



Ecro RV

Technical manual

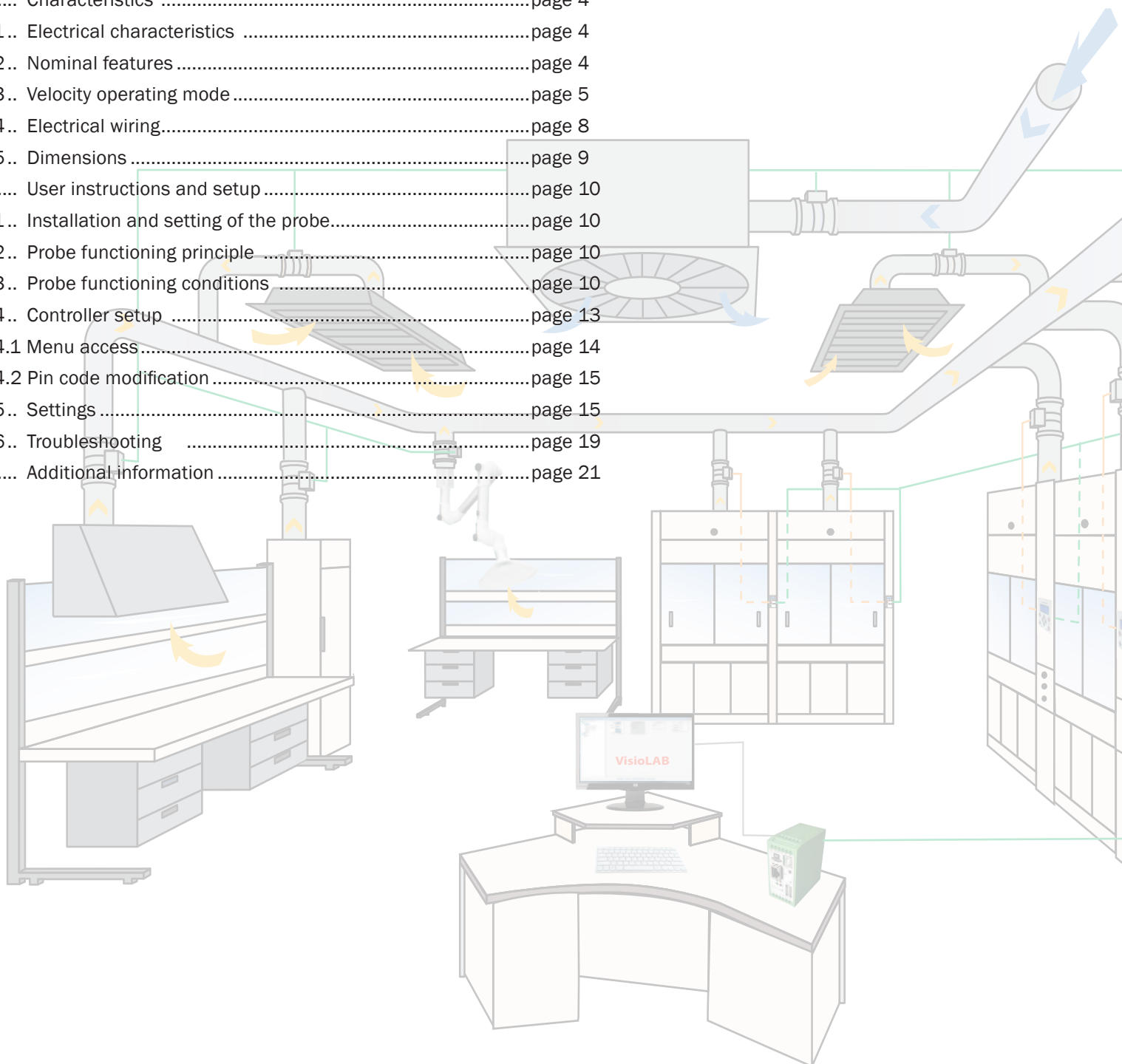


Digital device for the control and monitoring of fume hoods in laboratories.

- Air control compliant with the EN14175 standard.
- Compact and low cost device.
- High-speed hot wire probe.
- Closed loop control.
- Air speed digital display in m/s.
- Sash window automation available.
- Suitable for every laboratory applications.



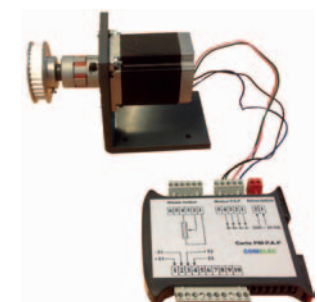
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Gamme ECRO	ECRO RS			ECRO RV			ECRO RD		
	ORIGINE	PROGRESSIVE	EXCLUSIVE	ORIGINE	PROGRESSIVE	EXCLUSIVE	ORIGINE	PROGRESSIVE	EXCLUSIVE
Supply 230 V	●	●	●	●	●	●	●	●	●
Display	12 DELs	12 DELs	12 DELs	LCD 2 lines	LCD 2 lines	LCD 2 lines	LCD 2 lines	LCD 2 lines	LCD 2 lines
Double run command relay	●	●	●	●	●	●	●	●	●
Light relay	●	●	●	●	●	●	●	●	●
Alarm relay	●	●	●	●	●	●	●	●	●
Permanent 0-10V		●	●	●	●	●	●	●	●
PID 0-10V signal		●	●	●	●	●	●	●	●
High sash contact control	●	●	●	●	●	●	●	●	●
Low sash contact control					●	●	●	●	●
Hot wire			●	●	●	●			
Measuring cross				●	●	●	●	●	●
Up/down sash contact					●	●		●	●
Presence sensor control					●	●		●	●
Supplementary contact control*	●	●	●		●	●		●	●
Position sensor control **								●	●
Communication version	●	●	●				●		●
Potentiometer package Cable Belt								●	●
Motorization package for belt					●	●		●	●

● in Included ● Optional *See the operating instructions manual
 **Potentiometer compulsory, must be chosen according to the fumehood (cable or belt)

Potentiometer package	Motorization package
Fumehood with cable 	fumehood with belt 
	

2. GENERAL TECHNICAL INFORMATION

- Supply 230 VAC- 50Hz included
- Data backup in EEPROM in case of power outage
- Visual and audible alarm for a functioning > 40 cm (EN14175).
- PID control algorithm integrated
- Response time programmable by HMI.
- Terminals separated for an easy and quick connection
- Bus output for the networking with other products.
- Visual and audible alarm when the thresholds are exceeded.
- Alarm contact available
- Access code to parameters reconfigurable by the user

3. CHARACTERISTICS

Supply 230VAC – 50 HZ
 Consumption 10 VA
 Safety class II (optional ground connection)
 Protection.....exchangeable fuse
 Fuse intensity 500Ma

3.1. Electrical Characteristics

INPUTS

Digital inputs 4x 0-5V/25mA TOR

OUTPUTS

Inverter control0-2...10V / 0...10V (PID)
 Voltage source..... 10V / 500mA permanent
 Inverter run command contact..... 5A / 230 VAC
 Alarm contact1A/24VDC – 0.5A/230 VAC
 Fume hood light contact..... 4A /250VAC
 Sash lowering and raising contact..... 4A /250VAC

COMMUNICATION

Bus CAN 250kbits/s
 Protocol..... COMnet
 Access process..... Station / Multi-Master
 Number of units 256.
 Maximum length 300m.
 Kind of support twisted pair.

SERVOMOTEUR

Operating time..... 8s.
 Shaft size Ø10 à 20mm / □10 à 16mm.
 Noise level during operation.....45dB.
 Absorbed power.....6 W

3.2. Nominal features

Velocity setpoint0.1 à 0.99 m/s
 Alarm response time.....5 à 30s. Temps
 Hot wire response time..... < 100ms
 Sash lowering1 à 250s
 Operating temperature de 15 à 35 °C.

3.3. Velocity operating mode

The velocity operating mode regulates the front air velocity ($v=0.1 \dots 0.5\text{m/s}$) so as to maintain it constant despite the sash position.

The exhausted air is either regulated by a servomotor (in centralised exhaust systems) or by a fan mounted on a roof and controlled by a frequency inverter.

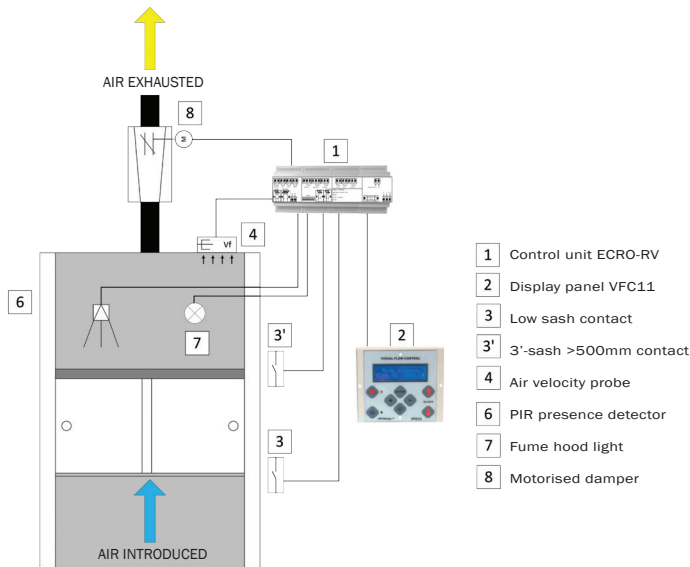


Figure 1 : Velocity operating mode

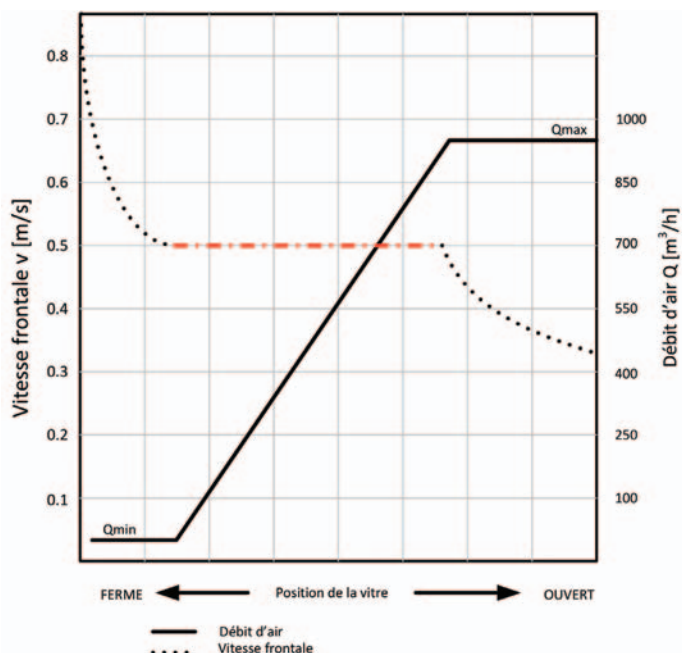


Figure 2 : Velocity regulation diagram

Air velocity probe :

Nowadays, 3 different kinds of sensors able to measure velocity can be found on the market.

- Hot wire
- hot body
- propellers

- The hot-wire solution is obviously the most professional way to measure accurately and quickly low speeds from 0 to 1 m/s

- The hot-body solution is economic and resistant. Its disadvantages are its accuracy and its reaction time.

- The systems with propellers are used to measure velocities above 1 m/s.

With the velocity probe developed by Comelec, the least change in the sash position begets a fluctuation of air which is translated by the probe into an electrical signal 0.5Vdc.



The technology chosen is the hot-wire type. This gives a very fast response time to the probe in the measuring scale 0...1m/s ($Tr100\text{ms}$).

This velocity range is particularly adapted to measure the front velocity of fume hoods and laboratory hoods.

The hot-wire anemometry consists in a measurement at a fixed point. This technology is little intrusive. Its strength lays in its excellent spatial and temporal resolution. Thus, it makes it the best technology to study turbulent fluctuations.

The usual hot-wire anemometers are made of a thin wire of a few millimetres long and a diameter from 1 to 10 μm .

Most of the time, the measurements are made in the air (for velocities from 0.1 m/s to several dozens of m/s)

The installation of the probe onto the top of the fume hood permits to measure the air velocity.

If the place has been wisely chosen, the air flow measure corresponds exactly to the air front entering the fume hood.

Motorized damper :



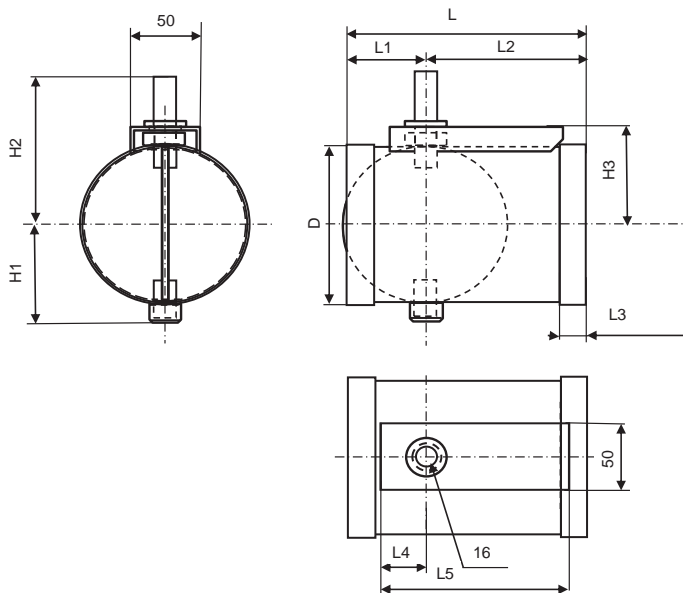
The quantity of air exhausted is controlled by the servomotor. The fast servomotor (8s for 90°) is mounted directly on the damper axis show a 8Nm couple (see picture opposite).

The servomotor is controlled directly by the Ecro, this guarantees a stability and accuracy. For the fumehoods, we use dampers with diameters of 200 mm or 250 mm.

Below, the mechanical properties of the plastic part (PVC).

The plastic part :

M1 PVC Damper to motorize



D	L	L1	L2	L3	L4	L5	H1	H2	H3
125	200	65	135	30	25	155	93,5	140	90
160	220	80	140	30	25	155	111	160	110
200	250	110	140	40	35	180	131	180	130
250	280	110	170	40	35	180	151	203	153
315	350	150	200	40	35	180	188	238	188

The motor part.

The servomotor has been chosen from the proportional range of the brand Joventa, its reference is SM1.2.



Applications: this range of electrical servomotors has been designed for air dampers in HVAC applications (Heating, Ventilation and Air-Conditioning). Joventa's universal adapter is particularly convenient. It allows a rotation angle limitation with a position indicator.

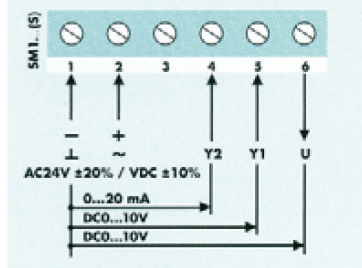
Specifications : command ...10V cc or 0...20 mA – Running time independent from the load – Possibility of having 5 servomotors functioning in parallel- Plug-in screw terminal blocks – Universal adapter for a cylindrical axis 10 to 20 mm ø, for a square axis 10 to 16 mm on the side.

The axis must be 48 mm long minimum – turning direction selectable – rotation angle limitable – manual control possible by disengaging the push-button – 2 auxiliary adjustable potential-free contacts optional (.S) – End auto-stop (overload protection) – Energy consumption reduced at the limit.

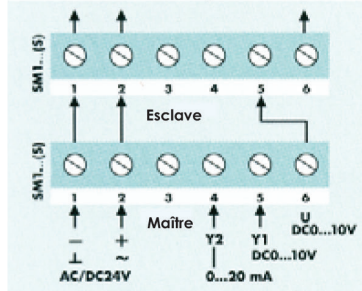
Characteristics :

SM1.10	Servomoteur 24 V ca/cc	
SM1.10S	Servomoteur 24 V ca/cc	avec 2 contacts auxiliairesSM
SM1.12	Servomoteur 24 V ca/cc	
SM1.12S	Servomoteur 24 V ca/cc	avec 2 contacts auxiliaires
SERVOMOTEURS	SM1.10(S)	SM1.12(S)
COUPLE DE ROTATION	16 Nm	8 Nm
SURFACE DE VOILET *	3,0 m ²	1,5 m ²
TEMPS DE MARCHÉ MOTEUR	16 sec chrono	8 sec chrono
TENSION D'ALIMENTATION	24 V ca/cc	
FRÉQUENCE	50-60 Hz	
CONSOMMATION :		
- EN MARCHÉ	6,0 W	
- EN FIN DE COURSE	0,6 W	
DIMENSIONNEMENT	15,0 VA / 3,6A@2ms	
POIDS	1,1 Kg	
SIGNAL DE COMMANDE	Y1	0...10 V cc
SIGNAL DE COMMANDE	Y2	0...20 mA
SIGNAL DE POSITIONNEMENT	U	0...10 V cc
PLAGE DE TRAVAIL	90° (93° mech.)	
LIMITATION DE L'ANGLE	5°...85° par pas de 5°	
DURÉE DE VIE	60'000 rotations	
CONTACTS AUXILIAIRES	3(1,5)A, 24 V ca	
- PLAGE DE RÉGLAGE AJUSTABLE	5°...85°	
NIVEAU SONORE	45 dB(A)	
CLASSE DE PROTECTION	II	
DEGRÉ DE PROTECTION	IP 54 (câble en bas)	
ENTRÉE DU CÂBLE	Presse étoupe M 16 x 1,5	
PRINCIPE DE FONCTIONNEMENT	Type 1	
TEMPÉRATURE AMBIANTE	-20...+50°C / IEC 721-3-3	
TEMPÉRATURE DE STOCKAGE	-30...+60°C / IEC 721-3-2	
HUMIDITÉ AMBIANTE	5...95% Hr	
SERVICE	Sans entretien	
NORMES	Mécanique	EN 60 529 / EN 60 730-2-14
	Electronique	EN 60 730-2-14
	CEM Emission	EN 50 081-1:92 / IEC 61 000-6-3:96
	CEM Immunité	EN 50 082-2:95 / IEC 61 000-6-2:99

Schéma électrique

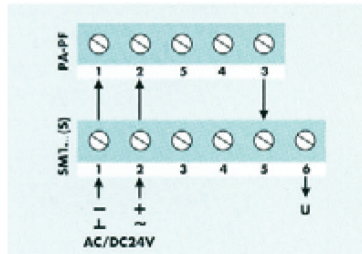


Connexion parallèle

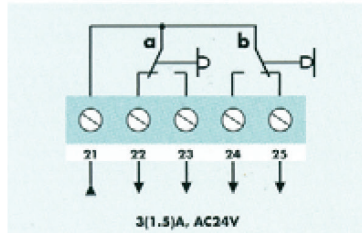


Maximum 5 servomoteurs

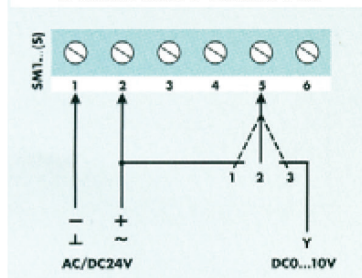
Positionneur



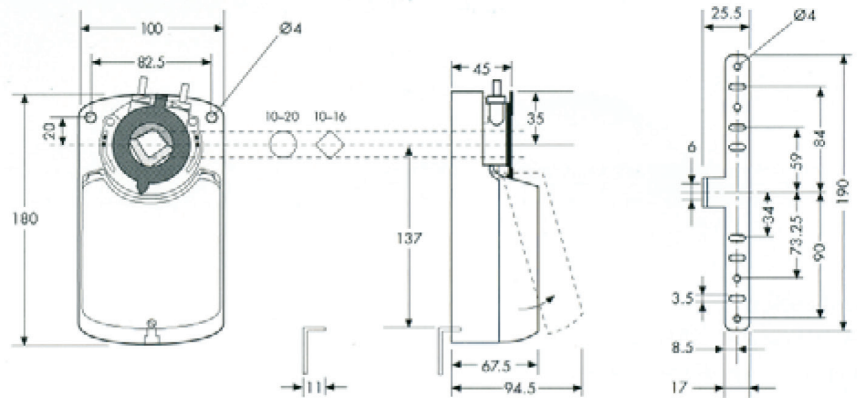
Contacts auxiliaires (S)



Commande manuelle



Dimensions en mm



Réglage de signal de commande

Signal de commande Y1 0...10 Vcc
Résistance d'entrée Ri 200 kΩ

Signal de commande Y2 0...20 mA
Résistance d'entrée Ri 388 Ω

Signal de positionnement U 0...10 Vcc
Résistance de charge > 50 kΩ

En inversant le micro-rupteur **d1** sur la position ON, le signal de commande Y1 ou Y2 s'adaptera à l'angle de rotation choisi.

Micro-rupteur **d** auto-adaptable

Désactivé



Potentiomètre **p** pour signal Y

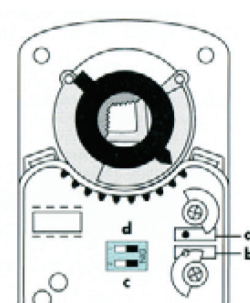
Pot **0**



Changement du sens de rotation

Micro-rupteur **c**

Pot **5**



Pour plus d'informations voir la fiche 5.50

Positionneur

Les servomoteurs SM1... (S) peuvent aussi être contrôlés en utilisant un positionneur JOVENTA (PA-PF) avec un signal de commande 0...10 Vcc.

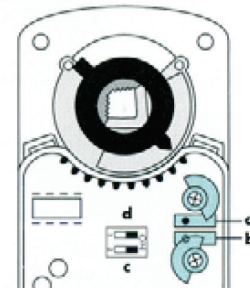
Pour plus d'informations sur les positionneurs PA et PF, merci de voir la fiche 6.20.

Attention : 5 servomoteurs maximum peuvent être commandés en parallèle.

Réglage des contacts auxiliaires

Réglage d'usine :
Contact **a** à 10°
Contact **b** à 80°

La position des contacts auxiliaires peut être modifiée par la rotation manuelle des commutateurs a et b.



Commande manuelle

Le servomoteur SM1... (S) peut être commandé manuellement quand la connexion est identique au schéma de gauche.

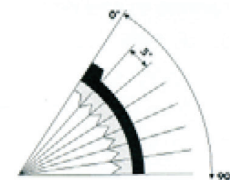
Position de l'interrupteur :
1 = Servomoteur marche vers 10 V
2 = Servomoteur marche vers 0(2) V
3 = Servomoteur marche vers le signal de commande du régulateur

Angle de rotation

L'angle de rotation (ou plage de travail) peut être limité, en déplaçant l'adaptateur par pas de 5°.

Le déverrouillage de l'adaptateur se fait à l'aide d'un tournevis en poussant le ressort.

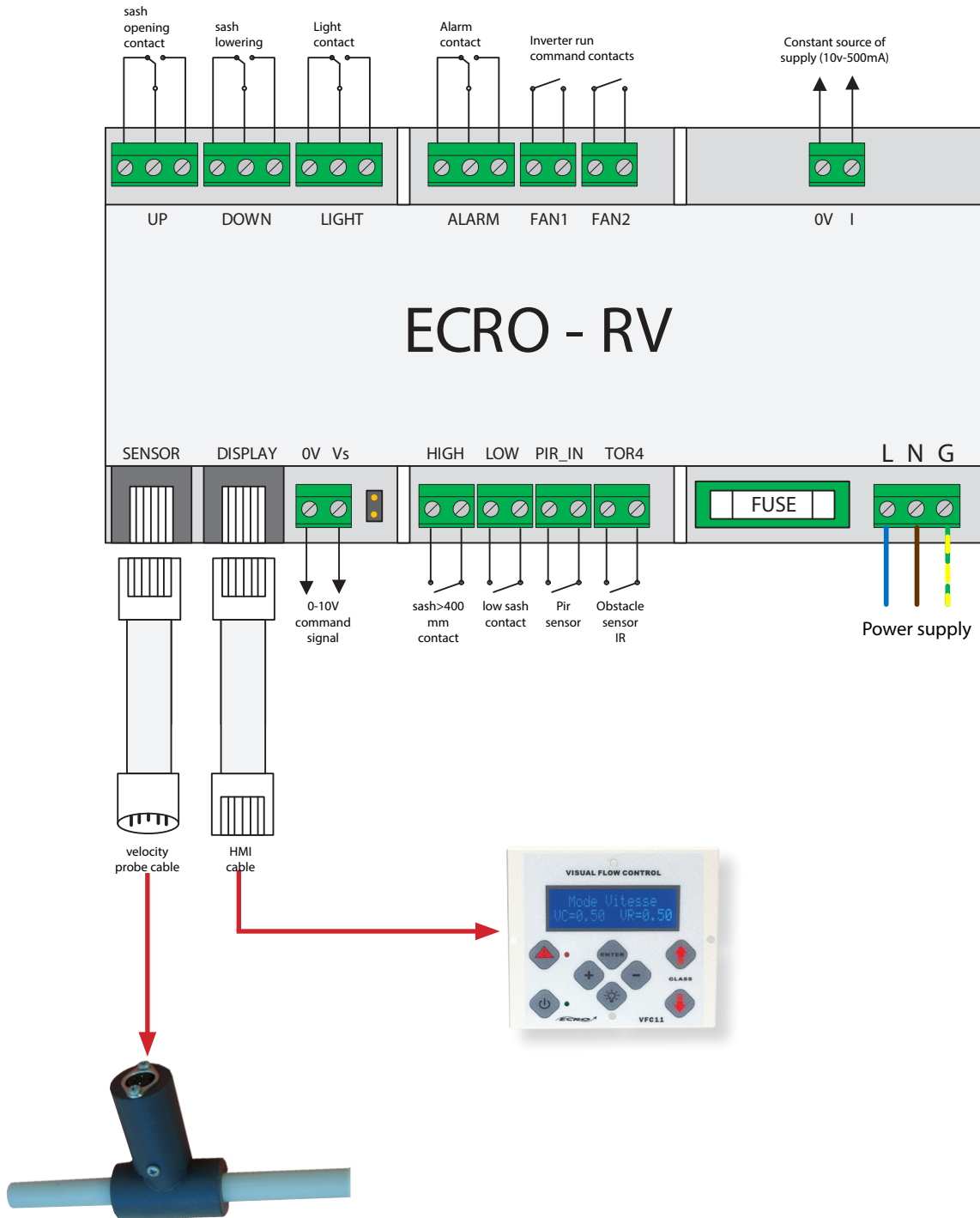
Limitation de l'angle de rotation



Déverrouillage de l'adaptateur

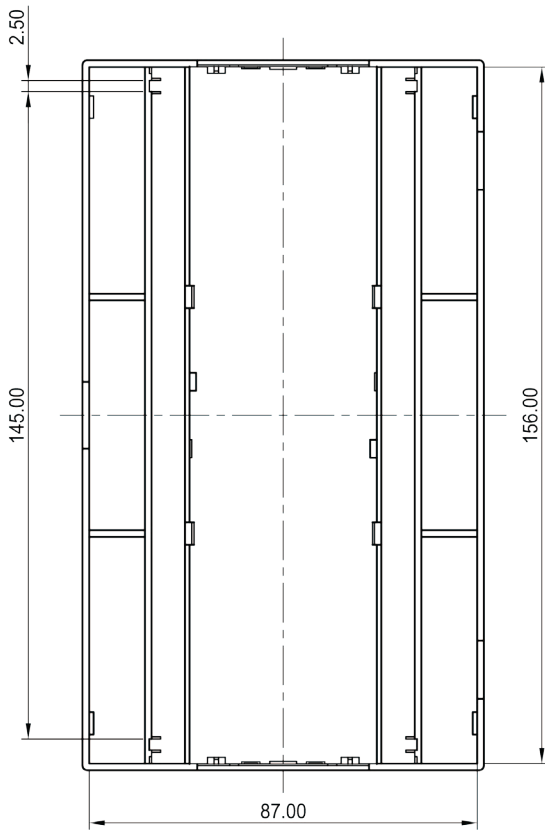


3.4. Electrical wiring

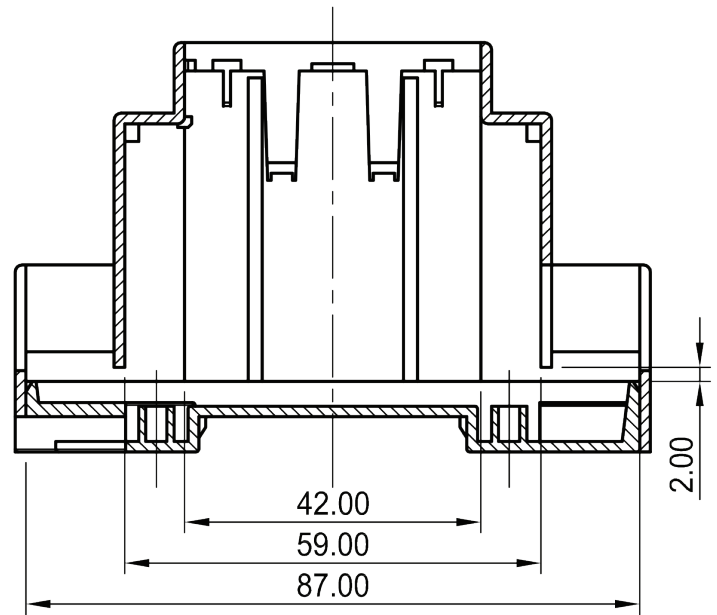


3.5. Dimensions

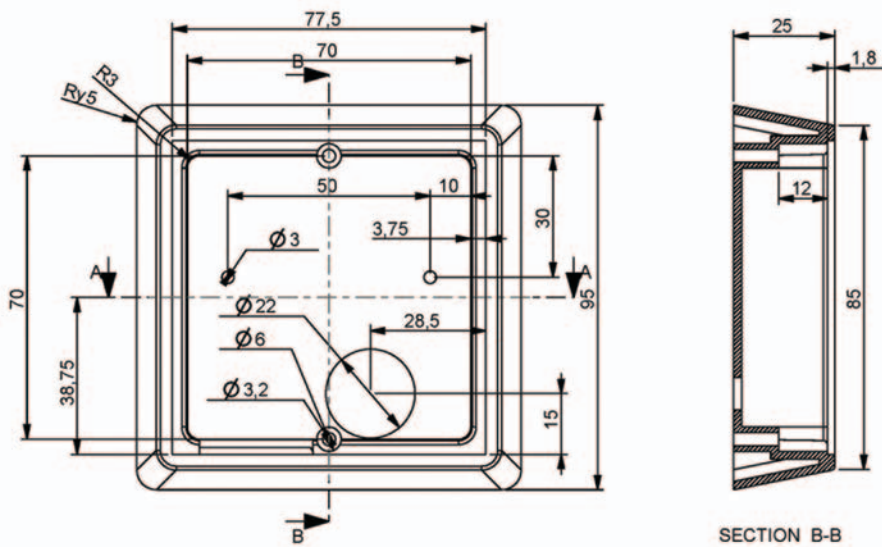
Supply enclosure front view



Side view



HMI enclosure front and side view



4. USER INSTRUCTIONS AND SETUP

This leaflet is dedicated to the installer in charge of the setup of the Ecro-RV, a product for laboratories, developed by the Company COMELEC.

These few pages explain the different steps for an optimal setting of this control device.

4.1 Installation and setting of the probe

Each fume hood is different from an aerodynamic point of view. The manufacturer must show the installer where the hot-wire speed probe has to be placed so as to get the face air velocity. If this emplacement is not respected, the speed measured by the probe will be wrong.

Once the emplacement is determined, a 16.5 mm diameter hole has to be made with a drill. The probe is mounted with its clamping ring (included in the package).

4.2 Probe functioning principles

The depression (PL-PS) generated by air extraction creates a way through the probe for the air.

The velocity of the air crossing the probe is identical to the one at the entry of the fume hood.

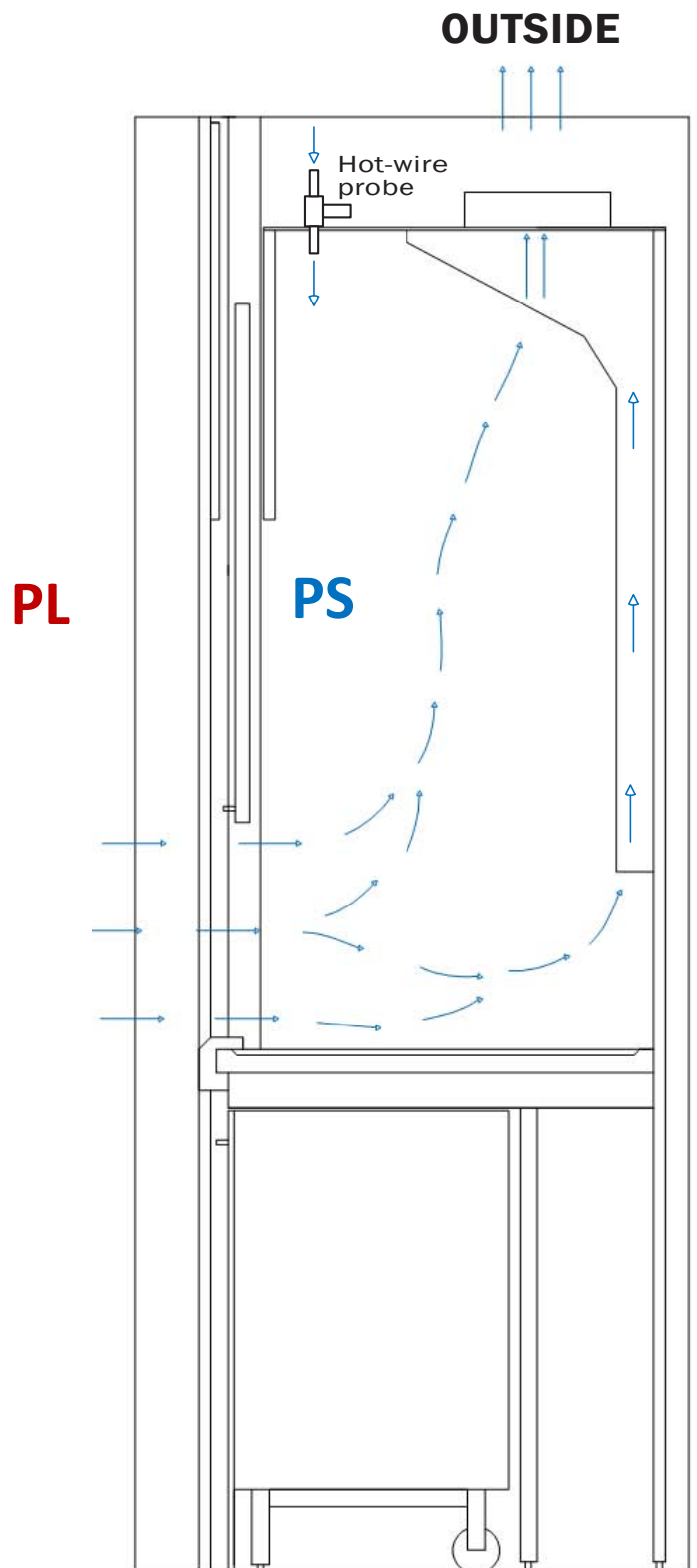
The air crossing the probe condenses more or less a filament. This begets a change of temperature.

This change of temperature permits to find the front air velocity.

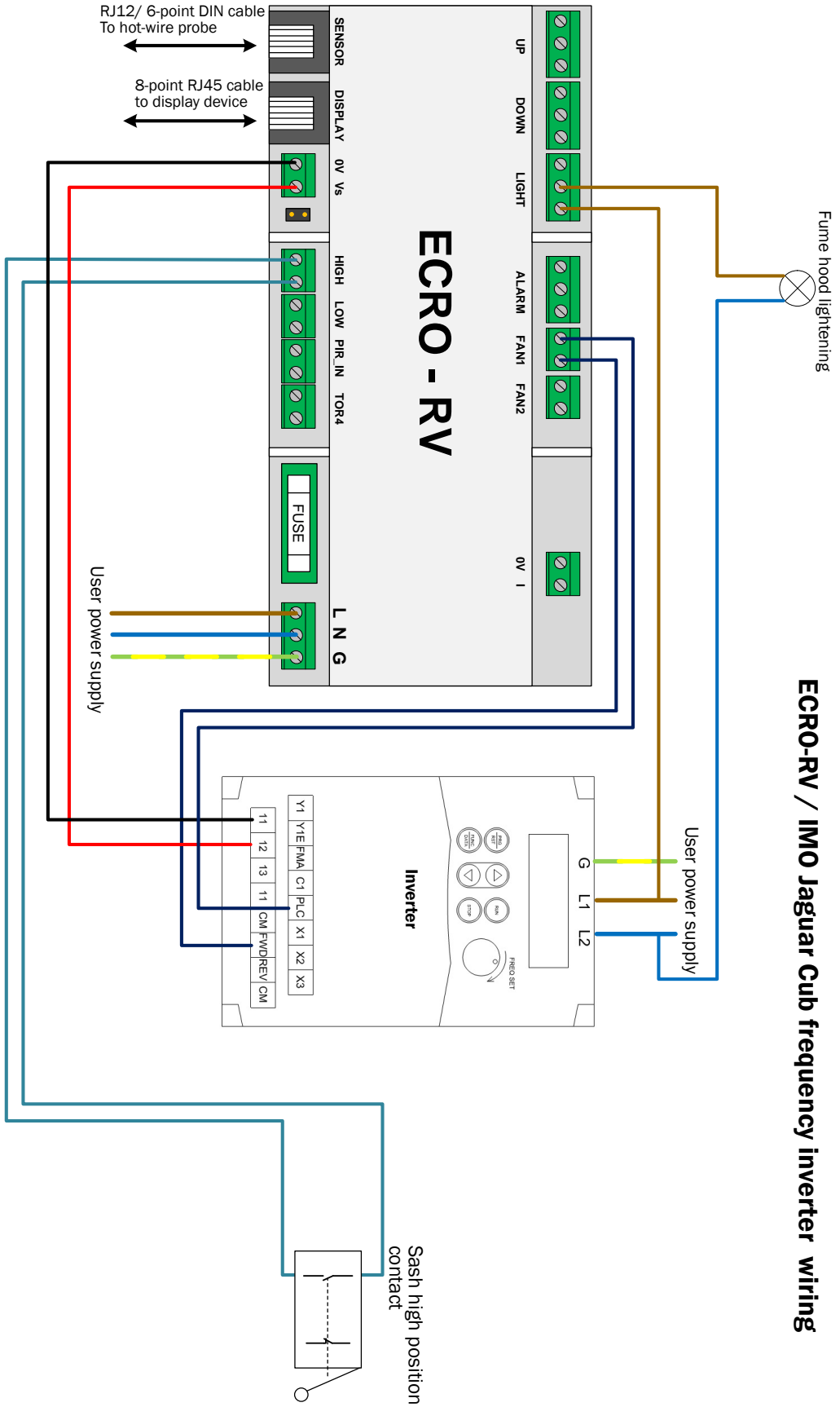
4.3 Conditions de fonctionnement de la sonde

⚠ CAUTION, for an accurate measure of velocity, apart from the position of the probe, it is important to make sure that:

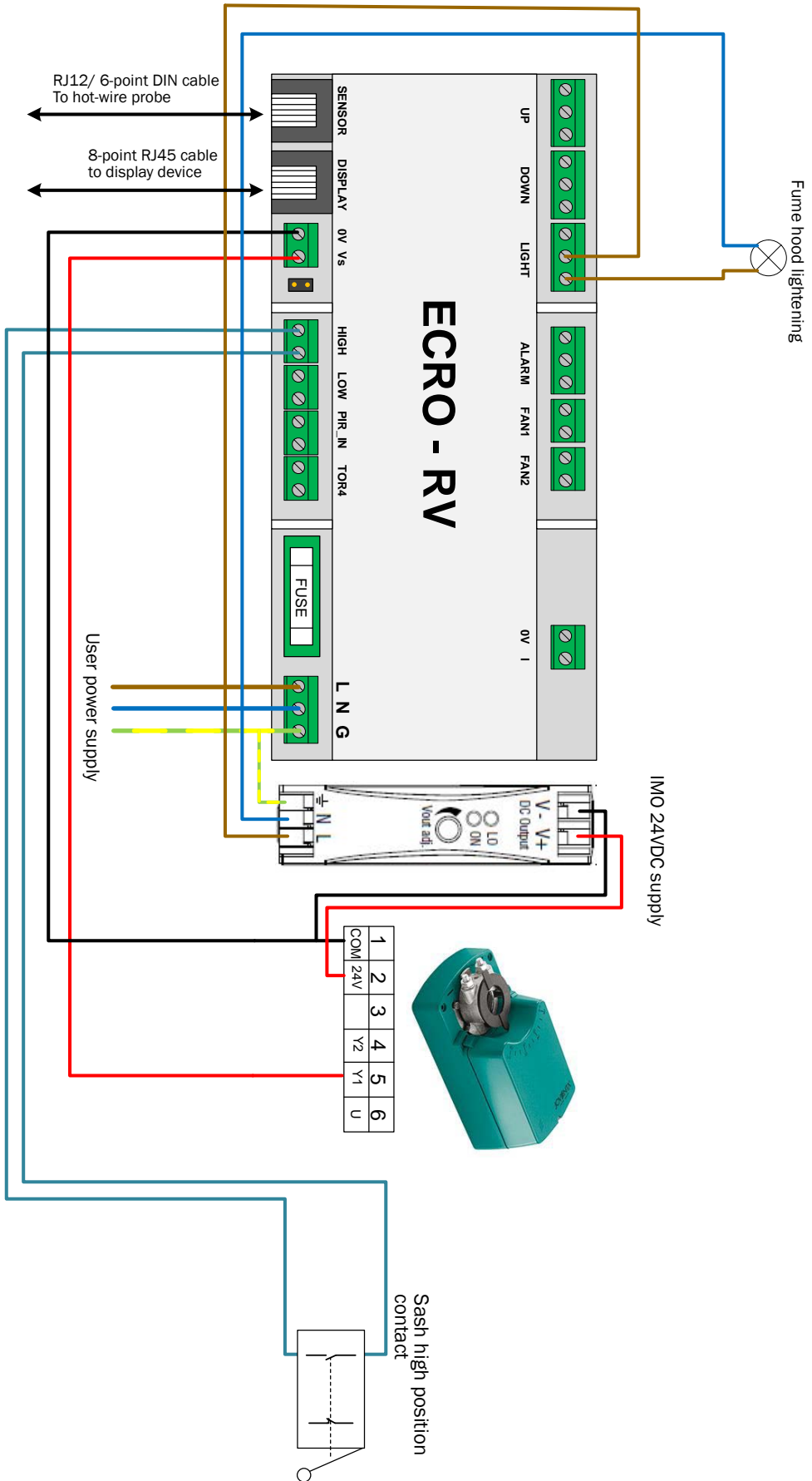
- the air crossing the probe comes from the laboratory. For instance, if the top of the fume hood is completely closed, the measure will be wrong.
- The laboratory is not in high depression (because of a bad compensation for example), otherwise the measure of velocity will be wrong.
- No draught disturbs the probe – otherwise, you must protect it.



Electrical wiring Ecro-RV.



ECRO-RV / IMO Jaguar Cub frequency inverter wiring




ECRO-RV/ Joventa motorised damper

4.4 Controller setup

Elements included for the first installation:

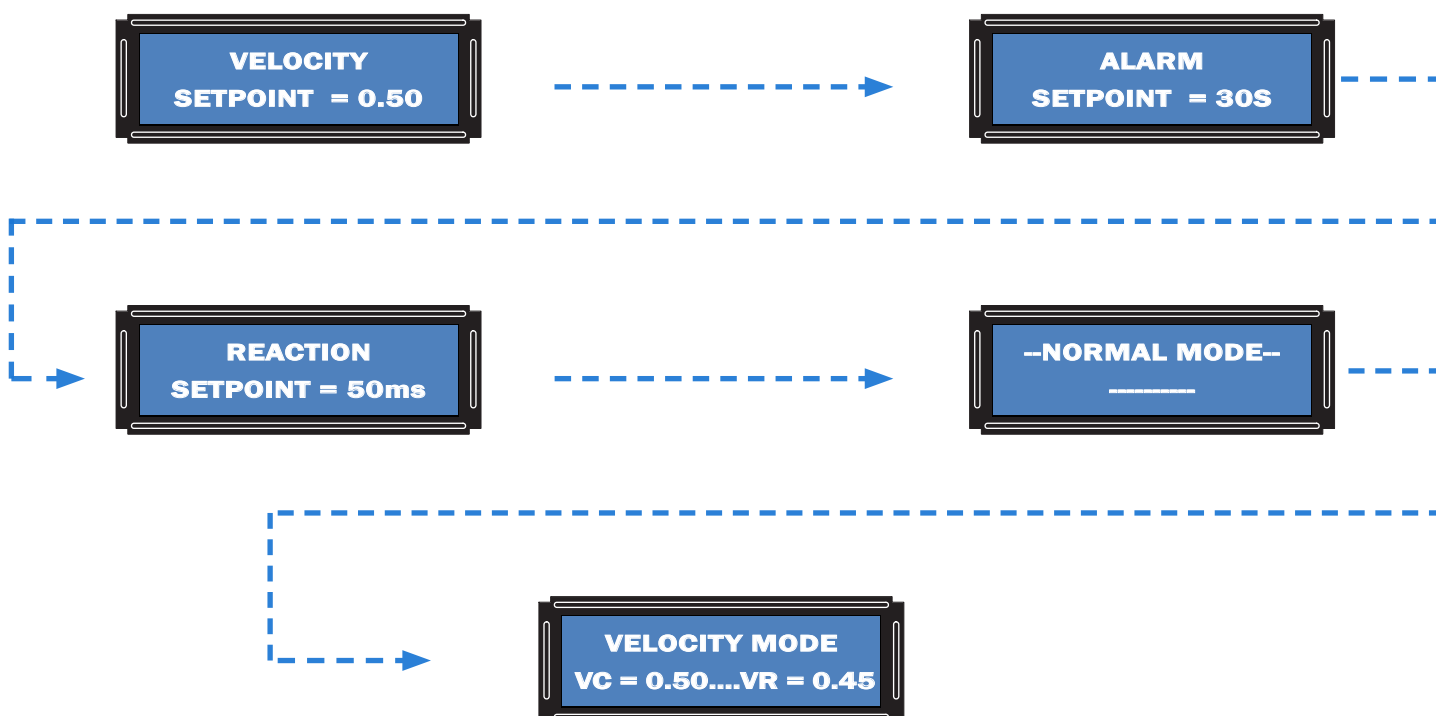
- Controller Ecro-Rv.
- HCI VFC11
- Face velocity probe.
- RJ12/DIN cable for probe.
- RJ45/RJ45 connection cable.
- Frequency inverter or motorised damper
- Optional :
 - PIR presence sensor.
 - Photoelectric barrier.
 - Sash motorisation.

 **CAUTION** : the electrical wiring must be done in accordance to the installation leaflet. When the device is powered, the IMH VFC11 makes a long bip then the LCD display lits.

First, the display shows the version of software and the reference of the product.



Once the main screen is over, the installer will see, on the following screens, the default setting programmed by the manufacturer



4.4.1 Menu access

In order to protect the device against inadvertent disadjustments, the access to the menu IHM VFC11 is protected by a PIN code.

NB: The default PIN code is 0000 but it is possible to modify it.

To have access to the menu, do as follows:
Press button ENTER, the following screen is displayed :



To enter the first number, press buttons “+” or “-” then “ENTER”.
Repeat the process for the 3 following numbers.
Once the correct code is registered, the installer can change the access code.



By pressing “-” the installer has access to the menu.
Use button “+” or “-” to browse through the menu

4.4.1.1 PIN code modification

If the installer wants to modify the menu access code, he just has to press button “+” to modify the PIN code.
A screen is displayed asking to enter the new PIN code. As soon as the new code is registered it is taken into account by the device.



4.4.2 Settings

Setting the velocity setpoint.

The containment change according to the kind of fumehoods used.

To obtain a secure containment, and by the way an adequate face velocity, the installer can easily modify the velocity setpoint.

To do so, proceed as follows:
Enter the menu as explained in part 4.41

Once in the menu, enter the sub-menu “choose velocity” by pressing button “ENTER”



Once in the sub-menu “Choose velocity”, press buttons “+” or “-“ to select the setpoint chosen.
(default value 0.5m/s)



When the desired velocity setpoint is reached, validate by pressing button “ENTER”.

The screen appears, confirming the modification of the value.



To come back to the first screen, enter the sub-menu “Normal mode” pressing buttons “+” and “-“ then, press button “ENTER”.

Setting range for the velocity setpoint :
Vmin : 0.1 m/s
Vmax : 0.99 m/s

Alarm response time setting.

The alarm response time is the period you accept to stay in default before informing the user. It can be modified by the installer.

To do so, proceed as follows:

Reach the menu as explained in part 4.4.1

Once in the menu, enter the sub-menu “Choose alarm” by pressing button “ENTER”.



Once in the menu “choose alarm”, press buttons “+” and “-“ to select the desired length (default value 30s).



When the desired setpoint is reached, validate by pressing button “ENTER”.

A screen appears confirming the modification of the value.



To come back to the first screen, enter the sub-menu “Normal mode” pressing buttons “+” and “-“ then, press button “ENTER”.

Setting range for the the alarm response time :
min : 1s.
max : 250s

Reaction time setting.

The reaction time is the period taken by the device to detect a default and apply a correction. It can be modified by the installer.

To do so, proceed as follows :
Enter the menu as explained in part 4.4.1.

Once in the menu, enter the sub-menu “choose reaction” by pressing the button “ENTER”



Once in the sub-menu “Choose reaction”, press buttons “+” or “-” to select the desired length (default setpoint 50ms).



When the desired length is reached, validate by pressing the button “ENTER”.

A screen appears confirming the modification of the value.



To come back to the first screen, enter the sub-menu “Normal mode” pressing buttons “+” and “-” then, press button “ENTER”.

Setting range for the reaction time :

min : 1ms
max : 250ms

Sash closing settings.

The ECRO-RV device can include a command mechanism to pilot the hung-window, associated to a PIR presence detector and a photoelectric barrier.

The device can not only regulate the face velocity, it can also pilot the closing of the sash which depends on the presence or not of persons or obstacles after a period preset.

The delay can be programmed by the installer. To do so, proceed as follows:

Once in the menu, enter the sub-menu “sash closing delay” pressing button “ENTER”.



Once in the sub-menu “sash delay”, press buttons “+” or “-” to define the time delay desired.
(default value 1 min)



When the desired delay is reached, validate by pressing button “ENTER”.

A screen appears confirming the modification of the value.



To come back to the first screen, enter the sub-menu “Normal mode” pressing buttons “+” and “-” then, press button “ENTER”.

Setting range for the closing delay:

min : 1min

max : 250min

Hot-wire probe corrective coefficient setting.

The velocity probe consists of a wire heated at a temperature higher than the ambient temperature.

Over time and depending on the using conditions, it can be altered (like a light-bulb filament) and can lose accuracy. To solve this problem, a corrective coefficient can compensate the probe deterioration.

It can be modified by the installer.

To do so, proceed as follows : enter the menu as explained in part 4.4.1.

Once in the menu, enter the sub-menu "probe calibration" by pressing the button "ENTER".



Once in the sub-menu "Probe calibration", press buttons "+" or "-" to select the coefficient desired. (Default value : 128).



When the desired value is reached, validate by pressing button "ENTER".

A screen appears confirming the modification of the value



To come back to the first screen, enter the sub-menu "Normal mode" pressing buttons "+" and "-" then, press button "ENTER"



CAUTION : this value is calibrated by a qualified technician during the factory's calibration phase.
Buzzer activation .

When the alarm is activated on the control device, the buzzer is triggered to inform the user there is a default.

The alarm can be activated or deactivated as explained below.

To do so, proceed as follows: enter the menu as explained in part 4.4.1

Once in the menu, enter the sub-menu "buzzer activation" pressing button "ENTER".



Once in the sub-menu "Buzzer activation", press buttons "+" or "-" to activate or deactivate the buzzer.



When the status desired is reached, validate pressing button "ENTER".

A screen appears confirming the modification of the value



To come back to the first screen, enter the sub-menu "Normal mode" pressing buttons "+" and "-" then, press button "ENTER"

HMI locking.

To prevent the control device from being put into standby mode, the button ON/OFF can be locked.

To do so, proceed as follows : enter the menu as explained in part 4.4.1

Once in the menu, enter the sub-menu " ENABLE ON/OFF" by pressing button "ENTER" .



Once in the sub-menu "Enable ON/OFF", press buttons "+" or "-" to enable or disable the buzzer.



When the status desired is found, confirm by pressing the button "ENTER".

A screen appears confirming the change of status.



To come back to the first screen, enter the sub-menu "Normal mode" pressing buttons "+" and "-" then, press button "ENTER"

VMin tension setting.

The velocity control device delivers a PID type analog signal varying between 0 and 10 V. However, for some applications, a minimum tension threshold is necessary to guarantee a minimum exhaust flow rate. To do so, proceed as follow : enter the menu as explained in part 4.41.

Once in the menu, enter the sub-menu "Vmin tension setting" pressing the button "ENTER".



Once in the sub-menu "Vmin tension setting", press the button "+" or "-" to select the threshold.



When the value desired is reached, validate by pressing the button "ENTER".

A screen appears confirming the change of value.



To come back to the first screen, enter the sub-menu "Normal mode" pressing buttons "+" and "-" then, press button "ENTER"

Setting range for the tension min.:

Vmin-min : 1

Vmin-max : 255

To find the equivalence in Volt, use the following calculation:

Tension in volt = setpoint * (10/255)

Example : setpoint : 128 -> 128*(10/255)=5 Volts

4.5 Troubleshooting.

The table above helps the user to troubleshoot possible connectivity problems linked to the control device when the ECRO-RV is put into service.

Problem :	The VFC11 HMI does not light up and does not emit any bip.
Cause :	The device is not powered.
Solution :	Check both the connection cable between the HMI and the control device, and the 230 vac-50Hz mains voltage on the control device.
Problem :	The face velocity remains at 0.00m/s whereas there is suction.
Cause :	The probe is not connected to the regulator.
Solution :	Check the connection of the probe's cable.
Problem :	The alarm is triggered as soon as it is powered.
Cause :	The sash is open above the high safety stop (entry "HIGH" closed) Alarm response time too short.
Solution :	Check the alarm response time in the menu and the high sash contact.
Problem :	The motorised damper does not work.
Cause :	The 0-10V signal does not reach the control unit. The motorised damper is not powered.
Solution :	Check the wiring and the regulator's command signal.
Problem :	The inverter does not pilot the fan.
Cause :	The run command is not given to the fan The 0-10 V signal does not reach the control unit.
Solution :	Check both the run command cable between the regulator and the frequency inverter, and the control signal.
Problem :	The fumehood does not light up.
Cause :	No tension The output relay wiring is faulty.
Solution :	Check the output relay wiring and the supply wiring.

The table above helps the user to troubleshoot possible aeraulic problems when the ECRO-RV is put into service.

Problem :	Low air suction
Cause :	The fan is ill-suited The fan rotates in the wrong direction There are problems in the aeraulic network.
Solution :	Select a suited fan Reverse the direction of rotation Remove the potential obstacles (eg: mechanical damper/air bump)
Problem :	The actual velocity is different from the velocity setpoint.
Cause :	The probe is in a zone of excessively turbulent airflow. The hot-wire probe is misplaced. Bad environmental conditions for the probe.
Solution :	Remove the turbulence affecting the probe. Do place the probe as indicated by the manufacturer. Make sure that the probe takes a measurement between the laboratory and the fumehood; otherwise, cover the probe to protect it. BEWARE not closed false ceilings BEWARE the airtightness between the probe and the laboratory.
Problem :	Oscillation phenomenon in the device during the regulation "Pumping"
Cause :	The inverter's deceleration/acceleration ramps are too slow. The inverter's frequency min. is too low. The regulator's response time is too short.
Solution :	Reduce the inverter's ramps. Increase the inverter's frequency min. Increase the regulator's response time.
Problem :	The motorised damper works in the wrong direction.
Cause :	The damper's direction of rotation is reversed.
Solution :	Reverse the direction of rotation.

5. Additional information

Maintenance

Avoid any aggressive solvent

When cleaning with products based on formalin (pieces or ducts) protect the device and the probe.

Device range

- ECRO-RV Origin
- ECRO- RV Progressive
- ECRO-RV Exclusive

Options

- Fumehood motorization
- Module for communication via Bus

Warranty

1/ Warranty terms and conditions

The warranty covers the replacement of items only after the malfunction has been assessed by our services. It excludes any lost and damages or penalties. The labour cost, the charges for freight and removal/reinstallation are always at the Customer's expense.

2/ Warranty period

The guarantee only covers defects that have been discovered within 12 months. In any case, the guarantees period begins on the date of delivery from our factory.

3/ Obligations of the buyer

In order to claim the benefit of these provisions, the buyer must inform us in writing the defects he observes as soon as possible. He shall provide us all evidence regarding defects or anomalies reported. The customer shall give us every opportunity to investigate the causes of the malfunction and to find a solution. Unless explicitly agreed by ourselves, he will not repair himself or involve a third party for that purpose.

The buyer cannot invoke the warranty claim to suspend or defer his payments.

Our liability shall be strictly limited to the aforementioned obligations.

We are not liable to pay for any loss of earnings or damages corresponding to items not concerned by the contract.

4/ Warranty holdback

No warranty holdback is accepted unless expressly agreed by ourselves in a written agreement.

Technical assistance.

The installer or user can contact our services for any information or further request.