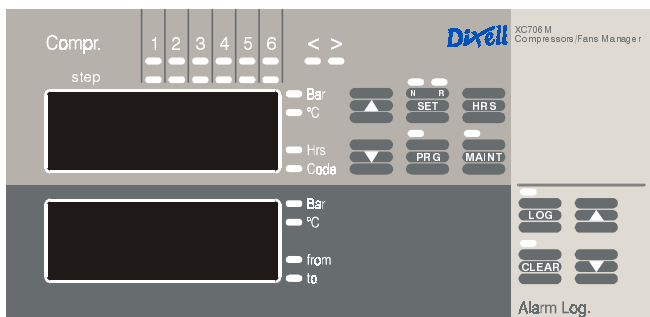
The front panel offers complete information on the system's status by displaying the suction pressure (temperature), the status of the loads, possible alarms or maintenance conditions.

Each load has its own alarm input that is able to stop it when activated. To guarantee the total system's safety, there are also an input for low pressure switch: when this is activated, the system is stopped.

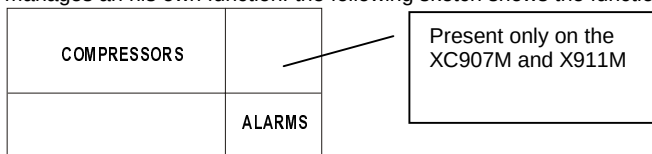
By means of the HOT KEY the controller can be easily programmed at power on.

The controller can be connected to the XJ500, controlling and monitoring system, thanks to the RS485 output, using the standard ModBus RTU protocol.

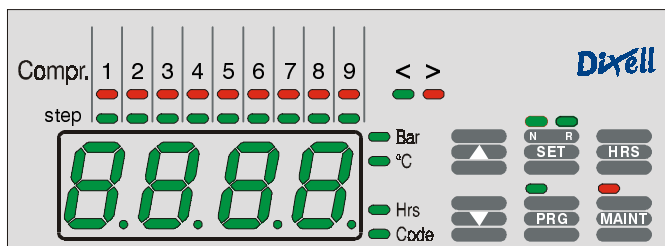
3. User interface



The front panel of the instruments is divided in 2 parts with different colours. Each part manages an his own function. the following sketch shows the functions:



3.1 Compressors Section



Keys

- 
Up
 It scrolls the parameter codes or increases the value of the displayed variable. Holding it pressed will increase the speed.
- 
Down
 It scrolls the parameter codes or decreases the value of the displayed variable. Holding it pressed will increase the speed.



3. **Set**

To display and modify the set point of the suction section. It displays the normal and reduced set point in °C and bar.

To modify the value use the Up and DOWN keys.

If the **N** or **R** led is flashing, it means that the displayed set point is not active.



4. **Prog**

To access the programming mode. By pressing once the operative parameters (oPr) are entered, by pressing twice the configuration (cnF) parameters are entered. To exit the programming mode press the **Prog** key again.



5. **MAINT**

Used for displaying the state of loads: "available" or "in maintenance".



6. **HRS**

Used for displaying the loads run times.

3.2 Displaying, setting and modifying the normal and reduced set point

WARNING: before setting the target set points for the first time, check and, if necessary, modify the type of freon (par. FtyP) and the default unit of measurement (par. dEU) for compressors.

PROCEDURE

1. Set the kind of freon (FtyP par. of configuration)
2. Set the measurement unit (dEU par. of operative).
3. Check and if necessary modify the set point limits (LSE and HSE pars).

NOTE: the reduced set point is enabled by means of internal clock or digital input.



1. Press the "SET" key.
2. The normal set point will be displayed in the measurement unit pointed out from the led (°C or bar).
3. If the normal set is operating the "N" led is lighted, otherwise the "N" led blinks.
4. To modify the value use the "UP" & "DOWN" keys
5. To change the measurement unit press the "SET" key again.
6. To select the reduced set point, press the "SET" key again. (if it is operating the "R" led is lighted, otherwise the "R" led blinks).

To exit: press the "SET" key till the "N" and "R" LED's are turned off or wait for the Exit time out (30 s).

3.3 Programming



1. Press the **"PRG"** key once for selecting the operative parameters (oPr); twice for the configuration parameters (CnF).
2. Press the **"UP"** key and the first parameters will be displayed.
3. Press the **"SET"** key to see the value, use the **"UP"** and **"DOWN"** keys to modify the value.
4. By pressing the **"SET"** key again the new value will be recorded and the label of the next parameter will be shown.

To exit: press the **"PRG"** key or wait for the exit time out (30 s).

3.3.1 Security code input.

The security code prevents not qualified personnel from modifying parameters.

This feature is enabled if the parameter PSo (operative parameters) or PSc (configuration parameters) is different from zero.

1. Press the **"PRG"** key once for selecting the operative parameters (oPr); twice for the configuration parameters (CnF).
2. Press the **"UP"** key: the "PASS" message will be displayed.
3. Press the **"SET"** key: the "0" number will be displayed.
4. Insert the security code by using the **UP** and **DOWN** keys.
5. Confirm it by pressing the **SET** key.
6. If the security code is correct the first parameters will be displayed, otherwise the set value keeps on being displayed. Press the UP key again to restart the procedure..

3.4 How to display the status of the outputs

1. Press the **"MAINT"** key
2. The LED's of the first output start blinking and the compressor display shows the following messages:
 - onLn = output enabled
 - oFLn = output disabled

for compressor with more steps the LED's linked to the compressor (red) and the valves (green) blink together.
3. To see the status of the following output press the UP key.
4. **To exit:** press the MAINT key or wait for 30 sec.

3.5 How to disabled an output during a maintenance session.

1. Press the **"MAINT"** key
2. The LED's of the first output start blinking and the compressor display shows the following messages:
 - onLn = output enabled
 - oFLn = output disabled

for compressor with more steps the LED's linked to the compressor (red) and the valves (green) blink together.
3. Select the output by pressing the UP key.

4. Hold pressed the "CLEAR" key for more than 2 sec: the displayed message will change: onLn → oFLn or oFLn → onLn). **To exit:** press the MAINT key or wait for 30 sec.

3.5.1 Output disabled signalling.

If an output is disabled his led (red and green) blinks.

3.5.2 Regulation with some outputs disabled.

If some outputs are disabled they don't take part to the regulation, so the regulation goes on with the other outputs.

3.6 Displaying running hours of loads

The controller memorises the running hours of each load.

To see how long a load has been working follow this procedure:

1. Press the "HRS" key
2. The HRS led of the compressors display starts flashing together with the LED's of the first output. The compressors display shows the running hours of the first compressor.
3. For compressors with more steps the LED's linked to the compressor (red) and the valves (green) blink together.
4. To see the running hours of the following load press the UP key.
5. **To exit:** press the HRS key or wait for 30 sec.

3.6.1 How to reset the working hours of a load.

1. Press the HRS key.
2. Select the load by pressing the UP key.
3. Hold pressed the CLEAR key (alarm section) till the display shows zero.
4. Repeat the operation for other loads
5. **TO EXIT:** press the HRS key or wait for 30 sec without pressing any key.

3.7 Alarm section

3.7.1 User interface





- **Log**

By pressing this key the alarm menu is entered. Press the UP and DOWN keys to see the alarms happened.



- **Up**

Scroll the alarm list.



- **Down**

Scroll the alarm list



- **Clear**

This button has several properties linked to the time that is hold pressed and the menu of the instrument:

Standard operating mode

1. Silence the buzzer during an alarm condition
2. Hold pressed for more than 2 seconds switch off the alarm relay during an alarm condition
3. **In the alarm menu:**
 - a. Hold it pressed for more than 2 seconds for erase the displayed alarm.
 - b. Hold it pressed for more than 10 seconds for erase the whole alarm list.
4. **In the “running hours” menu:**
 - a. Hold it pressed for more than 2 seconds for erase the displayed working hours.
5. **In the “status of outputs” menu:**
 - a. Hold it pressed for more than 2 seconds for change the status of the shown output. From off to on and viceversa

4. Hot key for programming

4.1 DOWNLOAD (from the “Hot Key” to the instrument)

1. Turn OFF the instrument.
2. Insert the “Hot Key”
3. Turn the instrument ON.
4. Automatically the parameter list of the “Hot Key” is downloaded into the instrument memory, the “doL” message is blinking.
5. At the end the “End” message will be displayed and after 10 seconds the instrument will restart working with the new parameters.
6. Remove the “Hot Key”.

If the “err” message will be displayed it means that the programming failed. In this case turn the unit off and then on if you want to restart the download again or remove the “**Hot key**” to abort the operation.

4.2 UPLOAD (From the instrument to the “Hot key”)

1. When the unit is ON, insert the “**Hot key**” and push **UP** key of compressor section; the “**uPL**” message appears and the values of parameters will be memorised on the hot key.
2. At the end of the data transfer phase the instrument displays the following messages:
“end” for right programming.
“err” for failed programming. In this case push “**SET**” key if you want to restart the programming again or remove the **not programmed “Hot key”**.
3. Remove the “**Hot Key**”.

5. List of parameters

5.1 Configuration parameters - compressor section

WARNING: after having modified one of these parameters the controller automatically switches off and on to load the new map.

5.1.1 Plant dimensioning and type of regulation.

By means of these parameters the plant can be dimensioned according to the number and type of compressors and the number of steps for each one.

CpnU: **Compressor Number:** number of compressor present in the plant. (1-6).

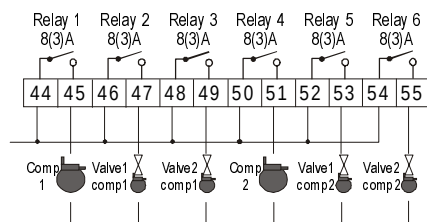
CtyP: **Compressor type:** it selects if the compressor have the same power (homogeneous) or not.

0 = compressor with different capacities: in this case the regulation is neutral zone.

1 = homogeneous: the regulation can be neutral zone or proportional band.

CPst: **Compressor Steps:** present only if CtyP=1: compressor homogeneous (1-6).

It is equal to the numbers of compressor valves plus one. NOTE: with 2 compressors (CPnU=2), each with 3 steps (CPSt=3), the relays have to be connected as below:



PC1 ..PC6 Power of compressor 1...6: for setting the power of single compressors. Available only if CtyP=0. The power is identified by a value (range 1÷255) proportional to the capacity of single compressor.

E.I. 3 compressors with following capacity: 10, 20, 40 HP. The parameters have to be set in these way: PC1=10, PC2=20, PC3=40.

rTy: Type of regulation

db = neutral zone, **Pb** = proportional band.

Sty: Activation: type of sequence

rt = rotation: this algorithm distributes the working time between the various loads to ensure even run times.

F = fixed sequence: the compressors are enabled and disabled in fixed sequence: first, second etc.

FtyP: Freon Type: set the kind of freon used in the plant

r22 = R22; **r404**= R404a; **507**= R507; **134**=134

5.1.2 Suction probe configuration

Pbc: Probe selection. **Cur** = $4 \div 20$ mA probe; **ntc** = NTC probe.

PA04: Adjustment of read out (present only if Pbc=Cur). corresponding to **4mA** input signal, given by the suction probe ($0 \div 30$ Bar)

Warning: set a value correspondent to absolute pressure. If the transducer measures relative pressure increase the range of 1 bar.

E.I. **PP07** absolute pressure transducer, range $0.5 \div 8.0$ bar. PA04=0.5; PA20=8.0.

PP30 relative pressure transducer, range: $0 \div 30$ bar. PA04=1; PA20=31.

PA20: Adjustment of read out corresponding to **20mA** input signal, given by the suction probe ($0 \div 30.0$ bar) **SEE THE WARNING FOR PA04.**

CAL: Suction probe calibration ($-1.00 \div 1.00$ bar; $-10.0 \div 10.0^\circ\text{C}$)

5.1.3 Others inputs configuration

SEP: Polarity of Low pressure-switch alarm (terminals 5-6)

0=alarm with voltage absence;

1= alarm with voltage presence

rSIP: Reduced set input polarity (terminals 13-14)

0=reduced set enabled with open circuit

1= reduced set enabled with closed circuit

LLI: Liquid level input polarity (terminals 6-8)

0=alarm with voltage absence;

1= alarm with voltage presence

ALIP: Alarm input for compressors polarity

0=alarm with voltage absence;

1= alarm with voltage presence

StPP: valve outputs polarity: polarity of the outputs for capacity valves. It determines if the state of the relays associated with the capacity valves (only for homogeneous and stepped-capacity compressors)

0=valve enabled with open contact;

1= valve enabled with closed contact.

5.1.4 Security code

PSc: Security code to access the configurations parameters. ($0 \div 255$). With "0" the security code is disabled

5.2 Operative parameters - compressors section

5.2.1 Date and time

Pri: Minutes set (0÷59)

HoUr : Hour set (0÷23)

dAY: Day set (0÷31)

ndAy Day of the week ((**Sun**=Sunday; **Mon**=Monday; **tuE**=Tuesday; **Ued**=Wednesday; **thu**=Thursday; **Frd**=Friday; **SAt**=Saturday);

Mont Month (0÷12)

YAr Year (2000 ÷ 2099)

5.2.2 Measurement unit and regulation type

dEU: Default measurement unit for displaying

bar=Bar; **°C**=°C)

The dEU parameter sets the measurement unit also for these parameters: **Pbd**, **LSE**, **HSE**, **LAL**, **HAL**. After modifying this parameter check the set point and the parameters **Pbd**, **LSE**, **HSE**, **LAL**, **HAL**.

Pbd: Proportional band or neutral zone width (0.10÷5.00 bar).

Set the dEU par. and the target set point before setting this parameter. The band (or zone) is symmetrical compared to the target set point, with extremes: set+Pbd/2 ... set-Pbd/2. The measurement unit depends on the dEU par.

onon: Minimum time between 2 following switching ON of the same compressor (0÷255 min).

oFon: Minimum time between the switching off of a compressor and the following switching on. (0÷255min).

Note: usually onon is greater than oFon.

Cdn: don and doF equal for all the compressors.

YES: don and doF equal for all the compressors:

no: don and doF different for each compressor. In this case there are as don1, don2... and doF1, doF2... as the compressors are.

don1: Time delay between the insertion of the first compressor and the following one. (It is present only if Cdn=no) (0÷255 sec)

....

don6: Time delay between the insertion of the sixth compressor and the following one. (It is present only if Cdn=no) (0÷255 sec)

doF1: Time delay between the switching off of the first compressor and the following one. (It is present only if Cdn=no) (0÷255 sec)

.....

doF6: Time delay between the switching off of the sixth compressor and the following one. (It is present only if Cdn=no) (0÷255 sec)

don: Time delay between the insertion of two different compressors. (It is present only if Cdn=yES) (0÷255 sec)

doF: Time delay between switching off of two different compressors. (It is present only if Cdn=yES) (0÷255 sec)

donF: Minimum time a stage stays switched ON (0÷255 s)

FdLy: "don" delay enabled also for the first call. If enabled the triggering of the step is delayed for a "don" value, respect to the call. (**no** = "don" not enabled; **yES**="don" enabled)

dLF “doF” delay enabled also for the first switching off. It enables the “doF” delay between the request of a release and the actual switching off.

(**no** = “doF” not enabled; **yES**=“doF” enabled)

odo: Regulation delay on start-up: (0÷255s) on switching ON the instrument starts working after the time delay imposed in this parameter.

5.2.3 Operating and reduced set point

LSE: Minimum set point: The measurement unit depends on dEU parameter. Sets the minimum value that can be used for the set point, to prevent the end user from setting incorrect values

HSE: Maximum set point: The measurement unit depends on dEU parameter.. Sets the maximum acceptable value for set point.

StrS: Start time reduced set. (0÷23 h) Starting time for reduced set point operation time interval.

SPrS: Stop time reduced set (0÷23 h) Stopping time for the reduced set point operation time interval.

RSd1 Reduced set point enabling for Sunday (**no**= reduced set disabled; **yES**= reduced set enabled)

....

RSd7 Reduced set point enabling for Saturday (**no**= reduced set disabled; **yES**= reduced set enabled)

NOTE: RSd1=Sunday, RSd2=Monday ... Rsd7=Saturday.

5.2.4 Alarms

Uaro: Measurement unit for the Aro parameter

(**min** = minutes; **Hour** = hours)

Aro: Alarm override it is the period following the silencing of an alarm during which the alarm signalling is disabled. After this time if the alarm condition lasts the relay and the buzzer are enabled again. (0÷255m/h 0=always on; 255=always disabled)

PAo: Alarm probe exclusion at power on. it is the period starting from instrument switch on, before an alarm probe is signalled. (0÷255 min). During this time if the pressure is out of range all the compressor are switched on.

LAL: Low pressure alarm: The measurement unit depends on dEU parameter. When the value SET-LAL is reached the A03C alarm is enabled, (possibly after the **tAo** delay time).

HAL: High pressure alarm: The measurement unit depends on dEU parameter. When the value SET+HAL is reached the A04C alarm is enabled, (possibly after the **tAo** delay time).

tAo: Low and High pressure (temperature) alarms delay: (0÷255 min) time interval between the detection of a pressure (temperature) alarm condition and alarm signalling.

Ser: Service request: (1÷9999 hours) number of running hours after that the “A14C” maintenance call is generated.

PEn: Low pressure-switch intervention numbers: (0÷15 with 0 the manually unlocking is disabled) if the low pressure-switch is enabled PEn times in the PEI interval, the controller is locked. Only the manually unlocking is possible. See also the alarms table at paragraph 10. Every time the pressure-switch is enabled all the compressor are turned off.

PEI: Pressure-switch interventions time (0÷15 min) Interval, linked to the Pen parameter, for counting interventions of the low pressure-switch..

CPP: compressor management with faulty probe (A01C)

0 = maintaining the resource entered at the moment of the failure

1 =entering the resources established by means of SPPr or PoPr parameters.

SPPr: number of steps engaged with faulty probe. (0÷CpnU) It's used only if CtyP=1.

PoPr: capacity engaged with faulty probe (0÷255) It's used only if CtyP=0.

5.2.5 User interface

rELP Suction pressure displaying:

AbS = absolute pressure;

rEL = relative pressure, in this case the absolute value is decreased by 1.02bar

Loc: keyboard lock: **no** = keyboard enabled;

yES = keyboard lock

dLI Data logger interval for recording(1÷60 sec)

Adr: Controller address (1 –247) It is used in monitoring system.

PSo: Security code for operative parameters (0÷255; with 0 the security code is disabled)

5.3 Relations amount parameters

Parameter	CtyP	
Value	Displayed	Hidden
CtyP = 0	Cp1, ..., CPx, PoPr	CPSt, rty e sty, SPPr.
CtyP = 1	CPSt, rty e sty, SPPr	Cp1, ..., CPx, PoPr

where x is CPnu value

Parameter	Cdn	
Value	displayed	hidden
Cdn = 0	don, doF	don1....donx, doF1...doFx
Cdn = 1	don1....donx, doF1...doFx	don, doF

where x is Cpn value

6. Type of regulation

6.1 Dead band

This kind of regulation is available for all kinds of loads. The neutral zone (Pbd) is symmetrical compared to the target set point, with extremes: set+Pbd/2 ... set-Pbd/2. If the pressure (temperature) is inside this zone the controller maintains the same number of loads switched on and off, without changing anything.

When the pressure (temperature) go out from the zone, regulation starts. If the pressure is greater than SET+Pbd/2, the loads are switching on with timing given by parameters: don and doF. (don1÷don6, doF1÷doF6 if Cdn=no).

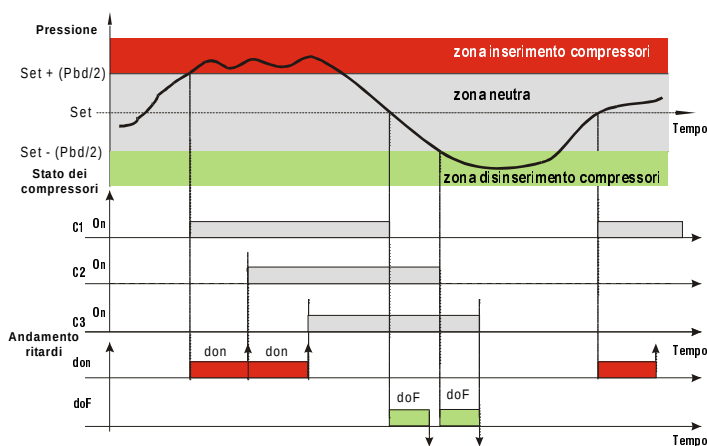
A load is turned on only if the his safety times **onon**, **oFon**, **donF** are over.

Regulation stops when the pressure (temperature) come back into the neutral zone.

In the following a simplify exemplum that explains the regulation in neutral zone for compressor homogeneous with 1 step for each compressors. The safety times onon, oFon and donF are not considered. In the real regulation the a load is entered or turned off only if these times are over.

NOTE

1. The regulation algorithm turn on a load when the pressure coming from the “lower out band” reaches the set point.
2. The regulation algorithm turns off a load when the pressure coming from the “upper out band” reaches the set point.

Ex. Dead band control, compressors with same capacities, 1 step for each compressor.**In this example:****CPnu = 3** number of compressors**CtyP = 1** homogeneous compressors;**CPSt = 1** one step for each compressor;**rty = db** dead band regulation**Sty = rot** rotation**FdLy = no** “don” delay not enabled at first calling after an equilibrium condition.**dLF = no** “doF” delay not enabled at first calling after an equilibrium condition.

6.2 Proportional Band

The regulation band (Pbd) is divided into as many parts as there are stages according to the following formula:

step = CPnu x CPSt. (number of compr. x num. of steps).

The numbers of stages switched ON is proportional to the value of the input signal: when this distance itself from the target set point and enters the various bands, the compressors are switched ON, to be then turned OFF when the signal brings near the set point.

In this way if the pressure is greater than regulation band, all the compressors are on, if the pressure (temperature) is lower than the regulation band all the compressors are off.

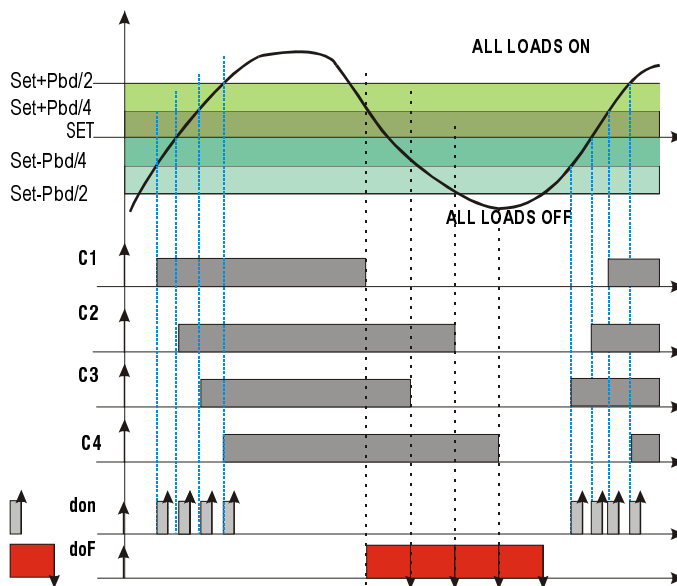
Naturally also for this regulations all the delays (don and doF) safety times (onon, ofon and donF) are valid.

Regulation according to the running hours

The algorithm switch on and off the loads according to the running hours of each load. In this way the running hours are balanced.

Example

Cpnu = 4	number of compressors
CtyP = 1	homogeneous compressors.
CPSt = 1	one step for each compressors.
rtY = Pb	proportional band regulation
Sty = rot	fixed sequence
FdLy = 0	"don" delay at first call not enabled.
dLF = 0	"doF" delay at first call not enabled.



This draw highlights the doF time: the loads are in fact turned off only when the doF time is over.

7. Mounting & installation

The instruments are suitable only for internal use. They are panel mounted, hole dims 135x69 mm, and fixed with the supplied clips.

The ambient operating temperature range is between 0÷55°C.

Avoid locations subject to heavy vibration, corrosive gases or excessive dirt. The same applies to the probes. Ensure ventilation around the instrument.

8. Electrical connections

The instruments are provided with disconnectable screw terminal blocks to connect cables with a cross section up to 2,5 mm².

Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the input connection cables from the power supply cables, from the outputs and the power connections. **Do not exceed the maximum current allowed on each relay**, in case of heavier loads use a suitable external relay.

8.1 Probes connection

Pressure probe (4 - 20 mA): respect the polarity. If using terminal ends be sure there are no bare parts which could cause short circuiting or introduce noise disturbance at high frequencies. To minimise the induced disturbances use shielded cables with the shield connected to earth.

Temperature probe: it is recommended to place the temperature probe away from direct air streams to correctly measure the temperature.

9. RS485 serial link

All models can be integrated into the monitoring and alarm system XJ500 using the RS485 serial port. They use the standard ModBus RTU protocol, so they can be fitted in a system integrator using this protocol.

10. Technical features

Housing: plastic self extinguishing V0.

Case: 144x72 mm; depth 100 mm.

Mounting: panel mounting 135x69cut out

Number of configurable outputs: 6 relays 8A 250Vac

Type of compressors: simple, multi-stage, different power

Regulation Inputs: 1 x Pressure Probe 4-20 mA or
NTC Probe

Type of refrigerant: R22, R134a, R404a, R507

Reduced set Input: 1, voltage free

Compressor alarm inputs: 6, line voltage, connected to the loads

Safety Pressure switch inputs: 1 line voltage, low circuit

Global Alarm output: 1 relay 8A 250Vac

Liquid level alarm input: 1, line voltage

Alarm logger: the last 10 alarm conditions are stored and displayed

Easy programming: via hot- key

Communication Protocol: Standard ModBus RTU, full documented

Operating temperature: 0÷55°C

Storage temperature: -30÷85 °C

Resolution: 1/100 Bar for suction , 1/10 Bar for condensing

Accuracy: better than 1% of F.S.

RTC back up battery: up to 48h

11. Alarm list

Usually alarm conditions are signalled by means of:

1. Activation of alarm relays (terminals 1-2 are closed)
2. Buzzer activation
3. Message on proper display
4. Log of alarm, hour, data and duration.

The table at paragraph 11.3

11.1 Types of alarms and signalling managed

11.1.1 Pressure switch alarm, suction section

Terminals

Low pressure switch input: 5-6.

Parameters

SEP: It establishes if the input is activated by supplying (SEP=1) or by opening (SEP=0) the terminals.

Actions

Every time the inputs are activated all the compressors are switched off. The instrument restart the standard operating mode when the input is disabled. If there are PEn activation in the PEi time, only manual resetting is allowed, by pressing the CLEAR key for 3s or by turning off and on the instrument.

11.1.2 Compressors and safeties alarm.

Terminals

The terminals (from 22 to 33) really used depends on the number of loads. The protections regarding the compressors are connected to these inputs. If one of these protections is enabling (E.I. for lack of oil or overheating, etc,) the corresponding load is turn off.

Parameters

ALIP: It establishes if the input is activated by supplying (ALIP=1) or by opening (ALIP=0) the terminals.

Actions

Every time one input is activated the corresponding output is turned off. The instrument restart the standard operating mode when the input is disabled.

11.1.3 Probe failure alarm

It is generated by failure in the probe of suction.

Probe parameters

CPP: compressor management with faulty probe (A01C)

0 = maintaining the resource entered at the moment of the failure

1 =entering the resources established by means of SPr or PoPr parameters.

SPr: number of steps engaged with faulty probe. (0÷CpnU) It's used only if CtyP=1.

PoPr: capacity engaged with faulty probe (0÷255) It's used only if CtyP=0.

11.1.4 High and low pressure (temperature) alarms (depending on parameters)

This alarm signals that the pressure (temperature) is out of limits established by parameters LAL and HAL.

The **tAo** parameter set the delay between alarm condition and alarm signalling.

Action

The alarm is signalled with standard action. The outputs are unchanged.

11.1.5 Clock data lost

It happens when the instrument is turned on for the first time or stays off more than the duration of the back up battery.

Action

Restore the clock data by means of the Pri, Hour, dAy, ndAy, Mont, YAr parameters.

11.2 Alarm muting

Press the "CLEAR" button to silence the buzzer during an alarm condition.

Hold pressed for more than 2 seconds switch off the alarm relay during an alarm condition

11.3 Alarm conditions – summary table

Code	Description	Cause	Action	Reset
Er0L	Low pressure-switch alarm	Low pressure switch input enabled (terminals 5-6)	– All compressors are turned off.	Automatically (if the number of activation are less than PE_i in the PE_i time) when the input is disable. – The compressors restarts working according to the working algorithm. Manually (if PE_n activation happened in the PE_i time) When the input is disable: - hold pressed the Clear key for 3s or - turn off and on the instrument.. – The compressors restarts working according to the working algorithm.
A01C	Suction probe failure alarm	Probe failure or out of range	– The compressors are activated according to the CPP, SPr or PoPr parameters.	Automatically as soon as the probe restarts working.

Code	Description	Cause	Action	Reset
A02C	Compressor safeties alarm	Safeties compressor input activation. NOTE: with step compressors 1 input for each compressor has to be used.	– the corresponding compressor is turned off. (with step compressors all relays referred to the input are disabled).	Automatically as soon as the input is disabled.
A03C	Minimum pressure (temperature) alarm compressors section	Suction pressure or temperature lower than SET-LAL value	– signalling only	Automatically: as soon as the pressure or temperature reaches the (Set-LAL+ differential) value. (differential = 0.3bar or 1°C)
A04C	Maximum pressure (temperature) alarm compressors section	Suction pressure or temperature higher than SET+HAL value	– signalling only	Automatically: as soon as the pressure or temperature reaches the (Set + HAL - differential) value. (differential = 0.3bar or 1°C)
A05	Liquid level alarm	Input (6-8) enabled	– signalling only	Automatically as soon as the input is disabled
A11F	Clock failure alarm	Problem on RTC board	– signalling only With this alarm the activation by RTC of the reduced set point and the alarm log are not available.	Manually: it is necessary to replace the RTC board.
A11L	Clock data lost	The clock back up battery is exhausted	– signalling only – With this alarm the activation by RTC of the reduced set point and the alarm log are not available.	Manually: set the data and the hour by means of the following parameters: Pri, Hour, dAy, ndAy, Mont, YAR
A13L	EEPROM data not valid	EEPROM data out of limits	– signalling only	Automatically: values are set inside the limits
A13F	EEPROM failure alarm	EEPROM problem	The instrument is locked	Manually: replace the EEPROM
A14C	Compressors maintenance alarm	A compressor has worked for the hour set in the SEr parameter	– signalling only	Manually: reset the running hour of the compressor (see par. 3.5)

12. Wiring connections

12.1 Digital inputs and outputs

1 - 2: ALARM RELAY: normally open, it's close when alarm happens or the instrument is switched OFF.

3 - 4: Safety relay: normally open, it's close when the instrument loses the control or is switched OFF

5 - 6 Low pressure-switch input: input at the same voltage of loads. The input is activated by supplying (SEP=1) or by opening (SEP=0) the terminals.

6 - 8 Liquid level input: input at the same voltage of loads. The input is activated by supplying the terminals.

9 - 10 Terminals supply.

13 - 14 Reduced set input: free voltage input. The input is activated by closing (rSIP=1) or by opening (rSIP =0) the terminals.

14- 15: Suction NTC probe input (PbC=ntc)

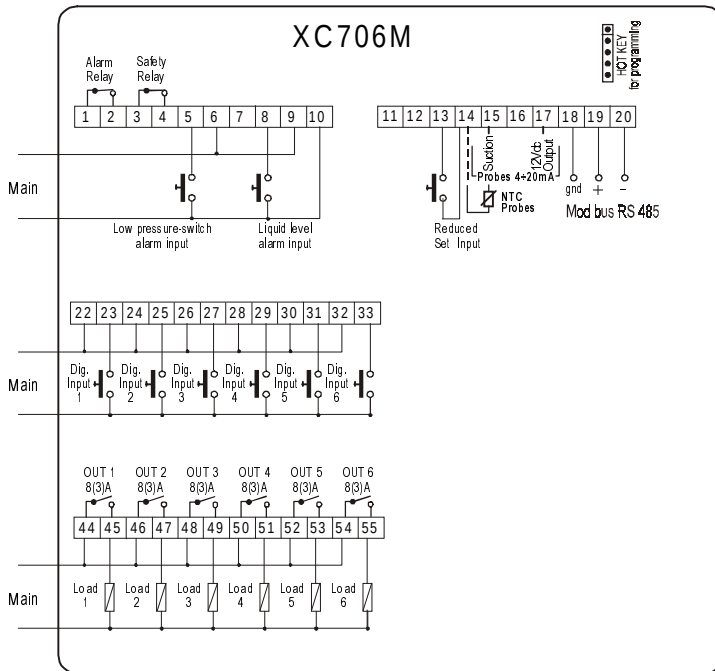
15 - 17: Suction 4÷20mA probe input (PbC=Cur)

18-19-20: Outputs for serial RS485 .

22 – 33 Digital inputs for safeties of compressors. When an d. i. is activated, the corresponding output is switched OFF.

44 – 55 Relay configurable outputs for compressors. The compressors are always allocated starting from left to right.

E. I. Cpu=4 The terminals 44-45 are for the first compressor; 46-47 are for the second compressor; 48-49 are for the third compressor; 50 - 51 are for the fourth compressor.



13. Parameters – Default values

Label	Value	Description	Range
Set_N	-18,0	Normal Set point; suction section	LSE+HSE
Set_R	-18,0	Reduced Set point; suction section	LSE+HSE

Configuration parameters - compressors section

CPnU	6	Compressor Number	0÷6
CtyP	1	Compressor type	0÷1
CPSt	1	Compressor Step	1÷6
PC1 ¹	0	Power of compressor 1	0÷255
PC2 ¹	0	Power of compressor 2	0÷255
PC3 ¹	0	Power of compressor 3	0÷255
PC4 ¹	0	Power of compressor 4	0÷255
PC5 ¹	0	Power of compressor 5	0÷255
PC6 ¹	0	Power of compressor 6	0÷255
rty	db	Type of regulation: neutral zone or proportional band	db= neutral zone; Pb= proportional band
Sty	rt	Sequence type	rt= rotation; F= fix sequence
FtyP	r22	Freon Type	r22 = R22; r404= R404a; 507= R507; 134=134
PbC	cur	Type of probe (NTC - Current)	Cur= 0÷20mA; ntC=NTC
PA04 ²	0,5	4mA readout (compressors)	0.00÷30.00
PA20 ²	8,0	20mA readout (compressors)	0.00÷40.00
CAL	0	Probe Calibration (compressors)	-1.00÷1.00bar; -10.0÷10.0°C
SEP	1	Low pressure-switch polarity	0 =enabled without voltage; 1 =enabled with voltage.
rSIP	1	Reduced set input polarity	0 = enabled by opening; 1 =enabled by closing
LLI	1	Liquid level input polarity	0 =enabled without voltage; 1 =enabled with voltage.
ALIP	1	Alarm input for compressors polarity	0 =enabled without voltage; 1 =enabled with voltage.
StPP	1	Valve outputs polarity	0 =enabling by opening the relay; 1 = enabling by closing the relay
PSc	0	Security code for configuration parameters (compressors)	0÷255 (0=no security code)

Operative parameters - compressors section

Prl	-	Minutes	1÷59
HoUr	-	Hours	0÷23
dAy	-	Day of month	1÷31
ndAY	-	Day of week	Sun=Sunday; Mon=Monday; tuE=Tuesday; Ued=Wednesday; thu=Thursday; Frd=Friday; SAt=Saturday

Label	Value	Description	Range
Mnth	-	Month	0÷12
YAr	-	Year	2000÷2099
dEU	°C	Displaying measurement unit	bar= bar, °C=celsius
Pbd	4.0	Regulation band width (compressors)	0.10÷5.00bar; 0.1÷30°C
OnOn	5	Minimum delay between 2 switching on of the same compressor	0÷255m
OFOn	2	Delay between the switching off and on of the same compressor	0÷255m
Cdn	YES	don and doF equal for all the compressors	no, YES
don1 ³	15	Time delay between the insertion of the compressor 1 and the following one	0÷255s
don2 ³	15	Time delay between the insertion of the compressor 2 and the following one	0÷255s
don3 ³	15	Time delay between the insertion of the compressor 3 and the following one	0÷255s
don4 ³	15	Time delay between the insertion of the compressor 4 and the following one	0÷255s
don5 ³	15	Time delay between the insertion of the compressor 5 and the following one	0÷255s
don6 ³	15	Time delay between the insertion of the compressor 6 and the following one	0÷255s
doF1 ³	5	Time delay between the switching off of the compressor 1 and the following one	0÷255s
doF2 ³	5	Time delay between the switching off of the compressor 2 and the following one	0÷255s
doF3 ³	5	Time delay between the switching off of the compressor 3 and the following one	0÷255s
doF4 ³	5	Time delay between the switching off of the compressor 4 and the following one	0÷255s
doF5 ³	5	Time delay between the switching off of the compressor 5 and the following one	0÷255s
doF6 ³	5	Time delay between the switching off of the compressor 6 and the following one	0÷255s
don	15	Time delay between the insertion of two different loads	0÷255s
doF	5	Time delay between switching off of two different compressors	0÷255s
donF	15	Minimum time a stage stays ON	0÷255s
FdLy	no	"don" delay enabled also for the first request	no, YES
FdLF	no	doF delay enabled also for the first switching off	no, YES
odo	20	Regulation delay with power on	0÷255s
LSE	-40.0	Minimum set point (compressors)	PA04+HSE with PbC = Cur, -50+HSE with PbC = NTC
HSE	10.0	Maximum set point (compressors)	LSE+PA20 with PbC = Cur; LSE+110 with PbC = NTC
StrS	0	Reduced set point start time	0÷23h
SPrS	0	Reduced set point stop time	0÷23h

Label	Value	Description	Range
rSd1	no	Enabling reduced set on Sunday	no, YES
rSd2	no	Enabling reduced set on Monday	no, YES
rSd3	no	Enabling reduced set on Tuesday	no, YES
rSd4	no	Enabling reduced set on Wednesday	no, YES
rSd5	no	Enabling reduced set on Thursday	no, YES
rSd6	no	Enabling reduced set on Friday	no, YES
rSd7	no	Enabling reduced set on Saturday	no, YES
UAro	Hours	Measurement unit for the Aro parameter	min, Hours
Aro	255	Temporary alarm silencing	0÷255m/h
PAo	30	Alarm probe delay at power on	0÷255m
LAL	15.0	Minimum pressure alarm (compressors)	0.00÷(Set-PA04)
HAL	20.0	Maximum pressure alarm (compressors)	0.00÷(PA20-Set)
tAo	20	Low and High pressure (temperature) alarms delay	0÷255m
SEr	9999	Running hours for maintenance	1÷9999h
PEn	5	Max number of pressure-switch activation	0÷15
PEI	15	Pressure-switch interventions time	0÷15m
CPP	1	Compressor management with faulty probe	0 = Outputs on when alarm happens; 1 = Outputs according to. SPr or PoPr parameters
SPr	2	Number of on compressors with faulty probe	0÷CPnU
PoPr ¹	0	Capacity engaged with faulty probe	0÷255
rELP	rEL	Suction pressure displaying: relative or absolute	AbS= absolute pressure; rEL=relative pressure
Loc	no	Keyboard lock	no, YES
Adr	1	Serial address	1÷247
PSo	0	Security code for operative parameters (compressors)	0÷255 (0=security code disabled)

¹ Visible only if CtyP=0

² Visible only if PbC=Cur

³ Visible only if Cdn=no

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