

VECTROSTAR

R25 – R65 – R120 – R200 – R200P – R200T



Commissioning, Technical and
Maintenance manual

INTRODUCTION

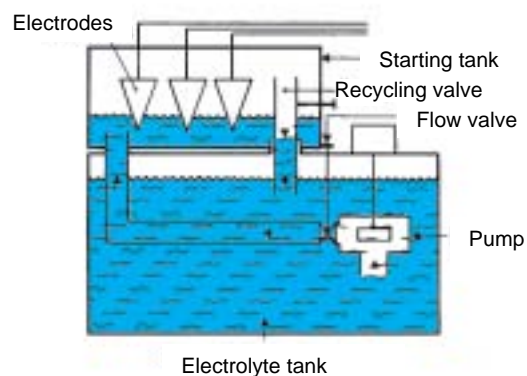
VECTROSTAR R starters are designed to reduce a specific starting resistance as gradually as possible, and as harmoniously as possible, according to the resistant torque of the machine. Ohmic value of the resistor value is close to 0 at the end of the starting sequence.

Running principle :

The starter allow the motor to deliver its maximum torque at minimum speed. Unblocking loaded machines is even possible.

The rising electrolyte level makes the resistance between the electrodes decreasing continuouly and smoothly. The recycling valve evacuates hot electrolyte during starting. That way, the electrolyte remains liquid and permit a perfect start.

At the end of starting period, final resistance is almost zero. Then, the time relay control the short circuiter.



Advantages :

- ✓ Smooth start without mechanical shakes.
- ✓ Current reduced to its minimum.
- ✓ Simple and precise adjustment of starting conditions.
- ✓ Starter designed to work in hard conditions.
- ✓ Starting time adjustable by Electrolyte dosing and valves adjustment.
- ✓ Several and identical startings possible due to the big electrolyte tank.
- ✓ Security due to double electrical insulation and to electrolyte temperature measurement.
- ✓ Srength and high resistance to corrosion.
- ✓ Reduced maintenance.

Applications :

Use Electrolytic starters VECTROSTAR R for starting slip rings and squirrel cage motors.

Slip rings motor

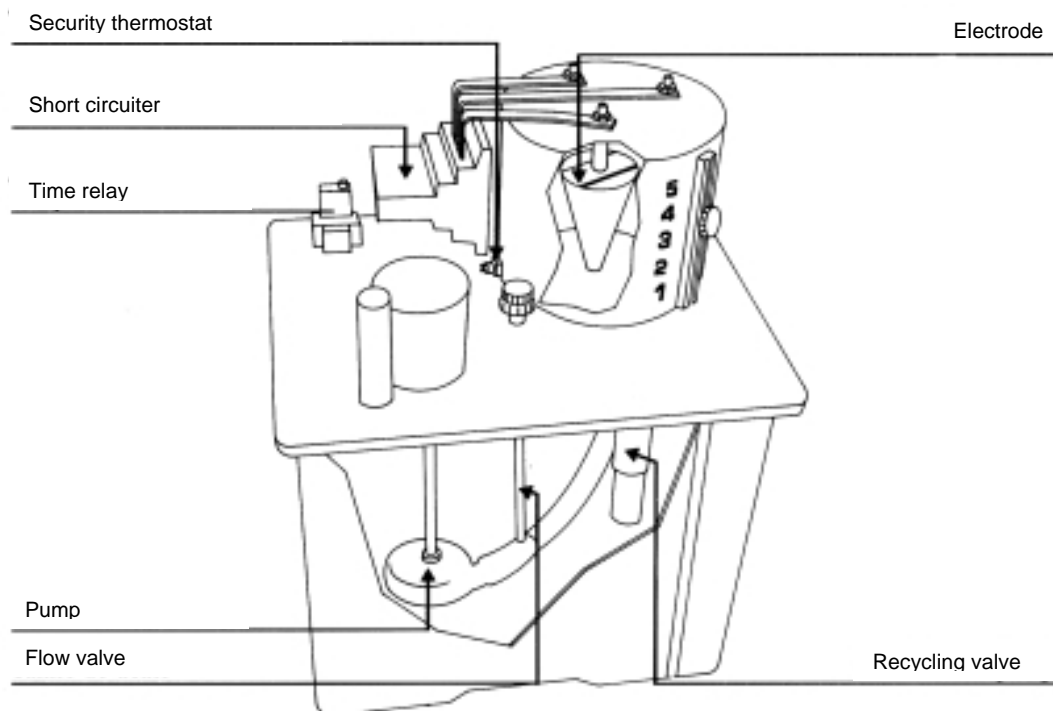
The starter is plugged on the rotor. At the end of starting period, final resistance is almost zero. The three-phase switch short-circuits the rotor.

Squirrel-cage motor

The starter is plugged on the stator. The motor must be star connected (ex : for a 230/400V motor, the supply voltage must be 400V). At the end of starting, the short circuiter creates the star point of the motor.

Nota : remove the connections in the motor terminal box. The star point is made by the short circuiter of the starter.

CAPTION



TECHNICAL SPECIFICATIONS

Adequacy motor / starter :

Slip rings motor

Starter choice according to maximum motor power

Starter	R25	R65	R120	R200	R200P	R200T
Maximum motor power (kW)						
Loaded motor	40	90	160	300	600	900
Unloaded motor	50	110	200	335	650	1000

Maximum rotor current according to the short circuiter

Short circuiter ref	Short circuiter rating	Maximum rotor current
LC1D40P7	80T	85 A
LC1D80P7	140T	175 A
LC1F115M5	260T	280 A
LC1F185M5	315T	380 A
LC1F265M7	420T	490 A
LC1F400M7	500T	700 A
LC1F500M7	1000T	980 A

Squirrel-cage motor

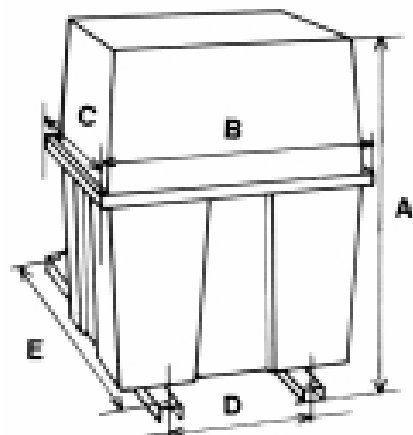
Starter choice according to maximum motor power and maximum power of the short circuiter

Starter	R25	R65	R120	R200
Maximum motor power (kW)				
Loaded motor	30	45	110	200
Unloaded motor	37	55	132	220
Short circuiter rating	80T	80T	140T	260T
Maximum short-circuiter power (kW)	30	45	90	147

Dimensions, weight and electrolyte capacity :

	A	B	C	D	E
R25	570	410	390	240	385
R65	750	600	470	335	425
R120	900	735	560	275	525
R200	1045	880	560	415	525

	Weight (kg)		Capacity (L)
	Empty	Full	
R25	20	45	25
R65	38	103	65
R120	65	185	120
R200	78	278	200



Characteristics :

Maximum rotoric voltage Ur (V)	V STAR R25 et R65 : 600 V V STAR R120 et R200 : 800 V For Ur >800, ask for an optional
Short circuiter KMCC	Three phases switch Télémécanique Coil 230 V – AC 50-60 Hz
Number of startings per hour	4 startings per hour or 3 consecutive startings per hour (depending on the load, ambient temperature and starting time)
Starting time	From 5 to 35 seconds (valves adjustment)
Ambient temperature (°C)	With antifreeze : up to -25°C 0°C to + 35°C : normal conditions + 35°C à + 45°C : reduced rate
Maximum relative humidity	95 % without any condensation
Maximum altitude	1000 Meters
Casing	V STAR R25 & R65 : polypropylene tank & hood V STAR R120 & R200 : fiberglass reinforced polyester tank & hood
Protection degree	IP 569
Positionning	Horizontal area, difference of level 2% max
Security	Electrolyte temperature control
Auxiliary contacts	1 contact DEFAUT NF Max.voltage : 415 V AC Thermal current : 4A VSTAR R120 et R200 : Hypsotherm (Pump motor temperature)
Start command	230 V linked with short circuiter

HANDLING AND STORAGE

The starter is delivered in a cardboard, set and attached to a wooden pallet. It must be transported vertically. After unpacking, the cardboard must be thrown away, recycled or kept.

The starter must be stored closed, without electrolyte, in his original cardboard. Storage temperature must be comprised between -10 and +45°C, without too much humidity (95% max). The consumable such as soda, antifreeze and anti-evaporation oil must be stored in their original package inside the starter

Empty the starter before any transporation and use the original wooden pallet.

Consumables :

Soda, antifreeze and anti-evaporation oil must be stored far from food, strong oxidatives and flammable products. The storage location must be well ventilated.

Use only METAL DEPLOYE RESISTOR products.

Handling the products :



**Wear GLOVES, GLASSES and PROTECTION CLOTHES.
Do not drink, eat or smoke during this job.**

Read the products Safety data sheet before handling.

Doc N° : 02ENU75 File :02ENU750	Rev : 0 Date : 22/12/06	Written by: M. Parthiot Checked by: F.Lavogiez	Page : 5 / 15
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COMMISSIONING



Caution : Unplug power before working on the equipment. Commissioning must be made by entitled personnel only

Important : Before each test : Put the casing on the starter in order to avoid contact with on potential parts.

Filling the tank :

For use at temperatures under 0°C, add antifreeze to electrolyte. Use only METAL DEPLOYE RESISTOR antifreeze (Mono-Ethylene-Glycol). Antifreeze quantity depends on temperature level and tank capacity.

Température °C	Quantity (L)			
	R25	R65	R120	R200
-10	5	15	25	40
-15	10	20	35	60
-20	10	25	40	70
-25	10	30	50	80

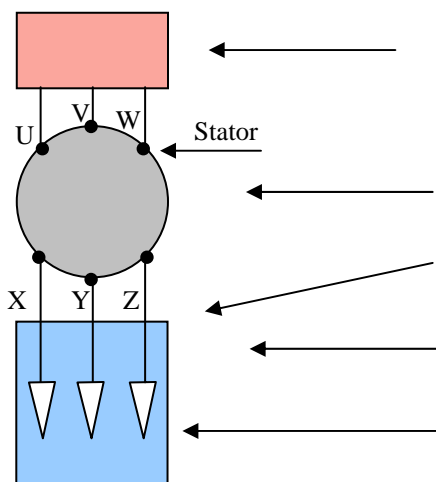
Pour out antifreeze into the tank and complete to the MAX level with water.

Plugging power supply :

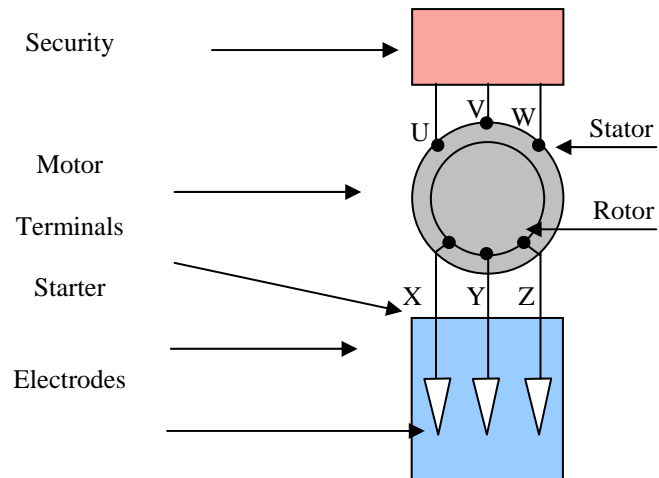
Use plastic cable glands to permit the cables to enter the frame of the starter. As the starter is double insulated, there is no need to connect it to earth.

In order to not apply any torque to the electrodes, use 2 wrenches for clamping your cables to electrodes.

Squirrel cage motor



Slip rings motor



Concentrate electrolyte preparation :

In a water bucket, pour soda and water according to the following table. Let it cool down.

	R25	R65	R120	R200
Soda weight	250 g	500 g	500 g	1000 g
Water quantity	0.5 L	1 L	1 L	2 L



Caution : The mixture temperature can rise up to 90°C.

**Wear GLOVES, GLASSES and PROTECTION CLOTHES.
Do not drink, eat or smoke during this job.**

In case of discharge on eye or skin, rinse out with clear water and consult a doctor.

Pour the electrolyte into the dosing bottle.

Test without power (IMPORTANT) :

In order to prepare the following startings, we need to fill in the starting tank at minimum level.

- ✓ Tune the time relay on its maximum
- ✓ Switch off the power
- ✓ Turn on the starter
- ✓ The pump starts until the time relay is over.

The starter is ready for the following tests.

ADJUSTMENTS

First adjustment according to your use :

		Squirrel cage motor			Wounded rotor motor
		Pre adjustment	Starting parameters guide		
MACHINE	TYPE	$I_p = x I_n$	$I_d = x I_n$	Td (sec)	$I_d = x I_n$
Pump	Centrifugal	2.5	2.8	8-10	0.7-1
	Piston	3	3.5	12-15	0.9-1.2
Compressor	Rotary screw	2.5	2.8	8-10	0.7-1
	Piston	3	3.5	12-45	0.9-1.2
Fan	Centrifugal	3	3.5	20-40	0.7-1.2
	Screw	2.7	3	12-20	0.7-1
Crusher	Jaw	3	3.5	25	0.8-1.2
	Ball or Rod mill	3.6	4.1	30	0.8-1.2
	Hammer	3.5	3.8	30-35	0.8-1.2
	Impact	3.6	4	25	0.8-1.2
	Gyratory	2.5	2.5	15	0.7-1
Sieve		3	3.5	15	1
Press	Pelleting	2.7	3	5	0.7-1
	Mechanical	2.7	3	30	0.7
Arm conveyor		3	3.5	20-40	0.8-1.2
Extractor		3.6	4	40-90	0.7-0.9
Wood hog		3	3.5	20-40	0.8-1.2
Pulper		3	3.5	15	0.7-0.9
Disk refiner		2.7	3	8-10	0.8
Mixer		2.7	3	12	
Bandsaw		3.5	4	20-30	1
Circular saw		2.7	3	8	0.6

Adjustment for SLIP RINGS MOTOR :

1. Valves and time relay

Flow valve (lièvre – tortue) : R65 → Position 7
R120/200 → Plant adjustment

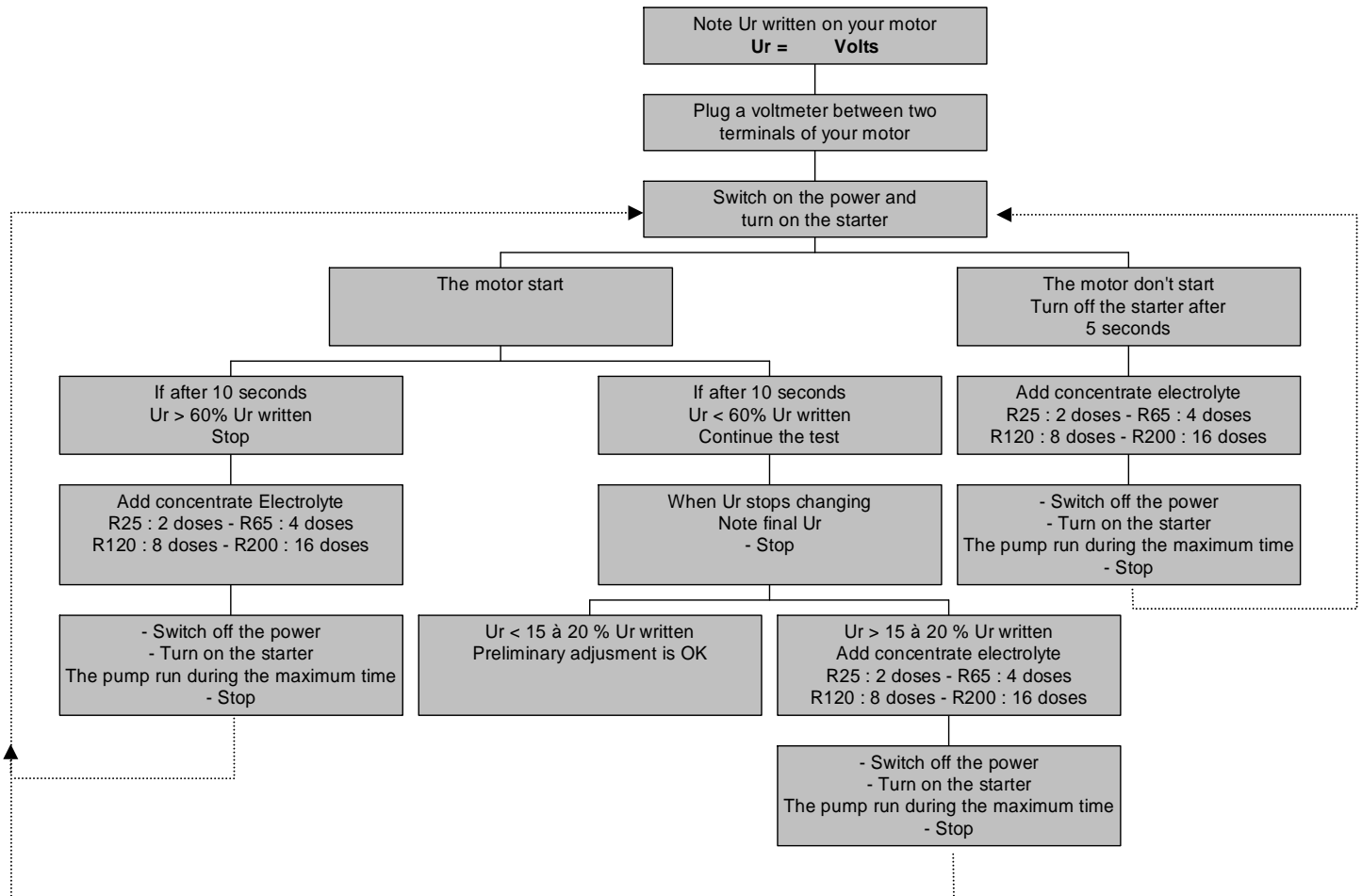
Recycling valve : Rotoric level (top located)

Time relay : Max (around 100 sec)

2. Preliminary adjustment

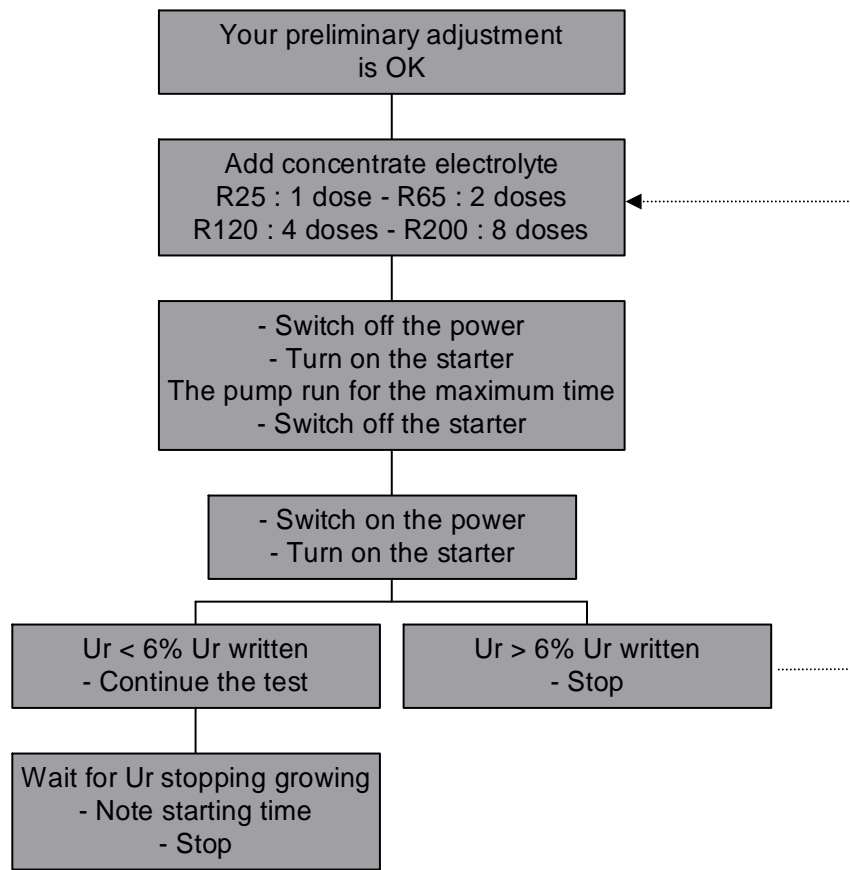
This adjustment consists on several short time tests that avoid the electrolyte to heat. The goal of this step is to obtain a low value of rotoric voltage (around 20%). Use a voltmeter, a chronometer and dosing bottle.

IMPORTANT : The motor must be loaded like in real conditions.



Note : If the motor starts too fast, empty a quarter of the tank, and re-add water and antifreeze.

3. Final adjustment



Adjustment for SQUIRREL CAGE MOTOR :

1. Valves and time relay

Flow valve (hare – turtle) : R65 → Step 9
R120/200 → Max (lièvre) minus 2 turns

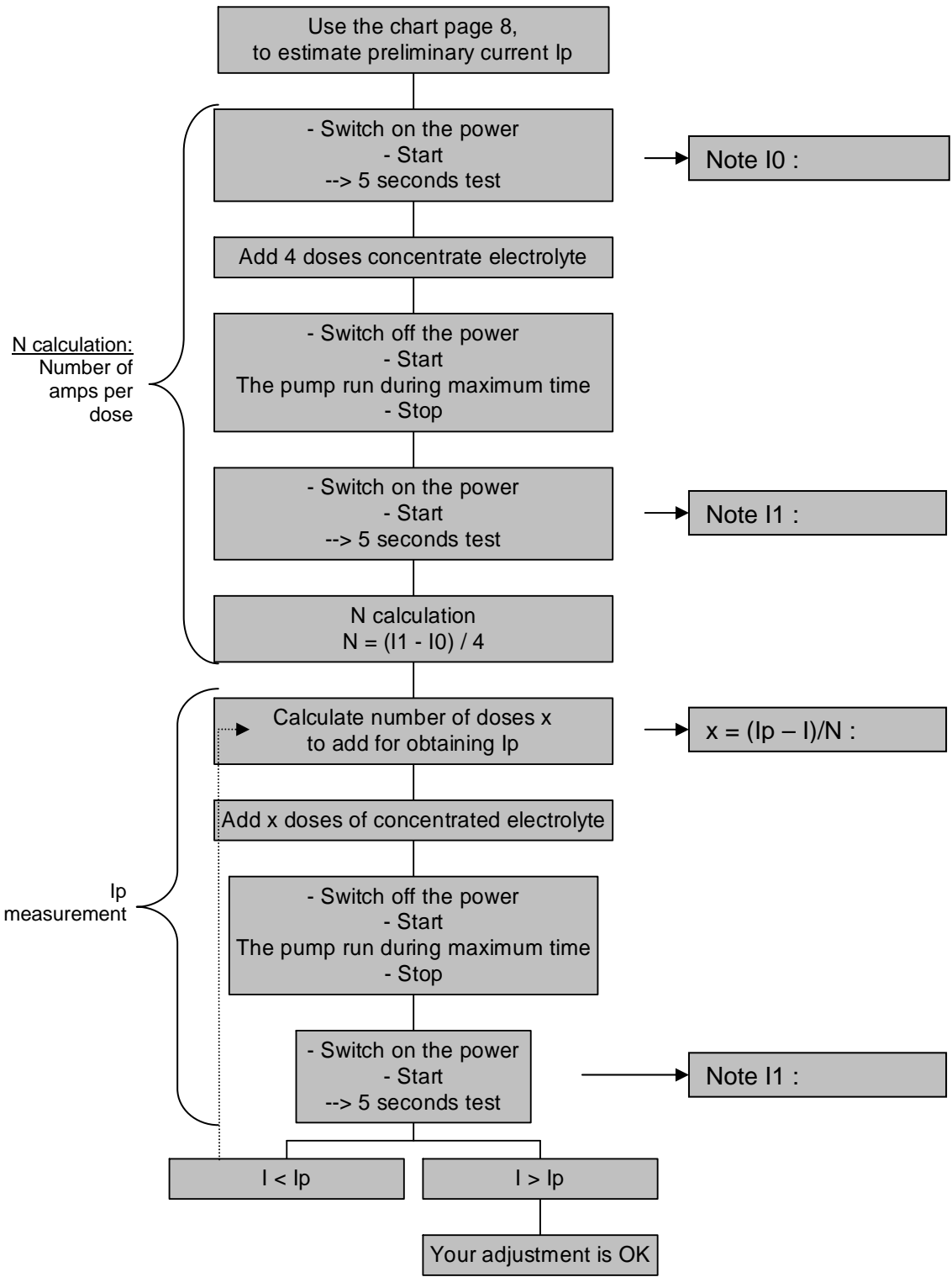
Recycling valve : R65 → Repère 5
R120/200 → Entre repères 3 et 4

Time relay : Max (around 100 seconds)

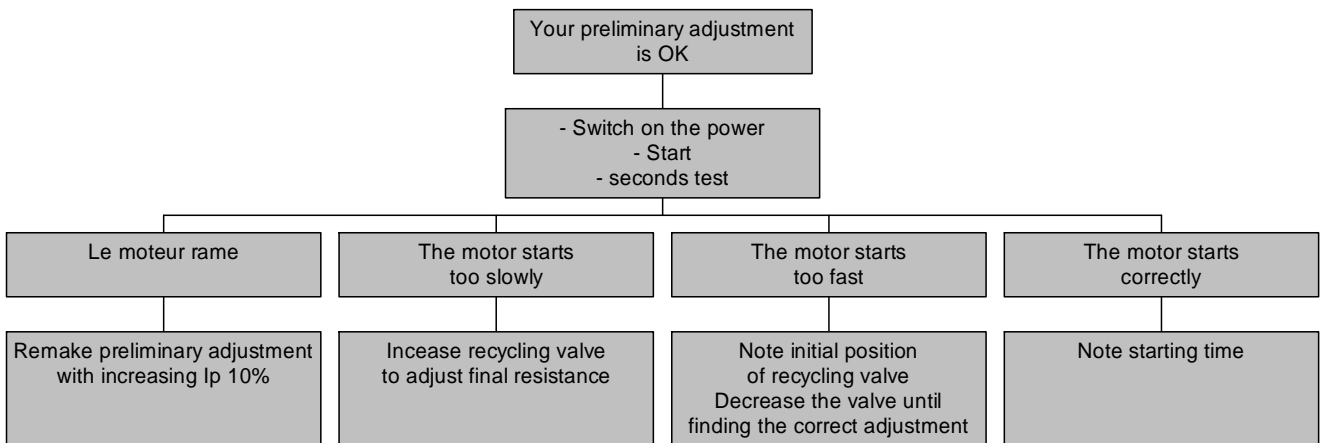
2. Preliminary adjustment

This adjustment consists on several short time tests that avoid the electrolyte to heat. The goal of this step is to reach the preliminary current **Ip** of the machine. Use a voltmeter, a chronometer and the dosing bottle.

IMPORTANT : The motor must be loaded like in real conditions.



3. Final adjustment



Caution : During adjustments, never turn the recycling valve on rotoric position nor under position 1.
Do not adjust anything when the starter is under power.

COMMISSIONING

- ✓ Switch off the power
- ✓ Check time relay adjustment (Running time of the pump)
- ✓ Check the connections between electrodes and wires
- ✓ Lock recycling valve
- ✓ Adjust the measured starting time and add a security (2 to 10 seconds)
- ✓ Pour the anti-evaporation oil in the tank
- ✓ Run a complete starting under control, and write starting parameters

$I_d = \text{ _____ } \text{ A}$
 $T_d = \text{ _____ } \text{ sec}$
 Total number of doses = $\text{ _____ } \text{ doses}$

- ✓ Fix hood and skirt to the starter.

MAINTENANCE



Caution : Unplug power before working on the equipment. Commissioning must be made by entitled personnel only

Important : Before each test : Put the casing on the starter in order to avoid contact with on potential parts.

Check twice a year :

- ✓ Electrolyte level : if it is too low, add water without electrolyte
- ✓ All connections
- ✓ Electronic components
- ✓ Starting quality

Change electrolyte every 3 years

Electrolyte neutralization

When removing electrolyte from the starter, the electrolyte containing soda, oil and anti-freeze must be stored and recycled.

As quantity of soda contained in electrolyte is low, electrolyte can be neutralized with nitric acid.

PARTICULARITY FOR R200P/T

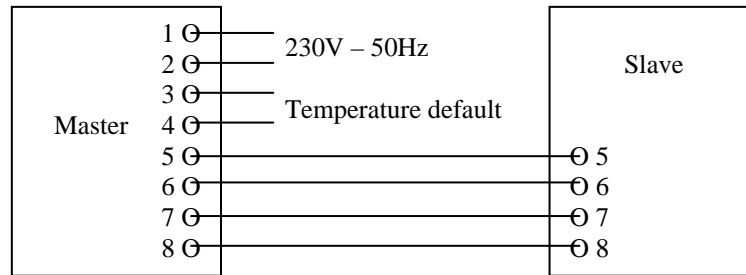
Principle :

The VectroStar R200P & R200T have been designed on the same principle than the other VECTROSTAR R except that they use 2 or 3 reserve tanks and 2 or 3 start tanks instead of 1. Their conception corresponds to the need of an higher thermal absorbtion. However, they only need one set of control devises (Time relay) and one short circuiter.

- ✓ The VectroStar R200P includes a Master unit (a VectroStar R200) and one Slave unit (a VectroStar R200 without Time Relay and without Short circuiter) electrically linked together.
- ✓ The VectroStar R200T includes a Master unit and 2 Slave units electrically linked together.

The principle is to get 2 or 3 times the same resistance in parallel so that all the devices will work in the same conditions to balance the power to be dissipated.

Wiring diagram



Electrolyte rising adjustment

The goal of this adjustment is to obtain the same electrolyte level at all time in every starter tank.

1. Switch off the power.
2. Adjust on the same manner, on each starter :
 - ✓ Recycling valve
 - ✓ Flow valve
3. Dismantle electrodes support
 - ✓ Tag support relative position with the tank
 - ✓ Unscrew the 3 mounting bolts
 - ✓ Dismantle the copper bars (short circuiter side only)
 - ✓ Remove the whole block *support + copper bars*
4. Run the pump and look at the rising in the starting tanks.

At all time, electrolyte level must be identical in all the starting tanks. To get this adjustment, the valves must be adjusted in the same manner. Use flow valve adjustment to get the good electrolyte rising.

5. Re-assembly electrodes support.

Starting adjustment

Adjustment and commissioning are identical as for a single starter.

TROUBLESHOOTING

In case of problem, refer to the following chart and try to diagnostic the trouble. You can also contact MDR customer service at the following address :



1, route de Semur
21500 Montbard

tél : 03 80 89 58 75

fax : 03 80 92 24 33

e-mail : power.resistor@mdresistor.com

Your motor					Check
Doesn't start	Démarré mal	Stops during starting	Stops during fonctionnement		
X		X	X		Control elements : Thermostat Relays
X	X	X	X		Load conditions : Inappropriate motor Too high ambient temperature Blocked rotor
	X		X		Time relay Connections
X	X	X	X		Control wires : Cut wire Untightened lug
X	X	X			The pump : Pump protection relay Capacitor
			X		Le short circuiter: Control voltage Magnetic circuit
X	X				Recycling valve position
X		X	X		Fuses

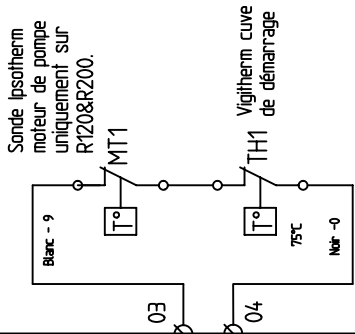
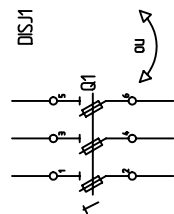
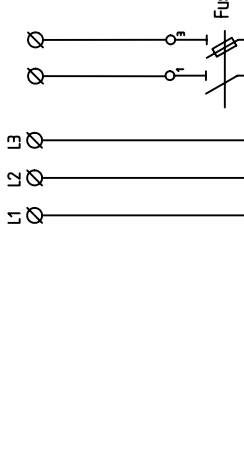
ANNEXURES

- ✓ Electrical schematics
 - ✓ R25 à R200
 - ✓ R200P
- ✓ Certificate of incorporation
- ✓ Declaration of conformity

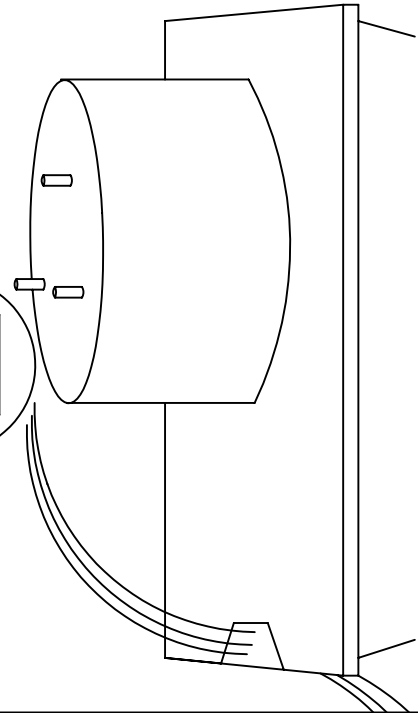
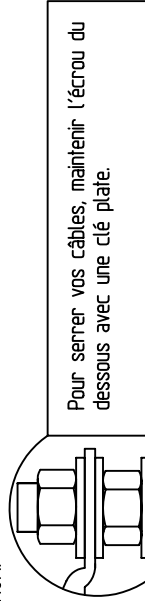
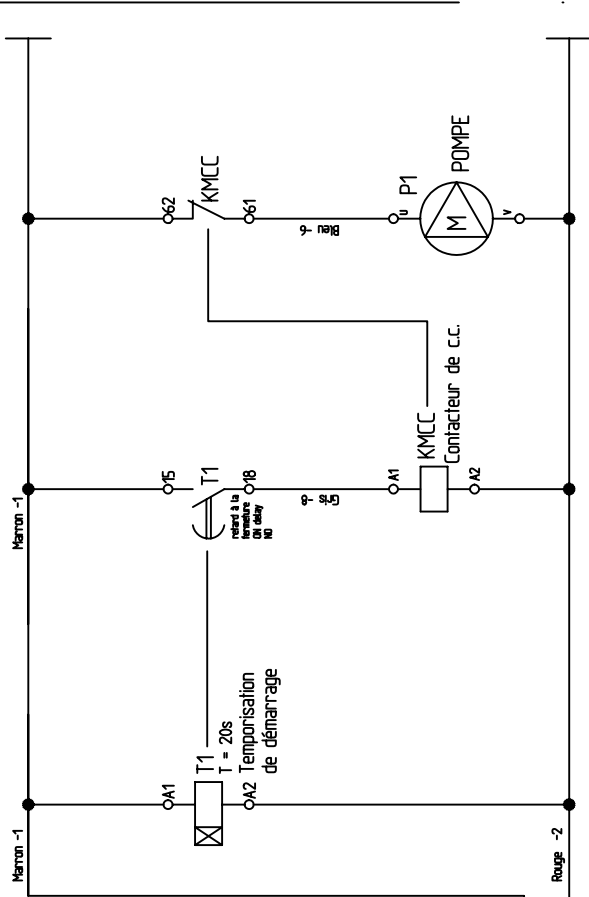
Chaîne de sécurité
Défaut température

230Vac
50/60Hz-2000VA

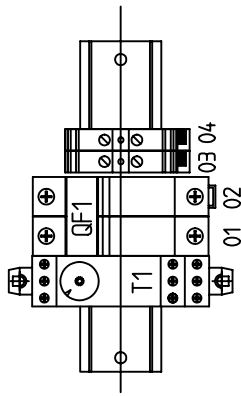
PUISSANCE
L1 L2 L3



Les câbles de commande sont des câbles souples 1mm2 noir.
Chaque câble est repéré par sa propre couleur ou le n° du code des couleurs correspondant.



DETAIL du bornier de commande



DEMARREURS ELECTROLYTIQUES

DRAWN BY : LB

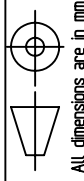
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DATE : 22/03/2004

SPECIFICATION :



METAL DEPLOYE RESISTOR
1, Route de Semur - BP 150
21501 MONTBARD - FRANCE



All dimensions are in mm

VECTORSTAR R25 à R200

MD QUOTATION REF. :

MD ORDER REF. :

MD DRAWING NB :

REVISION Nb. : 0

REVISION DATE :

MODIFICATIONS :

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CERTIFICATE OF INCORPORATION

Part of machine

The manufacturer,

METAL DEPLOYE RESISTOR
1, route de Semur
21500 MONTBARD

Declares that the part of machine described below :

Electrolytic starter VECTROSTAR R

Manufactured in MONTBARD by METAL DEPLOYE RESISTOR

Is a sub-unit to be incorporated in a machine or assembled with other machine units. The directive n°89/392/eee modified will be applicable to the machine created by this units assembly.

THE STARTER MUST NOT BE USED BEFORE BEING INCORPORATED IN A MACHINE COMPLIANT WITH THE DIRECTIVE.

Montbard, March 09th 2006

Mathias PARTHIOT
Project manager



CERTIFICATE OF CONFORMITY

The manufacturer,

METAL DEPLOYE RESISTOR
1, route de Semur
21500 MONTBARD

Declares that the part of machine described below :

Electrolytic starter VECTROSTAR R

Manufactured in MONTBARD by METAL DEPLOYE RESISTOR

is **compliant with CE directives applicable to this kind of machine.**

Montbard, March 09th 2006

Mathias PARTHIOT
Project Manager

