Farm Management Made Easier

NMC-Junior Irrigation

Installation & Service Manual

NETAFIM™

	Name	Signature	Date
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Updates

Rev	Change Description	Change No.	Date	Authorizer's Name
1.0			30-Jan-2008	Idan Marko

Table of Contents

Table of Contents Con't…

Table of Contents Con't…

1. General Instructions

- Installation should be performed by authorized technicians only.
- Verify that field components are working properly.
- All safety regulations are to be applied.
- Do not apply force or pressure on components during the installation procedure.
- Refer to your supervisor if problems occur during installation procedure.

2. Basic Requirements for On-Site Preparation

- Verify power source between 115-220 VAC±10% or 12VDC (Australia & New Zealand 240VAC±5%).
- Verify grounding connection <10Ω
- Environment temperature between (-10°c/14°F)-(+60°c/140°F).
- Verify protection from damaging climate conditions.

3. General Dimensions

Type A

Type B

4. Unpacking and Installation

4.1 Unpacking

1

Package carefully

2

User manual

3

Junior case Type A

Or

Junior case Type B

Type A

Type B

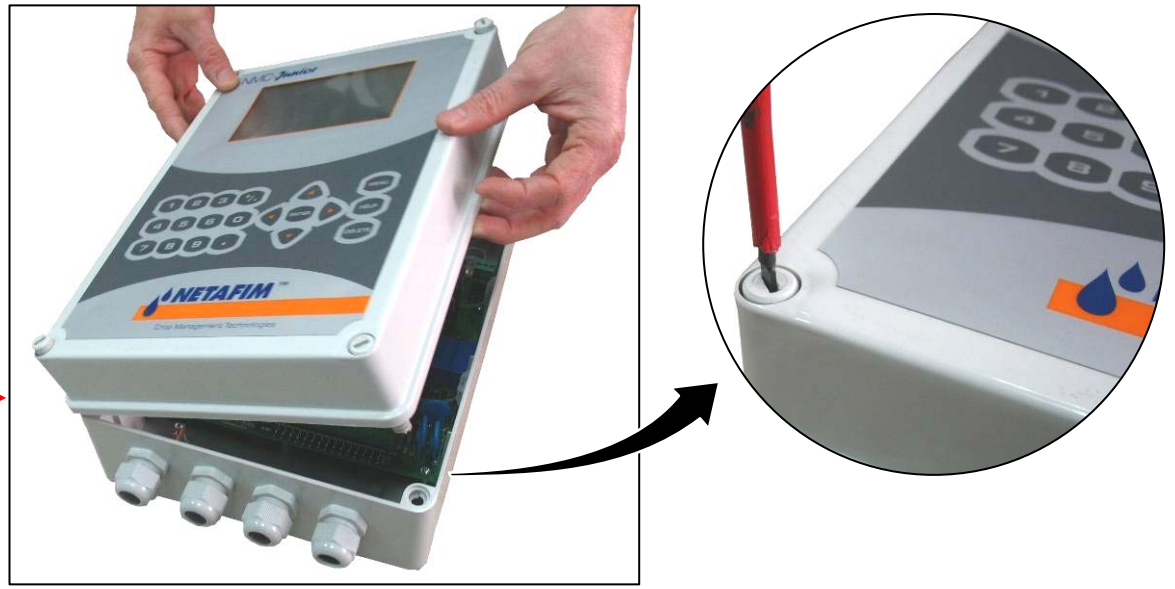
4.2 Box Installation

4.2.1 Option A

1

Cover by opening screws x4

Flat, wide headed screwdriver



2

Junior case Type A

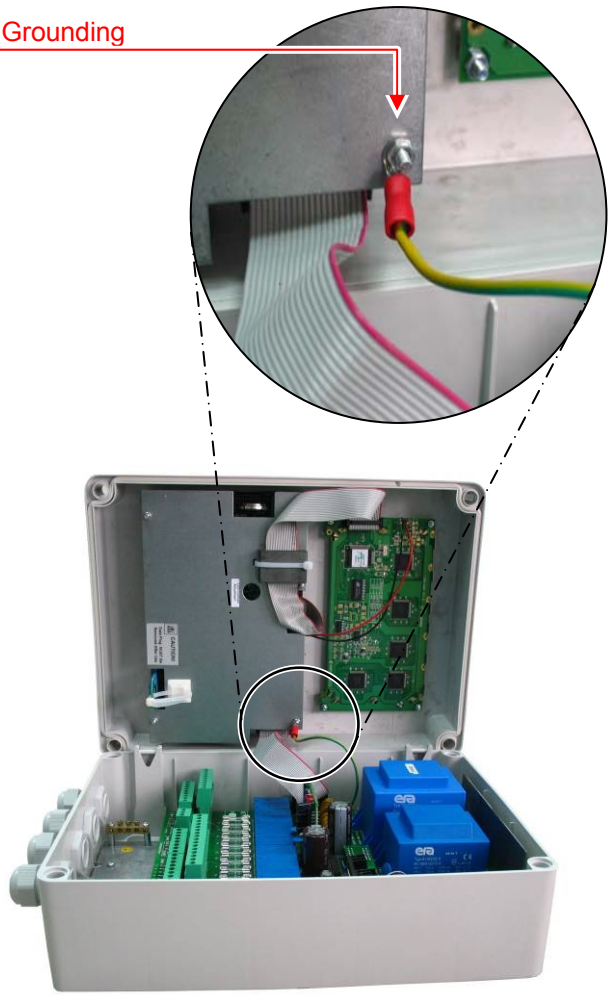
3

REMOVE

Grounding

TOOLS

Spanner



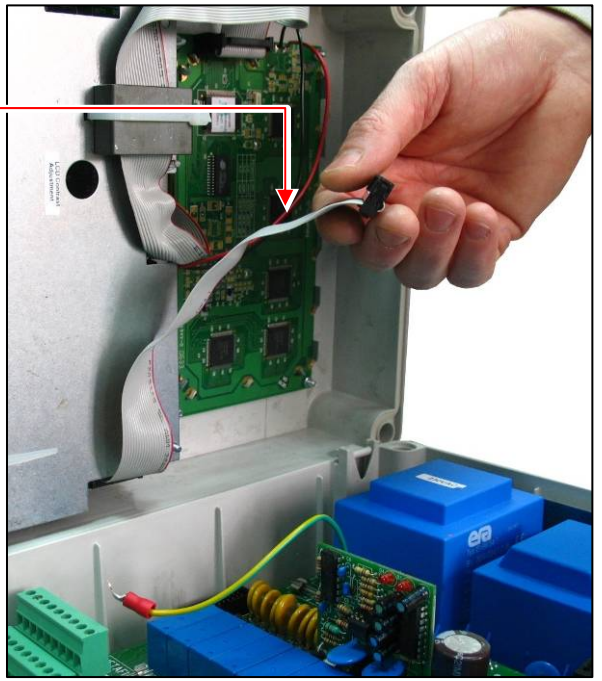
4

DISCONNECT

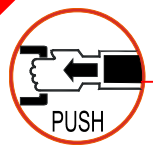
Flat cable

ATTENTION

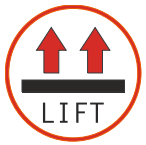
Rock slightly



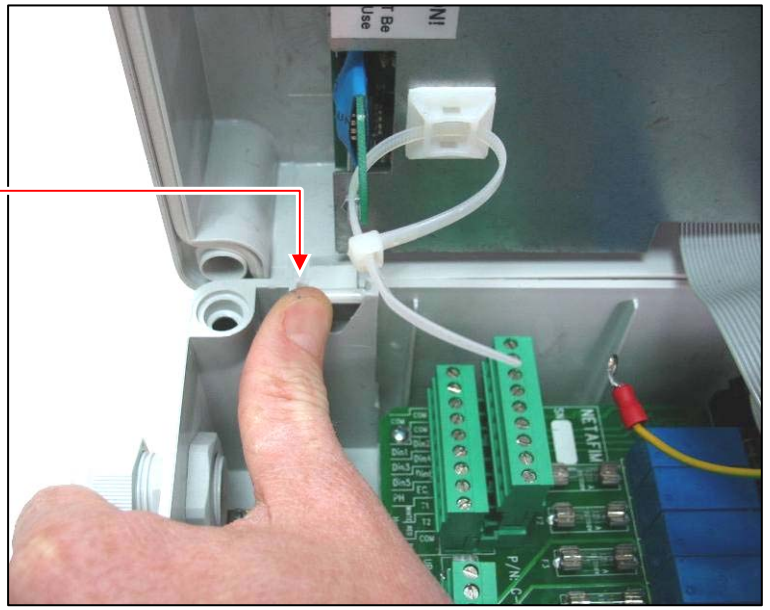
5



Bracket from slots

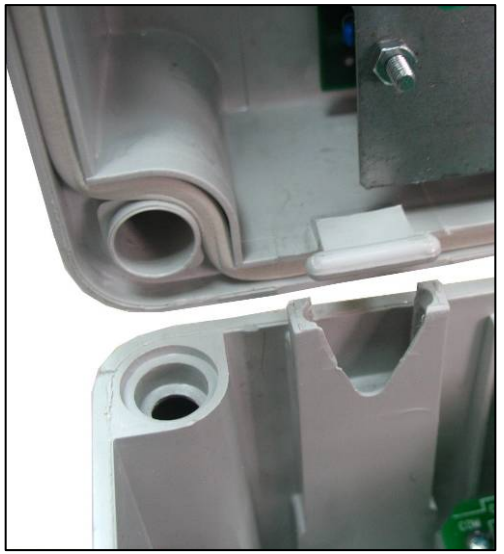


Door wing



6

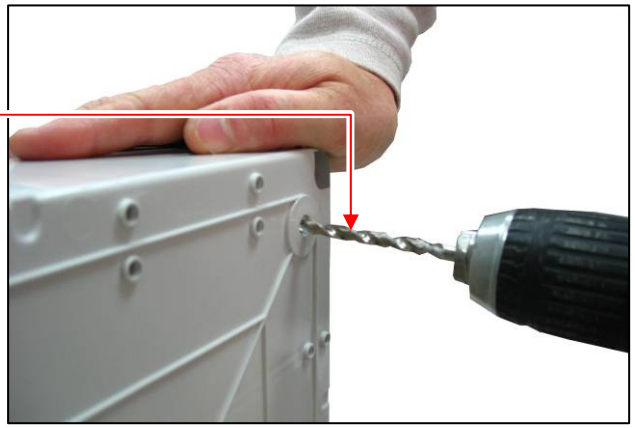
Door from base



7

DRILL

Holes x4 according to markings on back side



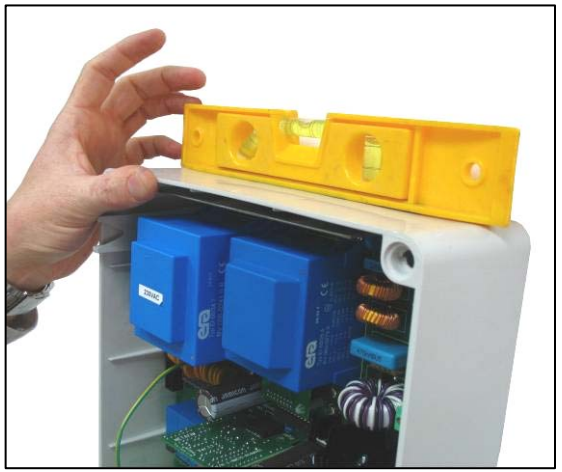
8

ADJUST

Box on the wall at intended location

TOOLS

Level



9

MARK

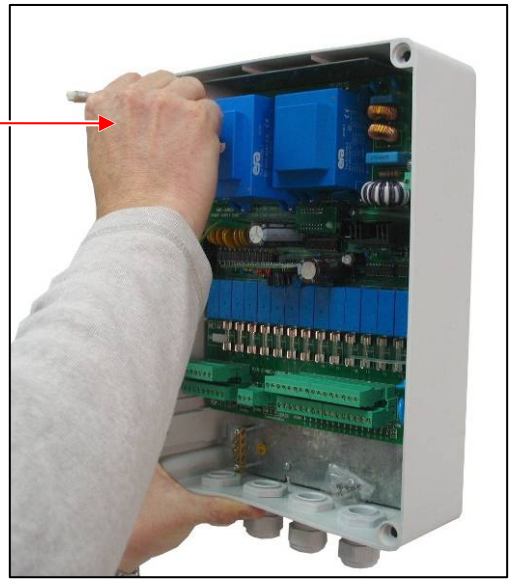
Exact location of four holes

DRILL

Holes ø6mm according to markings on the wall

INSERT

Anchors



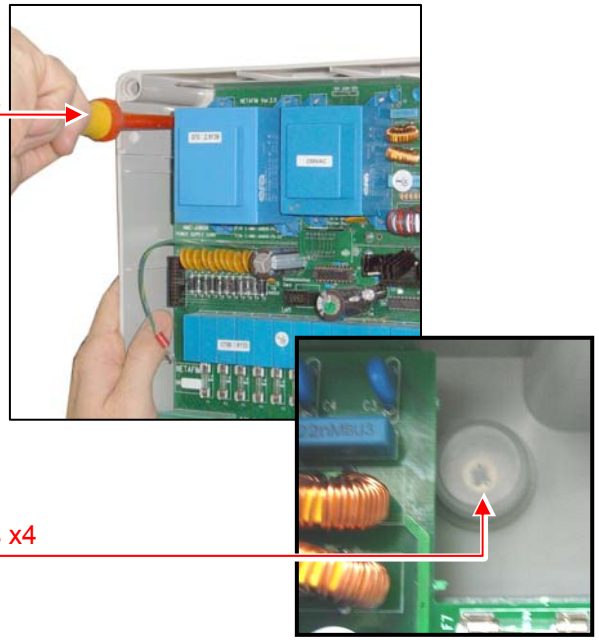
10

SCREW

Screws 4.5X4 Flat washer x4

TOOLS

Screwdriver



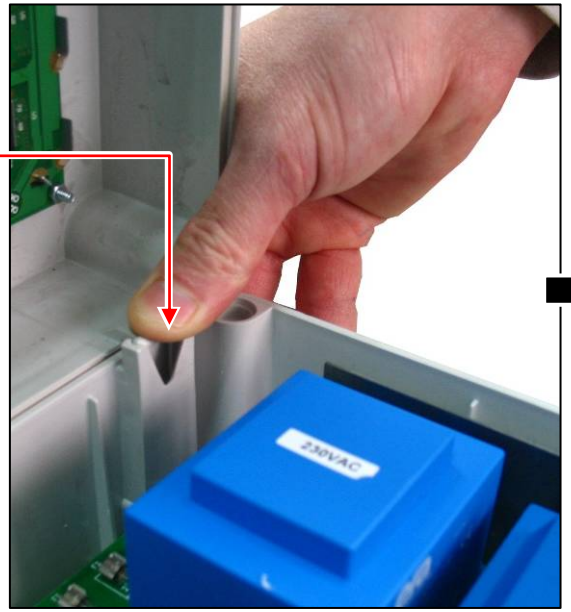
ASSEMBLE

Screw covers x4

11

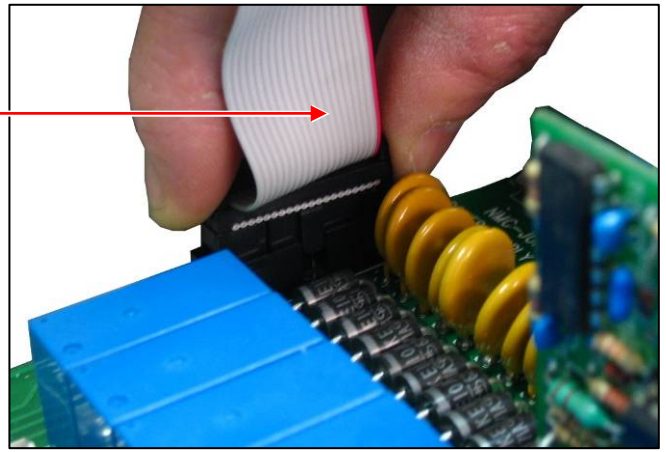
Pin into socket

Door to base



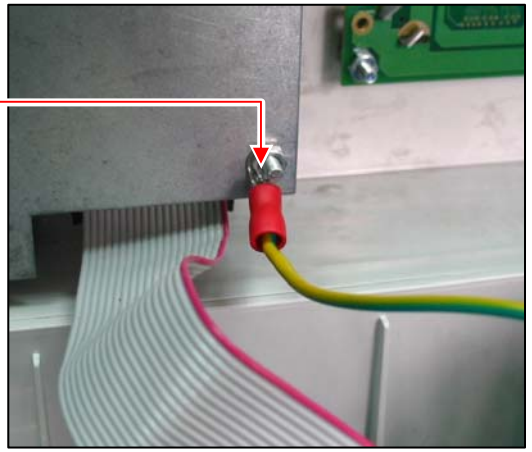
12

Flat cable



13

Grounding

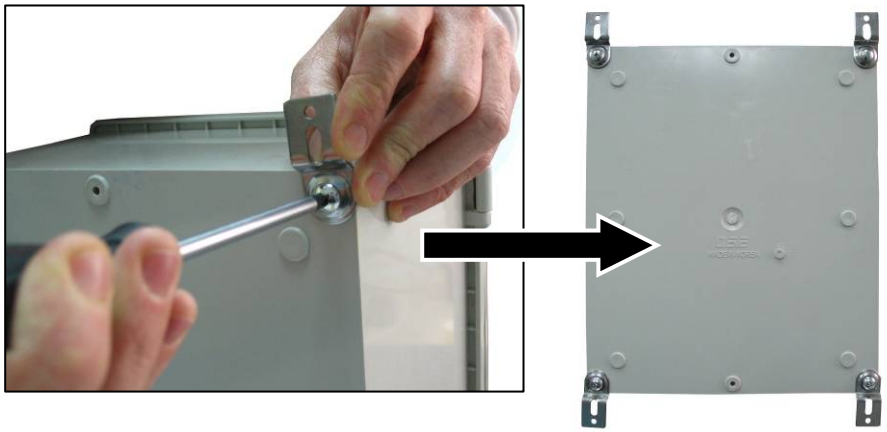


4.2.2 Box Option B

1

Bracket X4

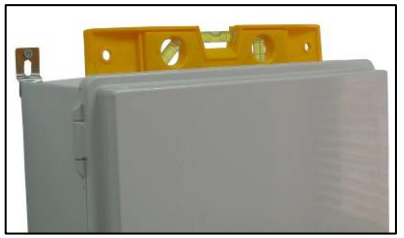
Philips tip screwdriver



2

Box on the wall at intended location

Level



3

Exact holes location

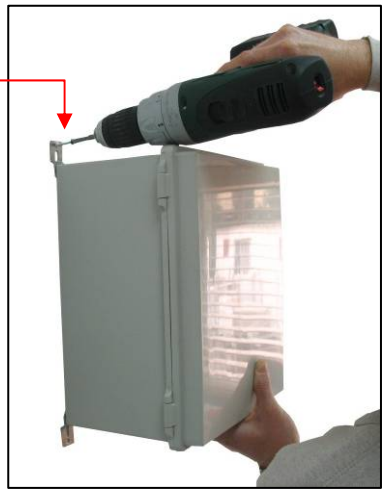
Drill holes

Anchor X4

4

Screws 4.5X4
Flat washer x4

Screwdriver



5. Power Supply Wiring

5.1 Main Power Wiring

CAUTION! SHOCK HAZARD! The electrical installation should be performed by a qualified electrician only!

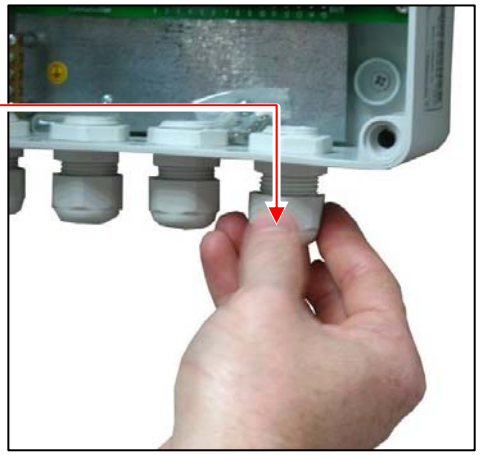
1

Main power

Verify grounding connection <10Ω

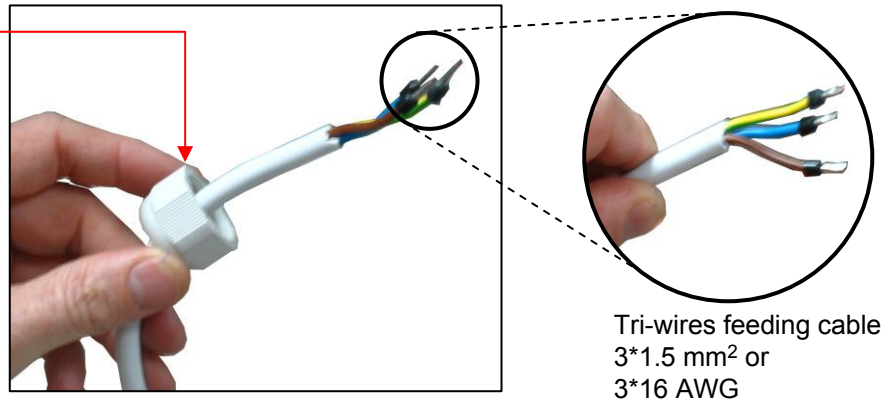
2

Gland screw



3

Feeding cable into Gland cover



Tri-wires feeding cable
3*1.5 mm^2 or
3*16 AWG

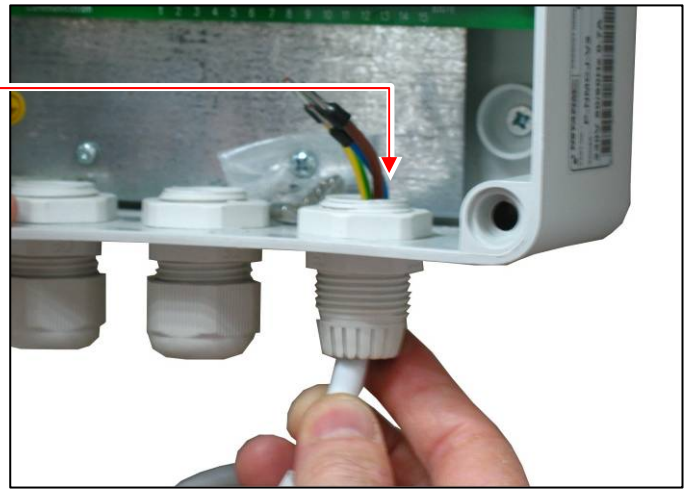
USA:
Green =GND
White = Common
Black = Phase

NOTE: Ensure source voltage matches sticker (USA/MEX: 115VAC)

4

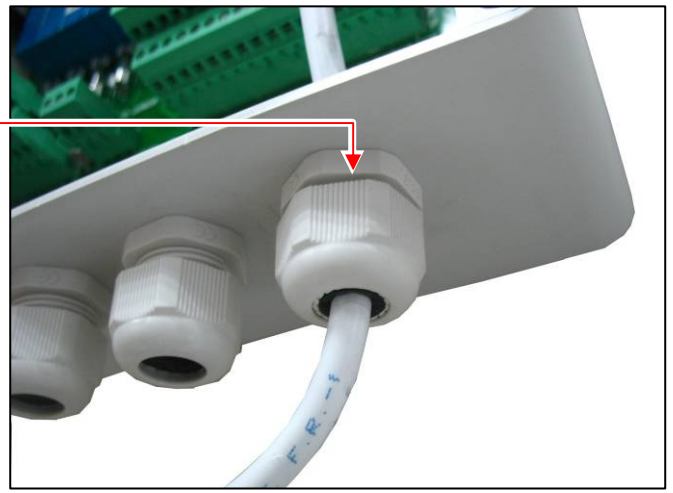
Cable into gland screw

Cable length to reach the terminal connector location



5

Gland cover

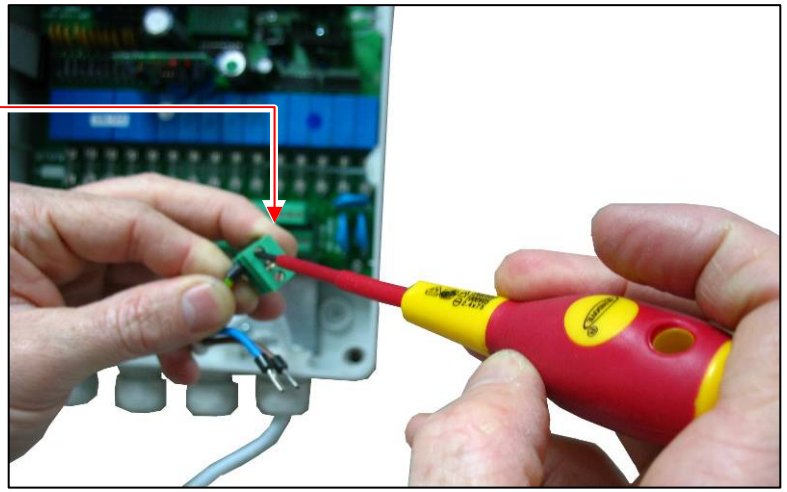


6

Terminal Connector

7

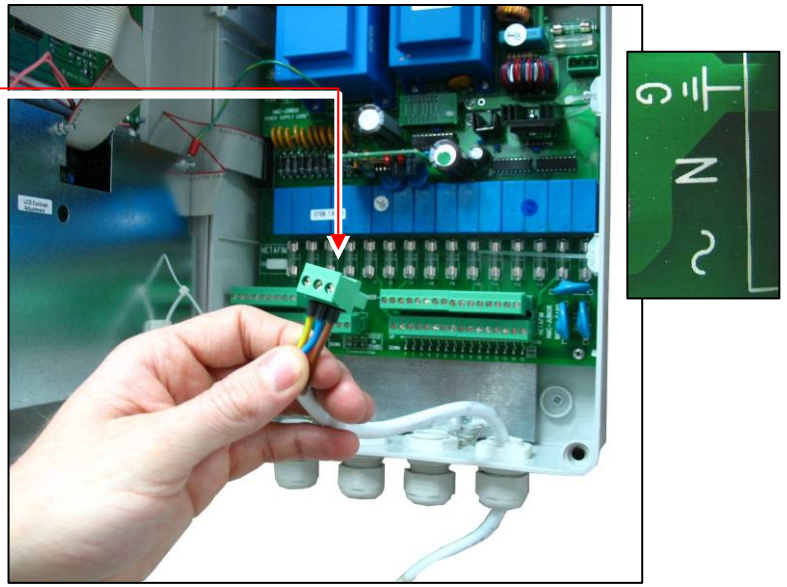
Screws x3



8

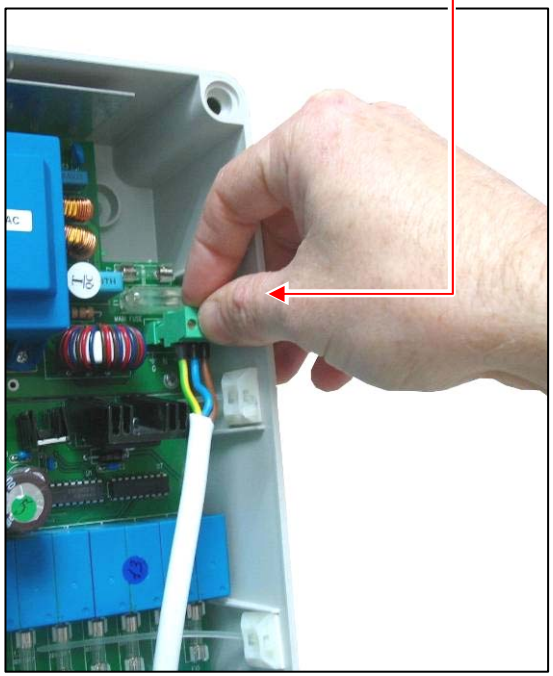
Wire accordingly:
~- Phase
N- Neutral
G- Ground

Screws x3



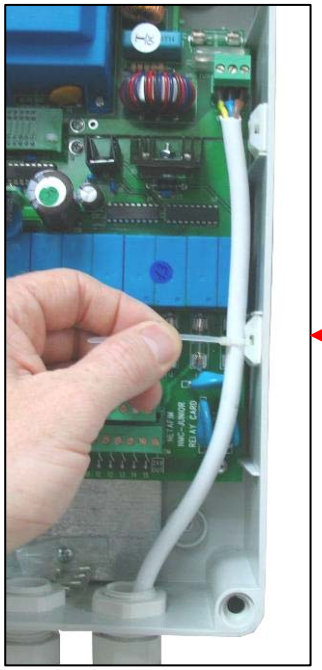
9

Connector terminal



10

Feeding cable to interior box wall using a tie wrap



11

Main power

5.2 Electrical Test

CAUTION! SHOCK HAZARD! The electrical installation should be performed by a qualified electrician only!

1

PERFORM Electrical test with Multimeter

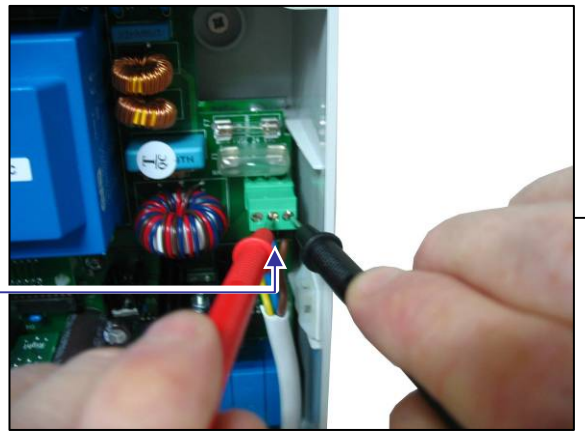
2

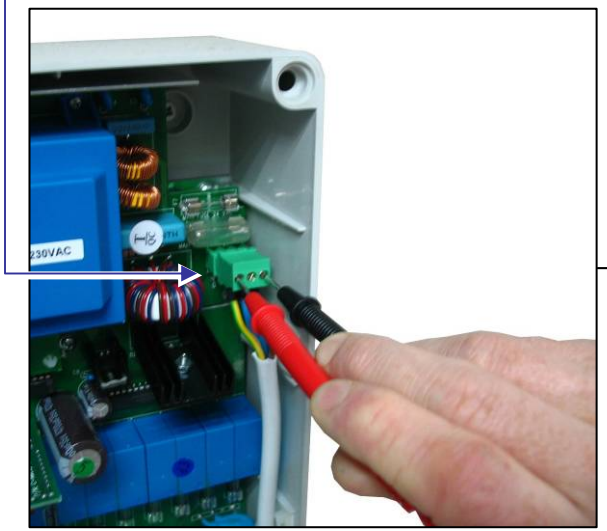
CHECK
- ⇨ Phase to ground
- ⇨ Phase to neutral

ENSURE

Phase to ground results:
Option 1- 220VAC± 10 % (EUR, AFR)
Option 2- 115VAC±10% (USA, MEX)
Option 3- 240VAC±5% (AUS, NZ)

Phase to neutral results:
Option 1- 220VAC± 10 % (EUR, AFR)
Option 2- 115VAC±10% (USA, MEX)
Option 3- 240VAC±5% (AUS, NZ)





3

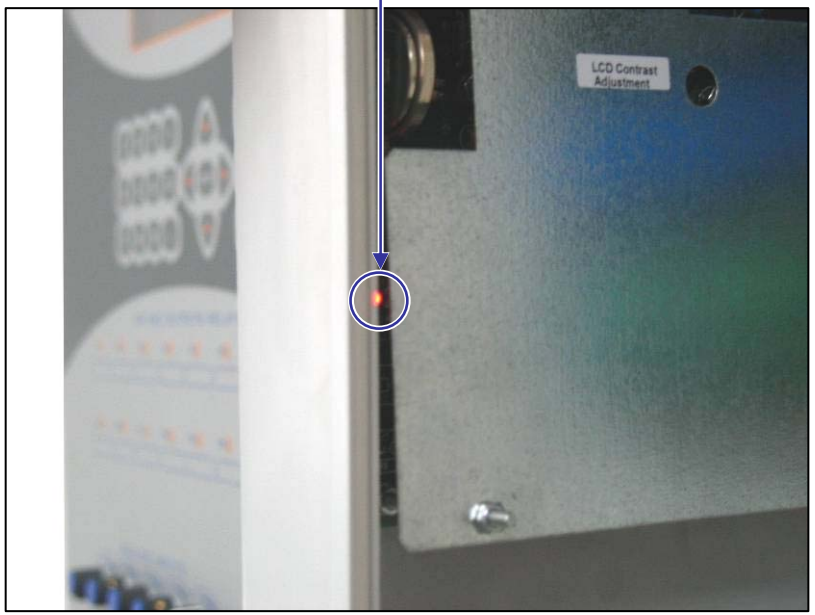
ENSURE

Display is OK

4

ENSURE

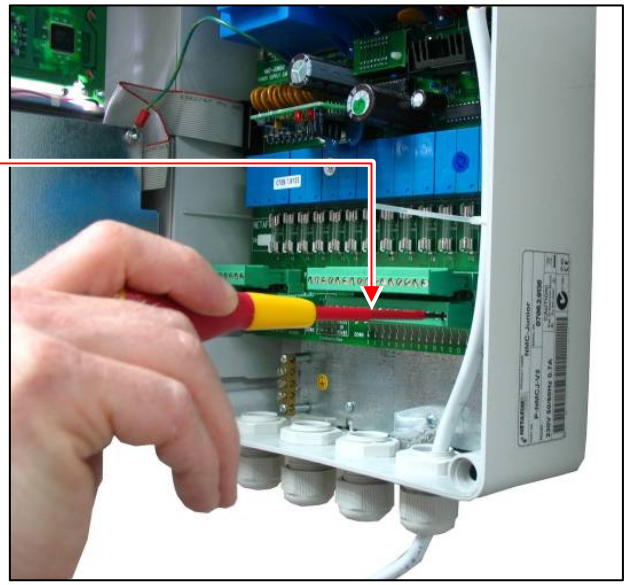
CPU led is blinking



5

SCREW

Final high and low terminals of output card



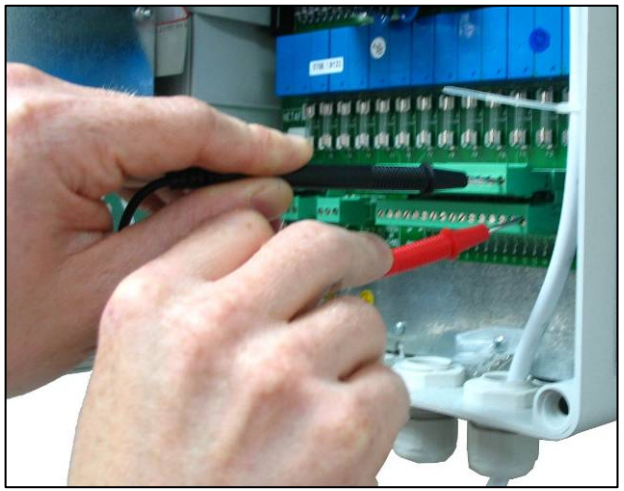
REPEAT

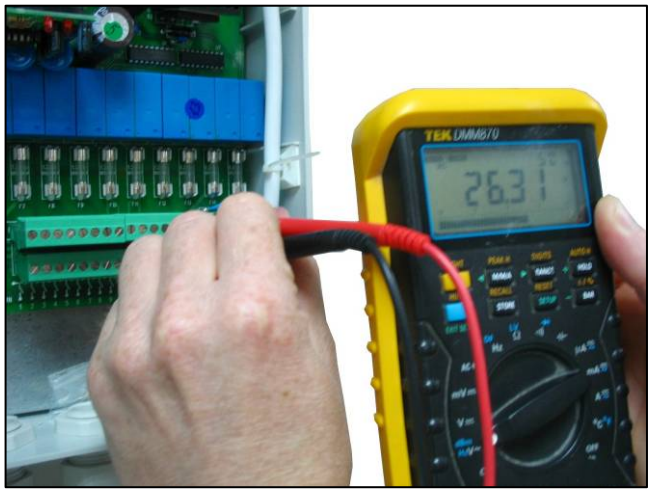
Electrical test with Multimeter

6

ENSURE

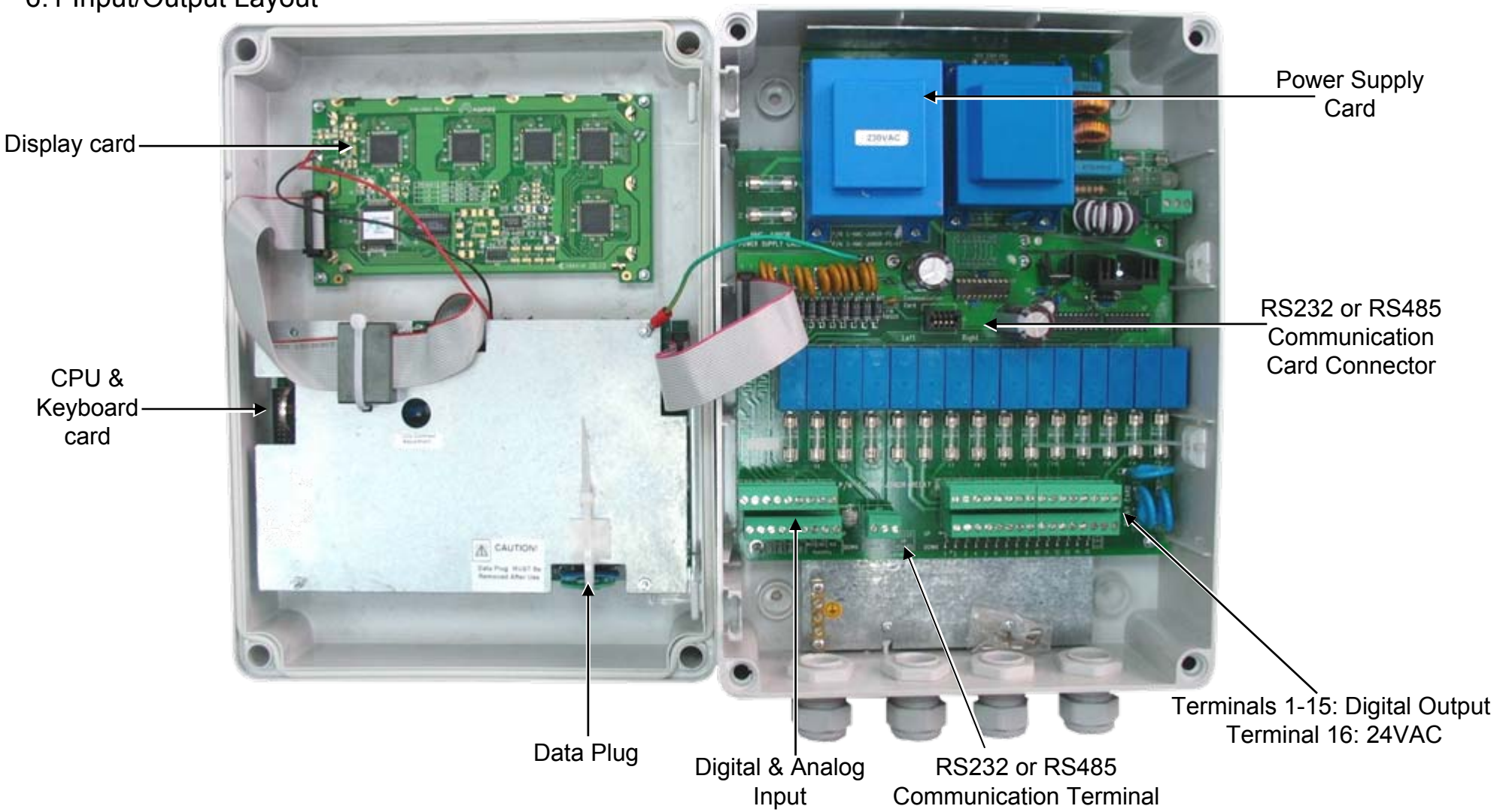
Result:
24VAC± 10%





6. Electrical Installation

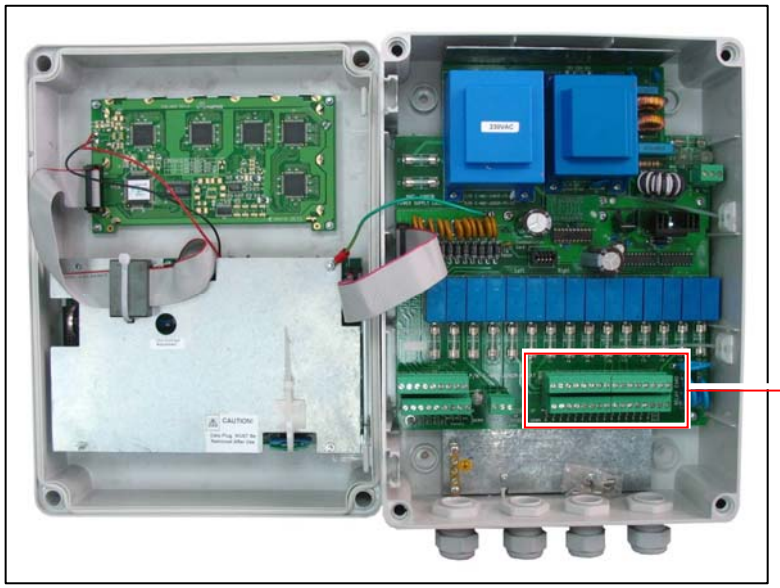
6.1 Input/Output Layout



6.2 Output Terminals

6.2.1 Wiring

24 VAC as shown



1

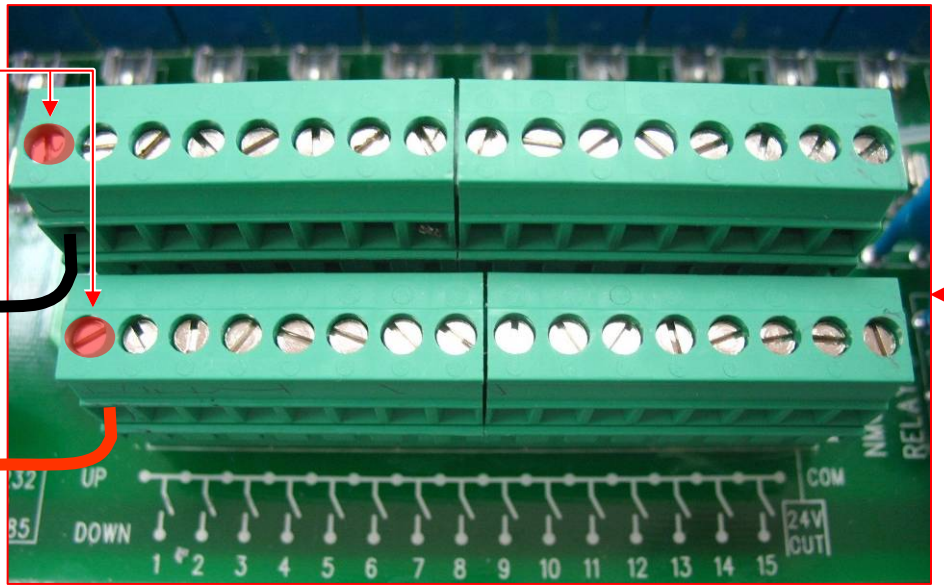
Relevant screws

2

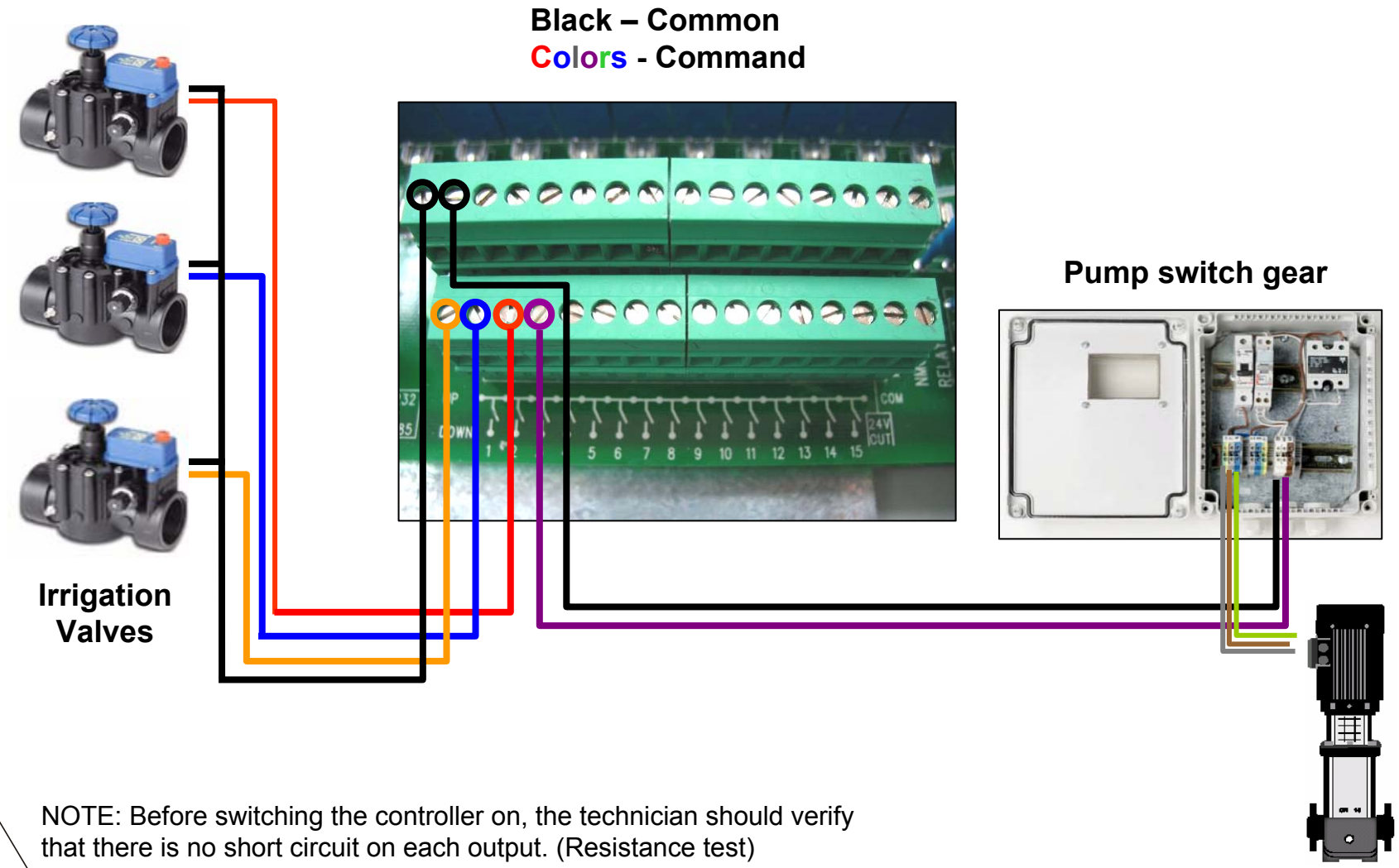
-Common wires on top row
-Command wires on lower row

3

Until wires are secure



6.2.2 Output Wiring Example



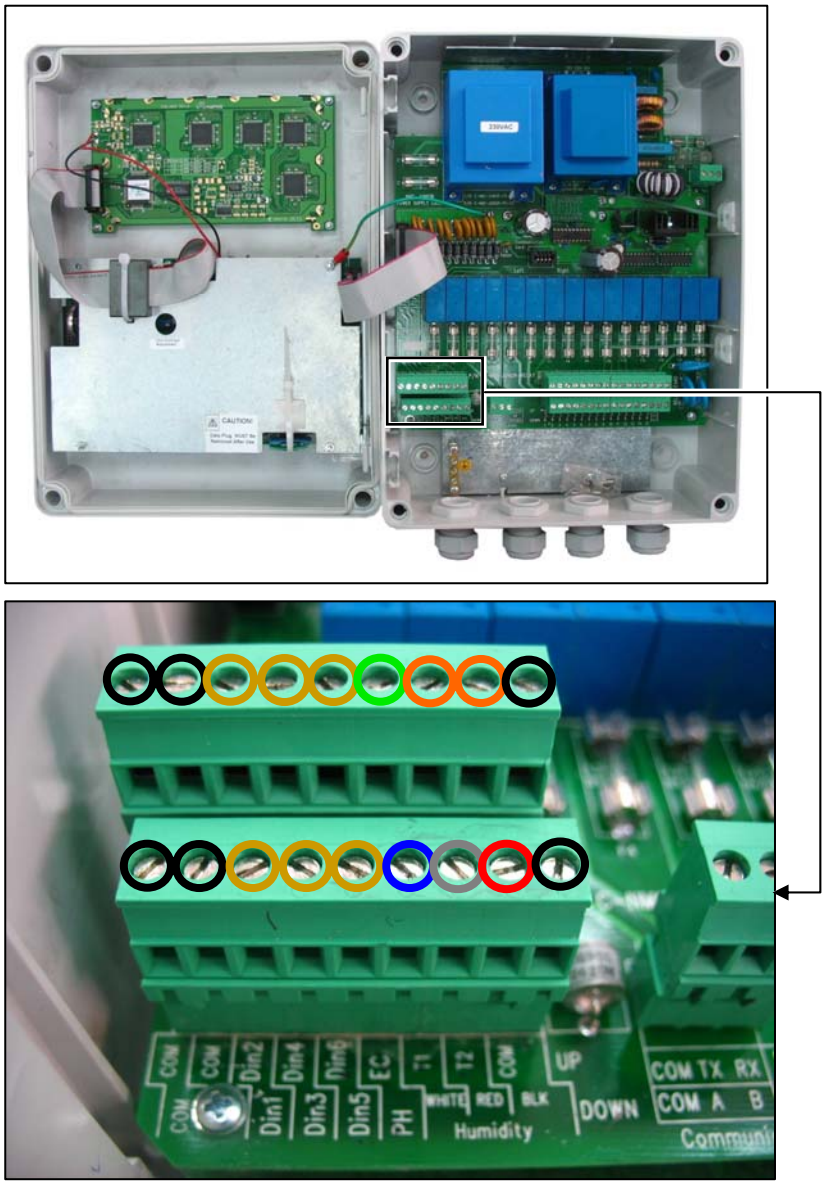
NOTE: Before switching the controller on, the technician should verify that there is no short circuit on each output. (Resistance test)

6.3 Input Terminals

6.3.1 Wiring

CONNECT Input terminals

- **Common**
- **Digital input #1 to #6**
- **EC sensor input**
- **PH sensor input**
- **Temperature sensors input**
- **Humidity sensors input**
- **+12 VDC**



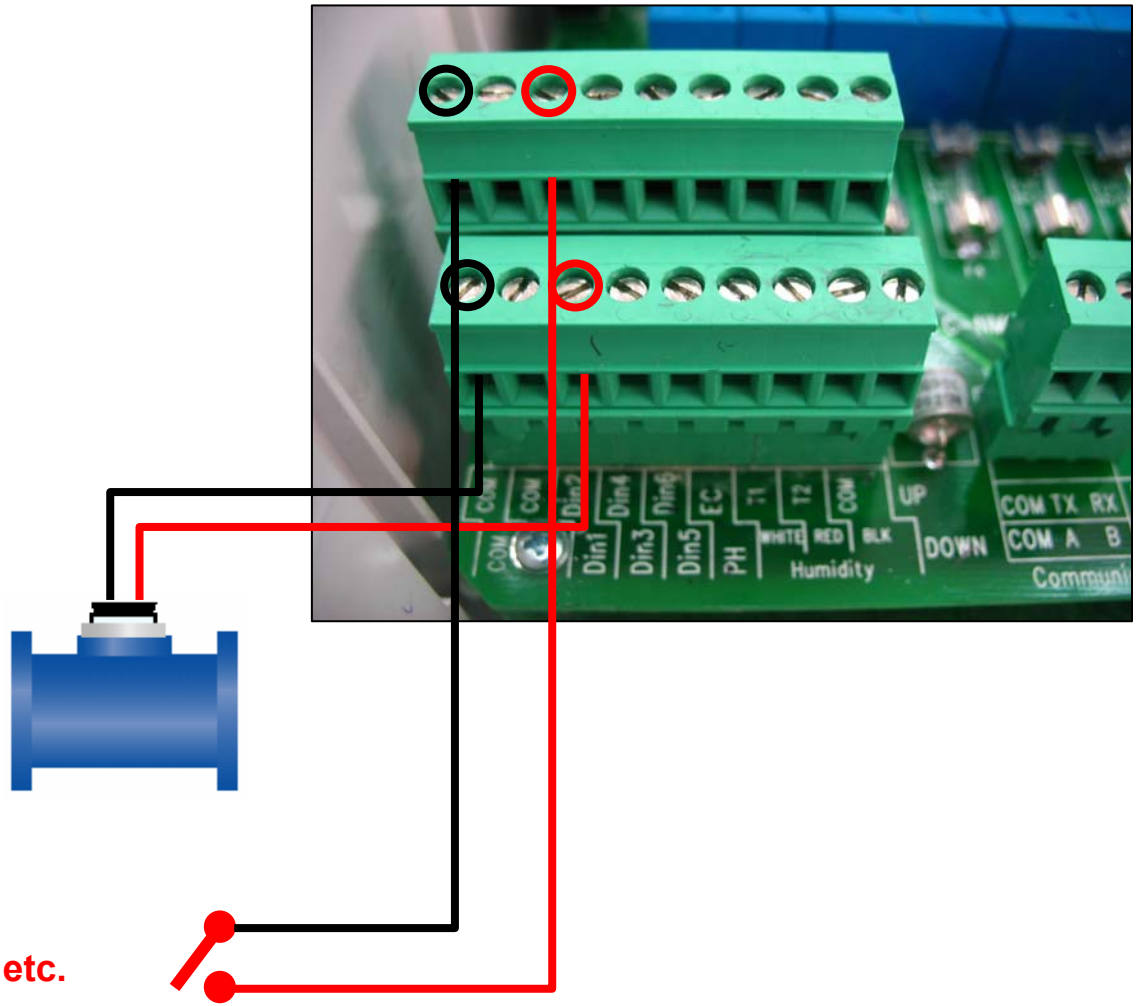
NOTE: Before switching the controller on, the technician should verify that there is no short circuit on each input. (Resistance test)

6.3.2 Digital Input Examples

Example A-

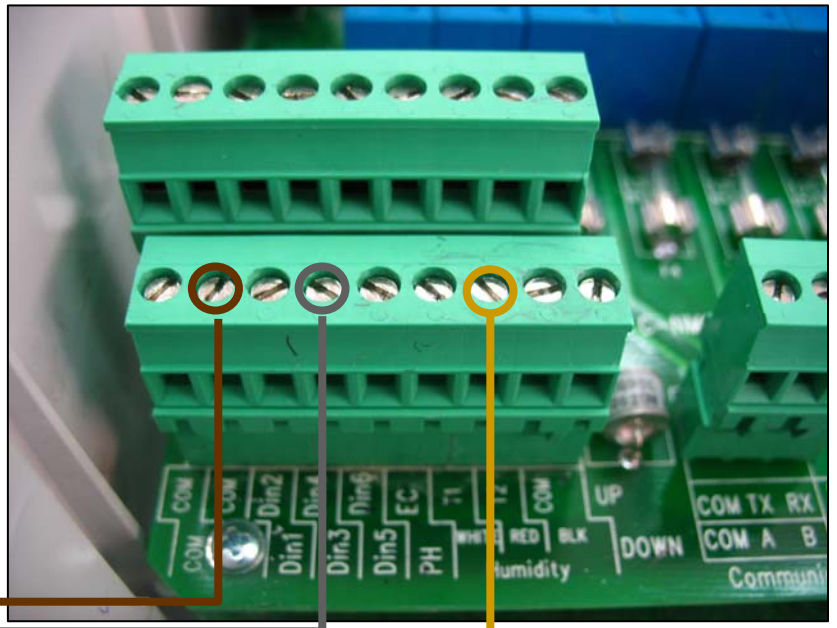
Digital input 1: Water meter, Fertilizer meter

Digital input 2: Float switch, Pressure switch

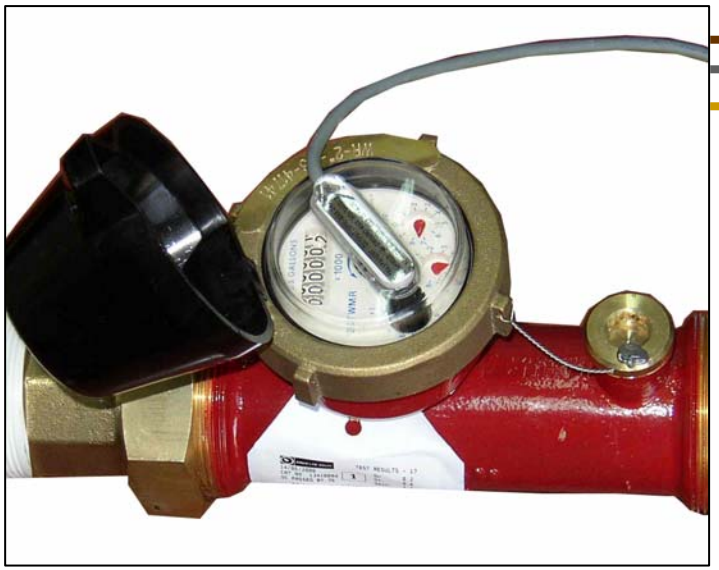


Example B-

Digital input 3: Water Meter with Photo-Diode Output

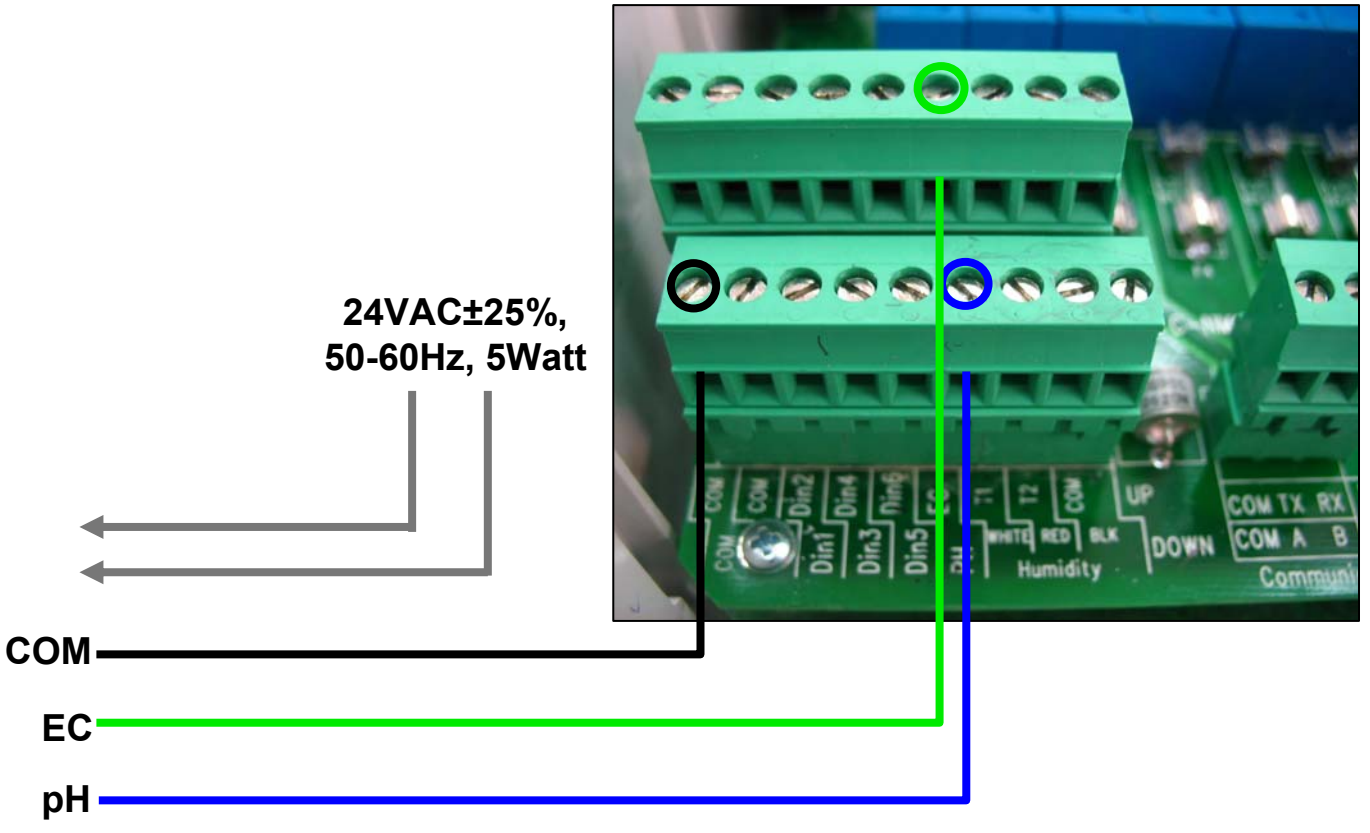


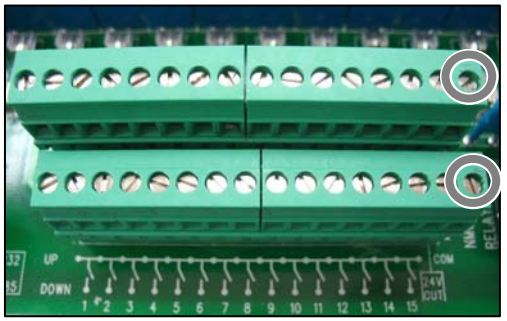
Water Meter with Photo- Diode Output



500Ω Resistor

Example B-
EC / pH sensors



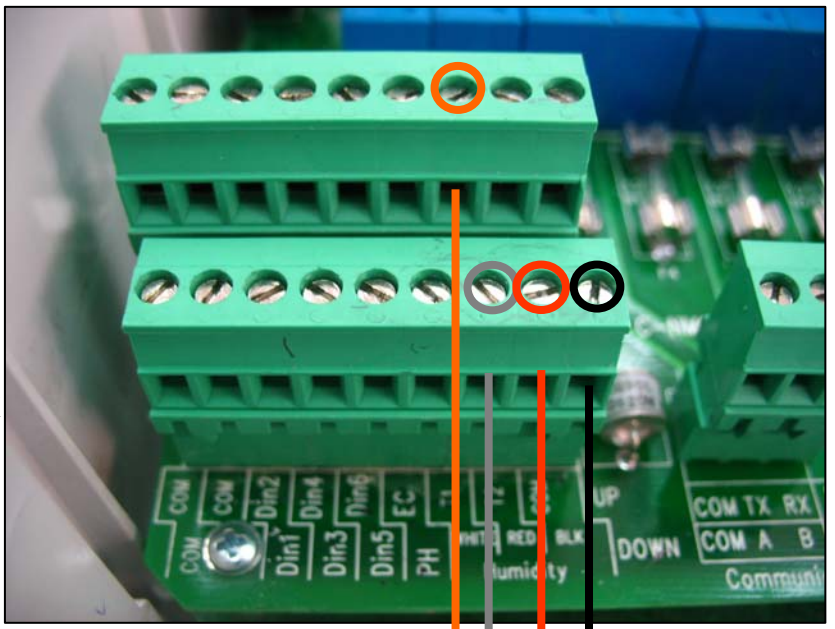


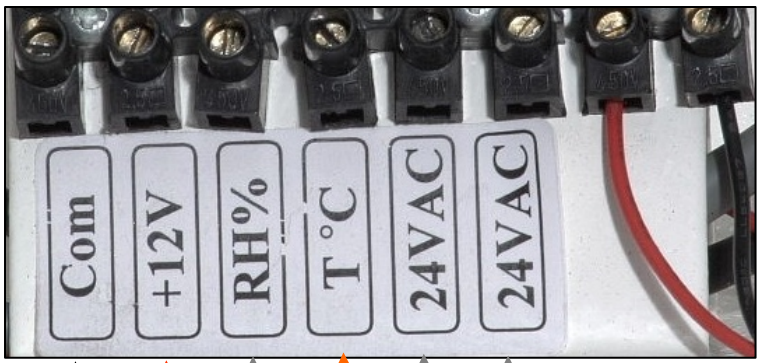
NOTE: Can wire EC/pH main power source to 24VAC on the output terminals.

Example C-
Temp/ Humidity sensors

Temp./Hum. Sensor

NOTE: Can wire 24VAC source in same way as on previous page.





Measuring Box Terminals

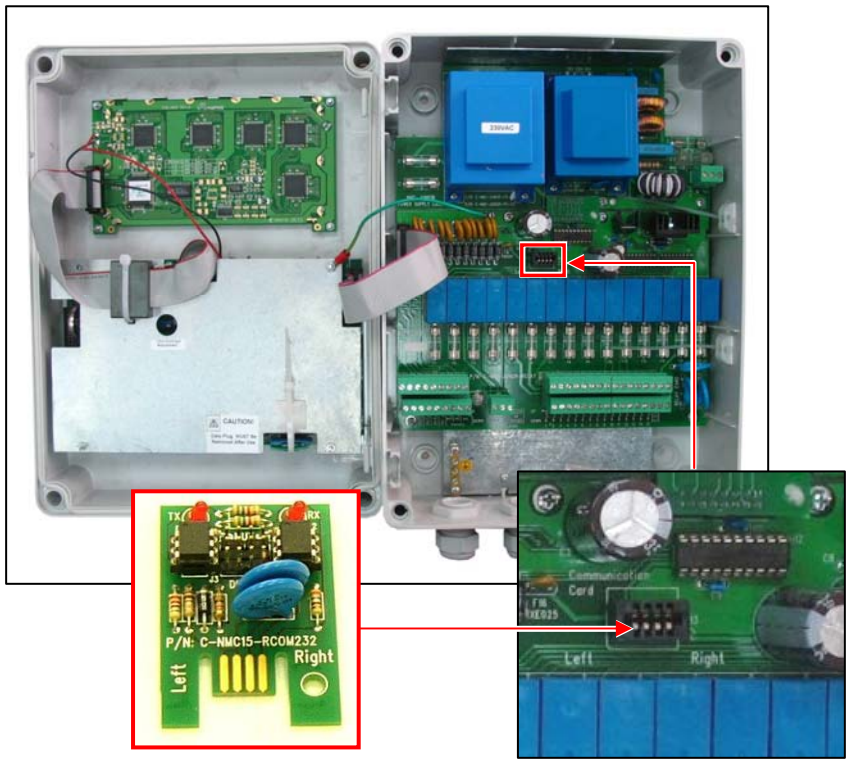
24VAC

6.4 PC and Inter-Controller Communication

6.4.1 Card Installation

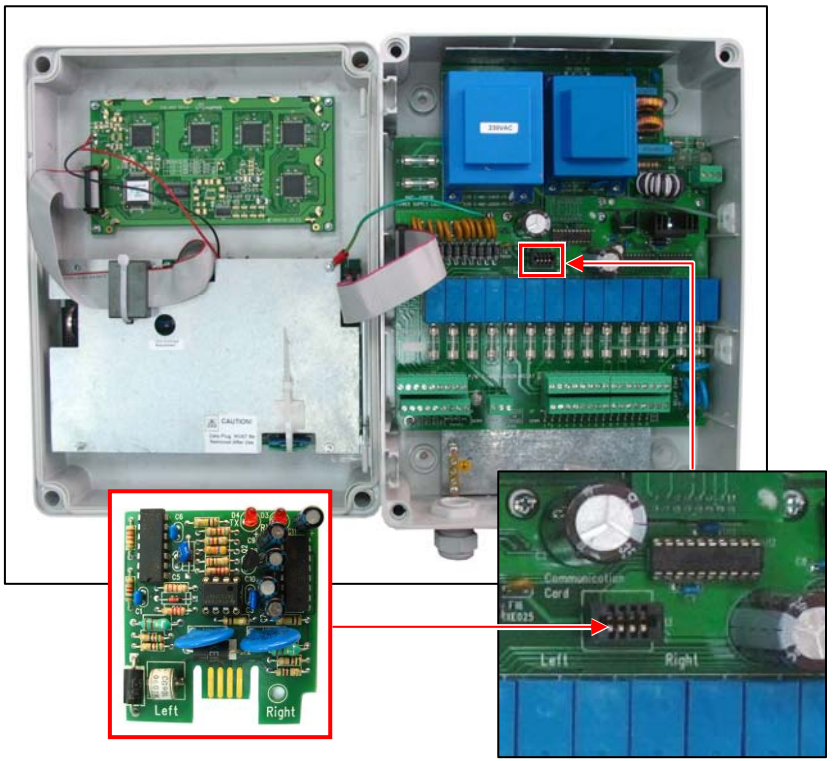
Insert RS-232 card

Option A: RS-232



Insert RS-485 card

Option B: RS-485

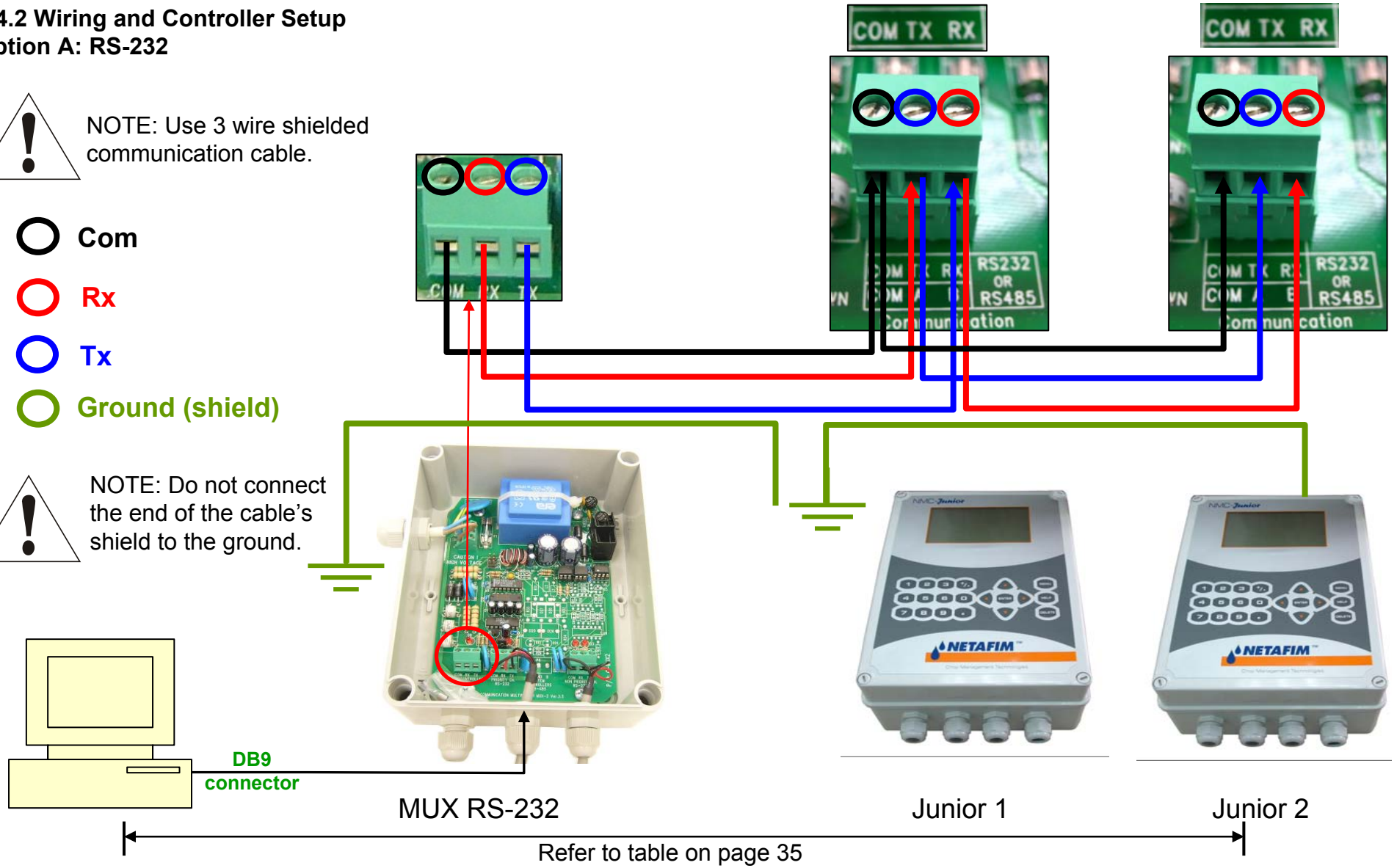


6.4.2 Wiring and Controller Setup
Option A: RS-232

NOTE: Use 3 wire shielded communication cable.

- **Com**
- **Rx**
- **Tx**
- **Ground (shield)**

NOTE: Do not connect the end of the cable's shield to the ground.



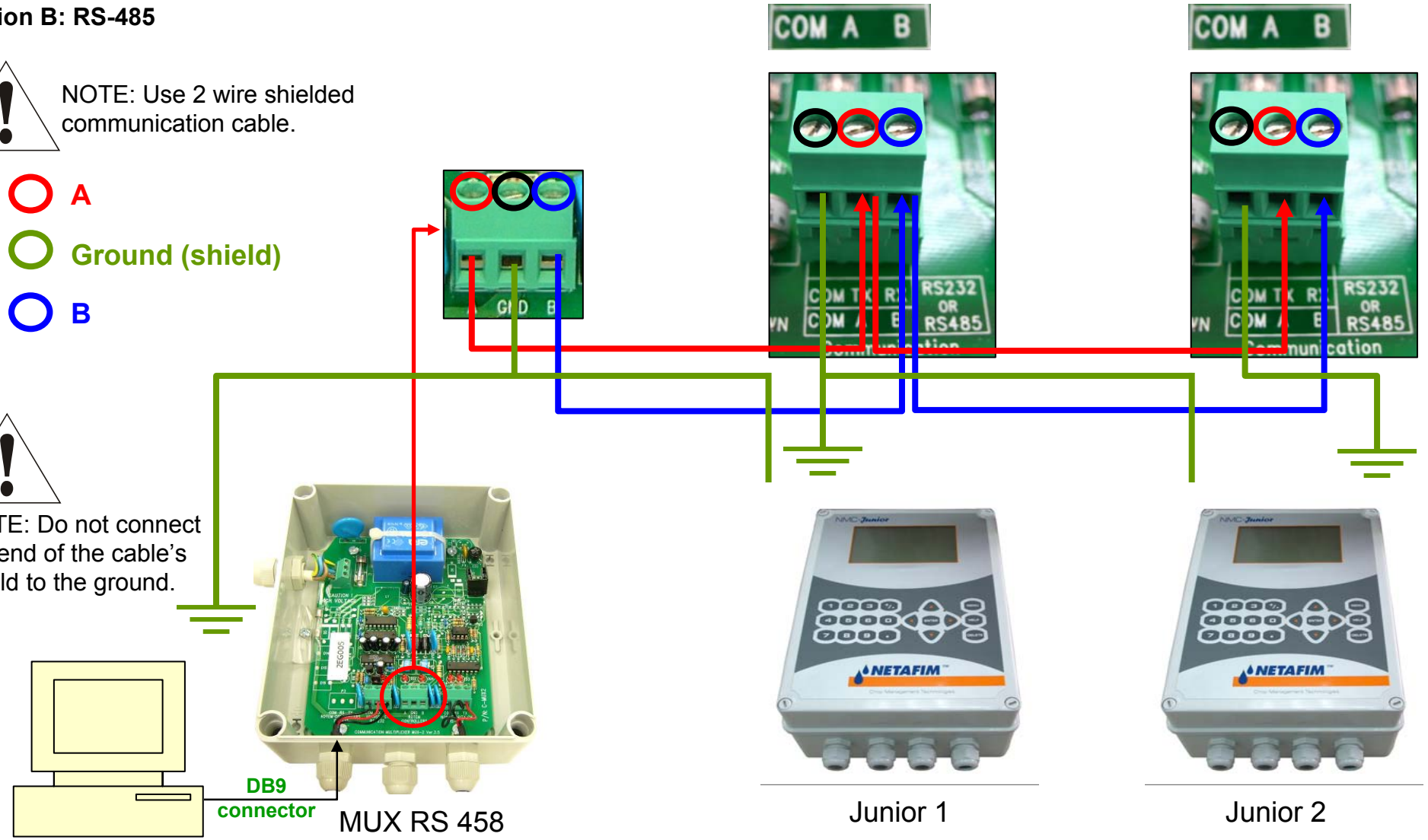
Refer to table on page 35

Option B: RS-485

NOTE: Use 2 wire shielded communication cable.

- A
- Ground (shield)
- B

NOTE: Do not connect the end of the cable's shield to the ground.



Refer to table on page 35

Communication Distance and Baud Rate

Baud Rate	1 Controller	10 Controllers
9600 BPS	2000 meter 1.25 mile	1200 meter 0.75 mile
4800 BPS	2500 meter 1.55 mile	1800 meter 1.12 mile
2400 BPS	3000 meter 1.86 mile	2400 meter 1.49 mile

NOTE: Baud rate is dependent on cable length and number of controllers.

7. Controller Set-Up

7.1 Start-up

1

RUN PROGRAM

Irrigation system and controller set-up and definition

2

SWITCH ON

Main power

SWITCH ON

Controller

PRESS

"MENU" on touch pad

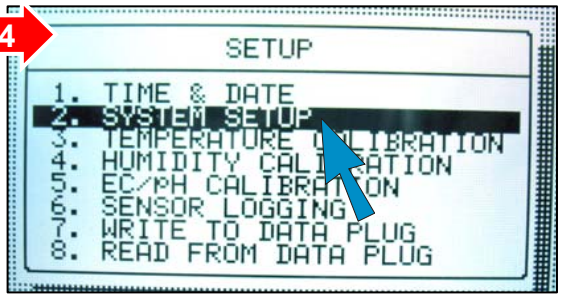
7.2 Language, Time and Date

SELECT

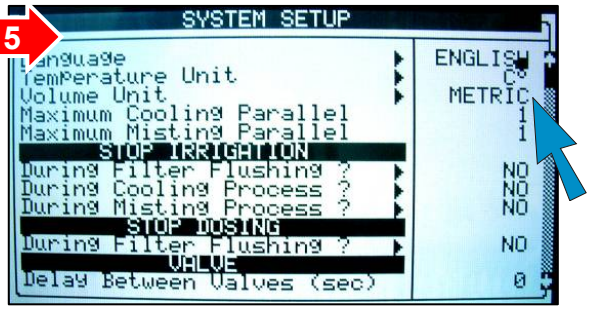
⇨ Select desired language
⇨ Select Temp. and Vol. unit (USA: Temp.=°F, Vol.=Gallon)
⇨ "1. Time & Date" in Setup menu and set

3

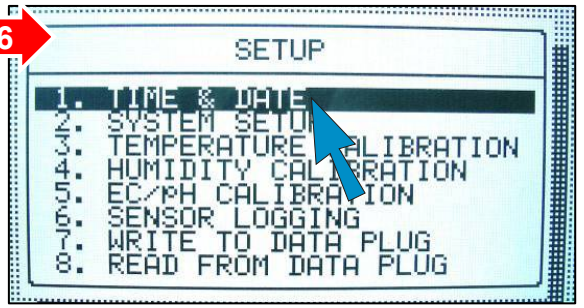
4



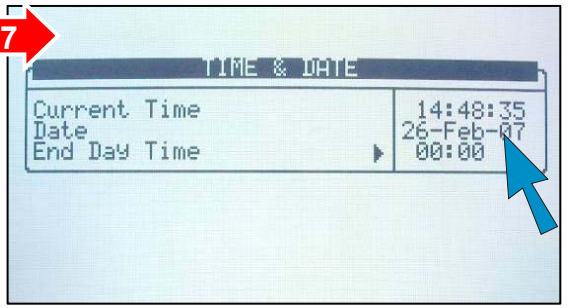
5



6



7



NOTE: In any given menu, you may use arrow and ENTER keys on touch pad to make a selection or press the corresponding number and ENTER on touch pad as a short cut.

7.3 Output Definition

SELECT

⇨ “8. Install” in main menu and press ENTER
⇨ “1. Device Layout” and press ENTER

1

ENSURE

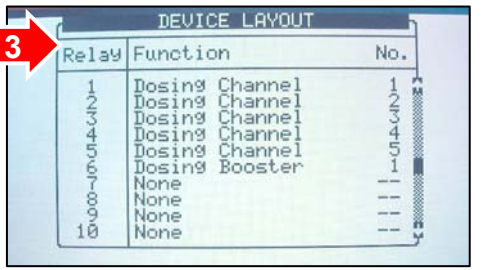
Technician writes an I/O list

2

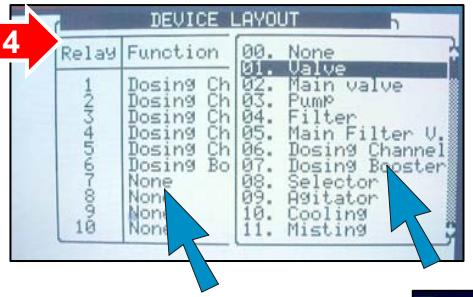
SELECT

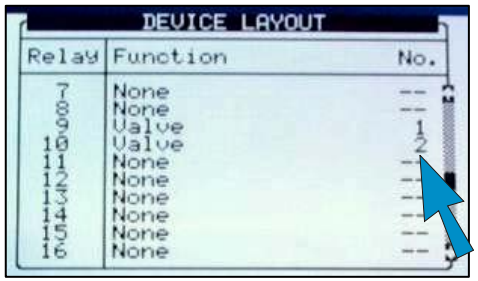
Define devices:
Ex: Valves 1 and 2,
Relays 3 and 4 as Output 3 and 4

3



4





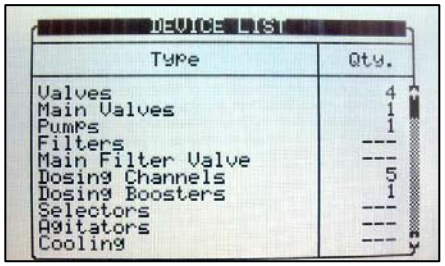
REPEAT

These step for every Output

5

VERIFY

“2. Device List” is read-only overview list of definitions for verification



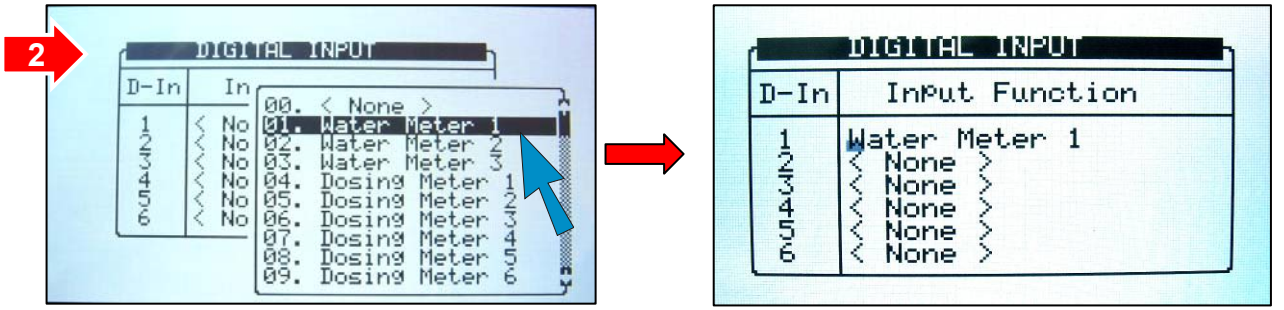
7.4 Digital Input Definition

SELECT

⇨ “3. Digital Input” in Installation menu
⇨ Input 1 set definition

REPEAT

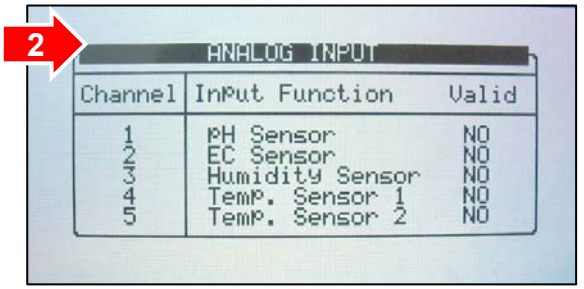
Step 2 for all Input definitions- **according to technician and equipment in field**

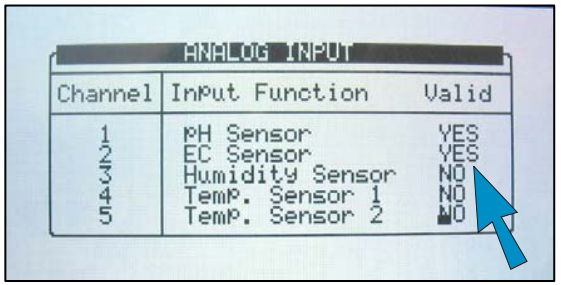


7.5 Analog Input Definition

SELECT

5. Analog Input in Installation menu





SELECT

Channel and enter “YES” for sensors according to terminal

REPEAT

Previous step for all other analog input sensors

8. Controller Test Procedure

8.1 Test Relays

RUN TEST

SELECT

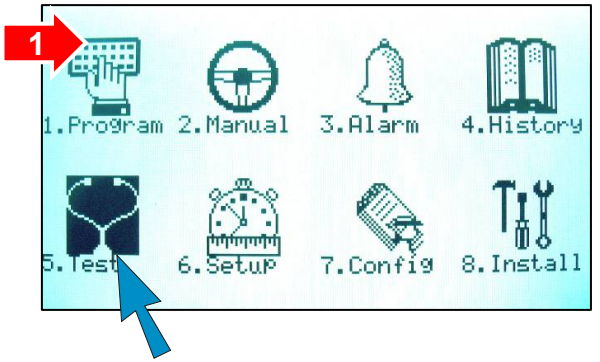
"5. Test" in Main Menu

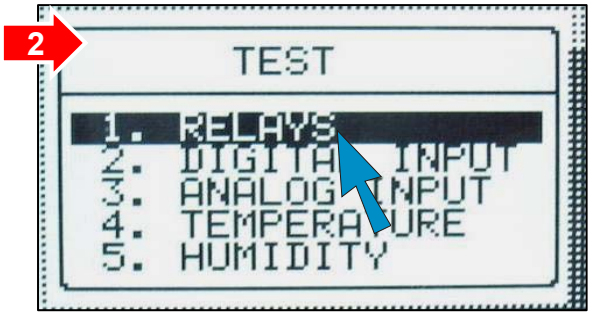
SELECT

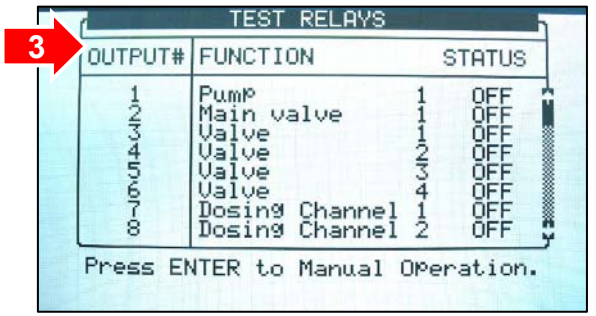
⇨ "1. Relays" to test output devices in the field (dry test)
⇨ Highlight status, press ENTER, "MAN" appears
⇨ To end process press ENTER again

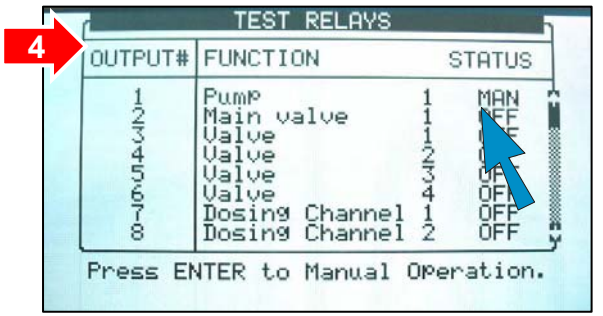
CHECK

For Irrigation valve test, send someone out in field with Walky-Talky to verify status



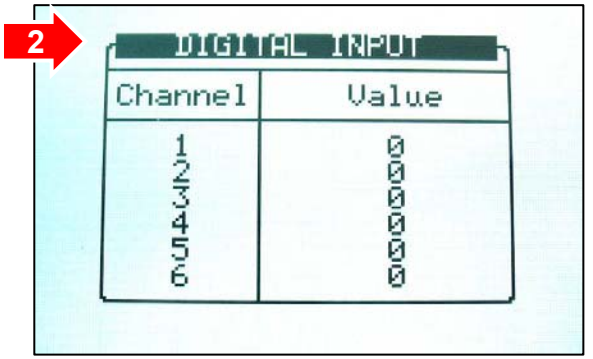






8.2 Digital Input Test

SELECT ⇨ “2. Digital Input” in Test menu



PERFORM Dry test- Get a pulse using magnet; attach magnet to get a pulse from the “read” of the cable

VERIFY ⇨ Water, fertilizer and any auxiliary meters: Count up 1-256
⇨ Delta pressure: 1= **ON**, 0= **OFF**

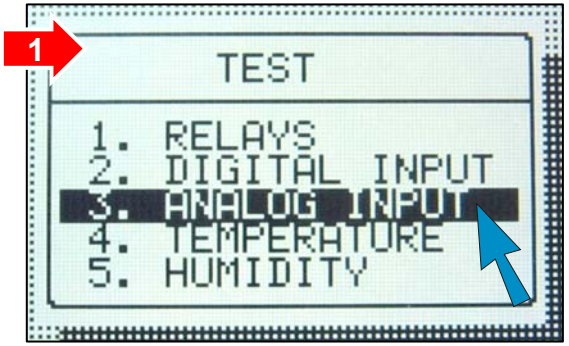
8.3 Analog Input Test

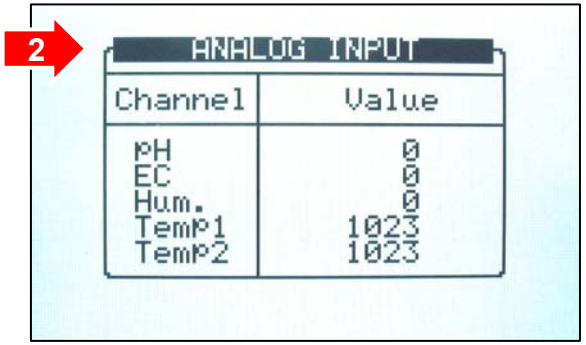
SELECT

"3. Analog Input" in Test menu
See table below

SELECT

"4. Temperature" or "5. Humidity"-
values will be displayed





Sensor type	Description
pH sensor	pH = 0 – A/D = 205
	pH = 7.0 – A/D = 615
	pH = 14.0 – A/D = 1023
EC sensor	EC = 0 – A/D = 205
	EC = 2.0 – A/D = 370
	EC = 10.0 – A/D = 1024
Humidity sensor	RH% = 0 – A/D = 0
	RH% = 50 – A/D = 308
	RH% = 100 – A/D = 620
Temp sensor	T°C = 0 – A/D = 768
	T°C = 25 – A/D = 489
	T°C = 50 – A/D = 250

9. System Configuration Procedure

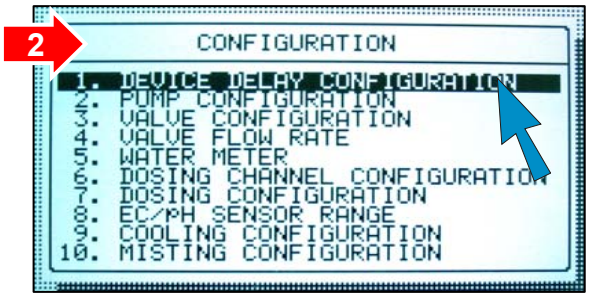
9.1 Device Delay Configuration

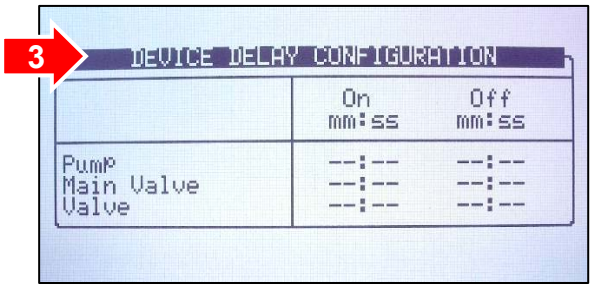
RUN PROGRAM

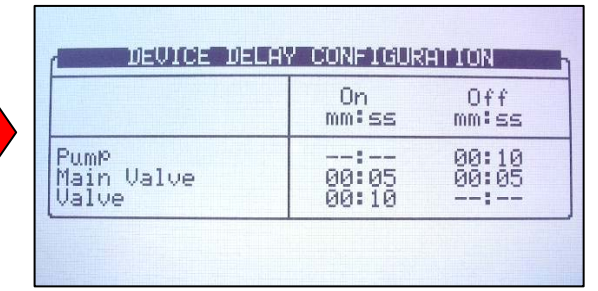
Irrigation system and controller configuration

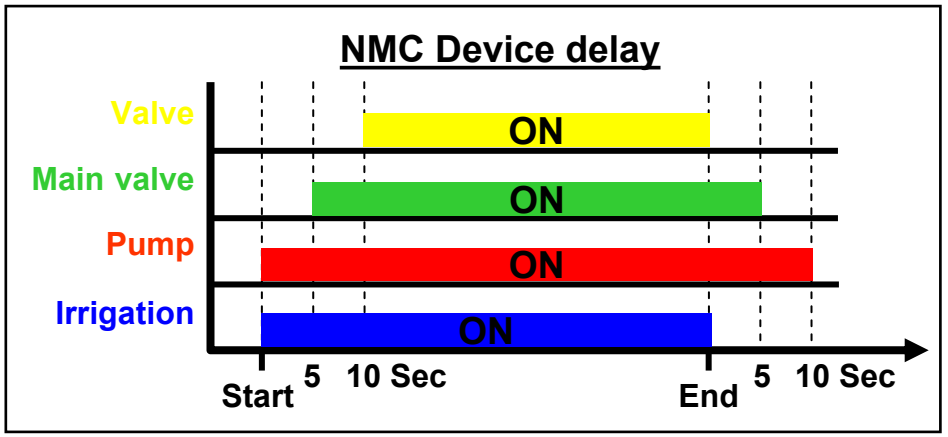
SELECT

⇨ “7. Config” in Main Menu
⇨ “1. Device Delay Configuration”
⇨ Enter delay values. See table below.







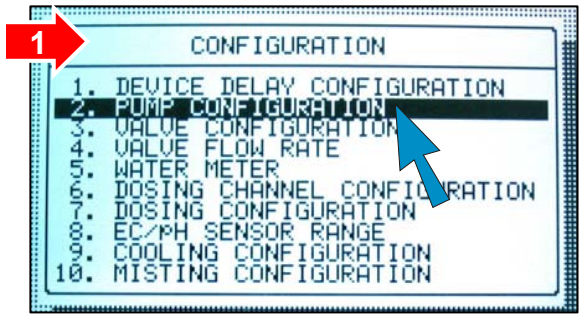


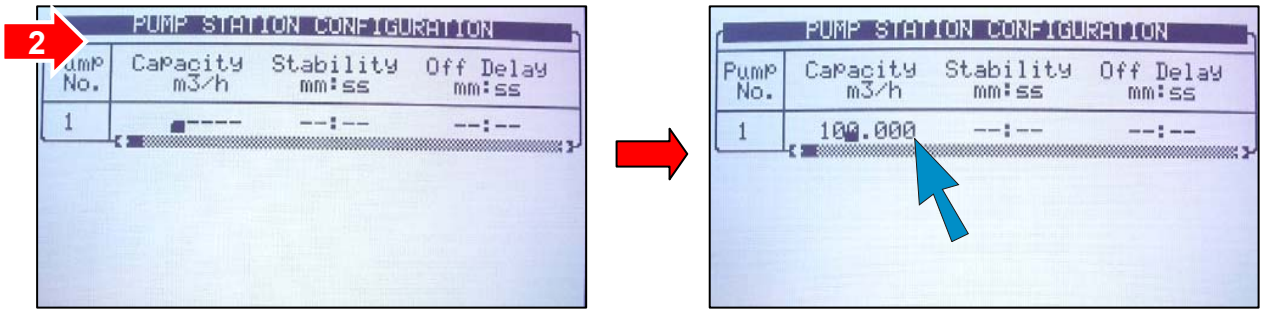
NOTE: Settings in the graph below are for example only.

9.2 Pump Station Configuration

SELECT

⇨ “2. Pump Station Configuration”
⇨ Define capacity of main pump (USA: Gallon/min.)



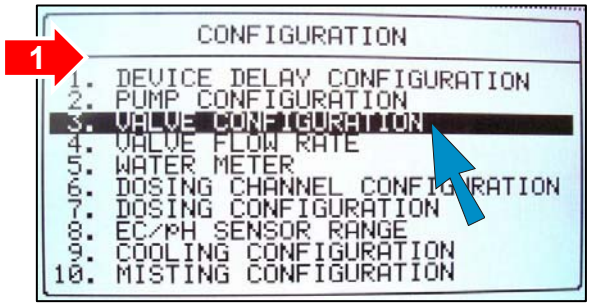


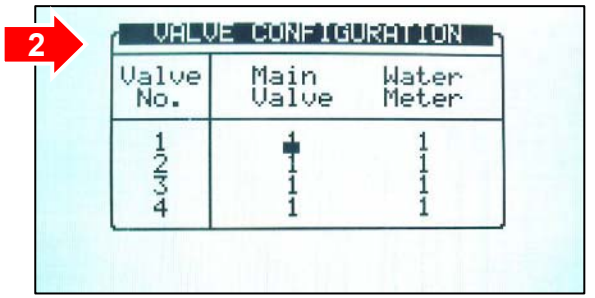
If there is more than 1 is being used, refer to *Controller Advanced Settings* chapter p.58

9.3 Valve Configuration

SELECT

⇨ "3. Valve Configuration"
⇨ Allocate pump, main valve and water meter (Note: If there is more than 1 pump, refer to NMC-Junior Advanced Settings chapter)

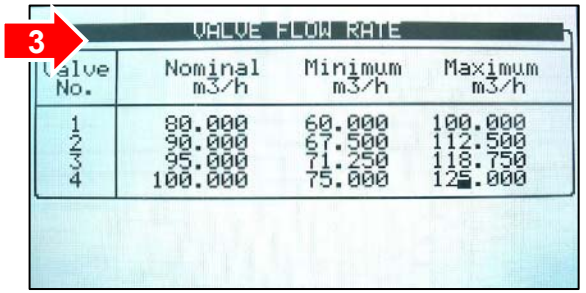


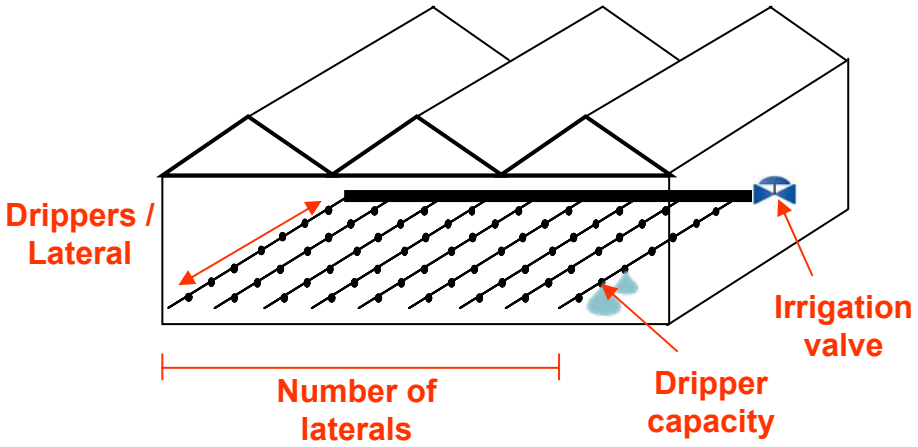


9.4 Valve Flow Rate

SELECT

⇨"4. Valve Flow Rate" (USA: Gallon/min.)
⇨ Define exact flow consumption of every valve: Technician must calculate formula:
[Drippers/lateral x dripper capacity (liters/hr) x # of laterals/valve**]** ÷ 1000 = *nominal flow of valve (m³/hr)*
⇨ Set Min./Max. flow rate limits per valve for alarm (already defined as 25% by default)



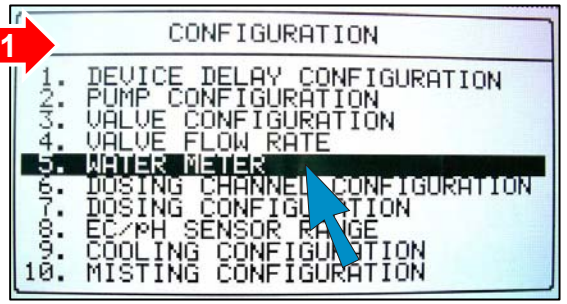


9.5 Water Meter

SELECT

⇨ “5. Water Meter”
⇨ Define resolution of water meter- See label on water meter as shown in Step 2 (USA: Gallon/min.)

1

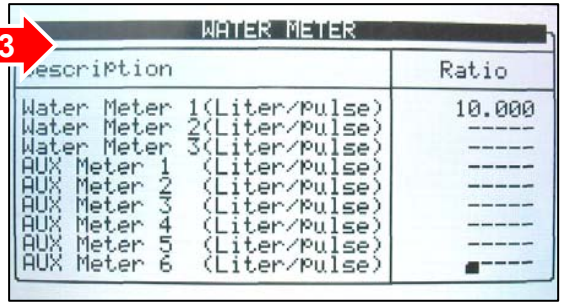


2

CHECK

If there is no label, check data sheet supplied with the meter.

3

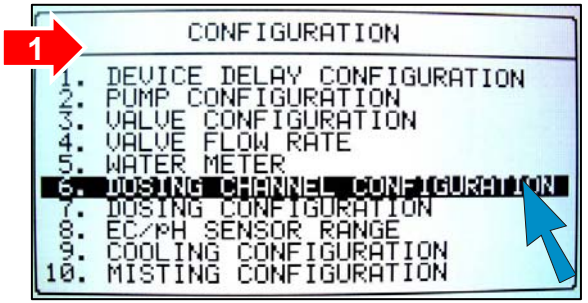


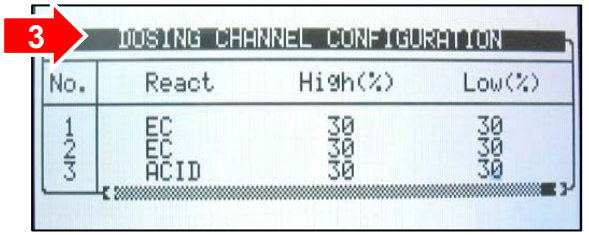
NOTE: If there is more than 1 water meter, refer to *Controller Advanced Settings* chapter on page 59.

9.6 Dosing Channel Configuration

SELECT

⇨ “6. Dosing Channel Configuration”
⇨ Define flow rate of every Venturi (USA: Gallon/hr.)
⇨ Define channels 1-2=EC
⇨ Define channel 3=Acid



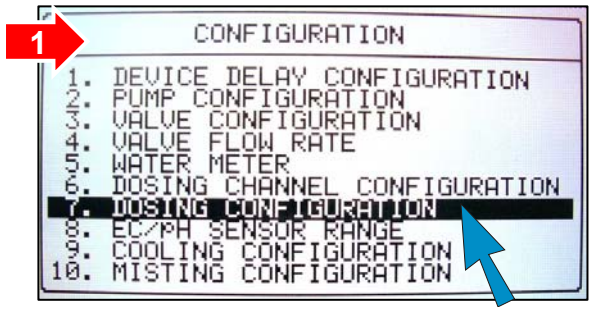


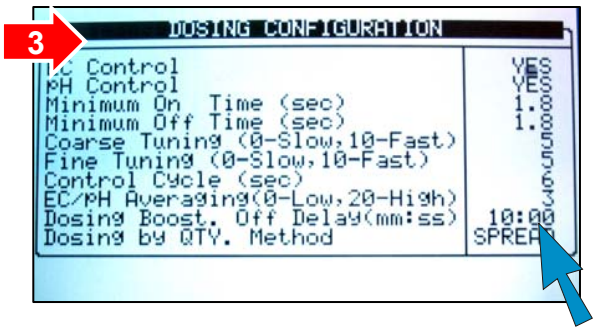
NOTE: In case that different dosing pump (electric) or setting (fertilizer meter), please refer to *Controller Advanced Settings* chapter on pages 60-61.

9.7 Dosing Configuration

SELECT

⇨ “7. Dosing Configuration”
⇨ EC and PH Control and Alarms to “Yes”
⇨ Set Min. On Time to 0.8≤2.0 seconds
⇨ Set Min. Off Time to 0.8≤2.0 seconds
⇨ To set Control Cycle, run system and measure time in seconds it takes to see reaction of EC/PH meter
⇨ Set dosing Booster Off Delay to 10 seconds (Time booster continues running after dosing process)

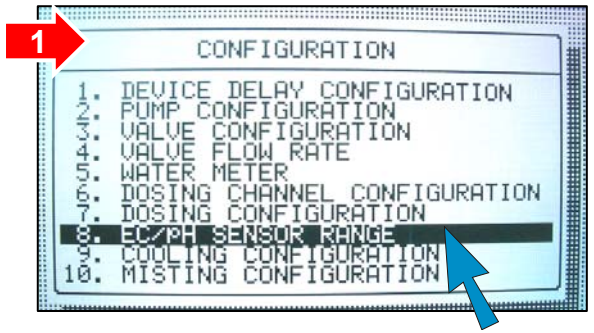


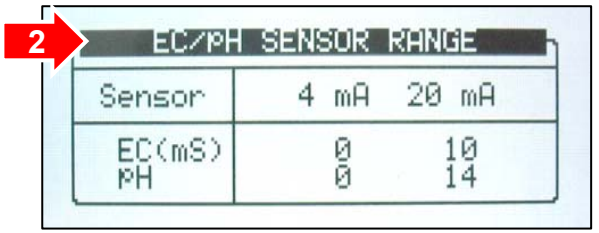


NOTE: For different dosing settings, please refer to *Controller Advanced Settings* chapter on page 62.

9.8 EC/PH Sensor Range

⇨ “12. EC/PH Sensor Range”
⇨ Leave as is

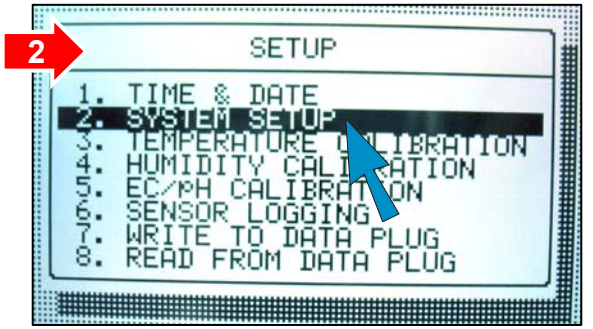




9.9 History Resolution

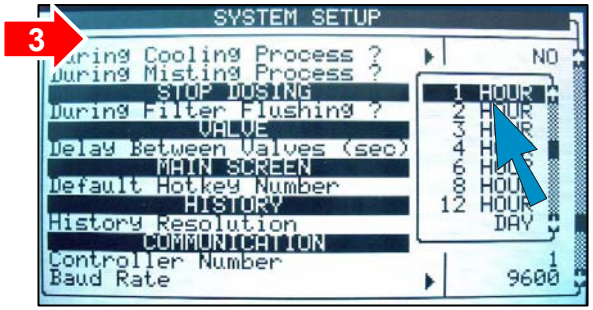
SELECT

⇨ Program how often computer should collect sensor data (keep in mind that lower resolution fill the memory in short period and will overwrite the old data)



SELECT

Controller number (in case of multiple controllers in the network, name each controller with a different number)



SELECT

Communication baud rate between controllers and PC

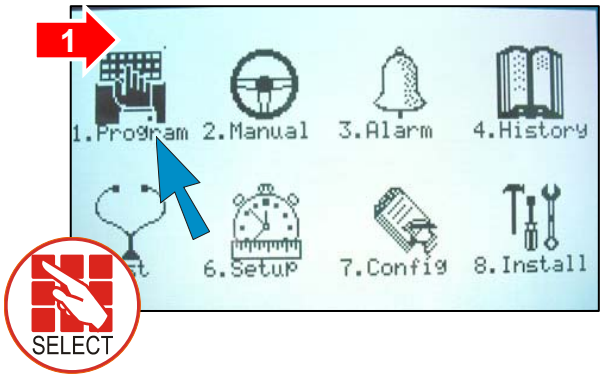
NOTE: For more details on system setup, please refer to *Controller Advanced Settings* chapter on page 63-65.

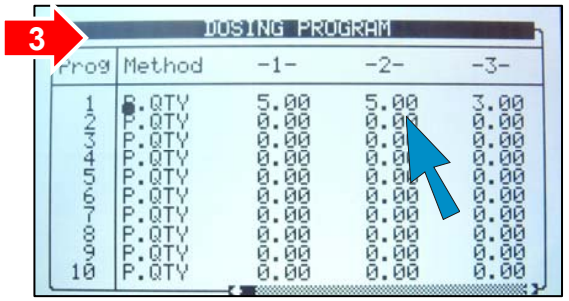
9.10 System Nutrigation™ Check

EC/PH is on target

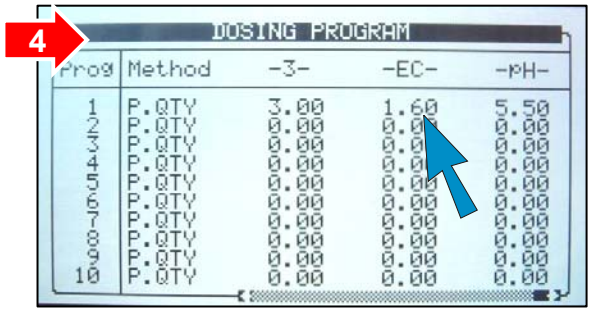
ENSURE

Know limits of irrigation system. Calculate max. allowed injection: (Dosing channel suction flow ÷ average flow rate from field) X 0.8 = Max. injection quantity (lit/m³, USA: Gallon/1000 gallon.)





Enter desired amount of fertilizer to inject per dosing channel in l/m³ (USA: Gallon/1000 gallon)



Enter desired target EC/PH levels

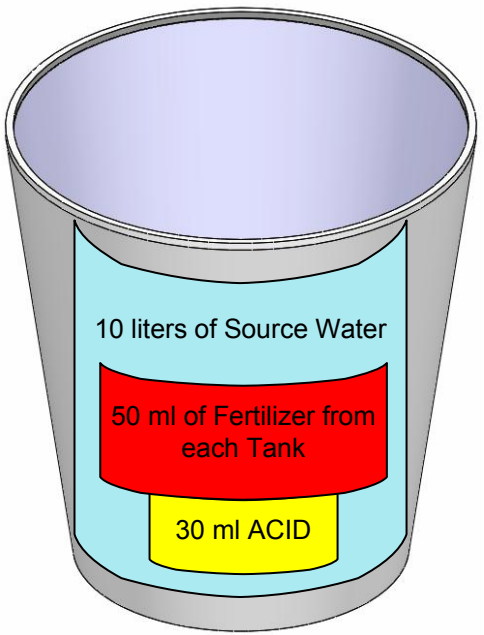
9.10.1 Simulation

ATTENTION

Use protective equipment, gloves and goggles when handling fertilizers, acid and other chemicals!

PERFORM

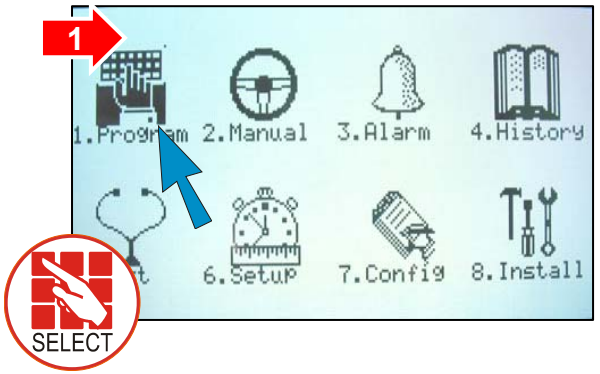
⇨10 liters of water in bucket
⇨ Inject 50 ml of fertilizer from each tank
⇨ Inject 30 ml of acid
⇨ Mix until acid and fertilizer is dissolved

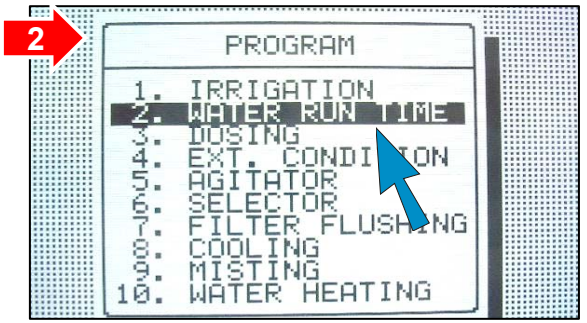


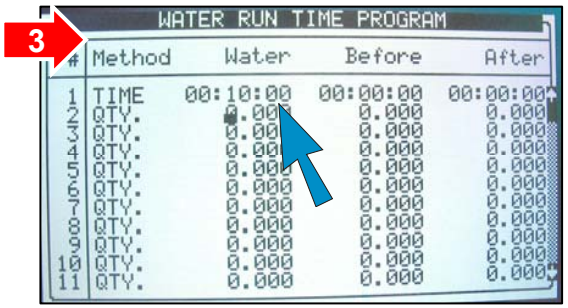
CHECK

⇨ EC and pH levels.
⇨ Results should be relatively close to desired target.
⇨ Deviation of ≤ 0.5 from target is allowed.

9.10.2 Water Run Time

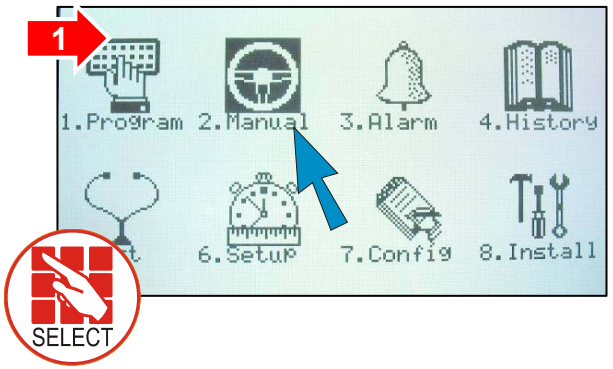


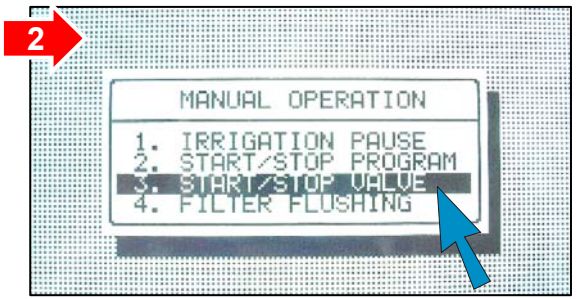


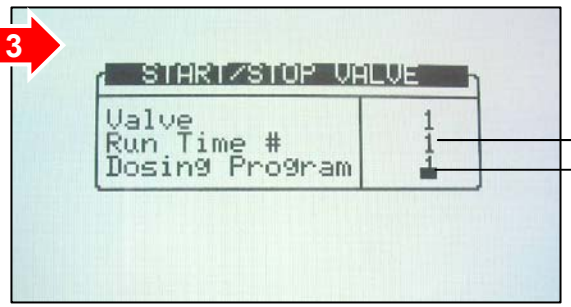


Enter water run time or quantity

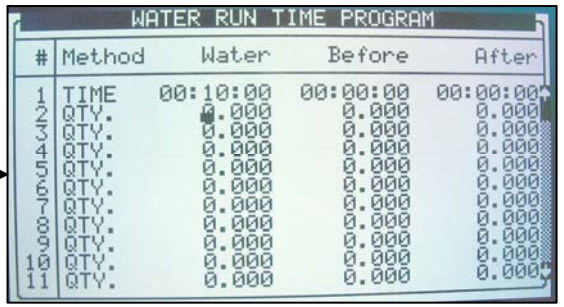
9.10.3 Start/Stop Valve

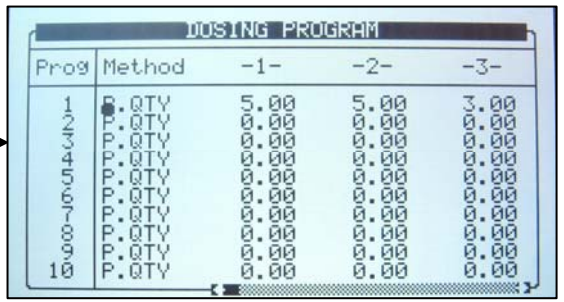






Run Time Program (1)
Dosing Program (1)

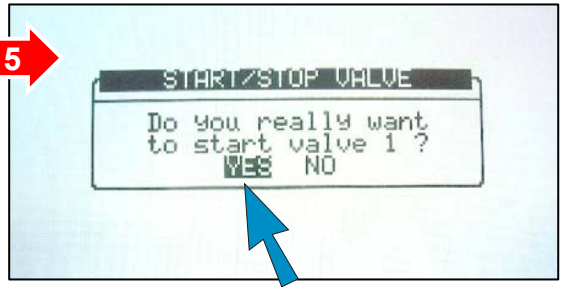




4

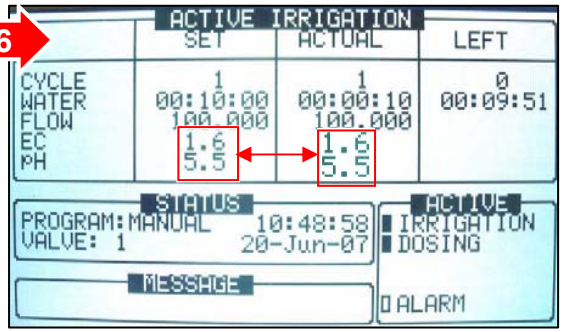
MENU

5

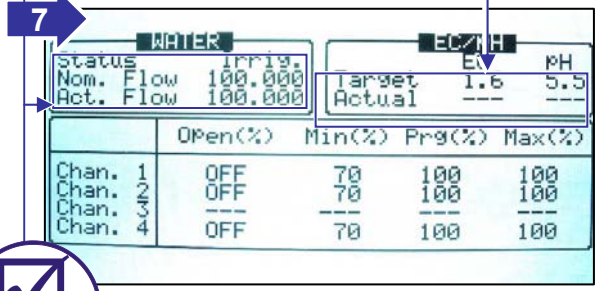


Active Irrigation Screen

6

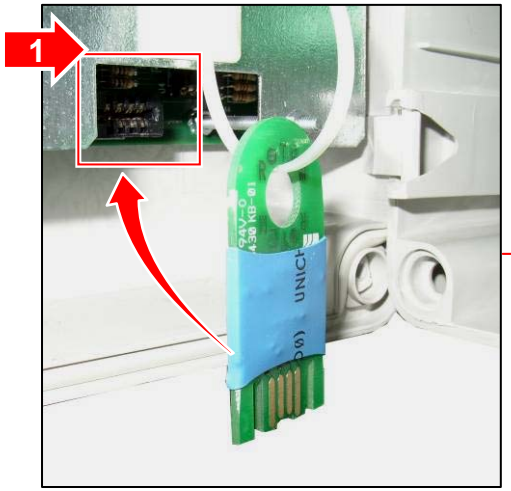


7



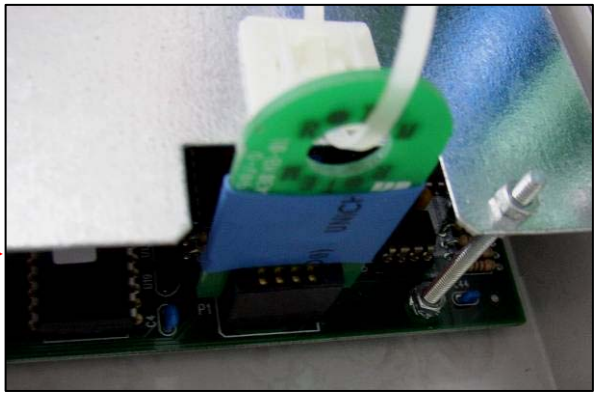
⇨ Difference between nominal and actual flow rate is ≤10%
⇨ Difference between target and actual EC\pH ≤0.2

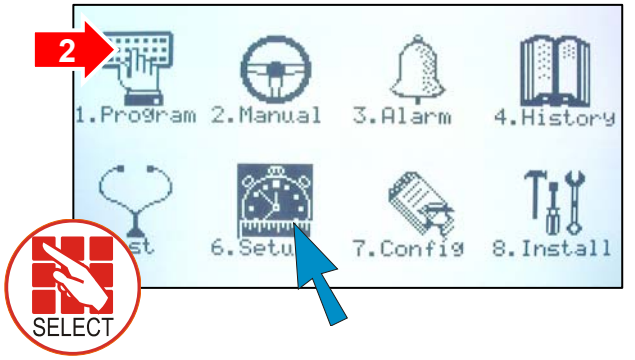
9.11 Data Plug



INSERT

Data plug into terminal

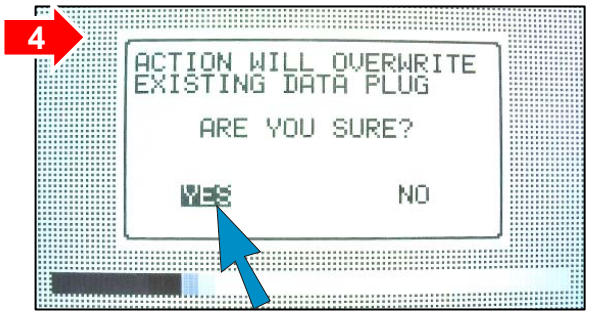




SELECT

ENSURE

System is idle and not in process before "Write to Data Plug"



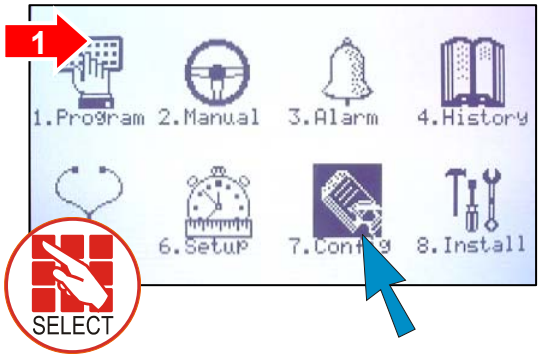
5

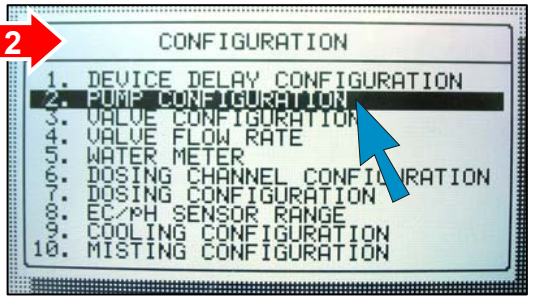
REMOVE

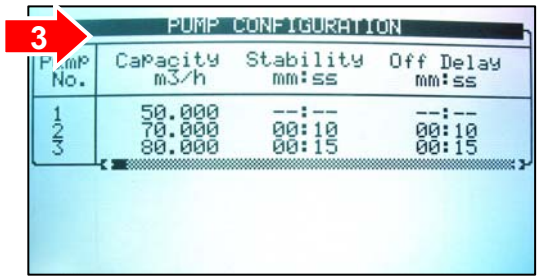
Data Plug from terminal at end of process

10. Controller Advanced Settings

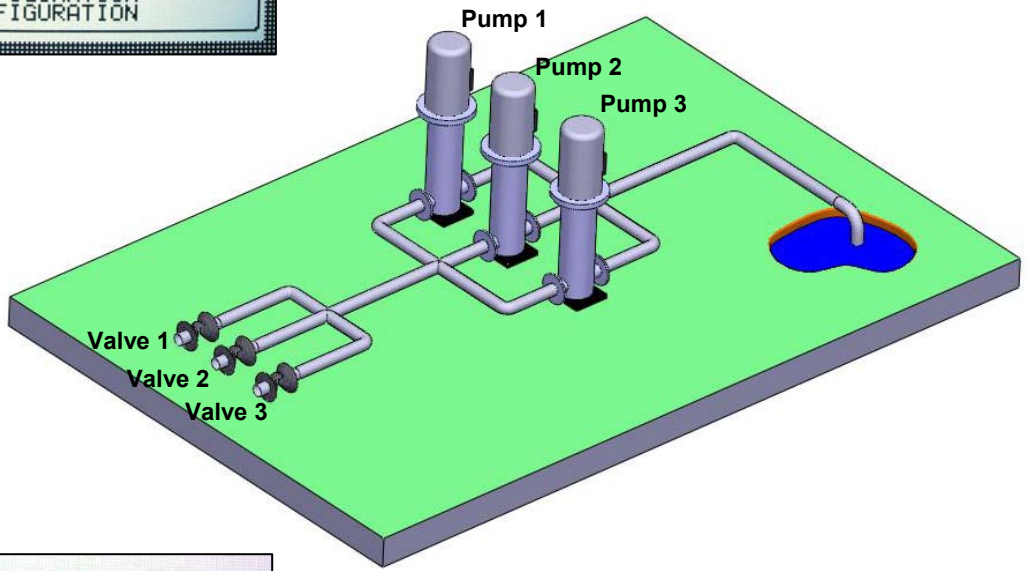
10.1 Pump Station Configuration

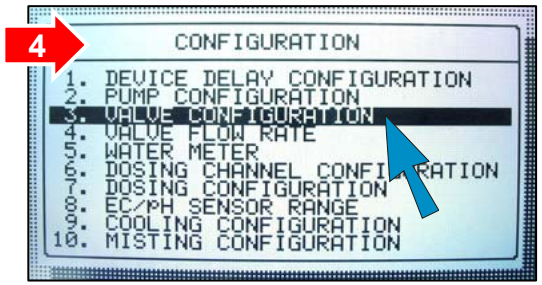


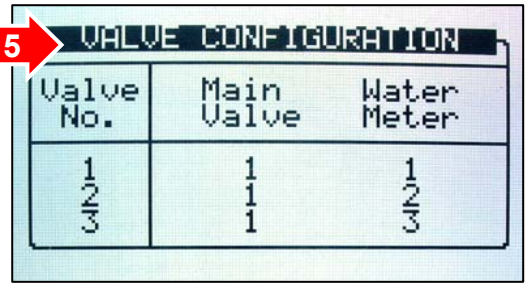




Stability: Time between each pump start
Off Delay: Time delay between switching each pump Off

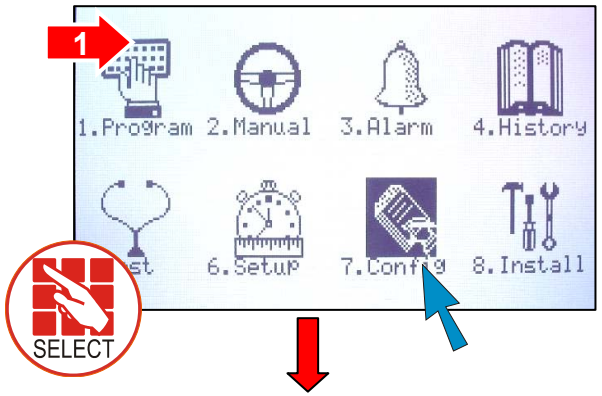


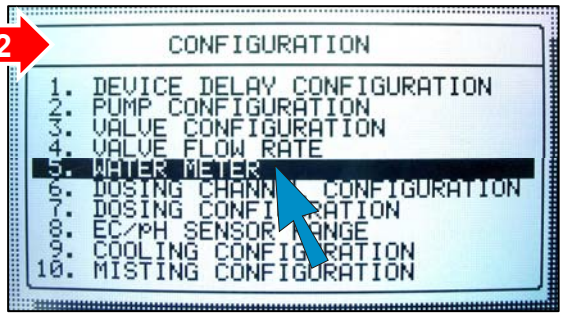


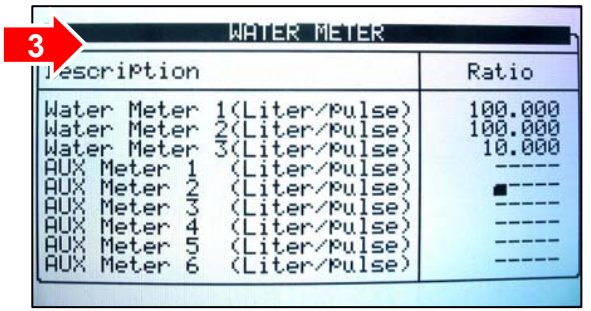


Valves 1, 2 & 3 allocated to Pumps 1, 2 & 3 (Pump station)
Pump station will be operated according to the valve/s nominal flow

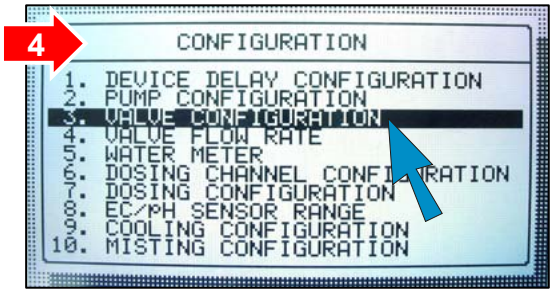
10.2 Multiple Water Meters

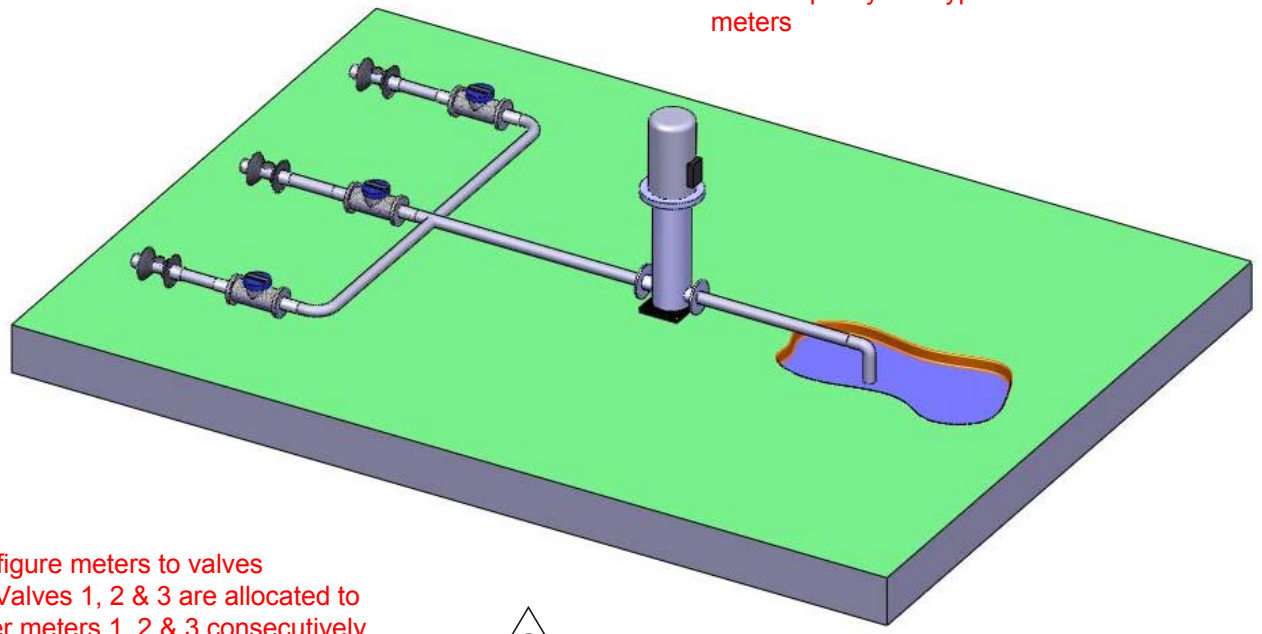


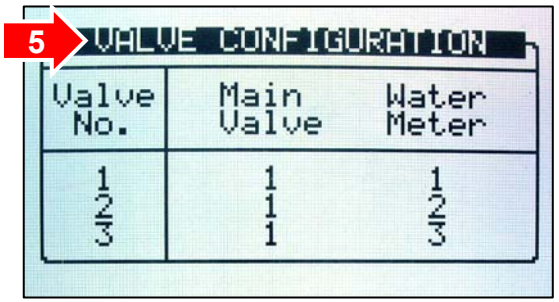




Enter capacity and type for additional water meters







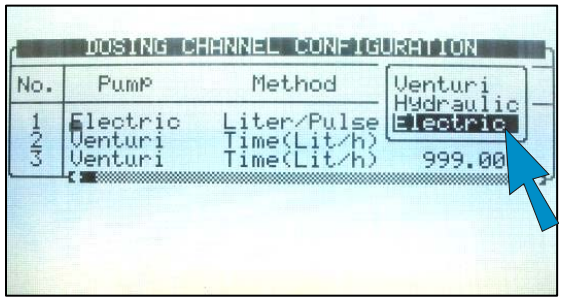
Configure meters to valves
Ex: Valves 1, 2 & 3 are allocated to water meters 1, 2 & 3 consecutively

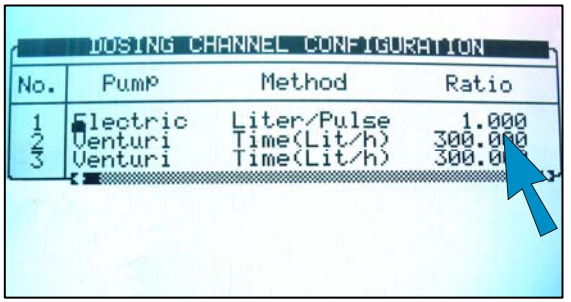
Only 1 water meter can be measured at a time.

10.3 Various Dosing Configurations

10.3.1 Method 1- Dosing Pump control = Fert. Meter
Dosing pump measurement= Fert. Meter
Dosing pump type= Venturi or Electric

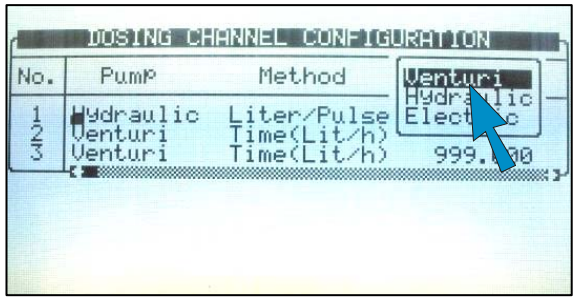
Inject fertilizer according to nominal capacity of pump/measure from fertilizer meter for verification purposes

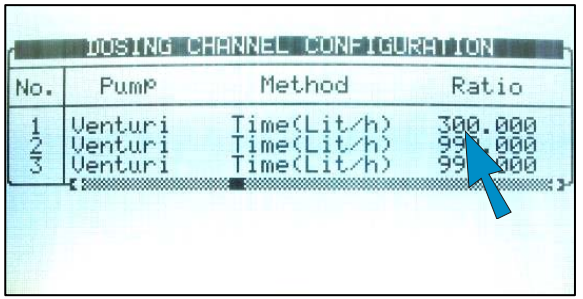




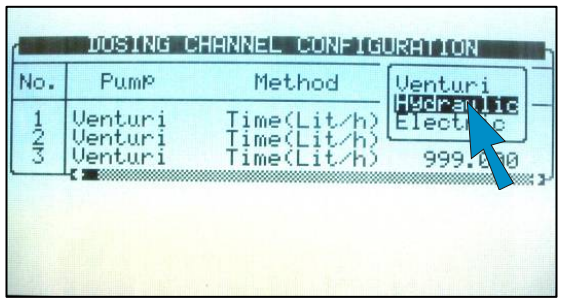
Set nominal pump capacity

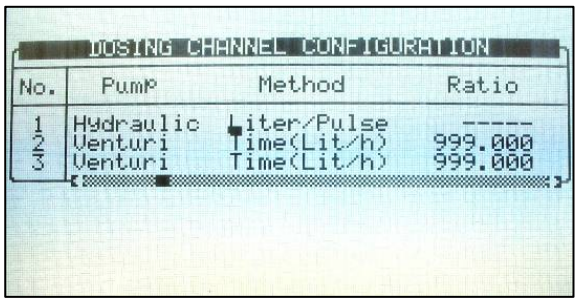
10.3.2 Method 2- Dosing Pump control =Nominal Flow Rate
Dosing pump measurement= Calculate dosing pump flow rate
Dosing pump type= Venturi or Electric

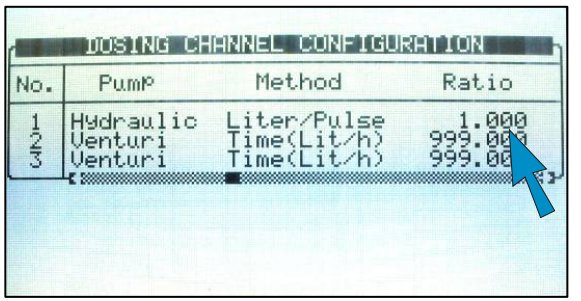




10.3.3 Method 3- Dosing Pump control =According Fert. meter pulses
(For quantitative injection only)
Dosing pump measurement= Fert. Meter
Dosing pump type= Hydraulic





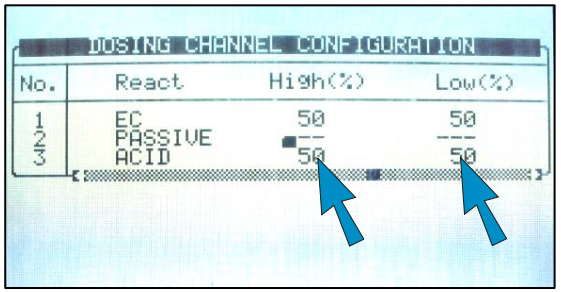


10.4 Dosing Configuration

Type of each channel configured by technician during installation process

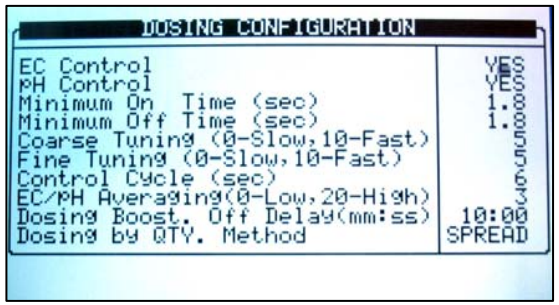
EC- channel influenced by EC levels
ACID- channel to inject acid to reduce pH levels
PASSIVE- no EC/pH influence
ALKALI- channel to increase pH levels

10.4.1 EC/pH Control- System will inject +/- depending on EC levels, auto-adjust to meet target levels. Set limits for controller adjustments when levels are too high/low



Ex: If dosing channel 1 is set by the grower to inject 10 liter/m^3, the controller auto adjust range is 5 to 15 liter/m^3 in order to meet the EC level.

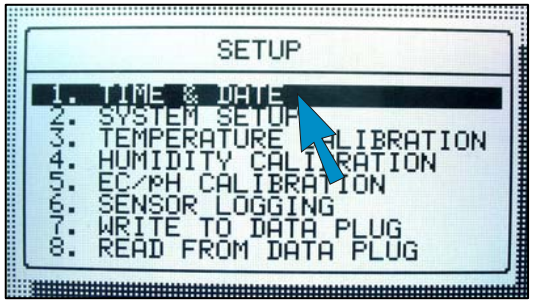
10.4.2 EC/pH Control

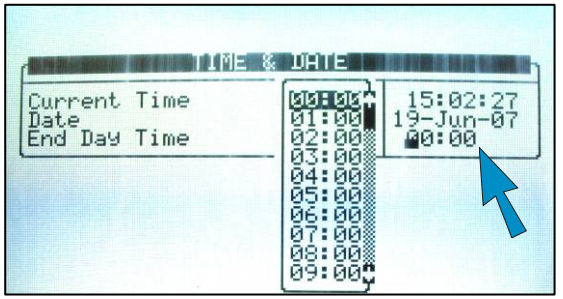


EC/pH coarse tuning- when way off target, faster/stronger correction
EC/pH fine tuning- off target is low, slow/light correction
Control cycle- Delay time from fertilizer/Acid injection point to EC/pH sensors reading
EC/pH averaging- balanced reading from EC/pH sensors
Dose boost off delay- time clear water circulated through system after fertigation stops and venturi closes

10.5 Advanced System Setup

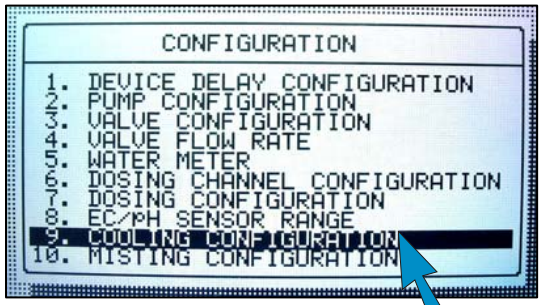
End day time

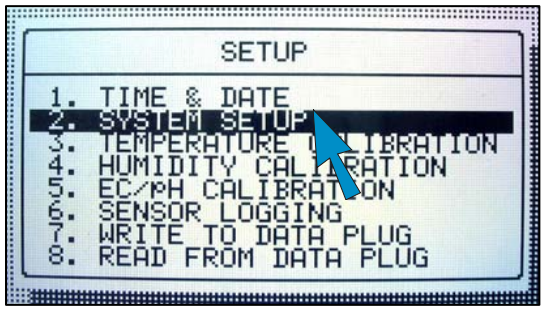




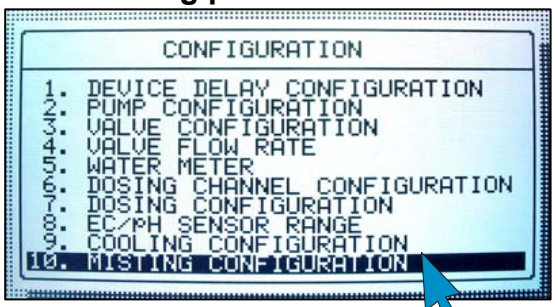
Stop time for measuring water and dosing accumulating information from irrigation valves and dosing channels

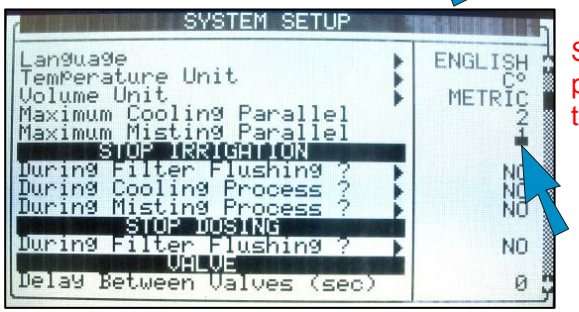
Max. cooling parallel



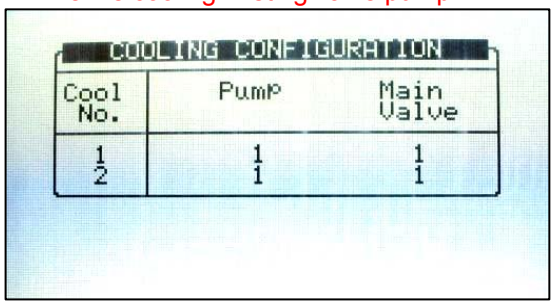


Max. misting parallel





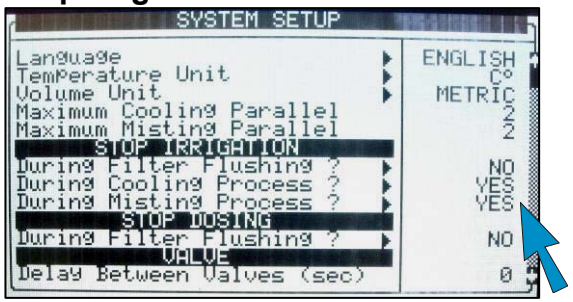
Define cooling/misting valve/pump



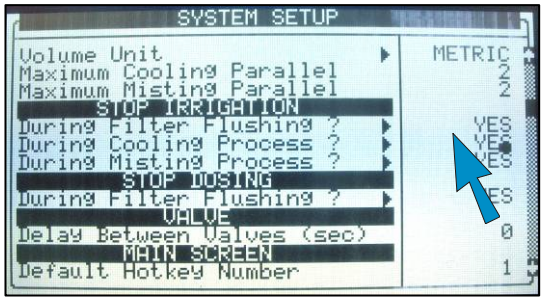
Set max. cooling/misting programs working together

NOTE: Use only when the system has a limited capacity to operate max # cooling/misting programs simultaneously.

Stop irrigation?

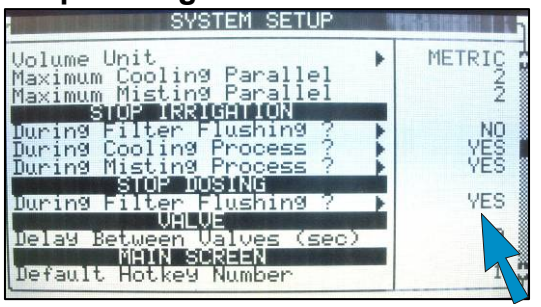


Set to pause irrigation during cooling/misting process, then resume irrigation



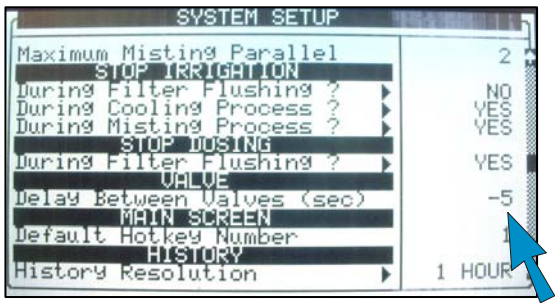
Set to pause irrigation during filter flushing process, then resume irrigation

Stop Dosing?



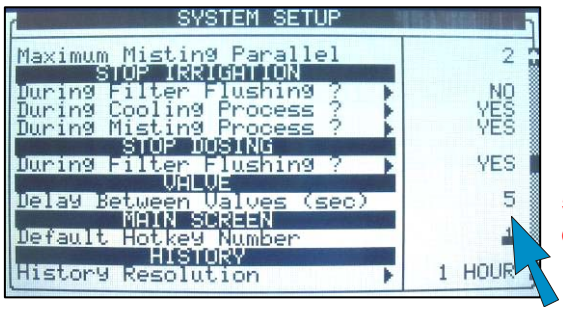
Set to pause dosing during filter flushing process, then resume irrigation

Valve transition

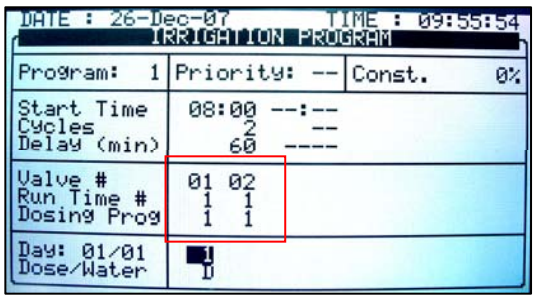


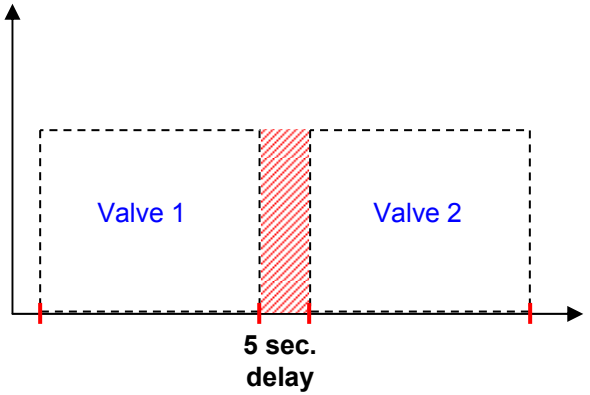
Set delay between valves or set to overlap valves in order to create pressure before opening them by pressing +/- key

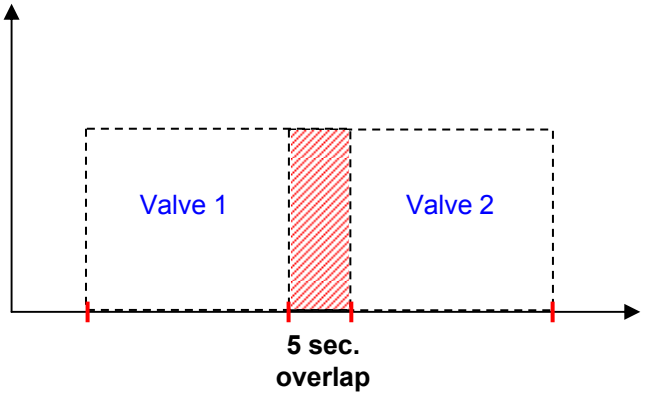
5 second overlap



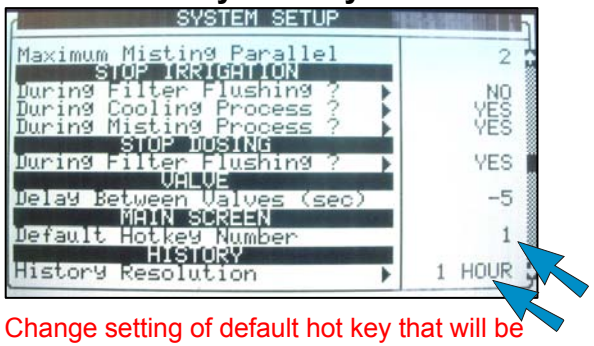
5 second delay





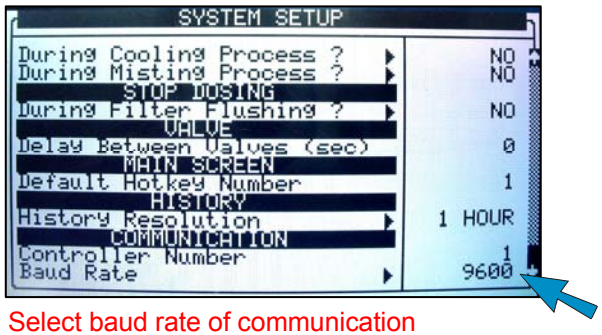


Default hot key/ History resolution



Change setting of default hot key that will be present for the grower as a default.
Set history resolution-how often system saves information

Baud rate

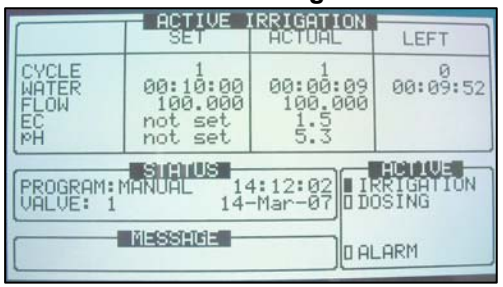


Select baud rate of communication

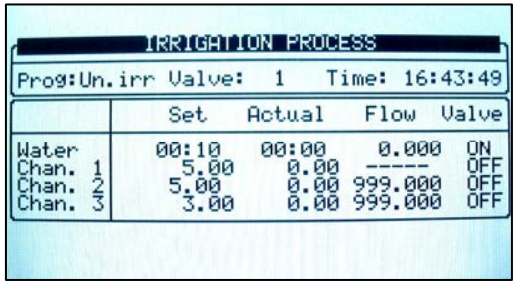
11. Hot Keys and Status Screens

In the Active Irrigation screen, can view status of the system by pressing number keys corresponding to each hot screen.

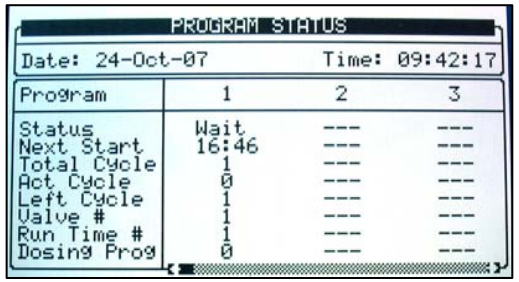
Hot Screen 1- Active Irrigation



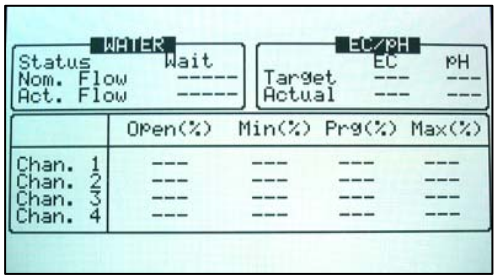
Hot Screen 2- Irrigation Process Status



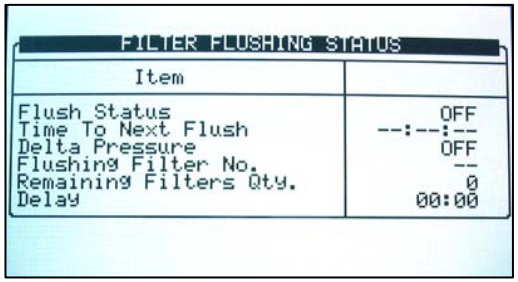
Hot Screen 3- Program Status



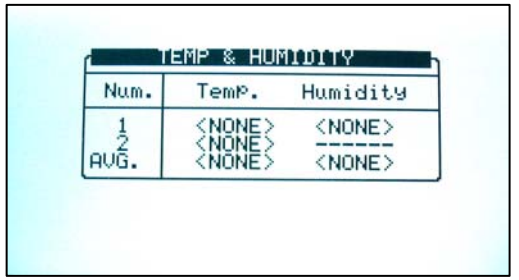
Hot Screen 4- Water Flow & EC/pH Status



Hot Screen 5- Filter Flushing Status



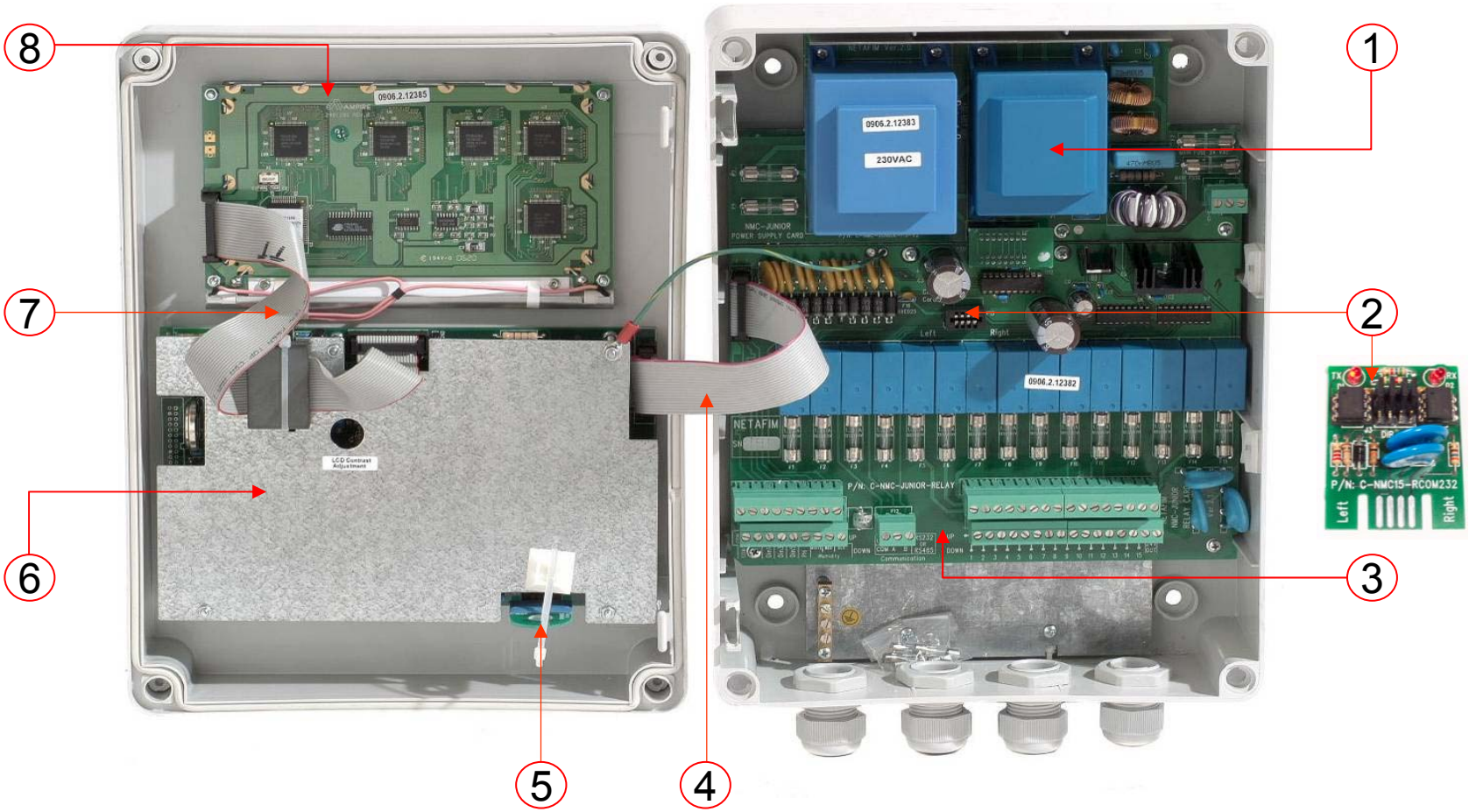
Hot Screen 6- Temp. & Hum. Status



APPENDIX A

NMC-JUNIOR Parts List

NMC-JUNIOR Parts List



NMC Junior Parts List Con't…

Item #	Description	Assembled When ordering a new controller	Additional Spare part
1	NMC-JUNIOR power supply card 115VAC NMC-JUNIOR power supply card 230VAC NMC-JUNIOR power supply card 115VAC external 24VAC* NMC-JUNIOR power supply card 230VAC external 24VAC* NMC-JUNIOR power supply card 12VDC	Part of the controller	74340-004995 74340-009400 74340- 74340- 74340-004997
2	NMC-JUNIOR Communication card RS-232 NMC-JUNIOR Communication card RS-485	74340-001000 74340-001100	74340-006600 74340-006700
3	NMC-JUNIOR input/output card	Part of the controller	74340-009490
4	NMC-JUNIOR flat cable for input/output card	Part of the controller	74340-004972
5	NMC-JUNIOR memory backup key - Data Plug	Part of the controller	74340-009000
6	NMC-JUNIOR CPU+Keyboard card for fluorescent display (old type) NMC-JUNIOR CPU+Keyboard card for LED backlit display (new type)	Part of the controller	74340-009480 74340-009485
7	NMC-JUNIOR flat cable for display card	Part of the controller	74340-004973
8	NMC-JUNIOR display card with fluorescent (old type) NMC-JUNIOR display card with LED backlit (new type)	Part of the controller	74340-009470 74340-004920

* Special request

APPENDIX B

Troubleshooting

Troubleshooting

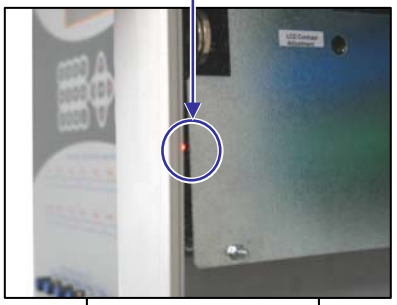
1. Display Malfunction- **Controller display is off**

1

CHECK Main power source is O.K

2

CHECK CPU led is blinking

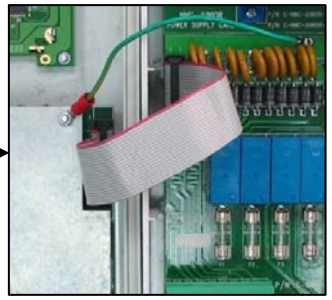


Yes

No

SWITCH OFF Main power

CHECK Flat cable connection is OK



Continue to next page

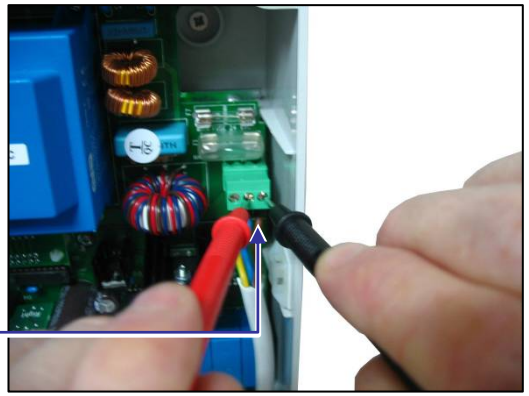
3

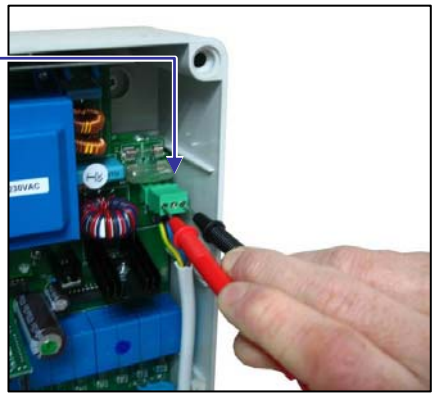
PERFORM Electrical test with Multimeter

CHECK
⇨ Phase to ground
⇨ Phase to neutral

ENSURE
Phase to ground results:
Option 1- 230VAC± 10 % (EUR, AFR, AUS)
Option 2- 115VAC±10% (USA, MEX)

Phase to neutral results:
Option 1- 230VAC± 10 % (EUR, AFR, AUS)
Option 2- 115VAC±10% (USA, MEX)

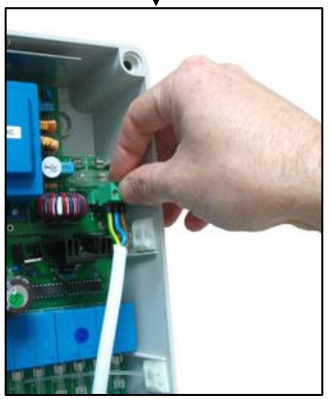




Voltage is OK

No Voltage

Continue to next page



CHECK Cable connection is OK

CAUTION! SHOCK HAZARD! The electrical installation should be performed by a qualified electrician only!

4

SWITCH OFF Main power

CHECK If fuses 1 and 2 are burnt

Burnt

REMOVE Fuse from casing

REPLACE with extra fuses provided

Not burnt

Contact CMT technical support

NOTE: Make sure that the same current load is written on the new fuse.

SWITCH ON Main power

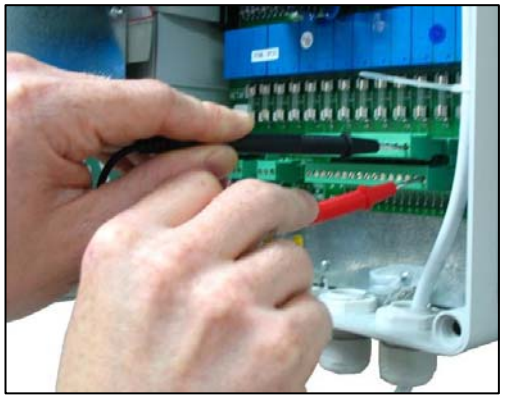
ENSURE 24VAC is available

2. Output Malfunction- **Outputs (valves, pumps etc.) are not working although controller show "ON"**

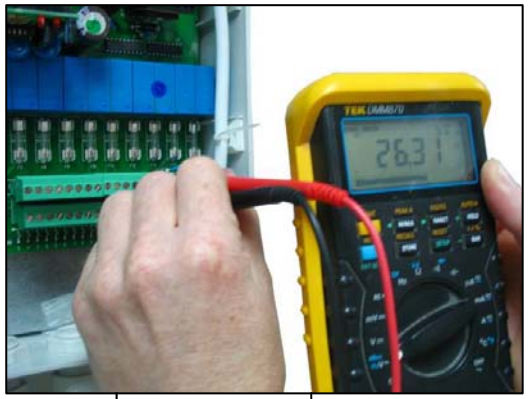
1

SCREW — Final high and low terminals of output card

PERFORM — Electrical test with Multimeter of final high and low terminals of output card



ENSURE — Result: 24VAC± 10%



Voltage is OK

No Voltage

Continue to next page

CHECK — Output wire connections and cable

2

SWITCH OFF Main power

CHECK If fuses 5 and 7 are burnt

Burnt

REMOVE Fuse from casing

REPLACE With extra fuses provided

NOTE: Make sure that the same current load is written on the new fuse.

SWITCH ON Main power

ENSURE 24VAC is available

Not burnt

Contact CMT technical support

APPENDIX C

Replacement and Additional Installations

Replacement and Additional Installations

1. Card Replacement

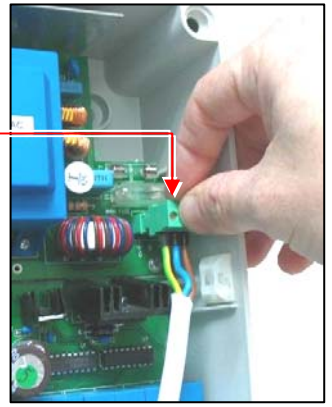
1.1 Power Supply Card

1

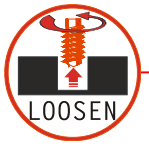
Main power

2

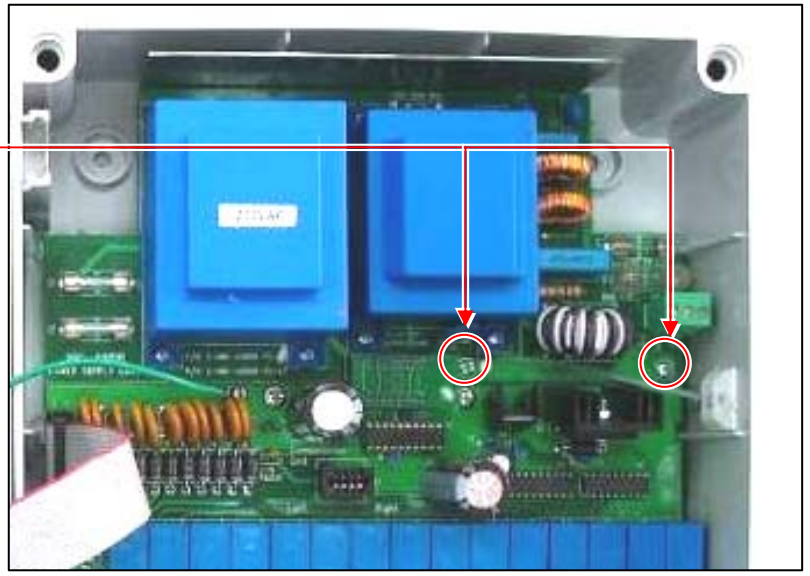
Power Cable



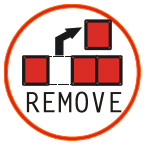
3



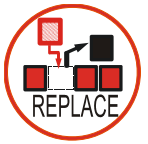
Screws x2



4



Old Card

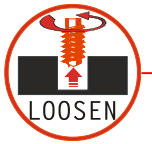


1.2 Relay Card

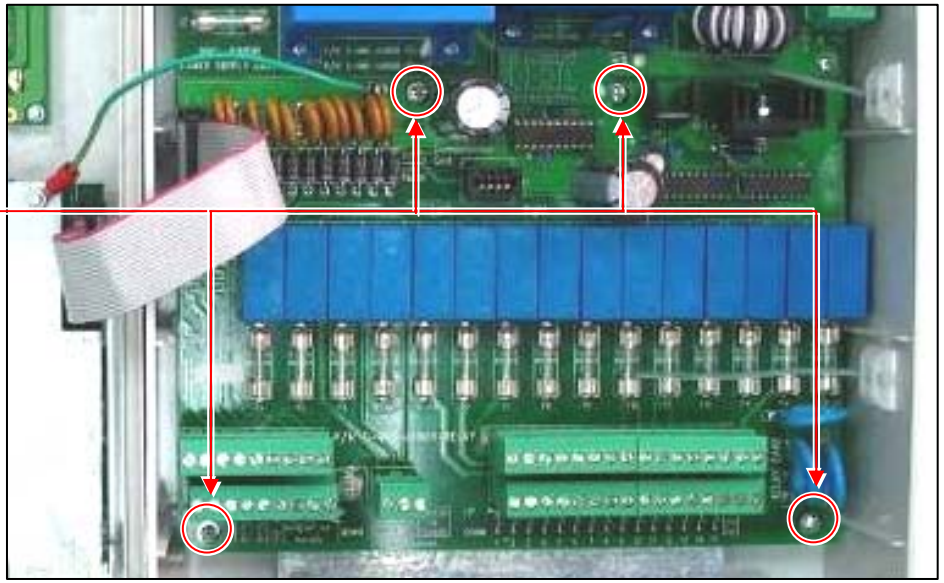
1

Main power

2

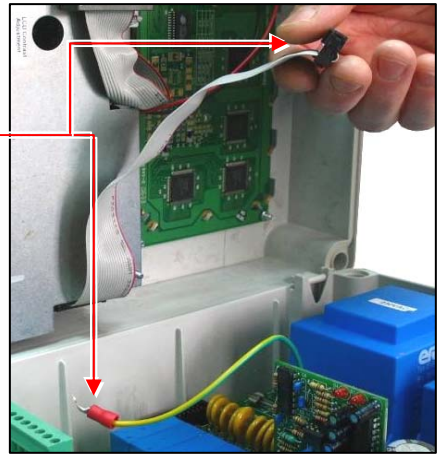


Screws x4



3

Grounding Cable
and Flat Cable

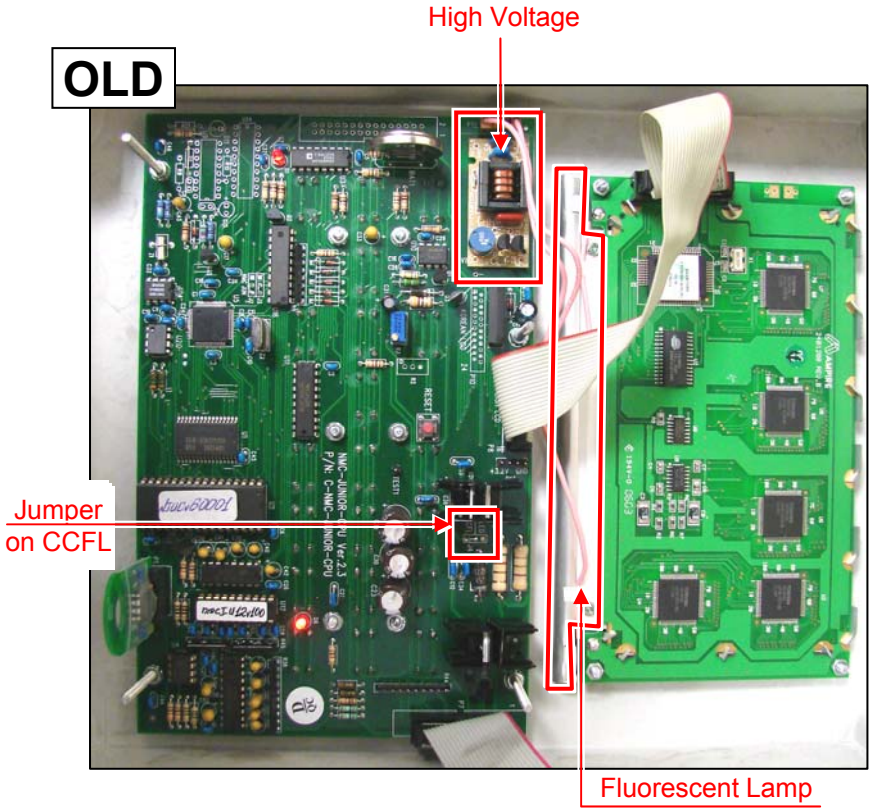


4

Old Card

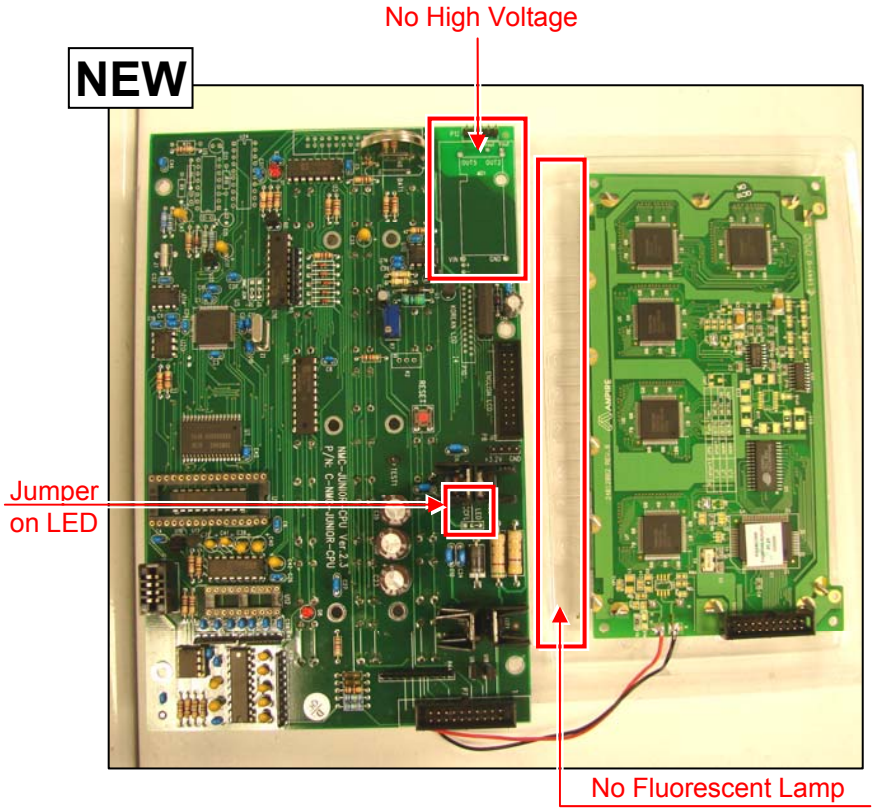
2. NMC-Junior LCD & Keyboard

If LCD or keyboard are no longer in working condition first recognize if your LCD or keyboard is an **OLD** or **NEW** version.



Fluorescent LCD SAP# : 74340-007600
Fluorescent CPU+Keyboard SAP#: 74340-009480

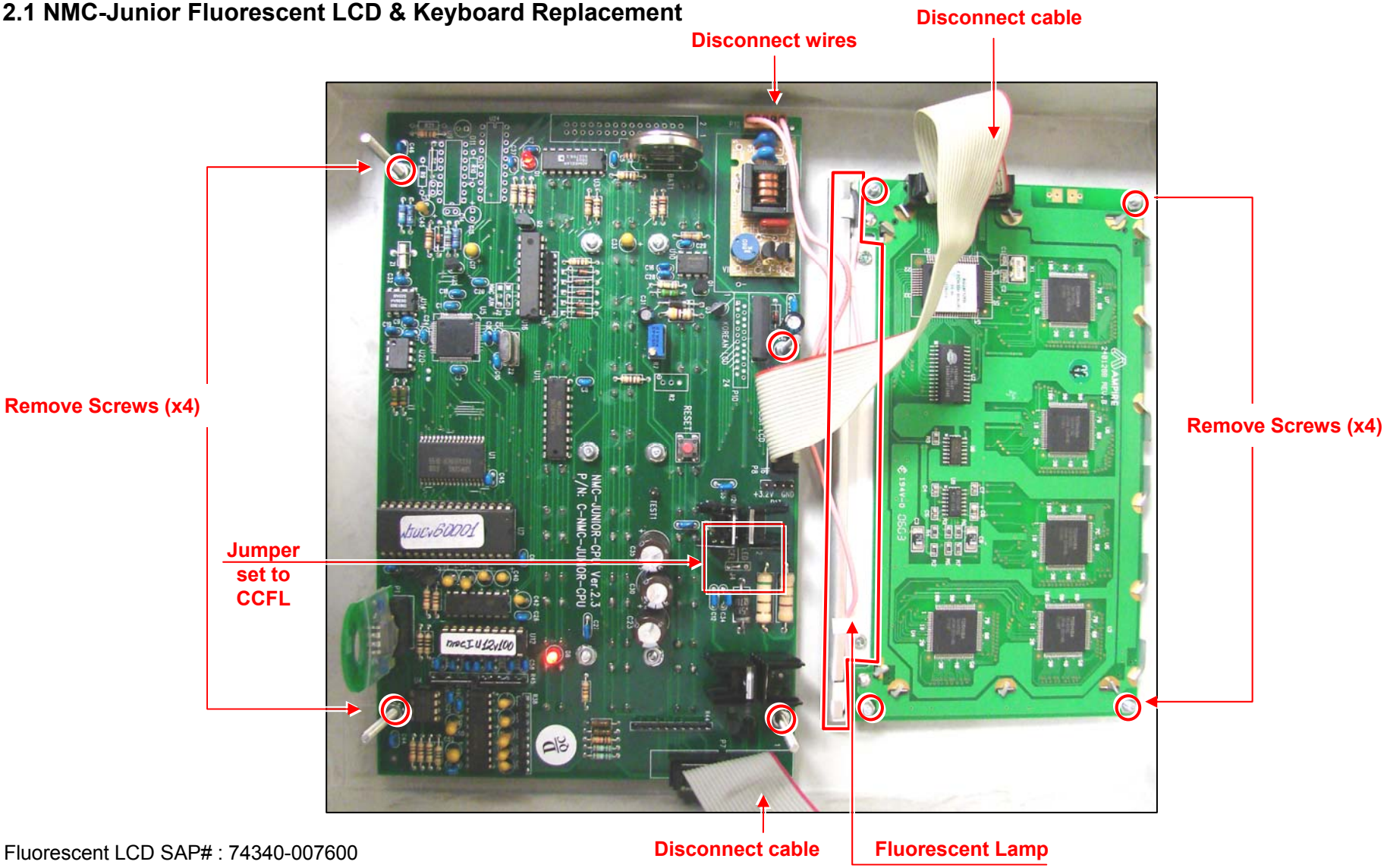
Refer to next page if you have a Fluorescent version.



LED LCD SAP# : 74340-004920
LED Keyboard SAP#: 74340-009485
CHINESE/KOREAN LED LCD SAP# : 74340-004930 (Not Standard)

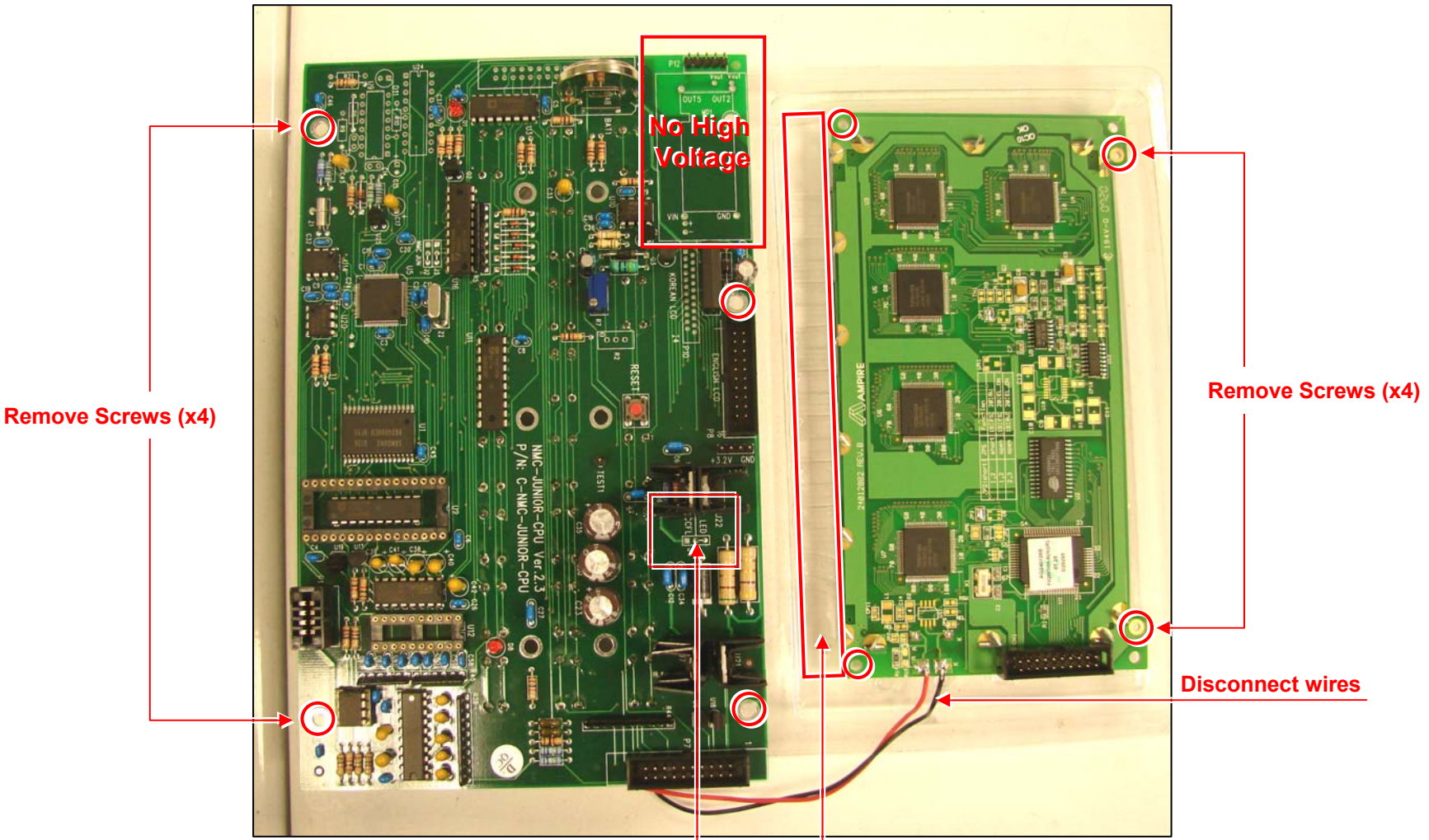
Refer to page 81 if you have a LED version.

2.1 NMC-Junior Fluorescent LCD & Keyboard Replacement



Fluorescent LCD SAP# : 74340-007600
Fluorescent CPU+Keyboard SAP#: 74340-009480

2.2 NMC-Junior LED LCD & Keyboard Replacement



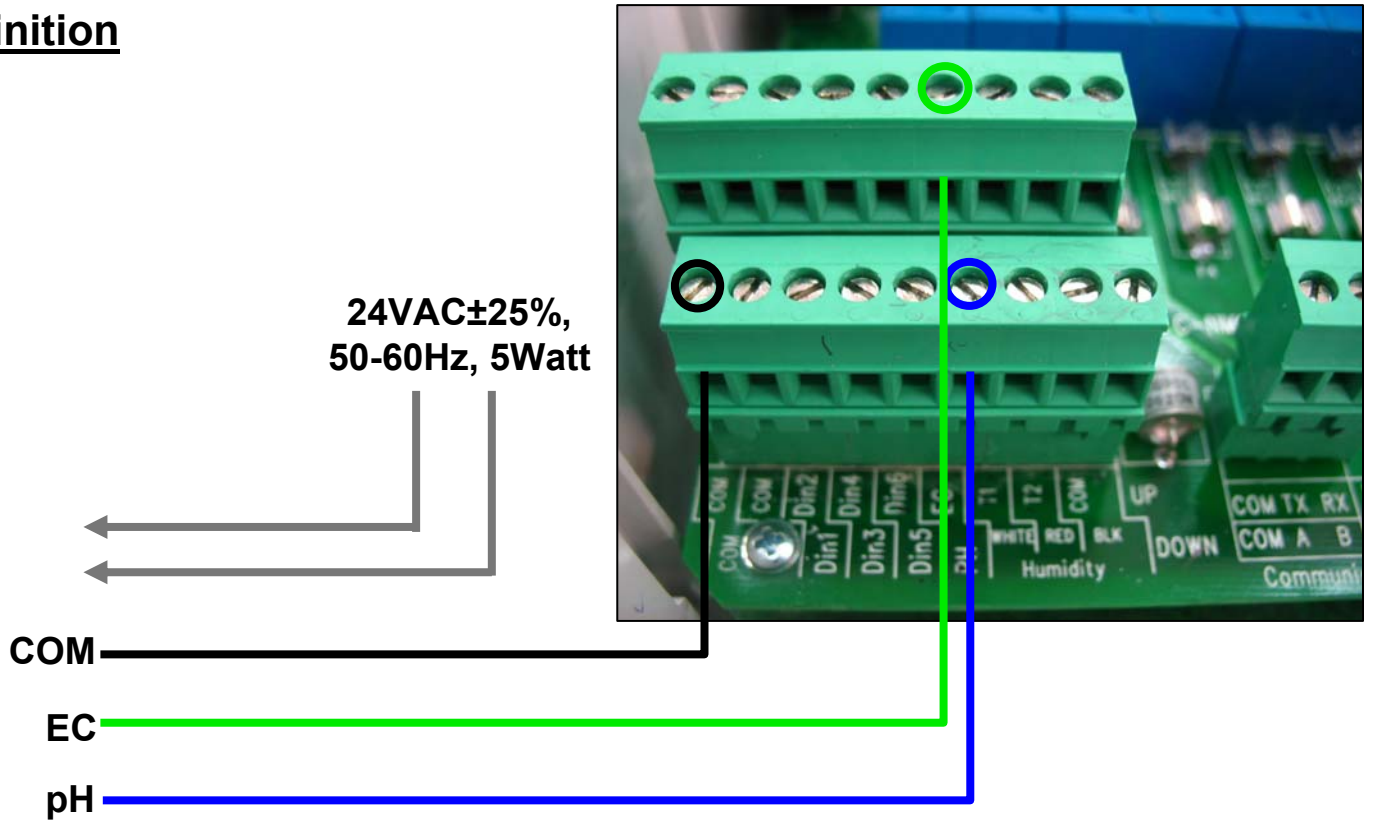
LED LCD SAP# : 74340-004920
LED Keyboard SAP#: 74340-009485
CHINESE/KOREAN LED LCD SAP# : 74340-004930 (Not Standard)

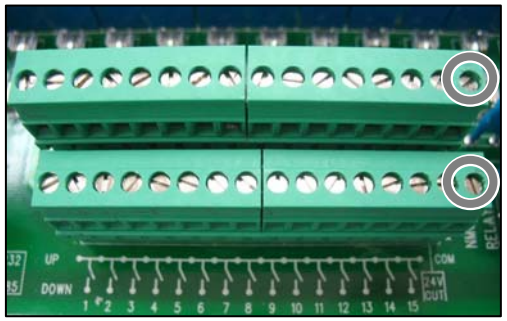
APPENDIX D

Sensor Installation and Definition

Sensor Installation and Definition

1. EC / pH Sensor Connection





NOTE: Can wire EC/pH main power source to 24VAC on the output terminals.

Cable type

COM/EC/pH- 3x0.5mm^2 (20AWG) Shielded

24VAC- 2x0.5mm^2 (20AWG)

1.1 EC Sensor Calibration

ENSURE SM Pump switch is in **OFF** position

1

SELECT

⇨On EC/pH screen, press MENU
⇨ Scroll down to EC Calibration by pressing SELECT
⇨ ENTER

2

3

4

ESC to Main Menu

5

MENU

6

7

8

EC sensor into Calibration Buffer and immerse for 30 seconds

ENTER

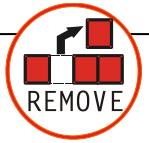
9

10

Calibration in process

11

12



Sensor from buffer

ENTER

13

Calibration in process

14

If display says “Buffer Fault”, please see Troubleshooting Appendix B

1.2 pH Sensor Calibration

1

⇨On EC/pH screen, press MENU
⇨ Scroll down to pH Calibration by pressing SELECT

2

3

4

5

ESC to Main Menu

1.2.1 pH 7.01 Sensor Calibration

1

MENU

2

3

4

Sensor from plastic bottle

pH sensor into pH 7.0 Calibration Buffer and immerse for 30 seconds

ENTER

5

Calibration in process

If display says “Buffer Fault”, please see Troubleshooting Appendix B

1.2.2 pH 4.01 Sensor Calibration

1

2

INSERT

pH sensor into water and immerse for 30 seconds

3

INSERT

pH sensor into pH 4.0 Calibration Buffer and immerse for 30 seconds

PRESS

ENTER

4

Calibration in process

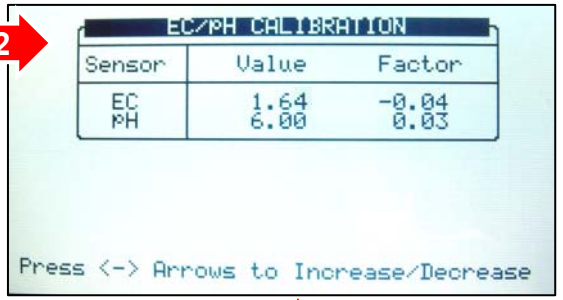
5

PRESS

ESC

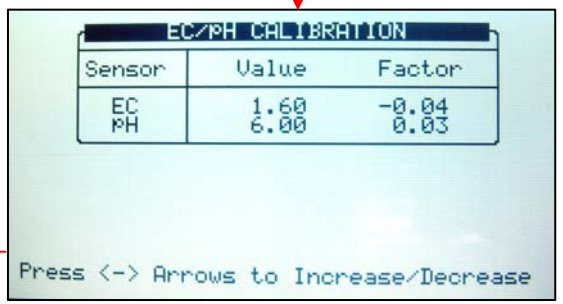
If display says “Buffer Fault”, please see Troubleshooting Appendix B

In Setup menu, select EC/pH Calibration

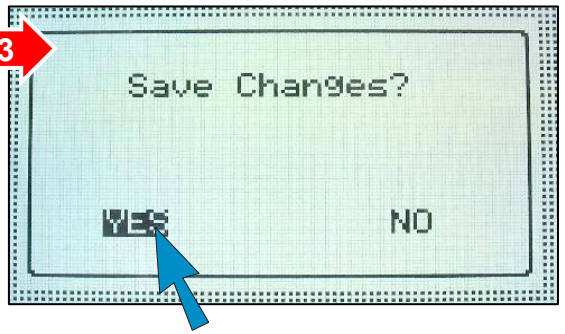


If EC and PH numbers match on both screens. If not:

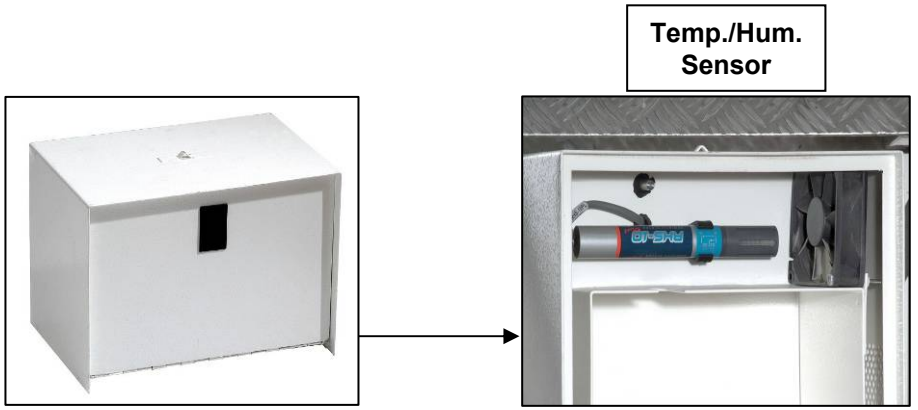
Use arrows to increase/decrease value so numbers match



⇨ ENTER when values match
⇨ Press MENU

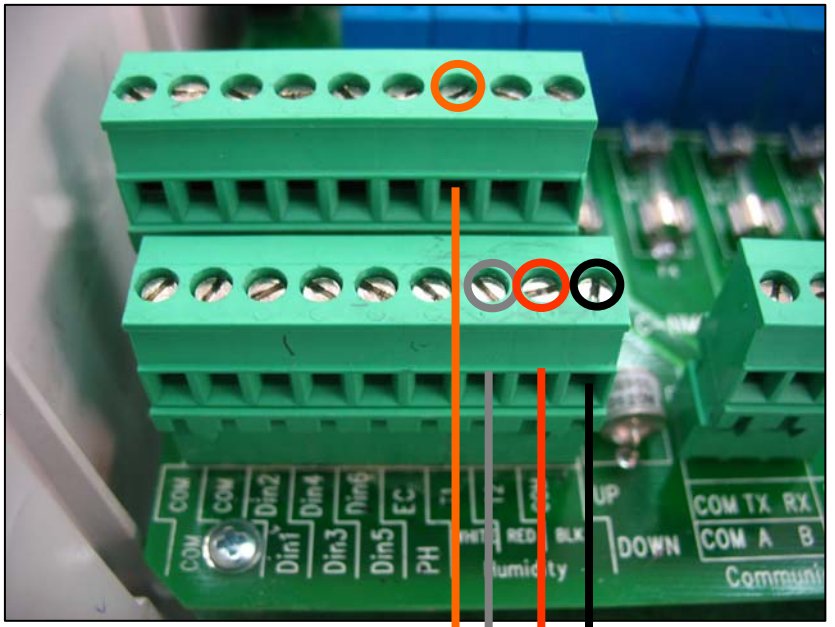


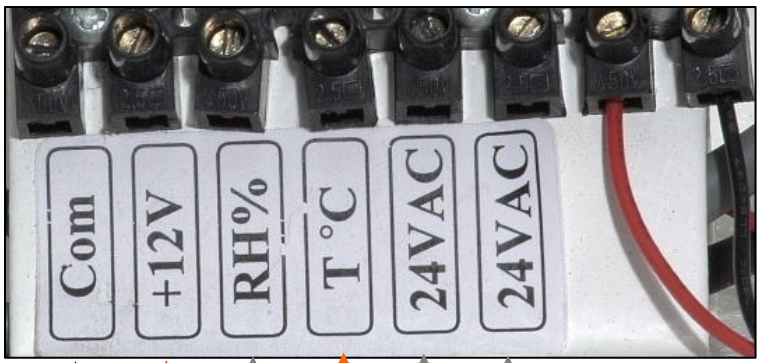
2. Temperature / Humidity Sensor Connection



NOTE: Can wire 24VAC terminals of measuring box to 24VAC on the output terminals.

Cable type
6x0.5mm^2 (20AWG)



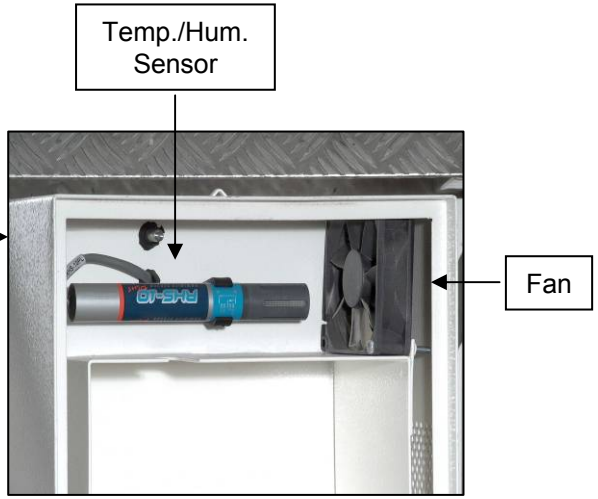


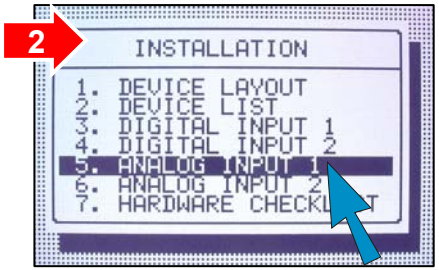
Measuring Box Terminals

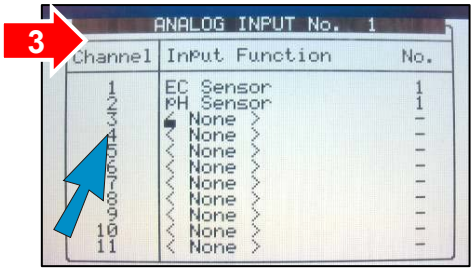
24VAC

2.1 Sensor Definition

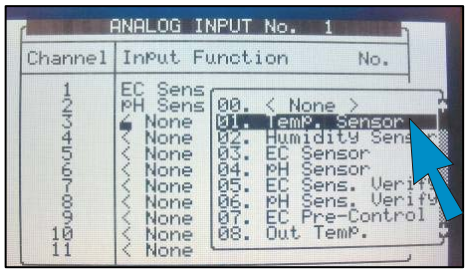
Measuring Box

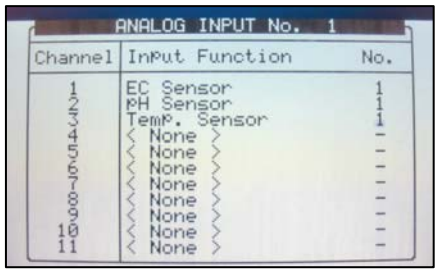


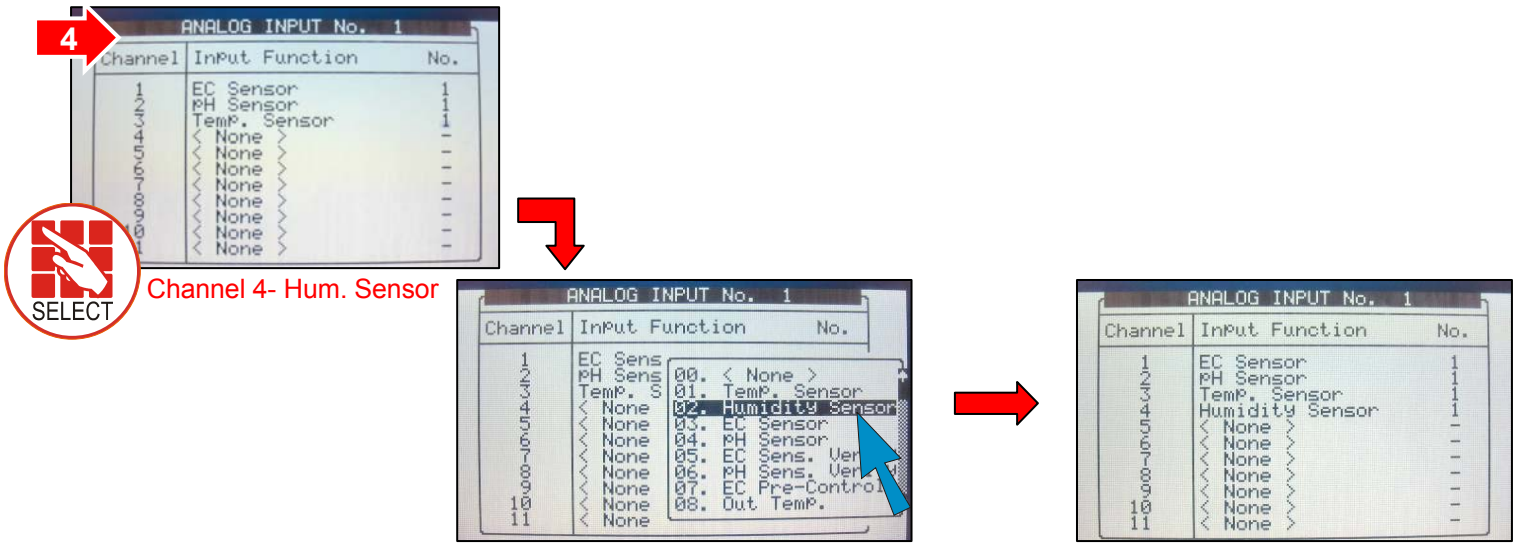




Channel 3- Temp. Sensor






4
ANALOG INPUT No. 1
Channel
Input Function
No.
1 EC Sensor 1
2 pH Sensor 1
3 Temp. Sensor 1
4 < None > -
5 < None > -
6 < None > -
7 < None > -
8 < None > -
9 < None > -
10 < None > -
11 < None > -
SELECT
Channel 4- Hum. Sensor
00. < None >
01. Temp. Sensor
02. Humidity Sensor
03. EC Sensor
04. pH Sensor
05. EC Sens. Ver
06. pH Sens. Ver
07. EC Pre-Control
08. Out Temp.
ANALOG INPUT No. 1
Channel
Input Function
No.
1 EC Sensor 1
2 pH Sensor 1
3 Temp. Sensor 1
4 Humidity Sensor 1
5 < None > -
6 < None > -
7 < None > -
8 < None > -
9 < None > -
10 < None > -
11 < None > -

3. Sensor and Cable Specifications

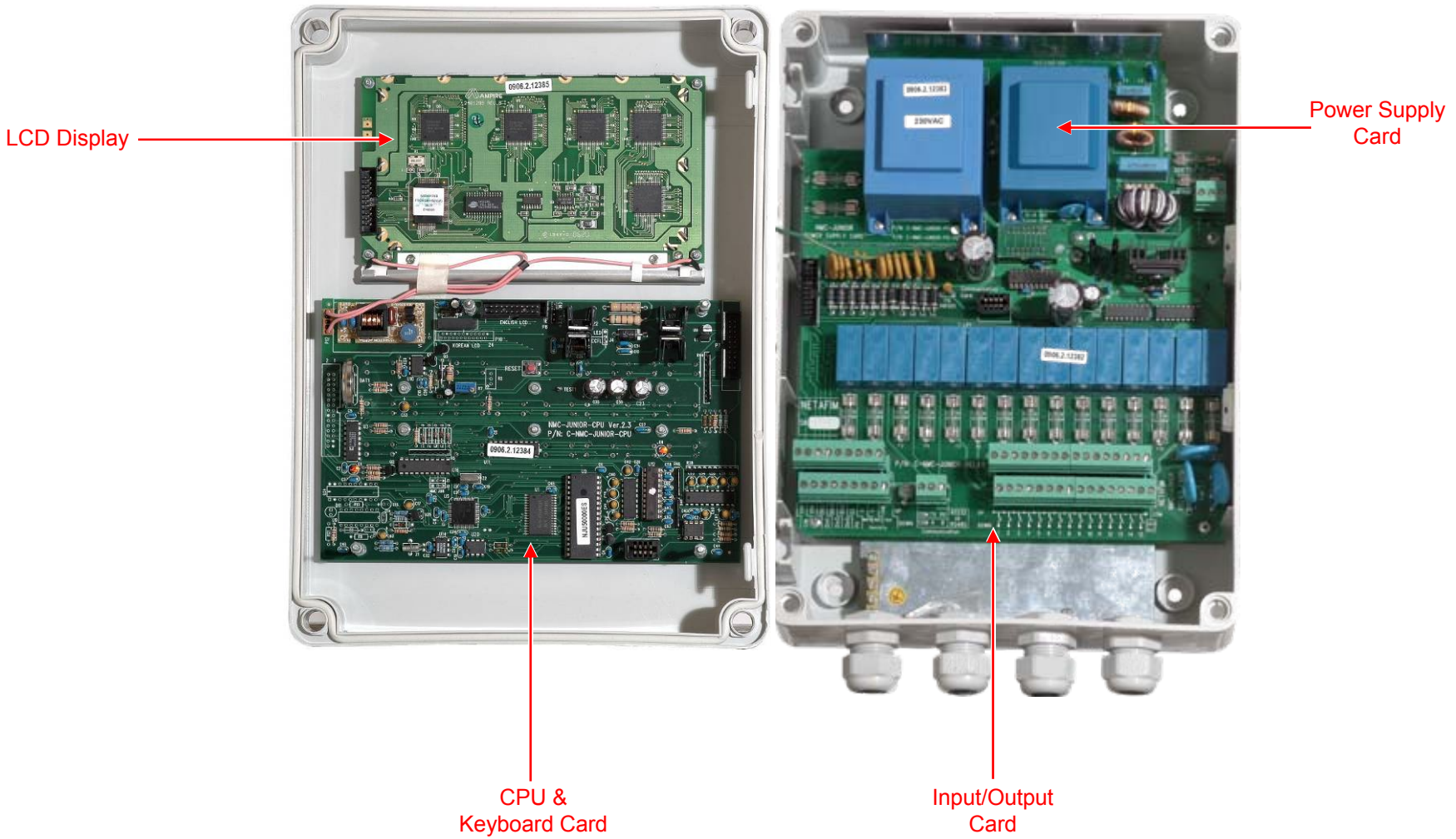
Sensor Type	Measured Values	Accuracy	Input Range	Maximum Cable Length	Cable Type
Temperature – RTS-s	-20°C to 50°C/ -4°F to 122°F	0.3°C/ 0.54°F	30kΩ (kOhm)	500 meters (1640 feet)	2x0.5mm^2 (20AWG)
RH – RHS-10	0 – 100%	±2% (10%-90%RH) ±3.5% (90%-100%RH)	0 – 3 VDC	300 meters (985 feet)	3x0.5mm^2 (20AWG)
EC	0 to 10mS (old transmitters used 20mS)	0.05-0.1mS	4 – 20mA	---	3x0.5mm^2 (20AWG) Shielded
pH	0 - 14	0.1	4 – 20mA		

APPENDIX E

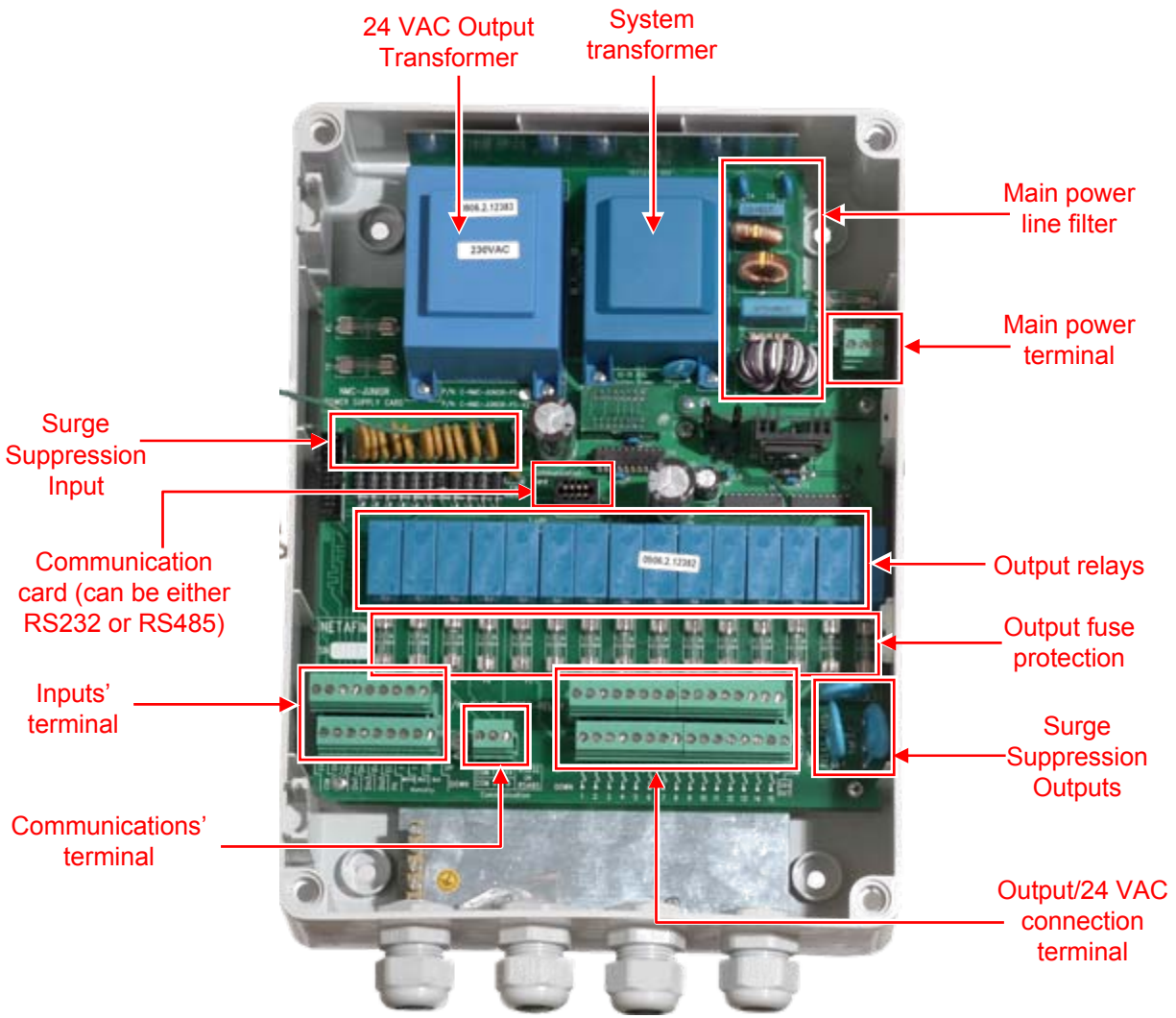
Technical Specifications

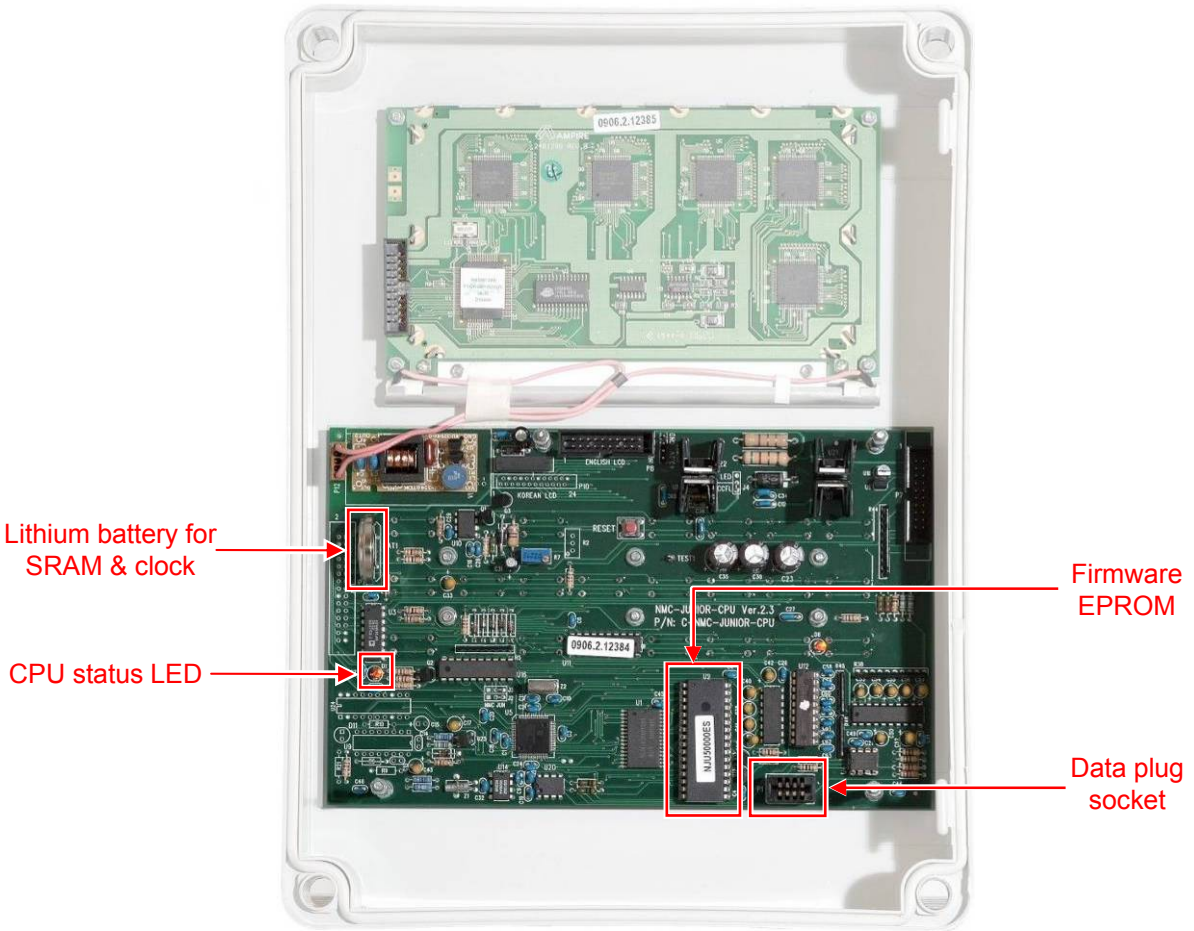
1. Technical Specifications

		Small Plastic box (Indoor installation)	Sealed Plastic box (Outdoor installation)
Housing	Plastic housing with a screw on lid	IP 65	IP 65
	Dimensions (LxWxH)	22.5x31x13 cm (8.86x12.2x5.12 inch)	32.5x29.0x18.0 cm (12.79x11.41x7.08 inch)
	Weight	4.5 kg 9.9 lbs	5.5Kg 12.12 lbs
Ambient Conditions	Operating temperature range	-10 to $+60^0$ Celsius (14 to 140^0 Fahrenheit)	-10 to $+60^0$ Celsius (14 to 140^0 Fahrenheit)
	Storage temperature range	-10 to $+70^0$ Celsius (14 to 158^0 Fahrenheit)	-10 to $+70^0$ Celsius (14 to 158^0 Fahrenheit)
Approvals	The 115/230VAC has Safety CE approval	EN61010-1	EN61010-1
	EMC approval CE	EN55011 Class A EN55011 Class B EN61000-4-2,3,4,5,6,8,11;	EN55011 Class A EN55011 Class B EN61000-4-2,3,4,5,6,8,11;


LCD Display
Power Supply Card
CPU & Keyboard Card
Input/Output Card

2. Hardware Layout

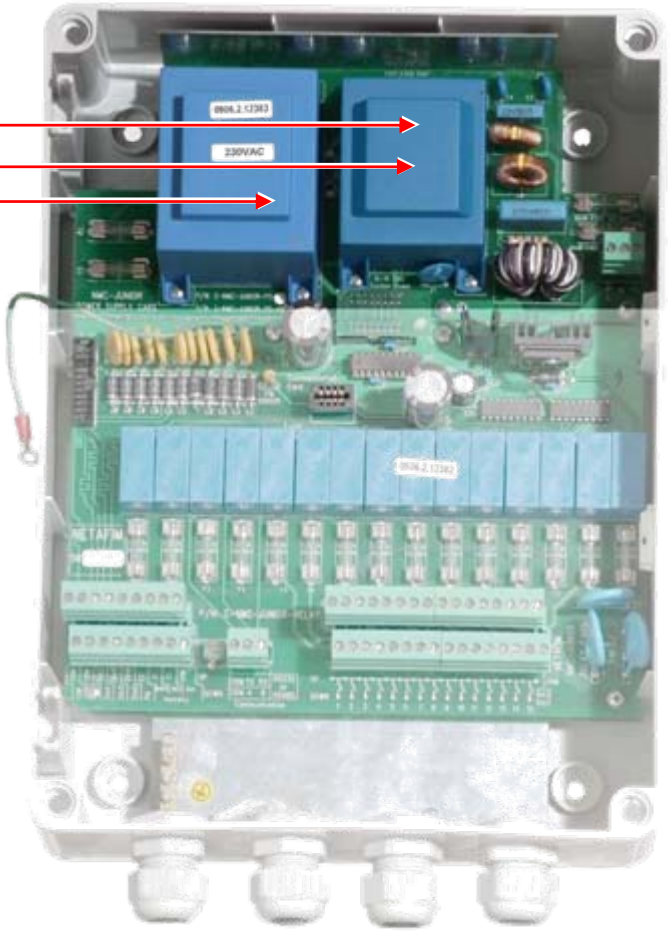



Lithium battery for SRAM & clock
CPU status LED
Firmware EPROM
Data plug socket
0906.2.12385
0906.2.12384

3. Power Supply Card

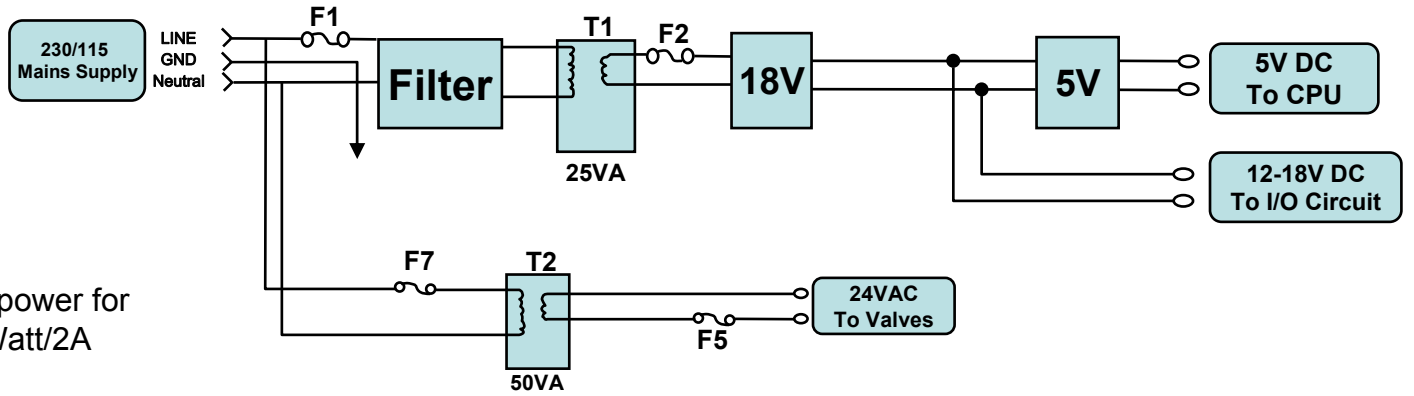
Power supply transformers:

- 12VDC to the CPU and relays.
- 5VDC to digital inputs, 3VDC to analog inputs, etc'.
- 24VAC to 24VAC output card.



Option A: 115 or 230 VAC Power Supply Card

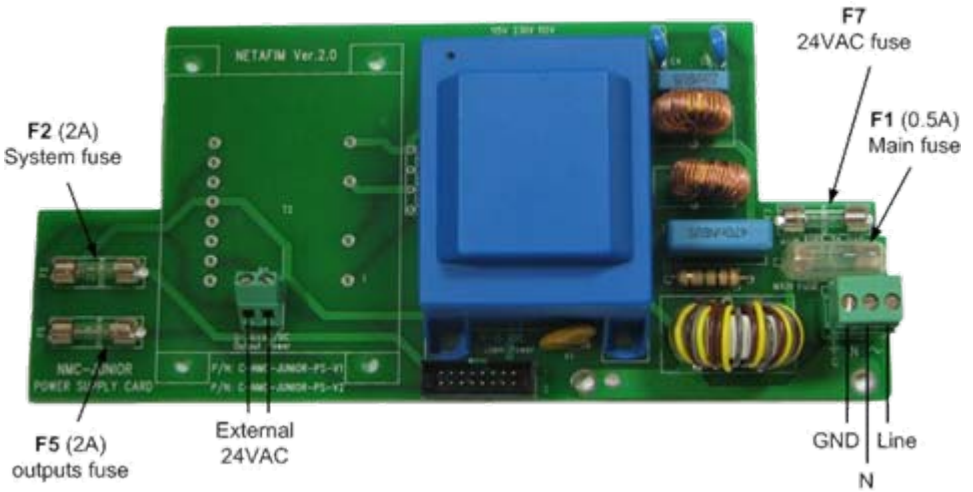
Specifications				
Main voltage	Main frequency	Max voltage	Min voltage	Main fuse
Single phase 230 VAC, 0.5 Amp	50/60	250 VAC	200 VAC	0.5 Amp
Single phase 110 VAC, 0.5 Amp	50/60	130 VAC	90 VAC	0.5 Amp

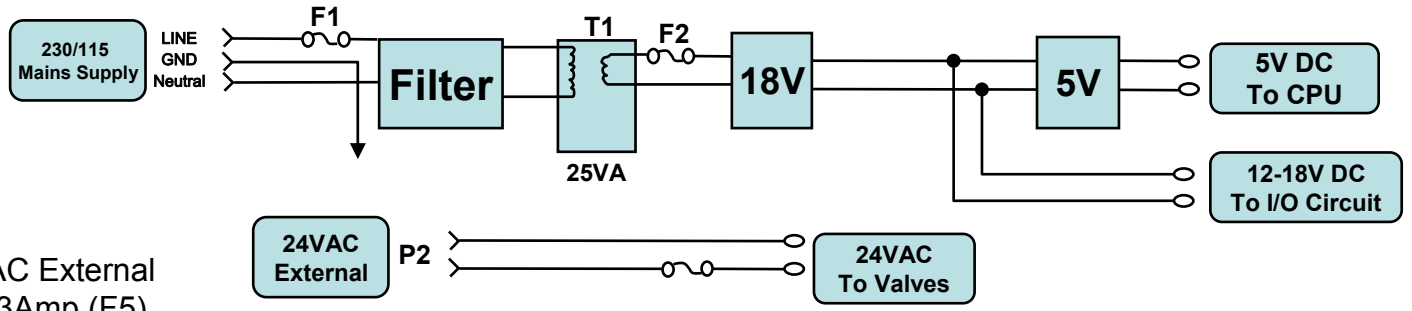


NOTE: 24 VAC- available power for peripheral equipment: 50Watt/2A

Option B: 115VAC or 230VAC power supply card with external 24VAC power for output devices

Specifications				
Main voltage	Main frequency	Max voltage	Min voltage	Main fuse
Single phase 230 VAC, 0.5 Amp	50/60	250 VAC	200 VAC	0.5 Amp
Single phase 110 VAC, 0.5 Amp	50/60	130 VAC	90 VAC	0.5 Amp

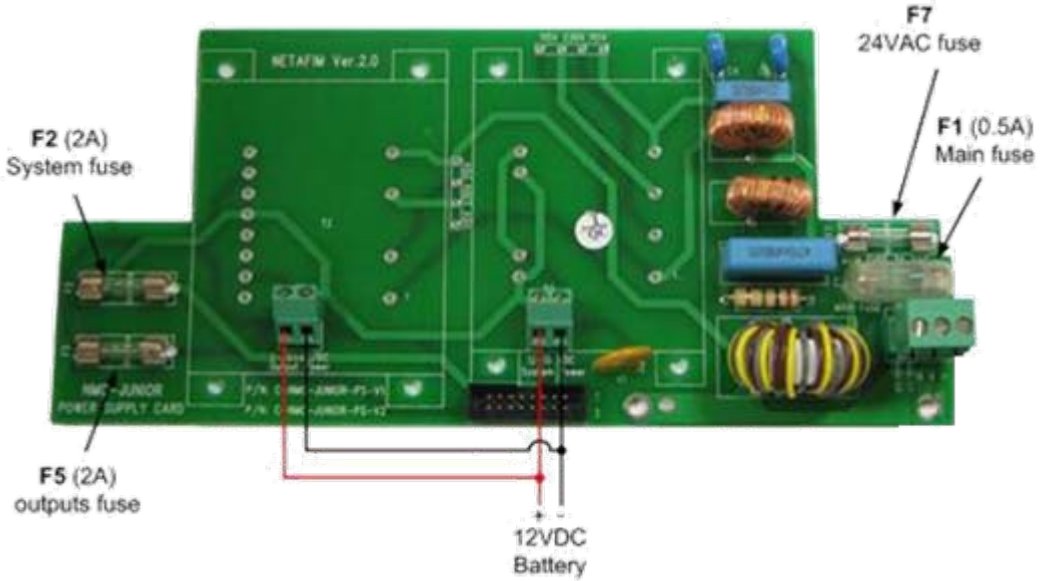


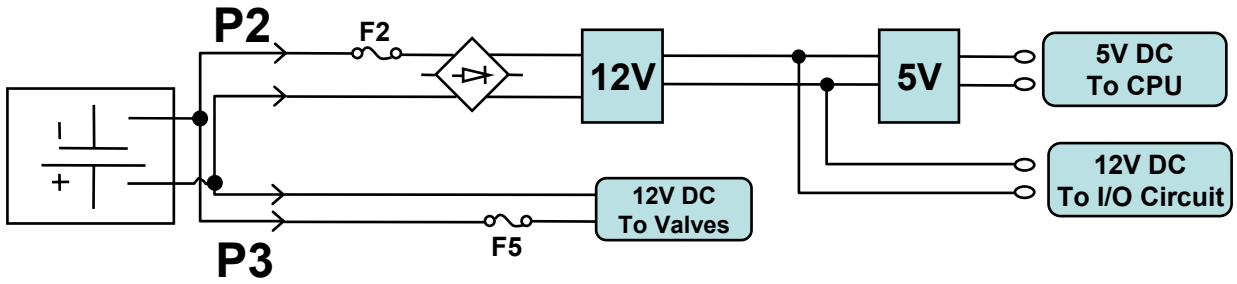


NOTE: System uses 24VAC External transformer with limit of 6.3Amp (F5).

Option C: 12VDC Power Supply Card

Specifications	
Main voltage	System fuse
12 – 48 VDC/VAC	2 Amp





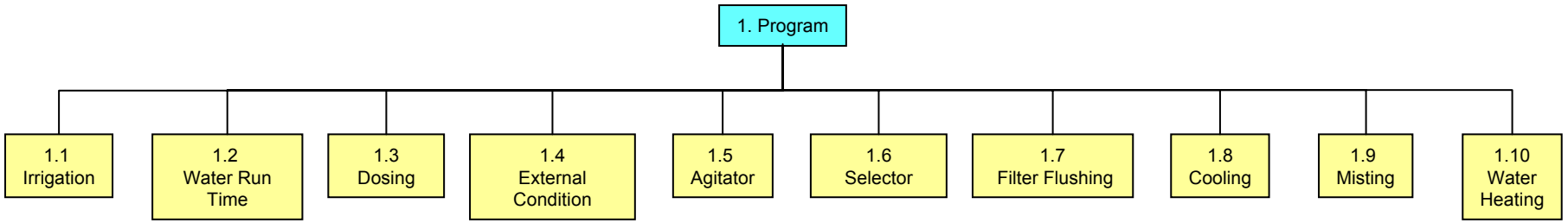
4. Input and Output Card

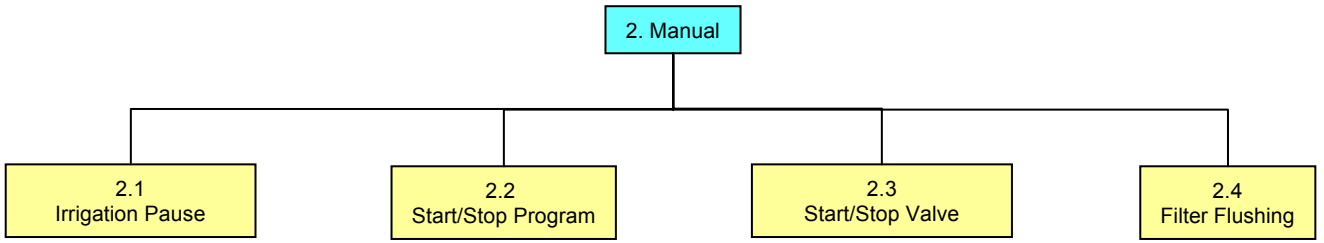
The Input & Output card consists of the following

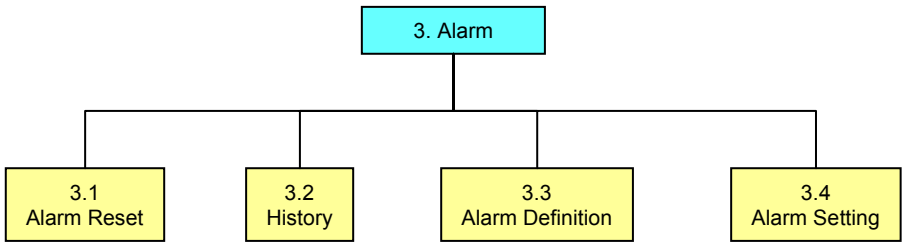
Analog inputs	1x EC input	4 - 20 mA
	1x pH input	4 - 20 mA
	1x humidity sensor input	0 - 3 VDC
	2x temperature sensor input	30KΩ THERMISTOR
Digital inputs	6x digital input	5V/2mA, max pulse rate 50 Pulse/Sec
Relays outputs	15x N.O output	24VAC low power relay, 5 Amps, maximum output changing rate 0.4 Sec
Communication	1x RS232/RS485 port	RS232 or RS485 communication port, function depends on type of connection and type of MUX used.

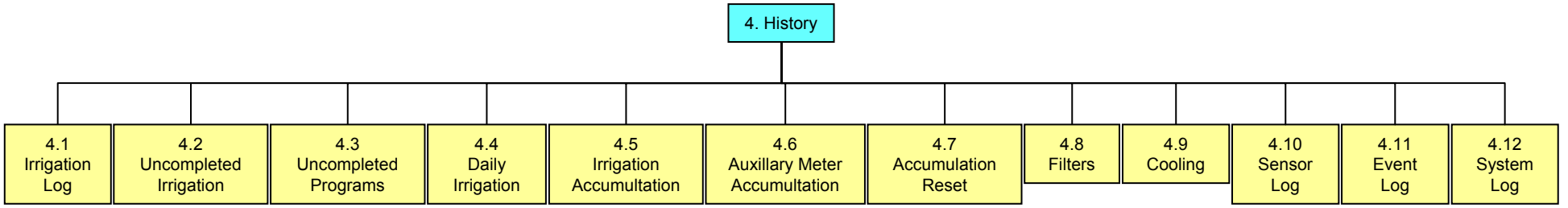
APPENDIX F

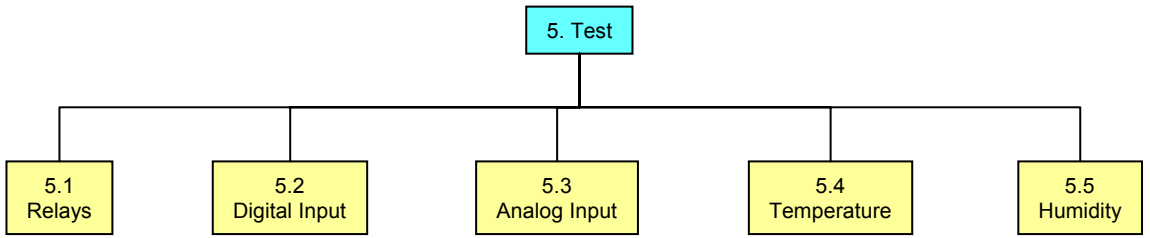
Main Menu Tree

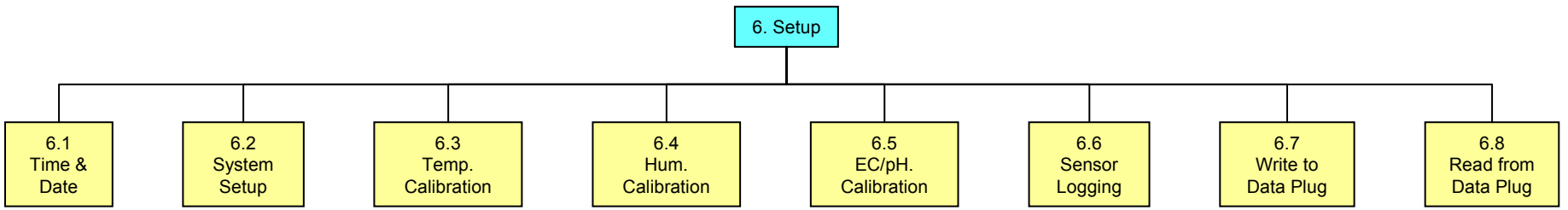

1. Program
1.1 Irrigation
1.2 Water Run Time
1.3 Dosing
1.4 External Condition
1.5 Agitator
1.6 Selector
1.7 Filter Flushing
1.8 Cooling
1.9 Misting
1.10 Water Heating

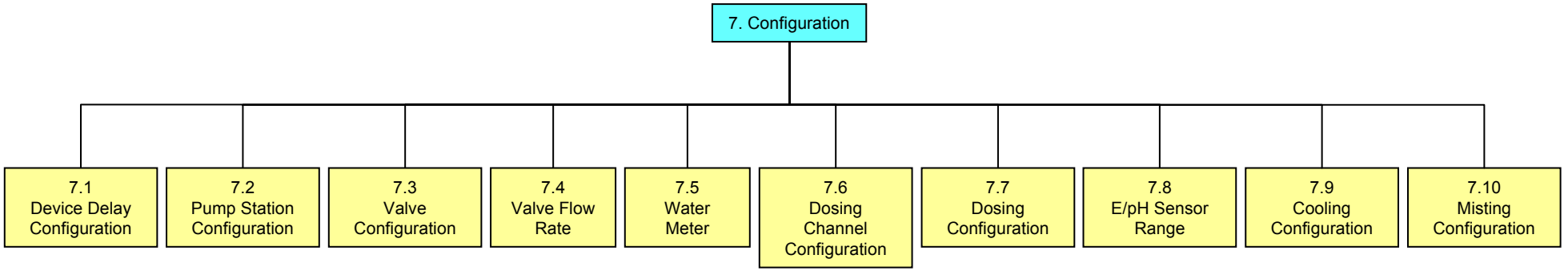

2. Manual
2.1 Irrigation Pause
2.2 Start/Stop Program
2.3 Start/Stop Valve
2.4 Filter Flushing

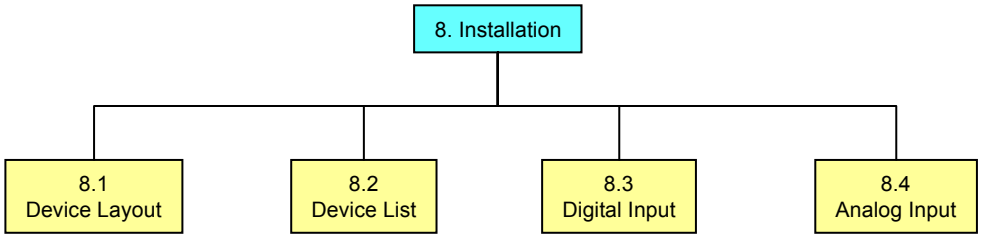

3. Alarm
3.1 Alarm Reset
3.2 History
3.3 Alarm Definition
3.4 Alarm Setting


4. History
4.1 Irrigation Log
4.2 Uncompleted Irrigation
4.3 Uncompleted Programs
4.4 Daily Irrigation
4.5 Irrigation Accumultation
4.6 Auxillary Meter Accumultation
4.7 Accumulation Reset
4.8 Filters
4.9 Cooling
4.10 Sensor Log
4.11 Event Log
4.12 System Log


5. Test
5.1 Relays
5.2 Digital Input
5.3 Analog Input
5.4 Temperature
5.5 Humidity


6. Setup
6.1 Time & Date
6.2 System Setup
6.3 Temp. Calibration
6.4 Hum. Calibration
6.5 EC/pH. Calibration
6.6 Sensor Logging
6.7 Write to Data Plug
6.8 Read from Data Plug


7. Configuration
7.1 Device Delay Configuration
7.2 Pump Station Configuration
7.3 Valve Configuration
7.4 Valve Flow Rate
7.5 Water Meter
7.6 Dosing Channel Configuration
7.7 Dosing Configuration
7.8 E/pH Sensor Range
7.9 Cooling Configuration
7.10 Misting Configuration


8. Installation
8.1 Device Layout
8.2 Device List
8.3 Digital Input
8.4 Analog Input

Controller Warranty

Controller:

Netafim warrants the electronic components of the NMC-Junior Controller on to be free of defects in materials or workmanship for **2 (two)** years from the date of purchase by end user. If a defect is discovered during the applicable warranty period, Netafim will repair or replace, at its option, the product or the defective part.

Note: Lightning and surge damages are not covered by warranty.

Date of commissioning:

Customer's representative:

Name:

_____

Signature:

_____

Netafim's representative:

Name:

_____

Signature:

_____