ITELCO INDUSTRY

Service Manual

Chiller unit

MQH R 410A

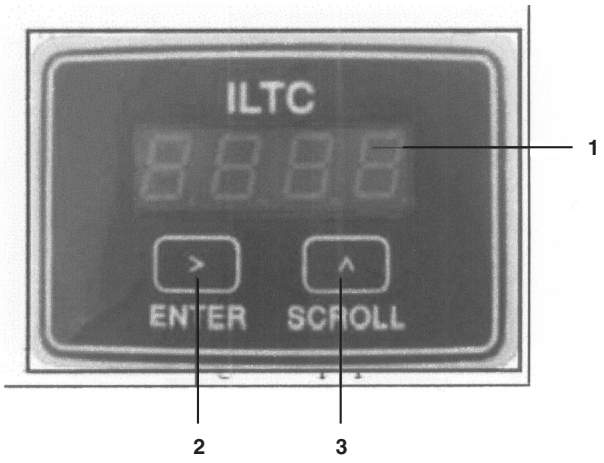
Release Date	Rev	Review Date
november 2008	—	—

MQH R410A ELECTRONIC CONTROL

CONTROL PANEL

The control panel allows the user to carry out all the operations related to the use of the controller, in particular:

- To set the operation parameters
- To manage alarms
- To check the status



1	**Display**	Display the status of the unit, entering/leaving water and ambient air temperatures, compressor discharge pressure, setpoint, running times, alarm code, alarm history etc.
2	**Enter Key**	Select the display value or to program and modify system values
3	**Scroll Key**	Scroll the menu

1 TECHNICAL CHARACTERISTICS

1.1 ELECTRICAL PERFORMANCE

Maximum Rating

Item	Spec.
Rated input voltage	• 24 V, Single-Phase, 50 Hz or 60 Hz. Protected with on board fuse
Operating input voltage range	• 20.4 – 26.4 Vac
No damage input voltage range	• 16 – 32 Vac
Maximum current	• 0.5A @ 24Vac
Minimum power factor	• 0.92
Power consumption in stand-by	• < 5W

1.2 GENERAL SPECIFICATIONS

- The control box is in compliance with European current standard about emissions and immunity (e.m.c).
- The miniCAC control board mounted in a IP20 plastic case. The plastic is in compliance with UL94V0.
- Flash memory is used to store the program, enable re-download via 10 bit A/D converter in factory and at site.
- During power failure with a duration more then 40 msec, the control goes off and will random restart after power comes back according the dip 5 position.

1.3 COMPATIBILITY WITH OTHER PRODUCTS AND SYSTEMS

1.3.1 ELECTRICAL INTERFACES

Analogue Input	
N°	**Type**
B1	NTC
B2	NTC
B3	NTC
B4	NTC/ratio
B5	NTC/ratio

Digital Input	
N°	**Chiller**
ID1	Remote Unit Start/Stop
ID2	Cooling/Heating mode selection
ID3	Fan motor overload (or 2nd compressor protection)
ID4	Compressor motor protection
ID5	Flow switch - Water diff. pressure switch
ID6	Low pressure switch
ID7	High pressure switch
ID8	Night Mode/Second setpoint

Digital output			
N°	**Chiller**	**Type of relay (AC motor rating)**	**Type**
1C-O	Compressor	2A @ 230Vac	N.A
2C-O	Fan high speed or 2nd comp	4A @ 230Vac	N.A
3C-O	Fans motor or low speed	See note 1	TRIAC (see note 1)
4C-O	Antifreeze heater	2A @ 230Vac	N.A
5C-O	Reversing valve	2A @ 230Vac	N.A
6C-O	Pump	4A @ 230Vac	N.A
7C-O	Unit alarm relay	2A @ 230Vac	N.A

2 START-UP & OPERATING INSTRUCTIONS

ABBREVIATIONS	
SYMBOL	**DESCRIPTION**
BMS	Building management system
C1	Compressor
CP	Condensing pressure
CSPT	Cooling setpoint temperature
CDCO	Cooling compensation offset
DEWT	EWT derivative DEWT = (EWT(t) – EWT(t-1))/dt °C/min
EP	Evaporating pressure
EWT	Entering water temperature
EWTM	Maximum entering water temperature
FP	Freeze protection (minimum LWT)
FS	Flow switch to detect sufficient water flow
HPC	High pressure cut-out
HSPT	Heating setpoint temperature
HDCO	Heating compensation offset
LO	Low fan speed
LOAT	Low level of the external temperature
LSL	Low speed limit
LWTM	Minimum leaving water temperature
LWT	Leaving water temperature
MCB	Main control board
NM	Night mode
OAT	Outdoor air temperature
OD	Outdoor
OFAN	Outdoor fan
PGI	Percent of glycol in the water
RC	Reverse cycle (heat pump)
RV	Reversing valve
SPT	Setpoint temperature
ST	Standard model (cooling only)
tC	Comp timer
TH	Trace heater for frost protection
Eph	Low pressure heating adjust
tD	Defrosting duration
THC	Coil heater
BYP	TXV by-pass during defrost
EPCR	Evaporating Pressure Calculation (function of OAT)
EPIC	Evaporating Pressure Iced Coil
EPCC	EP Clean Coil
OPEr	Parameter for mode selection in standard parameter
LOAt	OAT limit valve for THC activation

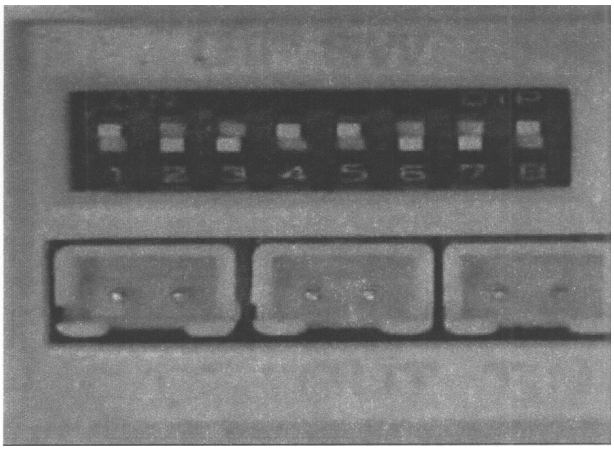
2.1 PRELIMINARY CHECK

The checks listed below shall be performed before starting the unit.

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the master switch open.
- Check that any voltage and phase variation in the power supply dose not exceed the prefixed thresholds.
- Check that the components of the external water circuit (user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacture's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles.
- Check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 4 hours. Then, clean the filters on the suction side of the pumps.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.
- Check that oil heaters, if any, have been turned on at least 4 hours before (it is mandatory if the temperature is under 15 °C).

2.2 BEFORE START-UP

Before you start-up the unit, you must check the DIP switch setup.



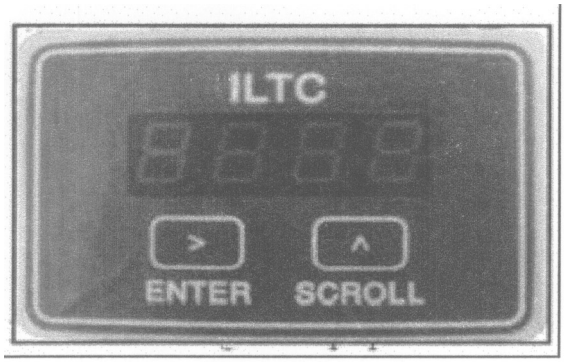
DIP SWITCH CONFIGURATION

DIP NO.	POSITION OFF	POSITION ON	FACTORY SETUP
1	U BMS	MODBUS	ON
2	Not used		OFF
3	No auto restart	Auto Restart after power failure	OFF
4	No OAT compensation	OAT compensation	ON
5	Cooling only unit	Heatpump unit	ON
6	No auto fan	Auto FAN	OFF
7	Pump ON when unit is ON	Pump always ON	OFF
8	Refrigerant R 407C	Refrigerant R 410A	ON

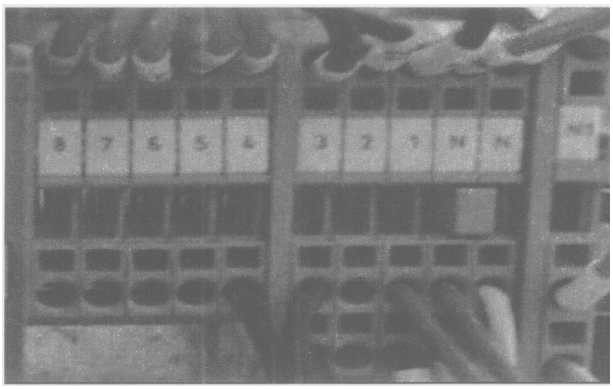
** Turn ON the main switch of the power line.

Display	Description
C1	When compressor is operating
C1H	Compressor in heat mode
DEIC	defrost in operation
OFF	Off mode
COOL	Cool mode with no compressors on
HEAT	Heat mode with no heating on

2.3 STARTING AND USING THE UNIT



- To start/stop the unit press for 5 secs the SCROLL key.
- To remotely stop the unit, open the connection between No. 7 and No. 8 on the terminal board.



- During the normal operation, if the connection between No. 5 and No. 6 terminal is closed, the unit will operate in heating mode. When the connection is opened, the unit will operate in cooling mode. If connection 5-6 is open, then OPER mode can be selected by display.
- To modify operative mode or the setpoints, press both ^ and > keys at the same time for 5s, then the "OPEr" message appears on the display. The parameters are scrolled using the ^ button and selected using the > button. When selected, the values can be changed by using the ^ button to scroll from the present value to max then min and can be selected by pushing the > button.
  After selection the menu will return to the beginning of the same parameter change menu. If no button is pressed for 10s the display reverts back to normal mode.

TABLE LIST OF STANDARD PARAMETERS

Display	Meaning	Min. value	Max value	Step	Default value
OPEr	Cooling/Heating mode selection	COOL	HEAT	--	COOL
CSP	Cooling Setpoint	CSPL	23	0.5	12
HSP	Heating Setpoint	20	47	1	40
gLY	Glycol %	0	30	10	0
nigh	Night mode	1	4	1	2
COAL	CSPT compensation low limit	10	30	2	20
COAH	CSPT compensation high limit	20	36	2	30
CDCO	CSPT compensation	0	8	1	6
HDCO	HCSPT compensation	0	15	1	8
HOAL	HCSPT compensation low limit	-10	10	1	-5
HOAH	HCSPT compensation high limit	0	20	1	10
HPCE	1 auto reset for HPC alarm	0	1	1	0
ND	Night mode differential	0	15	1	2
NFC	Night mode fan change	-4	4	1	2
Id	Identification address	0	255	1	0
F0	Factory parameter	0	9	1	0
F1	Factory parameter	0	9	1	0
F2	Factory parameter	0	9	1	0

TABLE LIST OF FACTORY PARAMETERS (DEFAULT VALUES ACCORDING TO DIP 8 SELECTION)

If you want to change the parameter value, you must get the password from the factory or your authorized service support.

Display	Meaning	Unit	Min. value	Max value	Step	Default value R410A
CSPL	Minimum Cooling setpoint	°C	-5	14	1	8
FL	Fluid paremeter		0	2	0.5	0
CPL	Condensing Pressure Limit	bar	0	50	0.5	40
TC0	Min. condensing temperature	°C	0	100	1	20
TC1	Condensing temperature setpoint	°C	0	100	1	30
TC2	Max condensing temperature	°C	0	100	1	50
rpml	Min. Triac output	%	0	100	5	20
rpmh	Max Triac output	%	0	100	5	100
OAT1	Low OAT value in heating fan control	°C	0	50	1	15
OAT2	High OAT value in heating fan control	°C	0	50	1	30
LOL	EP protection correction in cooling	bar	0	1	0.2	0.4
EWTn	EWTM max EWT (only in cooling)	°C	16	40	1	24
Eph	Low pressure heating adjust	bar	0	1	0.1	0.3
tde	Defrost cycle maximum duration	min	2′	10′	1′	5′
dd	Delay time for defrost cycle	min	10′	60′	5′	35′
OCTi	OCT defrost start value	°C	-10	10	1	-3
OCTe	OCT defrost exit value	°C	5	30	1	12
CPe	CP defrost exit value	bar	15	40	1	34
EPi	EP defrost enter value	bar	1.8	10	0.2	5.4
COF	Off comp exiting defrost cycle		flag	0	1	0
b4	B4 analog input type		ntc	rAt	none	Ntc
b5	B5 analog input type		ntc	rAt	none	rAt

- During normal operation the current value of entering water temperature is displayed flashing alternatively with the current status. To display other useful data, go to level 1, use the ^ button to scroll the menu, and use the > button to select the display value.

DISPLAY DATA

PARA READING (PArA)

Code Parameter	Meaning
DE	
TO (Triac output)	
CSPT	cooling setpoint enabled
HSPT	heating setpoint enabled
tD	last defrosting time

SENSOR READING (SEnS)

Code Parameter	Meaning
EWT	entering water temperature
LWT	leaving water temperature
CP	discharge pressure
EP	suction pressure
CPS	saturated discharge temperature
EPS	saturated suction temperature
OAT	room air temperature
OCT	sensor temperature in coil

ALARM CODE READING

Code Parameter	Meaning
ALARM	see last alarm exhisting

HRS RUNNING HOURS (HRS)

Code Parameter	Meaning
C1	Compressor 1 running hours x 10
tC1	Compressor 1 running hours by the last reset

LOG LAST 10 ALARM (LOG)

Code Parameter	Meaning
ALARM	see alarm list

STATUS READING (STat)

Code Parameter	Meaning
C1	Compressor 1 on/off
RV REVERSING VALVE	Rv on = heating mode Rv off = cooling mode
EH	ON or OFF
Pump	Pump on/off
OFAN	Fan on/off
dEIC	defrost in operation
MODE	OFF or COOL or HEAT

- If an alarm is occurred, the alarm code is displayed, but after 30', even if the alarm is still active, the display shows again the mode but "Alarm" message is displayed for 2' every 10' when an alarm is active.
  When we enter in Alarm list, the first alarm code displayed is the last occurred.

ALARM SUMMARY

Fault as on display	Fault description
ADC	ADC error
CPF	CP transducer failure, out of range
EPF	EP transducer failure, out of range
REF	Refrigerant leak- low pressures
CPnc	CP transducer failure, no change error
EPnc	EP transducer failure, no change error
CFC1	CP and EP no change, compressor not operating (burn out or phase change)
EWTH	EWT entering water temperature sensor short circuited
EWTL	EWT entering water temperature sensor short disconnected
LWTH	LWT entering water temperature sensor short circuited
LWTL	LWT entering water temperature sensor short disconnected
OATH	OAT outdoor air temperature sensor short circuited
OATL	OAT outdoor air temperature sensor short disconnected
OCTH	OCT coil temperature sensor short circuited
OCTL	OCT coil temperature sensor short disconnected
HP	High pressure protection, automatic reset for first three times
HPC	High pressure cut-out
LP	Low pressure limit, unit cut out
LO	Leaving water temperature below allowed limits
HI	EWT is too high
FS	Flow switch opens, low water flow
CF1	CF1 input open, compressor 1 overload
OF1	OF1 input open, outdoor fan overload
PF	PF input open, pump internal overload
LOu	Low water volume
ConF	Not allowed configuration

2.4 CHECKING THE OPERATION

Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the compressor and in case of stabilized operation.
- The fan's current absorption.

Check that the condensing and evaporation temperatures, during operation at high and low pressure detected by the pressure gauges of the refrigerant, are within the following range:
(on the units not provided with HP/LP pressure gauges for the refrigerant, connect a pressure gauge to the Schreader valves on the refrigeration circuit).

HP	Approx. 13 to 18 °C above the temperature of the air entering the condenser, for R 410a units.
LP side	Approx. the difference between the temperature of the leaving water and saturated evaporating temperature must be in the 2 - 4 °C for R 410a units.

2.5 SYSTEM DIAGNOSTICS AND OPERATION AT FAULT CONDITIONS

FAULT	RESPONSE
LWT sensor failure	If in cooling then stop machine
EWT sensor failure	Use EWT = LWT + 5
EWT & LWT failure together	Stop machine
OAT sensor failure	Use OAT = 35 (cooling) – 8 (heating). Variable speed in heating always in maximum speed
CP sensor failure	Fans to max speed when OAT > 20 °C Fans to low speed when 15 °C < OAT < 20 °C If OAT < 15 °C, stop the unit in cooling only Disable vs. In heating, end defrost only with OCT > OCTe or Td > Tde
EP sensor failure	In cooling mode, correct CSPT to CSPT > FP + 7 In heating, if OAT < 10 °C start defrost routine every 40 mins and end defrost routine after 90 sec.
OCT failure or CP & OCT failure	In heating, if OAT < 10 °C start defrost routine every 40 mins and end defrost routine after 90 sec. Variable speed in cooling: always in maximum speed.
EP & CP failure	Stop the unit