

EASY-1 USER FRIENDLY Step-less Electronic Voltage Controller for single-phase asynchronous motors

TECNICAL CHARACTERISTICS EASY-1

Power Supply	Voltage	230Vac +/- 10 % / 15% single-phase (110Vac 400Vac on request)
	Frequency	50 Hz Standard (60 Hz on request)
	Over Voltage protection	For installation category II (4 KV)
Operating Principle	Single-phase electronic voltage regulators which utilize the phase-cutting principle in order to regulate the output active voltage as a function of the control signal being applied to the inputs.	
Current	Rated	ESY108 08 A up to 50°C environment , over decrease by 0,4 A/C ESY112 12 A up to 50°C environment , over decrease by 0,6 A/C ESY116 16 A up to 50°C environment , over decrease by 0,8 A/C ESY120 20 A up to 50°C environment , over decrease by 1,0 A/C
In-Rusch	ESY108	16A
	ESY112	24A
	ESY116	32A
	ESY120	40A
Overload	150% of the rated current (max. 10° ogni 3')	
Power	Control Circuits	3VA
	Thermally dissipated	1,4 W/A
Operating Characteristic	Master (Regulator) (Input IN1,IN2,IN3)	The output voltage change in order to keep the measured value by the transducer at Set-point otherwise inside the proportional band (Pb)
	Slave (Power Unit) (Input IN4)	The output voltage is controlled by a 0-10V driving input applied in IN4 , according to the device presetting
Input Signals	Config. OM	Master (Regulator) IN 1 4-20 mA on 100 ohm (R) IN 2 4-20 mA on 100 ohm (R) IN 3 NTC 10kohm @ 25°C Slave (Power Unit) IN 4 0-10V on 10 kohm
	Config. 0X	Master (Regulator) IN 1 4-20 mA on 100 ohm (R) IN 2 NTC 10 kohm @ 25°C IN 3 NTC 10 kohm @ 25°C Slave (Power Unit) IN 4 0-10V on 10 kohm
	Config. 0V	Master (Regulator) IN 1 4-20 mA on 100 ohm (R) IN 2 0-5 Vdc IN 3 NTC 10 kohm @ 25°C Slave (Power Unit) IN 4 0-10V on 10 kohm
	Config. 0B	Master (Regulator) IN 1 4-20 mA on 100 ohm (R) IN 2 0-5 Vdc IN 3 NTC 10 kohm @ 25°C Slave (Power Unit) IN 4 0-10 V on 10 kohm
	Functional logical	SP2 : selection Set Point 1 or Set Point 2 (Double Set Point option)
Working Parameters	Set-Point Regulation	Double detent (13 positions)
	Input type	4-20 mA NTC 10K @ 25°C 0-5 Vdc
	Main Set Point (rough)	8 - 18 mA 10 - 60 °C 0,5 - 4,5 V
	Set Point adjustment (fine)	+/- 0,5 mA +/- 2,5 °C +/- 0,40
	Proportional band (default)	2,5 mA 7°C 0,65 V
	Min limit / Cut-Off	This adjusts the output voltage from 0 to 60%
	Maximun output limit	This adjusts the output voltage from 100% to 0%
	Acceleration ramp (fixed)	5°
	Modality operation	Direct (The output increases when driving input increases) or Reverse (The output decreases when driving input decreases)
	Set Point output voltage regulation	Max or Min (Max fan speed or Min fan speed)
	Lower output voltage	Min selected otherwise Cut-Off
	Signal for Power unit (SLAVE)	Analog 0-10V otherwise PWM logic 0-cross modulation
Output Signals	Config. OM	V1 Aux.power supply 22V (+10/-20%) max. 25mA V2 Aux.power supply 22V (+10/-20%) max. 25mA + 10V Aux.power supply 10,0V (+/-1%) OUT Output signal for Power unit : 0-10V o PWM (Max 5 modules)
	Config. 0X	V1 Aux.power supply 22V (+10/-20%) max. 25mA V2 Aux.power supply 22V (+10/-20%) max. 25mA + 10V Aux.power supply 10,0V (+/-1%) OUT Output signal for Power unit : 0-10V o PWM (Max 5 modules)
	Config. 0V	V1 Aux.power supply 22V (+10/-20%) max. 25mA V2 Aux.power supply 5,0V (+/-1%) + 10V Aux.power supply 10,0V (+/-1%) OUT Output signal for Power unit : 0-10V o PWM (Max 5 modules)
	Config. 0B	V1 Aux.power supply 22V (+10/-20%) max. 25mA V2 Aux.power supply 5,0V (+/-1%) + 10V Aux.power supply 10,0V (+/-1%) OUT Output signal for Power unit : 0-10V o PWM (Max 5 modules)
Protections	EMC integrated mains filter	According to EN 55011 (CEI 110-6) Category B : appliances directly connected to low voltage power mains.
	SURGE arrester protection	According to EN 61000-4-5 :Overvoltage category II (4 KV)
Casement	Materials	GW-Plast 120°C (max. 120°C) and aluminium
	Protection Degree	IP 55 (on request IP 00)
	Heatsink temperature	60°C
	Environmental pollution	Low pollution
	Fire Resistance	Category D
	ESY108	195 x 162 x 97 1,4 Kg
	ESY112	195 x 162 x 97 1,5 Kg
	ESY116	240 x 152 x 115 1,7 Kg
	ESY120	240 x 152 x 115 1,8Kg
Insulation	Electric stress of the insulating parts	Long Time Class I (use of the protection cable connected to the ground)
		2000 Vac between protection grounding and energized parts of the device
	Control circuit	2500Vac between the driving input and energised parts of the device
		4000V between the driving input and the parts having the supply voltage
Enviromental conditions	Working temperature	-20 T 50 (-20°C from + 50°C)
	Storing temperature	-30 T 85 (-30°C from + 85°C)
	Vibrations	Lower of 1G (9.8 m/s²)
	Ageing characteristics	60.000 ore
Installation	Wall mounted-only in vertical position with N° 4 holes Ø 5 mm,free space above and below the regulator about 100 mm	
Electrical Connections	Signal cables	Trailing cable with rated cross section min. 1,5 mmq
	Power cables	ESY108 Trailing cable with rated cross section min. 1,5 mmq ESY112 Trailing cable with rated cross section min. 2,5 mmq ESY116 Trailing cable with rated cross section min. 4,0 mmq ESY120 Trailing cable with rated cross section min. 4,0 mmq

The device is suitable for the installation in units of class I, II & III

COMMUNITARIANS DIRECTIVES & TECHNICAL NORMS

Like all our products, the ESY100 series bears CE marking as required by directive 89/336/ECC and its subsequent modification EEC/92/31 on electromagnetic compatibility.
The essential requirements of the directive are satisfied by conformity to "generic standards" for heavy industry:
CEI-EN 60204-1 : "Safety of machinery"
EN 50081-1 emission standard civil environment
EN 50082-2 immunity standard industrial environment
EN 55011 class B, for radiated disturbances
EN 50140 (IEC 801-3) for susceptibility (on the power supply)
ENV 50141 for conducted susceptibility on power lines
IEC 801-4 for fast transistors (bursts / high frequency disturbances)
IEC 801-2 for electrostatic discharge (ESD)

POWER SUPPLY CONNECTION TERMINAL BOARD M1



WARNING !

HIGH LEAKAGE CURRENT: first connect to earth !

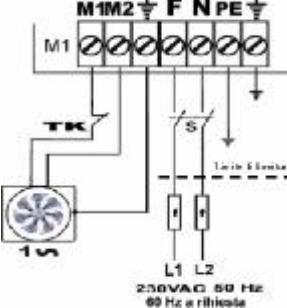
DO NOT touch the electrical parts of the circuit when the power supply is connected under any circumstances.

Before supplying power to the unit, check carefully that the power and earth are correctly connected.

The regulator must be suitably and effectively earthed by the installer according to the standards in force; earthing is essential for the EMC filter to operate correctly.

The user must be protected from the electric supply and the motor must be protected from possible overloads in compliance with the standards in force.

The regulator must be connected as shown in figure , being careful:



Prearrange a switch and two fuses upstream of the regulator so as to interrupt of the power supply for inspection;

Control the power connections and check the efficiency of earthing, before energizing the regulator;

Utilize, for the power connections and the earth cable, a cable with a right section;

Regulator fixing to the electrical panel: it's important the vertical fixing and that the internal temperature does not exceed 50°C and the air circulation is adequate.

Servicing:

After verifying the wiring, supply the card and connect a PWM input signal.

The output voltage ranges from 0 to 230 Vac according to the change in the driving signal.

*Switch and Fuses characteristics are defined by the Rated Current of the regulator and by the Load used.

M1	Fans electrical connections	Single phase motor 230 Vac 50 Hz
M2	Power supply phase 1 (L1)	Single phase power supply 230 Vac 50 Hz (on request 60 Hz)
N	Power supply phase 2 (L2)	
PE	Safety ground	
	Auxiliary ground	Ground connection (PE obligatory)
S	Switch	External device
f	Protection Fuses	Outside device protection
TK	Fan motor thermal protection	

INPUT/OUTPUT CONNECTIONS TERMINAL STRIP M2 :

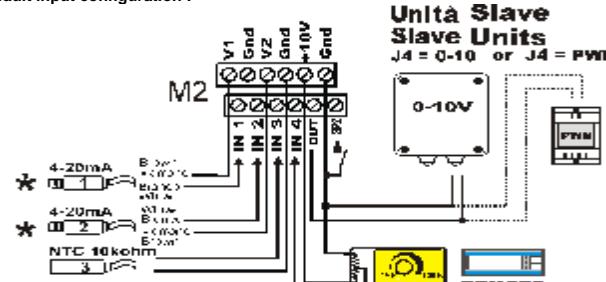
For the control connections in undisturbed environments, to utilise a common bipolar cable, whereas, in electromagnetically disturbed environments, to utilise a cable shielded with the braiding connected to the earth, keeping it as much far as possible from any other power cable.

The working modality can be:

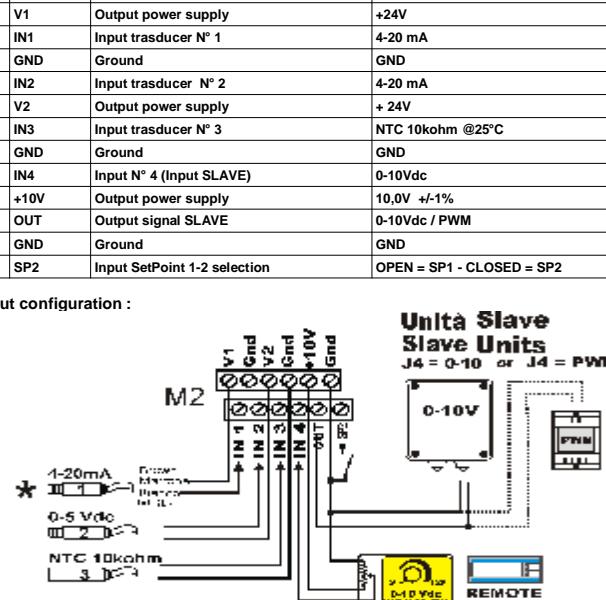
- MASTER with Set-Point (inputs 4-20mA, 0-5Vdc or NTC probe)
- SLAVE (input 0-10Vdc)

The selection of the input signal and the working modality is automatic : The device function with the sensor/input signal at the moment operative and the customer will not have to operate on the device selection or programming (Jumper only to modify the default working modality).

OM Default input configuration :

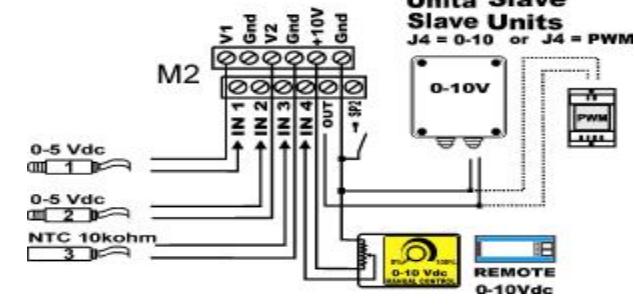


OB input configuration :



N°	Name	Function	CONF. OB
1	V1	Output power supply	+24V
2	IN1	Input trasducer N° 1	4-20 mA
3	GND	Ground	GND
4	IN2	Input trasducer N° 2	4-20 mA
5	V2	Output power supply	+ 24V
6	IN3	Input trasducer N° 3	NTC 10kohm @25°C
7	GND	Ground	GND
8	IN4	Input N° 4 (input SLAVE)	0-10Vdc
9	+10V	Output power supply	10,0V +/-1%
10	OUT	Output signal SLAVE	0-10Vdc / PWM
11	GND	Ground	GND
12	SP2	Input SetPoint 1-2 selection	OPEN = SP1 -CLOSED = SP2

OV input configuration :

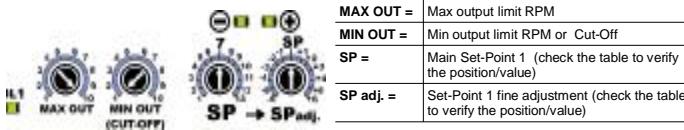


N°	Name	Function	CONF. OV
1	V1	Output power supply	+ 5,0V +/-1%
2	IN1	Input trasducer N° 1	0-5 Vdc
3	GND	Ground	GND
4	IN2	Input trasducer N° 2	0-5 Vdc
5	V2	Output power supply	+ 5,0V +/-1%
6	IN3	Input trasducer N° 3	NTC 10kohm @25°C
7	GND	Ground	GND
8	IN4	Input N° 4 (input SLAVE)	0-10Vdc
9	+10V	Output power supply	+10,0V +/-1%
10	OUT	Output signal SLAVE	0-10Vdc / PWM
11	GND	Ground	GND
12	SP2	Input SetPoint 1-2 selection	OPEN = SP1 -CLOSED = SP2

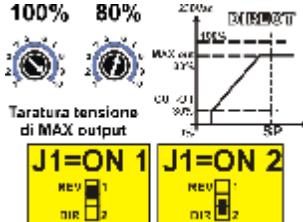
N°	Name	Function	CONF. 0X
1	V1	Output power supply	+ 24

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WORKING PARAMETERS SETTING :

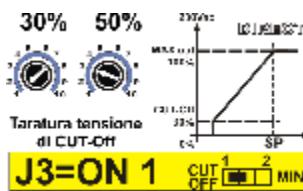


MAX OUT It limits the Max Vac output (from 100% to 0%). It limits the Max capacity or the noisiness of the fans to Max RPM.
MAX Out is set up in factory to the max value '10', that it corresponds to 100% of the command value.



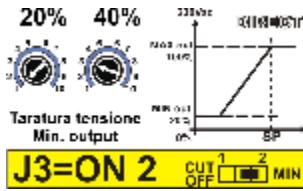
Regulation :
1) Select J1 Jumper in ON1(REV) position ;
2) Turn MAX-Out deten starting from position '10', until the limit voltage value Vac MAX wished;
3) Bring back J1 Jumper in ON2 position: in automatic regulation the output voltage Vac MAX to the fans will be the MAX-Out set up value.

CUT-OFF It regulates the Min Vac to the fan in automati modality: the fan never will not be fed with an inferior value to the prefixed that would not be sufficient to supply the couple necessary to maintain it in rotation.



'CUT-OFF' voltage regulation :
1) Select J3 Jumper in ON2 position;
2) Turn CUT-Off deten starting from position '1', until the Min Rotation Vac wished ;
3) Bring back J1 Jumper in ON1 position: the fans will be fed starting from the CUT-Off value.

MIN OUT It allows to manually regulate the Min Vac output from 0% to 70% and to verify the correct PARZIAZZIONE of the device d the fans rotation.
It is used to set up CUT-Off value.



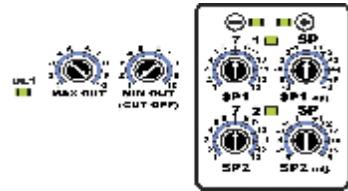
'MIN out' voltage regulation :
1) Select J3 Jumper in ON2 position;
2) Turn MIN-Out deten starting from position '1', until the Min rotation Vac wished, the fans will be fed starting from the Vac Min set up value.

WORKING PARAMETERS SETTING

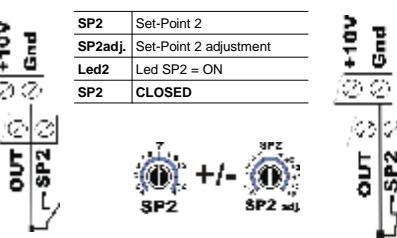
with Double Set-Point selection optional board:

Double Set-point Selection Optional Board (SP1 & SP2 Set-point) (FACTORY PRESETTING)
The device is predisposed in order to contain the optional board for Double Set-Point selection, it allows a regulation with two points of job: SP1 & SP2. This is a factory predisposition and must be demanded at the moment of the order. For the selection of CUT-OFF/MIN Out and the MAX Out follow the written indications over.

Use SP2 input + GND (Terminal board M2) for Set-Point selection.

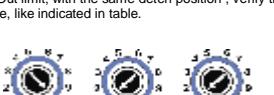


SP1	Set-Point 1
SP1adj.	Set-Point 1 adjustment
Led1	Led SP1 = ON
SP2	OPEN



Pos.	MAX out	CUT-off	MIN out
1	0	60	40
2	70	85	65
3	100	110	90
4	130	135	115
5	160	150	135
6	185	160	150
7	205	170	160
8	215	180	170
9	225	190	180
10	230	190	185

Working parameters setting – Indicative values table
(*) Move J3 jumper from ON1 to ON2 position in order to select CUT-Off or Min Out limit; with the same deten position , verify the difference of Vac value, like indicated in table.



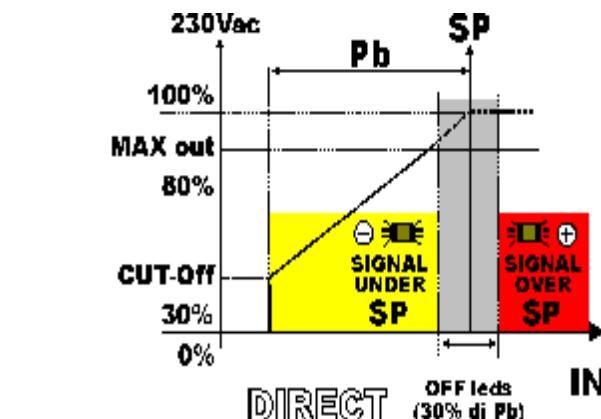
JUMPERS FUNCTION :

Position	Default	Function	Mode
J1	REV	Regulation mode	Reverse
	DIR		Direct
J2	MAX	SP MAX	Speed at set-Point
	MIN		MIN fans speed
J3	Cut-Off	Cut-Off	Start Regulation Mode
	MIN		MIN speed
J4	PWM 0-10 Vdc	0-10	Output for Extra Slave Power
		0-10 Vdc	analog signal

ATTENTION : with J2 in MAX position (SP to MAX) at set-point the output voltage is the max value

LED OF VISUALIZATION :

DL1	Green Led	Power supply ON
	Green Led	Reg.Under SP
	Green Led	Reg.Over SP
1	Green Led	Selection Set-point 1 ON
2	Green Led	Selection Set-point 2 ON



WORKING PARAMETERS TABLES :

Set-Point value is the sum of SP and SPadj.



Set-Point parameters scale 4-20 mA (Scale Transducer 4-20 mA)

- SP adj.							4-20mA					+ SP adj.						
-6	-5	-4	-3	-2	-1	SP	+1	+2	+3	+4	+5	+6						
7,00	7,05	7,15	7,25	7,35	7,45	1	7,56	7,66	7,76	7,86	7,96	8,06	8,11					
7,51	7,56	7,66	7,76	7,86	7,96	2	8,06	8,16	8,26	8,36	8,46	8,56	8,61					
8,51	8,56	8,66	8,76	8,86	8,96	3	9,06	9,16	9,26	9,36	9,46	9,56	9,61					
9,51	9,56	9,66	9,76	9,86	9,96	4	10,06	10,16	10,26	10,36	10,46	10,56	10,61					
10,51	10,56	10,67	10,77	10,87	10,97	5	11,07	11,17	11,27	11,37	11,47	11,57	11,62					
11,52	11,57	11,67	11,77	11,87	11,97	6	12,07	12,17	12,27	12,37	12,47	12,57	12,62					
12,52	12,57	12,67	12,77	12,87	12,97	7	13,07	13,17	13,27	13,37	13,47	13,57	13,62					
13,52	13,57	13,67	13,78	13,88	13,98	8	14,08	14,18	14,28	14,38	14,48	14,58	14,63					
14,53	14,58	14,68	14,78	14,88	14,98	9	15,08	15,18	15,28	15,38	15,48	15,58	15,63					
15,53	15,58	15,68	15,78	15,88	15,98	10	16,08	16,18	16,28	16,38	16,48	16,58	16,63					
16,53	16,58	16,68	16,78	16,88	16,98	11	17,08	17,19	17,29	17,39	17,49	17,59	17,64					
17,54	17,59	17,69	17,79	17,89	17,99	12	18,09	18,19	18,29	18,39	18,49	18,59	18,64					
18,04	18,09	18,19	18,29	18,39	18,49	13	18,59	18,69	18,79	18,89	18,99	19,09	19,14					

Set-Point parameters scale 0-15 bar (Scale Transducer 4-20 mA)

- SP adj.							0-15 bar					+ SP adj.						
-6	-5	-4	-3	-2	-1	SP	+1	+2	+3	+4	+5	+6						
2,82	2,86	2,96	3,05	3,14	3,24	1	3,33	3,43	3,52	3,62	3,71	3,80	3,85					
3,2																		