EYR 203: Universal controller, moduFlex

EYR203F001

How energy efficiency is improved

For precise control and regulation functions around the clock

Features

- Universal controller for regulation and control
- 18 inputs
- 10 outputs
- Can be given network and communication capability by fitting an auxiliary module for novaNet
- Communication with EY-OP 250 touch-panel possible via auxiliary module
- Programming/parameterisation via PC using CASE Suite software (based on IEC 61131-3)
- Control libraries
- Time and calendar function
- Data recording: historical database (HDB)

Technical data

Power supply		
	Power supply	24 V~, ±20%, 50...60 Hz
	Power consumption	10 VA
Ambient conditions		
	Operating temperature	0...45 °C
	Storage and transport temperature	–25...70 °C
	Admissible ambient humidity	10...85% rh, no condensation
Inputs/Outputs		
	Digital inputs	8 (2 can be used as pulse counters)
	Analogue inputs	5 × Ni1000/Pt1000, 5 × 0...10 V
	Digital outputs	2 × 0-I, 2 × 0-I-II
	Analogue outputs	4 × 0...10 V
Interfaces and communication		
	AS network/novaNet	With auxiliary module on main pcb
	Local operating unit, modu240	1 × RJ-45 socket
	modu250 touch-panel	With point-to-point auxiliary module
	Languages	German, French, English, Italian, Dutch, Spanish, Swedish, Norwegian, Danish, Portuguese, Finnish (for other languages, see accessories)
	MFA	128
	Time commands	320 entries
HDB entries	Digital	1792 (block 1)
	Analogue	1792 (block 2)
Construction		
	Weight	0.8 kg
	Dimensions W x H x D	235 × 147.5 × 64.5 mm
Standards and directives		
	Type of protection	IP 10 (EN 60529)
	Protection class	I (EN 60730-1)
	Environment class	3K3 (IEC 60721)
	Mode of operation	Type 1 CY (EN 60730)
CE conformity as per	EMC directive 2004/108/EC[1)]	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4 Interference Class A
	Low-voltage directive 2006/95/EC	EN 60730-1, EN 60730-2-9
	Software	A (EN 60730)

[1)] *EN 61000-6-2: In order to meet the European standard, the power cable should not exceed 30 metres in length.*

Overview of types

Type	Properties
EYR203F001	Universal controller, moduFlex

Accessories

Operating unit

Type	Description
EY-OP240F001	Local operating unit, modu240
EY-OP250F001	modu250 touch-panel, coloured
EY-OP250F002	modu250 touch-panel, monochrome

Microprogram

Type	Description
0501149002	Microprogram for modu240 languages: German, French, English, Polish, Slovene, Hungarian, Romanian, Russian, Czech, Turkish, Slovakian

Connecting cables

Type	Description
0367842002	moduFlex to modu240: 1.5 m
0367842003	moduFlex to modu240: 2.9 m
0367842004	moduFlex to modu240: 6.0 m
0367862001	moduFlex to modu250: 1.5 m
0367862002	moduFlex to modu250: 2.9 m
0367862003	moduFlex to modu250: 6.0 m

Data memory

Type	Description
0367883001	6× EPROM (empty) (User EPROM)

Auxiliary module

Type	Description
0374413001	Auxiliary module, novaNet
0374448001	Auxiliary module, pt. to pt. for direct connection of modu250, distance max. 6 m

Additional information

Fitting instructions	MV505769
Declaration on materials and the environment	MD 92.507

Description of operation

The automation station is used to regulate, control, monitor and optimise operational installations in HVAC.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.
All related product documents must also be adhered to. Changing or converting the product is not admissible.

Engineering notes

Fitting and power supply

The moduFlex universal controller must be fitted in a cabinet using a top-hat rail (EN 60715) and is supplied with 24 V AC. To connect the power supply and the auxiliary novaNet or point-to-point (modu250) modules, the cover must be removed. Connection may only be performed when the system is disconnected from the electrical supply. The ground terminals are connected internally to the earth connection (PELV electrical circuits). The plant devices and the data line (novaNet) are connected via screw terminals, and the following conditions must be fulfilled:

- Conductor cross-section min. 0.8 mm², max. 2.5 mm² copper wire in accordance with standards and national installation requirements.
- When the power supply is being connected, the protective earth absolutely must be connected with the terminal provided.
- The communication wiring must be carried out correctly, must be separated from the power-carrying wiring, and must adhere to the specifications of standards EN 50174-1, EN 50174-2 and EN 50174-3.

- Special standards such as IEC/EN 61508, IEC/EN 61511, IEC/EN 61131-1, IEC/EN 61131-2 and similar were not taken into account.
- Local standards regarding installation, application, access, access rights, accident prevention, safety, dismantling and disposal must be taken into account. Furthermore, the installation standards EN 50178, 50310, 50110, 50274, 61140 and similar must be observed.

For further information, see the fitting instructions.

Data line

novaNet:	Can only be operated with auxiliary module 2-pin with twisted power cable (shielding recommended) Capacity C ≤ 200 nF Resistance R ≤ 300 Ω

Inputs/outputs

Digital inputs	Potential-free contacts, opto-coupler, transistor (open collector)
Meter	Potential-free contacts, opto-coupler, transistor (open collector)
Digital outputs	Relay contacts, load < 250 V~/ 2 A (resistive load)
Analogue inputs	< 24 V, no external potential
Analogue outputs	0…10 V, no external voltage

Description of the inputs and outputs

Temperature measurement

Number of inputs	5
Type of inputs	Ni1000 (without coding) Pt1000 (software coding)
Measuring range:	
Ni1000	-50...+150 °C
Pt1000	-100...+500 °C

The temperature inputs do not require any calibration and can be used immediately for Ni1000 and Pt1000.

A 2 Ω line resistance is set up and pre-compensated.

The sensors are connected using two wires. With the correct line resistance of 2 Ω (cable cross-section 1.5 mm²), the power cable may be max. 85 m long. The measuring voltage is pulsed to ensure that the sensor is not heated up. While the inputs are basically designed for Ni1000 sensors, Pt1000 sensors can also be used with software coding.

U/pot/(I) measurement

Number of inputs	5
Type of inputs	Voltage measurement, no external potential
Voltage	0...10 V
Current	0...20 mA with external resistance circuitry
Potentiometer	1…10 kΩ
Specifications:	
Voltage measurement	Max. 24 V
Return line for all signals	Ground
Accuracy	0.5% / ±0.05 V
Resolution	U = 5 mV
Processing	5 s (card code 50)

Linear correction with **a** (multiplier) and **b** (zero point correction):

Y = a X + b.

The linearity can be precisely adapted for each input.

Settings for displaying standardised analogue signal (AI 0…1)

Input signal Y	Correction values b	b
0...10 V	1.672	-0.107
2...10 V	2.090	-0.384
0...20 mA	16.987	-1.093
4...20 mA	20.650	-1.562

Voltage measurement (U)

Voltage measurement is possible on all 5 inputs. The voltage to be measured is connected between an input terminal for voltage (see connection diagram) and a ground terminal.

Note
The signal must not be carrying external potential!

The measurements 0(2)...10 V are selected by the software.
The maximum voltage without damage is < 50 V, but the displayed range is limited to 10 V and the internal resistance R**i** of the input is > 20 kΩ.

Current measurement (I)

With external resistance connected in parallel to the voltage input, current measurement is possible on all 5 inputs.

Note
The signal must not be carrying external potential!

Potentiometer measurement

Potentiometers are connected to the U, ground and +5 V terminals.
To avoid overloading the reference output, the potentiometer value should be at least 1 kΩ. Potentiometers can be used on all 5 inputs.
Note: If required, the analogue inputs can also be used as digital inputs. This means that the 13 V power supply (terminal 16) is input as a reference via external contacts and is connected to the analogue inputs.
The software uses the limit values to detect:

- Voltage present = 1
- No voltage present = 0

Thus, the BI soft module can be used to display and evaluate an analogue input digitally.

Pulse counting

Number of inputs	2 (for digital inputs)
Input type	Potential-free contacts, opto-coupler, transistor (open collector)
Input frequency	< 15 Hz
Max. output current of the inputs	0.4 mA to ground
Debounce time	5 ms
Protection against external voltage	< 24 V~/= (never connect voltages under 0.5 V)

Potential-free contacts, opto-couplers or open-collector transistors can be connected to the meter inputs. The maximum pulse frequency may be up to 15 Hz. To ensure that switching contacts are recorded correctly, a de-bounce time of 20 ms is used. The pulse is recorded on the falling edge and may be present for an unspecified length of time.
The internal counter value of the station is queried in every cycle, and the totalling to the actual counter value is performed in the software after 30 seconds at the latest by the processor of the station.
The format enables counter values up to 67,108,864 to be represented with a resolution of 1.

Digital inputs

Number of inputs	8 (2 pulse counters)
Type of inputs	Potential-free contacts with ground connection opto-coupler, transistor (open collector)
State “Contact closed”	1 V max. with respect to ground terminals
Max. output current	0.4 mA to ground
Max. admissible line resistance	1 kΩ with respect to ground terminals

Debounce time	20 ms
Protection against external voltage	24 V~/=

8 digital inputs can be connected directly to the universal controller. Digital inputs are connected between the input and ground terminals. The bit is 0 for an open contact and 1 for a closed contact. The station applies a voltage of 13 V to the terminal, and a current of approximately 0.4 mA flows when the contact is closed. Short-term changes of at least 30 ms between the station queries are stored temporarily and processed during the next cycle.
For every digital input, setting software parameters can be used to select individually whether it is used as an alarm or a status value.
Note: By assigning the corresponding MFAs (50/51), the two digital inputs at terminals nos. 39 and 40 can also be used as pulse counters.

Digital outputs

Number of outputs	2x 0-I 2x 0-I-II
Type of outputs	6x relay 250 V~ / 2(2) A

Note: The relay outputs can each be supplied with a voltage of a maximum of 250 V~ and loaded with 2 A. The plant devices are connected using screw terminals (PELV electrical circuits).

Note
The work may only be carried out when the system is disconnected from the electrical supply.

Analogue outputs

Number of outputs	4
Type of outputs	4x 0...10 V=, (max. 20 mA)

With the universal controller, a total of 4 analogue signals can be output directly. The output voltage is taken from between the corresponding output terminal and a ground terminal.

Note
The outputs are not protected against external voltage!

Clock and battery concept

A Real Time Clock (RTC) is integrated into the universal controller for the time programmes, and the date and time are set in the factory. A lithium battery ensures that, if there is a power failure, the user data (CASE Engine data), parameterised time programmes and historical data (HDB) are retained in the SRAM. The battery enables the data to be retained and the Real Time Clock to be operated without a power supply for at least 3 years from the production date of the controller. When the power returns, the universal controller will check the consistency of the data and start the communication.
It is recommended to store the user data in a user PROM, as this strengthens the security against data loss. The user PROM can be programmed using a commercially available device and then be inserted directly into the station.

User program

The universal controller contains a fast operating program. It reads in all inputs, processes the parameterised modules, updates the outputs and handles the necessary communication with other automation stations and visualisation PCs via novaNet (only with auxiliary module 0374413 001).
The universal controller contains a total of 128 machine fine addresses (MFA) for the parameterisation with CASE Engine. In general, MFAs 0…59 are used for the HW addressing and MFAs 64…127 for the SW addressing. MFAs 60…63 are reserved service addresses and are for internal usage.
All user programs can be read in/out from any novaNet connection when using the auxiliary module. Additionally, the data can be stored in a non-volatile user memory (User PROM). This ensures a very high degree of security with regard to data loss.

Memory structure

The universal controller has RAM totalling 3 Mbits, divided into 3 sections of 1 Mbit each. The RAM, the microprogramme memory and the HDB memory. Each of these areas is divided into 128 machine fine addresses (MFA) of 128 double words (DW) of 32 bits each.
The RAM is used to process the loaded application data via CASE Engine and can be parameterised (reading and writing). During the initialisation of the universal controller, the stored user data is loaded automatically from the User PROM (if this exists).

The microprogramme RAM is reserved for the internal use of the current microprogramme and cannot be overwritten.
The HDB memory (historical data base) is used to save and reproduce digital and analogue values. A historical entry of an MFA is parameterised in CASE Engine and requires a total of 72 bits. It is possible to save a total of 3584 historical entries in a universal controller (ring memory).
This is divided into 2 blocks of 1792 entries each.

Block 1:	1792 pieces of digital information in MFAs 0-127
Block 2:	1792 pieces of analogue information in MFAs 0-127

Time programmes and calendars

The universal controller has a special area within the RAM that can hold a total of 320 time commands. The parameterisation of the schedules is performed via the management software or the manual operating unit.
On the level above the individual time programmes there is a yearly table that can be configured for 2 years (even/odd year number).

Summer- and wintertime

The automatic changeover for summer- and wintertime is a part of the universal controller and can be changed or deactivated using parameterising software or a manual operating unit. The factory setting is for the changeover for summer- and wintertime to be on the last weekend of March and October respectively, from Saturday to Sunday.

Manual operating units

The modu240 (EY-OP240F001) operating panel is available as an accessory for the universal controller. It is connected directly via the RJ-45 socket. The operating panel enables data from the universal controller (with the exception of the HDB) to be processed, e.g. reading measured values, alarms and status, changing setpoints, outputting positioning commands and changing schedules.
The modu250 touch-panel can also be used as an additional accessory. For direct connection, you use the point-to-point module (accessory 0374448 001) with integrated RJ-11 socket, limiting the cable length to max. 6 m.

Starting up the universal controller

When the power supply is being connected, the protective earth absolutely must be connected with the terminal screw provided (protection class I). The work must always be carried out when the system is disconnected from the electrical supply.
The universal controller has an indicator (green LED) for the operating voltage which lights up continuously to indicate the “ON” operating status.

novaNet auxiliary module (optional)

If the universal controller is to be connected to a novaNet network (e.g. for parameterisation), this is only possible when using the auxiliary module. Here every controller must be given a unique address between 0 and 128. The address is binary coded manually on the auxiliary module via the 8 DIP switches.

B09611	A yellow LED on the novaNet auxiliary module flashes to indicate the “Send” telegram traffic. Example of a setting: AS number 15

1 + 2 + 4 + 8 = 15 (Even Parity: OFF)
The parity switch is set so that the number of switches set to “ON”, including the parity switch, is an even number.
In principle, the user data is read in via CASE Engine. The communication is performed via the novaNet SAUTER system bus at terminals a and b, and the novaNet auxiliary module must be used. The programming can be performed in parallel with the ongoing data traffic.
So as not to reduce the communication speed of other novaNet subscribers, the station can be disconnected from the novaNet for the programming period and the parameterising PC connected locally. After the data transfer, the data is active immediately.

Initialisation

The initialisation is performed by short-circuiting the two “Ini” half-moon buttons (under the housing cover) for 1-2 seconds. The effect of this is that the universal controller deletes the entire RAM and

loads all the user data from the User PROM (if this exists) in order to restart the controlling and regulation functions under defined starting conditions.

Overview of MFA/connection terminals

Connection	MFA	KC	Terminals	
Ni/Pt1000			GND	
	00	51	36	37
	01	51	34	35
	02	51	32	33
	03	51	30	31
	04	51	28	29

Analogue inputs			GND	U/pot/(I)
U/pot/(I)	09	50	25	26
U/pot/(I)	09	50	23	24
U/pot/(I)	10	50	21	22
U/pot/(I)	11	50	19	20
U/pot/(I)	12	50	17	18

Reference voltage	U out
+5 V	27
+13 V	16

Analogue outputs			GND	U
0...10 V	20	82	10	11
0...10 V	21	82	10	12
0...10 V	22	82	15	13
0...10 V	23	82	15	14

Pulse counter	MFA	KC	GND	In
(digital input MFA52)	50	C1	38	39
(digital input MFA53)	51	C1	38	40

Digital inputs	fc [2)]	Bit		GND	In
				38	
	52-8	31	10		39
	53-8	31	10		40
	54-8	31	10		41
	55-8	31	10		42
	56-8	31	10		43
	57-8	31	10		44
	58-8	31	10		45
	59-8	31	10		46
				47	

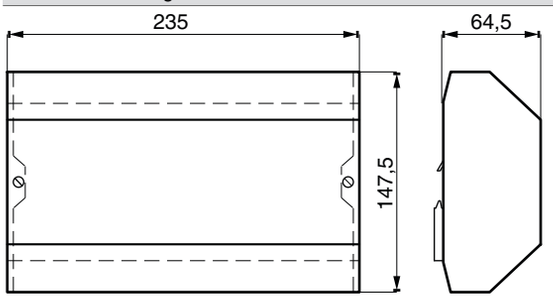
Digital outputs (relay with normally-open contacts)			In	Out
0-I	32	20	1	2
0-I	33	20	1	3
0-I	34	20	4	5
0-II				6
0-I	35	20	7	8
0-II				9

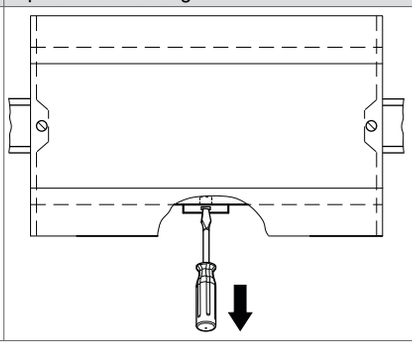
[2)] *Connection flag for CASE Engine binary input (BI)*

Disposal

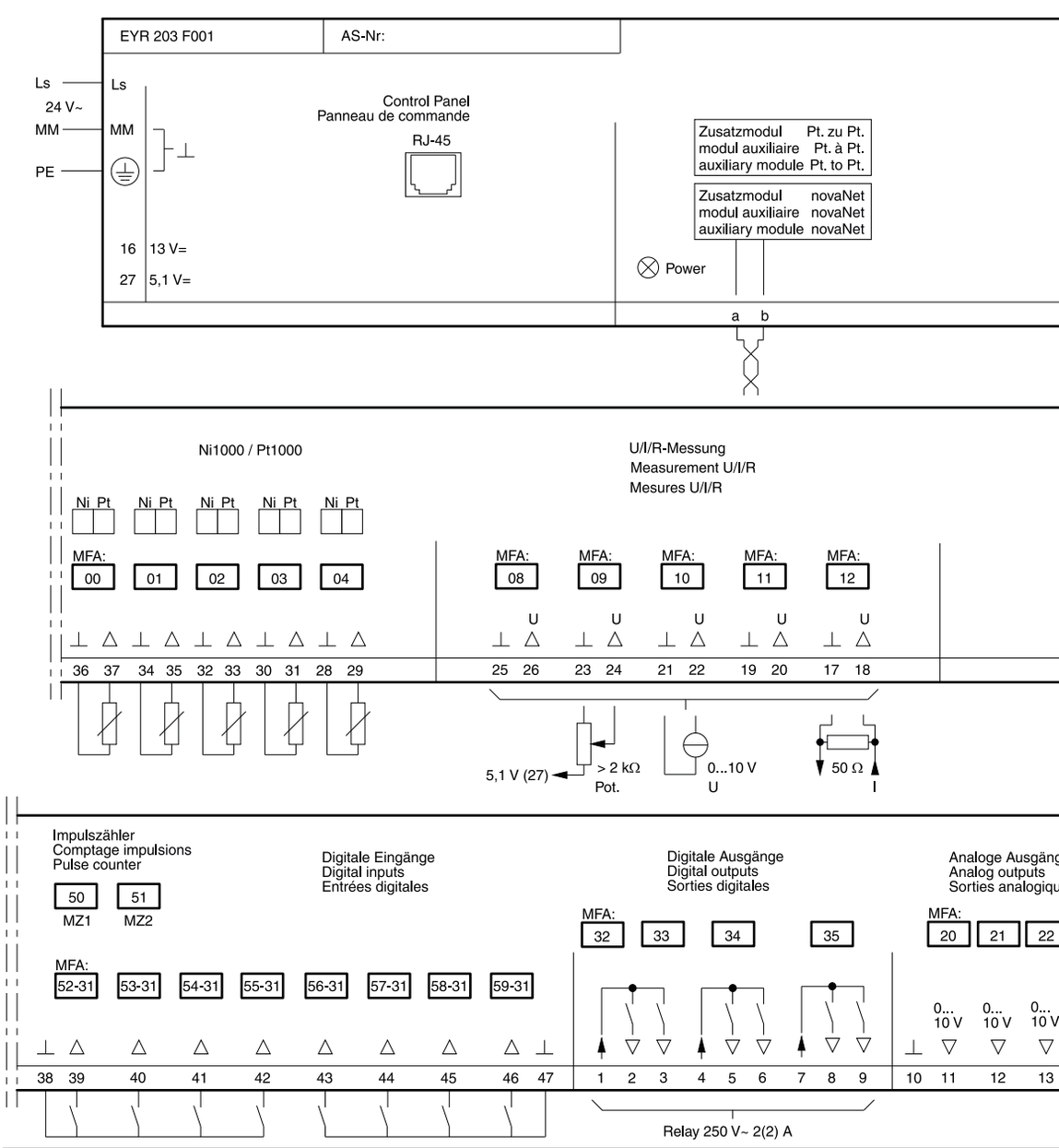
When disposing of the product, observe the currently applicable local laws.
More information on materials can be found in the Declaration on materials and the environment for this product.

Dimension drawing	Top-hat rail mounting





Wiring diagrams



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