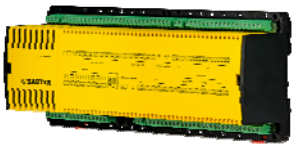
modu225: Станция автоматизации



modu225 – компактная станция автоматизации семейства EY-modulo, используемая для управления и регулирования приложений HVAC. Эта станция автоматизации содержит все комплектующие и интерфейсы, необходимые для работы, для подключения приборов установки и для коммуникации (**novaNet)** с другими станциями и с верхним уровнем управления.
В сочетании с полевыми модулями **moduLink** (дистанционные приборы) имеет всего 76 входов и 26 выходов. Благодаря короткому времени цикла может выполнять даже задачи быстрого управления. Станция автоматизации может быть подключена к сети коммуникации без дополнительных предосторожностей. Любое программирование (параметризация) выполняется на PC, используя программу **CASE Suite** (согласно IEC 61131-3).

Тип	Описание	Напряжение	Вес, кг
EY-AS225F001	Компактная станция автоматизации	24 V	0.8

Технические данные

Напряжение питания	24 V AC (50/60 Hz) ±20% 24 V DC (18…30 V)
Потребляемая мощность	17 VA / 43 VA с полевыми модулями
Потери мощности	8.7 W / 23 W с полевыми модулями
Батарея (питание RTC/SRAM)	Литиевая (CR2032, вставная)

Техническое описание

Цифровые входы	12 (в станции)
Дополнительно:	
3× moduLink174	48 (3 × 16)
Цифровые выходы	8 × 0-I (в станции)
Дополнительно:	
moduLink164	8 × 0-I (2 × 4)
moduLink165	4 × 0-I-II (4 × 2)
Аналоговые входы	8 × Ni/Pt1000 6 × U/Pot/ (I)
Аналоговые выходы	4 × 0…10 V (в станции) 2 × 0…10 V / 0…20 mA (в станции)
Дополнительно: moduLink170	4 × 0…10 V (2 × 0…20 mA)
Счетчики импульсов	2

Разъемы, коммуникация

Сеть CA /novaNet	1 × a/b клеммы, вставные
Сервисная панель EY-OP240F001	1 × RJ-45-разъем

Языки: немецкий, французский, английский, итальянский, голландский, испанский, шведский, норвежский, датский, португальский, финский, польский, словенский, венгерский, румынский, русский, чешский, турецкий, словацкий

MFA (машинные адреса)	256
Временные команды	320 всего команд
Записи в БИД	
цифровые	2×3584 (Блок 1;3)
аналоговые	2×3584 (Блок 2;4)

Допустимые окружающие условия :

Рабочая температура	0…45 °C
Температура хранения и транспортировки	–25…70 °C
Влажность	10…85 %rh Без конденсата
Степень защиты	IP 00 (EN 60529) [1]
Класс защиты	I (EN 60730-1)
Класс окружающей среды	IEC 60721 3K3
Размеры W × H × D	300 × 120 × 73 (mm)
Электросхема	A10535
Размерный чертеж	M11388
Инструкция по монтажу	P100002323
Декларация о материалах	MD 92.810
Заводские установки	Все переключатели в положении «Выкл.»

Совместимость

Правила	Стандарты
73/23/EEC	EN 60730
EMC 89/336/EEC	EN 61000-6-1 / EN 61000-6-2 [2]
	EN 61000-6-3 / EN 61000-6-4

Аксессуары

EY-OP240F001	Местная сервисная панель **modu240**
0367842 002	Кабель подключения, станция автоматизации - **modu240** 1.5 m
0367842 003	Кабель подключения, станция автоматизации – **modu240** 2.9 m
0367842 004	Кабель подключения, станция автоматизации 1– **modu240** 6.0 m
EY-FM164F001	**moduLink164 – полевой модуль, цифровые выходы 4 x 0-I**
EY-FM165F001	**moduLink165 - полевой модуль, цифровые выходы 2 x 0-I-II**
EY-FM170F001	**Полевой модуль: moduLink164 аналоговые выходы 4x 0-10V (2x 0-20mA)**
EY-FM174F001	**Полевой модуль : moduLink164 цифровые входы 16x**
0367883 002	PROM память, 1Mb пустой (данные пользователя), упаковка 5шт.
0900240002	Крышка для клемм (295 mm), упаковка 2шт.

[1)] Степень защиты IP10 с крышкой для клемм (аксессуар 0900240001)

[2)] Если требуется соответствие промышленному стандарту (EN 61000-6-2), длина соединительного кабеля для цифровых входов (DI), аналоговых входов/выходов (AI/AO), счетчиков импульсов (CI) и вольтовых выходов (5 и 13 V) не должна превышать **30 m**.

Engineering notes

Installation and voltage supply

The **modu225** automation station can be fitted in a cabinet (MCC) by means of a top-hat rail (EN 60715) and is supplied with 24V alternating or DC voltage. Connection is permitted only while 'dead' (i.e. no power applied). The earthing terminals are connected internally to the earth connection (PELV power circuits). The plant devices and the data line (novaNet) are connected via screw terminals, and the following conditions must be observed:

- Cross section of wire: min. 0.8 mm², max. 2.5 mm², copper conductor, in compliance with standards and national installation regulations.
- When the power supply is connected, it is mandatory to connect the protective earth to the terminal provided for this purpose.
- Communication cabling must be executed in a technically correct manner, must be separated from cabling which carries power, and must be compliant with 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 have not been considered.

- Local standards regarding installation, application, access, access authorisation, accident prevention, safety, dismantling and disposal must be followed. Compliance with installation standards EN 50178, 50310, 50110, 50274, 61140 and similar is also required.

- See the Fitting Instructions for further information.

Data line

novaNet:	2-pole with twisted cable (screening advisable) capacitance C ≤ 200nF resistance R ≤ 300Ω
Inputs/outputs	
Digital inputs:	potential-free contacts, opto-coupler, transistor (open collector)
Meters/counters:	potential-free contacts, opto-coupler, transistor (open collector)
Digital outputs:	relay contacts, load < 250 VAC / 2A (resistive load)
Analogue inputs:	< 24 V, no extraneous potential
Analogue outputs:	0…10 V (0…20 mA) no extraneous voltage
novaLink:	connection line, 100 m max. (5nF / 7.5 Ω), twisted and screened, on both sides to earth

Description of inputs and outputs

Temperature measurement

Number of inputs	8
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 calibration and can be used directly for Ni1000 and Pt1000.
A line resistance of 2Ω is included in the calculation and is pre-compensated.

The sensors are connected using two-wire technology. With the corresponding line resistance of 2 Ω (cable cross-section: 1.5 mm²) the connection cable may be a maximum of 85 m in length. The measuring voltage is pulsed so that the sensor does not heat up. While the inputs were basically designed for Ni1000 sensors, they can also be used for Pt1000 by means of software coding.

U/Pot/(I) measurement

Number of inputs	6
Type	Voltage measurement; no extraneous potential
Voltage	0...10 V
Current	0...20 mA with external resistance wired
Potentiometer	2…10 kΩ

Specifications:

Voltage measurement	max. 24 V
Return conductor for all signals	chassis/earth

Accuracy:	0.5% / ± 0.05 V
Resolution:	U = 5 mV
Processing:	MFA08 - 10: 5 seconds (card code 50) MFA11 - 13: 1 second (card code 60)

Linear correction with **a** (multiplier) and **b** (zero point correction): (Y = a X + b)
The linearity can be adapted precisely for each input

Settings for display of standardised analogue signal (AI 0...1)

Input signal	Correction values	
Y	a	b
0...10 V	1	0
0...1 V	10	0
0...20 mA	1	0
0...1 mA	20	0
2...10 V	1.25	–0.25
4...20 mA	1.25	–0.25
0.2...1 V	12.5	–0.25

Voltage measurement (U)
Voltage measurement is possible on all U-I-R inputs. The voltage to be measured is connected between one of the input terminals for voltage (see the wiring diagram) and an earth terminal. The signal must not be subject to extraneous potential!
The measurements 0 (0.2)...1 V and 0 (2)...10 V are selected by means of the software. The maximum voltage without destruction is < 24 V, but the display range is limited to 10 V; the internal resistance R_i of the input is > 50 kΩ.

Current measurement (I)
Current measurement is possible on all U-I-R inputs with an external resistor connected in parallel to the voltage input. The signal must not be subject to extraneous potential!

Potentiometer measurement
Potentiometers are connected to terminals U, earth and +5 V.
So as not to overload the reference output, the lowest potentiometer value should not be less than 2 kΩ. Potentiometers can be used on all U-I-R inputs.
Note: The +5 V voltage output (terminal 48) is **not protected against short circuits**! It is therefore essential to check that the potentiometer connection is correct before starting operation.

Pulse counting

Number of inputs	2
Type of inputs	potential-free contacts, opto-coupler, transistor (open collector)
Input frequency	< 15 Hz
Max. output current for inputs	0.5 mA with respect to earth
Debounce time	20 ms
Protection against extraneous voltage	24 V

Potential-free contacts, opto-couplers or transistors with an open collector can be connected to the counter inputs. The maximum pulse frequency may reach 15Hz.
To ensure that switched contacts are registered correctly, provision is made for a debounce time of 20 ms. The pulse is measured on the falling flank and can remain for any length of time.

The internal counter value of the station is interrogated every cycle, and totalling to the actual counter value is performed after no more than 30 sec by the processor of the automation station, with the help of the software. The format allows presentation of numerical values up to 67,108,864 with a resolution of 1.

Digital inputs

Number of inputs	12	on board; no optical display
	3 x 16	moduLink174 with optical display
Type of inputs	potential-free contacts, wired to earth	
	opto-coupler, transistor (open collector)	
Status - "closed contact"	1 V max. with respect to earth terminals, digital input	
Max. output current	0.5 mA to earth	
Max. permitted line resistance	1 kΩ to earth terminals, digital input	
Debounce time	20 ms	
Protection against extraneous voltage	24 V	

12 digital inputs can be connected directly with the **modu225** automation station. With a maximum of 3 field modules (**moduLink174**), extension by a further 48 digital inputs (3x16) is possible.
Digital inputs are connected between the input and earth terminals. When a contact is open, it corresponds to one Bit = 0, and with a closed contact, it corresponds to one Bit=1. The station applies a voltage of approx. 13V to the terminal and in this case, a current of approx. 0.4 mA flows with the contact closed. Brief changes of at least 30 ms are buffered between the station's polling enquiries and are then processed in the next cycle.

For each digital input, software parameterisation allows individual selection of whether the input should be processed as an alarm or status value.

Digital outputs

Number of outputs		8 × 0-I	on board; no optical display
	optional	2 x 4 x 0-I	moduLink164 with optical display
	or	4 x 2 x 0-I-II	moduLink165 with optical display
Type of outputs		relays	
Load for outputs		250 VAC / 2 A	(resistive load)
Note:		On the onboard relay outputs, mixed connections for power circuits, different phases (L1/L2) or different voltage ranges (low/extra-low voltage) are not permitted!	

Eight digital outputs can be controlled directly with the **modu225** automation station. With field modules **(moduLink164/165)**, an additional eight or sixteen digital outputs are possible. The field modules have manual control components which allow the switching stages to be outputted manually and priority value settings to be made.
Real feedback signals can only be implemented via the digital inputs. Optical displays (LED) of unreal feedback signals are only present on the field modules.

Analogue outputs

Number of outputs		6	on board
	optional	4	with moduLink170
Type of outputs		4 × 0...10 V DC, 10 mA max. (source-sink)	
		2 × 0...10 V or 0...20 mA (source)	

A total of 6 analogue signals can be outputted directly with the **modu225** automation station. With a field module (**moduLink170**), extension by an additional 4 analogue signals is possible. The field module has manual control components which allow an analogue signal to be set manually and priority value settings to be made.

The output voltage is measured between the relevant output terminal and an earth terminal. Two outputs can supply 0-20 mA (see the wiring diagram). The outputs are protected against static discharges, but not against the presence of extraneous voltage!

The **moduLink** field modules are connected to the defined terminals on the AS (see the wiring diagram) using 2-core connection cable (conductor twisted and screened).

Timer and battery concept
A real-time clock (RTC) for the time programmes is integrated in the **modu225** automation station. The date and time are preset in the factory.
A plug-in button-cell lithium battery (type CR2032) ensures that the user data (CASE Engine data), parameterised time programmes and historical data (HDB) are retained in the SRAM in the event of a power failure. The battery makes it possible to retain the data and run the real-time clock without power for at least 3 years from the production date of the

automation station. When mains power is restored, the automation station will check the data consistency and launch communication.
It is advisable to store the user data in a User-EPROM for added security against data loss. The User-EPROM can be programmed with a normal commercial device and then inserted directly into the station.

Technical data for the battery:

Type	CR2032 lithium button-cell
Nominal voltage	3 V
Capacitance	210 mAh
Dimensions	20 mm x 3.2 mm

Changing the battery
If it becomes necessary to change the battery during operation, this must **be undertaken only by trained specialist staff**!

User programme
The **modu225** automation station contains a fast operating program. It reads all the inputs, processes the parameterised modules, updates the outputs and effects the necessary communication with other automation stations and visualisation PCs via **novaNet**.
The **modu225** automation station has a total of 256 machine fine addresses (MFAs) for parameterisation with **CASE Engine**. Of these, MFA 0-59 are generally used for HW addressing and MFA 64-255 for SW addressing. MFA 60-63 are reserved service addresses for internal use.

All user programmes can be read in or out by any desired **novaNet** connection. The data are retained in the battery-assisted S-RAM even in case of a power failure. In addition, the data can be stored captively in a user memory (User-PROM). This provides very high protection against data loss.

Memory structure
The automation station has a RAM memory totalling 4 Mbit, divided into 3 sections of 1 Mbit each. These are the working memory, the microprogram memory and the HDB memory. Each of these sections is divided into 256 machine fine addresses of 128 double words (DW) with 32 Bits each.

The working memory is used for processing the loaded application data by **CASE Engine** and it can be parameterised (read and write). On initialisation of the AS, stored user data are loaded automatically from the User-PROM (if available).

The microprogram's working memory is reserved for internal use by the current microprogram and cannot be overwritten.

The HDB memory (historical database) is used to store and reproduce digital and analogue values. A historic MFA entry is parameterised by **CASE Engine** and requires a total of 72 Bits. It is possible to store a total of 14,336 historic entries in an automation station (ring memory).
It is divided into 4 blocks with 3584 entries each.

Block 1: 3584 items of digital information recorded in MFA range 0-127
Block 2: 3584 items of analogue information recorded in MFA range 0-127

Block 3: 3584 items of digital information recorded in MFA range 128-255
Block 4: 3584 items of analogue information recorded in MFA range 128-255

Time programme and calendar
The automation station has a special area within the working memory which can accommodate a total of 320 time commands. Parameterisation of the time profiles is handled via the management software or the manual operating panel.
At the level above the individual time programmes, there is a yearly table which is designed for 2 years (even/uneven year numbers) and which can be configured.

Summertime and wintertime
Automatic switching between summertime and wintertime is an element of the automation station and can be modified or deactivated by means of parameterisation software or via the manual operating panel. The factory setting provides for a change-over between summertime and wintertime on the last weekend of March or October, from Saturday to Sunday.

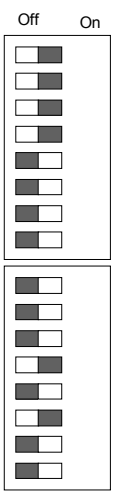
Manual operating panel
Operating Panel **modu240** (EY-OP240F001) is available as an accessory for the **modu225** automation station. It is connected directly via the RJ-45 socket. The Operating Panel allows treatment of data (except HDB data) from the automation station, e.g. reading measured values, alarms and status, changing setpoints, outputting positioning commands and changing time profiles.

Commissioning the automation station
When connecting the power supply, it is essential to connect the protective earth with the clamping screw provided (protection class I). This work must always be undertaken while the equipment is dead (no voltage).

The automation station has a display for the operating voltage (green LED) and a display for communication (yellow LED). When continuously lit, the green LED indicates that the automation station is in "On" mode, and a flashing yellow LED indicates "Send", i.e. telegram traffic to the **novaNet**.

Before a station is integrated into the **novaNet** , it must receive a unique (single) address between 0 and 28671. The address is binary-coded by hand, using the 16 DIP-switches (underneath the housing cover).

Note: in conjunction with a BACnet application (moduNet300, EYK200, 230, 300), the station coding must be in the range from 0 to 4194.



Value	Off	On	
1		×	1
2		×	2
4		×	4
8		×	8
16	×		
32	×		
64	×		
128	×		
256	×		
512	×		
1024	×		
2048		×	2048
4096	×		
8192		×	8192
16384	×		
Even Parity	×		

B04723

Example of a setting: AS number **10255**

1 + 2 + 4 + 8 + 2048 + 8192 = 10255 (Even Parity; Off)

The parity switch is adjusted so that the number of switches set to "On", including parity switches, produces an even number. If the parity is set incorrectly, the yellow "Send" LED goes out. No communication (CASE Engine, management level) with the AS takes place on the novaNet.

The user data are basically read in via CASE Engine. Communication is handled via the Sauter system bus, **novaNet,** at terminals a and b. Programming can be undertaken while data traffic is in progress.
To avoid reducing the communication speed of other **novaNet** participants, the station can be disconnected from **novaNet** for the programming period, and the parameterising PC can be connected locally. The data are active immediately after the data transfer.

Initialisation
Initialisation is performed by short-circuiting the two half-moon 'Ini' switches (under the housing cover) for 1-2 seconds. This causes the station to delete the entire RAM memory and to load all user data from the User-PROM (if available) in order to restart the control and regulation function with defined start conditions.
If no User-EPROM is available, all user data (CASE Engine Plan, time programmes, HDBs) are deleted after an initialisation!

An initialisation makes it possible to reload the automation station directly with CASE Engine data. To do this, the CASE Engine data must previously have been stored on a PROM and they must have been used in the automation station.

Overview of MFAs / connection terminals:

Connection - modu225	MFA		KC	Terminals			
Ni/Pt 1000				**GND**			
	00		51	01	02		
	01		51	03	04		
	02		51	05	06		
	03		51	07	08		
	04		51	09	10		
	05		51	11	12		
	06		51	13	14		
	07		51	15	16		
Analogue inputs				**GND**	**U/Pot/(I)**	**+13 V**	**+5 V [1]**
U/Pot/(I)	08		50	17	18	63	64
U/Pot/(I)	09		50	19	20		
U/Pot/(I)	10		50	21	22		
U/Pot/(I)	11		60	23	24		
U/Pot/(I)	12		60	25	26		
U/Pot/(I)	13		60	27	28		
Analogue outputs				**GND**	**U**	**I**	
0-10V	24		82	65	66		
0-10V	25		82	67	68		
0-10V	26		82	69	70		
0-10V	27		82	71	72		
0-10V or 0-20 mA	28		81	73	74	x	
0-10V or 0-20 mA	29		81	75	76	x	
Digital outputs (relays with normally open contact)				**In**	**NO**		
0-I	40		20	47	48		
0-I	41		20	49	50		
0-I	42		20	51	52		
0-I	43		20	53	54		
0-I	44		20	55	56		
0-I	45		20	57	58		
0-I	46		20	59	60		
0-I	47		20	61	62		
Pulse counters				**GND**			
	50		C1	29	30		
	51		C1	31	32		

Digital inputs	MFA	fc [2]	Bit		GND	
					33	
	58	1	24	10		34
		2	25	10		35
		3	26	10		36
		4	27	10		37
		5	28	10		38
		6	29	10		39
					40	
		7	30	10		41
		8	31	10		42
	59	8	31	10		43
		7	30	10		44
		6	29	10		45
		5	28	10		46

[1] Voltage output is not protected against short circuits!
[2] Connection flag, CASE Engine binary input (BI)

Field modules	MFA	KC	Terminals			
Digital inputs moduLink174			**GND**	Link Out		
	52-1…8	10	87	88		
	53-1…8	10				
	54-1…8	10	89	90		
	55-1…8	10				
	56-1…8	10	91	92		
	57-1…8	10				
Analogue outputs moduLink170			**GND**			
0-10V	20	91	85	86		
0-10V	21	91				
0-10V or 0-20 mA	22	91				
0-10V or 0-20 mA	23	91				
Digital outputs moduLink164 / 165			**GND**	**moduLink164**	**GND**	**moduLink165**
0-I / 0-I-II	32	30	77	78	77	78
0-I	33	30				
0-I / 0-I-II	34	30			79	80
0-I	35	30				
0-I / 0-I-II	36	30	81	82	81	82
0-I	37	30				
0-I / 0-I-II	38	30			83	84
0-I	39	30				

Top-hat rail mounting
Insert picture

Dimension drawing
Insert picture

Wiring diagram
Insert picture