

Life Is On

**eliwell**<sup>TM</sup>  
by Schneider Electric

# Free Optima

The powerful PLC for compact machines



[www.eliwell.com](http://www.eliwell.com)



# Free Optima: the powerful PLC for compact machines

Free Optima is the latest addition to the Free Way logic controllers' family, developed with the aim of improving the existing Free Smart range. It features an **increased memory, many connectivity options and an embedded Electronic Expansion Valve Driver**, all in the most compact 4 DIN form-factor.

## Applications

- Small and compact machines
  - Heat pumps
  - Process chillers
  - Pumping
  - Boilers/heaters/dryers
- For more complex machines just add I/O expansions.



**Low-GWP gas ready**  
Conform to EN/IEC 60335-2-40 related to A3 refrigerants, such as R290  
Suitable for A2L

**Green Premium product**  
Sustainable performance, by Design  
Compliance with environmental regulations

**1MB** to support simple and complex programs

**Less is more**  
Insulation everywhere simplifying machine wiring diagram and reducing the number of components

**Adaptive**  
One unit for super compact machines; for bigger ones, just add I/O expansions

**Multiple connection capabilities**  
to the other devices inside the machine  
Modbus RTU client and server,  
CANopen, USB-C, Remote display bus

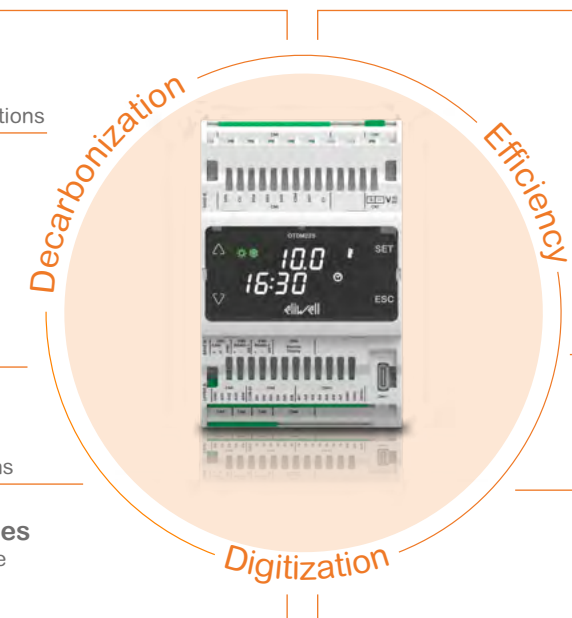
**Small dimensions**  
4-DIN module  
in three versions

**Flexible & Configurable**  
22 I/Os to adapt to different machines  
**Inputs:** NTC, PT1000, 0...5V, 0...10V, 4...20mA, voltage free, Pulse counter  
**Outputs:** Relay, SSR, PWM, 0...10V, 4...20mA

**Integrated EEVD**  
Integrated Unipolar Electronic Expansion valve driver

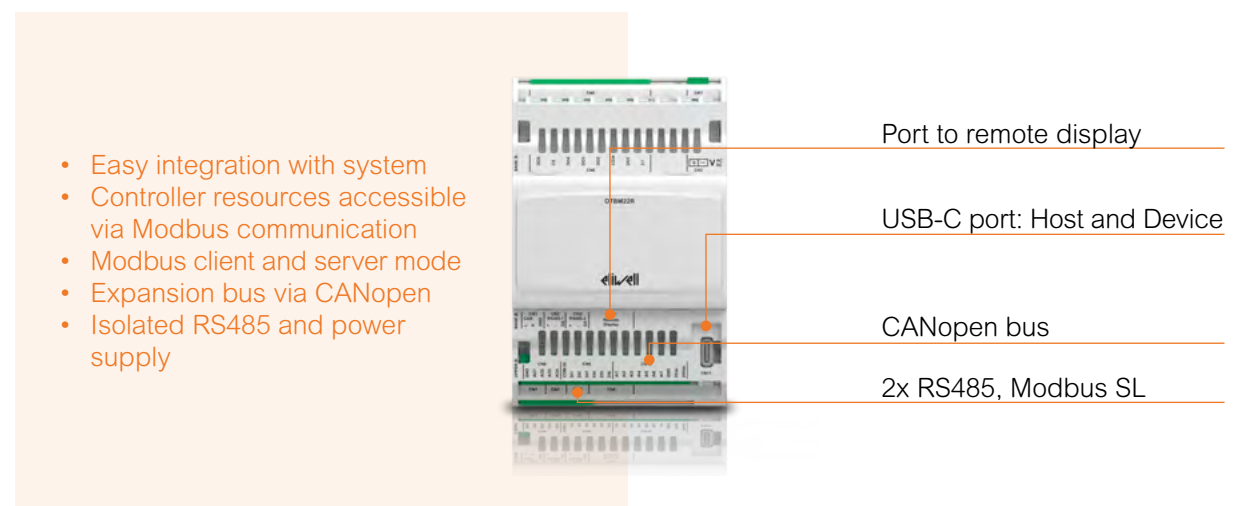
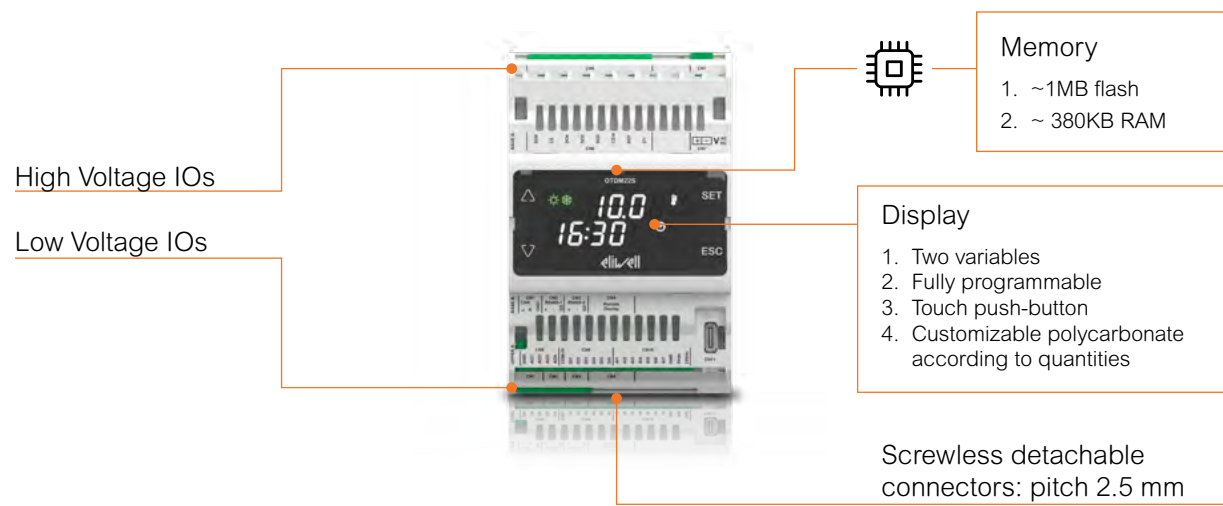
**Ready-to-use assets**  
simplifying programming  
IEC61131 - Many templates, libraries, function blocks available

**IoT on deck**  
Straightforward connection to the Secure Interface: cybersecure IoT module

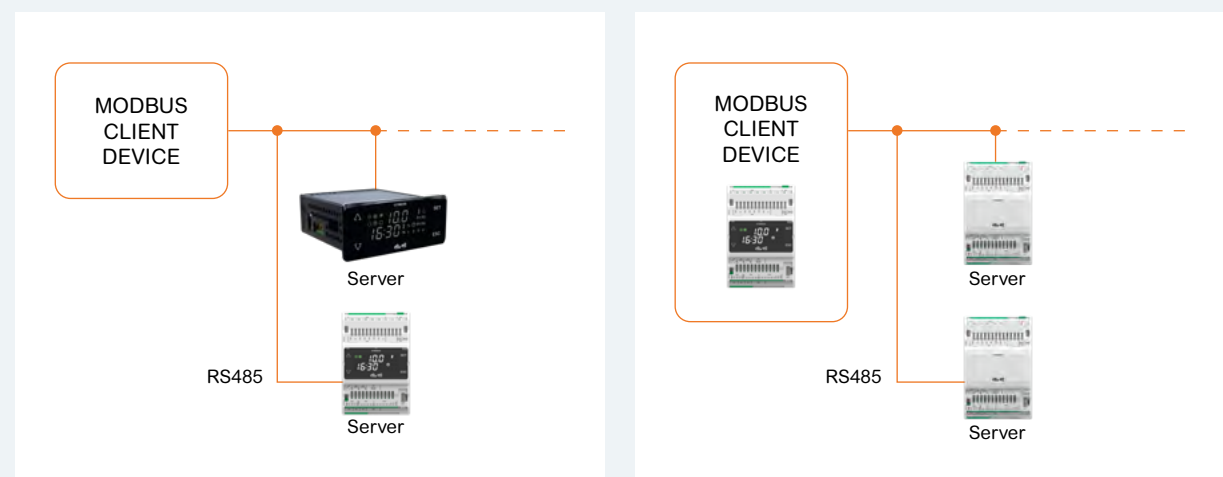




# Connectivity



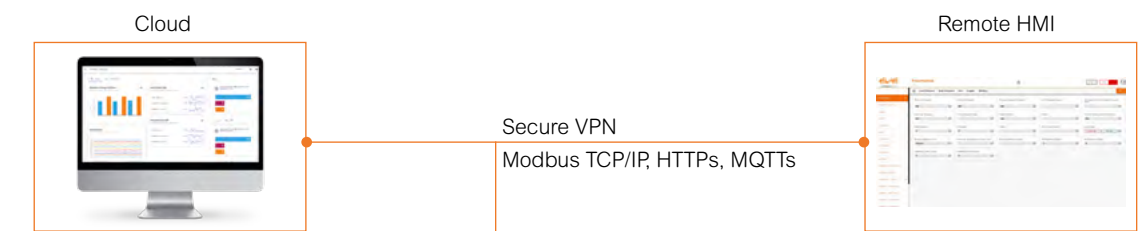
## Modbus server or client mode example



# Architecture

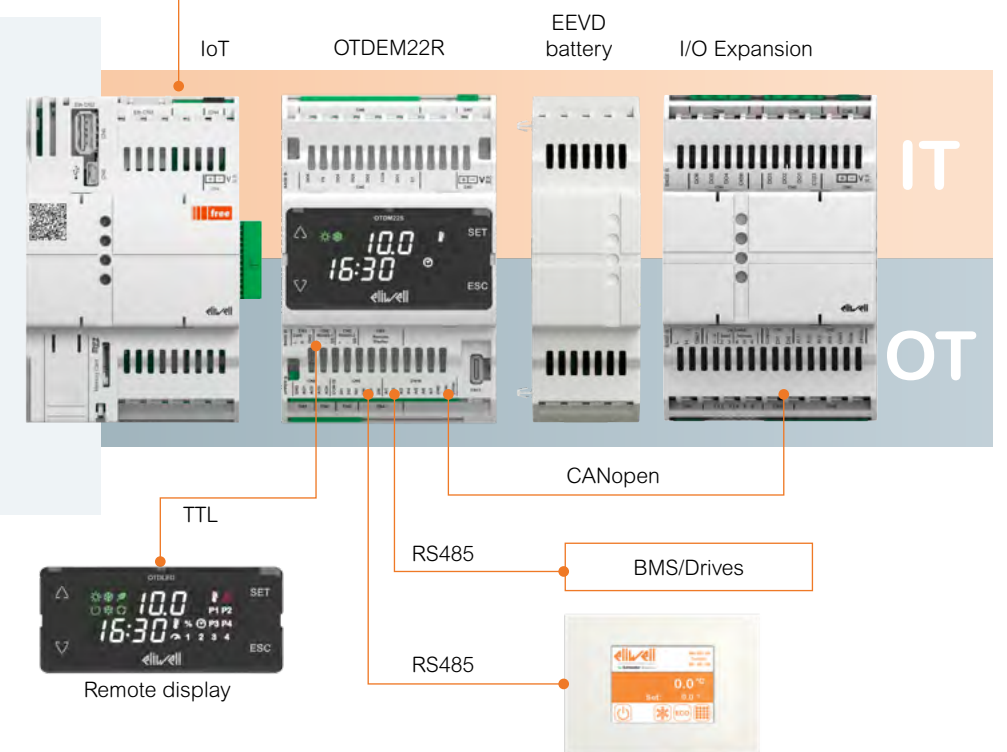
# Free Optima

Two ports on the side of the device provide connection to secure interface plug-in and backup EEVD battery.



## Secure Interface

- IoT ready device
- Access to cloud services
- Remote access to the machine via web server
- Connect to Building Management System
- VPN for safe connection



# Free Optima models

Models are available in **both 4 DIN rail mount version** (OTD with display, OTB without display) **and in the standard 32x74mm panel mount version** (OTF); with either **24Vac/dc** or **230/110 Vac** power supply (OTD and OTB only). OTD version come with integrated EEVD option (OTDE).



## Free Optima 24 Vac/dc

R identifies units with 5x relay DO - S identifies units with 3x relay, 2x SSR DO

Model	DI	AI	DO	AO	RS485 port	CAN bus	TTL for remote display	IoT connector	USB Type c	EEVD
OTDM22R	6	7	5	4	2	1	1	1	1	-
OTDM22S	6	7	5	4	2	1	1	1	1	-
OTDEM22R	6	7	5	4	2	1	1	1	1	✓
OTBM22R	6	7	5	4	2	1	1	1	1	-
OTFM22R	6	7	5	4	2	-	-	1	1	-
OTFM22S	6	7	5	4	2	-	-	1	1	-

## Free Optima 110...230 Vac

R identifies units with 5x relays DO - S identifies units with 3x relay, 2x SSR DO

Model	DI	AI	DO	AO	RS485 port	CAN bus	TTL for remote display	IoT connector	USB Type c	EEVD
OTDM22RH	6	7	5	4	2	1	1	1	1	-
OTDM22SH	6	7	5	4	2	1	1	1	1	-
OTBM22RH	6	7	5	4	2	1	1	1	1	-

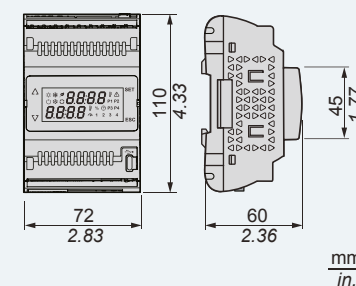
# Technical data

# Free Optima

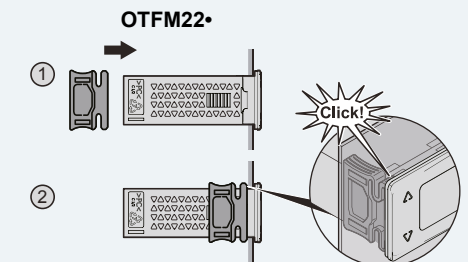
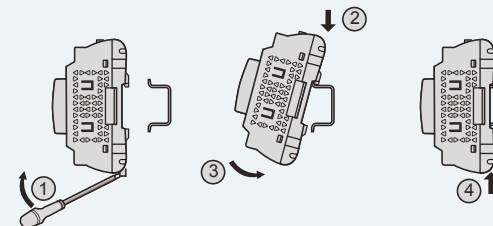
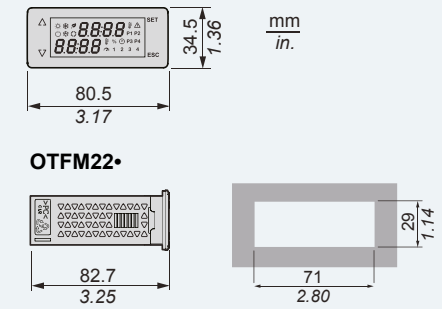
	OTDM22X	OTBM22X	OTFM22X
<b>Dimension HxWxD</b>	110x72x60 mm		34.5x80.5x82.7 mm
<b>Digital Inputs</b>	2x Voltage free or pulse reading - up to 2kHz		
	4x Voltage free		
<b>Analog Inputs (6x configurable by pair, 1x configurable)</b>	1x NTC(β3435 - 10 KW at 25 °C), PT1000, PTC, digital input, 0-10V		
	6x NTC(β3435 - 10 KW at 25 °C), PT1000, PTC, 4-20mA, 5 Vdc, 0...10 Vdc, digital input		
<b>Digital Outputs</b>	3x 5A SPST with the same common, 100k cycles - conforming to UL60730		
	2x 5A SPST with the same common, 100k cycles - conforming to UL60730 OR 2x SSR with the same common 110/240 Vac and 24 Vac		
<b>Analog Outputs</b>	1x 0...10 V / 4...20 mA		
	3x 0-10V/PWM - 10Hz...2kHz		
<b>Operating temperature</b>	-20...65 °C		

## Mount and dimensional diagrams

OTB\*\*\*\* / OTD\*\*\*\*  
DIN VERSION



OTFM22• / OTDLED  
FLUSH MOUNTING VERSION

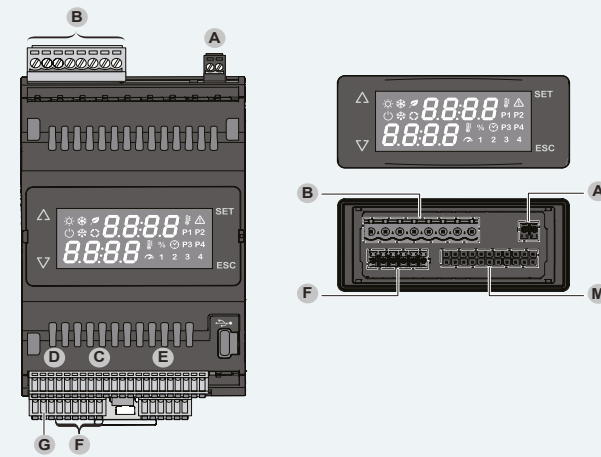
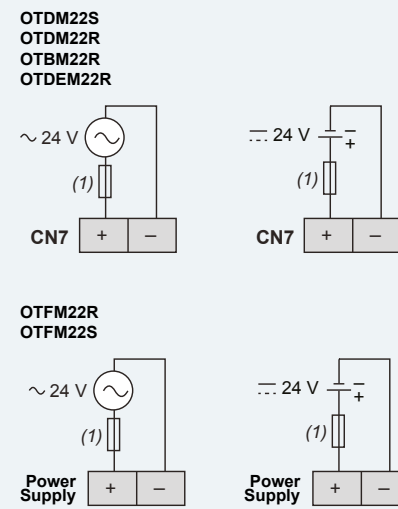


## Schemi elettrici

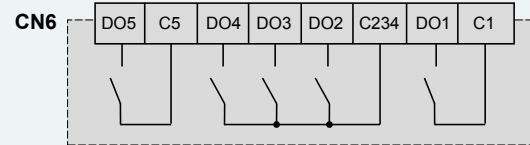
OTDM22R OTBM22R  
OTDM22S OTDEM22R

OTFM22R  
OTFM22S

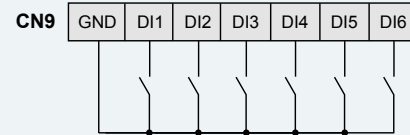
### A Power supply



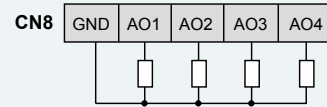
### B Digital outputs



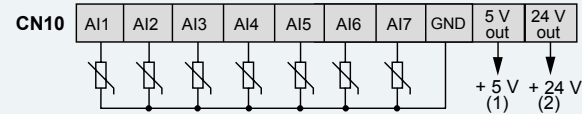
### C Digital inputs



### D Analog outputs



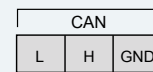
### E Analog inputs



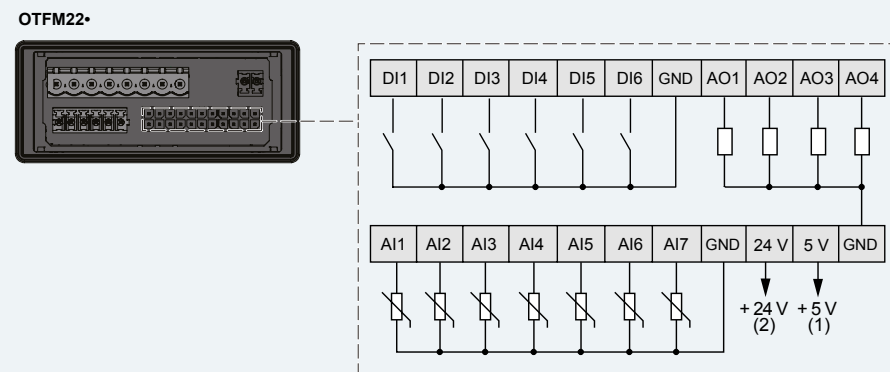
### F RS485



### G CAN bus



### M Microfit connectors (analog I/Os and digital inputs)



## Secure Interface

## Free Optima

**Secure Interface** is an edge device for IoT connection

- > Provides connection to **cloud services** based on AWS or MS Azure
- > **VPN** enables cyber-secure connection to any device
- > It is both a simple **ModBus gateway** and a **programmable device** for more complex connection and operation
- > It provides secure protocols as FTPs, HTTPs, SMTPs, MQTTs, SNMP, ModBus TCP/IP, NTP
- > It comes in two versions: **gateway** and **plug-in**

Gateway



Plug-In

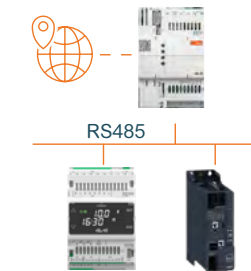


	AVS00GW	AVS00PI
Size	4 DIN	
Mount	On DIN rail	
Power supply	24 Vac ± 10% 50/60 Hz 20...38 Vdc (UL/CSA) 24 Vdc (IEC)	
Communication interfaces	1x USB-A, 1x USB-B mini 2x Ethernet 1x RS485	1x USB-A, 1x USB-B mini 2x Ethernet
Operating temperature	-20...55 °C	

### AVS00GW - Gateway

Can connect to several ModBus devices via the RS485 port located at the bottom of the device

Multiple device IoT connected:



### AVS00PI - Plug-In

Intended to connect to Free Optima via the local bus located on the right-hand side of the device

Single machine IoT connected:



Free Optima offering is completed by various I/O expansions for additional connectivity options and larger machine applications.



	EVE7500	EVE4200
<b>Size</b>	8 DIN	4 DIN
<b>Mount</b>	DIN rail	DIN rail
<b>Power supply</b>	24Vac/dc - 48 Vdc isolated	24Vac/dc
<b>DO</b>	2x 8A 250 Vac 5x 5A 250 Vac	1x 5A 250 Vac 3x 3A 250 Vac
<b>AO</b>	5x 0-10V / 4...20mA / switch 0...20mA	2x 0-10V
<b>DI</b>	8x SELV 1x voltage free fast counter 1 kHz	4x SELV
<b>AI</b>	2x NTC 103 AT / NTC NK103 / D.I. 4x NTC 103 AT / NTC NK103 / D.I. / Pt1000 / 4...20 mA / 0-10 V / 0-5 V	4x NTC 103AT / NTC NK103 / D.I. / Pt1000 / PTC / 4...20 mA / 0-10 V / 0-5 V
<b>Connectivity</b>	CANBus isolated: CANopen RS485 isolated: Modbus RTU 1x EVS Plugin (only EVS RS485, EVS CAN)	CANBus isolated: CANopen
<b>Operating temperature</b>	-10...+55 °C	-10...+55 °C

EVE6000	EVE10200	EP4S00LIV500	EP4S0024V500
4 DIN		4 DIN	
DIN rail		DIN rail	
24 Vac 20...38 Vdc		24 Vac 20...38 Vdc	
6x 3A 250 Vac	10x 3A 250 Vac	4x SPST 3A 250 Vac 3x SSR 75...240 Vac	4x SPST 3A 250 Vac 3x SSR 24 Vac/dc
-	2x 0-10 V, 2x 0-10 V / 4...20 mA / ON-OFF / PWM / O.C. 24 Vdc 30 mA max	2	
2x pulse/frequency counters up to 2kHz	4x SELV 2x pulse/frequency counters up to 2kHz	6	
4x NTC 103 AT / NTC NK103 / D.I. / PTC KTY81 / Pt1000 / 0...20 mA / 4...20 mA / 0-10 V / 0-5 V	10x NTC 103 AT / NTC NK103 / D.I. / PTC KTY81 / Pt1000 / 0...20 mA / 4...20 mA / 0-10 V / 0-5 V	10	
CANBus: CANopen		CANBus	
-20...+65 °C		-20...+65 °C	



# Electronic Expansion Valve Drivers

OTDEM22R model comes with an **integrated EEVD**. For all the other models, **external drivers are available**.

The embedded EEVD on OTDEM22R can drive **1 unipolar valve** and works on a 6-wires connector structured as follows:  
WMOT, WMOT, W1+, W1-, W2+, W2-

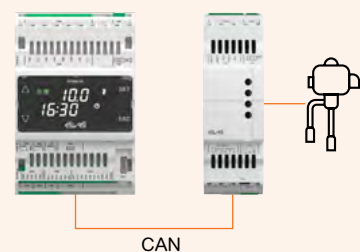
## External valve drivers



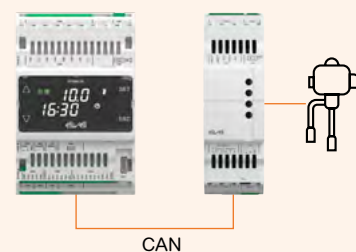
	EVEVD1U	EVEVD1B	EVEVD2B	EVEVBAT
<b>Size</b>	2 DIN	2 DIN	4 DIN	2 DIN
<b>Power supply</b>	24 Vac ± 10% - 50/60 Hz / -20...38 Vdc functional insulation			
<b>Valve control output</b>	1x unipolar	1x bipolar	2x bipolar	-
<b>Connectivity</b>	CANBus			
<b>Operating temperature</b>	-20...+65 °C			

## Architecture examples

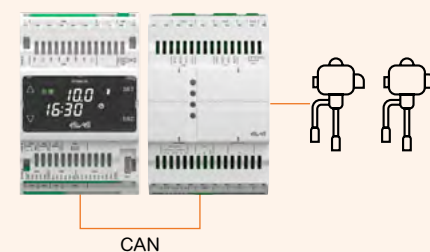
Unipolar Electronic Expansion Valve



Bipolar Electronic Expansion Valve



2x Bipolar Electronic Expansion Valve



# Remote displays

# Free Optima



	OTDLED
<b>Size</b>	74x32mm
<b>Mount</b>	Panel
<b>Display</b>	LED touchscreen - double variable display
<b>Power supply</b>	From controller
<b>Connectivity</b>	TTL
<b>Operating temperature</b>	-20...+65 °C



	AVP1000/P	AVP1100/C	AVP1200/C	AVP1300/C
<b>Size</b>	134x96x35mm	120x86x25mm		
<b>Mount</b>	Panel	Wall		
<b>Display</b>	320x240 3.5" touchscreen			
<b>Power supply</b>	24Vac/dc	24Vac/dc		
<b>Connectivity</b>	RS485, micro-USB (programming)			
<b>Operating temperature</b>	-20...+60 °C	0...+50 °C		
<b>Built in probe</b>	None	Temperature	Temperature, RH	Temperature, RH, presence

In association with Free Optima, Eliwell supplies a vast range of accessories, from a protected transformer to temperature probes, pressure transducers and switches.

## Temperature probes



CODE	DESCRIPTION	DETAILS
<b>SN8DAC11502AV</b>	Fast response NTC 4x40 1.5m IP67	-50...110 °C
<b>SN8DED11502C0</b>	NTC 103 AT 5X20 1.5m TP IP68	-50...110 °C
<b>SN8DAE11502C0</b>	NTC 103 AT 6X20 1.5m TP IP68	-50...110 °C
<b>SN9DAE11502C6</b>	Pt1000 6X20 1.5m IP68	-50...110 °C
<b>SN9DED11502C6</b>	Pt1000 5X20 1.5m IP68	-50...110 °C
<b>SN400004</b>	Wide range TCK 6x200 1.0m IP45	-40...1150 °C

## Pressure transducers



CODE	DESCRIPTION	DETAILS
<b>TD220050B</b>	4...20mA / 0...667 psi / 0...50 bar IP54 2m cable	1/4 SAE PLUG
<b>TD220007B</b>	4...20mA / -7...101.5 psi / -0.5...7 bar IP54 2m cable	1/4 SAE PLUG
<b>TD320050B</b>	4...20mA / 0...667 psi / 0...50 bar IP54 2m cable	1/4 SAE SOCKET
<b>TD320007B</b>	4...20mA / -7...101.5 psi / -0.5...7 bar IP54 2m cable	1/4 SAE SOCKET

## Ratiometric transducers



CODE	DESCRIPTION	DETAILS
<b>TD420010B</b>	0...145 psi / 0...10 bar IP67 2 m cable	Female connection
<b>TD420030B</b>	0...508 psi / 0...30 bar IP67 2 m cable	Female connection
<b>TD420050B</b>	0...667 psi / 0...50 bar IP67 2 m cable	Female connection

## Demo case



CODE	DESCRIPTION	DETAILS
<b>VAL0034</b>	Demo Case for Free Optima	-

## Transformers



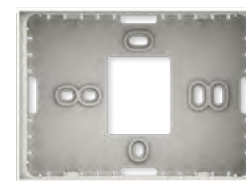
CODE	DESCRIPTION	DETAILS
<b>TF111205</b>	Transformer 230V~/24V 35 VA DIN rail mount	-

## Converters



CODE	DESCRIPTION	DETAILS
<b>SAR0RA00X701</b>	USB/485 converter	3 kV opto-insulated
<b>SAR0RN00XU00</b>	USB/485 converter	No insulation

## Base plates

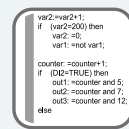


CODE	DESCRIPTION	DETAILS
<b>AVA00WMRC0000</b>	White base plate for wall mount	For AVP1000
<b>AVA00WMRC0001</b>	Gray base plate for wall mount	

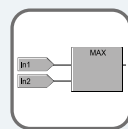


FREE Studio plus is the universal programming software for machines automated by the Free Way PLCs. It allows developers to program in various working environments and access to **constantly updated functions and optimizations**, available in the specific area of the Eliwell web site.

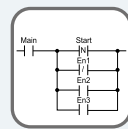
- Compatible with the 5 IEC 61131-3 standard programming languages (ST, FBD, LD, IL, SFC)
- Advanced debug and simulation options plus complete and effective online Help
- Advanced communication features such as remote control and download
- Webserver creation from the software
- Tools for easy commissioning



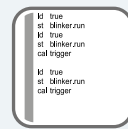
ST



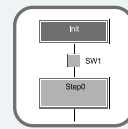
FBD



LD



IL



SFC

MINIMUM KIT FOR DEVELOPERS	AVAILABLE RESOURCES The IEC programmer includes the following resources:	
•FREE Studio Plus installation setup •1 Free Optima •USB-C cable for PC connection •Free Optima power transformer	<b>CPU</b>	160 MHz
	Available memory for <b>Programming</b>	1 MB
	RAM memory - automatic mapping for <b>Programming and Display</b>	378 kB
	Retain data space	8 kB
	<b>RAM memory</b> - ModBus mapping	10 kB
	<b>Parameters area</b> - ModBus mapping	10 kB

The **Application Expert Center** constantly develops and updates additional contents to be integrated into Free Studio and fit any specific need customers might have for their application

Additional solutions for FREE Studio Plus are available for download at the dedicated area on the eliwell.com website and include:

- Always up-to-date application
- Function libraries add-ons
- New Application Function Blocks
- HMI templates
- Web templates and sample projects
- How-to guides
- Training
- Documentation.



Web server template



HMI user interface

### Installation requirements

- **Operating Systems:** Windows 10/11 - 64 Bit
- **Hardware requirements:** 1GB hard disk space / 2 GB RAM (4 GB preferred) / 1.6 GHz processor or greater

The installation setup, software updates, libraries and documentation are available on the eliwell.com website, after registration for access to the private area.

The USB port on Free Optima works both as host and device and allows for easy update and commissioning

USB Host USB Drive → ← Free Optima		
<b>Data download direction</b>	→	←
<b>Parameter map</b>	✓	✓
<b>IEC application</b>	✓	-
<b>BIOS</b>	✓	-

USB Device / RS485 / Ethernet PC → ← FREE Optima		
	USB-A to USB-C cable	
	USB to RS485 cable	
	Ethernet cable with Secure Interface	
<b>Data download direction</b>	→	←
<b>Parameter map</b>	✓	✓
<b>IEC application</b>	✓	-
<b>BIOS</b>	✓	-

# Access useful resources and increase your knowledge

## DOCUMENTATION



DOWNLOAD HERE



For additional technical information about FREE Optima and other devices from the FREE Way family consult the detailed user manuals available for download at [eliwell.com](http://eliwell.com) or scanning the QR CODE.

## DIGITAL ACADEMY



ACCESS HERE



The all-in-one place where customers can explore and learn everything about Eliwell solution offer and increase their knowledge and business.

## UPDATE CENTER



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**Access the Software area**

for security updates and drivers for communication  
with always up-to-date controllers



[eliwell.com/software](https://eliwell.com/software)



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Since 1980, Eliwell has been developing and manufacturing control systems, solutions and services for both commercial and industrial refrigeration units. It embodies the success story of an Italian company that has brought Made in Italy technological developments to the world for over 40 years. In 2014, it became part of the Schneider Electric group and remains its centre of excellence for HVACR applications. Together with Schneider Electric, Eliwell is now the global partner providing efficient and sustainable solutions and services for food storage and distribution systems, and for integrated resource control of environmental comfort installations.