

Installation Manual

OmniaPRO

PROGRAMMABLE CONTROLLERS

WPRO-560/W560-RT/W560-EXP
WPRO-521



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1 INTRODUCTION

1.1 General description

OmniaPRO are compact programmable controllers suitable for different needs in HVAC applications.

Models are available both in a DIN rail-mounted version which significantly reduces wiring times and in the 32x74 format for panel mounting.

In association with OmniaPRO hardware, the FREE Studio development tool is also provided to quickly and reliably program and customize new programmes for any application.

The use of several different programming languages in accordance with IEC61131-3 regulations (programming standard for industrial control), makes it possible to develop new algorithms or entire programmes totally unassisted, which can then be uploaded to OmniaPRO modules via PC or Multi Function Key, guaranteeing the utmost confidentiality with appropriate security.

1.1.1 Specifications:

WPRO560 come in a variety of models, giving you 6 digital inputs, up to 5 relay outputs, up to 2 TRIAC outputs, up to 2 Open Collector PPM/PWM analogue outputs, up to 3 configurable 0...10V/0...20mA/4...20mA analogue outputs and up to 2 Open Collector digital outputs for an external relay.

The 4DIN format guarantees maximum flexibility and easy installation.

All inputs and outputs are independent and configurable ensuring adaptability to every system.

It runs on 12-24V~ or 24Vcc power supplies.

WPRO521 is the model which can be supplied by high voltage (100-240Vac). It has 4 high voltage digital outputs, 3 analogue outputs 0..10V, up to 2 open collector outputs programmable as digital inputs and 5 inputs programmable as NTC/PT100 or digital inputs.

1.1.2 Main functions of hardware:

- Parameter settings via keyboard or PC
- Multi Function Key (MFK) to download or upload parameter maps
- Terminal (up to 100m cable) with direct connection without serial interface
- Configurable NTC, 0...20mA ,4...20mA, 0...1V, 0...5V, 0...10V inputs or digital input configurable from parameters

2 MECHANICAL INSTALLATION

W560RT

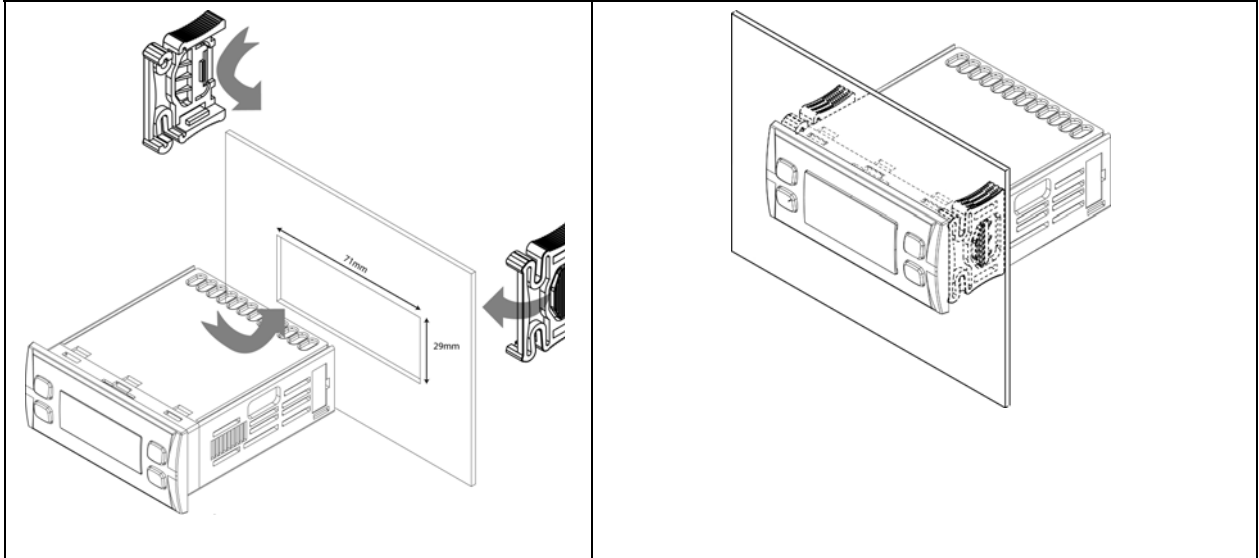
The instrument is intended for panel mounting (see diagram).

Drill a 29x71 mm hole and insert the instrument; secure it with the special brackets provided.

Do not mount the instrument in damp and/or dirty areas; it is suitable for use in places with ordinary or normal levels of pollution.

Keep the area around the instrument cooling slots adequately ventilated.

The TTL serial is on the left side of the device.



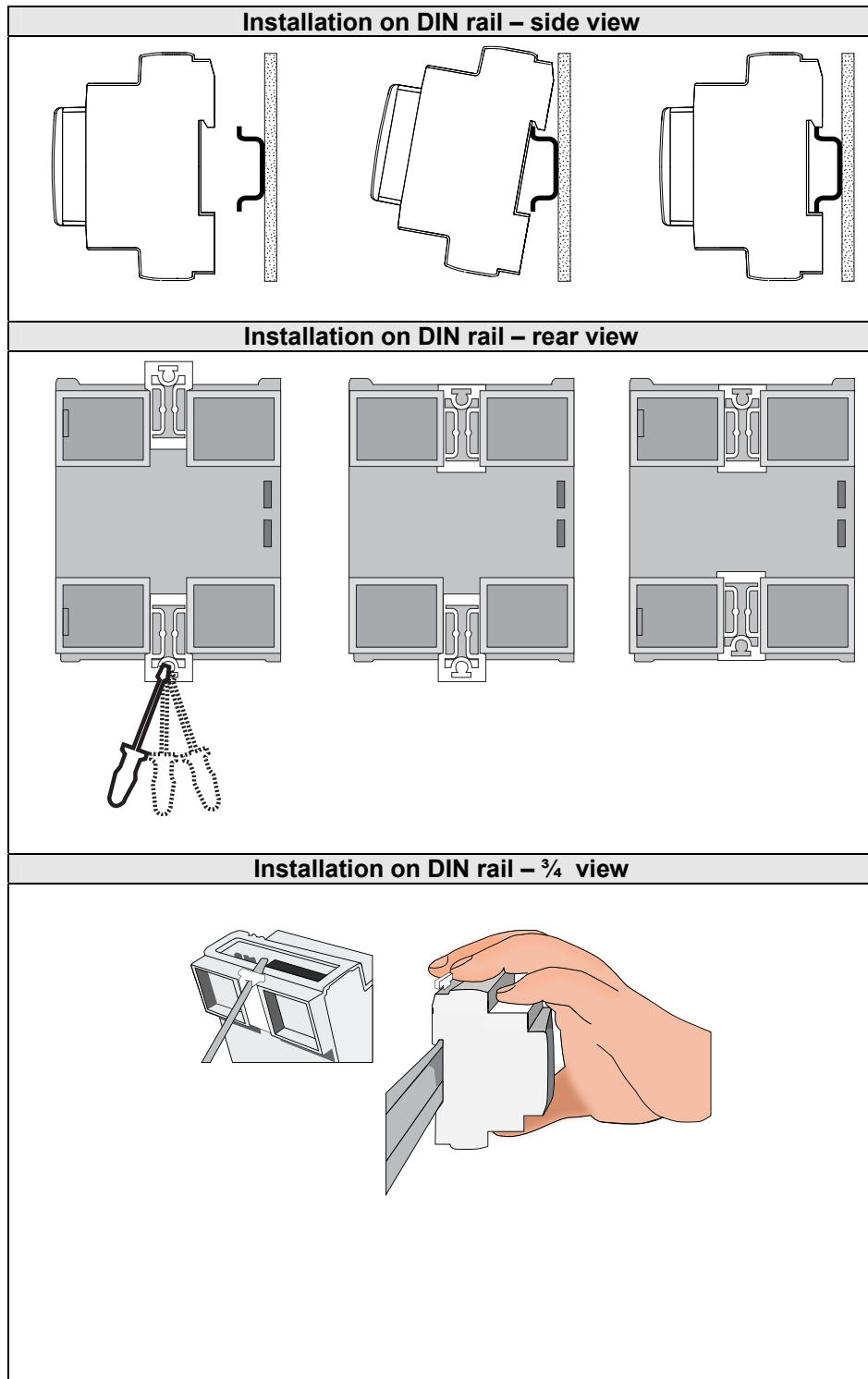
W560RT Example of panel mounting - side view	W560RT Removing the device from the panel – side view

WPRO560 ranges

The instrument is intended for 4DIN rail mounting.

For DIN rail installation, follow the steps described below:

- Move the two spring docking devices to their standby position (use a screwdriver to press against the relative compartments).
- Then install the device on the DIN RAIL, pressing on the "spring docking devices" to put them into the locked position.



3 ELECTRICAL CONNECTIONS



3.1 General warnings

Before doing anything, make sure the device is connected to a suitable external *transformer*. The following rules must be followed when connecting cards to each other and to the application:

- Loads that exceed the maximum limits set forth in this manual/product *label* must not be applied to outputs.
- When connecting loads, follow connection diagrams carefully.
- To avoid electric pairings, wire all low SELV (*) utilities separately from high voltage ones.

IMPORTANT!

Make sure the machine is switched off before working on the *electrical connections*. All operations must be carried out by qualified personnel. To ensure proper connections, comply with the following:

- Power supplies other than those specified can seriously damage the system.
- Use cables of suitable section for the *terminals* used.
- Separate the cables of probes and *digital inputs* from inductive loads and high voltage connections to prevent any electromagnetic interference. Do not place the probe cables near other electrical equipment (switches, meters, etc.)
- Make connections as short as possible and do not wind them around electrically connected parts.
- To avoid causing static discharges, do not touch the electronic *components* on the boards.
- Controlli supplies the high voltage cables to connect the device to loads - see *Accessories* chapter
- Controlli supplies the signal cables to connect the power supply, probes, *digital inputs*, etc - see *Accessories* Chapter.
- The device must be connected to a suitable *transformer* that complies with the specifications provided in the Specifications chapter.

3.1.1 Power supply - High voltage inputs (relay)

Do not exceed the maximum permitted current; for higher loads, use a contactor with sufficient power capacity.

Important!

Make sure that the power supply is of the correct voltage for the device.

3.1.2 TRIAC

The *TRIAC* TC1 output (TC1, TC2 in WPRO562D/DS and WPRO562/562S models), when partialized, suppresses the half-wave at the zero-crossing.

3.1.3 Analogue Inputs-sensors

Probes have no connection polarity and can be extended using a normal bipolar cable (note that the extension of the probes influences the instrument's EMC electromagnetic compatibility: take great care with the wiring).



Important!

Temperature
sensors

Pressure probes have a specific insertion polarity which must be observed.

Signal cables (temperature/*pressure probes*, *digital inputs*, *TTL* serial) must be wired separately from high voltage cables.

Controlli-supplied sensors are recommended. Contact Controlli sales department for item availability.

3.1.4 Serial connections

TTL

Use a 5-wire *TTL* cable up to 30cm in length.

An Controlli-supplied *TTL* cable is recommended. Contact Controlli sales department for item availability.

IS models : the *TTL* and RS485 *serials* cannot be used at the same time.

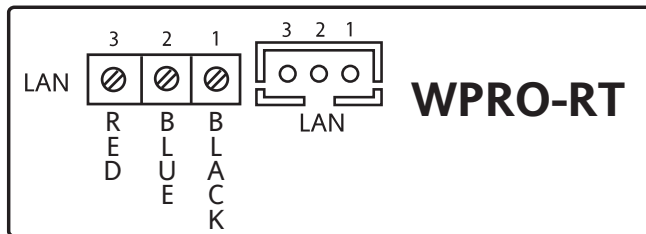
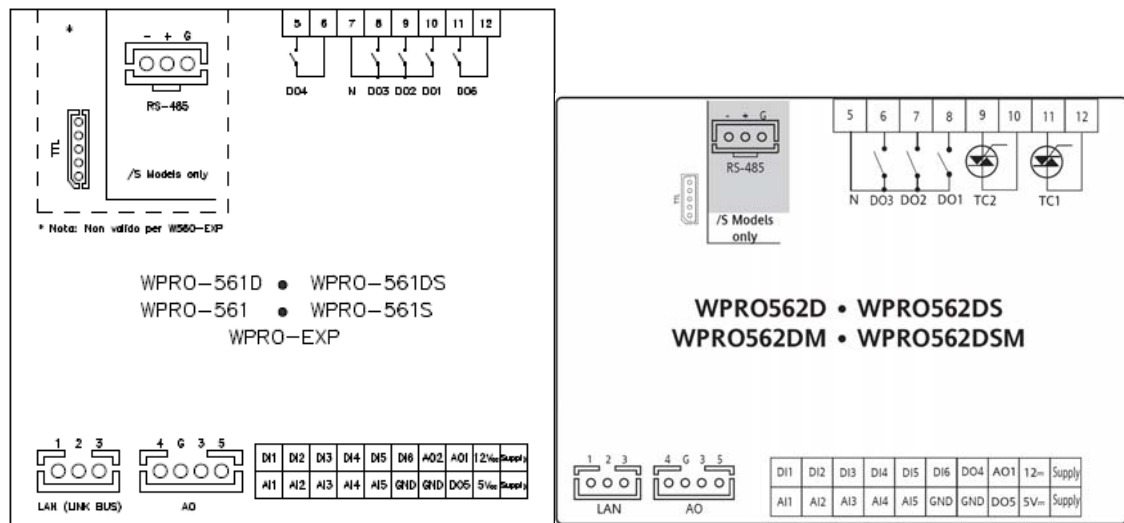


LAN

LAN

3-wire *LAN 3* powered serial available on the terminal board to connect to the *LAN* network. Max. distance of 100m between the first and last element in the network.

3.2 Wiring diagrams



Legend

5Vdc	Auxiliary power supply 5Vdc 20mA max.
12Vdccc	Auxiliary power supply 12Vdc
N	Neutral
GND	Ground
LAN	Remote keyboard (KEYBoard) W560-RT • STA60L • WPRO-560 connection to expansion: 1 = BLACK / GND; 2 = BLUE / SIGNAL 3 = RED / +12Vdc
RS-485	serial RS-485 (only /S models)
TTL	supplied as standard

Inputs/outputs

- 6 free digital inputs
- 5 analogue inputs (2 universal)
- 5/3 relay digital outputs
- 0/2 digital outputs with triac
- 2 analogue outputs 0..10 Vcc
- 1 analogue output 4(0)..20 mA
- 3 "oc" outputs for external relays

Ingressi analogici

- 3 passive (NTC, DI)
- 2 universal (NTC, DI, V, mA)

Inputs/outputs precautions

- DO1...DO4, DO6 high voltage relay outputs 2A - 230Va

- DO4 WPRO-562 Open Collector low voltage output (SELV (§))
- TC1, TC2 WPRO-562 high voltage TRIAC output 3A 230Va
- AO1, AO2 low voltage analogue output (SELV (§)) PWM (^)
- AO3, AO4 low voltage analogue output (SELV (§)) 0...10V
- AO5 low voltage analogue output (SELV (§)) 4...20mA/0...20mA
- DO5 low voltage Open Collector output (SELV (§))
- DI1...DI6 free digital inputs (°)
- AI1, AI2, AI5 Configurable analogue inputs NTC* / Digital Input***
- AI3, AI4 configurable analogue inputs NTC/voltage, power**/Digital Input***

* SEMITEC 103AT (10Kohm / 25°C)

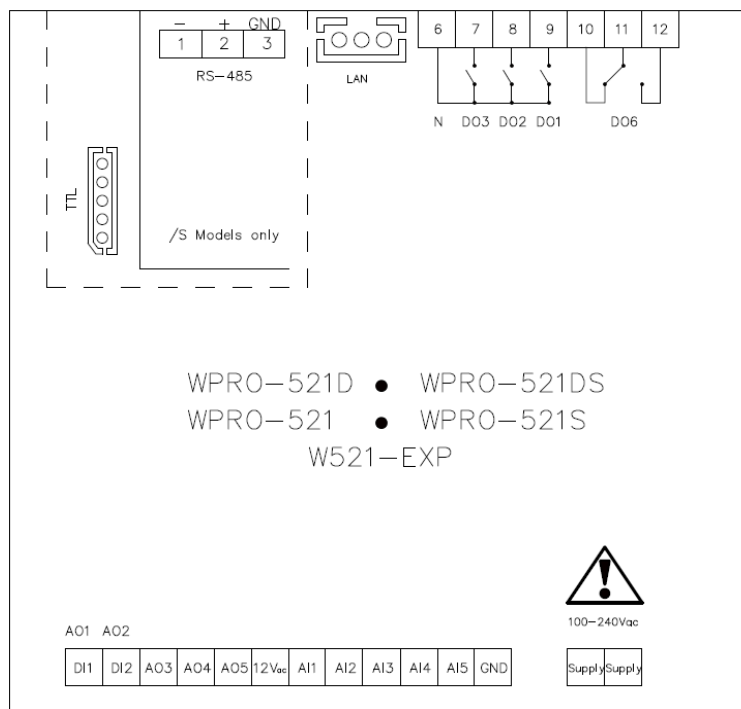
** power supply input 4...20mA or voltage 0...5V / 0...10V / 0...1V or free digital input (°)

*** free digital input (°)

(^) PWM Open Collector

(°) Current with closed contact 0.5mA (reference GND)

(§) SELV: SAFETY EXTRA LOW VOLTAGE



- 4 high voltage digital outputs 2A 230Vac • [DO1, DO2, DO3, DO6]
- 5 analogue outputs:
 - 2 analogue outputs [AO1, AO2] Open Collector PWM;
 - 3 low voltage analogue outputs (SELV (§));
 - 2 outputs [AO3-4] 0-10V;
 - 1 output [AO5] 0-10V;
- 2 free contact digital input (°) [DI1...DI2]
- 5 analogue inputs
 - 3 NTC* / Pt1000(^) / Digital Input*** [AI1, AI2, AI5]
 - 2 NTC* / Voltage / current** / Digital Input*** [AI3, AI4]

(^) If one Pt1000 is programmed all three contacts are programmed as Pt1000

* model SEMITEC 103AT (10KΩ / 25°C)

** current inputs 0...20mA/4...20mA or voltage 0...5V / 0...10V / 0...1V or free contact digital input

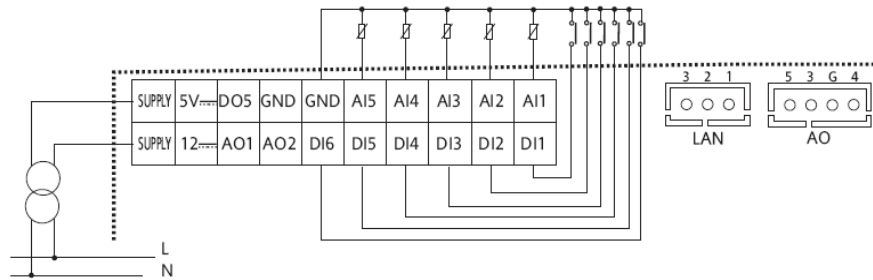
*** free contact digital input

(°)Current with closed contact 0.5mA (reference GND)

(§) SELV: (SAFETY EXTRA LOW VOLTAGE)

3.2.1 Example of low voltage input/output connection

WPRO-560\WPRO-521 (for WPRO521 terminal please look at diagram on page 10)



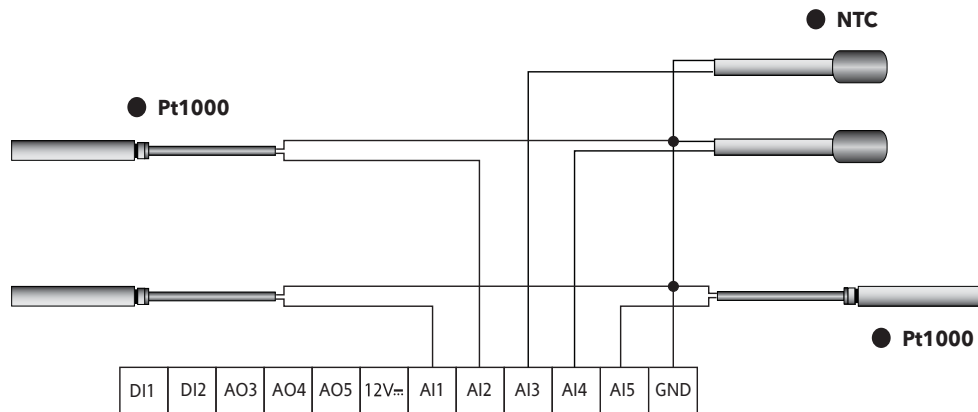
Analogue outputs AO see System Configuration chapter (folder Par/CF) paragraph Configuration of analogue outputs

Digital output D05 see Digital Output Configuration

LAN: see terminal/SE6xx connection

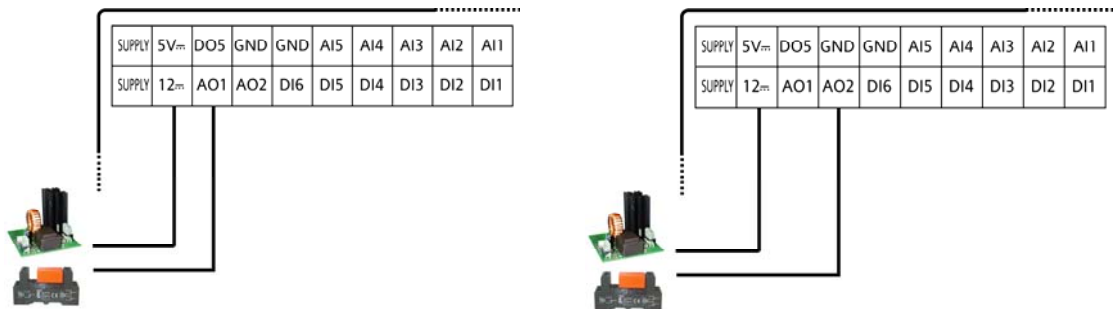
3.2.2 Example of Pt1000 connection (WPRO-521 only)

se impostata 1 Pt1000 → tutti e tre AI1/AI2/AI5 sono configurati come Pt1000



3.2.2.1 Example of AO1 / AO2 connection

WPRO-560 \ WPRO521 (for WPRO521 terminal please look at diagram on page 10)



3.2.2.2 Example of AO3 - AO4/AO5 connection

WPRO-560

Analogue output	Terminal Nr.	Description
AO3	3	0-10V
AO3	G	GND
AO4	4	0-10V
AO4	G	GND

Analogue output	Terminal Nr.	Description
AO5	5	0...20mA/ 4...20mA
AO5	G	GND

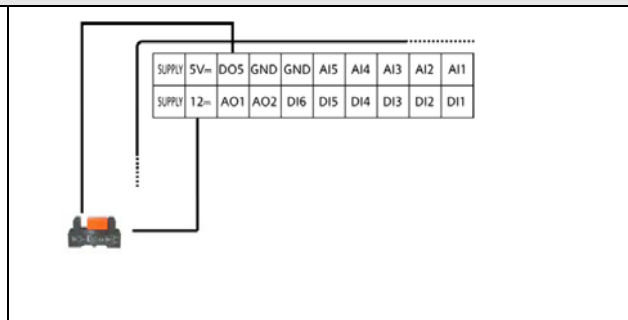
WPRO-521

Analogue output	Terminal Nr.	Description
AO3	3	0-10V
AO3	G	GND
AO4	4	0-10V
AO4	G	GND

Analogue output	Terminal Nr.	Description
AO5	5	0-10V
AO5	G	GND

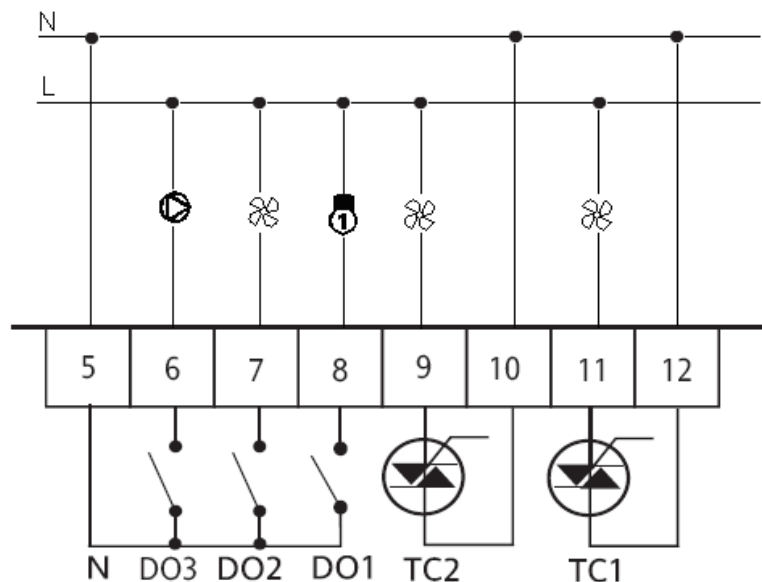
3.2.2.3 Example of DO5 connection

WPRO-560 \ WPRO521 (for WPRO521 terminal please look at diagram on page 10)



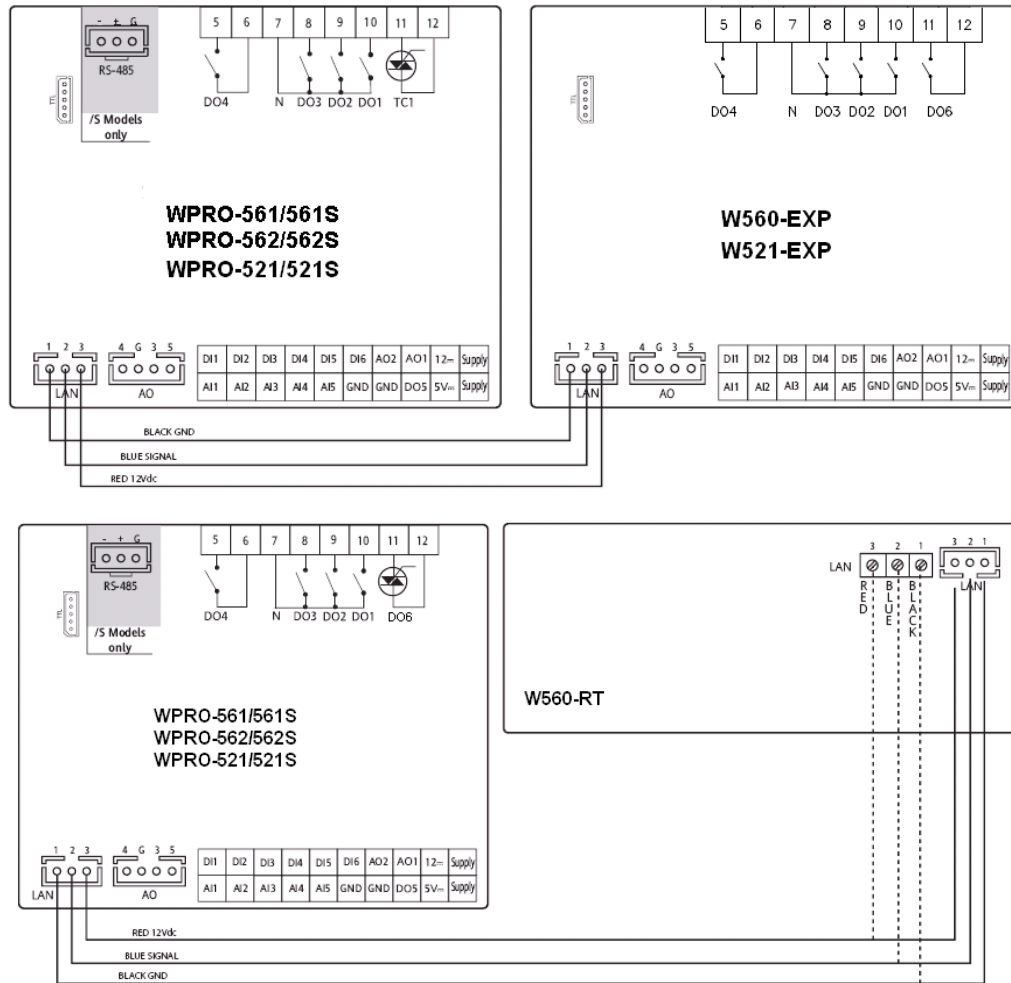
3.2.3 Example of connection of high voltage outputs

WPRO-560



Network connection examples

3.2.4 Example of WPRO-560 / W560-RT / W560-EXP connection



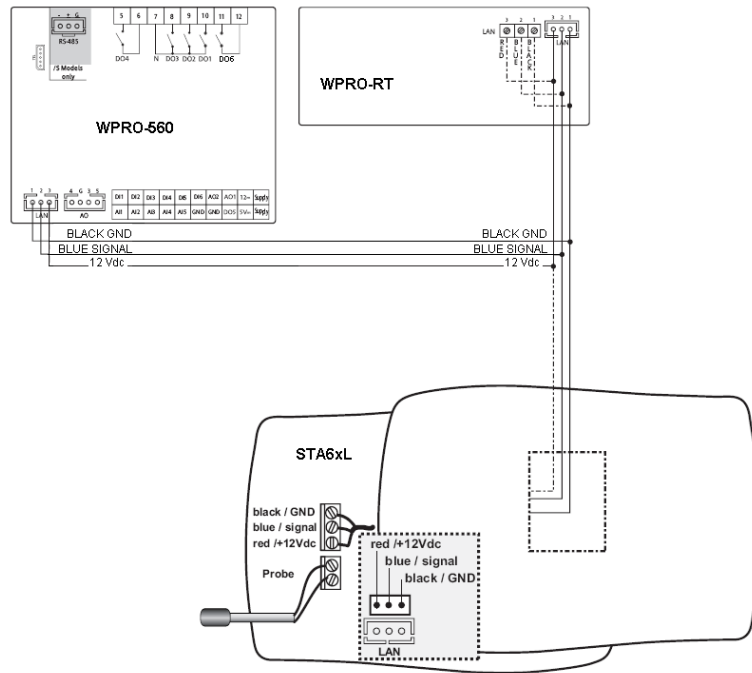
terminal	W560RT terminal	Description
1	1 BLACK	GND / black
2	2 BLUE	Signal / blue
3	3 RED	12V~ power supply from base module

STA6xL sensors

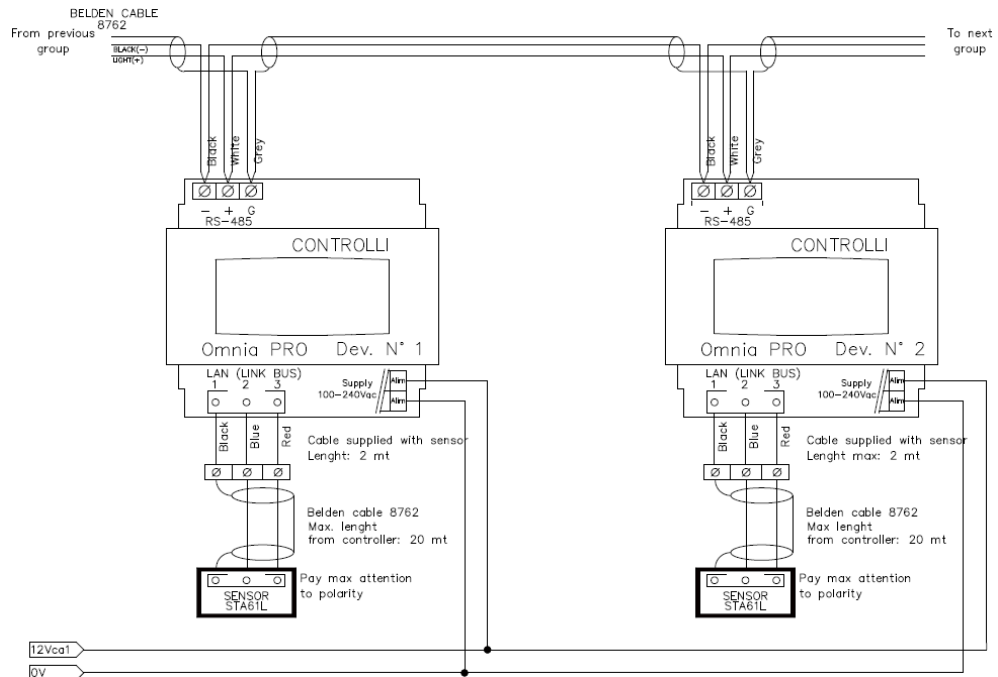
WPRO560	STA6xL	description
	AIR1	NTC integrated analogue input
1	GND / black	GND / black
2	Signal / Blue	Signal / blue
3	+12Vdc / red**	12V~ power supply from Smart
AIR2	-	Remote KEYBoard (remote terminal)

**the transducer can be powered from the +12Vdc terminal

3.2.5 Example of WPRO-560 – W560-RT – STA6xL connection



3.2.6 Example of Bus RS485 connection



4 TECHNICAL DATA

4.1 General specifications

	Standard	Min.	Max.
Supply voltage WPRO521D/DS and WPRO521/521S	100-240vAC	-10%	+10%
Supply voltage WPRO561D/DS and WPRO561/561S	12-24V~ /24Vc	-10%	+10%
Supply voltage WPRO562D/DS and WPRO562/562S (models with 2 TRIAC)	12-24V~	-10%	+10%
Power supply frequency	50Hz/60Hz	---	---
Power draw	6VA / 4W	---	---
Power draw for W521	4.3W	---	---
Insulation class	2	---	---
Room operating temperature	25°C	-20°C	55°C
Room operating humidity (non-condensing)	30%	10%	90%
Storage temperature	25°C	-40°C	85°C
Room storage humidity (non-condensing)	30%	10%	90%

Classification	
The product complies with the following European Community Directives	Directive 2006/95/EC Directive 89/108/EC
And complies with the following harmonized regulations	EN 60730-2-6 / EN 60730-2-9
Use	operating (not safety) device for incorporation
Mounting	panel or on DIN Omega bar support
Type of action	1.B 1.Y
Pollution class	2
Over voltage category	II
Nominal pulse voltage	2500V
Digital outputs	refer to the label on the device
Fire resistance category	D
Software class	A

4.2 I/O features

Type and Label	Description	WPRO561/561S WPRO561D/561DS	WPRO562/562S WPRO- 562D/562DS	WPRO521/521S WPRO- 521D/521DS
PWM/PPM OC low voltage (SELV) analogue outputs AO1 AO2	Open Collector PWM/PPM outputs Accuracy: 2% Nominal range 0...16.9Vc (12V~ rectified) Closing at 12Vc ** Max. current 35mA** (min. load 340Ohm @12Vcc)	OC: PWM	AO2 = TC2 (TRIAC)	x
Low voltage (SELV) analogue outputs AO3 AO4	0-10V max 28mA*** @10V outputs (min. 360 Ohm load resistance) 2% full scale accuracy Resolution: 1%	x	x	x
AO5	1 x 4...20mA / 0...20mA output 2% full scale accuracy Resolution: 1% • 0/4...20mA output, max load (max load resistance 350Ohm***)	x	x	

AO5	1 x 0...10V output on dedicated model 2% full scale accuracy Resolution: 1%			x
<i>Analogue inputs</i> AI1 AI2 AI5	3 configurable inputs: Pt1000 temperature, measurement range -50°C ÷ 400°C; Accuracy: 1% full scale Resolution: 0.1			x
<i>Analogue inputs</i> AI1 AI2 AI5	3 configurable inputs: a) NTC temperature 103AT 10kΩ, measurement range -50°C ÷ 99.9°C; b) no voltage digital input Accuracy: 1% full scale Resolution: 0.1	x	x	
<i>Analogue inputs</i> AI3 AI4	2 configurable inputs: a) NTC temperature 103AT 10kΩ, measurement range -50°C ÷ 99.9°C. b) 0...20mA/4...20 mA current input/0-10V/0-5V/0-1V voltage input measurement range -50.0 ÷ +99.9; c) no voltage digital input Accuracy: <ul style="list-style-type: none"> • 0-10V 1% full scale • 0-5V: 1% full scale • 0-1V: 2% full scale • 0...20mA /4...20mA: 1% full scale Resolution: 0.1 Input impedance (b): <ul style="list-style-type: none"> • 0-10V 21KOhm • 0-5V: 110KOhm • 0-1V: 110KOhm • 0...20mA / 4...20mA: 100Ohm 	x	x	x
Open Collector low voltage (SELV) digital output DO4*, DO5	2 x Open Collector outputs ** Max. current 35mA** @12VDC		x	
DO5	1 x Open Collector output ** Max. current 35mA** @12VDC	x		

* for WPRO562 models, DO4 is an open collector, **TC2 corresponds to AO2 (TC2=AO2)** - see chapter entitled **Physical I/O Configuration (PAr/CL..Cr folder)**

** Outputs AO1, AO2 and DO5 (typically connected to the device's auxiliary 12Vc output) cannot deliver more than **70mA** in total. Any other loads connected to the same 12Vc auxiliary output must also be taken into account.



If the **W560RT** keypad is connected to the device, the current becomes **55mA**.

***Outputs AO3, AO4 and AO5 cannot deliver more than 40mA total.

4.3 Mechanical specifications

	Description	All models except for WPRO521	WPRO521 models
	Terminals and connectors		
High voltage	1 x 8-way high voltage male connector For use in combination with the supplied female connector	✓	-
	1 x 2-way high voltage male connector For use in combination with the supplied female connector	-	✓
	1 x 7-way high voltage male connector For use in combination with the supplied female connector	-	✓
Low voltage	1 x 20-way snap-on low voltage connector To be used with COLV0000E0100	✓	-
	1 x 12-way low voltage male connector For use in combination with the supplied female connector	-	✓
	1 x 4-way connector	✓	-

	To be used with COLV000042100		
terminal	1 x 3-way LAN connector and terminal To be used with COLV000033200	✓	✓
RS485 serial <i>/S models</i>	1 x 3-way connector To be used with COLV000035100	<i>/S models</i>	-
	1 x 3-way low voltage male connector For use in combination with the supplied female connector	-	<i>/S models</i>
	Container		
	PC+ABS plastic resin with V0 flammability rating	All models	All models

4.4 Serials

Type	Label	Description	Models
<i>Serials</i>	TTL	1 TTL serial to connect CopyCard (MFK) or Personal Computer via interface module	All
	RS-485	RS-485 opto-isolated serial	<i>/S models</i>

4.5 Transformer

OmniaPRO must be connected to a suitable current transformer with the following features:

- Primary voltage: Depending on requirements of the individual device and/or country of installation.
- Secondary voltage: 12V~
- Power supply frequency: 50/60Hz
- Power: 6VA min. (*/S models*), 5VA (all other models)

4.6 Mechanical dimensions

	Length (L) mm	Depth (d) mm	Height (H) mm	Notes
W560 front panel	76.4	//	35	(+0.2mm)
WPRO560 front panel (cover)	70	//	45	(+0.2mm)
WPRO560 dimensions	70.2	61.6 56.4 from Din bar to cover	87	4DIN
Hole for W560RT panel- mounting	71	//	29	(+0.2mm /-0.1mm)

4.7 Permitted use

For safety reasons, the device must be installed and used in accordance with the instructions provided. In particular, parts carrying dangerous voltages must not be accessible under normal conditions.

The device must be adequately protected from water and dust with regard to the application, and must only be accessible using tools (with the exception of the front panel).

The device is suitable for use in household refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with harmonized European reference standards.

4.8 Improper Use

Any use other than that expressly permitted is prohibited.

The relay contacts supplied are of the functional type and are subject to fault (since they are electronically controlled they are prone to short-circuiting or remaining open). Any protection devices specified in product standards or suggested by common sense for obvious safety requirements must be installed externally to the device.

Controlli is not liable for damage caused by:

- Unspecified installation/use and, in particular, in contravention of the safety requirements of established legislation or specified in this document;
- Use on equipment which does not provide adequate protection against electrocution, water and dust in the actual installation conditions;
- Use on equipment in which dangerous components can be accessed without the use of specific tools;
- Installation/use on equipment which does not comply with established legislation and standards.

4.9 Disclaimer

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Every care has been taken in preparing this document; however, **Controlli Srl** cannot accept liability for any damage resulting from its use.

5 USER INTERFACE (FOLDER PAR/UI)

The front panel of the device functions as the user interface and is used to perform all operations relating to the device.

Note:

The WPRO561/561S and WPRO562/562S modules do not have a display. To operate on the device, use the W560RT remote terminal or STA6xL sensors.

5.1 Keys

Key	Press once (press and release)	Key [depending on the application; press for Ui26 seconds]
▲UP (UP)	<ul style="list-style-type: none"> Increase a value Go to next label 	F1
▼DOWN (DOWN)	<ul style="list-style-type: none"> Decrease a value Go to previous label 	F3
Esc(ape) Exit (Without saving new settings)	<ul style="list-style-type: none"> Exit without saving new settings Go back to previous level 	F2
Set Confirm (and save new settings)	<ul style="list-style-type: none"> Confirm value / exit and save new settings Move to next level (open folder, subfolder, parameter, value) Open state Menu 	F4

5.1.1 Description of keys – combined action

Symbol (function when keys are pressed together)	Combined pressing Single press (press and release)	(Associated Function)
F5	[F1+F3]	[Lets you switch from the BIOS menu in the main display to the main display of the PLC menu (if present)] See FREE Studio Quick Start for details
Prg	[F2+F4]	(Open programming <i>menu</i>)

5.2 LEDs and Display








The display has 18 icons (LEDs) split into 3 categories:



1. States and Operating Modes
2. Values and Units of Measure
3. Utilities



5.2.1 Display

Values of up to 4 figures or 3 figures plus a sign can be displayed.

5.2.2 LEDs

LED states and Operating Modes	Icons	Description	Colour
 <p>The <i>display</i> shows the value/resource set for the "main <i>display</i>".</p> <p>The Alarm icon lights up if there is an alarm.</p>		Alarm	Red
		Heating	Green
		Cooling	
		Standby	
		Defrost	
		Economy	

LED Unit of measure	Icons	Description	Colour
		Clock (RTC)	Red
	°C	Degrees centigrade	
	Bar	Pressure (Bar)	
	%R.H.	Relative humidity transducer RH	
	ABC	Menu (ABC)	

LED utilities	Icons	Description	Colour
		Utility	Amber

5.3 First switch on

	<p>When OmniaPRO is powered on for the first time, a lamp test is carried out to check its state and operation.</p> <p>-----</p> <p>The Lamp Test lasts for a few seconds. During this short time, all LEDs and digits flash at the same time.</p>
--	--

5.4 Access to folders - menu structure

Access to folders is organised into menus.

Access is determined by the keys on the front panel (see relative sections).

Access to each individual menu is explained below (or in the sections indicated). There are 2 menus:

- "States" menu → see "States Menu" section;
- "Programming" Menu → see "Programming Menu" section.

There are 3 folders/submenus in the Programming Menu:

- Parameters Menu (PAr folder) → see Parameters chapter.
- Functions Menu (Fnc folder) → see Functions chapter.
- PASS Password

5.4.1 "States" menu




From the states menu you can view values for each resource.

The resources may be present / not present depending on the model

<i>Label</i>							Description	Change
Ai	AIL1	AiL2	AIL3	AIL4	AIL5		LOCAL <i>analogue inputs</i>	//
Ai	Air1	Air2					TERMINAL <i>analogue inputs</i>	//
di	diL1	diL2	diL3	diL4	diL5	diL6	LOCAL <i>digital inputs</i>	//
AO	tCL1	AOL1	AOL2	AOL3	AOL4	AOL5	LOCAL <i>analogue outputs</i>	//
dO	dOL1	dOL2	dOL3	dOL4	dOL5	dOL6	LOCAL <i>digital outputs</i>	//
CL	HOUr	dAtE	YEAr				Clock	YES
AL	Er45	Er46					Alarms	//







As you can see from the table, only time can be modified and viewed:

5.4.1.1 Display of Inputs/Outputs (AiL, diL, tCL1/AOL, dOL)

Inputs/Outputs <i>display</i>		
		
<p>Example of view for Analogue Inputs. The same procedure applies to all other I/Os***</p> <p>The label Ai will appear on the display.</p> <p>(Use the UP and DOWN keys to scroll the other labels until you find the label required).</p>	<p>Press the set key to view the label for the first analogue input (AiL1 in this case).</p>	<p>Press the set key again to view the value of AiL1. Note that the °C icon lights up to indicate that the value shown is in degrees centigrade.</p> <p>-----</p> <p>Press the esc key to go back to the main display.</p>
<p>***For digital inputs/analogue inputs configured as digital, the value will be:</p> <ul style="list-style-type: none"> - 0 = Input not active (for digital inputs this is equivalent to input open, for analogue inputs configured as digital this is equivalent to input shortcircuited to ground). - 1 = Active input (for digital inputs this is equivalent to input shortcircuited to ground, for analogue inputs configured as digital it is equivalent to input open). 		




5.4.1.2 Setting the clock (CL)

FREE Smart has a clock (RTC) to run the alarm history just like a programmable chronothermostat. Instructions are provided below on how to set the time: the same procedure applies to change the date and year.

Setting clock		
		
<p>To change the clock on your machine, press the set key from the main display.</p>	<p>Pressing the set key once will open a list of the various folders. Use the "UP" and "DOWN" keys to find the CL folder.</p>	<p>Press the set key to open the CL menu.</p>
		
<p>On entering this menu, you will see HOUR. Use the "UP" and "DOWN" keys to select the time, date or year.</p> <p>Once you have decided what you want to set, press the [set]** key to open the modification menu for the variable selected.</p> <p>**press and hold for about 3 seconds.</p>		

		
To set the time, date and year, use the "UP" and "DOWN" keys to enter the required value, then	Press set.	Press the Esc key to exit the set clock menu and go back to the main display.

5.4.1.3 Alarm Display (AL)

Alarm display		
Press the set key from the main display		
		
The label Ai will appear on the display. Use the UP and DOWN keys to browse the other labels until you find the AL label.	Press the set key to view the label of the first active alarm (if it exists).	In this case, the first alarm is Er01. Use the UP and DOWN keys to scroll any other alarms. ----- Note: the menu is not cyclical. For example, if the active alarms are Er45 and Er46, the display will show: Er45 ->Er46<Er45 Note: -> UP, <-DOWN Press the esc key to go back to the main display.




5.4.2 Programming menu







Parameters	Parameter	CL	Cr	CF	Ui	Parameters
Functions	FnC					Functions
Password	PASS					Password

5.4.2.4 Parameters (folder PAR)

Modifying a parameter

Instructions are provided below on how to change a machine parameter. By way of example, let's look at the CL configuration parameters folder, parameter CL01 (folder PAR/CL/CL01).

Modifying a parameter -1		
		
Press the esc and set keys together to open the parameters menu. This will open the PAR menu.	The PAR parameters menu contains all device parameter folders. Press the set key to view all folders.	The first folder the controller shows is the CL configuration one. Just press the set key again to modify individual CL

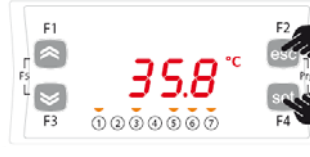


		<p>parameters.</p> 
		
<p>The CL00 parameter will be shown on the device (factory default settings).</p> <p>Press the "up" key to scroll through the various parameters or move to the next parameter (CL01 in this case) or the "down" key to go back to the previous parameter</p>	<p>Press the set key to view the value of the parameter (CL01 in this case).</p>	<p>For parameter CL01, the value shown will be 2. Press the "up" and "down" keys to modify this value.</p> <p>Press the set key once you have entered the required value. **</p> <p>Press the esc key to exit this display and go back to the previous level.</p> <p>**N.B. pressing the set key will confirm the value entered; Pressing the esc key will take you back to the previous level <u>without saving the value entered.</u></p>

5.4.3 Functions (Par/FnC folder)

See Functions chapter (folder FnC)

5.4.4 Entering a password (Par/PASS folder)

To view parameters visible for the given password, open folder PASS (press esc and set together [esc+set] from the main display and search the folder using the up/down keys) and set the PASS value.

Setting password		
		
<p>Press the esc and set keys together from the main display to enter the PASS folder. [esc+set]</p>	<p>Pressing the two keys will open the menu containing the list of folders. Use the "up" and "down" keys to scroll the list until you find the PASS folder.</p>	<p>Press the set key to open the PASS folder. Enter the password (installation or manufacturer) from here, press the set key and exit.</p> <p>Now open and view parameters to change a value (see parameters chapter).</p>

6 CONFIGURATION PHYSICAL I/O (FOLDER PAR/CL..CR)

6.1 Analogue inputs

The analogue inputs referred to below as AiL1...AiL5 are 5 in total.

Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be "physically" configured for each type of input:

- 3 inputs can be configured as temperature probes, an NTC type probe, or as digital inputs.
- 2 inputs (AiL3 and AiL4) can be configured as temperature probes, an NTC type probe, as digital inputs or current/voltage input
- 2 inputs (AiE3 and AiE4) can be configured as temperature probes, an NTC type probe, as digital inputs or current/voltage input (signal 4-20mA / 0-10V, 0-5V, 0-1V).

6.1.1 STA6xL analogue inputs

The analogue inputs referred to below as AIR1...AIR2 are 2

Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be "physically" configured for each type of input:

- 1 input configurable as NTC type temperature probe.
- 1 input configurable as NTC type temperature probe, digital input or current input (4-20mA signal).

Inputs can be "physically" configured as specified in the table below.

	Par	Description	0	1*	2	3	4	5	6	7	8
WPRO	CL00	Type of analogue input AiL1	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	//
	CL01	Type of analogue input AiL2	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	Pt1000 WPRO-521 models only
	CL02	Type of analogue input AiL3	Probe not configured	Probe configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V	0-20 mA	Pt1000 WPRO-521 models only
	CL03	Type of analogue input AiL4	Probe not configured	Probe configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V	0-20 mA	//
	CL04	Type of analogue input AiL5	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	Pt1000 WPRO-521 models only
W560-EXP	CE00	Type of analogue input AiE1	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	//
	CE01	Type of analogue input AiE2	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	//
	CE02	Type of analogue input AiE3	Probe not configured	Probe configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V	0-20 mA	//
	CE03	Type of analogue input AiE4	Probe not configured	Probe configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V	0-20 mA	//
	CE04	Type of analogue input AiE5	Probe not configured	Probe configured as no voltage digital input	NTC sensor	//	//	//	//	//	//
STA6xL	Cr00	Type of analogue input Air1	Probe not configured	//	NTC sensor	//	//	//	//	//	//
	Cr01	Type of analogue input Air2	Probe not configured	Probe configured as no voltage digital input	NTC sensor	4...20mA	//	//	//	0-20 mA	//

Note: // indicates that value is not present

*See Configuration of Digital Inputs

	Analogue input AI	Parameter	range	Description
WPRO560	AiL3	CL10	CL11...99.9	Analogue input AiL3 full scale value
	AiL3	CL11	- 50.0...CL10	Analogue input AiL3 start of scale value
	AiL4	CL12	CL13...99.9	Analogue input AiL4 full scale value
	AiL4	CL13	- 50.0...CL12	Analogue input AiL4 start of scale value
STA6xL	Air2	Cr10	CR11...99.9	Analogue input Air2 fullscale value
	Air2	Cr11	-50.0...Cr10	Analogue input Air2 start of scale value

The values read by analogue inputs can be calibrated using parameters CL20...CL24 / CR20...CR21

	Parameter	Description	Measurement Unit	Range
WPRO560	CL20	Analogue input AiL1 differential	°C	- 12.0..12.0
	CL21	Analogue input AiL2 differential	°C	- 12.0..12.0
	CL22	Analogue input AiL3 differential	°C / Bar	- 12.0..12.0
	CL23	Analogue input AiL4 differential	°C / Bar	- 12.0..12.0
	CL24	Analogue input AiL5 differential	°C	- 12.0..12.0
STA6xL	Cr20	Analogue input Air1 differential	°C	- 12.0..12.0
	Cr21	Analogue input Air2 differential	°C / Bar	- 12.0..12.0

6.2 Digital Inputs

The no voltage digital inputs referred to below as DI1...DI6 are 6 in total.

6.3 Digital outputs

See the chapter on Electric Connections for the number and capacity of relays/open collectors and for information on the symbols used on labels supplied with the device.

- High voltage outputs (relays) are identified as DO1, DO2, DO3, DO4 and DO6.
- The low voltage (SELV), open collector output is called DO5.

6.4 Analogue outputs

See the chapter on Electric Connections for the number and type of *analogue* outputs used and for information on the symbols used on labels supplied with the device.

There are 6 analogue outputs. 1 high voltage one and 5 low (SELV) voltage ones, the exact number depending on the following models and with the following characteristics:

Table A – Analogue Outputs and Models

uscita	Label a display	WPRO-562/S/D/DS	Open Collector PWM/PPM	0-10V	0...20mA 4...20mA	WPRO-562/S/D/DS	WPR-561/D/S/DS WPRO-521/S/D/DS
TC1	TCL1	3A 230V				•	
TC2	TCL2	3A 230V				•	
AO1	AOL1		•			•	•
AO2	AOL2		•				•
AO3	AOL3			•		•	•
AO4	AOL4			•		•	•
AO5	AOL5				•	• (4..20mA)	• (0..10V only WPRO521)
TC1	TCE1	3A 230V					
TC2	TCE2	3A 230V					
AO1	AOE1		•				
AO2	AOE2		•				
AO3	AOE3			•			
AO4	AOE4			•			
AO5	AOE5				•		

Triac Analogue Outputs (TC1, TC2)

One TRIAC output is a high voltage one and is generally used to pilot fans or water pumps. The output can be configured for proportional operation (constant speed variation) or as ON/OFF.



Remote control switches downstream from the Triac are NOT permitted

The output can be configured as described in table “Analogue Output TC1 - AO1 AO2: table”.

Configuration of low voltage (SELV) analogue output

AO1	AO2	AO3-AO4	AO5
always available. Configurable as: PWM/PPM (via CFS modules) or On/Off)	always available. Configurable as: PWM/PPM (via CFS modules) or On/Off)	low voltage (SELV) output to pilot external modules (e.g. to control fans).	low voltage (SELV) output to pilot external modules to run fans. It can be used to pilot 4-20mA fans or 0-20mA fans (via parameter CL60/CE60)

To configure, see the table below. All analogue outputs can be configured as digital or proportional.

Table B – Analogue Outputs

Analogue output TC1 - AO1 AO2

Output	Par.	Description	Values	Notes
TC1 Only <i>models</i> WPRO 562D/DS 562/562S	CL73 CE73	Analogue output TCL1 phase shift Analogue output TCE1 phase shift	0...90	Phase shift values to pilot Triac with cut-off in the event of inductive loads.
	CL76 CE76	Analogue output TCL1 pulse time Analogue output TCE1 pulse time	5...40 units (347...2776 µs)	Pulse length to pilot Triac (1 unit = 69.4 µs).

TCL1	CL70	Enable TRIAC output TCL1	0= WPRO561D/DS WPRO561/561S	
AO1	CL71 CE71	Enable AOL1 analogue output	0= Output configured as digital	If=0 see parameter CL96 / CE96
		Enable AOE1 analogue output	1= Output configured as Triac	(for pulse pilot) If =1 see parameters CL74 – CL77 – CL80 CE74 – CE77 – CE80
	CL74 CE74	Analogue output AOL1 phase shift Analogue output AOE1 phase shift	0...90	Active if CL71=1 / CE71=1
	CL77 CE77	Analogue output AOL1 pulse time Analogue output AOE1 pulse time	5...40 units (347...2776 µs)	Active if CL71=1 / CE71=1 (1 unit = 69.4 µs).
AO2 *	CL72 CE72	Enable AOL2 analogue output	0= Output configured as digital	If=0 see parameter CL97 / CE97
		Enable AOE2 analogue output	1= Output configured as <i>Triac</i>	(for pulse pilot) If =1 see parameters CL75 – CL78 – CL81 CE75 – CE78 – CE81
	CL75 CE75	Analogue output AOL2 phase shift Analogue output AOE2 phase shift	0...90	Active if CL72=1 / CE72=1
	CL78 CE78	Analogue output AOL2 pulse time Analogue output AOE2 pulse time	5...40 units (347...2776 µs)	Active if CL72=1 / CE72=1 (1 unit = 69.4 µs).

* In WPRO562D/DS and WPRO562/562S models AO2 is used as TRIAC (TC2).

**SELV
analogue
output AO3-4-
5**

Parameter	Description	Values
CL60 CE60	Type of analogue output AOL5 Type of analogue output AOE5	0=4-20mA Current analogue output 1=0-20mA Current analogue output 2=0-10V on dedicated model

The following can be piloted:

- Loads with output modulation or
- Loads with on/off type switching using
 - the Triac as switch (TC1 AO1 AO2).
 - the output as switch 0-10V (AO3-4).
 - the output as switch 0/4...20mA (AO5).

7 PARAMETERS (PAR)

Parameters are used to configure every aspect of OmniaPRO;

They can be modified with:

- The Multi Function key (MFK).
- Keys on the front panel or remote terminal.
- Personal computer and free Studio software.

THE DEVICE MUST BE TURNED OFF AND SWITCHED ON AGAIN AFTER BIOS PARAMETERS MODIFICATION

The following sections analyse each parameter, divided into categories (folders), in detail.

Each folder is designated with 2 figures (example: CF, UI, etc).

Folder label	Acronym meaning (label)	Parameters of:
CL	Configuration Local	Local I/O configuration
CE	Configuration Expansion	Configuration I/O Expansion
Cr	Configuration terminal	Terminal I/O configuration
CF	Configuration	Configuration
UI	User interface	User interface

Visibility and value of Parameters

OmniaPRO is a family of programmable controllers.

There are various hardware models with varying numbers of inputs/outputs.

Depending on the model, some configuration parameters may not be visible and/or of any significance given that the associated resource is not present.

Levels of visibility

Four levels of visibility can be set by assigning suitable values to each parameter and folder, by **serial, software** (free Studio or other communication softwares) **or by programming key**.

The visibility levels are:

- Value 3 = parameter or folder always visible.
- Value 2 = **manufacturer level**; These parameters can only be seen by entering the manufacturer's password (see parameter Ui28) (all parameters specified as always visible, parameters that are visible at the installation level, and manufacturer level parameters will be visible).
- Value 1 = **installation level**; these parameters can only be viewed by entering the installation password (see parameter Ui27) (all parameters specified as always visible and parameters that are visible at the installation level will be visible).
- Value 0 = parameter or folder NOT visible.

1. Parameters and/or folders with visibility level $\neq 3$ (i.e. password protected) will only be visible if the correct password is entered (installer or manufacturer) following the procedure outlined below:
2. Parameters and/or folders with visibility level =3 are always visible and no password is required; in this case, the procedure below is not required.

Refer also to the following table:

	hardware	TCL1 TCE1	TCL2 TCE2	DOL6 DOE6
OmniaPRO Model	WPRO562D/DS 562/562S	CL73-CL76 CE73-CE76	CL75-CL78 (AOL2) CE75-CE78 (AOE2)	
	WPRO561D/DS 561/561S	//	//	//

When not indicated otherwise, the parameter is always visible and modifiable, unless customised settings have configured via serial.

Note: parameters and folder visibility can both be controlled (See Folder table).

If folder visibility is modified, the new setting will apply to all parameters in the folder.

7.1 Parameters / visibility table, folder visibility table and client table

The **tables below** list all information required to read, write and decode all accessible resources in the device.

There are three tables:

- The **parameter table** contains all device configuration parameters stored in the non-volatile memory of the instrument, including visibility information.
- The **folders** table lists the visibility of all parameter folders.
- The client table includes all I/O and alarm status resources available in the volatile memory of the instrument.

Description of columns:

FOLDER	This indicates the label of the folder containing the parameter in question.
LABEL	This indicates the label used to display the parameters in the device menu.
VAL PAR ADDRESS	Indicates the address of the modbus register containing the resource you wish to access.
VIS PAR ADDRESS	Same as above. In this case, the parameter visibility value is in the MODBUS register address. By default, all parameters have <ul style="list-style-type: none"> • Data size WORD • Range 0...3** • U.M. num
	** See Setting Password (folder Par/PASS) paragraph, User Interface chapter.
VIS PAR VALUE	Indicates parameter / folder visibility <ul style="list-style-type: none"> ○ 0 = Never visible. Not visible from device ○ 1 = Level 1 – see Ui27 ○ 2 = Level 2 – see Ui28 ○ 3 = Always visible.
R/W	Indicates if resources are read/write, read-only or write-only: <ul style="list-style-type: none"> R Read-only resource W Write-only resource RW Read / write resource
DATA SIZE	Indicates the size of the data in bits. The dimension is always in WORD = 16 bit.
CPL	When the field indicates "Y", the value read by the register requires conversion, because the value represents a number with a sign. In the other cases the value is always positive or null. To carry out conversion, proceed as follows: <ul style="list-style-type: none"> • If the value in the register is between 0 and 32.767, the result is the value itself (zero and positive values). • If the value in the register is between 32.768 and 65.535, the result is the value of the register – 65.536 (negative values).
RANGE	Describes the interval of values that can be assigned to the parameter. It can be correlated with other instrument parameters (indicated with the parameter label). NOTE: If the actual value is outside the limits specified for the parameter itself (for example, because other parameters defining the limits in question have been varied), instead of the actual value the <u>value of the limit not respected is displayed.</u>
DEFAULT	

Indicates the factory setting for the standard model of the instrument. In this table we have the hardware model with 4 relays + TRIAC + 2 A01 AO2 Open Collector PWM/PPM analogue outputs + 1 low voltage analogue output A03.

EXP If = -1 the value read from the register is divided by 10 (value/10) to convert it to the values given in the RANGE and DEFAULT column and the unit of measure specified in the **U.M. column.**

Example: parameter CL04 = 50.0. Column EXP = -1:

- The value read by the device /free Studio is 50.0
- The value read from the register is 500 --> 500/10 = 50.0

U.M. Measurement unit for values converted according to the rules indicated in the CPL and EXP columns.

Measurement unit listed shall be considered as an example – it could depends on the application developed (i.e. parameters with U.M. °C/bar could have U.M. %RH)

7.1.1 BIOS Parameters / visibility table

(See next page).

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
CL	CL00	53304	WORD			53585	2	RW	Type of analogue input AiL1 <ul style="list-style-type: none"> • 0= Probe not configured • 1= DI • 2 = NTC 	0 ... 2	0	num
CL	CL01	53305	WORD			53586	2	RW	Type of analogue input AiL2 See CL00	0 ... 2	0	num
CL	CL02	53306	WORD			53587	2	RW	Type of analogue input AiL3 <ul style="list-style-type: none"> • 0= Probe not configured • 1= DI • 2 = NTC • 3=4..20mA • 4=0-10V • 5=0-5V • 6=0-1V 	0 ... 6	0	num
CL	CL03	53307	WORD			53588	2	RW	Type of analogue input AiL4 See CL02	0 ... 6	0	num
CL	CL04	53308	WORD			53589	2	RW	Type of analogue input AiL5 See CL00	0 ... 2	0	num
CL	CL10	15649	WORD	Y	-1	53590	1	RW	Analogue input AiL3 full scale value	CL11 ... 999	500	°C/Bar
CL	CL11	15655	WORD	Y	-1	53591	1	RW	Analogue input AiL3 start of scale value	-500 ... CL10	0.0	°C/Bar
CL	CL12	15650	WORD	Y	-1	53592	1	RW	Analogue input AiL4 full scale value	CL13 ... 999	500	°C/Bar
CL	CL13	15656	WORD	Y	-1	53593	1	RW	Analogue input AiL4 start of scale value	-500 ... CL12	0	°C/Bar
CL	CL20	53334	WORD	Y	-1	53594	1	RW	Analogue input AiL1 differential	-120 ... 120	0	°C
CL	CL21	53335	WORD	Y	-1	53595	1	RW	Analogue input AiL2 differential	-120 ... 120	0	°C
CL	CL22	53336	WORD	Y	-1	53596	1	RW	Analogue input AiL3 differential	-120 ... 120	0	°C/Bar
CL	CL23	53337	WORD	Y	-1	53597	1	RW	Analogue input AiL4 differential	-120 ... 120	0	°C/Bar
CL	CL24	53338	WORD	Y	-1	53598	1	RW	Analogue input AiL5 differential	-120 ... 120	0	°C
CL	CL60	53344	WORD			53599	2	RW	Type of analogue output AOL5 <ul style="list-style-type: none"> • 0 = 4-20mA • 1 = 0-20mA 	0 ... 1	0	num

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
CL	CL70	53346	WORD			53600	0	RW	Enable TRIAC output TCL1 <ul style="list-style-type: none"> • 0 = models without TRIAC • 1 = models with 1 TRIAC see CL73 – CL76 	0 ... 1	0	num
CL	CL71	53347	WORD			53601	2	RW	Enable analogue output AOL1 <ul style="list-style-type: none"> • 0 = Output configured as digital • 1 = models with 1 TRIAC see CL74 – CL77 	0 ... 1	0	num
CL	CL72	53348	WORD			53602	2	RW	Enable analogue output AOL2 <ul style="list-style-type: none"> • 0 = Output configured as digital • 1 = output configured as Triac – see CL75 – CL78 	0 ... 1	0	num
CL	CL73	53349	WORD			53603	0	RW	Analogue output TCL1 phase shift	0 ... 90	27	Deg
CL	CL74	53350	WORD			53604	2	RW	Analogue output AOL1 phase shift	0 ... 90	27	Deg
CL	CL75	53351	WORD			53605	2	RW	Analogue output AOL2 phase shift	0 ... 90	27	Deg
CL	CL76	53352	WORD			53606	0	RW	Analogue output TCL1 pulse time	5 ... 40	10	num (1 unit = 69.4 µsec)
CL	CL77	53353	WORD			53607	2	RW	Analogue output AOL1 pulse time	5 ... 40	10	num (1 unit = 69.4 µsec)
CL	CL78	53354	WORD			53608	2	RW	Analogue output AOL2 pulse time	5 ... 40	10	num (1 unit = 69.4 µsec)
CE	CE00	53792	WORD			53615	2	RW	Type of analogue input AIE1 <ul style="list-style-type: none"> • 0= Probe not configured • 1= DI • 2 = NTC 	0 ... 2	0	num
CE	CE01	53793	WORD			53616	2	RW	Type of analogue input AIE2 See CE00	0 ... 2	0	num
CE	CE02	53794	WORD			53617	2	RW	Type of analogue input AIE3 <ul style="list-style-type: none"> • 0 = Probe not configured • 1 = DI • 2 = NTC 	0 ... 7	0	num

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
									<ul style="list-style-type: none"> 3 = 4..20mA 4 = 0-10V 5 = 0-5V 6 = 0-1V 			
CE	CE03	53795	WORD			53618	2	RW	Type of analogue input AIE4 See CE02	0 ... 7	0	num
CE	CE04	53796	WORD			53619	2	RW	Type of analogue input AIE5 See CE00	0 ... 2	0	num
CE	CE10	15893	WORD	Y	-1	53620	1	RW	Analogue input AIE3 fullscale value	CE11 ... 999	500	°C/Bar
CE	CE11	15899	WORD	Y	-1	53621	1	RW	Analogue input AIE3 start of scale value	-500 ... CE10	0	°C/Bar
CE	CE12	15894	WORD	Y	-1	53622	1	RW	Analogue input AIE4 fullscale value	CE13 ... 999	500	°C/Bar
CE	CE13	15900	WORD	Y	-1	53623	1	RW	Analogue input AIE4 start of scale value	-500 ... CE12	0	°C/Bar
CE	CE20	53822	WORD	Y	-1	53624	1	RW	Analogue input AIE1 differential	-120 ... 120	0	°C
CE	CE21	53823	WORD	Y	-1	53625	1	RW	Analogue input AIE2 differential	-120 ... 120	0	°C
CE	CE22	53824	WORD	Y	-1	53626	1	RW	Analogue input AIE3 differential	-120 ... 120	0	°C/Bar
CE	CE23	53825	WORD	Y	-1	53627	1	RW	Analogue input AIE4 differential	-120 ... 120	0	°C/Bar
CE	CE24	53826	WORD	Y	-1	53628	1	RW	Analogue input AIE5 differential	-120 ... 120	0	°C
CE	CE60	53832	WORD			53629	2	RW	Type of analogue output AOE5 <ul style="list-style-type: none"> 0 = 4-20mA 1 = 0-20mA 	0 ... 1	0	num
CE	CE70	53834	WORD			53630	0	RW	Enable analogue output TCE1 <ul style="list-style-type: none"> 0 = models without TRIAC 1 = models with 1 TRIACsee CE73 – CE76 	0 ... 1	1	num
CE	CE71	53835	WORD			53631	2	RW	Enable analogue output AOE1 <ul style="list-style-type: none"> 0 = Output configured as digital – see CE96 1 = output configured as Triac – see CE74 – CE77 	0 ... 1	0	num
CE	CE72	53836	WORD			53632	2	RW	Enable analogue output AOE2 <ul style="list-style-type: none"> 0 = Output configured as digital – see CE97 1 = output configured as Triac – see CE75 – CE78 	0 ... 1	0	num

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
CE	CE73	53837	WORD			53633	0	RW	Analogue output TCE1 phase shift	0 ... 90	27	Deg
CE	CE74	53838	WORD			53634	2	RW	Analogue output AOE1 phase shift	0 ... 90	27	Deg
CE	CE75	53839	WORD			53635	2	RW	Analogue output AOE2 phase shift	0 ... 90	27	Deg
CE	CE76	53840	WORD			53636	0	RW	Analogue output TCE1 pulse time	5 ... 40	10	69 µsec
CE	CE77	53841	WORD			53637	2	RW	Analogue output AOE1 pulse time	5 ... 40	10	69 µsec
CE	CE78	53842	WORD			53638	2	RW	Analogue output AOE2 pulse time	5 ... 40	10	69 µsec
Cr	Cr00	53760	WORD			53609	2	RW	Type of local analogue input Air1 <ul style="list-style-type: none"> • 0= Probe not configured • 1 = Not used • 2 = NTC 	0 ... 2	0	num
Cr	Cr01	53761	WORD			53610	2	RW	Type of local analogue input AIR2 <ul style="list-style-type: none"> • 0= Probe not configured • 1= DI • 2 = NTC • 3 = 4..20mA 	0 ... 3	0	num
Cr	Cr10	15874	WORD	Y	-1	53611	1	RW	Local analogue input AIR2 fullscale value	Cr11 ... 999	0	num
Cr	Cr11	15876	WORD	Y	-1	53612	1	RW	Local analogue input AIR2 start of scale value	-999 ... Cr10	0	num
Cr	Cr20	53770	WORD	Y	-1	53613	1	RW	Local analogue input AIR1 differential	-12.0 ... 12.0	0.0	°C
Cr	Cr21	53771	WORD	Y	-1	53614	1	RW	Local analogue input AIR2 differential	-12.0 ... 12.0	0.0	°C/Bar
CF	CF01	53265	WORD			53639	2	RW	Select COM1 protocol Select COM1 (TTL) communication channel protocol: 0 = Eliwell; 1 = Modbus Note: <ul style="list-style-type: none"> • If CF01=0 parameters CF20/CF21 should be configured. • If CF01=1 parameters CF30/CF31/CF32 should be configured. 	0 ... 1	1	num
CF	CF20	53272	WORD			53640	1	RW	protocol controller address CF20= device index in family (values from 0 to 14) CF21 = device family (values valid from 0 to 14) The pair of values CF20 and CF21 represent the	0 ... 14	0	num

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
									device's network address and is indicated as "FF.DD" (where FF=CF21 and DD=CF20).			
CF	CF21	53273	WORD			53641	1	RW	protocol controller family See CF21	0 ... 14	0	num
CF	CF30	53274	WORD			53642	3	RW	Modbus protocol controller address Note: 0 (zero) is not included.	1 ... 255	1	num
CF	CF31	53275	WORD			53643	3	RW	Modbus protocol Baudrate <ul style="list-style-type: none"> • 0=not used • 1= not used • 2=not used • 3=9600 baud • 4=19200 baud • 5=38400 baud • 6=57600 baud • 7=115200 baud 	0 ... 7	3	num
CF	CF32	53276	WORD			53644	3	RW	Modbus protocol parity <ul style="list-style-type: none"> • 1= EVEN • 2= NONE • 3= ODD 	1 ... 3	1	num
CF	CF43	//	//	//	//	//	//	//	Firmware screen (Mask)	0 ... 999	412	num
CF	CF44	//	//	//	//	//	//	//	firmware release	0 ... 999	//	num
CF	CF50	53456	WORD			53645	0	RW	RTC present 0= RTC not present; 1 = RTC present	0 ... 1	0	num
CF	CF60	15639	WORD			53646	3	RW	Client code 1 Parameter for exclusive use of the customer/user. The client can assign these parameters values that e.g. identify the type and/or model of the system, and its configuration etc.	0 ... 999	0	num
CF	CF61	15640	WORD			53647	3	RW	Client code 2 See CF60	0 ... 999	0	num
UI	UI26	15715	WORD			53648	2	RW	Key hold time to enable function	0 ... 999	350	4ms

FOLDER	LABEL	VAL PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	VIS PAR VALUE	R/W	DESCRIPTION	RANGE	DEFAULT	U.M.
UI	UI27	15744	WORD			53649	1	RW	Installation password When enabled (value other than zero), constitutes the password for access to parameters.	0 ... 255	1	num
UI	UI28	15745	WORD			53650	2	RW	Manufacturer password When enabled (value other than zero), constitutes the password for access to parameters.	0 ... 255	2	num

7.1.2 Folder visibility table

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	VIS. PAR VALUE	U.M.
VisCarStati_Ai	53520	RW	Ai folder visibility	WORD	0 ... 3	3	num
VisCarStati_di	53521	RW	Visibility of folder	WORD	0 ... 3	3	num
VisCarStati_AO	53522	RW	AO folder visibility	WORD	0 ... 3	3	num
VisCarStati_dO	53523	RW	dO folder visibility	WORD	0 ... 3	3	num
VisCarProgPar	53525	RW	PAR folder visibility	WORD	0 ... 3	3	num
VisCarFnC	53526	RW	FnC folder visibility	WORD	0 ... 3	3	num
VisCarProgPASS	53527	RW	PASS folder visibility	WORD	0 ... 3	3	num
VisCarPrCL	53578	RW	Par\CL folder visibility	WORD	0 ... 3	1	num
VisCarPrCr	53579	RW	Par\Cr folder visibility	WORD	0 ... 3	1	num
VisCarPrCE	53580	RW	Par\CE folder visibility	WORD	0 ... 3	1	num
VisCarPrCF	53581	RW	Par\CF folder visibility	WORD	0 ... 3	3	num
VisCarPrUi	53582	RW	Par\Ui folder visibility	WORD	0 ... 3	1	num
VisCarCC	53584	RW	FnC\CC folder visibility	WORD	0 ... 3	3	num
VisCarCC\UL	53651	RW	FnC\CC\UL folder	WORD	0 ... 3	3	num

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	VIS. PAR VALUE	U.M.
			visibility				
VisCarCC\dL	53652	RW	Fn\CC\dL folder visibility	WORD	0 ... 3	3	num
VisCarCC\Fr	53653	RW	Fn\CC\Fr folder visibility	WORD	0 ... 3	3	num

7.1.3 Client Table

<i>CONTENTS</i>	<i>FOLDER</i>	<i>LABEL</i>	<i>ADDRESS</i>	<i>R/W</i>	<i>DESCRIPTION</i>	<i>DATA SIZE</i>	<i>CPL</i>	<i>RANGE</i>	<i>DEFAULT</i>	<i>EXP</i>	<i>U.M.</i>
1	AI	LocalAIInput[0]	8336	R	Analogue input AIL1	WORD	Y	-500 ... 999	0	-1	°C
2	AI	LocalAIInput[1]	8337	R	Analogue input AIL2	WORD	Y	-500 ... 999	0	-1	°C
3	AI	LocalAIInput[2]	8338	R	Analogue input AIL3	WORD	Y	-500 ... 999	0	-1	°C/Bar
4	AI	LocalAIInput[3]	8339	R	Analogue input AIL4	WORD	Y	-500 ... 999	0	-1	°C/Bar
5	AI	LocalAIInput[4]	8340	R	Analogue input AIL5	WORD	Y	-500 ... 999	0	-1	°C
6	DI	LocalDigInput DIL1	8192	R	Digital input DIL1 status	WORD		0 ... 1	0		num
7	DI	LocalDigInput DIL2	8193	R	Digital input DIL2 status	WORD		0 ... 1	0		num
8	DI	LocalDigInput DIL3	8194	R	Digital input DIL3 status	WORD		0 ... 1	0		num
9	DI	LocalDigInput DIL4	8195	R	Digital input DIL4 status	WORD		0 ... 1	0		num
10	DI	LocalDigInput DIL5	8196	R	Digital input DIL5 status	WORD		0 ... 1	0		num
11	DI	LocalDigInput DIL6	8197	R	Digital input DIL6 status	WORD		0 ... 1	0		num
13	DO	LocalDigOutput DOL1	8528	R	Digital output DOL1	WORD		0 ... 1	0		num
14	DO	LocalDigOutput DOL2	8529	R	Digital output DOL2	WORD		0 ... 1	0		num
15	DO	LocalDigOutput DOL3	8530	R	Digital output DOL3	WORD		0 ... 1	0		num
16	DO	LocalDigOutput DOL4	8531	R	Digital output DOL4	WORD		0 ... 1	0		num
17	DO	LocalDigOutput DOL5	8532	R	Digital output DOL5	WORD		0 ... 1	0		num
18	DO	LocalDigOutput DOL6	8533	R	Digital output DOL6	WORD		0 ... 1	0		num
19	AO	LocalDigOutput AOL1	8449	R	Digital output AOL1	WORD		0 ... 1	0		num
20	AO	LocalDigOutput AOL2	8450	R	Digital output AOL2	WORD		0 ... 1	0		num

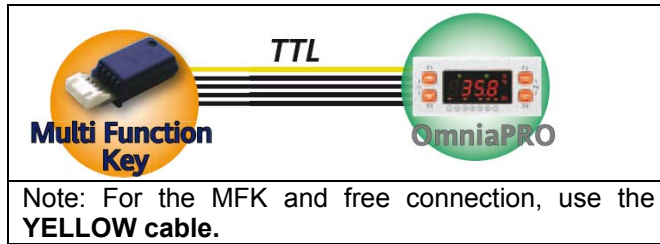
CONTENTS	FOLDER	LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	U.M.
21	AO	Analog.Out TC1	8448	R	Analogue output TCL1	WORD	Y	0 ... 100	0		num
22	AO	Analog.Out AOL1	8449	R	Analogue output AOL1	WORD	Y	0 ... 100	0		num
23	AO	Analog.Out AOL2	8450	R	Analogue output AOL2	WORD	Y	0 ... 100	0		num
24	AO	Analog.Out ALO3	8451	R	Analogue output AOL3	WORD	Y	0 ... 999	0	-1	num
25	AO	Analog.Out AOL4	8452	R	Analogue output AOL4	WORD	Y	0 ... 999	0	-1	num
26	AO	Analog.Out AOL5	8453	R	Analogue output AOL5	WORD	Y	0 ... 999	0	-1	num
27	AI	ExtAIInput[0]	8352	R	Analogue input AIE1	WORD	Y	-500 ... 999	0	-1	°C
28	AI	ExtAIInput[1]	8353	R	Analogue input AIE2	WORD	Y	-500 ... 999	0	-1	°C
29	AI	ExtAIInput[2]	8354	R	Analogue input AIE3	WORD	Y	-500 ... 999	0	-1	°C/Bar
30	AI	ExtAIInput[3]	8355	R	Analogue input AIE4	WORD	Y	-500 ... 999	0	-1	°C/Bar
31	AI	ExtAIInput[4]	8356	R	Analogue input AIE5	WORD	Y	-500 ... 999	0	-1	°C
32	DI	ExtDigInput DIL1	8224	R	Digital input DIE1 status	WORD		0 ... 1	0		num
33	DI	ExtDigInput DIL2	8225	R	Digital input DIE2 status	WORD		0 ... 1	0		num
34	DI	ExtDigInput DIL3	8226	R	Digital input DIE3 status	WORD		0 ... 1	0		num
35	DI	ExtDigInput DIL4	8227	R	Digital input DIE4 status	WORD		0 ... 1	0		num
36	DI	ExtDigInput DIL5	8228	R	Digital input DIE5 status	WORD		0 ... 1	0		num
37	DI	ExtDigInput DIL6	8229	R	Digital input DIE6 status	WORD		0 ... 1	0		num
39	DO	ExtDigOutput DOL1	8544	R	Digital output DOE1	WORD		0 ... 1	0		num
40	DO	ExtDigOutput DOL2	8545	R	Digital output DOE2	WORD		0 ... 1	0		num
41	DO	ExtDigOutput DOL3	8546	R	Digital output DOE3	WORD		0 ... 1	0		num
42	DO	ExtDigOutput DOL4	8547	R	Digital output DOE4	WORD		0 ... 1	0		num
43	DO	ExtDigOutput DOL5	8548	R	Digital output DOE5	WORD		0 ... 1	0		num
44	DO	ExtDigOutput DOL6	8549	R	Digital output DOE6	WORD		0 ... 1	0		num
45	AO	ExtDigOutput AOE1	8465	R	Digital output AOE1	WORD		0 ... 1	0		num
46	AO	ExtDigOutput AOE2	8466	R	Digital output AOE2	WORD		0 ... 1	0		num
47	AO	Analog.Out TCE1	8464	R	Analogue output TCE1	WORD	Y	0 ... 100	0		num

CONTENTS	FOLDER	LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	U.M.
48	AO	Analog.Out AOE1	8465	R	Analogue output AOE1	WORD	Y	0 ... 100	0		num
49	AO	Analog.Out AOE2	8466	R	Analogue output AOE2	WORD	Y	0 ... 100	0		num
50	AO	Analog.Out AOE3	8467	R	Analogue output AOE3	WORD	Y	0 ... 999	0	-1	num
51	AO	Analog.Out AOE4	8468	R	Analogue output AOE4	WORD	Y	0 ... 999	0	-1	num
52	AO	Analog.Out AOE5	8469	R	Analogue output AOE5	WORD	Y	0 ... 999	0	-1	num
53	AI	RemAIInput[0]	8432	R	Analogue input AIr1	WORD	Y	-500 ... 999	0	-1	°C
54	AI	RemAIInput[1]	8433	R	Analogue input AIr2	WORD	Y	-500 ... 999	0	-1	°C/Bar
55	alarm	Er45	NA	R	Clock faulty alarm	WORD		0 ... 1	0		flag
56	alarm	Er46	NA	R	Time loss alarm	WORD		0 ... 1	0		flag

Note: NA not accessible

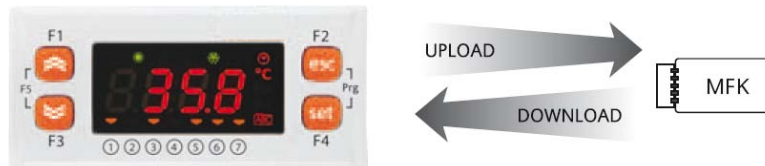
8 FUNCTIONS (FOLDER FNC)

When connected to the Energy TTL serial port, the Multi Function Key (MFK) allows you to rapidly program device parameters (up/download parameter map to or from one or more devices of the same type) and also program the device's firmware.



Connecting the Multi Function Key

For the rapid programming of parameters, upload operations (label UL), downloads (label dL) and formatting of the key (label Fr) should be done as follows:



UPLOAD (copy from DEVICE to MULTI FUNCTION KEY)

By doing this, the programming parameters will be downloaded from Free to the Multi Function Key.

DOWNLOAD (copy from MULTI FUNCTION KEY to DEVICE)

By doing this, the programming parameters will be uploaded from the Multi Function Key to the device.

FORMAT*

Formatting the Multi Function Key consists of deleting the contents of the Multi Function Key.

* This should be done prior to the Upload when used for the first time.

Upload / Download / Formatting		
<p>Upload / Download / Formatting The download procedure is illustrated in the example. Press [esc + set] in the main screen. The label 'PAR' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' label. Press 'set'. The label 'CC' will appear.</p>	<p>The commands you need to use the Multi Function Key are in the "CC" folder. Press "set" to access the functions.</p>	<p>Use the 'UP' and 'DOWN' keys to display the desired function:</p> <ul style="list-style-type: none"> • UL for upload • dL for download • Fr for format <p>Press the 'set' key and the upload (or download) will be performed. (in this example, dL-download).</p> <p>Wait for a few seconds</p>
		<p>If this completes successfully, 'yes' is displayed; otherwise 'Err' is displayed.</p> <p>On completion, remove the MFK</p>

8.1.1 Download from reset

Connect the Copy Card when the instrument is switched off.

Download firmware

At start up, if a compatible firmware is loaded into the MFK (the MFK can be prepared from this with the free Studio software), the new firmware is downloaded into the device.

This happens as follows:

- Firmware verification/update (MFK led flashes).
- Termination with successful programming (MFK on fixed).
- Switch off the device.

If a compatible firmware is not loaded into the MFK, no download takes place.

If, on termination, the MFK led does not stay on fixed, the operation must be repeated as this means it failed.

Download parameters

On start up, if there is a compatible parameter map in the MFK, the programming parameters are loaded into the device;

<i>Download from reset</i>		
▼	▼	▼
<p>Example A lamp test completed... ...dLY... appears on the display. If the procedure terminates successfully.</p>	<p>Example B lamp test completed... ...dLn... appears on the display. If the procedure was not completed successfully. (°)</p>	<p>In both cases, the device will be switched OFF locally (OFF appears on the display). When you press [DOWN] (°°), the device will operate:</p> <ul style="list-style-type: none"> • With the new map Example A • With the previous map Example B <p style="text-align: right;">Remove the Copy Card on completion</p>

NOTES:

- If the MFK is loaded with both a compatible firmware and a compatible parameter map, the firmware is downloaded first and then (after the device has been switched off and back on again manually) the parameter map.
- The formatting function is **ONLY REQUIRED FOR UPLOADING (**)**:
 - to use the Multi Function Key the first time (Multi Function Key that has never been used) and
 - to use the Multi Function Key with models that are not compatible.
 - (**) a pre-programmed card supplied by Eliwell to DOWNLOAD parameters does not need to be formatted. **NOTE: Formatting can NOT be cancelled.**
- After the download operation, the instrument will work with the newly loaded parameters map/firmware.
- Remove the key on completion of the operation.



(°) If the string Err / dLn (download from reset) appears:

- Check that the card is connected to the device.
- Check the Multi Function Key – free Smart connection (check the TTL cable).
- Check that the card is compatible with the instrument.
- Contact Controlli Technical Support.

(°°) see User Interface section.

9.1 General description

The FREE Studio development tool makes it possible to quickly and accurately create and customize new programs for all types of application. It is especially recommended for applications in the HVAC/R sector.

The use of several different programming languages, in accordance with IEC61131-3 (industrial control programming standard) means new algorithms or entire programs can be developed independently, downloadable in OmniaPRO modules via PC or multi-function key with the utmost confidentiality, thanks to the appropriate security safeguards.

9.2 Components

All basic components and accessories are described below.

9.2.1 FREE Studio software component

The Free Studio software application has a graphic interface and its functions will be illustrated in this manual. FREE Studio consists of two applications

- FREE Studio Application, the software developer part, to create and manage libraries, applications and diagnostics.
- FREE Studio Device, the dedicated user part, to manage previously developed applications, upload/download applications, and modify device parameters from a serial port.

9.2.2 DM Interface (DMI) component

USB/TTL DMI 100-3 MANUFACTURER hardware interface, to be used in association with the software package, allows:

- The use of the software itself.
- Connection to device/s for controlling it/them.
- Connection to Multi Function Key component.

PLEASE NOTE: supply OmniaPRO ONLY through DMI when downloading BIOS parameters and application in the device

9.2.3 Multi Function Key Component

This is a memory support, which allows you to:

- Update the device's parameter values.
- Updating the device's firmware.
- Download the parameter values from the device.

9.2.4 Connection cables

- Yellow cable, see 9IS42020 DMI – FREE Studio instructions for advice on use.
- Blue cable, see 9IS42020 DMI – FREE Studio instructions for advice on use.
- USB-A/A 2m extension lead.

10 MONITORING

The TTL serial - referred to also as COM1 – can be used to configure the device, parameters, states, and variables using the Modbus protocol.

Study the following tables:

Parameter.	Description	value	
		0	1
CF01	Select COM1 (TTL) protocol	private	Modbus

If CF01=0, the following parameters should be configured:

Parameter.	Description	Range
CF20	protocol controller address	0...14
CF21	protocol controller family	

Parameter.	Description	Range
CF30	Modbus protocol controller address	1...255
Parameter.	Description	Values
CF31	Modbus protocol Baudrate	<ul style="list-style-type: none"> • 0= not used • 1= not used • 2= not used • 3=9600 baud • 4=19200 baud • 5=38400 baud • 6=57600 baud • 7=115200 baud

10.1 Configuration with Modbus RTU

Modbus is a client/server protocol for communication between network-connected devices. Modbus devices communicate using a master-slave technique in which a single device (the master) can send messages. All other devices in the network (slaves) respond by returning the data required to the master or executing the action indicated in the message received. A slave is defined as a device connected to a network that processes information and sends the results to a master using the Modbus protocol.

The master can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only reply to messages received individually from the master.

The Modbus standard used by Eliwell uses RTU coding for data transmission.

10.1.1 Data format (RTU)

The data coding model used defines the structure of messages sent to the network and the way in which the information is decoded. The type of coding selected is generally based on specific parameters (baud rate, parity, etc)*** and some devices only support specific code models. However, the same model must be used for all devices connected to a Modbus network.

The protocol used the RTU binary method with the following bytes:

8 bits for data, even parity bit (not configurable), 1 stop bit.

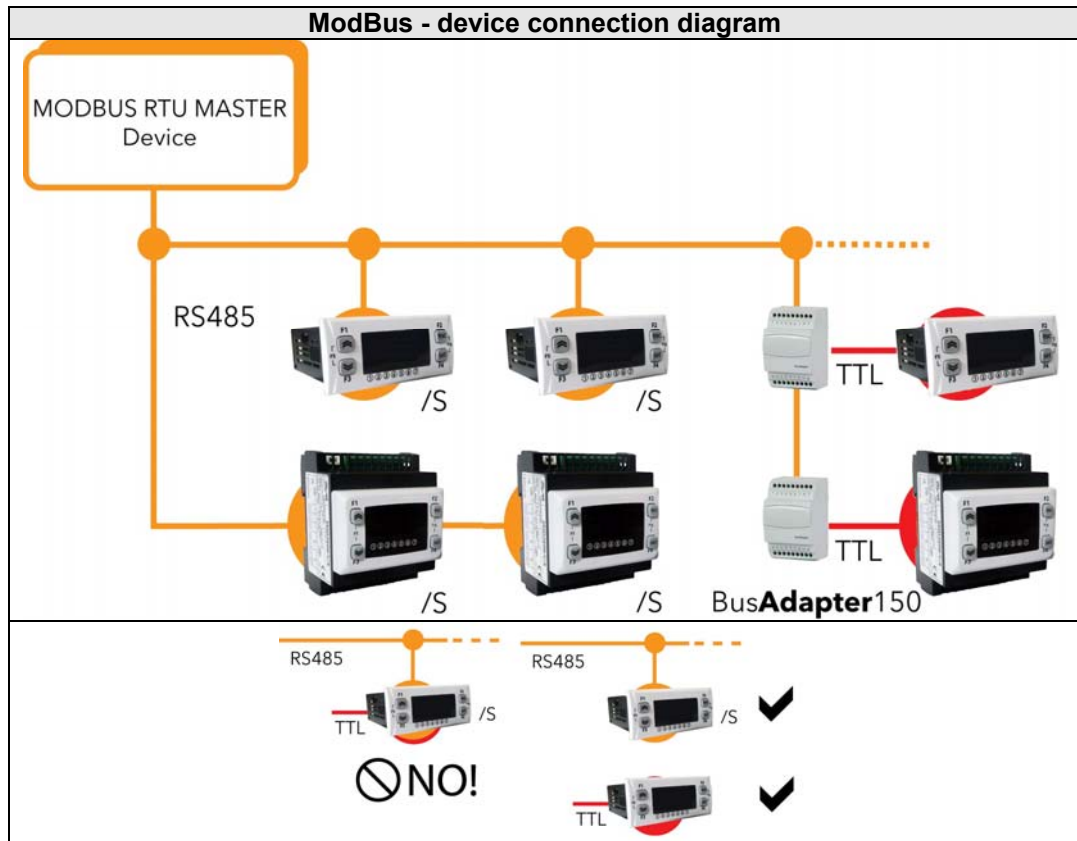
***configured with parameters **CF30, CF31 – see table at start of paragraph.**

The device is fully configurable via parameter settings.

They can be modified with:

- The instrument's keypad.
- Multi Function key.
- By sending data via the Modbus protocol straight to individual instruments, or via broadcast, using the address 0 (broadcast).

The connection diagram when using Modbus is shown below.



Device / Bus Adapter connection	5-wire TTL cable (30cm) in length (other measurements/lengths available)
Bus Adapter	BA150
Bus Adapter / Interface connection	RS485 cable shielded and twisted (example: Belden model 8762 cable)

10.1.2 Modbus commands available and data areas

The commands implemented are:

Modbus command	Description of command
3	Read multiple registers on Client side
16	Write multiple registers on Client side
43	Read device ID
	DESCRIPTION Manufacturer ID Model ID Version ID

Length restrictions

Maximum length in bytes of messages sent to device	30 BYTES
Maximum length in bytes of messages received by device	30 BYTES

Variables:

See Parameters chapter (PAr), Client table.

10.2 Configuration of device address

The Device Number in a ModBus message is defined by the parameter **CF30 – see table at beginning of this section.**

The address 0 is used for broadcast messages that all slaves recognize. Slaves do not reply to broadcast messages.

10.2.1 Configuration of parameter addresses

The list of addresses is given in the Parameters chapter under the section headed "Parameters Table / ADDRESS column visibility (parameters addresses) and VIS PAR ADDRESS (addresses visibility parameters).

10.2.2 Configuration of variable / state addresses

The list of addresses is given in the Parameters chapter, under the section headed Client Table ADDRESS column.

