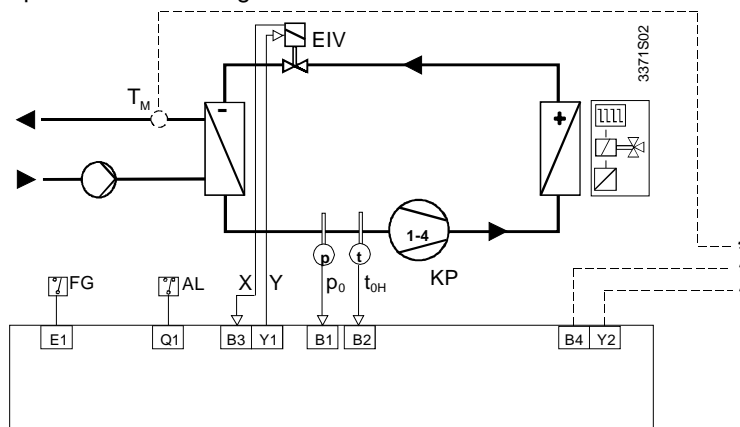


**RWR62.732**

Standalone electronic superheat controller for use with any type of dry expansion evaporator in refrigeration plants. The MOP (Maximum Operating Pressure) function and the monitoring of sensors and of minimum superheat are integrated. The controller can be included in the chiller's safety circuit. Optionally, control of the cooling capacity can be configured. It operates on AC 24 V. All required data are entered on the controller. No tools needed.

The PolyCool™ superheat controller with its associated components ensures optimum operation of the refrigeration unit.



Required only if control of the cooling capacity is configured (refer to page 3 / Selection of application).

The controller ensures optimum filling of the evaporator under all load conditions, resulting in low energy consumption. Various monitoring functions enhance operating safety and extend the plant's life

Field of use The controller has been designed for use with all standard types of dry expansion vaporators such as plate, tube and fin heat exchangers and is therefore especially suited for integration in chillers, air handling units, etc.

Auxiliary functions A number of auxiliary functions enhance efficiency and supervision of the refrigeration plant:

- Enabling operation via a digital input, e.g. by any operational status signal from the compressor
- Selection of different types of refrigerants
- Conversion of pressure to the respective temperature of the selected refrigerant
- Display of all measuring variables and of the valve's manipulated variable
- Optional display of the superheat setpoint change in the case of capacity control (external display)

Controller

Type reference	Inputs		Outputs	
	Analog/binary	Binary	Analog	Binary
RWR62.732	5	2	3	2

Customized controllers Landis & Staefa also supplies customer-specific controllers that differ from the standard products in terms of refrigerant selection and / or outer appearance. Please contact us if you require customized products.

Peripheral devices

The PolyCool™ superheat controller uses two sensors* and one valve made by Landis & Staefa:

Units	Data sheet no.
• Temperature sensor QAZ21.682/101 with a sensing element LG Ni 1000 Ω	1848 (OEM)
• Pressure sensor QBE621-P10U -1...9 bar delivering a DC 0...10 V measuring signal	1905
• Electronic injection valve (EIV) M2FE..L.../MVL661-25/MVL661...-... with a DC 0..10 V input	4712/4713/4714
• Safety transformer (25 VA) to EN 60 742 (not included in the delivery)	

* Optionally, depending on the configuration of capacity control, another temperature sensor or external signal transmitter DC 0...10 V is used (e.g. POLYGYR Joker or UNIGYR)



The controller and the above mentioned peripheral devices have been matched to the application covered by this data sheet. Therefore, valve and sensors may not be replaced by products of other manufacture.

Configurable functions

The controller's functions are preconfigured. By changing the parameters, the functions can be matched to the type of plant (see also chapter operation on page 7 «Parameter list»).

Selection of refrigerant Control of the evaporator is based on true superheat control. For this purpose, pressure **P0** acquired at the evaporator output is converted to the respective temperature of the refrigerant used.

The controller contains the polynomials of the following types of refrigerants:

R 22, R 134a, R 404A, R 407c, R 507, R 290*, R 717**, R 1270*, R 410A, R 23, R 600a.



* R290 und R1270 / valves are not explosion-proof!

** R 717 (NH3) requires the use of valves suited for ammonia!

Selection of units

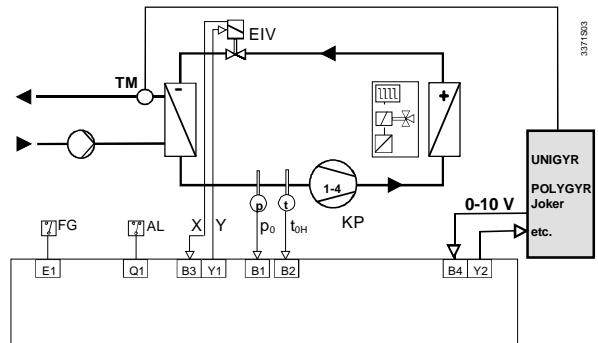
The temperature can be displayed in °C or °F, and the pressure in BAR or PSI.

Selection of application

It is possible to configure three different applications:

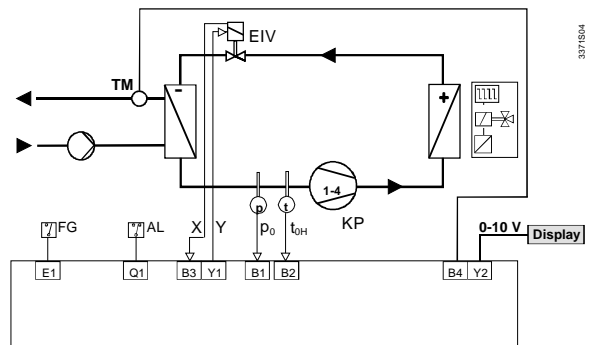
- Default: pure superheat control (refer to diagram on page 1)
- External capacity control

TM = temperature sensor



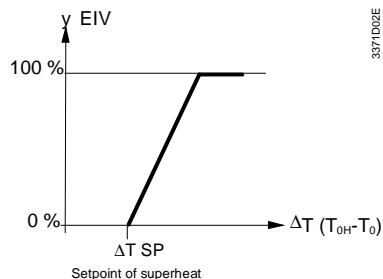
- Internal capacity control

TM = NI1000 or temperature sensor with DC 0-10 V measuring signal
Display = UNIGYR or POLYGYR, etc.



Superheat control

The superheat controller monitors the temperature differential between the suction gas temperature and the calculated evaporation temperature (**TOH-TO**) to maintain the adjusted setpoint **ΔT**. The electronic injection valve is controlled via analog output **Y1**.



External capacity control

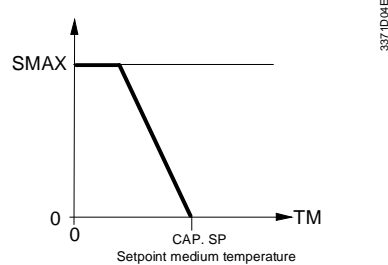
The capacity of the refrigeration unit drops as the superheat increases. Using a DC 0...10 V signal, the setpoint of superheat control can be increased via input B4. The signal is calculated and delivered by an external controller (UNIGYR, POLYGYR, etc.), based on the measured medium temperature TM.

The setpoint of superheat is increased proportionally as a function of the voltage at input B4. The maximum increase (SMA_X) corresponds to DC 10 V and is entered in the parameter mode. The setpoint used for superheat control represents the sum of the setpoint of overheat (ΔT SP) entered in the parameter mode plus the increase.

Internal capacity control

The temperature of the medium is acquired via input B4. Depending on the configuration of input B4, it is possible to choose a passive NI 1000 sensor (default) or an active DC 0...10 V sensor. The measurement range of the active sensor can be set between – 99.9 and 99.9 °C

Internal capacity control controls the medium temperature TM according to the setpoint (CAP. SP) entered in the parameter mode in that it reduces the capacity of the refrigeration unit by increasing the setpoint of superheat control. The maximum increase (SMA_X) is entered in the parameter mode.



Standard functions

Enable

In general, the control and monitoring functions are enabled by an operational status signal received from the plant.

Binary input E1

When feeding an AC 24 V signal (e.g. operational status signal from the compressor) to the binary input **E1**, the control of the evaporator and the safety functions for the compressor will be activated.

Protective functions for the compressor

To ensure the reliability of the refrigeration plant and to prolong the life of the compressor, the following protective functions have been integrated:

Minimum limitation of superheat

To protect the compressor from **shocks caused by liquid refrigerant**, the valve will be closed in modulating mode when the minimum superheat falls below **2 K**.

MOP function [MOP]

Limitation of the maximum evaporation temperature is another protective function provided for the compressor. It operates in PI mode and overrides the normal control function to maintain the maximum evaporation temperature.

Operating safety

When power is supplied to the controller, relay **Q1** will be energized. The following actions protect automatic control operation against faults at the universal inputs (B.).

Input B1

Measurement of pressure

A measured value of ≤ 0 V or ≥ 10 V produces the following effects:

- The LCD displays **ERROR** in place of the actual value of superheat Δt
- If the actual value crosses the range limit, the respective range limit value will flash
- The controller's output Y1 switches to 0 V
- Relay Q1 will be de-energized *

* When returning to the normal operational values, relay Q1 will automatically be energized again.

Input B2

Measurement of temperature

A measured value of ≤ -35 °C or ≥ 90 °C means short-circuit or open-circuit, which produces the following effects:

- The LCD displays **ERROR** in place of the actual value of superheat Δt
- The value of the measured suction gas temperature **TOH** flashes (one of the above extremes)
- The controller's output Y1 switches to 0 V
- Relay Q1 will be de-energized *

Input B4

External capacity control

DC 0...10 V signal from an external controller (UNIGYR, POLYGYR, etc.)

A measured value of ≤ -0.5 V or ≥ 10.5 V produces the following effects:

- The LCD displays **ERROR** in place of the actual value of superheat Δt
- If the actual value crosses the range limit, the respective range limit value will flash
- The controller's output Y1 switches to 0 V
- Relay Q1 will be de-energized *

Internal capacity control with passive sensor

Signal from a passive temperature sensor NI 1000.

A measured value of ≤ -35 °C or ≥ 90 °C means short-circuit or open-circuit, which produces the following effects:

- The LCD displays **ERROR** in place of the actual value of superheat Δt
- If the actual value crosses the range limit, the respective range limit value will flash
- The controller's output Y1 switches to 0 V
- Relay Q1 will be de-energized *

Internal capacity control with active sensor

A measured value of ≤ 0 V or ≥ 10 V produces the following effects:

- The LCD displays **ERROR** in place of the actual value of superheat Δt
- If the actual value crosses the range limit, the respective range limit value will flash
- The controller's output Y1 switches to 0 V
- Relay Q1 will be de-energized *

Alarm relay Q1

Alarm contact **Q1** is controlled by the safety functions. Depending on the circuitry, this changeover contact can be used either for actuating a separate alarm horn or for integration in the compressor's safety circuit.

Forced opening of the valve

In the **simulation mode**, the required valve opening (default value = 0 %) can be entered on the user interface. This is very helpful when filling the plant with refrigerant, for short-time emergency operation, service work, etc.

In this operating mode, the minimum superheat is monitored.

Important

In the simulation mode, the supervisory functions are active only if the operational status signal E1 is present. For safety reasons, the normal control mode is automatically resumed after 15 minutes.

Mechanical design

Casing

The RWR62.732 is a compact controller conforming to DIN 43 880 Gr 1, housed in a closed plastic casing.

Mounting choices

The superheat controller can be mounted in the control panel in one of the following ways:

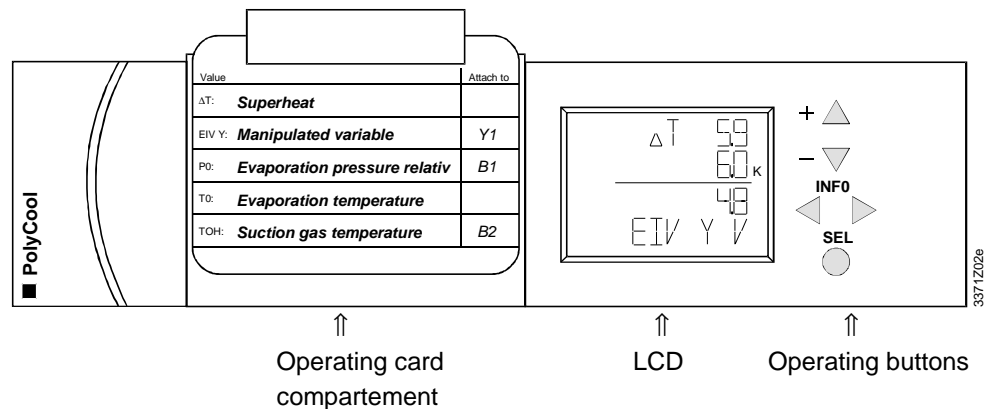
- In a standard control panel conforming to DIN 43 880
- Wall mounting on top hat rails which are already fitted (EN 50 022 - 35 x 7.5)
- Wall mounting with two fixing screws
- Flush panel mounting with the help of the ARG62.10 mounting kit

Connection terminals

Plug-in screw terminals.

Operating and display elements

The RWR62.732 is operated with the operating elements located on the unit front. No aids such as a PC tool, are required.



Operating card compartment

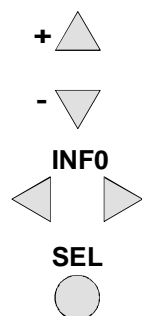
The card compartment contains the application-specific operating instructions (operating cards).

LCD

The LCD displays:

- The current operational data (max. three digits)
- The function code and the symbols

Operating buttons



The operating buttons provide the following functions:

- Operating buttons +/- are used to change flashing data
- Operating buttons INFO are used to select the screen. Button ◀ is used to select the previous screen, button ▶ to select the next screen.
- When the screen changes, button ▶ is also used to confirm a flashing display
- Operating button SEL is used to change settings and, by pressing it again, to confirm the change

A flashing display indicates adjustable data.

Operation

For the configuration and fine tuning of the superheat controller, there are different operating levels and operating modes available.

Selection of operating mode

In normal operation, PolyCool™ is in the **control mode**. By simultaneously pressing the +/- buttons for a certain time, the required operating mode will be activated:

Operating mode	Activation time in seconds
Parameter mode	5
Simulation mode	10
Configuration mode	15

If the controller has already been configured, the **control mode** will automatically be activated when switching on. From any other mode, the controller will automatically return to the control mode 15 minutes after pressing the INFO button on the right.

Exception

If settings in the configuration mode are changed while the controller is in operation (does not apply to units), controller output Y1 will switch to 0 V. In that case, the control will be released again only after all following parameters have been enabled by pressing the INFO button on the right (controller must be brought into the control mode).

Configuration mode
[CONF]

Following the initial power up, the controller automatically enters the configuration mode. In this mode, the type of refrigerant is selected and the unit of temperature (°C or °F) and pressure (BAR or PSI) determined.

Optionally, control of the cooling capacity can be configured.

To reconfigure the controller, refer to "Selection of operating mode" above.

Parameter list

Function	Parameter	Functions-Code	Factory setting	Selectable Range / step
Selection of refrigerant	Refrigerant	REFRIG	-	R22, R134A, R404A, R407C, R507, R290, R717, R1270, R 410A, R 23, R 600a.
Unit	SI or UN units	UNITS	BAR / °C	BAR / °C, BAR / °F, PSI / °F, PSI / °C
Capacity control	Application	CAP.	NONE	NONE / EXT. / INT.
	Type of sensor *	SENSOR	NI1000	NI1000 / 0-10 V
	Measurement range **	RANGE	-35/35 °C	-99.9...99.9 °C / 0.1 °C

* Can only be selected with internal capacity control

** Can only be selected with internal capacity control and an active sensor



If the wrong type of refrigerant is selected, the plant can be damaged!

Parameter mode [PARA]

Adjustment of all setpoints and parameters such as proportional band, integral action time, etc., for the superheat, capacity controller and the MOP function. The setpoint of the MOP function must be adjusted as specified by the supplier of the compressor or as demanded by the application.

Parameter list

Function	Parameter	Functions-Code	Factory setting	Selectable Range / step
Superheat * PID-sequence	Setpoint ΔT (tOH-t0)	ΔT SP	7.0 K	4.0...16.0 K / 0.1 K
	P-band	ΔT XP	10 K	2...200 K / 1 K
	Integral action time	ΔT TN SEC	30 s	0...600 s (10 min) / 1 s
	D-part	ΔT D	0	0...5
MOP	Max.limitation	MOP SP	15.0 °C	-35...35 °C / 0.1 °C
	P-band	MOP XP	5.0 K	2...200 K / 1 K
	Integral action time	MOP TN SEC	30 s	0...600 s (10 min) / 1 s
Capacity control **	Maximum setpoint change with superheat	CAP. SMAX	18 K	0...50 K / 0.1 K
	Setpoint of medium temperature TM ***	CAP. SP	6 °C	-35...90 °C / 0.1 °C
	P-band***	CAP. XP	35 K	2...200 K / 1 K
	Integral action time ***	CAP. TN	95 s	0...600 s (10 min) / 1 s

Note:

* The minimum overheating is fixed at 2.0 K and cannot be changed

** Can be parameterized only if external or internal capacity control has been selected in the configuration mode

*** Can be parameterized only if internal capacity control has been configured



Icing

Capacity control is accomplished by increasing the superheat. For this reason, a reduction in capacity is always associated with a drop in the evaporation temperature. In the case of chillers with no frost protection additives or direct expansion air coolers, there is thus a risk of icing under part load conditions.

Simulation mode [SIMU]

In simulation mode, the valve can be opened for service purposes. The position feedback signal and the values of pressure and temperature can be displayed.

Parameter list

Function	Parameter	Functions-Code	Factory setting	Selectable Range / step
Ventil	manueller Öffnungssgrad	EIV MAN V	0 V	0...10 V / 0.1 V

Important!

In simulation mode, the supervisory functions are active only if the operational status signal E1 is present. For safety reasons, the normal control mode is automatically resumed after 15 minutes.

Control mode

In this mode, all current input and output variables of the superheat and capacity control can be displayed.

Installation notes

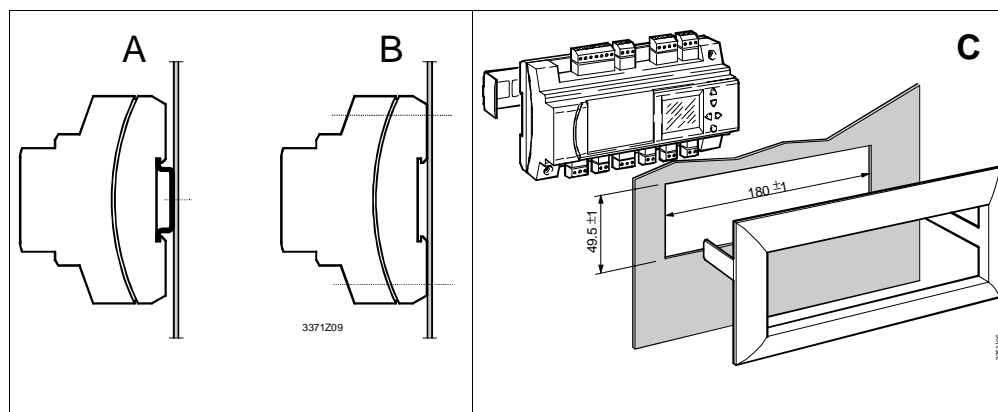
For mounting and electrical installation, the following notes should be observed.

Controller

For mounting on DIN rails, no additional parts are required (A).

For wall mounting, two screws for a hole diameter of 3.7 mm are required (B).

For flush panel mounting (C) with the help of the Landis & Staefa ARG62.10 mounting kit / Mounting Instruction M 3351.1.



Electrical installation

The wiring can be made with standard cables. Shielded cables are recommended only if the controller is exposed to strong electromagnetic fields (EMC).



The operating voltage must satisfy the requirements for safety extra low voltage (SELV) to EN 60 730.

The transformers used must be safety transformers with double insulation conforming to EN 60 742. They must be designed for 100 % duty.

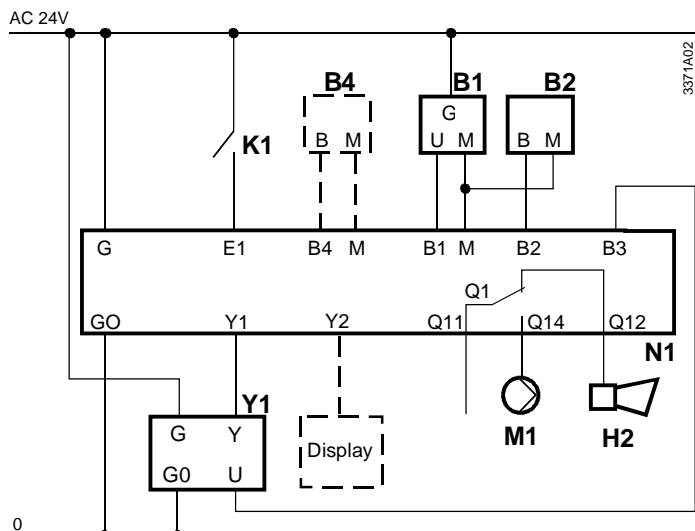
When using several transformers in the system, terminals G0 must be galvanically interconnected. The PolyCool™ RWR62.732 controllers operate on AC 24 V (max. 10 A) extra low voltage and are short-circuit-proof.

If voltages of more than AC 24 V are fed to the low voltage terminals, the controller or other connected devices can be damaged beyond repair. Also, voltages exceeding 42 V represent an electric shock hazard.

Mains voltages up to AC 250 V may only be fed to the potential-free contact Q1.

Connection diagram

Wiring must be made in compliance with the following connection diagram.



Units	Terminals
B1 Pressure sensor QBE621-P10U	B1, M Evaporation pressure
B2 Temp. sensor QAZ21.682/101	B2, M Suction gas temp.
B4 Only if capacity control is configured: - temperature sensor passive - temperature sensor active - signal transmitter DC 0...10 V	B3 Position feedback EIV B4, M Only required with capacity control: depending on the configuration, medium temperature or external signal DC 0...10 V
H2 Horn (alarm)	E1 Release
K1 Enable	G, GO Power supply AC 24 V
M1 Compressor	Q11, Q12 Alarm (horn)
N1 Controller RWR62.732	Q11, Q14 Compressor safety circuit *
Y1 El. expansion valve (EIV) M2FE.../MVL...	Y1 Positioning EIV
Display Optional display (e.g. UNIGYR, POLYGYR, etc.)	Y2 DC 0...10 V signal / proportional to the setpoint increase with superheat

* If there is no pump down before switching off the unit, the evaporator pressure can raise above 9 bar (130.5 psi) relative. In this case, PolyCool™ Superheat™ should not be wired into the safety circuit of the compressor (see chapter 7).

Commissioning notes

Required
documentation

To commission the controller, the following pieces of documentation are required:

- The Installation and User Manual CE1U3371X supplied with the controller
- The plant connection diagram and all other control documentation kept in the control panel or by the plant operator

Refrigeration data

To configure the PolyCool™ RWR62.732 control loops and to set the relevant parameters, the following plant data are required:

- Type of refrigerant used (R 22, R 134a, etc.)
- Design data of evaporator (superheat, max. evaporation temperature, MOP)

Checking the installation
of peripheral devices

Before applying power to the controller (AC 24 V), the installation must be checked to make certain it is wired according to the above connection diagram.

**Configuration and
parameter settings**

To meet the plant-specific requirements, the controller must be configured by authorized staff who must also set the relevant parameters:

- The project-specific data must be transferred to the controller. The Installation and User Manual contains the step-by-step procedure which must be followed
- The operating cards supplied with the controller carry the application-specific data in the various languages. Place the cards with the required language in the controller's card compartment. Enter changed data on the cards

Note

The values and settings entered on the controller are saved in non-volatile memory even in the event of a power failure.

Selection of refrigerant

When starting up the controller for the first time, the configuration mode appears. First, the correct type of refrigerant and the units must be selected. The types of refrigerant that can be selected are: R 22, R 134A, R 404A, R 407C, R 507, R 290, R 717, R 1270, R 410A, R 23 and R 600a



*If the **wrong type of refrigerant** is selected, the **plant can be damaged!***

Selection of units

The temperature can be displayed in °C or °F, and the pressure in BAR or PSI.

Selection of application

Configurable are (also refer to pages 3 and 4):

- Default: pure superheat control
- External capacity control
- Internal capacity control



Icing

Refer to page 7 (parameter mode /parameter list)

Checking the peripheral devices

Before switching the refrigeration plant on, the peripheral devices should be checked:

- Temperature and pressure sensors
The suction gas temperature TOH, the evaporation pressure P0, the evaporation temperature T0 and in accordance with the configuration, the medium temperature TM are displayed in the control mode
- Electronic injection valve
In the simulation mode, the degree of opening (MAN) of the electronic injection valve can be preset. Also, it is possible to check whether the valve's actual position (EIV X) agrees with the manually preset position (EIV Y)

When the wiring of the plant and all peripheral devices are in order, the plant can be switched on.

The factory-set parameters for superheat control (XP,TN and D), the MOP function and the capacity control (XP and TN) are values gained from practical experience. The Installation and User Manual CE1U3371X contains detailed information about how the controller can be fine-tuned to achieve optimum performance.

Fault status signals

Should faults or malfunctions on the controller, valve or sensors occur, the following list shows the possible causes and how the faults can be rectified:



Component	Fault	Possible cause / remedy
Passive temperature sensor NI1000	Measured value flashes Display: 90 °C / 194 °F	Sensor cable with an open-circuit / not connected
	Measured value flashes Display: -35 °C / -31 °F	Sensor cable with a short-circuit
Active temperature sensor and other DC 0...10 V signal transmitters (UNIGYR, POLYGYR etc.)	Measured value flashes: <ul style="list-style-type: none">• Display depending on the configuration *• Display 0 V**	Sensor cable with an open-circuit / not connected Faulty sensor / signal transmitter
	Measured value flashes: <ul style="list-style-type: none">• Display depending on the configuration *• Display 10 V**	Faulty sensor / signal transmitter External noise voltage on the signal line
Pressure sensor	Measured value flashes Display: 9 bar / 131 psi	Sensor cable with an open-circuit / not connected Measured value exceeds 9 bar / 131 psi
	Measured value flashes Display: -1 bar / -14.5 psi	Sensor cable with a short-circuit

Component	Fault	Possible cause / remedy
Electronic injection valve (EIV)	No position feedback signal = 0 V	Connecting cable for feedback signal with an open-circuit / not connected
	Valve does not open	Connecting cable not connected
		In the simulation mode, the valve can be checked by manually entering the degree of opening and by comparing it with the position checkback signal
		Valve faulty
	Position feedback signal does not match the manually entered degree of opening	Cable for feedback signal not connected (for connection terminals, refer to data sheet) Open-circuit or valve faulty
Controller	Icing of evaporator when valve is closed	Valve faulty Electronic calibration of valve not correct. Valve does not fully close; possibility of dirt inside the valve
	No display	Check power supply (AC 24 V)
	Manipulated variable always 0 V (Y1)	Short-circuit / sensor with open-circuit No enabling via E1 Controller faulty
		Controller output Y1 is not 0 V ➤ Controller faulty
		External noise voltage on the signal line to the EIV

* External capacity control

** Internal capacity control

Technical data

 Power supply	Operating voltage	AC 24 V ±20 % (Q1...Q6 AC 24...230 V)
	Safety extra low voltage (SELV) to Frequency	EN 60 730 50 Hz / 60 Hz
Power consumption	RWR62.732	5 VA
Interrogation rate	Cycle time Y1	0.5 s
	Cycle time Y2	1.5 s
Display (LCD)	Actual values and setpoints	3 digits
	Resolution	0.1
	Analog outputs (DC 0...10 V)	2 digits, resolution 0.1 V / 1 %
	Binary switching outputs	off / on
Environmental conditions	Transport	IEC 721-3-2
	Climatic conditions	Class 2K3
	Temperature range	-25...+70 °C
	Humidity	< 95 % r.h.
	Mechanical conditions	Class 2M2
	Operation	IEC 721-3-3
	Climatic conditions	Class 3K5
	Temperature range	-5...50 °C
	Humidity	< 95 % r.h.
Degree of contamination	Normal contamination	EN 60 730
Degree of protection	Casing	IP 20 to EN 60 529
	Front	IP 40 to EN 60 529
Product standards	Automatic electrical controls for household and similar use	EN 60 730
	Energy management equipment	UL 916
Quality assurance	Production and customer service	to ISO 9001
 conformity	According to the directives of the European Union	
Standards	Low voltage directive	73/23/EEC
	Emissions	EN 50 081-1
	Immunity	EN 50 082-1
	Safety	EN 60 730
Connection terminals	Plug-in screw terminals for wires	min.0.5 mm dia.
		2 x 1.5 mm ² or 1 x 2.5 mm ² max.
Weight (excl. Packing)	Controller	0.40 kg
Dimensions	Refer to «Dimensions»	
Universal inputs B1-B4		
B1 Pressure sensor (bar)	Range	DC 0...10 V
B3 Position feedback signal valve(%)analog voltage	Under- and overrange	DC -1.4...11.4 V
	Resolution	1.0 mV
*B4 Medium temperature	Accuracy of RWR62.732	−0.2...+0 V at 0 V / −0.5...+0 V at 10 V
*B4 External signal	Max. current drawn	0.11 mA
	Internal resistance R _i	≥ 100 kΩ
(*B4 According to the configuration)	Max. permissible cable length for dia. ≥0.6 mm	300 m, also refer to specification of connected unit
B2 Temperature sensor (LG Ni 1000 / 0 °C)	Range	-35...130 °C
	Under- and overrange	-50...150 °C
	Resolution	< 0.05 K at 0 °C
	Accuracy of RWR62.732	−1K ...+0 K
	Measuring voltage	max. DC 5.0 V
*B4 Medium temperature		

	Measuring current	2.6....3.4 mA
	Max. permissible cable length for dia. ≥ 0.6 mm	300 m (total line resistance of 4.5Ω corresponds to an error of approx. 1 K)
Binary control input E1, E2	Sensing voltage for control commands	AC 24 V
	Current drawn	≤ 8 mA
	Max. permissible cable length for dia. ≥ 0.6 mm	300 m
Analog output Y1-Y2 Voltage modulated (VM)	Range	DC 0...10 V
	Under- and overrange	DC -1.4...11.4 V
	Resolution	15 mV
	Max. current	± 1 mA
Binary switching out- put Q1	Switching capacity of relay contact Q1	
	Alternating current	AC 24...230 V, 4 A res., 3 A ind.
	Direct current	max. DC 50 V, max. 40 W, max. 5 A
	Min. contact rating	
	At mains voltage	AC 230 V / 5 mA
	At low voltage	DC 24 V / 10 mA
	Max. starting current	10 A (1 s)
	Life of relay contacts	
	AC	at 0.1 A res. $2 \cdot 10^7$ cycles at 0.5 A res. $2 \cdot 10^6$ cycles at 3 A res. $2 \cdot 10^5$ cycles
	Red. factor with inductive loads (cos.phi = 0.8)	0.85
	DC	$2 \cdot 10^5$ cycles
	External fuse on input side	max. 10 A
	Changeover switch	Q1
	Insulating strength	
	Between relay outputs and low voltage (SELV)	AC 3750 V, to EN 60 730 - 1
	Between relay outputs and adjacent relays	AC 3750 V, to EN 60 730 - 1

