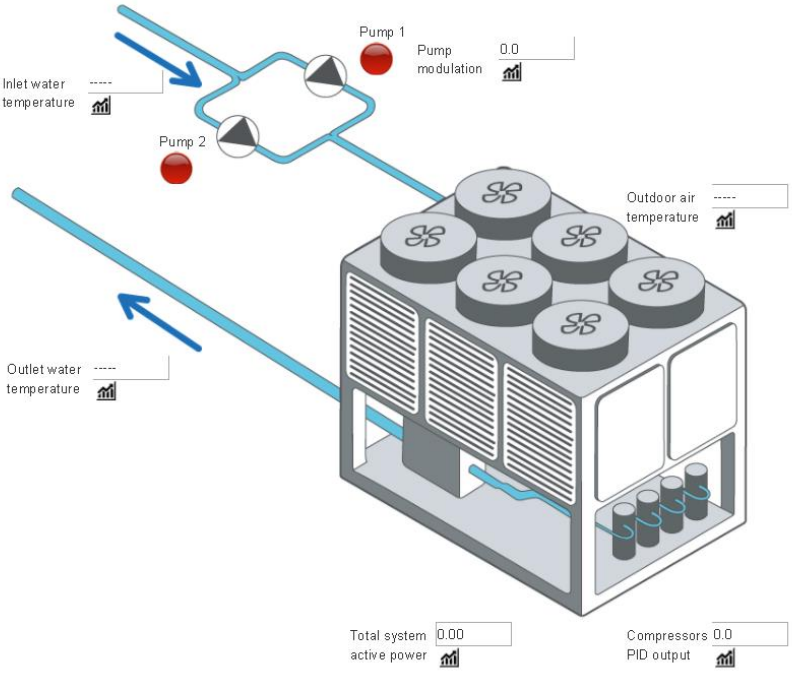
Air/Water Chiller-Heat Pump Baseline

User Guide



09/18

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Document History

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Safety Information

Notice

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER
DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING
WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION
CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury or equipment damage.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing the equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

Product Related Information

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

This equipment has been designed to operate outside of any hazardous location. Install this equipment only in areas known to be free of a hazardous atmosphere.

DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines (1).
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury or equipment damage.

(1) For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software tools approved by Schneider Electric for use with this equipment.
- Update your application program every time you change physical hardware configuration.

Failure to follow these instructions can cause death, serious injury or equipment damage.

1. Introduction

1.1. Document Scope

This User Guide provides a reference to the **Base Line Chiller/Heat pump Complex** application based on Free Advance Controller.

1.2. Validity Note

This document has been updated with the release of Free Studio 3.8.0

1.3. Product description

The product is an AVD controller programmed with the Baseline Air/Water Cooled Chiller/Heat pump application.
The Baseline Air/Water Cooled Chiller/Heat pump application will manage the product listed in the following table.

Component	Reference Documentation
AVD12600	AVD1260060500 Main CPU controller
EVE1020	EVE1020000500 Can Expansion
EVK1000	EVK1000000 Remote HMI
XVD420	XVD420H485000 Electronic expansion valve
Altistart22	998-1175971 AltiStart Family Brochure (Soft Start Optional: Change in the PLC HMI menu Parm.compressor the value of the parameter **02.072** “Comm. SoftStartMB”) BBV51330 ATS22 User manual
Altivar 212	AR021 Argu-Cat Altivar 212 (Inverter driver: Change in the PLC HMI menu Parm.compressor the value of the parameter **02.073** “MB Comm. Comp Inv”) (Fan driver: Change in the PLC HMI menu Parm.compressor the value of the parameter **02.074** “MB Comm. Fan Inv”) S1A53832 ATV212 Programming manual

Component	Reference Documentation
iEM3250	Energy meter used for COP Calculation (Change in the PLC HMI menu Parm.compressor the value of the parameter **02.070** “Energy Meter”) NHA15795 iEM3200 / iEM3250 Installation sheet DOCA0005 iEM3000 series - Energy Meters - User Manual

1.4. Controller

The controller **(Fig 1 - on pag. 14)** has the following components:

1. keyboard **(T)**;
2. display **(D)**;
3. LED Sign **(L)**;
4. connectors **(S)**.

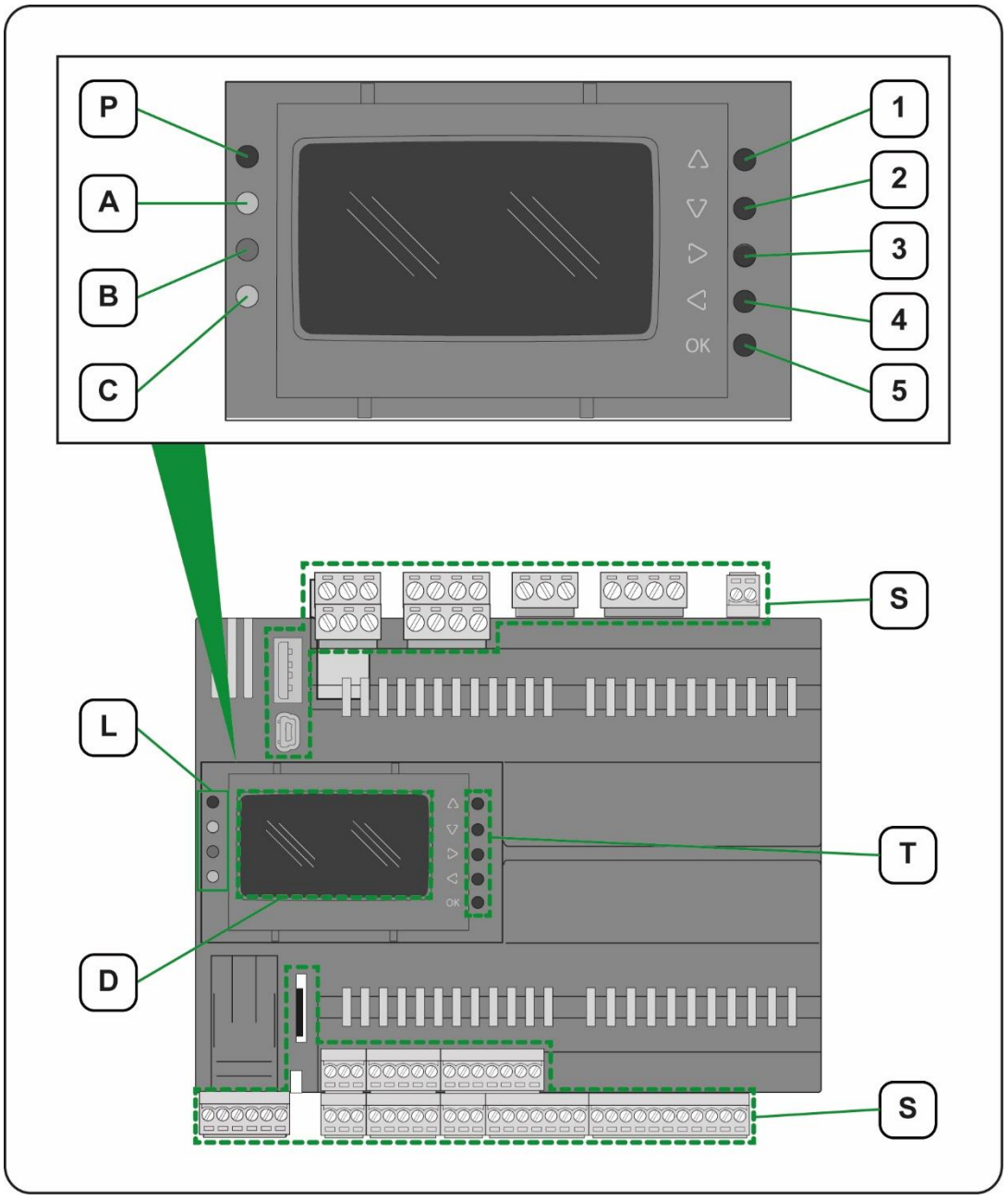


Fig 1 - Parts of the controller

The keyboard **(T)** has the following keys:

Key	Symbol	Name	Description
1		UP	- Increase/modify a value - Select the next label
2		DOWN	- Decrease / modify a value - Select the previous label
3		RIGHT	- Move the cursor to the right (in edit mode) - Select the next item - View next page (in the parameter lists)
4		LEFT	- Move the cursor to the left (in edit mode) - Select the previous item - View previous page (in the parameter lists) - (kept pressed) exit the edit mode without saving - (kept pressed) exit the page/return to previous page
5		OK	- Carry out operation linked to a graphic key - Confirm (in edit mode) - Edit mode entry

Table 1 - Keyboard

The display **(D)** allows the menus to be viewed and managed for AHU use. For the description of different menus please refer to User Interface **on pag** 53**.**

There are four signal LEDs **(L)** each one which can assume one or more states to indicate information.

LED	Colour	Resource	Meaning
P	Green	On	Powered controller
		Off	Controller not-powered
A	Red	Off	No alarm
		On	Has at least one alarm active; refer to **8 Alarms on pag.96**
		Flashing	Has at least one re-settable alarm and no alarm active (or manual re-armed); please refer to **8 Alarms on pag.96**.
B	Yellow	On	Writing on datalogger filesystem or data acquisition from USB port
C	Green	Off	AHU in OFF status
		On	AHU in ON status
		Flashing	AHU in stand-by status

Table 2 - signal LED

1.5. Air/Water Cooled Chiller / Heat Pump Application

System Description

Air/water or water/water cooled chiller / Heat pump for large and connected machines TVDA has been implemented for controlling an air-water chiller and/or an air/water Heat pump with the following main features:

- manage the two compressors circuits in balance or saturation mode, see "Circuit Management" on page 26.

- for each circuit:
  - from one to four compressors ON/OFF-Inverter-Screw-Pistons with CRII. See "Compressor Configuration" on page 89.
  - from one to four stages of condenser fans. See "Fan Configuration" on page 35 .
  - one stepper Electronic Expansion Valve (EEV) with or without solenoid valve with pump-down management.
  - One reversing valve (Only for Heat pump)
  - One heating resistor (Only for Heat pump)
- one or two pumps (second redundant)

The architecture is based on the Free Advance Controller. A CAN expansion module allows the management of extra inputs and outputs base on the selected configuration. see "I/O Configuration" on page 92.

A remote display installed on the door of the electric panel allows interaction with the controller.

The compressor model is configured from a dedicated parameter. The follow configuration is supported for both homogeneous circuits:

1- Compressor 1 to 4 **On-Off**

2- Compressor 1 to 4 **VSD**

3- Compressor 1 **VSD**, 2 to 4 **On-Off**

4- Compressor 1 to 4 **Screw Step**

5- Compressor 1 to 4 **Screw Stepless**

6- Compressor 1 to 4 **CRII Step**

7- Compressor 1 to 4 **CRII Stepless**

8- Digital Scroll compressor **(new)**

9- Mixed configuration are supported with the follow roles (Modulating compressor has index 1 to x and On-OFF compressor has index x to 4).

Soft starters or simple contactors or Delta Start starter can be configured for each compressor. See "Starter configuration" on page 116.

Condenser fans are driven on two levels: a VSD regulates the speed of all circuit fans, contactors turn single fan stages on and off.

The main pump is driven by a VSD, the redundant pump by a contactor. Each EEV is controlled by a EEV driver.

The system measures energy consumption data using an energy meter and estimates thermal energy absorption data using temperature sensors, pressure sensors and data coming from current machine functioning. All these data allow calculation of the chiller COP.

Circuit breakers protect the electrical system. A transformer converts input voltage from 230 Vac to 24 Vac.

For details about the implementation guidelines depending on the chiller/heat pump features, see "Commissioning Overview" on page 116.

Chiller/Heat pump application feature

Ready-to-use PLC project contains pre-configured application code to operate field devices, monitor the system status, and handle detected errors.

The following functions has been implemented:

- floating high pressure, see "Fan regulation" on page 35.
- manage the main pump with fixed speed or variable speed modulated on the differential between input and output water temperature, see "Pumps Management " on page 32
- calculate water setpoint (fixed or dependent on the external air temperature), see "Water Setpoint Calculation" on page 21
- manage alarms, see "Alarm Configuration" on page 96.
- estimate Coefficient Of Performance (COP) values and create trends without the need of flow meters, see "COP Calculation" on page 37.
- create energy consumption trends for different periods of time (day, week, month, year and custom period), see " consumption trends " on page 81.
- define the water regulation PID parameters manually or with auto-tuning function, see "PID Management" on page 30 .
- schedule system working mode (weekly or by time period), see "Working Mode Scheduling" on page 35.
- display QR code representing a customer-defined string (e.g. web site, email address), "QR Code" on page 41.
- Defrost operations, see “Defrost Management” on page 44
- Calculation of the best start-up time to achieve the desired temperature based on an adaptive predictive algorithm, see Optimum Start on page 21
- Manage the heat and cool working mode, see Mode Selection on page 22 (Only for Heat pump machine)

Application User interface

The ready-to-use interface for both **controller** and **remote display** can be used to:

- control the main system functionalities
- indicate system status
- display detected system errors

See "HMI Project" on page 52.

Web site

PLC project resources allowing system control and setup via web server. See "Web Site" on page 43.

Communications Interface

The system includes different communication networks.

- Modbus network RS485-1(Slave): for communication between controller and a PC (e.g.: for downloading the PLC project or for accessing the web server) or a supervisor system. To configure the Ethernet settings go in the HMI menu ***SETTINGS\10.Expert\3.RS485 Config*** to set the communication parameters

- Modbus RTU network RS485-2 (Master): for communication between controller (master) and energy meter, VSDs, soft starters and EEV drivers (slaves).

  NOTE: It is also possible to control with digital/analog I/Os between controller and VSDs, soft starters and EEV drivers.

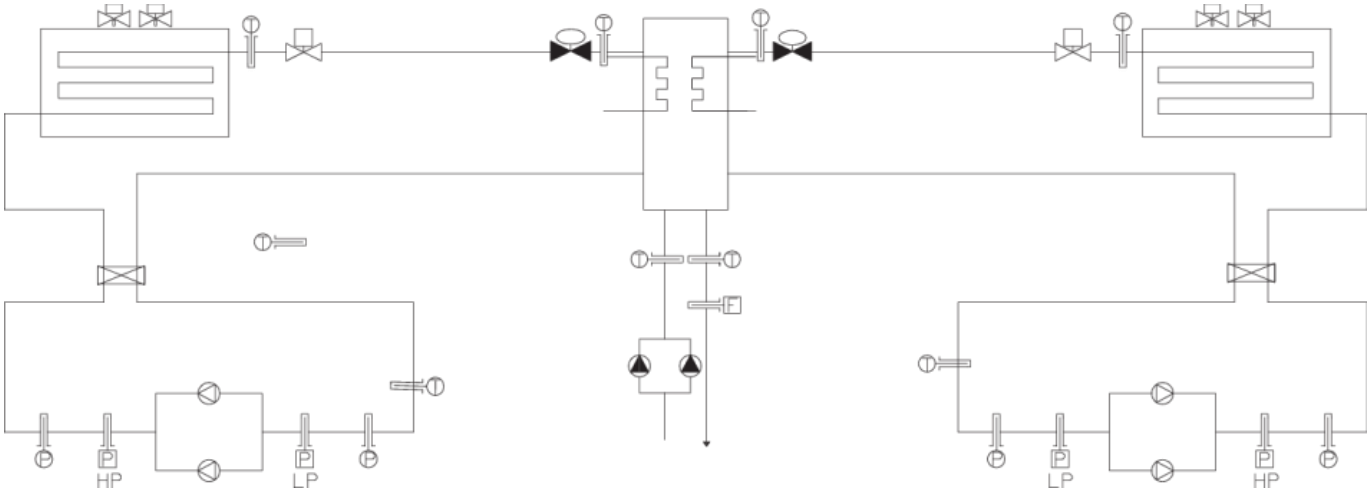
- CAN Expansion bus: for communication between controller and an expansion module and/or a remote display. see "CAN Configuration" on page 119.

- Ethernet or Modbus TCP network: for communication between controller and a PC (e.g.: for downloading the PLC project or for accessing the web server) or a supervisor system. To configure the Ethernet settings go in the HMI menu ***SETTINGS\10.Expert\4.Ethernet Config*** to set the communication parameters

Application Note 1 Air/water cooled chiller/Heat pump 2 circuit 2 compressor/circuit

The electric panel tested and validated during development allows control of chillers or heat pumps with the following main features:

- two circuits
- for each circuit:
  - two compressors
  - two stages of condenser fans
  - one EEV with solenoid valve
  - one reversing valve (icon)
  - one heating resistor (icon)
- two pumps (one redundant)
- temperature probes
- pressure sensors



2. Chiller/Heat pump Application

2.1. Optimum Start

Introduction

The system calculates the best start-up time and working mode (heat/cool) of the heat pump in order to achieve the temperature setpoint at a scheduled time of occupation.

Start-up Time Calculation

The system calculates how much time before occupation the machine must start-up based on the the room temperature (**iRoomTemp** variable), on the outdoor air temperature (**iOutdoorAirTemp** variable) and on past events records (**E2_OptStartHotBand** parameter).

2.2. Mode Selection

Introduction

The system can manage the selection of the **heat pump** working mode (heat/cool) in four different ways (**E2_usiModeType** parameter):

- manually (=0): setting the mode directly from the controller/remote display or from the web site
- from remote command (=1): using the scheduler or a EEPROM parameters (menu Param. General , parameter **01.001 Compr. Heat/cool**)
- from digital input (=2): using a digital switch (cf. Configuration 0 (Default) page 92)
- automatically (=3): determining the mode with an algorithm.

Automatic Mode Selection

If the automatic mode selection is enabled, the system calculates the working mode in the following way:

- heat mode: if the external temperature (**iOutdoorAirTemp** variable) is below the heat mode temperature threshold (**E2_iHeatTempThr** parameter)
- cool mode: if the external temperature (**iOutdoorAirTemp** variable) is above the cool mode temperature threshold (**E2_iCoolTempThr** parameter)

The automatic mode selection can also control the changeover from a mode to the other one. If the external temperature remains above/below the heat/cool mode threshold for a set time period (**E2_uiDelayChangeOver** parameter), then the mode switches to cool/heat.

2.3. Water Setpoint Calculation

Introduction

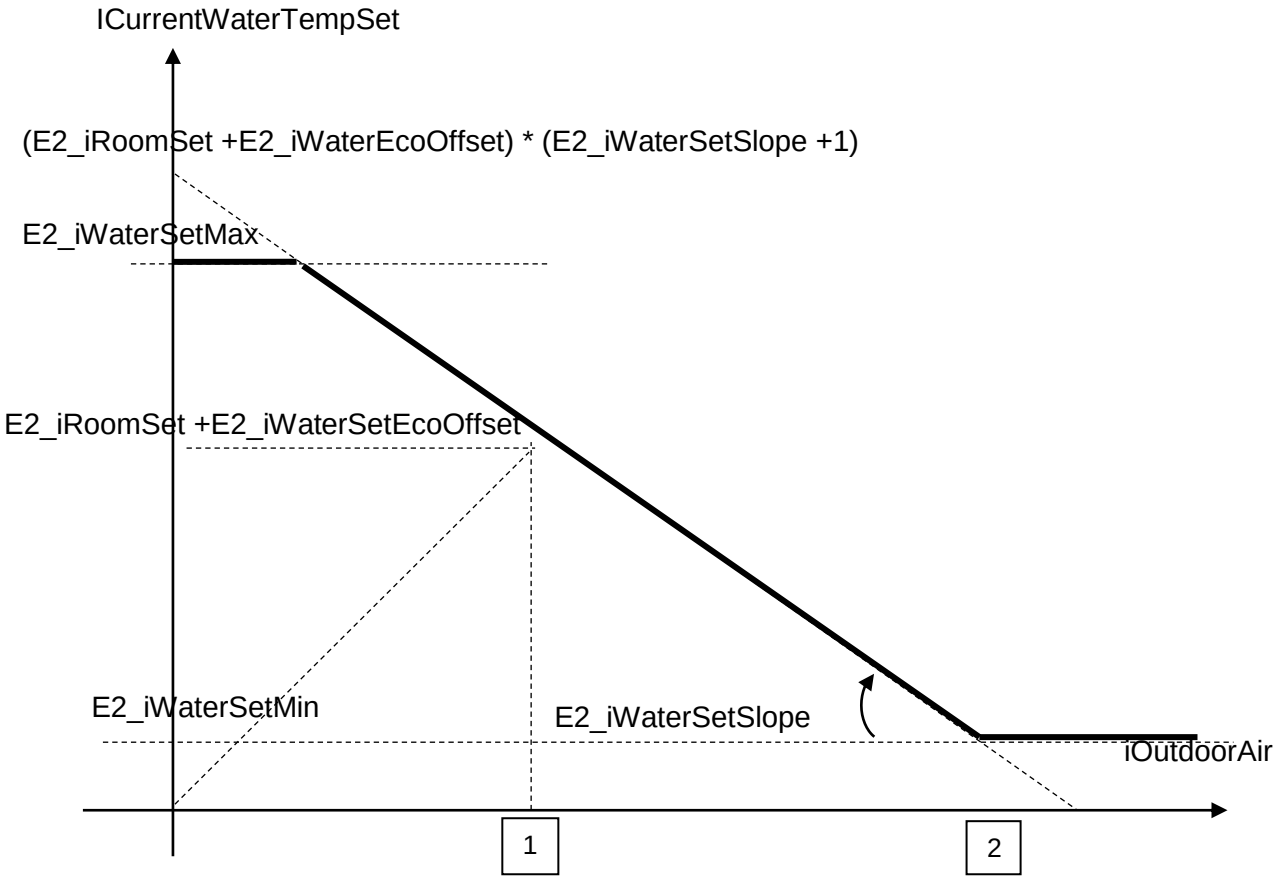
The water regulation setpoint can be calculated using two different ways (**E2_xEnWaterAirLinkSet** parameter):

- Law mode
- Fixed mode

It is possible to set minimum and maximum values for the water temperature setpoint by means of the **E2_iWaterSetMin** and **E2_iWaterSetMax** parameters.

Law mode Setpoint Calculation

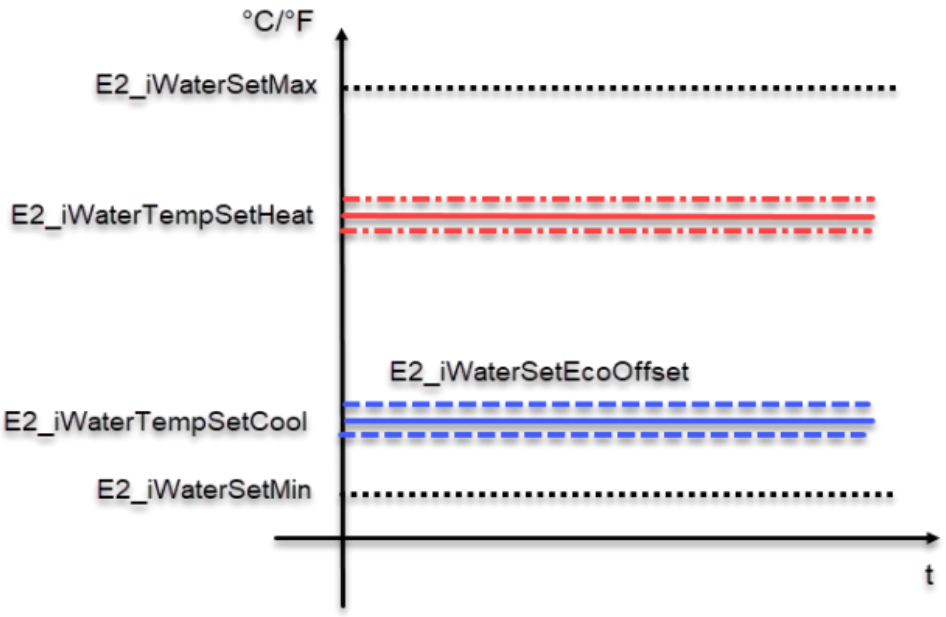
The setpoint is based on a room temperature setpoint **E2_iRoomSetCool/ E2_iRoomSetHeat** parameters, outdoor temperature (**iOutdoorAirTemp** variable) and the slope of the setpoint line (**E2_iWaterSetSlope** parameter)



1: E2_iRoomSet+ E2_iWaterSetEcoOffset
2: (E2_iRoomSet + E2_iWaterSetEcoOffset)*(E2_iWaterSetSlope+1)/ E2_iWaterSetSlope

Fixe mode

The setpoint is set with the parameters **E2_iWaterTempSetCool/E2_iWaterTempSetHeat** parameters



Offset in Economy Mode

If the machine is working in economy mode, an offset parameter (**E2_iWaterSetEcoOffset**) will be added to the setpoint (both law mode or fixed).

The following parameters must be set:

Parameter Name	Description	Default	Min	Max	Unit	Format
E2_iWaterSetAirLinkMin	Water temperature setpoint linked to outside air temperature minimum value	100	0	400	°C/°F	XXX.Y
E2_iWaterSetAirLinkMax	Water temperature setpoint linked to outside air temperature maximum value	200	0	400	°C/°F	XXX.Y
E2_iOutdoorTempMin	Outdoor air temperature to calculate water setpoint minimum value	380	0	400	°C/°F	XXX.Y
E2_iOutdoorTempMax	Outdoor air temperature to calculate water setpoint maximum value	250	0	400	°C/°F	XXX.Y

NOTE: If the machine is working in economy mode, an offset value will be added to the setpoint (both dynamic or fixed), see "Working Mode Scheduling" on page 35.

For more information about how the setpoint is calculated, see **SR_WaterSetAndScheduler** program.

2.4. Circuit Management

Introduction

The circuit management logic has the purpose to control a double circuit rack of compressors for a refrigeration or HVAC system.

It splits power percentage driven by the PID regulator in one or two circuits to optimize functionalities and energy consumption of compressors.

Each circuit will distribute the calculated power in the compressors.

Power Splitting Strategies

Power can be split between the two circuits using two different strategies:

- balance: splitting the power in a homogeneous way between the circuits
- saturation: using first one of the circuits and then the other only if necessary

The strategy used is defined by the parameter **Settings/Param.Compressor/usiCircRegulStrategy**:

- TRUE: balance (each circuit receive half of the PID demand)
- FALSE: saturation (First load to 100% one circuit (the circuit with less working hour) then load the other circuit.

2.5. Compressor Management

The system controls different types of compressors and proposes adding functionalities associated to Screw, Variable Speed, Pistons with CRII and Digital Scroll compressors:

- Oil recovery
- Frequency Limitation
- Liquid injection

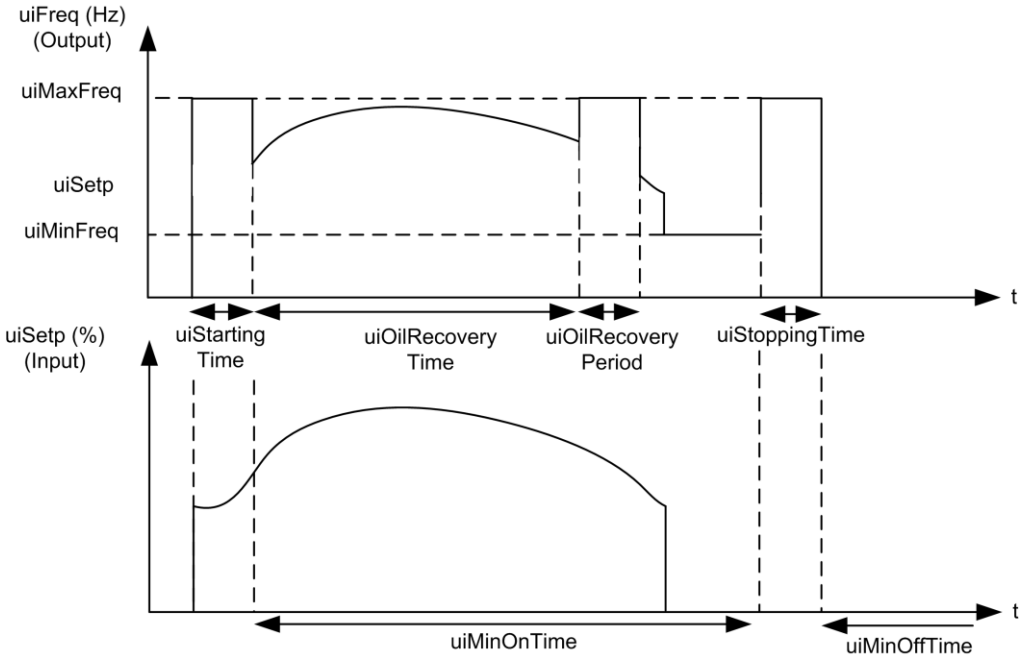
Oil Recovery

The purpose of this function is to lubricate the mobile parts of the machine to protect these parts from wear.

Oil recovery is regulated by the following parameters:

- **uiFreq** : The frequency of the variable speed drive (uiFreqSetpCompXCirX)
- **uiMaxFreq** : maximum frequency (E2_uiCompMaxFreq)
- **uiStartingTime** : Duration of the starting mode (E2_uiStartingTimeVSComp)
- **uiStoppingTime:** Duration of the stopping mode (E2_uiStoppingTimeVSComp)
- **uiOilRecoveryPeriod:** Duration of the oil recovery mode (E2_uiOilRecoveryPeriodVSComp)

If...	Then...
the compressor starts,	**uiFreq** is set to **uiMaxFreq** during the duration of **uiStartingTime**.
the compressor has run for the set time uiOilRecoveryTime,	**uiFreq** is set to **uiMaxFreq** during the duration **uiOilRecoveryPeriod**.
the compressor has the order to stop,	**uiFreq** is set to **uiMaxFreq** during the duration **uiStoppingTime**.
uiStoppingTime has elapsed,	The compressor is switched off and **uiFreq** is set to 0.



NOTE : This function should be enabled by the manufacturer only if the machine has this option available.

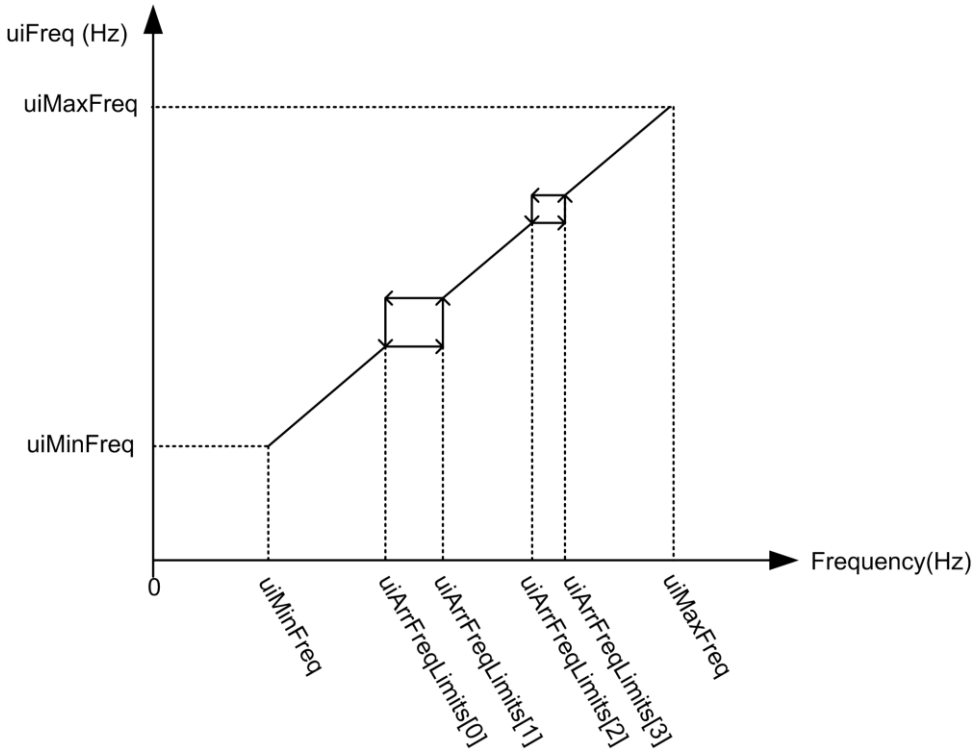
Oil recovery is disabled when **uiOilRecoveryTime** or **uiOilRecoveryPeriod** is set to 0.

Frequency limitation

The frequency of the variable speed drive **uiFreq** is limited by the minimum frequency **uiMinFreq** and by the maximum frequency **uiMaxFreq**.

NOTE: uiMinFreq must be lower than uiMaxFreq.

The following graphic presents the resonance frequencies exclusion (**uiArrFreqLimits**):



Liquid Injection

The purpose of this function is to remove the heat from the compressor by lowering the discharge temperature.

To start the liquid injection, there are 2 strategies:

- One based on the temperature of the compressor: Param A + diff (**E2_iInjectionStartValueTemp+ E2_iInjectionDiff**)
- Another one based on the compressor capacity if there is no discharge temperature probe configured: Param B + diff (**E2_iInjectionStartValuePID+ E2_iInjectionDiff**)

When the discharge temperature is greater than the maximum discharge temperature allowed (**iDischTempComp1CirX > E2_iMaxDischargeTemp**), the compressor alarm is activated and it stops the compressor.

Liquid injection is disabled when **E2_iInjectionStartValueTemp = 0.**

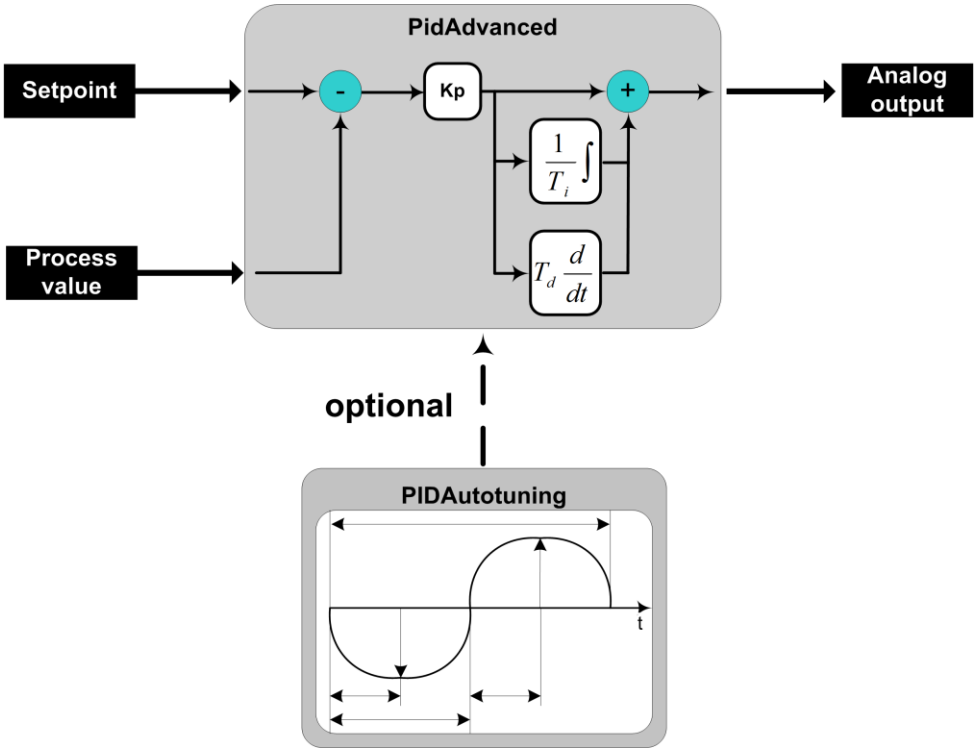
The alarm is disarmed once the discharge temperature is lower than the maximum discharge temperature allowed minus a differential (**iDischTempComp1CirX < E2_iMaxDischargeTemp – E2_iAlarmTempDiff**).

NOTE: the manufacturer shall dimension correctly the liquid line to avoid the compressor damages.

2.6. Temperature regulation

The PID regulation

The following graphic presents a functional overview of the PID regulator.



The **Setpoint** is the unit setpoint **iCurrentWaterTempSet**

Process variable is the regulator probe, it can be **iOutletWaterTemp, iInletWaterTemp** or **iLowPressCir1** (converted in Temperature).The parameter E2_usiRegulationProbe enable to select the regulation probe (see “Wizard Menu” on page 59).

The **Analog Output** is the Power 0-100% distributed to the circuit, **rReqCapacityCir1** and **rReqCapacityCir1**

The PIDAdvanced function block works according to the following transfer function:

$$Y_t = Kp * \left\{ e_t + \frac{Ta}{2 * Ti} * \sum_{i=0}^{t} e_i + \frac{Tv}{Td} * \frac{1}{2} * Ta(e_t - e_{t-2}) \right\}$$

Ways to Set PID Parameters

The water regulation PID parameters can be defined using the following methods:

- manually (**E2_uiCompressorPB**, **E2_uiCompressorTi**, **E2_uiCompressorTd**)
- with auto-tuning function (**E2_uiCompressorTi**, **E2_uiCompressorTd** only)

Set PID Parameters with auto-tuning function

To enable the auto-tuning function, follow the next instruction:

- on controller or remote display, see "PID Compressors Test"
- on web site: see "PID Compressors Test" on page 50

2.7. Pumps Management

Introduction

The system manages two pumps, a main pump (with VSD) and a redundant pump (contactor). The main pump, if present and not in alarm, is switched on when the machine is switched on. Pump activation and error detection is managed by the *RedundantPumpCntrl*.

The *RedundantPumpCntrl* balances the operating hours of two pumps, and takes into account the status of each pump: operating time, detected error, maintenance mode.

If one of the pump is not available, the second pump will run continuously.

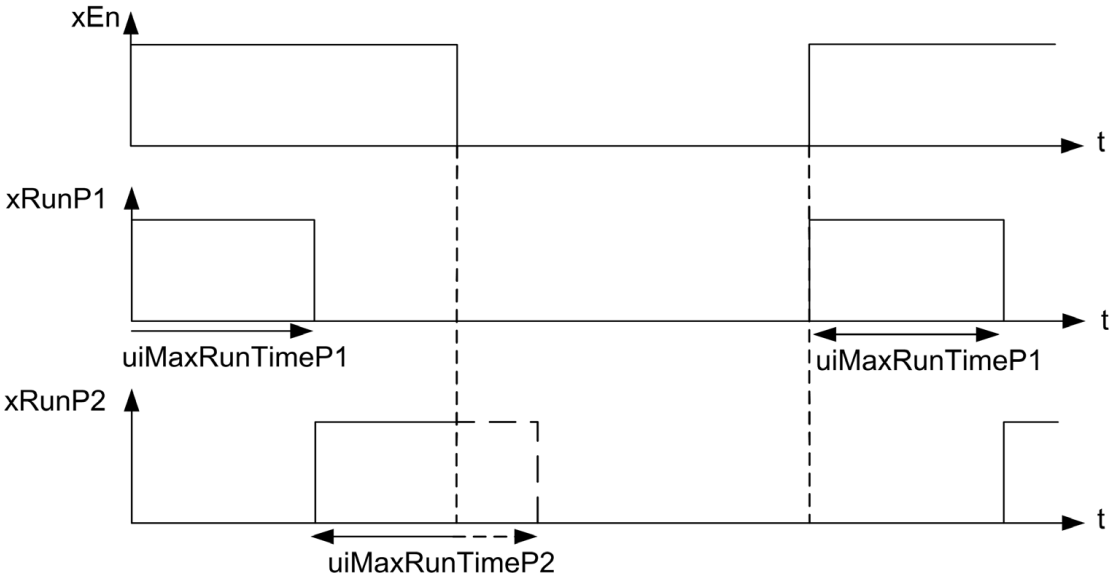
When the pumps are not used for a long time, to help avoid damage (corrosion, blocking, etc.) the pumps are switched on one after the other during a user-defined time.

The RedundantPumpCntrl function block provides the following features:

- balances of the running pumps
- loss compensation in case of error
- locked rotor protection

Unit ON

If input Chiller or Heat pump unit is Switched OFF (from local, or remote or from emergency input) xEn is FALSE and all pumps outputs are switched off, all the timers and pumps commands are reset.



Normal Operation

Pump 1 and pump 2 are available **uiMaxRunTimeP1** or **uiMaxRunTimeP2** > 0

When a pump did run for the set time, the pump is switched to the other pump.

If **uiMaxRunTimeP1** or **uiMaxRunTimeP2** is set to zero, the associated pump is unavailable.

Unit OFF

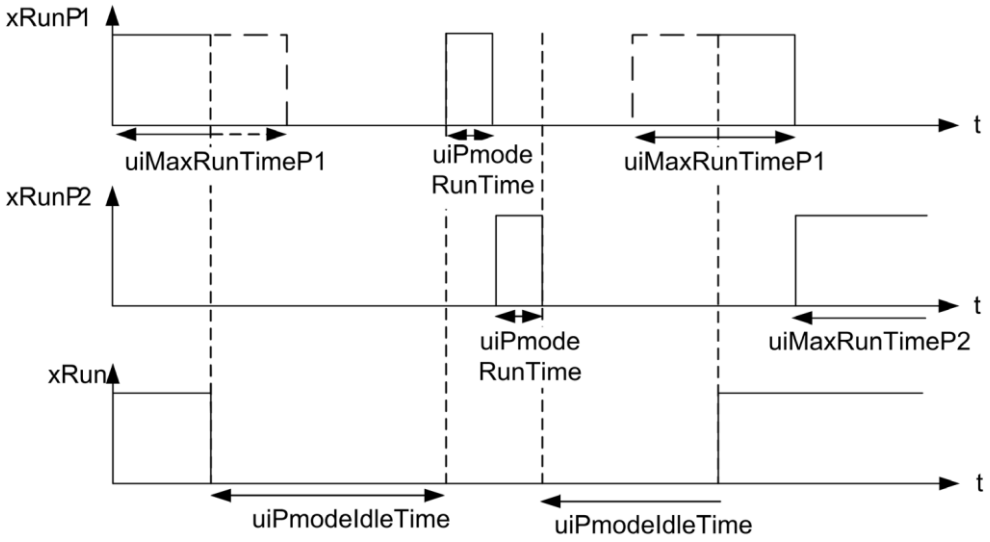
If the Unit is switched OFF the Running Pump will run the time **uiDelayPostPump**.

Locked Rotor Protection

When the pumps (P1 and P2) are not used for a long time, the pumps are switched on to avoid damage (corrosion, blocking, etc.). The duration when the pumps are switch off and the duration of the Protection mode (Pmode) are set by the user.

If **uiPModeIdleTime** or **uiPModeRunTime** are set to zero, the locked rotor protection is not started and **uiRemainIdleTime** is set to zero.

If the locked rotor protection is running (P1 or P2 are switched on), **uiRemainIdleTime** is set to **uiPModeIdleTime**.



Main Pump Management Strategies

The main pump can be managed as follows:

- with fixed speed, defined by the ***E2_uiPumpSetFixedSpeed*** parameter
- with automatic modulation on the differential between input and output water temperature (**E2_uiPumpDifSet**, **E2_uiPumpPb**, **E2_uiPumpTi**, **E2_uiPumpTd** parameters)

The strategy used is defined by the **E2_xPumpFixedSpeed** parameter:

- TRUE: fixed
- FALSE: automatic modulation

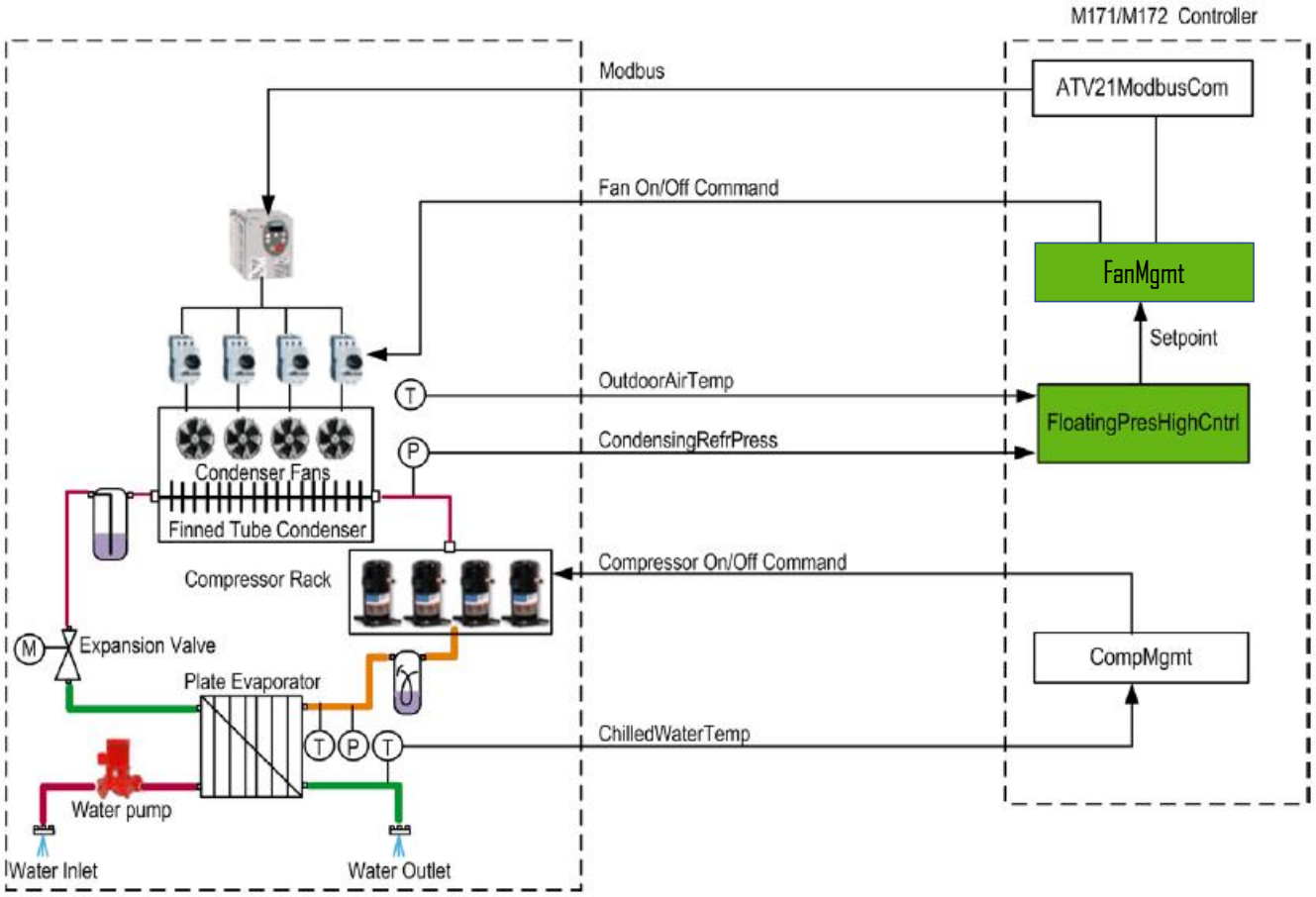
2.8. Fan regulation

The following graphic presents a functional overview of the Fan regulator.

Functional Description

High variations of the refrigerant pressure can result in a high energy consumption of the condensing fans and compressors.
The *FloatingHighPresCntrl* (Floating High Pressure Control) function block controls the condensing pressure by modulating air volume through the condenser.
The floating condensing temperature is based on outdoor air temperature.
The air volume is controlled by the number and the speed of the condenser fans.

The following picture presents the interaction between the function block and the machine.



The *FanMgmt* (Fan Management) function block manages together with the function block *FloatingHighPresCntrl* (Floating Pressure High Control) the condensing pressure in an HVAC&R system.
The *FanMgmt* function block controls up to 2 stages and up to 4 fans per stage and aims to manage the optimum number of fans and their required frequency depending on the required air flow in the machine. For this purpose, FanMgmt provides features for switching management and to optimize operation.

2.9. Working Mode Scheduling

Introduction

The machine can be scheduled in the following modes (**E2_usiEventID_1** parameters):

- economy, in which an offset (**E2_iWaterSetEcoOffset** parameter) is added to the water regulation setpoint
- heat
- cool
- defrost
- occupation
- off

The scheduled start-up time in occupation mode can change on the basis of the time calculated by the *OptimumStart* application, see "Optimum Start" on page 2.121.

Schedulers

The working mode of the machine can be defined using two different schedulers:

- weekly scheduler: to plan the machine working mode during the week
- yearly scheduler: to plan economy mode periods (e.g.: holiday closings)

If a certain period is managed both with the yearly and the weekly scheduler and the two are in conflict, the yearly scheduler prevails.

2.10. COP Calculation

Introduction

Chiller/Heat pump COP value is the ratio between thermal power and electrical power and it defines the unit's efficiency.

Electrical power is calculated by the energy meter, thermal power is calculated internally by the system.

Data for Thermal Power Calculation

For mass flow and enthalpy calculation, necessary for thermal power calculation, the system uses:

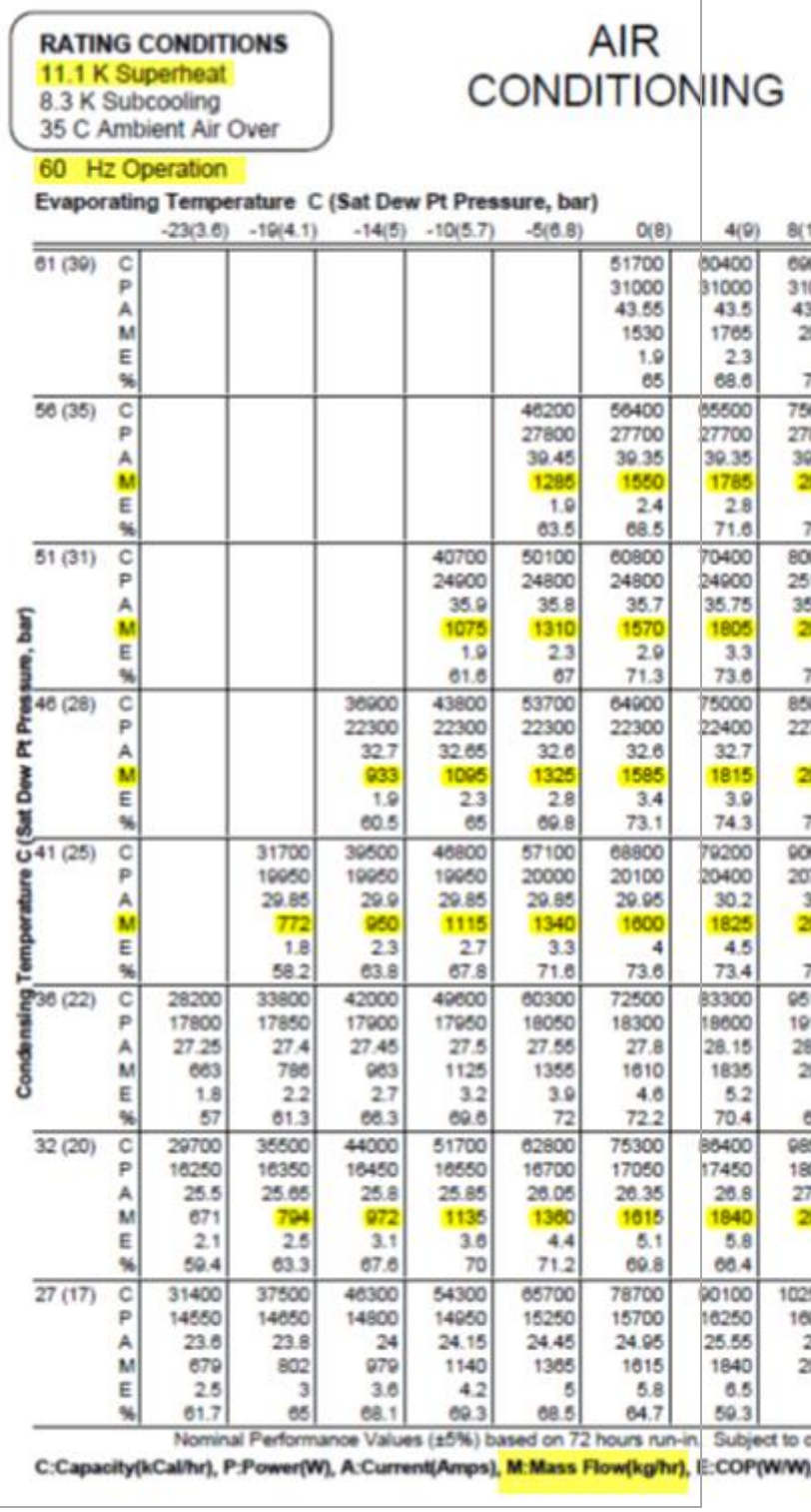
- data provided by the operator
  - compressors characteristics, see "How to Define Compressor Characteristics" on page 38
  - refrigerant type (**E2_usiRefrigerantType** parameter)
- for each circuit, data already present in the system:
  - high pressure sensors (**iHighPressCir1** and **iHighPressCir2** variables)
  - low pressure sensors (**iLowPressCir1** and **iLowPressCir2** variables)
  - evaporator output temperature sensors (**iEvapOutTempCir1** and **iEvapOutTempCir2** variables)
  - condenser output temperature sensors (**iCondOutTempCir1** and **iCondOutTempCir2** sensor)
  - number of switched on compressors and speed

  NOTE: No additional flow meters are needed.

For more information about how COP value is calculated, see **SR_FlowCalculation** and **SR_COPCalculation** programs.

How to Define Compressor Characteristics

NOTE: The **SR_COPCalculation** program assumes that all compressors have the same characteristics.

Step	Example
1. Gather the following compressors data (see only the highlighted data in the datasheet of the compressor used as example): • mass flow values related to condensation temperature (5 values) and evaporator temperature (8 values) • superheat • speed	

RATING CONDITIONS
11.1 K Superheat
8.3 K Subcooling
35 C Ambient Air Over

AIR CONDITIONING

60 Hz Operation

Evaporating Temperature C (Sat Dew Pt Pressure, bar)

Condensing Temperature C (Sat Dew Pt Pressure, bar)		-23(3.6)	-19(4.1)	-14(-5)	-10(5.7)	-5(6.8)	0(8)	4(9)	8(1
61 (39)	C						51700	60400	69
	P						31000	31000	31
	A						43.55	43.5	43
	M						1530	1765	2
	E						1.9	2.3	
	%						65	68.6	7
56 (35)	C					46200	56400	65500	75
	P					27800	27700	27700	27
	A					39.45	39.35	39.35	39
	M					1285	1550	1785	2
	E					1.9	2.4	2.8	
	%					63.5	68.5	71.6	7
51 (31)	C				40700	50100	60800	70400	80
	P				24900	24800	24800	24900	25
	A				35.9	35.8	35.7	35.75	35
	M				1075	1310	1570	1805	2
	E				1.9	2.3	2.9	3.3	
	%				61.6	67	71.3	73.6	7
46 (28)	C			36900	43800	53700	64900	75000	85
	P			22300	22300	22300	22300	22400	22
	A			32.7	32.65	32.6	32.6	32.7	
	M			933	1095	1325	1585	1815	2
	E			1.9	2.3	2.8	3.4	3.9	
	%			60.5	65	69.8	73.1	74.3	7
41 (25)	C		31700	39500	46800	57100	68800	79200	90
	P		19950	19950	19950	20000	20100	20400	20
	A		29.85	29.9	29.85	29.85	29.95	30.2	3
	M		772	950	1115	1340	1600	1825	2
	E		1.8	2.3	2.7	3.3	4	4.5	
	%		58.2	63.8	67.8	71.6	73.6	73.4	7
36 (22)	C	28200	33800	42000	49600	60300	72500	83300	95
	P	17800	17850	17900	17950	18050	18300	18600	19
	A	27.25	27.4	27.45	27.5	27.55	27.8	28.15	28
	M	663	786	983	1125	1355	1610	1835	2
	E	1.8	2.2	2.7	3.2	3.9	4.6	5.2	
	%	57	61.3	66.3	69.6	72	72.2	70.4	6
32 (20)	C	29700	35500	44000	51700	62800	75300	86400	98
	P	16250	16350	16450	16550	16700	17050	17450	18
	A	25.5	25.65	25.8	25.85	26.05	26.35	26.8	27
	M	671	794	972	1135	1360	1615	1840	2
	E	2.1	2.5	3.1	3.6	4.4	5.1	5.8	
	%	59.4	63.3	67.6	70	71.2	69.8	66.4	
27 (17)	C	31400	37500	46300	54300	65700	78700	90100	102
	P	14650	14650	14800	14950	15250	15700	16250	16
	A	23.6	23.8	24	24.15	24.45	24.95	25.55	2
	M	679	802	979	1140	1365	1615	1840	2
	E	2.5	3	3.6	4.2	5	5.8	6.5	
	%	61.7	65	68.1	69.3	68.5	64.7	59.3	

Nominal Performance Values (±5%) based on 72 hours run-in. Subject to c

C:Capacity(kCal/hr), P:Power(W), A:Current(Amps), M:Mass Flow(kg/hr), E:COP(W/W)

<table>
<tr><th>Step</th><th>Example</th></tr>
<tr><td>2. Organize mass flow data in a 5 x 8 matrix, with the condensation temperatures as rows and the evaporator temperatures as columns, both in increasing order.

In the example, missing mass flow values are intended to be at the same value of the lower condensation temperature value.</td><td>
<table>
<tr><th>Evap t (°C)/Cond t (°C)</th><th>-19</th><th>-14</th><th>-10</th><th>-5</th><th>0</th><th>4</th><th>8</th><th>13</th></tr>
<tr><td>32</td><td>794</td><td>972</td><td>1135</td><td>1360</td><td>1615</td><td>1840</td><td>2080</td><td>24</td></tr>
<tr><td>41</td><td>772</td><td>950</td><td>1115</td><td>1340</td><td>1600</td><td>1825</td><td>2070</td><td>24</td></tr>
<tr><td>46</td><td>772</td><td>933</td><td>1095</td><td>1325</td><td>1585</td><td>1815</td><td>2070</td><td>24</td></tr>
<tr><td>51</td><td>772</td><td>933</td><td>1075</td><td>1310</td><td>1570</td><td>1802</td><td>2050</td><td>24</td></tr>
<tr><td>56</td><td>772</td><td>933</td><td>1075</td><td>1285</td><td>1550</td><td>1785</td><td>2040</td><td>23</td></tr>
</table>
</td></tr>
<tr><td>3. If necessary,

4. convert mass flow values in g/s. In the example kg/h have been converted to g/s.

5. scale mass flow values coherently with the compressors nominal speed defined in the E2_uiCompNomFreq parameter. In the example, data are relative to 60 Hz and the compressors nominal speed is 60 Hz (E2_uiCompNomFreq = 60 Hz), then there is no need to scale the values.</td><td>
<table>
<tr><th>Evap t (°C)/ Cond t (°C)</th><th>-19</th><th>-14</th><th>-10</th><th>-5</th><th>0</th><th>4</th><th>8</th></tr>
<tr><td>32</td><td>220,6</td><td>270,0</td><td>315,3</td><td>377,8</td><td>448,6</td><td>511,1</td><td>577,8</td></tr>
<tr><td>41</td><td>214,4</td><td>263,9</td><td>309,7</td><td>372,2</td><td>444,4</td><td>506,9</td><td>575,0</td></tr>
<tr><td>46</td><td>214,4</td><td>259,2</td><td>304,2</td><td>368,1</td><td>440,3</td><td>504,2</td><td>575,0</td></tr>
<tr><td>51</td><td>214,4</td><td>259,2</td><td>298,6</td><td>363,9</td><td>436,1</td><td>500,6</td><td>569,4</td></tr>
<tr><td>56</td><td>214,4</td><td>259,2</td><td>298,6</td><td>356,9</td><td>430,6</td><td>495,8</td><td>566,7</td></tr>
</table>
</td></tr>
<tr><td>6. In the PLC project in Global variables > Constants > Ungrouped_vars insert:

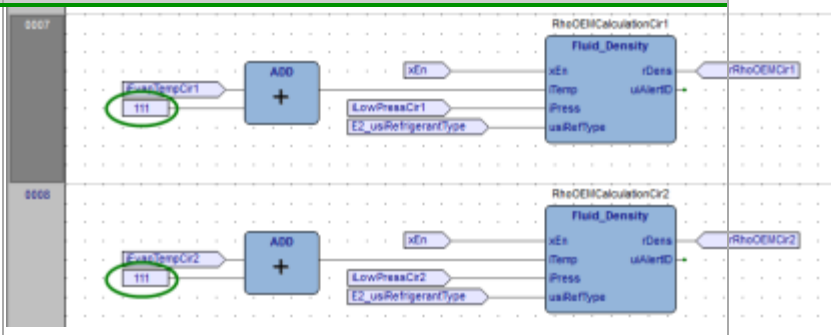
7. in the five vectors (aiMFOEML1,aiMFOEML2, aiMFOEML3, aiMFOEML4, aiMFOEML5) the eight mass flow values (expressed in decimal) at each condensation temperature

8. in the aiTCondRange vector the five condensation temperatures

9. in the aiTEvapRange vector the eight evaporator temperatures</td><td>

aiMFOEML1 = [2206, 2700, 3153, 3778, 4486, 5111, 5778, 6694]
aiMFOEML2 = [2144, 2639, 3097, 3722, 4444, 5069, 5750, 6694]
aiMFOEML3 = [2144, 2592, 3042, 3681, 4403, 5042, 5750, 6694]
aiMFOEML4 = [2144, 2592, 2986, 3639, 4361, 5006, 5694, 6667]
aiMFOEML5 = [2144, 2592, 2986, 3569, 4306, 5958, 5667, 6639]
aiTCondRange = [32, 41, 46, 51, 56]
aiTEvapRange = [-19, -14, -10, -5, 9, 4, 8, 13]

</td></tr>
</table>

Step	Example
10. If necessary, in the PLC project in SR_FlowCalculation program (row 0007 and 0008) insert the superheat of the compressors. Default = 11.1 K (expressed in decimal).	

2.11. QR Code

Introduction

The QR code is an image that allows quick access to an URL, a web app or other web resources with a mobile device (by default is set to the Eliwell web site).

The image is displayed only on the controller and remote display pages (selecting **QRcode** in the main menu).

How to Customize the QR Code from the PLC

See ” QR Code page “ on page 85.

2.12. Logger

Introduction

The logger application enables to records data over time. Data are saved in a CSV files. There is a yearly datalogger named as follows *2018.csv* and monthly data loggers, ex *May18.csv*. These csv files can be :

- Downloaded on the web server page “Logger file”. The chart (not downloadable) is also available on the page “Logger”
- And downloaded on a external driver (USB or MicroSD card). This procedure will be explained on the below part.

Datas records :

Date Time, State,Outlet Water,Inlet Water,HP Cir1,LP Cir1,Outdoor Air Temp,Out Cond Temp,Out Evap Temp,COP,Water Temp Setpoint,Request Capacity Cir1,Err Pump 2,Err Pump 1,Pump Flow Switch,Err Oil C1Cir1,Err Comp1 cir1,Err Fan1 Cir1,Err Fan2 Cir1,Err Fan3 Cir1,Err Fan4 Cir1,Err LP,Err HP,Remote Start Stop,Local Start Stop,Err Comp2 Cir1, PID limiter % Cir1, PID limiter % Cir2, LP limits PID Cir1, LP limits PID Cir2, HP limits PID Cir1, HP limits PID Cir2, Heating Resistor Cir1, Heating Resistor Cir2, Reversing Valve Cir1, Reversing Valve Cir2

2.13. PID Limiter

Introduction

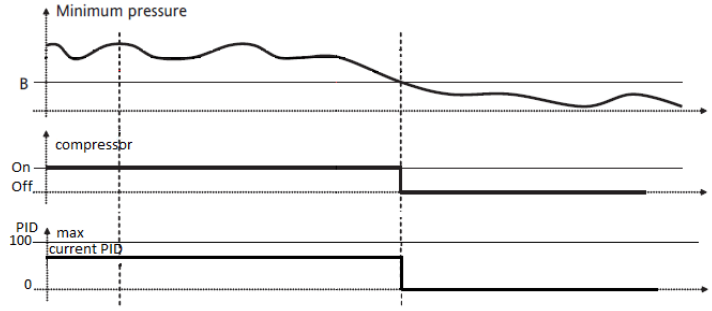
The PID limiter prevents the sudden stop of the compressor when the Low-pressure probe value < **E2_LowPressureMinLimit** or the High-pressure probe value > **E2_HighPressureMaxLimit** by reducing the current PID as soon as the pressure approaches the limits. The PID will decrease proportionally in the ranges:

- Max High pressure – Differential
- Min Low Pressure + Differential

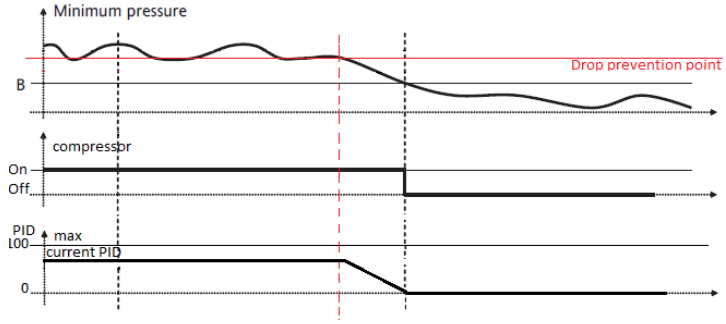
The decrease will be at 100% when the pressure reaches one of the limits. The decrease will be at 50% of the PID when the pressure is at: (Max High pressure - Differential)/2 or (Min Low Pressure + Differential)/2, and so on.

NOTE: The PID is recalculated by applying the maximum percentage of limitation exerted by the Low-pressure probe or High-pressure probe.

Before the function block:



With the function block :



B is the Low Pressure Probe Minimum value (**E2_LowPressureMinLimit**).
PID Drop prevention point = B + Differential
(For the High pressure probre, the PID drop prevention point = A – Differential, with A the High Pressure Probe maximum value).

NOTE: See “Procedure to Set the Low-Pressure Limiter” and “Procedure to Set the High-Pressure Limiter “on page 71 how to set the PID Limiter.

2.14. Defrost Management

Introduction

The system manages defrost operations by controlling the involved actuators (pumps, fans, heating resistors and compressors) and the reversing valves switch it manages also the priority and timing of defrost in a double circuit heat pump.

Defrost Launch

The system automatically launches defrost based on the outdoor air temperature (**iOutdoorAirTemp** variable).

NOTE: It is also possible to set the low-pressure probe (**iLowPressCirc** variable) for the automatic launch of defrost by changing the parameter **E2_xDefrostProbe** in the menu Defrost. In this case, the launch defrost value (**iEnDefrostValue** variable) must be changed accordingly.

Defrost launch can also be forced by setting the **xCmdDefrostStartCir** variable to TRUE in the menu Defrost see on page 80.

Defrost End

Defrost ends when the evaporator coil temperature (**iEvapCoilTempCir** variable) is above the defrost end temperature (**E2_iDefrostEndTemp** parameter).

NOTE: It is also possible to set the high-pressure probe (**iHighPressCirc** variable) to end defrost. In this case, the end defrost value (**iDefrostEndValue** variable) must be changed accordingly.

Defrost Priority in a Double Circuit Heat Pump

If the system has two circuits, it is possible to manage the two defrost cycles in four different modes (**E2_usiDefrostType** parameter):

- disabled (=0): the defrost is disabled on both circuits
- synchronous (=1): if defrost has been launched on one circuit (**usiDefrostStatusCir1**/**usiDefrostStatusCir2**>1), it will also be activated on the other one
- asynchronous (=2): if defrost has been launched on one circuit (**usiDefrostStatusCir1**/**usiDefrostStatusCir2**>2), it will not be launched on the other one. When defrost on the first circuit is complete, it can be launched on the second circuit after a set period (**E2_uiTimeBetweenDefrosts** parameter). At first start-up, if both circuits are ready for defrost, circuit 1 has priority over circuit 2.
- independent (=3): each circuit can launch defrost independently from the other one.

Further Information

For further information on the reverse valve management, see, "Reversing Valves Management" on page 45.

2.15. Reversing Valves Management

Introduction

The system manages the reversing valves switch both during heating/cooling changeover and during defrost.

Reversing Valves Switch

When executing the reversing valve switch, the system controls both the reversing valve and the deactivation/activation of the compressors.

The timings of the operations are set by two parameters that determine the delay between compressors deactivation and valves switch and between valves switch and compressors re-activation.

The parameters are the following:

- during heating/cooling changeover: **E2_uiModeChangeCompValveTime** and **E2_uiModeChangeValveCompTime**
- during defrost: **E2_uiDefrostCompValveTime** and **E2_uiDefrostValveCompTime**

3. Web Site

3.1. Introduction

Description

The web site pages have been designed to set and monitor the system by accessing the controller web server from a web browser.

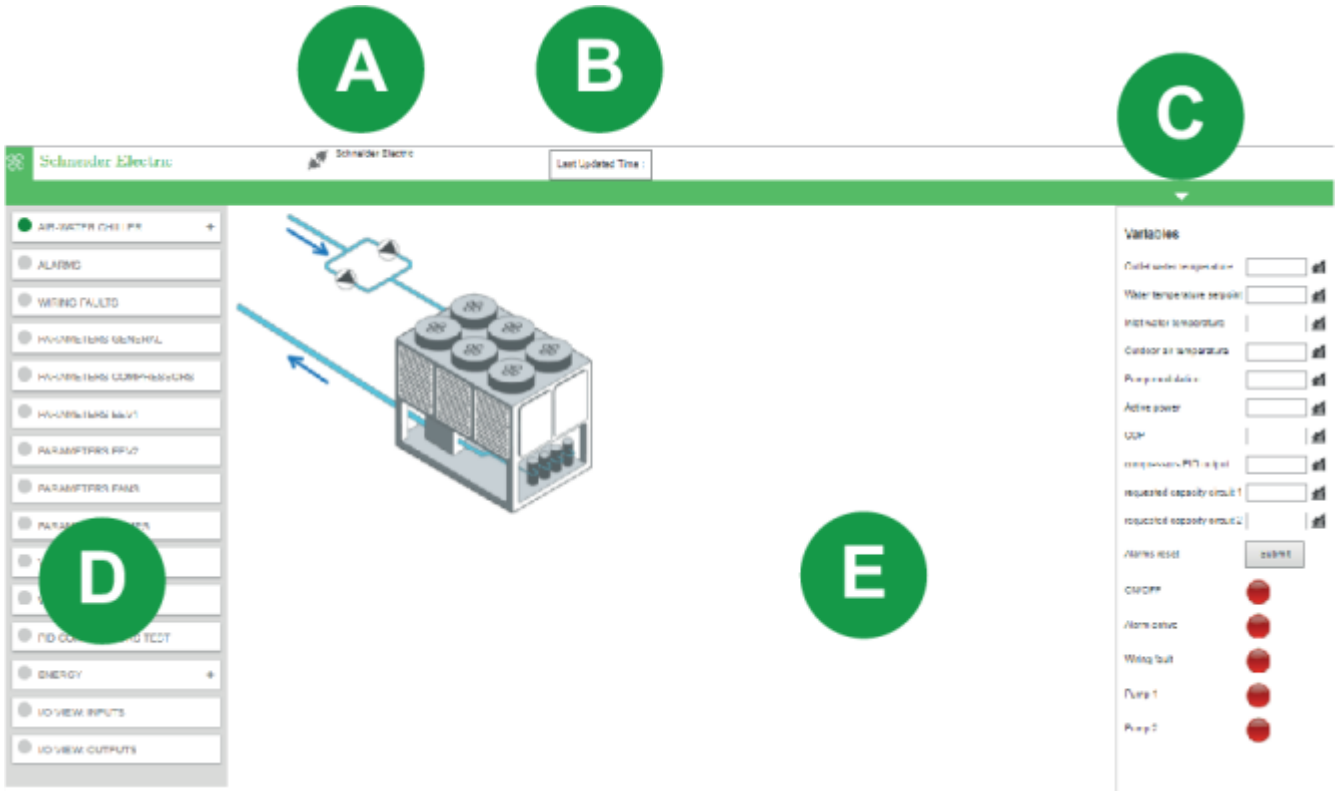
How to Access the Web Site

NOTE: The web site can only be accessed if the web server has been downloaded on the controller from the SoMachine HVAC Device.

1. Enter the IP address of the controller in the address bar in the web browser.

- Enter SoMachine HVAC default credentials (**Username**: administrator, **Password**: password): the web site main page is displayed.

Page Description



Part	Description
A	Connection status between the pc and the controller server web: • : connected • : not connected
B	Date and time of last page update
C	Goes back to the upper level page
D	List of pages. Click **+** to go to display lower level pages.
E	Page specific content

Buttons Description

Part	Function
	Opens the variable graphic. Click **+** to add other variables choosing them from other variables displayed in the same page.
	Parameters pages only. Saves on the local disk a .txt file containing the current settings for the selected parameters
	Parameters pages only. Uploads the parameter settings from a .txt file
	Saves the values of the selected parameters on the controller
	Displays the values on the controller for the selected parameters

How to Set a Parameter

NOTE: All parameter pages are password protected (default password is "1234"). See "Password Management" on page 48

1. Select a parameter page.
2. Click  : the parameters already set are displayed.
3. Enter the parameter values.
4. Select the parameter changed.
5. Click  to save the values on the controller.

Password Management

To change the password, in the PLC project, in **Resources**, **Web site** select the page and edit the **Password** box.

Change the default password upon first use. In addition, consider carefully the implications for giving any access to other people.

⚠WARNING

UNAUTHORIZED DATA ACCESS

- Immediately change any and all default passwords to new, secure passwords.
- Do not distribute passwords to unauthorized or otherwise unqualified personnel.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: A secure password is one that has not been shared or distributed to any unauthorized personnel and does not contain any personal or otherwise obvious information. Further, a mix of upper and lower-case letters and numbers offer greater security. You should choose a password length of at least seven characters. Do not exceed 50 characters and use only alpha-numeric characters.

Content Types

Below a description of the contents available in the website:

Content Type	Description
Text - Read-only variable for plotting graph	Analog variable displayed as value and as a graphic
Image - Read-only variable for showing image for Boolean values	Boolean variable displayed as a LED: •  : on •  : off
Button - Button to write in PLC	Command button. Click the button to set the value of the linked variable to TRUE.
Text - ReadWrite textbox	General parameter displayed as a text box
Image - Alarms	Alarms displayed as icons: •  : active •  : inactive

3.2. PID Compressors Test

Page Description

Element	Description	Reference Variable/Parameter
PID output	Compressors PID output	rSpCompressors
Auto tune ID message	Auto-tuning result	uiAutoTuneCompMessageID
Auto tune prop. band	Proportional band value (manual or calculated with auto-tuning)	uiAutoTuneCompPb
Auto tune integral time	Integral time value (manual or calculated with auto-tuning)	uiAutoTuneCompTi
Manual mode (LED)	Current PID management mode: • : auto mode • : manual mode	xCompressorsManualMode
Auto tuning	Auto-tuning activation status: • : off • : on	xStartAutoTuneCompressors
Manual output	Compressors control manual value	uiCompressorsManualValue
Selection of PID parameters	Command to change **Auto tune prop. band** and **Auto tune integral time** values: • **0**=values set in **uiCompressorsPbHeat/Cool** and in **uiCompressorsTi** • **1**= slow • **2**= medium • **3**=fast **NOTE**: **Auto tune prop. band** and **Auto tune integral time** values in **fast**, **medium** and **slow** are calculated only at the end of auto-tuning (**Auto tune ID message** = 1/2/3), otherwise they are equal to parameters in **manual**.	usiAutoTuneCompMode
Manual mode (button)	Command to start PID manual mode/stop PID auto mode	xCmdCompressorsManualMode
Auto mode	Command to start PID auto mode/stop PID manual mode	xCmdCompressorsAutoMode
Start auto tuning	Command to start PID auto-tuning	xCmdCompressorsManualMode
Stop auto tuning	Command to stop PID auto-tuning	xCmdCompressorsAutoMode

Element	Description	Reference Variable/Parameter
Save new parameters	Button to save **Auto tune prop. band** and **Auto tune integral time** values	xSaveAutoTuneParams

PID Parameters Auto-Tuning Process

Stage	Description
1	In the **PID compressors test** page (default password = 1234), you start the auto-tuning, by pressing **Start auto tuning** button. **Result**: **Auto tuning** =  and **Auto tune ID message** = 0. **NOTE**: For important information on password security, see "Password Management" on page 48.
2	The system runs the auto-tuning and at the end: • it shows the result in **Auto tuning ID message**. • it stops the auto-tuning: **Auto tuning** =  .
3	You: • select PID parameters changing the values in **Selection of PID parameters** and verify the machine behaviour with the **Auto tune prop. band** and **Auto tune integral time** values calculated and showed accordingly. • save the **Auto tune prop. band** and **Auto tune integral time** desired by clicking the **Save new parameters** button. **NOTE**: If **Auto tune prop. band** and **Auto tune integral time** are changed but not saved, the set values are used for water regulation PID only until the machine is switched on again, at this point the saved parameters will be applied.

3.3. Scheduler

Procedure to Set the Weekly Scheduler

1. Select the **Weekly Scheduler** page.
2. Enter the password (default = 1234).
3. Click : the parameters already set will be displayed.
4. In **Event ID** define the type of event to start (no event = 0, normal mode = 1, economy mode = 2).
5. In **Time** define the stat time of the event.
6. Select the days in which to schedule the event.
7. Repeat steps 2-4 to define when to start the new event and therefore stop the one set before.
8. Click to save the values on the controller and confirm the schedule.

NOTE: For important information on password security, see "Password Management" on page 48.

Procedure to Set the Yearly Scheduler

1. Select the **Yearly Scheduler** page.
2. Enter the password (default = 1234).
3. Click : the parameters already set will be displayed.
4. Define the month, day and time when to start the economy mode.
5. Define the month, day and time at when to stop the economy mode.
6. Select the parameters changed.
7. Click to save the values on the controller and confirm the schedule.

NOTE: For important information on password security, see "Password Management" on page 48.

4. User Interface

4.1. Introduction

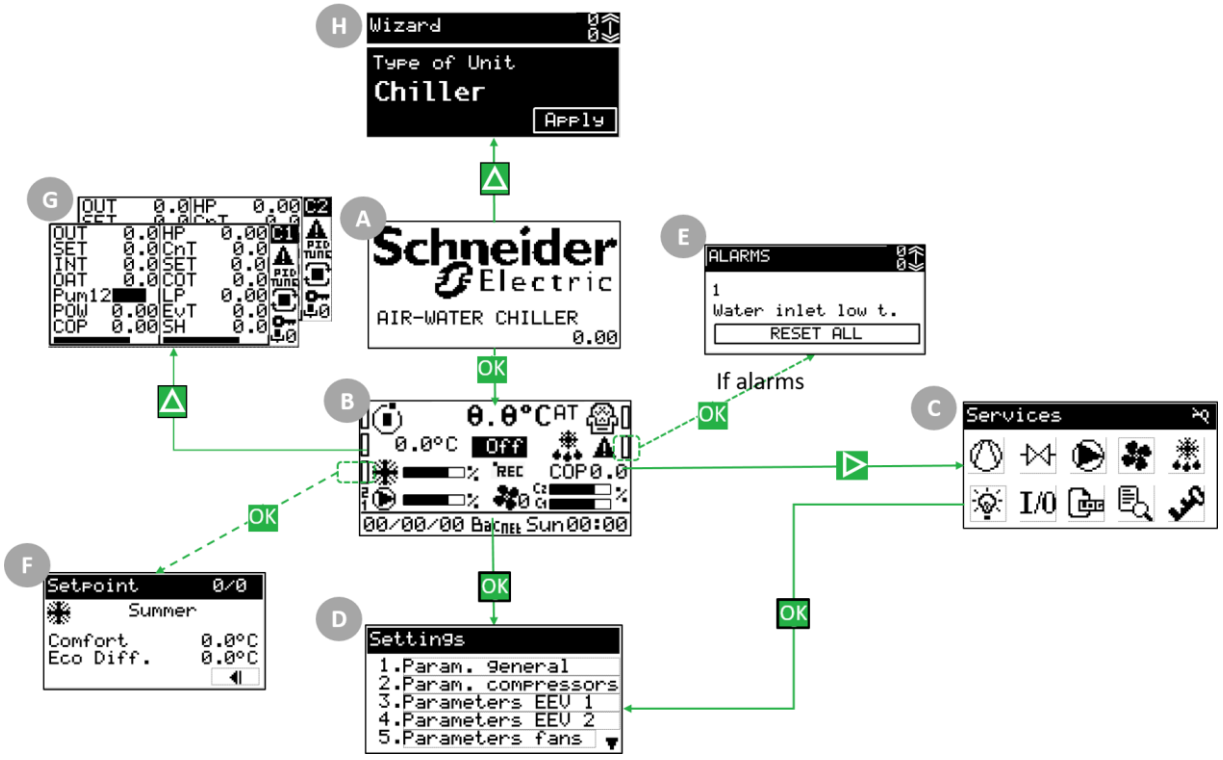
Description

The HMI project manages the HMI for the controller and the remote display.

NOTE: The remote display HMI must be uploaded from the controller, for instructions see Modicon M172 - Performance Logic Controller, Hardware User Manual.

4.2. Navigation

Main menu Navigation Tree



: Long press on the button

: Press on the button

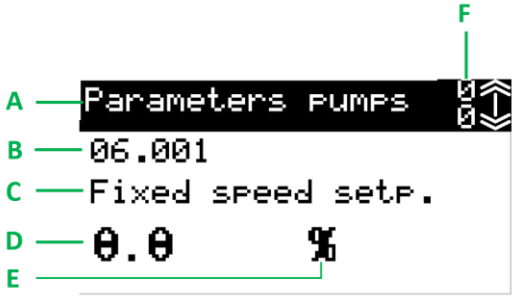
OK: Press **OK**

OK. Long press on the button **OK**

Monitoring pages

Part	Description	See
A	Splash page	-
B	Homepage of the system	“Homepage “on page 59

<table>
<tr><th>Part</th><th>Description</th><th>See</th></tr>
<tr><td>C</td><td>Main menu</td><td>"Main Menu " on page 59

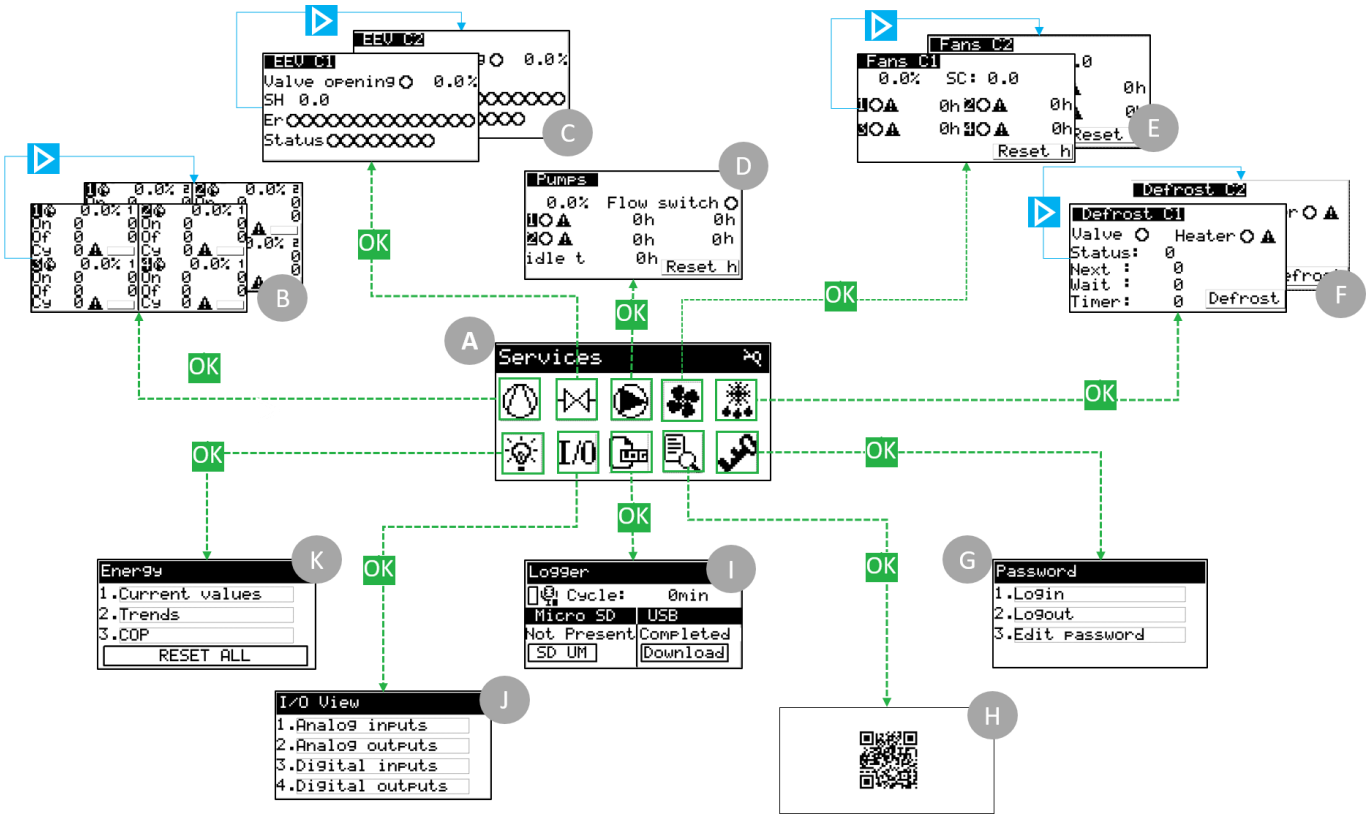
"Settings Menu Description
<table>
<tr><th>Menu Item</th><th>Description</th></tr>
<tr><td>Param. general</td><td>General system parameters</td></tr>
<tr><td>Param. compressors</td><td>Compressors parameters</td></tr>
<tr><td>Parameters EEV1</td><td>EEV driver 1 parameters</td></tr>
<tr><td>Parameters EEV2</td><td>EEV driver 2 parameters</td></tr>
<tr><td>Parameters fans</td><td>Condenser fans parameters</td></tr>
<tr><td>Parameters pumps</td><td>Pumps parameters</td></tr>
<tr><td>Yearly scheduler</td><td>Economy mode periods planning, see "Scheduler" on page 52.</td></tr>
<tr><td>Weekly scheduler</td><td>Weekly working mode planning, see "Scheduler" on page 52.</td></tr>
<tr><td>PID comp. test</td><td>Manual PID setting and auto-tuning management, see "PID Compressors Test" on page 70</td></tr>
<tr><td>Expert</td><td>See "Expert Menu Description" on page 70</td></tr>
</table>
Parameter Page Description
 

<table>
<tr><th>Part</th><th>Description</th></tr>
<tr><td>A</td><td>Submenu title</td></tr>
</table></td></tr>
</table>

Part	Description	See
D	Settings page	
E	Alarm page	"Alarm Page" on page 68
F	Setpoint pop-up page	See Change the Setpoint from the PLC
G	Circuit page	See “Circuit Page” on page 66
H	Wizard page	“Wizard Page” on page 59

Services Menu Navigation Tree

The Services menu includes monitoring pages and additional services like Logger functionality, Password setting and the QR Code page to access to the documentation.



Part	Description	See
A	Main menu	"Main Menu Pages" on page 69
B	Circuit 1/2 compressors page	" Compressors Pages (Circuit 1 and 2)" on page 75

Part	Description	See
C	Circuit 1/2 EEV page	" EEV Page (Circuit 1 and 2)" on page 77
D	Pumps page	"Pumps Page" on page 78
E	Circuit 1/2 fans page	"Fans Page (Circuit 1 and 2)" on page 79
F	Circuit 1/2 Defrost page	See “Defrost page” on page 80
G	Password management	"HMI Password Management" on page 85
H	QR Code page	"QR Code" on page 41
I	Logger page	
J	IOs view	" I/O View Menu Description" on page 81 "I/O View Page Description" on page 82
K	Energy	"Energy Menu Description" on page 81

NOTE: circuit 2 pages are visible only if the chiller/heat pump has two circuits. All the pages are common for the two circuits excepted the pages **B, C, E** and **F**.

Key Functions

Key	Function
^	• Scroll up • Increase/modify a value • Go to next label
v	• Scroll down • Decrease/modify a value • Go to previous label
<	• Exit menu page/ go back to previous menu • Move cursor to left in Edit mode • (long press) Exit Edit mode without saving
>	Move cursor to right in Edit mode
OK	• Move to next level/menu (open folder, subfolder, parameter, value) • Enter/exit Edit mode • Confirm operation

How to Set a Parameter

1. From the circuit pages, long press the **OK** key.
2. Select the **Settings** menu and press the **OK** key.
3. Insert the password and press the **OK** key.

   NOTE: No password is set by default, so you can use any password to access the parameters.

4. Use the **^** and **v** keys to select a category of parameters then press the **OK** key to enter the submenu.
5. Use the **^** and **v** keys to select a parameter then press the **OK** key to enter the edit mode.
6. Use the **^**, **<**, **>** and **v** keys to select an option or set a value.
7. Press the **OK** key to confirm the option or the value.

4.3. Main menu

4.3.1. Wizard page

The first start

When the PLC is switched on for the first time, it displays the Wizard page. This menu enables to set the main parameters for a quick start. Once the parameters are set, the button “Apply” will appear on the last item page. Press “Ok” on this button and the PLC will reboot and update the parameters.

Do not forget to check if the inputs and outputs are as suggested in the IOs configuration selected (see I/O Configuration on page 926.1) before to launch the reboot.

After the first start

To access again to the wizard menu, you can long press the up arrow “**^**” from the flash page. The access require a password of Level 3.

NOTE: The only way to exit from the page Wizard is to click on the button “Apply”.

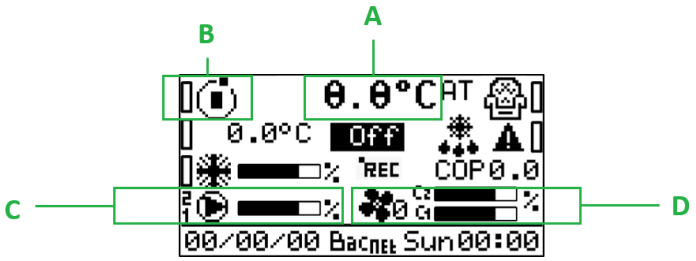
Wizard menu

Stage	Description	Options	Parameter	Modbus Address
1	Select the unit	1.Chiller 2.Heat pump 3.Chiller-Heat Pump	E2_usiUnitModel	17135
2	Select the IO configuration	See “Configuration I/Os” on page 92	E2_usiConfig	16860
3	Select the number of circuits	(max 2)	E2_usiNbCircuits	16388
4	Select the regulation probe	1.Suction Pressure 2.Water Inlet 3.Water outlet	E2_usiRegulationProbe	17137
5	If the expansion 1 is used, set the variable at true		E2_xExp1Used	16943
6	If the expansion 2 is used, set the variable at true		E2_xExp2Used	16944
7	If the expansion 3 is used, set the variable at true		E2_xExp3Used	16945
8	Select the model of compressor 1 in the circuit 1		E2_usiCompModelComp1Cir1	16394

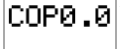
Stage	Description	Options	Parameter	Modbus Address
9	Select the model of compressor 2 in the circuit 1		E2_usiCompModelComp2Cir1	16779
10	Select the model of compressor 3 in the circuit 1		E2_usiCompModelComp3Cir1	16780
11	Select the model of compressor 4 in the circuit 1		E2_usiCompModelComp4Cir1	16781
12	Select the model of compressor 1 in the circuit 2 (Available only if there are 2 circuits)		E2_usiCompModelComp1Cir2	16782
13	Select the model of compressor 2 in the circuit 2 (Available only if there are 2 circuits)		E2_usiCompModelComp2Cir2	16783
14	Select the model of compressor 3 in the circuit 2 (Available only if there are 2 circuits)		E2_usiCompModelComp3Cir2	16784
15	Select the model of compressor 4 in the circuit 2 (Available only if there are 2 circuits)		E2_usiCompModelComp4Cir2	16785
16	Select the mode to change the activity mode (Cool or Heat) (Available only if the unit is a Chiller-Heat Pump)	1. Auto (Base on the outdoor temperature) 2. Digital (On the microcontroller) 3. Remote (Via web or BACnet) 4. Manual (Digital Input)	E2_usiModeType	17085
17	Select the type of refrigerant	See “Parameters”on page 143	E2_usiRefrigerantType	16385
18	Select the unit of the pressure	Bar or USI	E2_xUnitTypePress	16387
19	Select the unit of the temperature	Degree or Fahrenheit	E2_xUnitTypeTemp	16387
20	To enable the MODBus communication with the Electrovavle (EEV), set this parameter at TRUE		E2_xEnableTM171VEV	16940

Stage	Description	Options	Parameter	Modbus Address
21	To enable the MODBus communication with the Inverter set this parameter at TRUE		E2_xEnableInverterMB	16938
22	To enable the MODBus communication with the Fans set this parameter at TRUE		E2_xEnableModbusFanX	16939
23	To enable the MODBus communication with the Pumps set this parameter at TRUE		E2_xEnablePumpMB	16942
24	To enable the MODBus communication with the Altvar set this parameter at TRUE		E2_xEnableSoftStartMB	16938
25	Set the type of High Pressure Probe	1. EWPA010 2. EWPA030 3. EWPA050 4. CUSTOM PROBE	E2_usiProbeHP	16934
26	Set the type of Low Pressure Probe	1. EWPA010 2. EWPA030 3. EWPA050 4. CUSTOM PROBE	E2_usiProbeLP	16933
27	Set the number of fan in the circuit 1		E2_usiFanNbStageCir1	16496
28	Set the number of fan in the circuit 2 (Available only if there are 2 circuits)		E2_usiFanNbStageCir2	16497
Click on “Apply” to apply and reboot the PLC				

4.3.2. Homepage



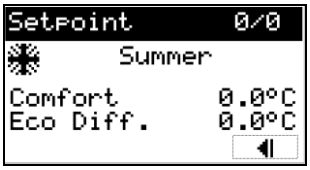
Part	Description	Reference Variable
A	• θ.θ°C : Current probe regulation value	• iOutletWaterTemp , iInletWater or iLowPressCir1
B	: The system is OFF : The system is ON : The system is in Standby : Button to switch ON/OFF/ON-STANBY the system **NOTE**: A pop-up page is displayed to select the system status request.	
C	• this icon refers to the pumps **1**: pump 1 on **2**: pump 2 on • : Pumps capacity	• xPump1 and xPump2 • iPump
D	• 0 indicates the total number of fans actives • C1 is the percentage of fans capacity in the circuit 1 • C2 is visible when there is a second circuit	• xNbFanActive • iFanCir1 • iFanCir2
0.0°C	• θ.θ°C: Water temperature setpoint • : Button to change the setpoint	• iCurrentWaterTempSet

Part	Description	Reference Variable
	•  : Circuit 1and Circuit 2 mode status When  is displayed, the system operates in cooling mode. When  is displayed, the system operates in heating mode. •  : Button to change working mode (Heat or Cool mode) If the icon is blinking, it means that the operating mode is changing. Once the blinking stop, the switching of the valve is completed. **NOTE**: The changing mode is only available for Chiller-Heat Pump machines. •  : Percentage of capacity generated by the system	• xHeatCool • (HMI controller local variable) rTotalCapacity = rCapacityCir1 + rReqCapacityCir2 rMaxCapacity = rCapMaxCir1 + rCapMaxCir2
	When it is displayed, it means that the logger is active.	E2_xLogEnable
	When  is displayed it means that PID tune functionality is active	
	When it is displayed, it means that BACnet communication is active	E2_xBACnetEnable
	This is the system operating mode. It can be set at: • Off • Stby • Comf	usiUnitMode
	When it is displayed, the defrost is active. **1**: Defrost in circuit 1 is ON **2**: Defrost in circuit 2 is ON	
	When it is displayed, it means that the COP Calculation is active and it displays the value of the COP	uiCOP

Part	Description	Reference Variable
	• : at least one alarm is active. • : wiring short-or open-circuit **NOTE**: If both conditions are present, the icons are displayed alternatively. To open the alarms page, click on the button.	xIsAlarmActive/ xIsWiringFaultActive
00/00/00	Date	
Sun00:00	Day and Time	
	Set or Reset Economy mode. When :  is displayed, the unit is in Economy mode  is displayed, the unit is in Comfort mode	xSwitchToEco

Change the Setpoint from the PLC

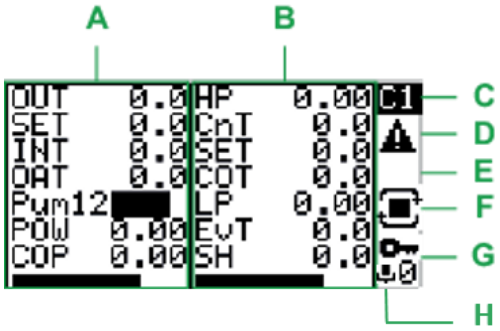
The following part explains how to set up a new setpoint from the PLC



Part	Description	Reference Variable
Summer	Summer refers to the two-system operating's mode (Heat and Cool). In summer, the unit will be in cool mode In winter, the unit will be in heat mode. Using the arrows **^** and **v** you can set right now the setpoint needed for the both modes	
Comfort	Setpoint when the unit is in Comfort mode	If E2_xEnAirWaterLink is true, the parameter used is E2_iRoomSetHeat / E2_iRoomSetCool If not, the parameter used is E2_iWaterTempSetHeat/ E2_iWaterTempSetCool

Part	Description	Reference Variable
Eco Diff.	Offset apply to the Comfort setpoint when the unit operates in Eco mode	Summer: E2_iWaterSetEcoOffsetCool Winter: E2_iWaterSetEcoOffsetHeat
	Exit button	

4.3.3. Circuit Page



Part	Description	Reference Variable
A	System variables	-
B	Circuit variables	-
C	Circuit identifier Values: C1 or C2	-
D	• ⚠: at least one alarm is active. • ⚠: wiring short-or open-circuit **NOTE**: If both conditions are present, the icons are displayed alternatively.	xIsAlarmActive/ xIsWiringFaultActive
E	PID TUNE: **Pb** and **Ti** values used for PID calculation are not the same as the one saved in the memory.	uiAutoTuneCompPb uiAutoTuneCompTi E2_uiCompressorsPbHeat/ Cool E2_uiCompressorsTi
F	Machine operating status: • ▶: on • ▶: on and PID in manual mode • ■: off • ECO: Eco mode • ⏻: StandBy mode	uiOperationMode xCompressorsManualMode
G	Current password level, see "HMI Password Management" on page 85	(HMI controller local variable) usiPermLevelCur
H	When 🖧 is visible, the logger is enabled	E2_xLogEnable

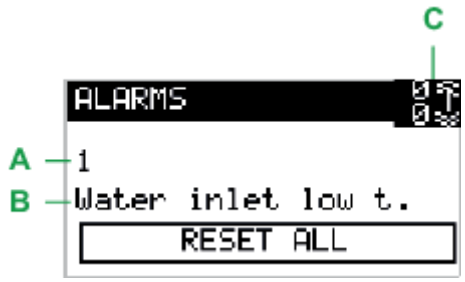
System Variables

Part	Description	Unit of Measure	Reference Variable
OUT	Chilled water temperature	°C/°F	iOutletWaterTemp
SET	Current water temperature setpoint	°C/°F	iCurrentWaterTempSet
INT	Hot water temperature	°C/°F	iInletWaterTemp
OAT	Outdoor air temperature	°C/°F	iOutdoorAirTemp
Pum	Start/stop command pump: • **1**: pump 1 on • **2**: pump 2 on	-	xPump1/ xPump2
	VSD output pump	%	iPump
POW	Current active power	kW	rActivePower
COP	COP instant	-	uiCOP
[redacted]	Percentage of capacity generated by the system	%	(HMI controller local variable) rTotalCapacity = rReqCapacityCir1 + rReqCapacityCir2 (HMI controller local variable) rMaxCapacity = rCapMaxCir1 + rCapMaxCir2

Circuit 1 and 2 Variables

Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
HP	High pressure	bar/PSI	iHighPressCir1	iHighPressCir2
CnT	Condensation temperature	°C/°F	iCondTempCir1	iCondTempCir2
SET	Condensation temperature current setpoint	°C/°F	iCondTempSetpCir1	iCondTempSetpCir2
COT	Condenser output temperature	°C/°F	iCondOutTempCir1	iCondOutTempCir2
LP	Low pressure	bar/PSI	iLowPressCir1	iLowPressCir2
EvT	Current evaporation temperature	°C/°F	iEvapTempCir1	iEvapTempCir2
SH	Superheat	K/R	iSuperHeatCir1	iSuperHeatCir2
[redacted]	Percentage of circuit capacity	%	rReqCapacityCir1 rCapMaxCir1	rReqCapacityCir2 rCapMaxCir2

4.3.4. Alarm Page

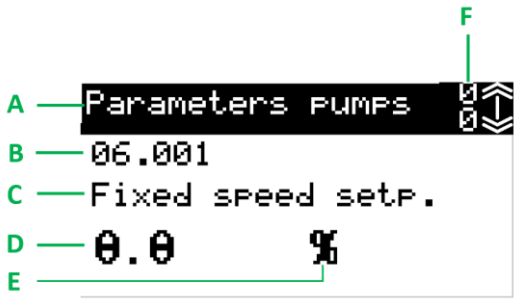


Part	Description	Reference Variable
A	Alarm ID	See "General Alarms" on page 99
B	Alarm description	
C	• Progressive number of the displayed alarm • Total number of alarms	-
RESET ALL	Resets all alarms. The alarms list is refreshed: only the alarms whose causes are still active are displayed.	xCmdAlarmsReset

4.3.5. Settings Menu Description

Menu Item	Description
Param. general	General system parameters
Param. compressors	Compressors parameters
Parameters EEV1	EEV driver 1 parameters
Parameters EEV2	EEV driver 2 parameters
Parameters fans	Condenser fans parameters
Parameters pumps	Pumps parameters
Yearly scheduler	Economy mode periods planning, see "Scheduler" on page 52.
Weekly scheduler	Weekly working mode planning, see "Scheduler" on page 52.
PID comp. test	Manual PID setting and auto-tuning management, see "PID Compressors Test" on page 70
Expert	See "Expert Menu Description" on page 70

Parameter Page Description



Part	Description
A	Submenu title
B	Parameter ID
C	Parameter description
D	Current value/option
E	Only for values, unit of measure
F	• Progressive number of the displayed parameter • Total number of parameters in the submenu

PID Compressors Test

PID Page

Part	Description	Unit of Measure	Reference Variable
A	Current PID management mode and button to change it	-	xCompressorsManualMode
B	Auto-tuning activation status and button to start/stop the auto-tuning	-	xStartAutoTuneCompressors
C	• **manual**: **Pb** and **Ti** values set manually in **uiCompressorsPbHeat/Cool** and **uiCompressorsTi** parameters (in **Settings** > **Par. compressors**) • **fast/ medium/ slow**: **Pb** and **Ti** values calculated post auto-tuning **NOTE**: **Pb** and **Ti** values in **fast**, **medium** and **slow** are calculated only at the end of auto-tuning (**ID** = 1/2/3), otherwise they are equal to parameters in **manual**.	-	usiAutoTuneCompMode
0.0%	Compressors PID output	%	rSpCompressors
SET	Compressors control manual value	%	uiCompressorsManualValue
ID	Auto-tuning result	-	uiAutoTuneCompMessageID
Pb	Proportional band value (manual or calculated with auto-tuning)	°C/ °F	uiAutoTuneCompPb
Ti	Integral time value (manual or calculated with auto-tuning)	s	uiAutoTuneCompTi
SAVE	Button to save **Pb** and **Ti** values	-	xSaveAutoTuneParams

PID Parameters Auto-Tuning Process

Stage	Description
1	You start the auto-tuning, selecting the button in **B**. **Result**: **tune ON** = ● and **ID** = 0.
2	The system runs the auto-tuning and at the end: • **ID** shows the result. • **tune OFF** = ● stops the auto-tuning:
3	You: • select PID parameters by changing the values in **C** and verify the machine behaviour with the **Pb** and **Ti** values calculated and showed accordingly. • save the **Pb** and **Ti** desired pressing the **SAVE** button. **NOTE**: If **Pb** and **Ti** are changed but not saved, the set values are used for water regulation PID only until the machine is switched on again, at this point the saved parameters will be applied. The icon PID on circuit page alerts that the values currently in use are not saved.

Procedure to Set the Low-Pressure Limiter

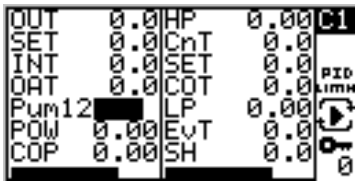
3. If the Minimum Low-pressure value is not defined, set the Low-Pressure Probe minimum value by using the parameter **02.018 Low press. Limit** in the menu Param. compressor
4. Set the Low-Pressure Differential with the parameter **01.032 LP Limiter diff** in the HMI menu Param. General

Procedure to Set the High-Pressure Limiter

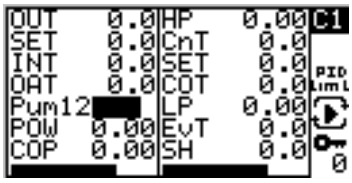
3. If the Minimum High-pressure value is not defined, set the High-Pressure Probe minimum value by using the parameter **02.017 High press. Limit** in the menu Param. compressor
4. Set the High-Pressure Differential with the parameter **01.031 HP Limiter diff** in the HMI menu Param. General

Once these parameters are set, enable the PID Limiter by setting at TRUE the parameter **01.030 Enable Press Limiter** in the HMI menu Param. General.

When the Low-Pressure Limiter is active, this icon PID LimL will be displayed in the HMI menu below:



When the High-Pressure Limiter is active, this icon PID LimH will be displayed in the HMI menu below:



Macro-Procedure to Set the Yearly Scheduler

3. Define the month, day and time when to start the economy mode.
4. Define the month, day and time when to stop the economy mode.

HMI Weekly Scheduler

Part	Description	Reference Parameter
A	Type of event: • **OCCUPATION**: The machine works in occupied mode • **ECONOMY**: The machine works in economy mode • **COOL**: The machine works in cool mode • **HEAT**: The machine works in heat mode • **DEFROST CIR1**: The machine works in defrost mode on circuit 1 • **DEFROST CIR2 :** The machine works in defrost mode on circuit 2 • **NO EVENT:** no event set • **OFF:** The machine is off	E2_usiEventID parameters
B	For each day of the week: • ●: the event will occur that day of the week • ○: the event won't occur that day of the week	E2_usiEventWeekDays parameters
C	• Progressive number of the displayed event • Total number of available events	-

Part	Description	Reference Parameter
D	Start time of the set event **NOTE**: If the event type is **NO EVENT**, the event is disabled.	E2_uiEventTime parameters

Procedure to Set the HMI Weekly Scheduler

7. Select the field to modify, using the **<** and **>** keys.
8. Define the type of event to start (e.g. economy mode).
9. Define the stat time of the event.
10. Select the days in which to schedule the event, using the **<** and **>** keys to move on the day button and press the **OK** key to toggle the day status.
11. Press the **v** key to display the following event and repeat steps 1-4 to define when to start the new event and therefore stop the previous one.
12. Long press the **<** key to exit.

HMI Yearly Scheduler

Part	Description	Reference Parameter
A	Parameter ID	• E2_usiStartDayMonth • E2_usiStartHours • E2_usiStartMonth • E2_usiStopDayMonth • E2_usiStopHours • E2_usiStopMonth
B	Parameter description	
C	Current parameter option	
D	• Progressive number of the displayed event • Total number of available events	-

Expert Menu Description

Menu Item	Description
AI configuration	Parameters to define the probe type, the operating range and offset value, if any

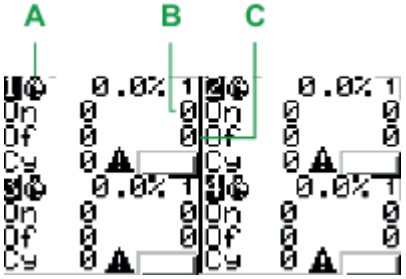
Menu Item	Description
AO configuration	Parameters to define the analog outputs type
RS485 config.	Parameters to define RS485 Modbus communication
Ethernet config.	Parameters to define Ethernet communication
Clock config.	Date and time setting, see "Clock Settings" on page **Error! Bookmark not defined.**, useful for machine working mode planning (see "Working Mode Scheduling" on page 35).
BACnet config.	Parameters to define BACnet communication

Procedure to Set Date and Time

4. Use the **<** and **>** keys to select the field to modify.
5. To modify the field, press the **OK** key: the **UPDATE** button is displayed and the icon flashes.
6. To save the changes, select **UPDATE** and press the **OK** key: the **UPDATE** button disappears and the icon stops flashing.

4.4. Services Menu

4.4.1. Compressors Pages



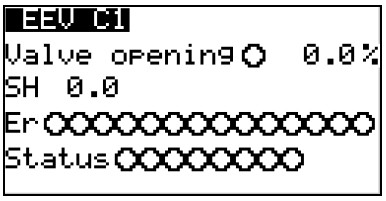
NOTE: The displayed variables depend on parameter settings.

Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
A	• : compressor on • nothing: compressor off	-	xComp1Cir1/ xComp2Cir1/ xComp3Cir1/ xComp4Cir1	xComp1Cir2/ xComp2Cir2/ xComp3Cir2/ xComp4Cir2
B	Total number of operating hours	h	E2_udiOpHoursComp1Cir1/ E2_udiOpHoursComp2Cir1/ E2_udiOpHoursComp3Cir1/ E2_udiOpHoursComp4Cir1	E2_udiOpHoursComp1Cir2/ E2_udiOpHoursComp2Cir2/ E2_udiOpHoursComp3Cir2/ E2_udiOpHoursComp4Cir2
C	Total number of starts	-	E2_udiNbStartsComp1Cir1/ E2_udiNbStartsComp2Cir1/ E2_udiNbStartsComp3Cir1/ E2_udiNbStartsComp4Cir1	E2_udiNbStartsComp1Cir2/ E2_udiNbStartsComp2Cir2/ E2_udiNbStartsComp3Cir2/ E2_udiNbStartsComp4Cir2
1	Compressor identifier	-	-	-
0.0%	VSD output compressor	%	iComp1Cir1/ iComp2Cir1/ iComp3Cir1/ iComp4Cir1	iComp1Cir2/ iComp2Cir2/ iComp3Cir2/ iComp4Cir2
1	Circuit identifier Values: **1** or **2**	-	-	-
On	Remaining time before minimum On time elapsed	s	uiElapsedOnTimeComp1Cir1/ uiElapsedOnTimeComp2Cir1/ uiElapsedOnTimeComp3Cir1/ uiElapsedOnTimeComp4Cir1	uiElapsedOnTimeComp1Cir2/ uiElapsedOnTimeComp2Cir2/ uiElapsedOnTimeComp3Cir2/ uiElapsedOnTimeComp4Cir2

Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
Off	Remaining time before minimum Off time elapsed	s	uiElapsedOffTimeComp1Cir1/ uiElapsedOffTimeComp2Cir1/ uiElapsedOffTimeComp3Cir1/ uiElapsedOffTimeComp4Cir1	uiElapsedOffTimeComp1Cir2/ uiElapsedOffTimeComp2Cir2/ uiElapsedOffTimeComp3Cir2/ uiElapsedOffTimeComp4Cir2
Cy	Remaining time before minimum cycle time elapsed	s	uiElapsedCycleTimeComp1Cir1/ uiElapsedCycleTimeComp2Cir1/ uiElapsedCycleTimeComp3Cir1/ uiElapsedCycleTimeComp4Cir1	uiElapsedCycleTimeComp1Cir2/ uiElapsedCycleTimeComp2Cir2/ uiElapsedCycleTimeComp3Cir2/ uiElapsedCycleTimeComp4Cir2
	Compressor or alarm/ oil pressure alarm/ VSD alarm *		xAlarmMotorComp1Cir1/ xAlarmMotorComp2Cir1/ xAlarmMotorComp3Cir1/ xAlarmMotorComp4Cir1 xOilPressSwitchComp1Cir1/ xOilPressSwitchComp2Cir1/ xOilPressSwitchComp3Cir1/ xOilPressSwitchComp4Cir1	xAlarmMotorComp1Cir2/ xAlarmMotorComp2Cir2/ xAlarmMotorComp3Cir2/ xAlarmMotorComp4Cir2 xOilPressSwitchComp1Cir2/ xOilPressSwitchComp2Cir2 xOilPressSwitchComp3Cir2/ xOilPressSwitchComp4Cir2
	Reset command for operating hours Press the **^** and **v** keys to scroll the commands.	-	xCmdOpHoursResetComp1Cir1/ xCmdOpHoursResetComp2Cir1/ xCmdOpHoursResetComp3Cir1/ xCmdOpHoursResetComp4Cir1	xCmdOpHoursResetComp1Cir2/ xCmdOpHoursResetComp2Cir2/ xCmdOpHoursResetComp3Cir2/ xCmdOpHoursResetComp4Cir2

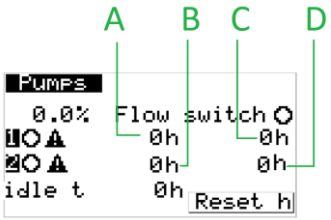
NOTE ***: Information received by VSD via serial communication (**uiRMbATVDrvAlarmNodeX** variable, where "X" is the Modbus address of the device).

4.4.2. EEV Page



Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
EEV				
○	Start/stop command solenoid valve: • ●: on • ○: off	h	xSolenoidCir1	xSolenoidCir2
C1	Circuit identifier Values: C1 or C2	-	-	-
0.0%	Valve opening from EEV drive	%	uiRMbTM171VEVOpenCir1	uiRMbTM171VEVOpenCir2
SH	Superheat	K/R	iSuperHeatCir1	iSuperHeatCir2
Er	Errors from EEV driver. (First dot = **Er15**, last dot = **Er01**) For error legend, see Modicon M171 Electronic - Expansion Valve Drivers, User Manual.	-	uiRMbTM171VEVErrorCir1	uiRMbTM171VEVErrorCir2
Status	Status from EEV driver. (First dot = **EEV_STTS_FORCE_OPEN**- bit 7; last dot = **EEV_STTS_ON** - bit 0). For status legend, see Modicon M171 Electronic - Expansion Valve Drivers, User Manual.	-	uiRMbTM171VEVStatusCir1	uiRMbTM171VEVStatusCir2

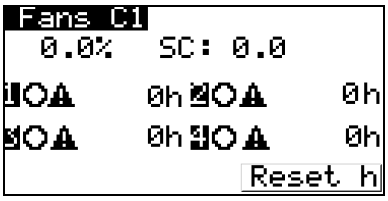
4.4.3. Pumps Page



NOTE: The displayed variables depend on parameter settings.

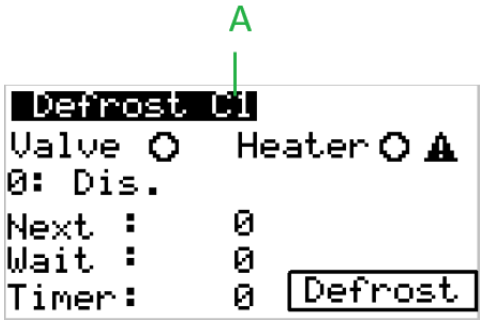
Part	Description	Unit of Measure	Reference Variable
A	Remaining time before pump 1 switches over to pump 2	h	uiRemainTimePump1
B	Remaining time before pump 2 switches over to pump 1	h	uiRemainTimePump2
C	Total number of operating hours pump 1	h	E2_udiOpHoursPump 1
D	Total number of operating hours pump 2	h	E2_udiOpHoursPump 2
0.0%	VSD output pump	%	iPump
1	Start/stop command pump 1: • ●: on • ○: off	-	xPump1 uiRMbATVDrvAlarmNode21
⚠	Alarm thermal block pump 1	-	xAlarmThermBlockPump1
2	Start/stop command pump 2: • ●: on • ○: off	-	xPump2
⚠	Alarm thermal block pump 2	-	xAlarmThermBlockPump2
Idle t	Remaining time before pump starts for **uiPModeRunTime**	h	uiRemainIdleTimePumps
Reset h	Reset command for operation hours all pumps. To reset, press **OK** key	-	xOpHoursResetPumps
Flow switch	Pump flow switch	-	xPumpFlowSwitch

4.4.4. Fans Page



Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
Fans				
0h	For each fan stage, total number of operating hours	h	E2_udiOpHoursFanStage1Cir1/ E2_udiOpHoursFanStage2Cir1/ E2_udiOpHoursFanStage3Cir1/ E2_udiOpHoursFanStage4Cir1	E2_udiOpHoursFanStage1Cir2/ E2_udiOpHoursFanStage2Cir2/ E2_udiOpHoursFanStage3Cir2/ E2_udiOpHoursFanStage4Cir2
C1	Circuit identifier Values: C1 or C2	-	-	-
0.0%	VSD output	%	iFanCir1	iFanCir2
SC	Subcooling	K/R	iSubCoolingCir1	iSubCoolingCir2
1/ 2/ 3/ 4	Start/stop command fan stage 1/ 2/ 3/ 4: • ●: on • ○: off	-	xFan1Cir1/ xFan2Cir1/ xFan3Cir1/ xFan4Cir1	xFan1Cir2/ xFan2Cir2/ xFan3Cir2/ xFan4Cir2
⚠	Alarm fan stage	-	xAlarmFan1Cir1 / xAlarmFan2Cir1 / xAlarmFan3Cir1 / xAlarmFan4Cir1	xAlarmFan1Cir2 / xAlarmFan2Cir2 / xAlarmFan3Cir2 / xAlarmFan4Cir2
Reset h	Reset command for operation hours all fans	-	xCmdOpHoursResetFansCir1	xCmdOpHoursResetFansCir2

4.4.5. Defrost page



Part	Description	Unit of Measure	Circuit 1 Reference Variable	Circuit 2 Reference Variable
A	Circuit identifier	-	-	-
Valve	Mode of the reversing valve: • ○: cool mode • ●: heat mode	-	xReversingValveCir1	xReversingValveCir2
Heater	Status of the heating resistor: • ○: off • ●: on • ⚠: alarm	-	xHeatingResistorCir1 xAlarmThermHeatResistorCir1	xHeatingResistorCir2 xAlarmThermHeatResistorCir2
0: Dis.	Defrost status: 0 – 13	-	usiDefrostStatusCir1	usiDefrostStatusCir2
Next	Time to next defrost on the circuit	min	uiTimerNextDefrostCir1	uiTimerNextDefrostCir2
Timer	Remaining time to the end of the present defrost status	s/min	uiTimerDefrPhaseCir1	uiTimerDefrPhaseCir2
Wait	Time to wait for next defrost on the circuit if defrost has been launched on the other circuit	min	uiTimerNextDefrost	uiTimerNextDefrost
StartDef	Command to start defrosting manually	-	xDefrostStartCir1	xDefrostStartCir2

4.4.6. Energy

Menu Description

Menu Item	Description	Reference Variable/Parameter
Current values	Energy related information: • Active power • Thermal power • Active energy • Thermal energy • Mass flow 1 • Mass flow 2	• rActivePower • rThermalPower • rActiveEnergy • rThermalEnergy • uiMassFlowCir1 • uiMassFlowCir2
Trends	Energy consumption trends: • Daily consumption (current and previous day) • Weekly consumption (current and previous week) • Monthly consumption (current month, previous month, past 12 months) • Yearly consumption (current and previous year) • Period consumption (current and previous period, current period start). **NOTE**: Start time of the current period is the last time the **RESET** button was pressed.	See "Energy" on page 169
COP	COP values: • Instant COP • Short-term COP • Long-term COP • COP period start **NOTE**: Start time of the current period is the last time the **RESET** button was pressed.	• uiCOP • uiShortTermCOP • uiLongTermCOP
RESET	Reset of current trend values, energy trend period and COP period. **NOTE**: Last reset date and time are displayed in **Curr. period start** and **COP period start**.	xCmdConsumReset

4.4.7. I/O View

Menu Description

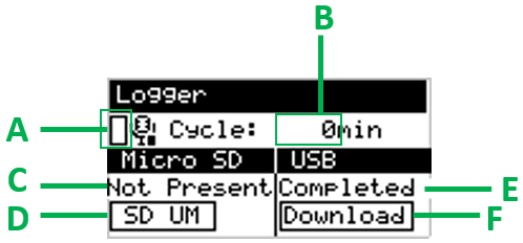
Menu Item	Description
Analog inputs	Analog inputs description and values
Analog outputs	Analog outputs description and values
Digital inputs	Digital inputs description and statuses
Digital outputs	Digital outputs description and statuses

I/O View Page Description

Part	Description
A	Submenu title
B	Terminal name (**E** = expansion module)
C	I/O description
D	I/O status
E	• Progressive number of the displayed I/O • Total number of I/Os in the submenu

4.4.8. Logger Page

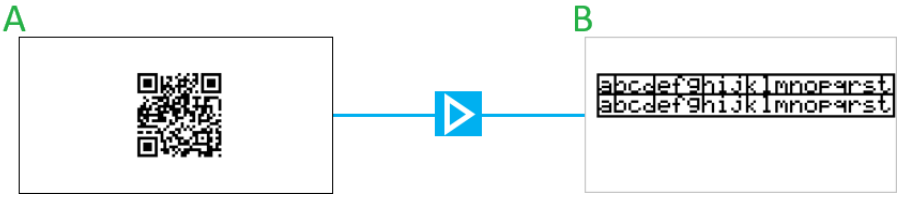
Logger Page Description



Part	Description	Unit of Measure	Reference Variable/Parameter
A	Enables/Disables data logger. When the data logger is enabled, this bitmap is displayed , and if the data logger is disabled this bitmap is displayed . Permission level 1 at least required for the use of this button	-	E2_xLogEnable
B	Defines the logging period of the monthly file	-	E2_uiMonthLogCycle
C	Micro SD Status 0: Not present 1: Unsafe Remove 2: Not Mounted 3: Mounted	-	microSdStatus
D	Enables to mount (when the message displayed on the button is “SD MO”) and to unmount (when the message displayed is “SD UM”) safely the microSD card. (Only visible if the micro SD is plugged) Permission level 1 at least required for the use of this button	-	reqMountSD reqUnmountSD

Part	Description	Unit of Measure	Reference Variable/Parameter
E	USB status 0: Completed 1: Processing 255: Failed 254: No File 253: Failed 252: USB not In 251: Failed 250: Failed 249: Failed 248: Failed 300:*****	-	UsbStatus
F	Enables to download logger files on the USB key	**-**	SaveUsb

4.4.9. QR Code page



Menu Item	Description	Reference Variable/Parameter
A	This first page displays the QR Code By pressing the right arrow **>** you will access to the page **B**	-
B	In this page, you can set a new QR Code. 1. By using the different arrows to set a new web address. 2. Once the new web address is set, press **<** to exit. 3. On the page A you will find the QR code updated	-

4.4.10. Password Management

Introduction

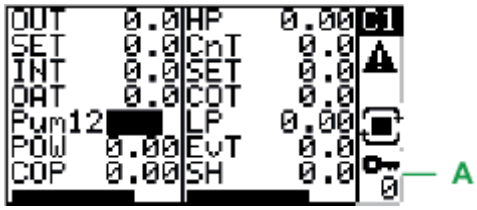
To set parameters you need to enter a password having the same level as the parameter itself.

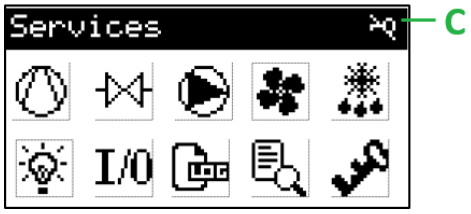
There are four password/parameter levels, where level 0 is the less restrictive.

By default, all parameters are set to level 0 and no default factory password is set.

How to Identify Current Password Level

The current password level (**usiPermLevelCur** local variable) is contained in the circuit page [**A**], it is displayed by entering the password in the **Settings** menu [**B**] and in the **Services** menu [**C**].





How to Change the Password Level for a Parameter

To modify the password level for a parameter:

1. Open the *HMI_TVDA_Chiller.pajx* file.
2. In **Resources**, **Sets** change the **Visible** parameter property (e.g.: **PermLevActive[1]** = permission level 1) to the desired level.
3. Repeat in all the sets where the parameter is included.

How to Change the Password

1. On the controller or the remote display, go to **Password** > **Edit Password**, and enter the current password: The **Edit Password** page is displayed.
2. Select the desired password level and enter the new password. Reference variables are:
   - **E2_uiPwdPermLev1**: level 1 password
   - **E2_uiPwdPermLev2**: level 2 password
   - **E2_uiPwdPermLev3**: level 3 password

   NOTE: Only the passwords for the current or lower level passwords can be changed.

5. BACnet Communication

BACnet (Building Automation Control networks) is a communication protocol for building automation and control networks. This protocol is available on the Air/Water Cooled Chiller/Heat pump solution. There is a dedicated parameters menu to set BACnet communication (see on page 167).

A range of parameters and variables are managed with BACnet, but the following part will be focused on the setting of the operation mode.

How to Enable/Disable BACnet communication

Action	Procedure
Enables BACnet communication	Set the EEPROM Parameter E2_xBACnetEnable at TRUE and reboot the device.
Disable BACnet Communication	Set the EEPROM Parameter E2_xBACnetEnable at FALSE and reboot the device.

How to set the operation mode via BACnet

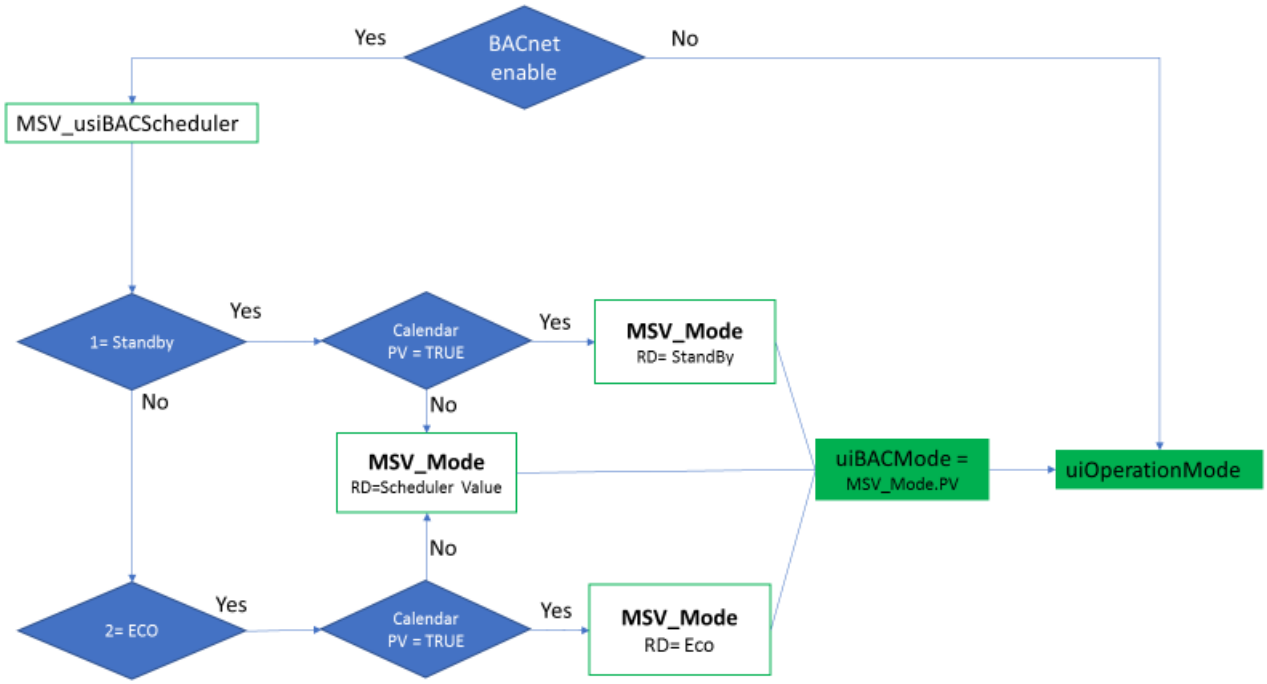
The unit mode can be set using the BACnet Calendar or by changing directly a BACnet multistate value.

MSV_usiBACScheduler is a Multi State value which enables to change the value of MSV_Mode via BACnet calendar.
MSV_Mode is a Multi State value which enables to set the operating mode via BACnet scheduler or BACnet Calendar.

BACnet Object	Settings
MSV_Mode	1: Standby 2: Eco 3: On
MSV_usiBACScheduler	1: Standby 2: Eco

The operating mode “On” is not managed by MSV_usiBACScheduler because the goal of the calendar is to schedule “exceptional events”.

The schema below sums up the setting of the operation mode (uiOperationMode) via BACnet.



MSV: Multistate Value
RD: Relinquish Default
PV: Present Value

The Present Value Indicates the current value of the variable BACnet.
The relinquish default is the Default value. Present value = Relinquish Default if the RD is written on the priority array or if the present value is empty.

Calendar Present Value is at True if the current date is in the Date List and False if the current date is not in the Date List.

NOTE: The EEPROM parameter **E2_usiBACScheduler enable to change the value of the MSV MSV_usiBACScheduler** from the PLC**.**

6. Variables Description

Introduction

The IO configuration can be selected from a parameter “E2_usiConfigIO”.

The possible configuration related in the below table.

Part	Description
0	Chiller HeatPump 1 VSD Compressor + 3 On Off Compressor. AVD12600 + EVE1020 + EVE1020 + EVE1020
1	Chiller Screw Step/Steppless Configuration AVD12600 + EVE1020
2	Chiller Bitzer CRII AVD12600 + EVE1020
3	1 to 4 On Off Compressors, regulation with proportional band or with Neutral Zone
4	Chiller 2 circuits, 2 compressors ON/OFF per circuit
5	Chiller 1 circuits, 2 compressors Digital Scroll

The variable name refers to the data type as follows:

- x = BOOL
- i = INT
- ui = UINT
- si = SINT
- usi = USINT
- udi = UDINT
- r = REAL

For example, the variable **xCmdAlarmsReset** is boolean.

For information about each variable (the Modbus address, where it is displayed on the controller and remote display, which AFB uses it), see "I/O Variables" on page 125 and "Other Variables" on page 125.

6.1. I/O Configuration

6.1.1. Configuration 0 (Default)

Digital Input		Analog Input		Digital Output		Analog Output	
Controller – Chiller /Heat pump circuit 1 which manages Variable speed + 3 On/Off (or 4 On/Off) + 3 Fan+ 1 pump							
DI1	ALARM COMP1 CIR1	AI1	WATER OUTLET	DO1	PUMP1	AO1	INV COND FAN CIR1
DI2	ALARM COMP2 CIR1	AI2	WATER INLET	DO2	XREVERSING VALVE CIR1	AO2	INV PUMP
DI3	ALARM COMP3 CIR1	AI3	HIGH PRESSURE CIR 1	DO3	GENERAL ALARM	AO3	COMP1 Y3 CIR1
DI4	ALARM COMP4 CIR1	AI4	LOW PRESSURE CIR 1	DO4	FAN 1 CIR1	AO4	COMP1 Y4 CIR1
DI5	HP SWITCH CIR.1	AI5	OUT DOOR AIR TEMP	DO5	FAN 2 CIR1	AO5	INV COMP1 CIR1
DI6	LP SWITCH CIR.1	AI6	COND OUT TEMP CIR1	DO6	FAN 3 CIR1	AO6	-----
DI7	ALARM THERM BLOCK PUMP 1	AI7	LOCAL START STOP **(DI)****	DO7	XHEATING RESISTOR CIR 1		
DI8	DIGITAL HEAT COOL	AI8	EMERGENCY STOP **(DI)****	DO8	SOLENOID CIR1		
DI9	ALARM COND FAN1 CIR1	AI9	XCOMMONALARM **(DI)****	DO9	COMP1 CIR1		
DI10	ALARM COND FAN2 CIR1	AI10	PUMP FLOW SWITCH **(DI)****	DO10	COMP2 CIR1		
DI11	ALARM COND FAN3 CIR1	AI11	EVAP OUT TEMP CIR1 EVAP COIL TEMP CIR1	DO11	COMP3 CIR1		
DI12	ALARM THERM RESISTOR	AI12	-----	DO12	COMP4 CIR1		
Expansion 1 – Chiller /Heat pump circuit 2 which manages Variable speed + 3 On/Off (or 4 On/Off) + 3 Fan+ 1 pump							
DI1	ALARM COMP1 CIR2	AI1	HIGH PRESSURE CIR 2	DO1	COMP1 CIR2	AO1	COND FAN CIR2
DI2	ALARM COMP2 CIR2	AI2	LOW PRESSURE CIR 2	DO2	COMP2 CIR2	AO2	INV COMP1 CIR2
DI3	ALARM COMP3 CIR2	AI3	ALARM COND FAN1 CIR2 **(DI)****	DO3	COMP3 CIR2		
DI4	ALARM COMP4 CIR2	AI4	ALARM COND FAN2 CIR2 **(DI)****	DO4	COMP4 CIR2		
DI5	HP SWITCH CIR.2	AI5	ALARM COND FAN3 CIR2 **(DI)****	DO5	SOLENOID CIR2		
DI6	LP SWITCH CIR.2	AI6		DO6	FAN 1 CIR2		
		AI7	EVAP OUT TEMP CIR2 EVAP COIL TEMP CIR2	DO7	FAN 2 CIR2		
		AI8	COND OUT TEMP CIR2	DO8	FAN 3 CIR2		
		AI9	ALARM THERM HEAT RESISTOR CIR 2 **(DI)****	DO9	XREVERSING VALVE CIR2		
		AI10	-----	DO10	XHEATING RESISTOR CIR 2		

Digital Input		Analog Input		Digital Output		Analog Output	
Expansion 2 – Manage Oil recovery circuit 1 + a second pump + fan 4 + Screw or Bitzer (On/Off, step, step less) compressor							
DI1	OIL PRESSURE SWITCH COMP1 CIR.1	AI1	-----	DO1	PW COMP1 CIR1	AO1	-----
DI2	OIL PRESSURE SWITCH COMP2 CIR.1	AI2	-----	DO2	COMP1 Y1 CIR1	AO2	-----
DI3	OIL PRESSURE SWITCH COMP3 CIR.1	AI3	-----	DO3	COMP1 Y2 CIR1		
DI4	OIL PRESSURE SWITCH COMP4 CIR.1	AI4	-----	DO4	PW COMP2 CIR1		
DI5	ALARM COND FAN4 CIR1	AI5	-----	DO5	COMP2 Y1 CIR1		
DI6	ALARM THERM BLOCK PUMP 2	AI6	-----	DO6	COMP2 Y2 CIR1		
		AI7	-----	DO7	COMP2 Y3 CIR1		
		AI8	-----	DO8	COMP2 Y4 CIR1		
		AI9	-----	DO9	PUMP 2		
		AI10	-----	DO10	FAN 4 CIR1		
Expansion 3 – Manage Oil recovery circuit 2 + fan 4 + Screw or Bitzer (On/Off, step, stepless) compressor							
DI1	OIL PRESSURE SWITCH COMP1 CIR.2	AI1	-----	DO1	PW COMP1 CIR2	AO1	COMP1 Y3 CIR2
DI2	OIL PRESSURE SWITCH COMP2 CIR.2	AI2	-----	DO2	COMP1 Y1 CIR2	AO2	COMP1 Y4 CIR2
DI3	OIL PRESSURE SWITCH COMP3 CIR.2	AI3	-----	DO3	COMP1 Y2 CIR2		
DI4	OIL PRESSURE SWITCH COMP4 CIR.2	AI4	-----	DO4	PW COMP2 CIR2		
DI5	ALARM COND FAN4 CIR2	AI5	-----	DO5	COMP2 Y1 CIR2		
DI6	-----	AI6		DO6	COMP2 Y2 CIR2		
		AI7	-----	DO7	COMP2 Y3 CIR2		
		AI8	-----	DO8	COMP2 Y4 CIR2		
		AI9	-----	DO9	FAN 4 CIR2		
		AI10	-----	DO10	-----		

NOTE **: Analog input used as digital input.

6.1.2. Configuration 1 (Screw)

Digital Input	Analog Input	Digital Output	Analog Output
Controller			
DI1 ALARM COMP1 CIR1	AI1 CHILLED WATER TEMP	DO1 COMP1 CIR1	AO1 INV COMP1 CIR1
DI2 ALARM COMP1 CIR2	AI2 HOT WATER TEMP	DO2 COMP.1 STEP 1 CIR1	AO2 INV COMP1 CIR2
DI3 ALARM COND FAN1 CIR1	AI3 HIGH PRESSURE CIR.1	DO3 COMP.1 STEP 2 CIR1	AO3 COMP1 CR3 CIR1
DI4 ALARM COND FAN2 CIR1	AI4 HIGH PRESSURE CIR.2	DO4 COMP.1 STEP 3 CIR1	AO4 COMP1 CR4 CIR1
DI5 ALARM COND FAN3 CIR1	AI5 LOW PRESSURE CIR.1	DO5 COMP1 CIR2	AO5 INV COND FAN CIR1
DI6 ALARM COND FAN4 CIR1	AI6 LOW PRESSURE CIR.2	DO6 COMP.2 STEP 1 CIR2	AO6 INV COND FAN CIR2
DI7 ALARM COND FAN1 CIR2	AI7 ALARM THERM BLOCK PUMP 1 **(DI)****	DO7 COMP.2 STEP 2 CIR2	
DI8 ALARM COND FAN2 CIR2	AI8 PUMP FLOW SWITCH **(DI)****	DO8 COMP.2 STEP 3 CIR2	
DI9 ALARM COND FAN3 CIR2	AI9 HP SWITCH CIR.2 **(DI)****	DO9 FAN 1 CIR1	
DI10 ALARM COND FAN4 CIR2	AI10 LP SWITCH CIR.2 **(DI)****	DO10 FAN 2 CIR1	
DI11 HP SWITCH CIR.1	AI11 OIL PRESSUR SWITCH COMP1 CIR1 **(DI)****	DO11 FAN 3 CIR1	
DI12 LP SWITCH CIR.1	AI12 OIL PRESSUR SWITCH COMP1 CIR2 **(DI)****	DO12 FAN 4 CIR1	
Expansion 1			
DI1 XLOCALSTARTSTOP	AI1 COND OUT TEMP CIR1	DO1 FAN 1 CIR2	AO1 -----
DI2 ALARM COMP2 CIR1	AI2 COND OUT TEMP CIR2	DO2 FAN 2 CIR2	AO2 -----
DI3 ALARM COMP2 CIR2	AI3 EVAP OUT TEMP CIR1	DO3 FAN 3 CIR2	
DI4 OIL PRESSURE SWITCH COMP2 CIR1	AI4 EVAP OUT TEMP CIR2	DO4 FAN 4 CIR2	
DI5 OIL PRESSUR SWITCH COMP2 CIR2	AI5 -----	DO5 PUMP 1	
DI6 -----	AI6 -----	DO6 COMP2 CIR1	
	AI7 -----	DO7 COMP2 CIR2	
	AI8 -----	DO8 GENERAL ALARM	
	AI9 -----	DO9 -----	
	AI10 -----	DO10 -----	

NOTE **: Analog input used as digital input.

6.1.3. Configuration 2 (CRII)

Digital Input	Analog Input	Digital Output	Analog Output
Controller – 1 circuit			
DI1 ALARM COMP1 CIR1	AI1 WATER OUTLET TEMP	DO1 PUMP1	AO1 INV COND FAN CIR1
DI2 ALARM COMP2 CIR1	AI2 WATER INLET TEMP	DO2 PUMP2	AO2 INV PUMP
DI3 ALARM COMP3 CIR1	AI3 OUT DOOR AIR TEMP	DO3 GENERAL ALARM	AO3 COMP1 Y3 CIR1
DI4 ALARM COMP4 CIR1	AI4 COND OUT TEMP CIR1	DO4 FAN 1 CIR1	AO4 COMP1 Y4 CIR1
DI5 HP SWITCH CIR.1	AI5 EMERGENCY STOP **(DI)****	DO5 FAN 2 CIR1	AO5 INV COMP1 CIR1
DI6 LP SWITCH CIR.1	AI6 LOCAL START STOP **(DI)****	DO6 FAN 3 CIR1	AO6 -----
DI7 ALARM THERM BLOCK PUMP 1	AI7 ------	DO7 FAN 4 CIR1	
DI8 ALARM THERM BLOCK PUMP 2	AI8 PUMP FLOW SWITCH **(DI)****	DO8 SOLENOID CIR1	
DI9 ALARM COND FAN1 CIR1	AI9 EVAP OUT TEMP CIR1	DO9 COMP1 CIR1	
DI10 ALARM COND FAN2 CIR1	AI10 ------	DO10 COMP2 CIR1	
DI11 ALARM COND FAN3 CIR1	AI11 HIGH PRESSURE CIR 1	DO11 COMP3 CIR1	
DI12 ALARM COND FAN4 CIR1	AI12 LOW PRESSURE CIR 1	DO12 COMP4 CIR1	

NOTE **: Analog input used as digital input.

6.1.4. Configuration 3 (Chiller – Heat Pump 4 OnOff Compressors)

Digital Input		Analog Input		Digital Output		Analog Output	
Controller – 1 circuit							
DI1	ALARM COMP1 CIR1	AI1	WATER OUTLET TEMP	DO1	COMP1 CIR1	AO1	INV COND FAN CIR1
DI2	ALARM COMP2 CIR1	AI2	WATER INLET TEMP	DO2	COMP2 CIR1	AO2	INV PUMP
DI3	ALARM COMP3 CIR1	AI3	HIGH PRESSURE CIR 1	DO3	COMP3 CIR1	AO3	FAN 2 CIR1
DI4	ALARM COMP4 CIR1	AI4	LOW PRESSURE CIR 1	DO4	COMP4 CIR1	AO4	FAN 3 CIR1
DI5	ALARM COND FAN1 CIR1	AI5	OUT DOOR AIR TEMP	DO5	REVERSING VALVE CIR1	AO5	------
DI6	ALARM COND FAN2 CIR1	AI6	COND OUT TEMP CIR1	DO6	HEATING RESISTOR CIR 1	AO6	-----
DI7	ALARM COND FAN3 CIR1	AI7	EVAP OUT TEMP CIR1	DO7	------		
DI8	ALARM COND FAN4 CIR1	AI8	EVAP COIL TEMP CIR1	DO8	------		
DI9	HP SWITCH CIR.1	AI9	DIGITAL HEAT COOL **(DI)****	DO9	PUMP1		
DI10	LP SWITCH CIR.1	AI10	ALARM THERM HEAT RESISTOR CIR 1**(DI)****	DO10	SOLENOID CIR1		
DI11	PUMP FLOW SWITCH	AI11	ALARM THERM BLOCK PUMP 1 **(DI)****	DO11	GENERAL ALARM		
DI12	LOCAL START STOP	AI12	ALARM THERM BLOCK PUMP 2 **(DI)****	DO12	FAN 1 CIR1		

NOTE **: Analog input used as digital input.

6.1.5. Configuration 4 (Chiller 2 circuits, 2 compressors ON/OFF per circuit)

Digital Input	Analog Input	Digital Output	Analog Output
Controller – 1 circuit			
DI1 ALARM COMP1 CIR1	AI1 WATER OUTLET TEMP	DO1 COMP1 CIR1	AO1 INV COMP1 CIR1
DI2 ALARM COMP2 CIR1	AI2 WATER INLET TEMP	DO2 COMP2 CIR1	AO2 INV COMP1 CIR2
DI3 ALARM COMP1 CIR2	AI3 HIGH PRESSURE CIR 1	DO3 COMP1 CIR2	AO3 INV PUMP
DI4 ALARM COMP2 CIR2	AI4 HIGH PRESSURE CIR 2	DO4 COMP2 CIR2	AO4
DI5 ALARM COND FAN1 CIR1	AI5 LOW PRESSURE CIR 1***	DO5 FAN 1 CIR1	AO5 INV COND FAN CIR1
DI6 ALARM COND FAN2 CIR1	AI6 LOW PRESSURE CIR 2***	DO6 FAN 2 CIR1	AO6 INV COND FAN CIR2
DI7 ALARM COND FAN3 CIR1	AI7 ALARM THERM BLOCK PUMP 1 **(DI)**** PUMP FLOW SWITCH **(DI)****	DO7 FAN 3 CIR1	
DI8 ALARM COND FAN1 CIR2	AI8 LOCAL START STOP **(DI)****	DO8 FAN 1 CIR2	
DI9 ALARM COND FAN2 CIR2	AI9 HP SWITCH CIR.2	DO9 FAN 2 CIR2	
DI10 ALARM COND FAN3 CIR2	AI10 LP SWITCH CIR.2	DO10 FAN 3 CIR2	
DI11 HP SWITCH CIR.1	AI11 COND OUT TEMP CIR1	DO11 PUMP1	
DI12 LP SWITCH CIR.1	AI12 COND OUT TEMP CIR2	DO12 GENERAL ALARM	

***Connect these output only if the electrovalve is not used.

6.1.6. Configuration 5 (Chiller 1 circuits, 2 compressors Digital Scroll)

Digital Input	Analog Input	Digital Output	Analog Output
Controller – 1 circuit			
DI1 ALARM COMP1 CIR1	AI1 HIGH PRESSURE CIR 1	DO1 COMP1 Y1 CIR1 (SSR)	AO1 INV COND FAN CIR1
DI2 ALARM COMP2 CIR1	AI2 LOW PRESSURE CIR 1***	DO2 COMP2 Y1 CIR1 (SSR)	AO2
DI3 ALARM COND FAN	AI3 OUT DOOR AIR TEMP	DO3 COMP1 ON	AO3
DI4 ------	AI4 COND OUT TEMP CIR1	DO4 COMP2 ON	AO4
DI5 ------	AI5 ~~SUCTION TEMP CIR1~~	DO5 LIQUID INJECTION COMP1	AO5
DI6 ------	AI6 DISCHARGE TEMP COMP1 CIR1	DO6 LIQUID INJECTION COMP2	AO6
DI7 ------	AI7 DISCHARGE TEMP COMP2 CIR1	DO7 ------	
DI8 ------	AI8 ------	DO8 ------	
DI9 ------	AI9 ------	DO9 ------	
DI10 ------	AI10 ------	DO10 ------	
DI11 ------	AI11 ------	DO11 ------	
DI12 ------	AI12 ------	DO12 ------	

***Connect these output only if the electrovalve is not used.

7. Alarms

NOTE: All alarms described in this document relate to the TVDA SoMachine project and the test equipment used during development.

NOTE: In the PLC project program code the variable name has the "usi" prefix, indicating local alarm variable, and the "x" prefix, indicating the correspondent status variable copy (e.g.: **usiAlarmPump** is copied to **xAlarmPump**).

For information about the alarm (the Modbus address, where it is displayed on the controller and remote display, which AFB uses it), see "Appendix A - Variables and Parameters Location Tables" on page 125.

7.1. General Alarms

Alarm List

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
1	xAlarmWaterInLowTemperature	Water low temperature in entry line	iInletWaterTemp<E2_iLowTemperatureMinLimit	Stops all compressors	AUTO	iInletWaterTemp > E2_iLowTemperatureMinLimit+1.0, also if machine in OFF	xGeneralAlarm (if cooling)
2	xAlarmWaterOutLowTemperature	Water low temperature in exit line	iOutletWaterTemp<E2_iLowTemperatureMinLimit	Stops all compressors	AUTO	iOutletWaterTemp>E2_iLowTemperatureMinLimit+1.0, also if machine in OFF	xGeneralAlarm (if cooling)
3	xAlarmEmergencyStop	Emergency Stop Alarm	xEmergencyStop input activated	Stops all compressors	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
10	xAlarmPump	Pump alarm	Both pumps in alarm (xAlarmThermBlockPump input or Altivar alarm active) or both pumps not active	Stops all compressors	MANUAL	-	xGeneralAlarm
11	xAlarmFlowSwitch	Flow switch alarm	xPumpFlowSwitch active for at least 3 seconds	Stops all compressors, stop pumps	AUTO	-	xGeneralAlarm
12	xAlarmPumpConfig	Error in pump configuration	PID parameters for pump modulation not correct	Stops all compressors, stop pumps	MANUAL	-	xGeneralAlarm
13	xAlarmPIDCompressorsConfig	Error in compressors PID configuration	PID parameters for compressors modulation not correct	Stops all compressors	MANUAL	-	xGeneralAlarm
14	xAlarmCircuit	Error in circuits management	Parameters in CircuitMgmt not correct	Stops all compressors	AUTO	-	xGeneralAlarm
100	xAlarmHighPressSwitchCir1	High pressure switch alarm in circuit 1	xHPSwitchCir1 input activated and the timer E2_uiDelayHPSwitch has elapsed	Stops all compressors in circuit 1	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
101	xAlarmLowPressSwitchCir1	Low pressure switch alarm in circuit 1	xLPSwitchCir1 input activated and the timer E2_uiDelayLPSwitch has elapsed	Stops all compressors in circuit 1	MANUAL	-	-
102	xAlarmHighPressCir1	High pressure alarm in circuit 1	iHighPressCir1 > E2_iHighPressureMaxLimit and the timerE2_DelayHPAlarm has elapsed	Stops all compressors in circuit 1	MANUAL	-	-
103	xAlarmLowPressCir1	Low pressure alarm in circuit 1	iLowPressCir1 < E2_iLowPressureMinLimit and the timerE2_DelayLPAlarm has elapsed	Stops all compressors in circuit 1	MANUAL	-	-
104	xAlarmCompressorsConfigCir1	Error in compressors configuration in circuit 1	Parameters in ComprCntrlOnOff or CompCntrl_VS in circuit 1 are not correct	Correspondent compressor in circuit 1 is stopped	AUTO	compressor is automatically restarted after the timers uiMinCycleTime and uiMinOffTime have elapsed	-
105	xAlarmCompressorsCir1	Error in compressor management in circuit 1	Parameters in CompMgmt or CompMgmtVS in circuit 1 are not correct, or all compressors in alarm, or clock not correctly set	Stops all compressors in circuit 1	MANUAL	-	xGeneralAlarm (if both circuit in alarm)

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
106	xAlarmEEVDriverCir1	Alarm from EEV driver in circuit 1	Alarm or Alert from FB_TM171VEV (see "FB_TM171VEVModbusCom: Alarm ID Description" on page 99 and "FB_TM171VEVModbusCom: Alert ID Description" on page 177)	Stops all compressors in circuit 1	MANUAL	-	xGeneralAlarm (if both circuit in alarm)
111	xAlarmMotorComp1Cir1	Motor alarm in compressor 1 of circuit 1	xAlarmComp1Cir1 input activated or Altivar/Altistart Comp1 Cir1 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 1 in circuit 1	MANUAL	-	-
112	xAlarmMotorComp2Cir1	Motor alarm in compressor 2 of circuit 1	xAlarmComp2Cir1 input activated or Altivar/Altistart Comp2 Cir1 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 2 in circuit 1	MANUAL	-	-
113	xAlarmMotorComp3Cir1	Motor alarm in compressor 3 of circuit 1	xAlarmComp3Cir1 input activated or Altivar/Altistart Comp3 Cir1 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 3 in circuit 1	MANUAL	-	-
114	xAlarmMotorComp4Cir1	Motor alarm in compressor 4 of circuit 1	xAlarmComp4Cir1 input activated or Altivar/Altistart Comp4 Cir1 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 4 in circuit 1	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
121	xAlarmOilPressureSwitchComp1Cir1	Oil pressure switch alarm in compressor 1 of circuit 1	xOilPressSwitchComp1Cir1 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 1 in circuit 1	MANUAL	-	-
122	xAlarmOilPressureSwitchComp2Cir1	Oil pressure switch alarm in compressor 2 of circuit 1	xOilPressSwitchComp2Cir1 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 2 in circuit 1	MANUAL	-	-
123	xAlarmOilPressureSwitchComp3Cir1	Oil pressure switch alarm in compressor 3 of circuit 1	xOilPressSwitchComp3Cir1 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 3 in circuit 1	MANUAL	-	-
124	xAlarmOilPressureSwitchComp4Cir1	Oil pressure switch alarm in compressor 4 of circuit 1	xOilPressSwitchComp4Cir1 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 4 in circuit 1	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
150	xAlarmFanCir1	Fans management alarm in circuit 1	Alarm in FanMgmt Cir 1 or alarm in FloatingHighPresCntrl Cir 1 or alarm in Fan Altivar Cir1 or all Fan stages in Cir 1 in alarm. All inputs xAlarmFan activated (configuration error, see Application function HVAC library guide)	Stops all compressors in circuit 1	MANUAL	Automatic rearm after all Fan stages in alarm	xGeneralAlarm (if both circuit in alarm)
151	xAlertFanCir1	Fans management alert in circuit 1	Alert in FanMgmt Cir 1 or alert in FloatingHighPresCntrl Cir 1 or alert in Fan Altivar Cir1(configuration error, see Application function HVAC library guide)	Fans are not operating as expected	AUTO	Except bit 0 alert (see Application function HVAC library guide) in FanMgmt or bit 3 in FloatingHighPresCntrl: if parameters are changed a new start up (OFF->ON) is needed	-
152	xAlarmHeatResistorCir1	Alarm heat resistor circuit 1	xAlarmThermHeatResistorCir1 active for at least 3 seconds	Stops heat resistor 1	AUTO	-	-
160	xAlarmGenericAlarmCir1	Generic Alarm circuit 1	xCommonAlarm input activated or blocking Wiring Error (see list) and the timer E2_uiDelayGenericAlarm has elapsed	Stops all compressors in circuit 1	MANUAL	-	-
200	xAlarmHighPressSwitchCir2	High pressure switch alarm in circuit 2	xHPSwitchCir2 input activated and the timer E2_uiDelayHPSwitch has elapsed	Stops all compressors in circuit 2	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
201	xAlarmLowPressSwitchCir2	Low pressure switch alarm in circuit 2	xLPSwitchCir2 input activated and the timer E2_uiDelayLPSwitch has elapsed	Stops all compressors in circuit 2	MANUAL	-	-
202	xAlarmHighPressCir2	High pressure alarm in circuit 2	iHighPressCir2 > E2_iHighPressureMaxLimit and the timerE2_DelayHPAlarm has elapsed	Stops all compressors in circuit 2	MANUAL	-	-
203	xAlarmLowPressCir2	Low pressure alarm in circuit 2	iLowPressCir2 < E2_iLowPressureMinLimit and the timerE2_DelayLPAlarm has elapsed	Stops all compressors in circuit 2	MANUAL	-	-
204	xAlarmCompressorsConfigCir2	Error in compressors configuration in circuit 2	Parameters in some ComprCntrlOnOff or CompCntrl_VS in circuit 1 are not correct	Correspondent compressor in circuit 2 is stopped	AUTO	Compressor is automatically restarted after the timers uiMinCycleTime and uiMinOffTime have elapsed	-
205	xAlarmCompressorsCir2	Error in compressor management in circuit 2	Parameters in CompMgmt or CompMgmtVS in circuit 2 are not correct, or all compressors in alarm, or clock not correctly set	Stops all compressors in circuit 2	MANUAL	-	xGeneralAlarm (if both circuit in alarm)

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
206	xAlarmEEVDriverCir2	Alarm from EEV driver in circuit 2	Alarm or Alert from FB_TM171VEV (see "FB_TM171VEVModbusCom: Alarm ID Description" on page 99 and "FB_TM171VEVModbusCom: Alert ID Description" on page 99)	Stops all compressors in circuit 2	MANUAL	-	xGeneralAlarm (if both circuit in alarm)
211	xAlarmMotorComp1Cir2	Motor alarm in compressor 1 of circuit 2	xAlarmComp1Cir2 input activated or Altivar/Altistart Comp1 Cir2 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 1 in circuit 2	MANUAL	-	-
212	xAlarmMotorComp2Cir2	Motor alarm in compressor 2 of circuit 2	xAlarmComp2Cir2 input activated or Altivar/Altistart Comp2 Cir2 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 2 in circuit 2	MANUAL	-	-
213	xAlarmMotorComp3Cir2	Motor alarm in compressor 3 of circuit 2	xAlarmComp3Cir2 input activated or Altivar/Altistart Comp3 Cir2 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 3 in circuit 2	MANUAL	-	-
214	xAlarmMotorComp4Cir2	Motor alarm in compressor 4 of circuit 2	xAlarmComp4Cir2 input activated or Altivar/Altistart Comp4 Cir2 in alarm and the timer E2_uiDelayMotorAlarm has elapsed	Stops compressor 4 in circuit 2	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
221	xAlarmOilPressureSwitchComp1Cir2	Oil pressure switch alarm in compressor 1 of circuit 2	xOilPressSwitchComp1Cir2 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 1 in circuit 2	MANUAL	-	-
222	xAlarmOilPressureSwitchComp2Cir2	Oil pressure switch alarm in compressor 2 of circuit 2	xOilPressSwitchComp2Cir2 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 2 in circuit 2	MANUAL	-	-
223	xAlarmOilPressureSwitchComp3Cir2	Oil pressure switch alarm in compressor 3 of circuit 2	xOilPressSwitchComp3Cir2 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 3 in circuit 2	MANUAL	-	-
224	xAlarmOilPressureSwitchComp4Cir2	Oil pressure switch alarm in compressor 4 of circuit 2	xOilPressSwitchComp4Cir2 input activated and the timer E2_uiDelayOilPressSwitch has elapsed	Stops compressor 4 in circuit 2	MANUAL	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
250	xAlarmFanCir2	Fans management alarm in circuit 2	Alarm in FanMgmt Cir 2 or alarm in FloatingHighPresCntrl Cir 2 or alarm in Fan Altivar Cir2 or all Fan stages in Cir 2 in alarm. All inputs xAlarmFan activated (configuration error, see Application function HVAC library guide)	Stops all compressors in circuit 2	MANUAL	Automatic rearm after all Fan stages in alarm	xGeneralAlarm (if both circuit in alarm)
251	xAlertFanCir2	Fans management alert in circuit 2	Alert in FanMgmt Cir 2 or alert in FloatingHighPresCntrl Cir 2 or alert in Fan Altivar Cir2 (configuration error, see Application function HVAC library guide)	Fans are not operating as expected	AUTO	Except bit 0 alert (see Application function HVAC library guide) in FanMgmt or bit 3 in FloatingHighPresCntrl: if parameters are changed a new start up (OFF->ON) is needed	-
252	xAlarmHeatResistorCir2	Alarm heat resistor circuit 2	xAlarmThermHeatResistorCir2 active for at least 3 seconds	Stops heat resistor 2	AUTO		
260	xAlarmGenericAlarmCir2	Generic Alarm circuit 2	xCommonAlarm input activated or blocking Wiring Error (see list) and the timer E2_uiDelayGenericAlarm has elapsed	Stops all compressors in circuit 2	MANUAL	-	-

7.2. Wiring Errors

Alarm List

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
15	xAlarmWaterInTempSensor	Water temperature in entry line sensor error	iInletWaterTemp related probe in Error	Modulated pump at fixed speed	AUTO	-	-
16	xAlarmWaterOutTempSensor	Water temperature in exit line sensor error	iOutletWaterTemp related probe in Error	Modulated pump at fixed speed, stops all devices	AUTO	Activates also xAlarmGenericAlarm (Cir 1 & Cir 2) with MANUAL rearm	xGeneralAlarm
17	xAlarmOutdoorAirTempSensor	Outdoor air temperature sensor error	iOutdoorAirTemp related probe in Error	Floating high pressure and Water setpoint algorithm disabled	AUTO	-	-
18	xAlarmRoomTemp	Room temperature sensor fault	iRoomTemp related probe in Error	Optimum start disabled	AUTO	-	-
107	xAlarmLowPressureSensorCir1	Low pressure sensor error in circuit 1	iLowPressCir1 related probe in Error	Stops all compressors in circuit 1	AUTO	activate also xAlarmGenericAlarm (Cir 1) with MANUAL rearm	xGeneralAlarm (if both circuit in alarm)
108	xAlarmHighPressureSensorCir1	High pressure sensor error in circuit 1	iHighPressCir1 related probe in Error	Stops all compressors in circuit 1	AUTO	activate also xAlarmGenericAlarm (Cir 1) with MANUAL rearm	xGeneralAlarm (if both circuit in alarm)
109	xAlarmCondenserOutTempSensorCir1	Condenser out temperature sensor error in circuit 1	iCondOutTempCir1 related probe in Error	Subcooling calculation disable, COP calculation disable	AUTO	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
110	xAlarmEvaporatorOutTempSensorCir1	Evaporator out temperature sensor error in circuit 1	iEvapOutTempCir1 related probe in Error	Superheat calculation disable, COP calculation disable, EEV circuit 1 controlled at fixed position (see Modicon M171 Electronic - Expansion Valve Drivers, User Manual)	AUTO	-	-
131	xAlarmDischargeTempSensorComp1Cir1	Discharge temperature sensor error in compressor 1 of circuit 1	iDischTempComp1Cir1 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
132	xAlarmDischargeTempSensorComp2Cir1	Discharge temperature sensor error in compressor 2 of circuit 1	iDischTempComp2Cir1 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
133	xAlarmDischargeTempSensorComp3Cir1	Discharge temperature sensor error in compressor 3 of circuit 1	iDischTempComp3Cir1 related probe in Error	User to manage the effect of the alarm	AUTO	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
134	xAlarmDischargeTempSensorComp4Cir1	Discharge temperature sensor error in compressor 4 of circuit 1	iDischTempComp4Cir1 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
135	xAlarmEvapCoilTempCir1	Evaporator coil temperature sensor fault circuit 1	iEvapCoilTempCir1 related probe in Error	Defrost terminates by time	AUTO	-	-
207	xAlarmLowPressureSensorCir2	Low pressure sensor error in circuit 2	iLowPressCir2 related probe in Error	Stops all compressors in circuit 2	AUTO	activate also xAlarmGenericAlarm (Cir 2) with MANUAL rearm	xGeneralAlarm (if both circuit in alarm)
208	xAlarmHighPressureSensorCir2	High pressure sensor error in circuit 2	iHighPressCir2 related probe in Error	Stops all compressors in circuit 2	AUTO	activate also xAlarmGenericAlarm (Cir 2) with MANUAL rearm	xGeneralAlarm (if both circuit in alarm)
209	xAlarmCondenserOutTempSensorCir2	Condenser out temperature sensor error in circuit 2	iCondOutTempCir2 related probe in Error	Subcooling calculation disable, COP calculation disable	AUTO	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
210	xAlarmEvaporatorOutTempSensorCir2	Evaporator out temperature sensor error in circuit 2	iEvapOutTempCir2 related probe in Error	Superheat calculation disable, COP calculation disable, EEV circuit 2 controlled at fixed position (see Modicon M171 Electronic - Expansion Valve Drivers, User Manual)	AUTO	-	-
231	xAlarmDischargeTempSensorComp1Cir2	Discharge temperature sensor error in compressor 1 of circuit 2	iDischTempComp1Cir2 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
232	xAlarmDischargeTempSensorComp2Cir2	Discharge temperature sensor error in compressor 2 of circuit 2	iDischTempComp2Cir2 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
233	xAlarmDischargeTempSensorComp3Cir2	Discharge temperature sensor error in compressor 3 of circuit 2	iDischTempComp3Cir2 related probe in Error	User to manage the effect of the alarm	AUTO	-	-

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
234	xAlarmDischargeTempSensorComp4Cir2	Discharge temperature sensor error in compressor 4 of circuit 2	iDischTempComp4Cir2 related probe in Error	User to manage the effect of the alarm	AUTO	-	-
235	xAlarmEvapCoilTempCir2	Evaporator coil temperature sensor fault circuit2	iEvapCoilTempCir2 related probe in Error	Defrost terminates by time	AUTO	-	-
50	xExp1Alarm	Expansion 1 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
51	xExp2Alarm	Expansion 2 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
52	xExp3Alarm	Expansion 3 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
53	xExp4Alarm	Expansion 4 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
54	xExp5Alarm	Expansion 5 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
55	xExp6Alarm	Expansion 6 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
56	xExp7Alarm	Expansion 7 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
57	xExp8Alarm	Expansion 8 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
58	xExp9Alarm	Expansion 9 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
59	xExp10Alarm	Expansion 10 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)
60	xExp11Alarm	Expansion 11 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)

ID	Alarm Name	Description	Causes	Effects	Rearm Type	Rearm Notes	Related Alarms
61	xExp12Alarm	Expansion 12 communication error		User to manage the effect of the alarm	AUTO	-	xGeneralAlarm (if both circuit in alarm)

8. Implementation Procedure

Introduction

Follow the steps below for the hardware components configuration and system commissioning.

1. Install the Software and Open the Device file TVDA_Chiller_Conf.CFN
2. For the Commissioning, see "Commissioning Overview" on page 116.

Installing the Software and Opening the project

Step	Description
1	Install the SoMachine HVAC software.
2	Open the TVDA SoMachine project.

Commissioning Overview

The commissioning procedure depends on the features of the chiller/heat pump to be controlled:

If the controlled chiller/heat pump...	Then...	See
has up to two circuits and up to two compressors and two fan stages **per circuit**	only PLC project parameters need to be customized	"Commissioning (Standard)" on page 117
has up to two circuits and up to four compressors and four fan stages **per circuit**	only PLC project parameters need to be customized	"Commissioning (Standard)" on page 117
does not have the EEV, the suction pressure and suction temperature are obtained from IOs	only PLC project parameters need to be customized	"Commissioning (Without EEV)" on page 118

Commissioning (Standard)

Step	Description	See
1	Open the *TVDA_Chiller_Conf.CFN* file: the SoMachine HVAC Device program starts automatically.	-
2	Connect the controller to the SoMachine HVAC.	SoMachine HVAC Software, Programming GuideModicon M172 - Performance Logic Controller, Hardware guide
3	Download the TVDA SoMachine project on the controller (**Application**, **HMI**, **HMI Remote for M171DGRP and M171PF**, **Cfg files**, **Web site**). Also download the default values. **NOTE**: if the communication between controller and EEV driver is correctly set, EEV drivers are automatically configured by the PLC project (see "EEV Drivers" on page 152 and 155).	SoMachine HVAC Software, Programming Guide
4	From the remote display, load the HMI downloaded on the controller.	Modicon M171 - Performance Logic Controller, Hardware User Manual
5	Set chiller/heat pump configuration parameters according to the custom system.	"Chiller/Heat pump Configuration Parameters" on page 119. "Parameters Setting" on page 143.
6	Set application parameters according to the custom system.	"Application Parameters" on page 125. "Parameters Setting" on page 125.
7	Restart all devices to make parameters changes operational.	-

Commissioning (Without EEV)

Step	Description	See
1	From the remote display, go in the settings menu	SoMachine HVAC Software, Programming Guide
2	Select the menu 02 Param. compressor.	
3	Go up to the variable 02.071 “Enable EEV”	
4	Set the value at FALSE to disable the expansion valve	

8.1. Device Configuration

Introduction

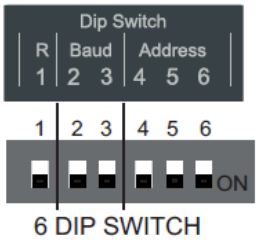
Below a list of the required settings for each component. Set these parameters for the system to operate properly and to allow communication with the controller.

Component	Required Setting	See
Altivar 212 VSD	• Modbus communication (except communication timeout) • Component specific parameters	"Altivar 212 VSD" on page 121
Altistart 22 Soft starter	• Modbus communication (except communication timeout) • Component specific parameters	"Altistart 22 Soft Starter" on page 122
TM171VEVM4 EEV driver	• Modbus communication • Refrigerant type selection mode	"TM171VEVM4 EEV Driver" on page 123
TeSys GV2L motor circuit breaker	• Power consumption of the controlled motor	"TeSys GV2L Motor Circuit Breaker" on page 124

TM171E28R Expansion Module

To set up CAN Expansion bus communication with the controller using the DIP switches, set the following values:

- **address**: 1
- **baud rate**: 500



For instructions on how to correctly connect I/Os and for more detailed information, see Modicon M171 - Performance Logic Controller, Hardware User Manual e "I/O Variables" on page 125.

TM171PDGRP Remote Display

In the **Bios parameters** > **CAN** menu, set the following parameters for CAN Expansion bus communication with the controller:

- **Address**: 126
- **Baud rate**: 500000

In the **HMI Management** > **CAN** menu, set the following parameters for allowing the upload of the HMI from the controller:

- **File**: HMIREM.KBD
- **Id**: 0
- **Address**: 124

For detailed instructions about how to start the HMI upload and other information, see Modicon M171 - Performance Logic Controller, Hardware User Manual.

Altivar 212 VSD

For each Altivar 212 VSD, set the following parameters for Modbus communication with the controller:

Parameter	Value	Description
Main menu		
CMod [Command mode sel]	2	Drive commands via serial communication
FMod [Frequency mode sel]	4	Drive speed reference via serial communication
Sub-menu Com		
F802 [Modbus address]	1...4	For compressors 1...4, circuit 1
	5...8	For compressors 1...4, circuit 2
	21	For pump
	22	For circuit 1 fans
	23	For circuit 2 fans
F820 [Mdb network baud]	1	19200 bps
F821 [Mdb network parity]	1	Even
F829 [Network protocol]	1	Mdb RTU
F851 [Com fault setting]	4	Communication error activates an alarm
F807 [Com channel choice]	1	Modbus command via Open style port

NOTE: Modbus communication time out (**F803** parameter) is defined by the **E2_uiComTimeOut** PLC project parameter.

To set the other device specific parameters and for more detailed information, see ATV212 Programming manual.

Altistart 22 Soft Starter

For each Altistart 22 soft starter, set the following parameters for Modbus communication with the controller:

Parameter	Value	Description
Cop menu		
Add [Modbus address]	11...14 15...18	For compressors 1...4, circuit 1 For compressors 1...4, circuit 2
tbr [Modbus baud rate]	19.2 Kbps	-
For [Modbus format]	8E1	8 bits, even parity, 1 stop bit
Ctrl [Command channel]	dbS	Commands via serial communication

NOTE: Modbus communication time out (**tt0** parameter) is defined by the **E2_uiComTimeOut** PLC project parameter.

To set the other device specific parameters and for more detailed information, see ATS22 User manual.

TM171VEVM4 EEV Driver

For each TM171VEVM4 EEV driver, set the following parameters for Modbus communication with the controller:

Parameter	Value	Description
Main menu		
dF00	1	Modbus
dF02	1	Commands via serial communication
dF30	40 41	Modbus address for circuit 1 Modbus address for circuit 2
dF31	4	19.2 Kbps
dF32	1	Even

All other EEV driver parameters are defined by the controller application, see "EEV Drivers" on page 152 and "EEV Drivers" on page 155. To allow the refrigerant type setting by controller parameter, set the pin 4, 5 and 6 of the EEV driver DIP switch to ON.

For more detailed information, see Modicon M171 Electronic - Expansion Valve Drivers, User Manual.

iEM3250 Energy Meter

Set the parameters for Modbus communication with the controller.

Parameter	Value	Description
Configuration menu, communication section		
Slave Address	30	-
Baud rate	19200	19200 bps
Parity	Even	-

To set the other device specific parameters and for more detailed information, see iEM3000 series - Energy Meters - User Manual.

TeSys GV2L Motor Circuit Breaker

For each TeSys GV2L motor circuit breaker, set the selector switch to the correct power consumption of the controlled motor.

Appendixes

9. Appendix A - Variables and Parameters Location Tables

Introduction

For information about each variable and parameter (default value, min and max value, unit of measure, format, data type), see "Variables Description" on page 89 and "Parameters Description" on page 143.

9.1. I/O Variables

NOTE: The following lists only include TVDA SoMachine project variables which can also be accessed from the controller or remote display and the web site.

Digital Inputs

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
xAlarmComp1Cir1	Alarm compressor 1	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 1, I/O View: Inputs	9444
xAlarmComp2Cir1	Alarm compressor 2	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 2, I/O View: Inputs	9445
xAlarmComp3Cir1	Alarm compressor 3	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 3	9446
xAlarmComp4Cir1	Alarm compressor 4	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 4	9447
xAlarmFan1Cir1	Alarm fan stage 1	Circuit 1 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 1 > Fans > Fan alarms, I/O View: Inputs	9454
xAlarmFan2Cir1	Alarm fan stage 2	Circuit 1 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 1 > Fans > Fan alarms, I/O View: Inputs	9455
xAlarmFan3Cir1	Alarm fan stage 3	Circuit 1 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 1 > Fans > Fan alarms	9456
xAlarmFan4Cir1	Alarm fan stage 4	Circuit 1 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 1 > Fans > Fan alarms	9457

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xHPSwitchCir1	Alarm high pressure	I/O view > Digital input	I/O View: Inputs	9452
xLPSwitchCir1	Alarm low pressure	I/O view > Digital input/O view	I/O View: Inputs	9453
xOilPressSwitchComp1Cir1	Oil pressure compressor 1	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 1, I/O View: Inputs	9448
xOilPressSwitchComp2Cir1	Oil pressure compressor 2	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 2, I/O View: Inputs	9449
xOilPressSwitchComp3Cir1	Oil pressure compressor 3	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 3	9450
xOilPressSwitchComp4Cir1	Oil pressure compressor 4	Circuit 1 compressors, I/O View > Digital input	Air-water chiller > Chiller circuit 1 > Compressor 4	9451
xAlarmThermHeatResistorCir1	Alarm heat resistor circuit 1	Circuit 1 > Defrost, I/O View > Digital input	Air-water heat pump > Circuit 1 > Fans & Defrost > Defrost, I/O View	12049
Circuit 2				
xAlarmComp1Cir2	Alarm compressor 1	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 1, I/O View: Inputs	9462
xAlarmComp2Cir2	Alarm compressor 2	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 2, I/O View: Inputs	9463
xAlarmComp3Cir2	Alarm compressor 3	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 3	9464
xAlarmComp4Cir2	Alarm compressor 4	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 4	9465
xAlarmFan1Cir2	Alarm fan stage 1	Circuit 2 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Fans > Fan alarms, I/O View: Inputs	9472
xAlarmFan2Cir2	Alarm fan stage 2	Circuit 2 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Fans > Fan alarms, I/O View: Inputs	9473
xAlarmFan3Cir2	Alarm fan stage 3	Circuit 2 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Fans > Fan alarms	9474
xAlarmFan4Cir2	Alarm fan stage 4	Circuit 2 fans, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Fans > Fan alarms	9475
xHPSwitchCir2	Alarm high pressure	I/O view > Digital input	I/O View: Inputs	9470
xLPSwitchCir2	Alarm low pressure	I/O view > Digital input	I/O View: Inputs	9471

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xOilPressSwitchComp1Cir2	Oil pressure compressor 1	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 1, I/O View: Inputs	9466
xOilPressSwitchComp2Cir2	Oil pressure compressor 2	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 2, I/O View: Inputs	9467
xOilPressSwitchComp3Cir2	Oil pressure compressor 3	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 3	9468
xOilPressSwitchComp4Cir2	Oil pressure compressor 4	Circuit 2 compressors, I/O view > Digital input	Air-water chiller > Chiller circuit 2 > Compressor 4	9469
xAlarmThermHeatResistorCir2	Alarm heat resistor circuit 2	Circuit 2 > Defrost, I/O View > Digital input	Air-water heat pump > Circuit 2 > Fans & Defrost > Defrost, I/O View	12050
General				
xAlarmThermBlockPump1	Alarm pump 1	Pumps, I/O view > Digital input	Air-water chiller > Pumps, I/O View: Inputs	9458
xAlarmThermBlockPump2	Alarm pump 2	Pumps, I/O view > Digital input	Air-water chiller > Pumps, I/O View: Inputs	9459
xCommonAlarm	Common alarm	I/O view > Analog input	I/O View: Inputs	9443
xEmergencyStop	Emergency stop switch	I/O view > Digital input	I/O View: Inputs	9461
xLocalStartStop	Local start/stop	I/O view > Analog input	I/O View: Inputs	9442
xPumpFlowSwitch	Pump/Evaporator flow switch	Pumps, I/O view > Digital input	Air-water chiller > Pumps, I/O View: Inputs	9460
xRemoteStartStop	Remote start/stop	I/O view > Analog input	I/O View: Inputs	9441

Analog Inputs

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
iCondOutTempCir1	Sensor condenser output temperature	Circuit 1, I/O view > Analog input	Air-water chiller > Chiller circuit 1, I/O View: Inputs	9415

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
iDischTempComp1Cir1	Sensor discharge temperature compressor 1	I/O view > Analog input	I/O View: Inputs	9410
iDischTempComp2Cir1	Sensor discharge temperature compressor 2	I/O view > Analog input	I/O View: Inputs	9411
iDischTempComp3Cir1	Sensor discharge temperature compressor 3	I/O view > Analog input	-	9412
iDischTempComp4Cir1	Sensor discharge temperature compressor 4	I/O view > Analog input	-	9413
iEvapOutTempCir1	Sensor evaporator output temperature	I/O view > Analog input	Air-water chiller > Chiller circuit 1, I/O View: Inputs	9416
iHighPressCir1	Sensor high pressure	Circuit 1, I/O view > Analog input	Air-water chiller > Chiller circuit 1, I/O View: Inputs	9408
iLowPressCir1	Sensor low pressure	Circuit 1, I/O view > Analog input	Air-water chiller > Chiller circuit 1, I/O View: Inputs	9407
iEvapCoilTempCir1	Evaporator coil temperature (defrost) circuit 1	Circuit 1, I/O view > Analog input	I/O View: Inputs	9819
Circuit 2				
iCondOutTempCir2	Sensor condenser output temperature	Circuit 2, I/O view > Analog input	Air-water chiller > Chiller circuit 2, I/O View: Inputs	9424
iDischTempComp1Cir2	Sensor discharge temperature compressor 1	I/O view > Analog input	I/O View: Inputs	9420
iDischTempComp2Cir2	Sensor discharge temperature compressor 2	I/O view > Analog input	I/O View: Inputs	9421
iDischTempComp3Cir2	Sensor discharge temperature compressor 3	I/O view > Analog input	-	9422

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
iDischTempComp4Cir2	Sensor discharge temperature compressor 4	I/O view > Analog input	-	9423
iEvapOutTempCir2	Sensor evaporator output temperature	I/O view > Analog input	Air-water chiller > Chiller circuit 2, I/O View: Inputs	9425
iHighPressCir2	Sensor high pressure	Circuit 2, I/O view > Analog input	Air-water chiller > Chiller circuit 2, I/O View: Inputs	9418
iLowPressCir2	Sensor low pressure	Circuit 2, I/O view > Analog input	Air-water chiller > Chiller circuit 2, I/O View: Inputs	9417
iEvapCoilTempCir1	Evaporator coil temperature (defrost) circuit 2	Circuit 2, I/O view > Analog input	I/O View: Inputs	9820
iEvapCoilTempCir1				
iOutletWaterTemp	Sensor chilled water temperature	Circuit 1, Circuit 2, I/O view > Analog input	Air-water chiller, I/O View: Inputs	9404
iInletWaterTemp	Sensor hot water temperature	Circuit 1, Circuit 2, I/O view > Analog input	Air-water chiller, I/O View: Inputs	9405
iOutdoorAirTemp	Sensor outdoor air temperature	Circuit 1, Circuit 2, I/O view > Analog input	Air-water chiller, I/O View: Inputs	9414

Digital Outputs

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xComp1Cir1	Start/stop command VSD compressor 1	Circuit 1 compressors, I/O View > Digital output	Air-water chiller > Chiller circuit 1 > Compressor 1, I/O View: Outputs	9479
xComp2Cir1	Start/stop command soft start compressor 2	Circuit 1 compressors, I/O View > Digital output	Air-water chiller > Chiller circuit 1 > Compressor 2, I/O View: Outputs	9480
xComp3Cir1	Start/stop command compressor 3 circuit 1	Circuit 1 compressors, I/O View > Digital output	Air-water chiller > Chiller circuit 1 > Compressor 3, I/O View: Outputs	9481

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xComp4Cir1	Start/stop command compressor 4 circuit 1	Circuit 1 compressors, I/O View > Digital output	Air-water chiller > Chiller circuit 1 > Compressor 4, I/O View: Outputs	9482
xFan1Cir1	Start/stop command fan stage 1	Circuit 1 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 1 > Fans, I/O View: Outputs	9483
xFan2Cir1	Start/stop command fan stage 2	Circuit 1 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 1 > Fans, I/O View: Outputs	9484
xFan3Cir1	Start/stop command fan stage 3	Circuit 1 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 1 > Fans, I/O View: Outputs	9485
xFan4Cir1	Start/stop command fan stage 4	Circuit 1 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 1 > Fans, I/O View: Outputs	9486
xSolenoidCir1	Start/stop command solenoid valve	Circuit 1 EEV, I/O view > Digital output	Air-water chiller > Chiller circuit 1, I/O View: Outputs	9491
Circuit 2				
xComp1Cir2	Start/stop command VSD compressor 1	Circuit 2 compressors, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Compressor 1, I/O View: Outputs	9492
xComp2Cir2	Start/stop command soft start compressor 2	Circuit 2 compressors, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Compressor 2, I/O View: Outputs	9493
xComp3Cir2	Start/stop command compressor 3 circuit 2	Circuit 2 compressors, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Compressor 3, I/O View: Outputs	9494
xComp4Cir2	Start/stop command compressor 4 circuit 2	Circuit 2 compressors, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Compressor 4, I/O View: Outputs	9495
xFan1Cir2	Start/stop command fan stage 1	Circuit 2 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Fans, I/O View: Outputs	9496
xFan2Cir2	Start/stop command fan stage 2	Circuit 2 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Fans, I/O View: Outputs	9497
xFan3Cir2	Start/stop command fan stage 3	Circuit 2 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Fans	9498
xFan4Cir2	Start/stop command fan stage 4	Circuit 2 fans, I/O view > Digital output	Air-water chiller > Chiller circuit 2 > Fans	9499

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xSolenoidCir2	Start/stop command solenoid valve	Circuit 2 EEV, I/O view > Digital output	Air-water chiller > Chiller circuit 2, I/O View: Outputs	9504
General				
xGeneralAlarm	General alarm	I/O view > Digital output	I/O View: Outputs	9478
xPump1	Start/stop command pump 1	Pumps, Circuit 1/ Circuit 2, I/O view > Digital output	Air-water chiller > Pumps, I/O View: Outputs	9476
xPump2	Start/stop command pump 2	Pumps, Circuit 1/ Circuit 2, I/O view > Digital output	Air-water chiller > Pumps, I/O View: Outputs	9477

Analog Outputs

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
iComp1Cir1	Regulation command VSD compressor 1	Circuit 1 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 1> Compressor 1, I/O View: Outputs	9430
iComp2Cir1	Regulation command VSD compressor 2	Circuit 1 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 1> Compressor 2, I/O View: Outputs	9431
iComp3Cir1	Regulation command VSD compressor 3	Circuit 1 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 1> Compressor 3, I/O View: Outputs	9432
iComp4Cir1	Regulation command VSD compressor 4	Circuit 1 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 1> Compressor 4, I/O View: Outputs	9433
iFanCir1	Regulation command VSD fan	Circuit 1 fans, I/O View > Analog output	Air-water chiller > Chiller circuit 1> Fans, I/O View: Outputs	9434
Circuit 2				

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
iComp1Cir2	Regulation command VSD compressor 1	Circuit 2 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 2> Compressor 1, I/O View: Outputs	9435
iComp2Cir2	Regulation command VSD compressor 2	Circuit 2 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 2> Compressor 2, I/O View: Outputs	9436
iComp3Cir2	Regulation command VSD compressor 3	Circuit 2 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 2> Compressor 3, I/O View: Outputs	9437
iComp4Cir2	Regulation command VSD compressor 4	Circuit 2 compressors, I/O View > Analog output	Air-water chiller > Chiller circuit 2> Compressor 4, I/O View: Outputs	9438
iFanCir2	Regulation command VSD fan	Circuit 2 fans, I/O View > Analog output	Air-water chiller > Chiller circuit 2> Fans, I/O View: Outputs	9439
General				
iPump	Regulation command VSD pump 1	Pumps, Circuit 1, Circuit 2, I/O View > Analog output	Air-water chiller > Pumps, I/O View: Outputs	9440

9.2. Other Variables

NOTE: The following lists only include TVDA SoMachine project variables which can also be accessed from the controller or remote display and the web site.

General

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
iCondTempCir1	Condensation temperature	Circuit 1	Air-water chiller > Chiller circuit 1	9400
iCondTempSetpCir1	Condensation temperature current setpoint	Circuit 1	Air-water chiller > Chiller circuit 1	9401
iEvapTempCir1	Current evaporation temperature circuit 1	Circuit 1	Air-water chiller > Chiller circuit 1	9409
iSuperHeatCir1	Superheat for circuit 1	Circuit 1, Circuit 1 EEV	Air-water chiller > Chiller circuit 1	9426

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
rCapMaxCir1	Maximum capacity for circuit 1	Circuit 1	-	9276
rReqCapacityCir1	Actual capacity for circuit 1	Circuit 1	Air-water chiller > Chiller circuit 1	9268
Circuit 2				
iCondTempCir2	Condensation temperature	Circuit 2	Air-water chiller > Chiller circuit 2	9402
iCondTempSetpCir2	Condensation temperature current setpoint	Circuit 2	Air-water chiller > Chiller circuit 2	9403
iEvapTempCir2	Current evaporation temperature circuit 1	Circuit 2	Air-water chiller > Chiller circuit 2	9419
iSuperHeatCir2	Superheat for circuit 2	Circuit 2, Circuit 2 EEV	Air-water chiller > Chiller circuit 2	9427
rCapMaxCir2	Maximum capacity for circuit 2	Circuit 2	-	9278
rReqCapacityCir2	Actual capacity for circuit 2	Circuit 2	Air-water chiller > Chiller circuit 2	9270
General				
iCurrentWaterTempSet	Current water temperature setpoint	Circuit 1, Circuit 2	Air-water chiller	9406
uiOperationMode	Operation mode	Circuit 1, Circuit 2	-	10009
xIsAlarmActive	Alarm active	Circuit 1, Circuit 2	Air water chiller	10010
xIsWiringFaultActive	Wiring error active	Circuit 1, Circuit 2	Air water chiller	10011
xEn	Global enable (on/off)	-	Air water chiller	10012
usiFTPServiceState	FTP Service State	-	-	9807
usiHTTPServiceState	HTTP Service State	-	-	9808
xLocalEco	Eco mode active	Circuit 1, Circuit 2		9791
xStandby	Standby mode active	Circuit 1, Circuit 2	Air water chiller	9790

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xModeHeatCool	Heat/Mode Status	Circuit 1, Circuit 2	Air water chiller	9809

Compressors

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
E2_udiNbStartsComp1Cir1	Total number of starts	Circuit 1- Compressor 1	Air-water chiller > Chiller circuit 1 > Compressor 1	16472
E2_udiNbStartsComp2Cir1	Total number of starts	Circuit 1- Compressor2	Air-water chiller > Chiller circuit 1 > Compressor 2	16474
E2_udiNbStartsComp3Cir1	Total number of starts	Circuit 1- Compressor 3	Air-water chiller > Chiller circuit 1 > Compressor 3	16476
E2_udiNbStartsComp4Cir1	Total number of starts	Circuit 1- Compressor 4	Air-water chiller > Chiller circuit 1 > Compressor 4	16478
E2_udiOpHoursComp1Cir1	Total number of operating hours	Circuit 1- Compressor 1	Air-water chiller > Chiller circuit 1 > Compressor 1	16456
E2_udiOpHoursComp2Cir1	Total number of operating hours	Circuit 1- Compressor2	Air-water chiller > Chiller circuit 1 > Compressor 2	16458
E2_udiOpHoursComp3Cir1	Total number of operating hours	Circuit 1- Compressor 3	Air-water chiller > Chiller circuit 1 > Compressor 3	16460
E2_udiOpHoursComp4Cir1	Total number of operating hours	Circuit 1- Compressor 4	Air-water chiller > Chiller circuit 1 > Compressor 4	16462
uiElapsedCycleTimeComp1Cir1	Remaining time before minimum cycle time elapsed compressor 1 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 1	9531
uiElapsedCycleTimeComp2Cir1	Remaining time before minimum cycle time elapsed compressor 2 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 2	9532
uiElapsedCycleTimeComp3Cir1	Remaining time before minimum cycle time elapsed compressor 3 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 3	9533
uiElapsedCycleTimeComp4Cir1	Remaining time before minimum cycle time elapsed compressor 4 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 4	9534

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
uiElapsedOffTimeComp1Cir1	Remaining time before minimum Off time elapsed compressor 1 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 1	9523
uiElapsedOffTimeComp2Cir1	Remaining time before minimum Off time elapsed compressor 2 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 2	9524
uiElapsedOffTimeComp3Cir1	Remaining time before minimum Off time elapsed compressor 3 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 3	9525
uiElapsedOffTimeComp4Cir1	Remaining time before minimum Off time elapsed compressor 4 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 4	9526
uiElapsedOnTimeComp1Cir1	Remaining time before minimum On time elapsed compressor 1 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 1	9515
uiElapsedOnTimeComp2Cir1	Remaining time before minimum On time elapsed compressor 2 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 2	9516
uiElapsedOnTimeComp3Cir1	Remaining time before minimum On time elapsed compressor 3 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 3	9517
uiElapsedOnTimeComp4Cir1	Remaining time before minimum On time elapsed compressor 4 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 4	9518
xCmdOpHoursResetComp1Cir1	Reset command for operation hours compressor 1 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 1	9505
xCmdOpHoursResetComp2Cir1	Reset command for operation hours compressor 2 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 2	9506

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xCmdOpHoursResetComp3Cir1	Reset command for operation hours compressor 3 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 3	9507
xCmdOpHoursResetComp4Cir1	Reset command for operation hours compressor 4 circuit 1	Circuit 1 compressors	Air-water chiller > Chiller circuit 1 > Compressor 4	9508
Circuit 2				
E2_udiNbStartsComp1Cir2	Total number of starts	Circuit 2- Compressor 1	Air-water chiller > Chiller circuit 2 > Compressor 1	16480
E2_udiNbStartsComp2Cir2	Total number of starts	Circuit 2- Compressor2	Air-water chiller > Chiller circuit 2 > Compressor 2	16482
E2_udiNbStartsComp3Cir2	Total number of starts	Circuit 2- Compressor 3	Air-water chiller > Chiller circuit 2 > Compressor 3	16484
E2_udiNbStartsComp4Cir2	Total number of starts	Circuit 2- Compressor 4	Air-water chiller > Chiller circuit 2 > Compressor 4	16486
E2_udiOpHoursComp1Cir2	Total number of operating hours	Circuit 2- Compressor 1	Air-water chiller > Chiller circuit 2 > Compressor 1	16464
E2_udiOpHoursComp2Cir2	Total number of operating hours	Circuit 2- Compressor2	Air-water chiller > Chiller circuit 2 > Compressor 2	16466
E2_udiOpHoursComp3Cir2	Total number of operating hours	Circuit 2- Compressor 3	Air-water chiller > Chiller circuit 2 > Compressor 3	16468
E2_udiOpHoursComp4Cir2	Total number of operating hours	Circuit 2- Compressor 4	Air-water chiller > Chiller circuit 2 > Compressor 4	16470
uiElapsedCycleTimeComp1Cir2	Remaining time before minimum cycle time elapsed compressor 1 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 1	9535
uiElapsedCycleTimeComp2Cir2	Remaining time before minimum cycle time elapsed compressor 2 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 2	9536
uiElapsedCycleTimeComp3Cir2	Remaining time before minimum cycle time elapsed compressor 3 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 3	9537
uiElapsedCycleTimeComp4Cir2	Remaining time before minimum cycle time elapsed compressor 4 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 4	9538

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
uiElapsedOffTimeComp1Cir2	Remaining time before minimum Off time elapsed compressor 1 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 1	9527
uiElapsedOffTimeComp2Cir2	Remaining time before minimum Off time elapsed compressor 2 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 2	9528
uiElapsedOffTimeComp3Cir2	Remaining time before minimum Off time elapsed compressor 3 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 3	9529
uiElapsedOffTimeComp4Cir2	Remaining time before minimum Off time elapsed compressor 4 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 4	9530
uiElapsedOnTimeComp1Cir2	Remaining time before minimum On time elapsed compressor 1 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 1	9519
uiElapsedOnTimeComp2Cir2	Remaining time before minimum On time elapsed compressor 2 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 2	9520
uiElapsedOnTimeComp3Cir2	Remaining time before minimum On time elapsed compressor 3 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 3	9521
uiElapsedOnTimeComp4Cir2	Remaining time before minimum On time elapsed compressor 4 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 4	9522
xCmdOpHoursResetComp1Cir2	Reset command for operation hours compressor 1 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 1	9509
xCmdOpHoursResetComp2Cir2	Reset command for operation hours compressor 2 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 2	9510

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xCmdOpHoursResetComp3Cir2	Reset command for operation hours compressor 3 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 3	9511
xCmdOpHoursResetComp4Cir2	Reset command for operation hours compressor 4 circuit 2	Circuit 2 compressors	Air-water chiller > Chiller circuit 2 > Compressor 4	9512

Fans

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
E2_udiOpHoursFanStage1Cir1	Total number of operating hours	Circuit 1	Air-water chiller > Chiller circuit 1 > Fans	16518
E2_udiOpHoursFanStage2Cir1	Total number of operating hours	Circuit 1	Air-water chiller > Chiller circuit 1 > Fans	16520
E2_udiOpHoursFanStage3Cir1	Total number of operating hours	Circuit 1	Air-water chiller > Chiller circuit 1 > Fans	16522
E2_udiOpHoursFanStage4Cir1	Total number of operating hours	Circuit 1	Air-water chiller > Chiller circuit 1 > Fans	16524
iSubCoolingCir1	Subcooling for circuit 1	Circuit 1 fans	Air-water chiller > Chiller circuit 1 > Fans	9428
Circuit 2				
E2_udiOpHoursFanStage1Cir2	Total number of operating hours	Circuit 2	Air-water chiller > Chiller circuit 2 > Fans	16526
E2_udiOpHoursFanStage2Cir2	Total number of operating hours	Circuit 2	Air-water chiller > Chiller circuit 2 > Fans	16528
E2_udiOpHoursFanStage3Cir2	Total number of operating hours	Circuit 2	Air-water chiller > Chiller circuit 2 > Fans	16530
E2_udiOpHoursFanStage4Cir2	Total number of operating hours	Circuit 2	Air-water chiller > Chiller circuit 2 > Fans	16532
iSubCoolingCir2	Subcooling for circuit 2	Circuit 2 fans	Air-water chiller > Chiller circuit 2 > Fans	9429
General				
xCmdOpHoursResetFans	Reset command for operation hours all fans	Circuit 1 fans, Circuit 2 fans	Air-water chiller > Chiller circuit 1 > Fans, Air-water chiller > Chiller circuit 2 > Fans	9513

EEV Drivers

Variable Name	Description	Controller/Remote Display Page	Web Site Page	Modbus Address

Variable Name	Description	Controller/Remote Display Page	Web Site Page	Modbus Address
Circuit 1				
uiRMbTM171VEVErrorCir1	Errors from EEV drive	Circuit 1 EEV	Air-water chiller > Chiller circuit 1 > EEV	9203
uiRMbTM171VEVOpenCir1	Valve opening from EEV drive	Circuit 1 EEV	Air-water chiller > Chiller circuit 1	9202
uiRMbTM171VEVStatusCir1	Status from EEV drive	Circuit 1 EEV	Air-water chiller > Chiller circuit 1 > EEV	9204
Circuit 2				
uiRMbTM171VEVErrorCir2	Errors from EEV drive	Circuit2 EEV	Air-water chiller > Chiller circuit 1 > EEV	9211
uiRMbTM171VEVOpenCir2	Valve opening from EEV drive	Circuit 2 EEV	Air-water chiller > Chiller circuit 1	9210
uiRMbTM171VEVStatusCir2	Status from EEV drive	Circuit2 EEV	Air-water chiller > Chiller circuit 1 > EEV	9212

Pumps

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
E2_udiOpHoursPump1	Total number of operating hours	Pumps	Air-water chiller > Pumps	16547
E2_udiOpHoursPump2	Total number of operating hours	Pumps	Air-water chiller > Pumps	16549
uiRemainIdleTimePumps	Remaining time before pump starts for uiPModeRunTime	Pumps	Air-water chiller > Pumps	9548
uiRemainTimePump1	Remaining time before pump 1 switches over to pump 2	Pumps	Air-water chiller > Pumps	9546
uiRemainTimePump2	Remaining time before pump 2 switches over to pump 1	Pumps	Air-water chiller > Pumps	9547
xOpHoursResetPumps	Reset command for operation hours all pumps	Pumps	Air-water chiller > Pumps	9545

Energy

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
uiMassFlowCir1	Mass flow circuit 1	Energy > Current values	Energy	8980
uiMassFlowCir2	Mass flow circuit 2	Energy > Current values	Energy	8981
rThermalPower	Active power	Energy > Current values	Energy	8982
rThermalEnergy	Thermal Energy	Energy > Current values	Energy	8984
uiCOP	COP instant	Energy > COP, Circuit1, Circuit 2	Energy > COP	8986
uiShortTermCOP	COP short term	Energy > COP	Energy > COP	8987
uiLongTermCOP	COP long term	Energy > COP	Energy > COP	8988
xCmdConsumReset	Reset Energy related variables	Energy	Energy	8989
rActiveEnergy	Current active Energy	Energy > Current values	Energy	9272
rActivePower	Current active Power	Energy > Current values, Circuit 1, Circuit 2	Energy	9274

PID

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
rSpCompressors	Compressors PID output	Settings > PID comp. Test	PID compressors test	8998
uiAutoTuneCompMessageID	0=auto-tuning active, 1=completed OK, 2= completed oversized, 3= completed undersized	Settings > PID comp. Test	PID compressors test	9541
uiAutoTuneCompPb	Pb value, manual or calculated with auto-tuning	Settings > PID comp. Test	PID compressors test	9542
uiAutoTuneCompTi	Ti value, manual or calculated with auto-tuning	Settings > PID comp. Test	PID compressors test	9543
uiCompressorsManualValue	Compressors control manual value	Settings > PID comp. Test	PID compressors test	8970
usiAutoTuneCompMode	Changes the PID parameters of the outputs rKp and uiTi. (0=manual param, 1= slow, 2= medium, 3=fast)	Settings > PID comp. Test	PID compressors test	9540
xCmdCompressorsAutoMode	to toggle state in WEB page	-	PID compressors test	8975
xCmdCompressorsManualMode	to toggle state in WEB page	-	PID compressors test	8974
xCmdCompressorsTuneOff	to toggle state in WEB page	-	PID compressors test	8977
xCmdCompressorsTuneOn	to toggle state in WEB page	-	PID compressors test	8976
xCompressorsManualMode	Enable compressors manual mode	Settings > PID comp. Test	PID compressors test	8969
xSaveAutoTuneParams	Accept and save auto-tuning parameters	Settings > PID comp. Test	PID compressors test	9544
xStartAutoTuneCompressors	A rising edge activates auto-tuning	Settings > PID comp. Test	PID compressors test	9539

QR Code

Variable Name	Description	Controller/ Remote Display Page	Modbus Address
E2_sQRSourcePart1	QR code Part1 First chars of the URL	QR code	16968
E2_sQRSourcePart2	QR code Part1 First chars of the URL	QR code	16969
E2_sQRSourcePart3	QR code Part1 First chars of the URL	QR code	16970
E2_sQRSourcePart4	QR code Part1 First chars of the URL	QR code	16971
E2_sQRSourcePart5	QR code Part1 First chars of the URL	QR code	16972

Alarm

Variable Name	Description	Controller/ Remote Display Page	Web Site Page	Modbus Address
xCmdAlarmsReset	Reset alarms	Alarms	Air-water chiller	9514

BACnet

Variable Name	Description	Controller/ Remote Display Page	Modbus Address
xPriorityActive	BACnet Priority Active	-	9792
xPrArrClear	Clear Bacnet the priority array	-	9788

PID Limiter

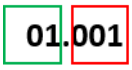
Variable Name	Description	Controller/ Remote Display Page	Modbus Address
xPIDLimitedCir1	PID is limited in the circuit 1	-	9793
xPIDLimitedCir2	PID is limited in the circuit 2	-	9794
rLimitPercentCir1	PID limitation percentage	-	9795
rLimitPercentCir2	PID limitation percentage	-	9797
xHPLimiterActiveCir1	High Pressure is limiting the PID	Circuit 1 compressors	9799
xHPLimiterActiveCir2	High Pressure is limiting the PID	Circuit 2 compressors	9800
xLPLimiterActiveCir1	Low Pressure is limiting the PID	Circuit 1 compressors	9801
xLPLimiterActiveCir2	Low Pressure is limiting the PID	Circuit 2 compressors	9802

9.3. Parameters

NOTE: All parameters values described in this document relate to the TVDA SoMachine project and the test equipment used during development.

NOTE: The parameter name displayed on the controller and remote display pages is the **Parameter name** without the "E2_" prefix.

NOTE: “Label” refers to the location in settings menu on the controller and remote dispay pages.



In settings menu, the green part refers to the menu 1 and the red part refers to the item number in the menu 1

Menu 1 – General Parameters

Label	Variable Name	Description	UM	Values	Modbus Address
01.001	E2_xHeatCool	Compressors heat (=TRUE) or cool (=FALSE)		Default: 0 Min: 0→COOL Max: 1→HEAT	16384
01.002	E2_usiRefrigerantType	Refrigerant type		0 = R22 (Default) 1 = R134a 2 = R404A 3 = R407C 4 = R410A 5 = R407A 6 = R407F 7 = R290 8 = R507A 9 = R717 10 = R723 11 = R1234ZE 12 = R744	16385
01.003	E2_xUnitTypeTemp	Unit selection of the relative temperature		TRUE: °F FALSE: °C	16386
01.004	E2_xUnitTypePress	Unit selection of the relative pressure		TRUE: PSI FALSE: bar	16387
01.005	E2_usiNbCircuits	Number of circuits			16388
01.006	E2_iWaterTempSetCool	Water temperature setpoint in cool mode (fixed)	°C/°F	Min: 0 Max: 40.0 Default: 14.0	17097
01.007	E2_iWaterTempSetHeat	Water temperature setpoint in heat mode (fixed)	°C/°F	Min: 0 Max: 80.0 Default: 35.0	17100
01.008	E2_iWaterSetEcoOffset	Water temperature setpoint offset for economy mode	K/R		16390
01.009	E2_xEnWaterAirLinkSet	Setpoint type selection		TRUE: linked to outside air temperature FALSE: fixed	16391

Label	Variable Name	Description	UM	Values	Modbus Address
01.010	E2_iWaterSetMin	Water temperature setpoint minimum value	°C/°F	Min: 0 Max: 40.0 Default: 10.0	17094
01.011	E2_iWaterSetMax	Water temperature setpoint maximum value	°C/°F	Min: 0 Max: 40.0 Default: 20.0	17095
01.012	E2_iRoomSetCool	Room temperature (pivot) to calculate water setpoint in cool mode	°C/°F	Min: 0 Max: 40.0 Default: 10.0	17093
01.013	E2_iRoomSetHeat	Room temperature (pivot) to calculate water setpoint in heat mode	°C/°F	Min: 0 Max: 40.0 Default: 20.0	17096
01.014	E2_iWaterSetSlope	Slope to calculate water setpoint	-	Min: 0.00 Max: 10.00 Default:1.00	16552
01.015	E2_uiWaterSetStepFilter	Step of filter in water temperature setpoint change	°C/°F	Default:1.0	17090
01.016	E2_uiWaterSetTimeStep	Time of step in water temperature setpoint change	s	Default:1.0	17091
01.017	E2_iLowTemperatureMin Limit	Minimum water temperature	°C/°F		16540
01.018	E2_uiComTimeOut	Communication timeout	s		16560
01.019	E2_usiModeType	Mode type management	num	0= Manual 1= Remote 2= DI 3= Automatic	17085
01.020	E2_iHeatTempThr	Heating mode temperature threshold	°C/°F	Min: -58.0 Max: 20.0 Default: E2_iCoolTempThr	17086
01.021	E2_iCoolTempThr	Cooling mode temperature threshold	°C/°F	Min: E2_iHeatTempThr Max: 302.0 Default:25.0	17087
01.022	E2_uiDelayChangeOver	Delay for heat/cool changeover	s	Default:3600	17088
01.023	E2_uiModeChangeComp ValveTime	Delay between compressors stopped and valve switch during mode change	s	Default: 60	17067
01.024	E2_uiModeChangeValve CompTime	Delay between valve switch and compressors on during mode change	s	Default: 60	17068
01.025	E2_xEnOptimumStart	Enable Optimum Start		TRUE: Enable FALSE: Disable	17089
01.026	E2_usiCompModelComp 1Cir1	Circuit 1 Compressor 1			16779
01.027	E2_usiCompModelComp 2Cir1	Circuit 1 Compressor 2			16780

Label	Variable Name	Description	UM	Values	Modbus Address
01.028	E2_usiCompModelComp3Cir1	Circuit 1 Compressor 3			16781
01.029	E2_usiCompModelComp4Cir1	Circuit 1 Compressor 4			16782
01.030	E2_usiCompModelComp1Cir2	Circuit 2 Compressor 1			16783
01.031	E2_usiCompModelComp2Cir2	Circuit 2 Compressor 1			16784
01.032	E2_usiCompModelComp3Cir2	Circuit 2 Compressor 1			16785
01.033	E2_usiCompModelComp4Cir2	Circuit 2 Compressor 1			16786
01.034	E2_Cfg_FullScallMaxHP	Last value analogue input exp. scale HP Probe			16927
01.035	E2_Cfg_FullScallMinHP	First value analogue input exp. scale HP Probe			16928
01.036	E2_usiProbeLP	LP Probe model		0: EWPA 010 1: EWPA 030 2: EWPA 050 3: custom probe	16933
01.037	E2_usiProbeHP	HP Probe model		0: EWPA 010 1: EWPA 030 2: EWPA 050 3: custom probe	16934
01.038	E2_Cfg_FullScallMaxLP	Last value analogue input exp. scale LP Probe			16935
01.039	E2_Cfg_FullScallMinLP	First value analogue input exp. scale LP Probe			16936
01.040	E2_xRemoteStartStop	Remote start/stop command		TRUE: Start (Default) FALSE: Stop	16963
01.041	E2_xEnPressureLimiter	Enables Pressure Limiter		TRUE: Enable (Default) FALSE: Disable	16966
01.042	E2_iHPDifferential	High Pressure limiter differential	bar/PSI	Min: 0.1	16967
01.043	E2_iLPDifferential	Low Pressure limiter differential	bar/PSI	Min: 0.1	16968
01.044	E2_usiCompressorRegulation	Type of circuit regulation. Proportional mode and Neutral mode only available for a single circuit with On Off compressors		0: PID (Default) 1: Proportional Mode 2: Neutral Mode	16969
01.045	E2_xEnDIStandby	Enables setting of Standby mode by digital input		TRUE: Enable FALSE: Disable	17134
-	E2_xEnableFTPServices	Start/Stop FTP service.		TRUE: Start FALSE: Stop	17050

Label	Variable Name	Description	UM	Values	Modbus Address
-	E2_xEnableHTTPServices	Start/Stop HTTP service.		TRUE: Start FALSE: Stop (Default)	17051
-	E2_DigitalScrollPulsePeriod	Pulse Period Digital Scroll compressor			17141
-	E2_iMaxDischargeTemp	Max. Temperature which enable the temperature alarm	°C/°F		17142
-	E2_iInjectionStartValueTemp	Min. Temperature which enable the liquid injection	°C/°F		17143
-	E2_iInjectionStartValuePID	Min. PID which enable the liquid injection			17144
-	E2_iInjectionDiff	Injection Deactivation Differential			17145
-	E2_iAlarmTempDiff	Alarm Temperature Deactivation Differential	°C/°F		17146

Menu 2 – Compressors Parameters

Label	Variable Name	Description	UM	Values	Modbus Address
02.001	E2_usiCircMode	Circuit control sequence mode		0=FIFO 1=Runtime 2=LIFO	16393
02.002	E2_usiCircRegulStrategy			0: saturation 1: balance	16394
02.003	E2_usiPriorityCircuit1	Priority for circuit 1			16395
02.004	E2_usiPriorityCircuit2	Priority for circuit 2			16396
02.005	E2_uiCircuitHysteresis	Hysteresis to start next circuit	%		16397
02.006	E2_uiCircSpMaxVar	Time to increase/ decrease compressors setpoint of 10 %	s	0=leave rSp as is	16398
02.007	E2_uiCompressorsPbCool	Compressors PID proportional band in Cool mode	K/R	Min: 0 Max: 3 Default:0	16544
02.008	E2_uiCompressorsPbHeat	Compressors PID proportional band in Heat mode	K/R	Min: 0.1 Max: 1000.0 Default:10.0	17082
02.009	E2_uiCompressorsTi	Compressors PID integral time	s		16400
02.010	E2_uiCompressorsTd	Compressors PID derivative time	s		16401
02.011	E2_uiMinOnTimeComp	Minimum time the compressor is running	s		16402
02.012	E2_uiMinOffTimeComp	Minimum time the compressor is stopped	s		16403
02.013	E2_uiMinCycleTimeComp	Minimum time between 2 consecutive starts of the compressor	s		16404
02.014	E2_uiStartingTimeVSComp	Duration of the starting mode for VS compressor	s		16405
02.015	E2_uiStoppingTimeVSComp	Duration of the stopping mode for VS compressor	s		16406
02.016	E2_uiOilRecoveryTimeVSComp	Maximum time oil recovery mode will be started for VS compressor	min		16407
02.017	E2_uiOilRecoveryPeriodVSComp	Duration of the oil recovery mode for VS compressor	s		16408
02.018	E2_iHighPressureMaxLimit	Maximum value of the high pressure	bar/PSI	Default: 10000	16409
02.019	E2_iLowPressureMinLimit	Minimum value of the low pressure	bar/PSI		16410

Label	Variable Name	Description	UM	Values	Modbus Address
02.020	E2_uiDelayEnAlarm	Start delay for LP switch and alarm when compressor running	s		16411
02.021	E2_uiDelayMotorAlarm	Delay for the motor alarm	s		16412
02.022	E2_uiDelayOilPressSwitch	Delay for the oil pressure switch alarm	s		16413
02.023	E2_uiDelayHPSwitch	Delay for the HP switch alarm	s		16414
02.024	E2_uiDelayLPSwitch	Delay for the LP switch alarm	s		16415
02.025	E2_uiDelayGenericAlarm	Delay for the generic alarm	s		16416
02.026	E2_uiDelayHPAlarm	Delay for the HP alarm	s		16417
02.027	E2_uiDelayLPAlarm	Delay for the LP alarm	s		16418
02.028	E2_usiPriorityComp1Cir1	Priority for compressor 1 circuit 1			16419
02.029	E2_usiPriorityComp2Cir1	Priority for compressor 2 circuit 1			16420
02.030	E2_usiPriorityComp3Cir1	Priority for compressor 3 circuit 1			16421
02.031	E2_usiPriorityComp4Cir1	Priority for compressor 4 circuit 1			16422
02.032	E2_usiPriorityComp1Cir2	Priority for compressor 1 circuit 2			16423
02.033	E2_usiPriorityComp2Cir2	Priority for compressor 2 circuit 2			16424
02.034	E2_usiPriorityComp3Cir2	Priority for compressor 3 circuit 2			16425
02.035	E2_usiPriorityComp4Cir2	Priority for compressor 4 circuit 2			16426
02.036	E2_xCompSwitchCtrlMode	Control mode (switch on/off the compressors)		FALSE=Delay/Neutral, TRUE=Hysteresis/Proportional	16427
02.037	E2_usiCompMode	Compressor control sequence mode		0=FIFO 1=Runtime 2=LIFO	16428
02.038	E2_uiCompCapOnOffCir1	Number of fix speed compressors circuit 1			16431
02.039	E2_uiCompCapVSCir1	Number of variable speed compressors circuit 1			16432
02.040	E2_uiCompCapOnOffCir2	Capacity of the On Off compressors			16435
02.041	E2_uiCompCapVSCir2	Capacity of the variable speed compressors at 50.0 Hz			16436
02.042	E2_uiCompNomFreq	Number of fix speed compressors circuit 2	Hz		16437
02.043	E2_uiCompMinFreq	Number of variable speed compressors circuit 2	Hz		16438

Label	Variable Name	Description	UM	Values	Modbus Address
02.044	E2_uiCompMaxFreq	Capacity of the On Off compressors	Hz		16439
02.045	E2_uiCompMinRange	Capacity of the variable speed compressors at 50.0 Hz	%		16440
02.046	E2_uiCompMaxRange	Nominal speed of the compressors	%		16441
02.047	E2_uiCompDelayOn	Minimum frequency of the variable speed compressors (read from VSD if configured)	s		16442
02.048	E2_uiCompDelayOff	Delay to decrement the number of requested compressors	s		16443
02.049	E2_uiCompHysteresis	Hysteresis to increment and decrement the number of requested compressors	%		16444
02.050	E2_uiCompBand1	Band low for neutral zone	°C/°F		16445
02.051	E2_uiCompBand2	Band high for neutral zone	°C/°F		16446
02.052	E2_uiCompTIncBand1	Delay to increment the number of requested compressors for band 1 only in neutral zone regulation	s		16447
02.053	E2_uiCompTDecBand1	Delay to decrement the number of requested compressors for band 1 only in neutral zone regulation	s		16448
02.054	E2_uiCompTIncBand2	Delay to increment the number of requested compressors for band 2 only in neutral zone regulation	s		16449
02.055	E2_uiCompTDecBand2	Delay to decrement the number of requested compressors for band 2 only in neutral zone regulation	s		16450
02.056	E2_xCompEnPpDownCir1	Enable pump down on circuit 1			16451
02.057	E2_xCompEnPpDownCir2	Enable pump down on circuit 2			16452
02.058	E2_uiCompSolenDelayCir1	Delay to open solenoid after EEV for circuit 1	s		16453
02.059	E2_uiCompSolenDelayCir2	Delay to open solenoid after EEV for circuit 2	s		16454

Label	Variable Name	Description	UM	Values	Modbus Address
02.060	E2_iCompPDownPressLimit	Minimum value of the low pressure during pump down	bar/PSI		16455
02.061	E2_uiPulseTimeDec	Pulse Time Decrementing Valve	s	Default: 1s Min:0.5 s Max:20 s	16787
02.062	E2_uiPeriodTimeDec	Period Time Decrementing Valve	s	Default: 3.0 s Min:1.0 s Max:20 s	16788
02.063	E2_uiPulseTimeInc	Pulse Time Incrementing Valve	s	Default: 1s Min:0.5 s Max:20 s	16789
02.064	E2_uiPeriodTimeInc	Period Time Incrementing Valve	s	Default: 3.0 s Min:1.0 s Max:20 s	16790
02.065	E2_iDeadBand	Dead Band %	%	Default: 10 % Min: 1 % Max: 100%	16791
02.066	E2_uiValve100Time	Time to move the valve to 100%	s		16792
02.067	E2_uiDelayPartWinding	Delay Part Winding	s		16793
02.068	E2_uiMinStepUp	Min Step Up	s		16794
02.069	E2_uiMinStepDown	Min Step Down	s		16795
02.070	E2_usiConfigIO	Config I/O (see page 92 for more details)		0: Default 1: Config 1 2: Config 2	16860
02.073	E2_xEnergyMeterPresence	Enable/ Disable Energy meter		TRUE: Enable FALSE: Disable	16937
02.074	E2_xEnableInverterMB	Modbus communication enabled if the compressor is an inverter		TRUE: Enable FALSE: Disable	16938
02.071	E2_xEnableModbusFanX	Modbus communication enabled if the Fan is monitored via Modbus		TRUE: Enable FALSE: Disable	16939
02.072	E2_xEnableTM171VEV	Enable Expansion Valve		TRUE: Enable FALSE: Disable	16940
02.075	E2_xEnableSoftStartMB	Modbus communication enabled		TRUE: Enable FALSE: Disable	16941
02.076	E2_xEnablePumpMB	Modbus communication enabled with the pump		TRUE: Enable FALSE: Disable	16942
02.077	E2_xExp1Used	Expansion 1		TRUE: Used FALSE: Not Used	16943
02.078	E2_xExp2Used	Expansion 2		TRUE: Used FALSE: Not Used	16944
02.079	E2_xExp3Used	Expansion 3		TRUE: Used FALSE: Not Used	16945
02.080	E2_DigitalScrollPulsePeriod	Pulse Period Digital Scroll compressor			17141

Label	Variable Name	Description	UM	Values	Modbus Address
02.081	E2_iMaxDischargeTemp	Max. Temperature which enable the temperature alarm	°C/°F		17142
02.082	E2_iInjectionStartValueTemp	Min. Temperature which enable the liquid injection	°C/°F		17143
02.083	E2_iInjectionStartValuePID	Min. PID which enable the liquid injection			17144
02.084	E2_iInjectionDiff	Injection Deactivation Differential			17145
02.085	E2_iAlarmTempDiff	Alarm Temperature Deactivation Differential	°C/°F		17146

Menu 3 – Parameters Expansion Valve Circuit 1

Label	Variable Name	Description	UM	Values	Modbus Address
dL00	E2_uiPardL00EEVCir1	Type of Probe 1 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16561
dL 01	E2_uiPardL01EEVCir1	Type of Probe 2 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16562
dL02	E2_uiPardL02EEVCir1	Type of Probe 3 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16563
dL03	E2_uiPardL03EEVCir1	Type of Probe 4 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16564
dL10	E2_iPardL10EEVCir1	Upper value for Pb 1 EEV	bar/PSI		16565
dL11	E2_iPardL11EEVCir1	Lower value for Pb 1 EEV	bar/PSI		16566
dL12	E2_iPardL12EEVCir1	Upper value for Pb 2 EEV	bar/PSI		16567
dL13	E2_iPardL13EEVCir1	Lower value for Pb 2 EEV	bar/PSI		16568
dL20	E2_siPardL20EEVCir1	Offset for Pb1 EEV			16569
dL21	E2_siPardL21EEVCir1	Offset for Pb2 EEV			16570
dL22	E2_siPardL22EEVCir1	Offset for Pb3 EEV			16571
dL23	E2_siPardL23EEVCir1	Offset for Pb4 EEV			16572
dL30	E2_uiPardL30EEVCir1	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16573
dL31	E2_uiPardL31EEVCir1	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16574

Label	Variable Name	Description	UM	Values	Modbus Address
dL32	E2_uiPardL32EEVCir1	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back	16575
dL33	E2_uiPardL33EEVCir1	Configuration of Probe 1 EEV driver		0=nu, 1=outev 2=sat 3=outev back 4= sat back	16576
dE00	E2_usiEEVTypeEEVCir1	Type of EEV (see documentation)			16577
dE21	E2_usiPardE21EEVCir1	Type of system operating mode 0 (see documentation)			16578
dE22	E2_usiPardE22EEVCir1	Type of system operating mode 1 (see documentation)			16579
dE23	E2_usiPardE23EEVCir1	Type of system operating mode 2 (see documentation)			16580
dE25	E2_usiPardE24EEVCir1	Type of system operating mode 3 (see documentation)			16581
dE30	E2_xEnSHSetCalcEEVCir1	Enable superheat setpoint auto calculation			16582
dE31	E2_uiSHSetMaxEEVCir1	Superheat max setpoint (auto calculation)	K/R		16583
dE32	E2_uiSHSetEEVCir1	Superheat setpoint	K/R		16584
dE47	E2_xEEVManualOpenEnEEVCir1	Enable EEV manual open			16585
dE48	E2_uiEEVManualOpenValueEEVCir1	EEV manual open value	%		16586
dE14	E2_usiPardE14EEVCir2	Minimum valve useful opening percentage	%		17154
dE15	E2_usiPardE15EEVCir2	Maximum valve useful opening percentage	%		17155
dE25	E2_uiPardE25EEVCir2	copy of Type of regulation			17156
dE26	E2_iPardE26EEVCir2	Overheating proportional band (when dE25=1)	s		17157
dE27	E2_uiPardE27EEVCir2	Overheating integral gain (when dE25=1)			17158
dE28	E2_uiPardE28EEVCir2	Overheating PID cycle period (when dE25=1)	100*mS		17159
dE29	E2_iPardE29EEVCir2	Overheating PID neutral zone (when dE25=1)	K		17160

Label	Variable Name	Description	UM	Values	Modbus Address
dE36	E2_iPardE36EEVCir2	Overheating proportional banfd (when dE25=0)	K		17162
dE55	E2_iPardE55EEVCir2	MOP full time	s		17164
dE50	E2_xPardE50EEVCir2	Enable MOP			17166
dE66	E2_iPardE66EEVCir2	EEV actuation speed (when dE25=1)	%/S		17168
dE54	E2_uiPardE54EEVCir2	MOP proportional band	K		17170
dE37	E2_uiPardE37EEVCir2	Overheating full time (when dE25=1)	s		17172
dE38	E2_uiPardE38EEVCir2	Overheating derivative time (when dE25=0)	s		17174

Menu 4 – Parameters Expension Valve Circuit 2

Label	Variable Name	Description	UM	Values	Modbus Address
dL00	E2_uiPardL00EEVCir2	Type of Probe 1 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16587
dL 01	E2_uiPardL01EEVCir2	Type of Probe 2 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16588
dL02	E2_uiPardL02EEVCir2	Type of Probe 3 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16589
dL03	E2_uiPardL03EEVCir2	Type of Probe 4 EEV driver		0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16590
dL10	E2_iPardL10EEVCir2	Upper value for Pb 1 EEV	bar/PSI		16591
dL11	E2_iPardL11EEVCir2	Lower value for Pb 1 EEV	bar/PSI		16592
dL12	E2_iPardL12EEVCir2	Upper value for Pb 2 EEV	bar/PSI		16593
dL13	E2_iPardL13EEVCir2	Lower value for Pb 2 EEV	bar/PSI		16594
dL20	E2_siPardL20EEVCir2	Offset for Pb1 EEV			16595
dL21	E2_siPardL21EEVCir2	Offset for Pb2 EEV			16596
dL22	E2_siPardL22EEVCir2	Offset for Pb3 EEV			16597
dL23	E2_siPardL23EEVCir2	Offset for Pb4 EEV			16598
dL30	E2_uiPardL30EEVCir2	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16599

Label	Variable Name	Description	UM	Values	Modbus Address
dL31	E2_uiPardL31EEVCir2	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16600
dL32	E2_uiPardL32EEVCir2	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16601
dL33	E2_uiPardL33EEVCir2	Configuration of Probe 1 EEV driver		0=nu 1=outev 2=sat 3=outev back 4= sat back 5=out direct	16602
dE00	E2_usiEEVTypeEEVCir2	Type of EEV		(see documentation)	16603
dE21	E2_usiPardE21EEVCir2	Type of system operating mode 0		(see documentation)	16604
dE22	E2_usiPardE22EEVCir2	Type of system operating mode 1		(see documentation)	16605
dE23	E2_usiPardE23EEVCir2	Type of system operating mode 2		(see documentation)	16606
dE25	E2_usiPardE24EEVCir2	Type of system operating mode 3		(see documentation)	16607
dE30	E2_xEnSHSetCalcEEVCir2	Enable superheat setpoint auto calculation			16608
dE31	E2_uiSHSetMaxEEVCir2	Superheat max setpoint (auto calculation)	K/R		16609
dE32	E2_uiSHSetEEVCir2	Superheat setpoint	K/R		16610
dE47	E2_xEEVManualOpenEnEEVCir2	Enable EEV manual open			16611
dE48	E2_uiEEVManualOpenValueEEVCir2	EEV manual open value	%		16612
dE14	E2_usiPardE14EEVCir2	Minimum valve useful opening percentage	%		17154
dE15	E2_usiPardE15EEVCir2	Maximum valve useful opening percentage	%		17155
dE25	E2_uiPardE25EEVCir2	copy of Type of regulation			17156
dE26	E2_iPardE26EEVCir2	Overheating proportional band (when dE25=1)	s		17157
dE27	E2_uiPardE27EEVCir2	Overheating integral gain (when dE25=1)			17158
dE28	E2_uiPardE28EEVCir2	Overheating PID cycle period (when dE25=1)	100*mS		17159
dE29	E2_iPardE29EEVCir2	Overheating PID neutral zone (when dE25=1)	K		17160

Label	Variable Name	Description	UM	Values	Modbus Address
dE36	E2_iPardE36EEVCir2	Overheating proportional banfd (when dE25=0)	K		17162
dE55	E2_iPardE55EEVCir2	MOP full time	s		17164
dE50	E2_xPardE50EEVCir2	Enable MOP			17166
dE66	E2_iPardE66EEVCir2	EEV actuation speed (when dE25=1)	%/S		17168
dE54	E2_uiPardE54EEVCir2	MOP proportional band	K		17170
dE37	E2_uiPardE37EEVCir2	Overheating full time (when dE25=1)	s		17172
dE38	E2_uiPardE38EEVCir2	Overheating derivative time (when dE25=0)	s		17174

Menu 5 – Parameters Fans

Label	Variable Name	Description	UM	Values	Modbus Address
05.001	E2_iCondTempMin	Minimum condensing temperature	°C/°F	0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16488
05.002	E2_iCondTempMax	Minimum condensing temperature	°C/°F	0=diS 1=ntc 2=Pt1000 3=420 mA 4= rA 5=010 V 6= ntcE	16489
05.003	E2_iCondTempExtSetp	External setpoint for the condensing temperature in fixed mode	°C/°F		16490
05.004	E2_xHeatRecovery	Heat recovery activation			16491
05.005	E2_iCondTempOffset	Condensing temperature offset	°C/°F		16492
05.006	E2_iCondTempOffsetAtMin	Condensing temperature offset at minimum condensing temperature	°C/°F		16493
05.007	E2_iCondTempOffsetAtMax	Condensing temperature offset at maximum condensing temperature	°C/°F		16494
05.008	E2_xFanLowNoiseOper	Low noise operation TRUE: activates FALSE: deactivates			16495
05.009	E2_usiFanNbStageCir1	Number of fan stages circuit 1			16496
05.010	E2_usiFanNbStageCir2	Number of fan stages circuit 2			16497
05.011	E2_usiFanNbStage1Cir1	Number of fan for stage1 circuit 1			16498
05.012	E2_usiFanNbStage2Cir1	Last value analogue input AI1 exp. scale			16499
05.013	E2_usiFanNbStage3Cir1	Number of fan for stage 3 circuit 1			16500
05.014	E2_usiFanNbStage4Cir1	Number of fan for stage 4 circuit 1			16501
05.015	E2_usiFanNbStage1Cir2	Number of fan for stage1 circuit 2			16502
05.016	E2_usiFanNbStage2Cir2	Number of fan for stage 2 circuit 2			16503
05.017	E2_usiFanNbStage3Cir2	Number of fan for stage 3 circuit 2			16504

Label	Variable Name	Description	UM	Values	Modbus Address
05.018	E2_usiFanNbStage4Cir2	Number of fan for stage 4 circuit 2			16505
05.019	E2_usiFanMode	Fan On/Off sequence mode		0: FIFO 1: Runtime 2: LIFO	16506
05.020	E2_usiFanPriorityStage1	Priority of stage 1 in LIFO mode			16507
05.021	E2_usiFanPriorityStage2	Priority of stage 2 in LIFO mode			16508
05.022	E2_usiFanPriorityStage3	Priority of stage 3 in LIFO mode			16509
05.023	E2_usiFanPriorityStage4	Priority of stage 4 in LIFO mode			16510
05.024	E2_uiFanFreqMin	Fan VSD minimum frequency	Hz		16511
05.025	E2_uiFanFreqMax	Fan VSD maximum frequency	Hz		16512
05.026	E2_uiFanLowNoiseMaxFreq	Fan VSD low noise operation frequency reduction	Hz	Default: 50.0 Min: 10.0 Max: 50.0	16513
05.027	E2_uiFanDelayIncr	Delay to increment the running fan stages	s		16514
05.028	E2_uiFanDelayDecr	Delay to decrement the running fan stages	s		16515
05.029	E2_uiFanMinOffTime	Fan minimum Off time of the stages	s		16516
05.030	E2_uiFanHysteresis	Fan hysteresis for the frequency	Hz	Default: 5.0 Min: 0.1 Max: 500.0	16517
05.031	E2_uiFanCondPb	Fan PID proportional band for condensing temperature	°C/°F	Default: 16.0 Min: 0.0 Max: 1000.0	16534
05.032	E2_uiFanCondTi	Fan PID integral time	s	Default: 0.0 Min: 0.0 Max: 360.0	16535
05.033	E2_uiFanCondDeadband	Fan dead band for condensing temperature	°C/°F	Default: 0.0 Min: 0.0 Max: 50.0	16536
05.034	E2_usiFanCondControlMode	High pressure control type 0: Floating 1: Floating with variable offset 2: Fixed		0 = Floating 1 = Floating with variable offset 2 = Fixed	16537
05.035	E2_iHeatRecoverySetpoint	Heat recovery setpoint	°C/°F		16538

Label	Variable Name	Description	UM	Values	Modbus Address
05.036	E2_uiRampSetpFilter	Ramp setpoint filter for switching from normal mode to heat recovery mode	°C°F/min	Default: 6.0	16539
05.037	E2_uiFanEvapPb	Fan evaporator PID proportional band	K/R	Default: 16.0 Min: 0.0 Max: 1000.0	17077
05.038	E2_uiFanEvapTi	Fan evaporator PID integral time	s	Default: 0 Min: 0 Max: 360.0	17078
05.039	E2_uiFanEvapDeadband	Fan dead band for evaporating temperature	K/R	Default: 0 Min: 0 Max: 50.0	17079
05.040	E2_usiFanEvapControlMode	Low pressure control type		0 = Floating 1 = Floating with variable offset 2 = Fixed	17080

Menu 6 – Parameters Pumps

Label	Variable Name	Description	Um	Values	Modbus Address
06.001	E2_uiPumpSetFixedSpeed	Fixed speed for modulated pump	%	0=FIFO 1=Runtime 2=LIFO	16541
06.002	E2_xPumpFixedSpeed	Pump fixed speed (TRUE) or automatic modulation (FALSE)			16542
06.003	E2_uiPumpDiffSetp	Differential setpoint for modulated pump	K/R		16543
06.004	E2_uiPumpPbCool	Pump PID proportional band in Cool mode	°C/°F		16544
06.005	E2_uiPumpPbHeat	Pump PID proportional band in Heat mode	°C/°F		17082
06.006	E2_uiPumpTi	Pump PID integral time	s		16545
06.007	E2_uiPumpTd	Pump PID derivative time	s		16546
06.008	E2_uiMaxRunTimeP1	Maximum running time of pump 1	h		16551
06.009	E2_uiMaxRunTimeP2	Maximum running time of pump 2	h		16552
06.010	E2_uiPModeRunTime	Duration of the locked rotor protection (P-mode)	min		16553
06.011	E2_uiPModeIdleTime	Max idle time - Pump will be started for uiPModeRunTime	h		16554
06.012	E2_uiPumpMinFreq	Minimum frequency of the pump	Hz		16555
06.013	E2_uiPumpMaxFreq	Maximum frequency of the pump	Hz		16556
06.014	E2_xPumpAutoManual	Pump automatic or manual mode			16557
06.015	E2_xManualRunPump1	Start pump 1 in manual mode			16558
06.016	E2_xManualRunPump2	Start pump 2 in manual mode			16559

Parameters Scheduler

Label	Variable Name	Description	Modbus Address
Yearly scheduler **(Menu 7)**			
7.001	E2_usiStartMonth	Yearly scheduler start month of event	16617
7.002	E2_usiStartDayMonth	Yearly scheduler start day month of event	16618
7.003	E2_usiStartHours	Yearly scheduler start hours of event	16619
7.004	E2_usiStopMonth	Yearly scheduler stop month of event	16620
7.005	E2_usiStopDayMonth	Yearly scheduler stop day month of event	16621
7.006	E2_usiStopHours	Yearly scheduler stop hours of event	16622
Weekly scheduler **(Menu 8)**			
	E2_usiEventID_1	Event 1 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16688
	E2_usiEventWeekDays_1	Event 1 days of week	16689
	E2_uiEventTime_1	Event 1 scheduler time	16690
	E2_usiEventID_2	Event 2 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16691
	E2_usiEventWeekDays_2	Event 2 days of week	16692
	E2_uiEventTime_2	Event 2 scheduler time	16693
	E2_usiEventID_3	Event 3 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16694
	E2_usiEventWeekDays_3	Event 3 days of week	16695
	E2_uiEventTime_3	Event 3 scheduler time	16696
	E2_usiEventID_4	Event 4 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16697
	E2_usiEventWeekDays_4	Event 4 days of week	16698
	E2_uiEventTime_4	Event 4 scheduler time	16699
	E2_usiEventID_5	Event 5 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16700
	E2_usiEventWeekDays_5	Event 5 days of week	16701
	E2_uiEventTime_5	Event 5 scheduler time	16702
	E2_usiEventID_6	Event 6 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16703
	E2_usiEventWeekDays_6	Event 6 days of week	16704
	E2_uiEventTime_6	Event 6 scheduler time	16705

Label	Variable Name	Description	Modbus Address
	E2_usiEventID_7	Event 7 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16706
	E2_usiEventWeekDays_7	Event 7 days of week	16707
	E2_uiEventTime_7	Event 7 scheduler time	16708
	E2_usiEventID_8	Event 8 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16709
	E2_usiEventWeekDays_8	Event 8 days of week	16710
	E2_uiEventTime_8	Event 8 scheduler time	16711
	E2_usiEventID_9	Event 9 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16712
	E2_usiEventWeekDays_9	Event 9 days of week	16713
	E2_uiEventTime_9	Event 9 scheduler time	16714
	E2_usiEventID_10	Event 10 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16715
	E2_usiEventWeekDays_10	Event 10 days of week	16716
	E2_uiEventTime_10	Event 10 scheduler time	16717
	E2_usiEventID_11	Event 11 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16718
	E2_usiEventWeekDays_11	Event 11 days of week	16719
	E2_uiEventTime_11	Event 11 scheduler time	16720
	E2_usiEventID_12	Event 12 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16721
	E2_usiEventWeekDays_12	Event 12 days of week	16722
	E2_uiEventTime_12	Event 12 scheduler time	16723
	E2_usiEventID_13	Event 13 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16724
	E2_usiEventWeekDays_13	Event 13 days of week	16725
	E2_uiEventTime_13	Event 13 scheduler time	16726
	E2_usiEventID_14	Event 14 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16727

Label	Variable Name	Description	Modbus Address
	E2_usiEventWeekDays_14	Event 14 days of week	16728
	E2_uiEventTime_14	Event 14 scheduler time	16729
	E2_usiEventID_15	Event 15 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16730
	E2_usiEventWeekDays_15	Event 15 days of week	16731
	E2_uiEventTime_15	Event 15 scheduler time	16732
	E2_usiEventID_16	Event 16 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16733
	E2_usiEventWeekDays_16	Event 16 days of week	16734
	E2_uiEventTime_16	Event 16 scheduler time	16735
	E2_usiEventID_17	Event 17 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16736
	E2_usiEventWeekDays_17	Event 17 days of week	16737
	E2_uiEventTime_17	Event 17 scheduler time	16738
	E2_usiEventID_18	Event 18 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16739
	E2_usiEventWeekDays_18	Event 18 days of week	16740
	E2_uiEventTime_18	Event 18 scheduler time	16741
	E2_usiEventID_19	Event 19 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16742
	E2_usiEventWeekDays_19	Event 19 days of week	16743
	E2_uiEventTime_19	Event 19 scheduler time	16744
	E2_usiEventID_20	Event 20 ID (0=NO_EVENT, 1=OCCUPATION, 2=ECONOMY, 3=OFF, 4=COOL, 5=HEAT, 6=DEFROST CIR1, 7=DEFROST CIR2)	16745
	E2_usiEventWeekDays_20	Event 20 days of week	16746
	E2_uiEventTime_20	Event 20 scheduler time	16747
	E2_xEnWeeklyScheduler	Enable weekly scheduler	17099

Menu10 – Defrost Parameters

Label	Variable Name	Description	Um	Values	Modbus Address
12.001	E2_usiDefrostType	Defrost type	-	0=disable (Default) 1=synchronous 2=asynchronous 3=independent	17052
12.002	E2_usiDefrostRegulProbe	Defrost Regulation probe	-	0=Outdoor Air Temp (Default) 1=Saturated Suction Temp 2=Saturated Evap Temp	17138
12.003	E2_uiTimeBetweenDefrost	Minimum time between two defrosts	min		17053
12.004	E2_iEnDefrostTemp	Enabling defrost temperature	°C/F	Min : - 58.0 Max: 302.0	17054
12.005	E2_uiDefrostDelay1	Delay between 2 defrosts (working time) when external temperature is below iAuthDefrostTemp	Min		17055
12.006	E2_iMinDefrostTemp	Temperature minimum to define the second delay	°C/°F	Min : - 58.0 Max: 302.0	17056
12.007	E2_iEnDefrostResetTemp	Defrost timer reset temperature	°C/°F	Default: 10.0 Min : - 58.0 Max: 302.0	17057
12.008	E2_uiDefrostDelay2	Second delay when the external temperature is below iMinDefrostTemp	Min	Default: 360	17058
12.009	E2_iDefrostEndTemp	Defrost end temperature	°C/°F	Min : - 58.0 Max: 302.0	17059
12.010	E2_uiMaxDefrostTime	Maximum defrost time	Min	Default: 5	17060
12.011	E2_uiMinDefrostTime	Temperature minimum to define the second delay	Min	Default: 2	17056
12.012	E2_uiDefrostCompValveTime	Delay between compressors stopped and valve switch during defrost	s	Default: 30	17062
12.013	E2_DefrostValveCompTime	Delay between valve switch and compressors on during defrost	s	Default: 30	17063
12.014	E2_uiDrippingTime	Dripping time	Min	Default: 5	17064
12.015	E2_uiDefrostCpCapCir1	Compressors capacity (%) during defrost for circuit 1	%	Min : 0.0 Max: 100.0 Default: 20.0	17065
12.016	E2_uiDefrostCpCapCir2	Compressors capacity (%) during defrost for circuit 2	%	Min : 0.0 Max: 100.0 Default: 20.0	17066

Label	Variable Name	Description	Um	Values	Modbus Address
12.017	E2_iHighPressureDefrostLimit	Value of the high pressure to start fans during defrost	Bar/USI		17081

Menu11 – QRCode Parameters

NOTE: Located on QR code page

Label	Variable Name	Description	Modbus Address
-	E2_sQRSourcePart1	QR code Part1 First 31 chars of the URL	16970
-	E2_sQRSourcePart2	QR code Part2 Next 31 chars of the URL	16986
-	E2_sQRSourcePart3	QR code Part3 Next 31 chars of the URL	17002
-	E2_sQRSourcePart4	QR code Part4 Next 31 chars of the URL	17018
-	E2_sQRSourcePart5	QR code Part5 Next 31 chars of the URL	17051

Menu12 - Logger Parameters

NOTE: Located on Logger page

Label	Variable Name	Description	Modbus Address
8.001	E2_xLogEnable	Logger Enable	16956
8.002	E2_uiMonthLogCycle	Logger Period	16957
8.003	E2_uiYearLogCycle	Logger Period	16958

Menu14 – BACnet Parameters

Label	Variable Name	Description	Modbus Address
-	E2_xBACnetEnable	Enables BACnet	16961
-	E2_usiBACScheduler	Scheduler operation unit mode	16964
-	E2_uiBACnetID	BACnet ID value	16959
-	E2_usiBACnetSubnet	BACnet Subnet Value	16960
-	E2_uidtBACnetUpdDsec	Present Value update period in [sec/10]	16962

Communication

Parameter Name	Description	Modbus Address
RS485 communication		
Addr_RS485_OB1	RS485_1 On Board address	16124
Proto_RS485_OB1	Select RS485-1 On Board protocol	16125
DataBit_RS485_OB1	RS485_1 On Board Data bit number	16126
StopBit_RS485_OB1	RS485_1 On Board stop bit number	16127
Parity_RS485_OB1	RS485_1 On Board parity protocol	16128
Baud_RS485_OB1	RS485_1 On Board baud rate protocol	16129
Ethernet communication		
Port_HTTP_PI	HTTP Port number, 0 is equal to default port 80	15796
Port_ETH_PI	TCP/IP Port number	15797
Ip_1_ETH_PI	Ethernet IP address (1st part)	15798
Ip_2_ETH_PI	Ethernet IP address (2 nd part)	15799
Ip_3_ETH_PI	Ethernet IP address (3 rd part)	15800
Ip_4_ETH_PI	Ethernet IP address (4 th part)	15801
DefGtwy_1_ETH_PI	Default Gateway (1 st part)	15802
DefGtwy_2_ETH_PI	Default Gateway (2 nd part)	15803
DefGtwy_3_ETH_PI	Default Gateway (3 rd part)	15804
DefGtwy_4_ETH_PI	Default Gateway (4 th part)	15805
NetMsk_1_ETH_PI	Net mask (1 st part)	15806
NetMsk_2_ETH_PI	Net mask (2 nd part)	15807
NetMsk_3_ETH_PI	Net mask (3 rd part)	15808
NetMsk_4_ETH_PI	Net mask (4 th part)	15809
PriDNS_1_ETH_PI	Primary DNS server (1 st part)	15810
PriDNS_2_ETH_PI	Primary DNS server (2 nd part)	15811
PriDNS_3_ETH_PI	Primary DNS server (3 rd part)	15812
PriDNS_4_ETH_PI	Primary DNS server (4 th part)	15813
SecDNS_1_ETH_PI	Secondary DNS server (1 st part)	15814
SecDNS_2_ETH_PI	Secondary DNS server (2 nd part)	15815
SecDNS_3_ETH_PI	Secondary DNS server (3 rd part)	15816
SecDNS_4_ETH_PI	Secondary DNS server (4 th part)	15817
EnableDHCP_ETH_PI	Enable DHCP	15818

Energy

Parameter Name	Description	Modbus Address
E2_rConsumDayPrev	Energy consumption of the previous day	16623
E2_rConsumDay	Energy consumption of the day	16625
E2_rConsumWeekPrev	Energy consumption of the previous week	16627
E2_rConsumWeek	Energy consumption of the current week	16629
E2_rConsumMonthPrev	Energy consumption of the previous month	16631
E2_rConsumMonth	Energy consumption of the current month	16633
E2_rConsumMonth_Jan	Energy consumption of January	16635
E2_rConsumMonth_Feb	Energy consumption of February	16637
E2_rConsumMonth_March	Energy consumption of March	16639
E2_rConsumMonth_April	Energy consumption of April	16641
E2_rConsumMonth_May	Energy consumption of May	16643
E2_rConsumMonth_June	Energy consumption of June	16645
E2_rConsumMonth_July	Energy consumption of July	16647
E2_rConsumMonth_Aug	Energy consumption of Aug	16649
E2_rConsumMonth_Sept	Energy consumption of Sept	16651
E2_rConsumMonth_Oct	Energy consumption of Oct	16653
E2_rConsumMonth_Nov	Energy consumption of Nov	16655
E2_rConsumMonth_Dec	Energy consumption of Dec	16657
E2_rConsumYearPrev	Energy consumption of the previous year	16659
E2_rConsumYear	Energy consumption of the current year	16661
E2_rConsumPrvReset	Energy consumption of the previous reset period	16663
E2_rConsumReset	Energy consumption since last reset	16665
E2_usiConsumeResetMinutes	Minutes when Reset command is active	16669
E2_usiConsumeResetHours	Hours when Reset command is active	16670
E2_usiConsumeResetMonthDay	Month Day when Reset command is active	16671
E2_usiConsumeResetMonth	Month when Reset command is active (0 = January, 1 = February, 2 = …., 11 = December)	16672
E2_usiConsumeResetYear	Year when Reset command is active	16673
E2_usiCOPLastResetHours	Hours when reset is active	16684
E2_usiCOPLastResetMonthDay	MonthDay when the Reset command is active	16685
E2_usiCOPLastResetMonth	Month when the Reset command is active (0 = January, 1 = February, 2 = …., 11 = December)	16686
E2_usiCOPLastResetYear	Year when the Reset command is active	16687

Clock

Parameter Name	Description	Modbus Address
sysClock_seconds	Second value	8736
sysClock_minutes	Minute value	8737
sysClock_hours	Hour value	8738
sysClock_dayweek	Day of week value	8739
sysClock_daymonth	Day of the month value	8740
sysClock_month	Month value	8741
sysClock_year	Year value	8742
sysClockSet_seconds	Second value (write)	8744
sysClockSet_minutes	Minute value (write)	8745
sysClockSet_hours	Hour value (write)	8746
sysClockSet_dayweek	Day of week value (write)	8747
sysClockSet_daymonth	Day of the month value (write)	8748
sysClockSet_month	Month value (write)	8749
sysClockSet_year	Year value (write)	8750
sysClockSet_Upload	RTC upload	8751

Password

NOTE: Located on Password page

Parameter Name	Description	Modbus Address
E2_uiPwdPermLev1	Password level 1	16748
E2_uiPwdPermLev2	Password level 2	16749
E2_uiPwdPermLev3	Password level 3	16750

9.4. Service Variables and Parameters

Introduction

Below a list of service variables of the PLC project which are neither displayed on the controller display nor in the web site.

Variables Exchanged Between Controller and VSD

For each VSD (address from 1 to 8 or from 21 to 23), the following variables exist, where "X" is the Modbus address of the device:

Variable Name	Description
uiRMbATVDrvStatusNodeX	Drive State
uiRMbATVDrvAlarmNodeX	Drive Alarm
uiRMbATVFreqMinNodeX	Drive Minimum Frequency
uiRMbATVFreqMaxNodeX	Drive Maximum Frequency
uiRMbATVFreqSetpOutNodeX	Drive Frequency
uiWMbATVCmdNodeX	Drive Command
uiWMbATVFreqSetpNodeX	Drive Frequency Setpoint
uiWMbATVTimeOutNodeX	Drive Timeout

These variables are used in the *ATV212ModbusCom* AFB. The variable Modbus addresses follow this sequence:

Device Modbus Address	Variable Modbus Address Range
1	9000–9007
2	9008–9015
3	9016–9023
4	9024–9031
5	9032–9039
6	9040–9047
7	9048–9055
8	9056–9063
21	9080–9087
22	9064–9071
23	9072–9079

Variables Exchanged Between Controller and Soft Starter

For each soft starter (address from 11 to 18) the following variables exist, where "X" is the Modbus address of the device:

Variable Name	Description
uiRMbATVDrvStatusNodeX	State of drive
uiRMbATVDrvAlarmNodeX	Alarm of drive
uiWMbATVCmdNodeX	Command for drive
uiWMbATVTimeOutNodeX	Timeout for drive

These variables are used in the *FB_AltistartModbusCom* function block. The variable Modbus addresses follow this sequence:

Device Modbus Address	Variable Modbus Address Range
11	9088–9091
12	9092–9095
13	9096–9099
14	9100–9103
15	9104–9107
16	9008–9011
17	9012–9015
18	9016–9019

Variables Exchanged Between the Controller and the EEV Drivers

Variable Name	Description	Unit	Format	App Type	Modbus Address
uiWMbTM171VEVCmdCir1	Command for EEV drive	-	%04x	UINT	9197
iRMbTM171VEVPb1Cir1	Pressure probe from EEV drive	bar/PSI	XXX.Y	INT	9198
iRMbTM171VEVPb3Cir1	Temperature probe from EEV drive	°C/°F	XXX.Y	INT	9199
iRMbTM171VEVTEvapCir1	Evaporation temperature from EEV drive	°C/°F	XXX.Y	INT	9200
iRMbTM171VEVSHCir1	Superheat from EEV drive	K/R	XXX.Y	INT	9201
uiWMbTM171VEVCmdCir2	Command for EEV drive		%04x	UINT	9205
iRMbTM171VEVPb1Cir2	Pressure probe from EEV drive	bar/PSI	XXX.Y	INT	9206

Variable Name	Description	Unit	Format	App Type	Modbus Address
iRMbTM171VEVPb3Cir2	Temperature probe from EEV drive	°C/°F	XXX.Y	INT	9207
iRMbTM171VEVTEvapCir2	Evaporation temperature from EEV drive	°C/°F	XXX.Y	INT	9208
iRMbTM171VEVSHCir2	Superheat from EEV drive	K/R	XXX.Y	INT	9209

The EEV driver parameters are copied in the variables that are sent to the EEV driver via Modbus, if they are modified on the controller (e.g.: **uiWMbTm171VEVPardL08**). They are used in the **SR_Param** program and their Modbus addresses are from 9213 to 9347.

Other Variables

Variable Name	Description	App Type	Modbus Address
LED1_EVE1	Expansion module LED 1 (Green) status. It flashes when there is communication between the controller and the expansion module.	USINT	8960
LED2_EVE1	Expansion module LED 2 (Orange) status.	USINT	8961
LED3_EVE1	Expansion module LED 3 (Red) status.	USINT	8962
uiEMActivePowerLow	Active power received from energy meter low word	UINT	8963
uiEMActivePowerHigh	Active power received from energy meter high word	UINT	8964
uiEMActiveEnergyLowWL	Active energy received from energy meter low word 1	UINT	8965
uiEMActiveEnergyHighWL	Active energy received from energy meter high word 1	UINT	8966
uiEMActiveEnergyLowWH	Active energy received from energy meter low word 2	UINT	8967
uiEMActiveEnergyHighWH	Active energy received from energy meter high word 2	UINT	8968
xCmdSystemOn	System start command	BOOL	9266
xCmdSystemOff	System stop command	BOOL	9267

10. Appendix B - Alarm Location Tables

Introduction

NOTE: All alarms described in this document relate to the TVDA SoMachine project and the test equipment used during development.

NOTE: In the PLC project program code the variable name has the "usi" prefix, indicating local alarm variable, and the "x" prefix, indicating the correspondent status variable copy (e.g.: **usiAlarmPump** is copied to **xAlarmPump**).

For further information about the alarm (causes, effects, rearm type, related alarms), see "Alarms" on page 96.

10.1. General Alarms

Alarm List

ID	Alarm Name	Description	Modbus Address
1	xAlarmWaterInLowTemperature	Water low temperature in entry line	12000
2	xAlarmWaterOutLowTemperature	Water low temperature in exit line	12001
3	xAlarmEmergencyStop	Emergency Stop Alarm	12002
10	xAlarmPump	Pump alarm	12037
11	xAlarmFlowSwitch	Flow switch alarm	12028
12	xAlarmPumpConfig	Error in pump configuration	12039
13	xAlarmPIDCompressorsConfig	Error in compressors PID configuration	12042
14	xAlarmCircuit	Error in circuits management	12045
6	xAlarmEnergyMeter	Energy Meter	12048
100	xAlarmHighPressSwitchCir1	High pressure switch alarm in circuit 1	12005
101	xAlarmLowPressSwitchCir1	Low pressure switch alarm in circuit 1	12007
102	xAlarmHighPressCir1	High pressure alarm in circuit 1	12009
103	xAlarmLowPressCir1	Low pressure alarm in circuit 1	12011
104	xAlarmCompressorsConfigCir1	Error in compressors configuration in circuit 1	12040
105	xAlarmCompressorsCir1	Error in compressor management in circuit 1	12043
106	xAlarmEEVDriverCir1	Alarm from EEV driver in circuit 1	12046
111	xAlarmMotorComp1Cir1	Motor alarm in compressor 1 of circuit 1	12013
112	xAlarmMotorComp2Cir1	Motor alarm in compressor 2 of circuit 1	12014
113	xAlarmMotorComp3Cir1	Motor alarm in compressor 3 of circuit 1	12015
114	xAlarmMotorComp4Cir1	Motor alarm in compressor 4 of circuit 1	12016
121	xAlarmOilPressureSwitchComp1Cir1	Oil pressure switch alarm in compressor 1 of circuit 1	12021
122	xAlarmOilPressureSwitchComp2Cir1	Oil pressure switch alarm in compressor 2 of circuit 1	12022
123	xAlarmOilPressureSwitchComp3Cir1	Oil pressure switch alarm in compressor 3 of circuit 1	12023

ID	Alarm Name	Description	Modbus Address
124	xAlarmOilPressureSwitchComp4Cir1	Oil pressure switch alarm in compressor 4 of circuit 1	12024
150	xAlarmFanCir1	Fans management alarm in circuit 1	12029
151	xAlertFanCir1	Fans management alert in circuit 1	12031
160	xAlarmGenericAlarmCir1	Generic Alarm circuit 1	12033
152	xAlarmHeatResistorCir1	Alarm heat resistor circuit 1	12049
200	xAlarmHighPressSwitchCir2	High pressure switch alarm in circuit 2	12006
201	xAlarmLowPressSwitchCir2	Low pressure switch alarm in circuit 2	12008
202	xAlarmHighPressCir2	High pressure alarm in circuit 2	12010
203	xAlarmLowPressCir2	Low pressure alarm in circuit 2	12012
204	xAlarmCompressorsConfigCir2	Error in compressors configuration in circuit 2	12041
205	xAlarmCompressorsCir2	Error in compressor management in circuit 2	12044
206	xAlarmEEVDriverCir2	Alarm from EEV driver in circuit 2	12047
211	xAlarmMotorComp1Cir2	Motor alarm in compressor 1 of circuit 2	12017
212	xAlarmMotorComp2Cir2	Motor alarm in compressor 2 of circuit 2	12018
213	xAlarmMotorComp3Cir2	Motor alarm in compressor 3 of circuit 2	12019
214	xAlarmMotorComp4Cir2	Motor alarm in compressor 4 of circuit 2	12020
221	xAlarmOilPressureSwitchComp1Cir2	Oil pressure switch alarm in compressor 1 of circuit 2	12025
222	xAlarmOilPressureSwitchComp2Cir2	Oil pressure switch alarm in compressor 2 of circuit 2	12026
223	xAlarmOilPressureSwitchComp3Cir2	Oil pressure switch alarm in compressor 3 of circuit 2	12027
224	xAlarmOilPressureSwitchComp4Cir2	Oil pressure switch alarm in compressor 4 of circuit 2	12028
250	xAlarmFanCir2	Fans management alarm in circuit 2	12030
251	xAlertFanCir2	Fans management alert in circuit 2	12032
260	xAlarmGenericAlarmCir2	Generic Alarm circuit 2	
252	xAlarmHeatResistorCir2	Alarm heat resistor circuit 2	12050

10.2. Wiring Errors

Alarm List

ID	Alarm Name	Description	Modbus Address
15	xAlarmWaterInTempSensor	Water temperature in entry line sensor error	12300
16	xAlarmWaterOutTempSensor	Water temperature in exit line sensor error	12301
17	xAlarmOutdoorAirTempSensor	Outdoor air temperature sensor error	12302
107	xAlarmLowPressureSensorCir1	Low pressure sensor error in circuit 1	12305
108	xAlarmHighPressureSensorCir1	High pressure sensor error in circuit 1	12304
109	xAlarmCondenserOutTempSensorCir1	Condenser out temperature sensor error in circuit 1	12307
110	xAlarmEvaporatorOutTempSensorCir1	Evaporator out temperature sensor error in circuit 1	12309
131	xAlarmDischargeTempSensorComp1Cir1	Discharge temperature sensor error in compressor 1 of circuit 1	12311
132	xAlarmDischargeTempSensorComp2Cir1	Discharge temperature sensor error in compressor 2 of circuit 1	12312
133	xAlarmDischargeTempSensorComp3Cir1	Discharge temperature sensor error in compressor 3 of circuit 1	12313
134	xAlarmDischargeTempSensorComp4Cir1	Discharge temperature sensor error in compressor 4 of circuit 1	12314
62	xAlarmEvapCoilTempCir1	Evaporator coil temperature sensor fault circuit 1	12331
207	xAlarmLowPressureSensorCir2	Low pressure sensor error in circuit 2	12305
208	xAlarmHighPressureSensorCir2	High pressure sensor error in circuit 2	12306
209	xAlarmCondenserOutTempSensorCir2	Condenser out temperature sensor error in circuit 2	12308
210	xAlarmEvaporatorOutTempSensorCir2	Evaporator out temperature sensor error in circuit 2	12310
231	xAlarmDischargeTempSensorComp1Cir2	Discharge temperature sensor error in compressor 1 of circuit 2	12315
232	xAlarmDischargeTempSensorComp2Cir2	Discharge temperature sensor error in compressor 2 of circuit 2	12316
233	xAlarmDischargeTempSensorComp3Cir2	Discharge temperature sensor error in compressor 3 of circuit 2	12317
234	xAlarmDischargeTempSensorComp4Cir2	Discharge temperature sensor error in compressor 4 of circuit 2	12318
63	xAlarmEvapCoilTempCir2	Evaporator coil temperature sensor fault circuit 2	12332
50	xExp1Alarm	Expansion 1 communication error	12319
51	xExp2Alarm	Expansion 2 communication error	12320
52	xExp3Alarm	Expansion 3 communication error	12321
53	xExp4Alarm	Expansion 4 communication error	12322
54	xExp5Alarm	Expansion 5 communication error	12323
55	xExp6Alarm	Expansion 6 communication error	12324
56	xExp7Alarm	Expansion 7 communication error	12325
57	xExp8Alarm	Expansion 8 communication error	12326

ID	Alarm Name	Description	Modbus Address
58	xExp9Alarm	Expansion 9 communication error	12327
59	xExp10Alarm	Expansion 10 communication error	12328
60	xExp11Alarm	Expansion 11 communication error	12329
61	xExp12Alarm	Expansion 12 communication error	12330
64	xAlarmRoomTemp	Room temperature sensor fault	12333
65	xHPLimiterActiveCir1	High Pressure is limiting the PID	12334
66	xLPLimiterActiveCir1	Low Pressure is limiting the PID	12335
67	xHPLimiterActiveCir2	High Pressure is limiting the PID	12336
68	xLPLimiterActiveCir2	Low Pressure is limiting the PID	12337

Glossary of Terms and Acronyms

A

AFB
Application Function Block

C

COP
Coefficient Of Performance

E

EEV
Electronic Expansion Valve

F

Fan stage
Group of fans.

FB
Function Block

H

HMI project
Project realized with SoMachine HVAC User Interface. Provided with the TVDA.

P

PLC project
Project realized with SoMachine HVAC Application. Provided with the TVDA.

T

TVDA
Tested Validated Documented Architecture: system composed of components specifically developed for a single application or group of applications. It has been tested, validated and offered with a set of deliverables (PLC project, HMI project, System User Guide, Bill Of Material and wiring diagram)

V

VSD
Variable Speed Drive