

Instruction manual for



iPM200-5 & iPM200-10 Equipment



Version 1.0.15

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iPM200 equipment

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1 Safety



THE ELECTRICAL INSTALLATION MUST ONLY BE DONE BY AN AUTHORIZED ELECTRICIAN.

This manual contains clearly marked symbols with Caution! and Warning! These are intended for your personal safety and to avoid accidental damage to product or attached devices.

Read the information carefully



Warning! High Voltage
Possibility of electric shock.



Caution! General warning
Risk of damage to the product or connected devices.
Please check the supplied topic reference.



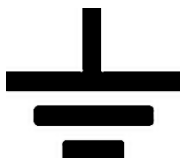
Caution! Hot surface
The ceramic electrodes in the cartridge can be extremely hot around 60-100°C, during corona treatment
When cleaning the cartridge after a production run, please let the cartridge cool for at least 10 minutes before cleaning.



Alternating current



Ozone
Exhaust airflow contains ozone.
See site preparation for more information



Earth
Ground terminal



Protective conductor terminal

1.1 Warnings



The components of the generator power unit is live when generator module is connected to the mains.
To get contact with this voltage is extremely dangerous and can cause death or serious injury.
The control module is isolated from the supply voltage.



If the Vetaphone equipment is used as part of a machine, it is the machine manufacturer's responsibility that the machine is equipped with a main switch and pre-fuse that comply with IEC 60947-1 and IEC 60947-3.

To comply with UL/cUL or ETL
The pre-fuses must be a Schneider Electric C25 3P 6KA UL or equal UL approved
The main switch must be a Ensto KSR3.60/U or equal UL approved



It can be extremely dangerous to touch the electrical parts even when the mains supply has been disconnected.

Wait at least 4 minutes after the input power has been removed before servicing the generator module.

Incorrect installation of the generator module may cause damage to the equipment, serious injury or death. Comply with the safety instructions in this manual as well as local and national rules and safety regulations.



Please consult the manual

1.2 Safety instructions



The Vetaphone is designed exclusively for permanent installations and is not intended for domestic use.



General warning

Risk of damage to the product or connected devices



Can be extremely dangerous to touch the electrical parts even when the mains supply has been disconnected.
Wait at least 4 minutes after the input power has been removed before servicing the generator.
Incorrect installation of the generator module may cause damage to the equipment, serious injury or death. Comply with the safety instructions in this manual as well as local and national rules and safety regulations.



Do not make measurements when the generator module is connected to the supply voltage.



Do not open the cover on generator module. Discharge of static electricity from your fingers, can damage the components. Opening the cover can also damage the device.
If the cover of the generator module is opened, it will void your warranty, unless it has been asked directly, by a Vetaphone technician



The VETAPHONE equipment must for safety reasons not be used by:

Employees not trained in the use of equipment and who have not been instructed on the safety aspects



The VETAPHONE equipment may for safety reasons not be used in:

1. HAZARDOUS atmospheres unless it is approved EXPLOSION-PROOF equipment
2. Dusty areas which could support combustion or explosion
3. Moist areas where electric shock could be caused.

NOTE!

If a fault protection relay is used, it must be of at least type B, preferably B+ (according to EN 50178), with a trip level of 300 mA.

This is for fire protection, not for touch protection in grounded systems.

The VETAPHONE equipment does not include the following safety aspects

EMERGENCY STOP:

The VETAPHONE equipment typically is only a small part of a larger installation, and is therefore not equipped with a separate emergency stop.

GUARDING OF ROTATING PARTS:

Rollers are not guarded. Guarding should be provided, where necessary by the user.

NOISE AND VIBRATION:

The user should make suitable arrangements during planning and installation, to keep noise and vibration to a suitable level.

ROTATION SENSING AND CONTROL OF ROLLER:

By deactivating of the rotation control system, the roller can remain stationary while the corona discharge is on. This can cause the roller covering and product to be burned through.

REMOVING OF ELECTRODE COVER

After mechanical removing of electrode cover for cleaning and maintenance, you must reinstall cover before switching on the Corona

TREATMENT OF ITEMS:

The dwell-time for treatment of items should be limited to avoid the material and the electrode being burned through

2 Technical data

AC line supply X19 (L1, L2, L3, PE)

	iPM200-5	iPM200-10
Supply voltage (L, L, L)	3Ph+PE: 3 x 220-300/380 - 520 VAC +/-10%	
Supply frequency	50/60 Hz	
Maximum input current	8.7Arms	17.5Arms
Maximum input power	5.75 kVA	11.5 kVA
Displacement Power Factor	> 0.95 at nominal output power	
Installation category	II	
Pollution degree	2	



Operation below 380Vac is possible with reduced load power.

Conforms to UL standard UL 61010-1
UL Standard for Safety Electrical Equipment For Measurement, Control, and Laboratory Use;
Part 1: General Requirements, Issued:2004/07/12 Ed:2 Rev:2008/10/28

Certified to CSA CSA C22.2#61010-1
Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
Part 1: General Requirements, with general instruction No. 1: 2008/10/28 - (R2009),
Issued:2004/07/12 Ed:2 (R2009)

To comply with UL/cUL

If the Vetaphone equipment is used as part of a machine, it is the machine manufacturer's responsibility that the machine is equipped with a main switch and pre-fuse that comply with IEC 60947-1 and IEC 60947-3.

The pre-fuses must be a Schneider Electric C25 3P 6KA UL or equal UL approved pre-fuse.

The main switch must be a Schneider Electric 63A 3P V3 or equal UL approved. Please consult the manufacture's specifications for details regarding installation.

Output data X18 (A1-A4, B1-B4,PE)

	iPM200-5	iPM200-10
Output voltage	380 - 520Vrms	
Output frequency	12 - 40 kHz	
Maximum output current (RMS)	15Arms	30Arms
Maximum output current (Peak)	60Apk	125Apk
Maximum power	5 kW	10 kW

iPM200 (X1)

USB_B

Only connect standard USB devices

iPM200 (X2)

USB_A

Only connect standard USB devices

iPM200 (X3, Customer I/O)

Terminal number 1, 2

Interlock 2 connection

For Interlock use only potential free contacts!

Terminal number 19

24 VDC Backup input

Terminal number 20

GND

Digital Inputs

Number of digital inputs Type 1

5

Configurable as

NPN, PNP

Terminal number Positive +

3, 5, 7, 9, 11

Terminal number Negative -

4, 6, 8, 10, 12

Voltage level, logic '1'

> 10 V DC

Voltage level, logic '0'

< 4,5 V DC

Input impedance

> 4,4 kOhm

Maximum input voltage

30 V DC

Digital inputs and outputs are galvanic isolated from the onboard circuit.

Digital Outputs

Number of digital outputs Type 2

3 Open collector outputs

Terminal number Collector

14, 16, 18

Terminal number Emitter

13, 15, 17

Useable for both

NPN e PNP

Max. voltage

30 V DC

Max. current

25 mA

Digital inputs and outputs are galvanic isolated from the onboard circuit.

Analog Input

Terminal number 21	4 to 20 mA or 0 to 10 VDC
Terminal number 22	Ground
Configurable for	4 to 20 mA
Voltage drop @ 20 mA	≤ 3.5 VDC
Configurable for	0 to 10 VDC
Input impedance	> 4.5 kOhm
Max voltage applied externally on terminals	24 V DC

Analog Output

Terminal number 23	4 to 20 mA or 0 to 10 VDC
Terminal number 24	Ground
RLOAD for 4 to 20 mA	≤ 500 Ohm
RLOAD for 0 to 10 VDC	≥ 1.2 kOhm

iPM200 (X4, Customer Relay output)

Terminal number 1	Relay K1- Common
Terminal number 2	Relay K2- Common
Terminal number 3	Relay K1- Normally Closed
Terminal number 4	Relay K2- Normally Closed
Terminal number 5	Relay K1- Normally Open
Terminal number 6	Relay K2- Normally Open
Contacts max load	500 mA @ 125 VAC 1.5 A @ 30 VDC

iPM200 (X5, Station I/O)

Terminal number 1, 2, 24, 26	Supply output
Max. output supply voltage	24 V DC
Max. output current	400 mA (total)
Terminal number 15	Logic ground
Terminal number 25	Supply output ground
Terminal number 27, 28	Interlock 1
For interlock use only potential free contacts	

Digital input

Number of programmable digital inputs Type 2	6
Block wise configurable as	NPN or PNP
Terminal numbers	9, 10, 11, 12, 13, 14
Voltage level, logic '1'	> 10 V
Voltage level, logic '0'	< 4.5 V
Max. voltage on input	30 VDC

Communication

Terminal number 7	RS485, signal A
Terminal number 8	RS485, signal B

Digital output

Number of digital output Type 3	8
Terminal numbers	16, 17, 18, 19, 20, 21, 22, 23
Open drain outputs with no reverse voltage protection	
Voltage	0 to 30 V DC
Current load max	0,5 ADC

iPM200 (X6, RS485)

Terminal number 1, 2, 9, 10	Supply ground
Terminal number 3 & 4	Supply output, 24 V DC
Terminal number 5 & 6	RS485, signal A
Terminal number 7 & 8	RS485, signal B
Max. supply output voltage	Supply output, 24 VDC
Max. output current at supply output	400 mA

iPM200 (X7, Feedback)

Terminal number 1	Feedback input, signal B
Terminal number 2	Feedback input, signal A
Terminal number 3, 4	Not connected
Terminal number 5	Peak detection input, signal B
Terminal number 7	Peak detection input, signal A
Terminal number 6, 8	CHASSIS/SCREEN

iPM200 (X8/X9, FieldBus)

Optional for CAN or Profi bus, see separate documentation.

iPM200 (X22, 24Vdc Output)

Terminal number 1 & 2	+24V
Terminal number 3 & 4	GND
Max. output current	1.1Adc

Mechanical dimension (iPM200 generator module)

Length	440 mm
Width	260 mm
Height	202 mm
Weight	15.9 kg

Ambient conditions

Enclosure	IP20
Altitude	< 2000m
Max. relative humidity	5% - 85% during operation
Ambient temperature, during operation	Max. 40°C 24-hour average max. 40°C
Min. ambient temperature during full-scale operation	0 °C
Temperature during storage/transport	0 °C to +65°C
EMC standards used, Emission	EN55011 (2007) +A2 Group 2, Class A (EDM).
EMC standards used, immunity	EN61000-6-2 (2005), EN61000-6-4 (2007)

3 EC declaration of conformity

4 Warranty

The warranty covers only manufacturing defects. The manufacturer assumes no responsibility for damage sustained during or as a result of transportation, receipt of delivery, installation, commissioning or use.

The manufacturer cannot in any way or under any circumstances be held responsible for damage or defects resulting from misuse, improper installation, unacceptable ambient temperature, dust, corrosive substances or operation outside the given specifications.

Likewise, the manufacturer cannot be held responsible for consequential damages.

Wearing parts, such as ceramic electrodes, rotation sensor, insulators, bearings etc., are not covered by this warranty.

Defective components will be exchanged free of charge during the warranty period, provided that the fault can be traced back to Vetaphone, and provided that the damaged part is returned to Vetaphone. As well as the working hours used by a Vetaphone technician repairing the delivered equipment. Charges for technician's transportation and accommodation are not covered.

The warranty does not cover failures or loss of production in which the equipment is used, nor does it cover any loss in profits or other indirect losses arising from any such failure in the supplied equipment.

This Vetaphone guarantee is not valid if the terms of payment are not fulfilled.

Factory warranty is 13 months from delivery or 12 months from the date of start-up in production, whichever expires first (Orgalime S2014)

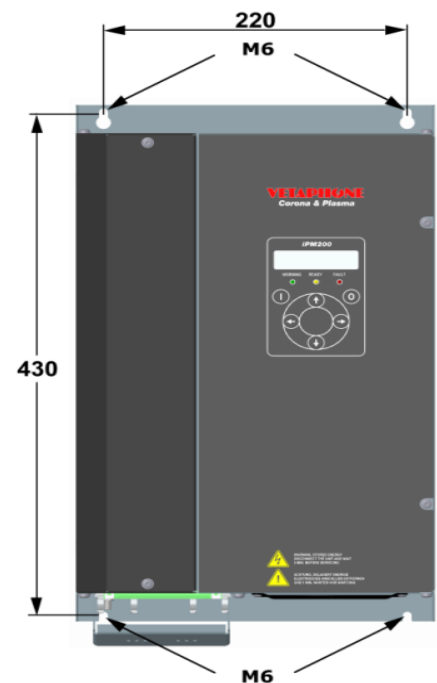
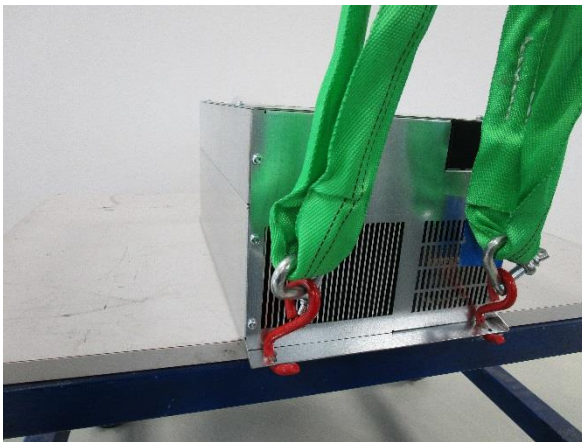
For questions regarding warranty, please contact Vetaphone.

5 Transportation, Handling and Installation

Generator

5.1 Transportation and handling

- Prior to installation and putting into service, check all parts for transit damage. A damaged generator is a potential safety hazard and, therefore, should not be put into service.
- Do not store the generator unprotected in the open (protect against moisture).
- Attach hoist securely to the upper keyholes, using 5-6 mm hooks. Only use hoists and load suspension devices with sufficient load-carrying capacity. Secure the route of transportation.



- Mount securely to a level and firm surface at the place of use, making sure that the surface has adequate loadbearing capacity.
- Prepare the surface by placing the two lowest bolts in it. Not tightened, just so they are in place in the surface. The generator is prepared with two recesses in the bottom. Hold the bottom of the generator towards the surface and lower the generator so the two bolts slide into the recesses.
- When the generator is carried by the two lower bolts, gently push the top of the generator up towards the surface.
- While supporting the generator with one hand, remove the two hooks and push the generator all the way up to the surface.
- Fit the two upper bolts in the free keyholes where the hooks used to sit, and tighten all four bolts.

5.2 Mechanical installation

The Vetaphone iPM200 generator module uses forced air-cooling and thereby have to be mounted vertically on the wall, inside the customer enclosure with 4 x M6 screws. Use the mounting holes in the top and bottom of the generator module, see figure 5.2

The enclosure that the generator module is installed in **MUST** at least be IP20.

Generator must be mounted inside an enclosure and the enclosure must meet the minimum distance requirements of table 5.2.1 for instalment without extern ventilator or the requirements of table 5.2.2 for instalment without with ventilator

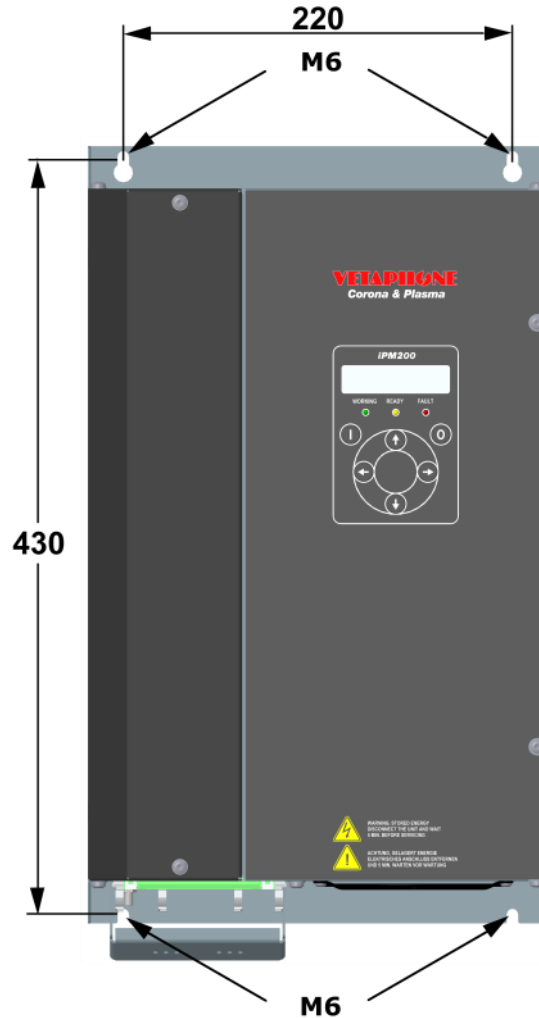


Figure 5.2: Mounting of the iPM200 module.

Forced air-cooling cools the Vetaphone generator module. For proper cooling, allow a minimum of open space around the unit.

See table 5.2.1 for installation without extern ventilation or table 5.2.2 for installation with extern ventilation installed.

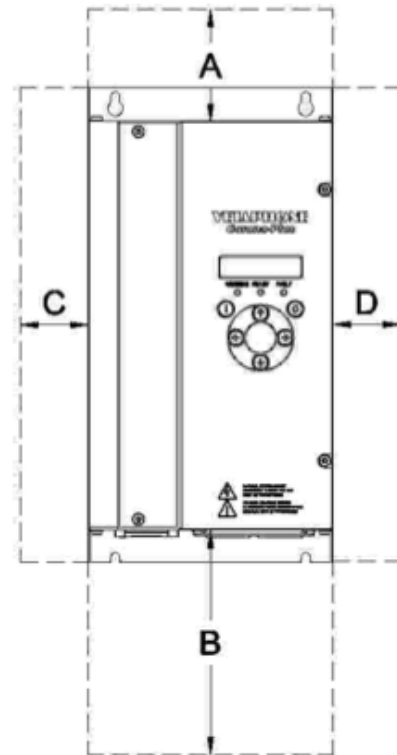
To protect the unit from overheating, ensure that both the ambient temperature and the 24-hour average temperature are not exceeded. The maximum temperature and 24-hour average are listed in *technical data* in this manual.

Minimum distances without extern ventilation installed				
Type	Dimension (mm)			
	A	B	C	D
iPM200	100	200	10	10

Table 5.2.1: Dimensions, required for adequate air circulation and cooling without extern ventilation installed

Minimum distances with extern ventilation installed				
Type	Dimension (mm)			
	A	B	C	D
iPM200	20	200	3	10

Table 5.2.2: Dimensions, required for adequate air circulation and cooling with extern ventilation installed



5.3 Cable connection

For information on electrical installation, please see the chapter "Electrical documentation"

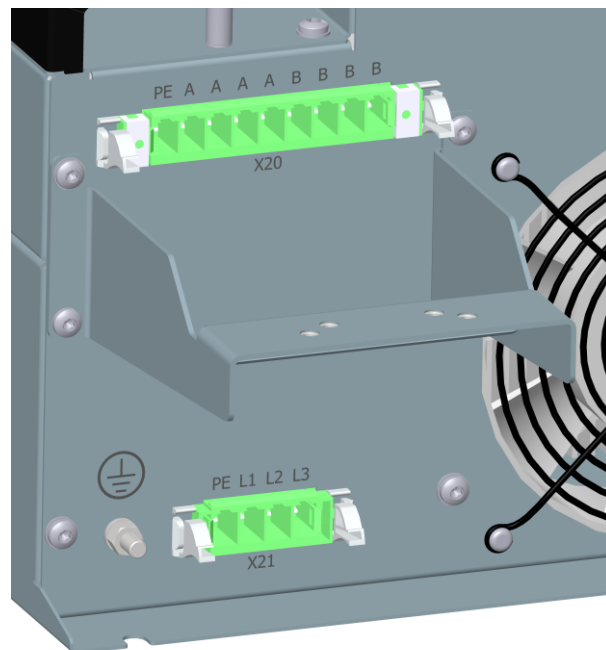
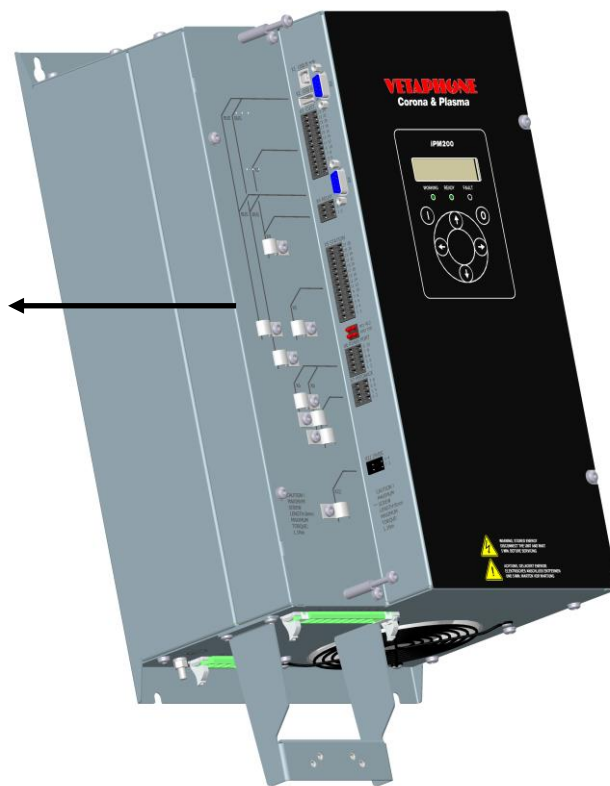
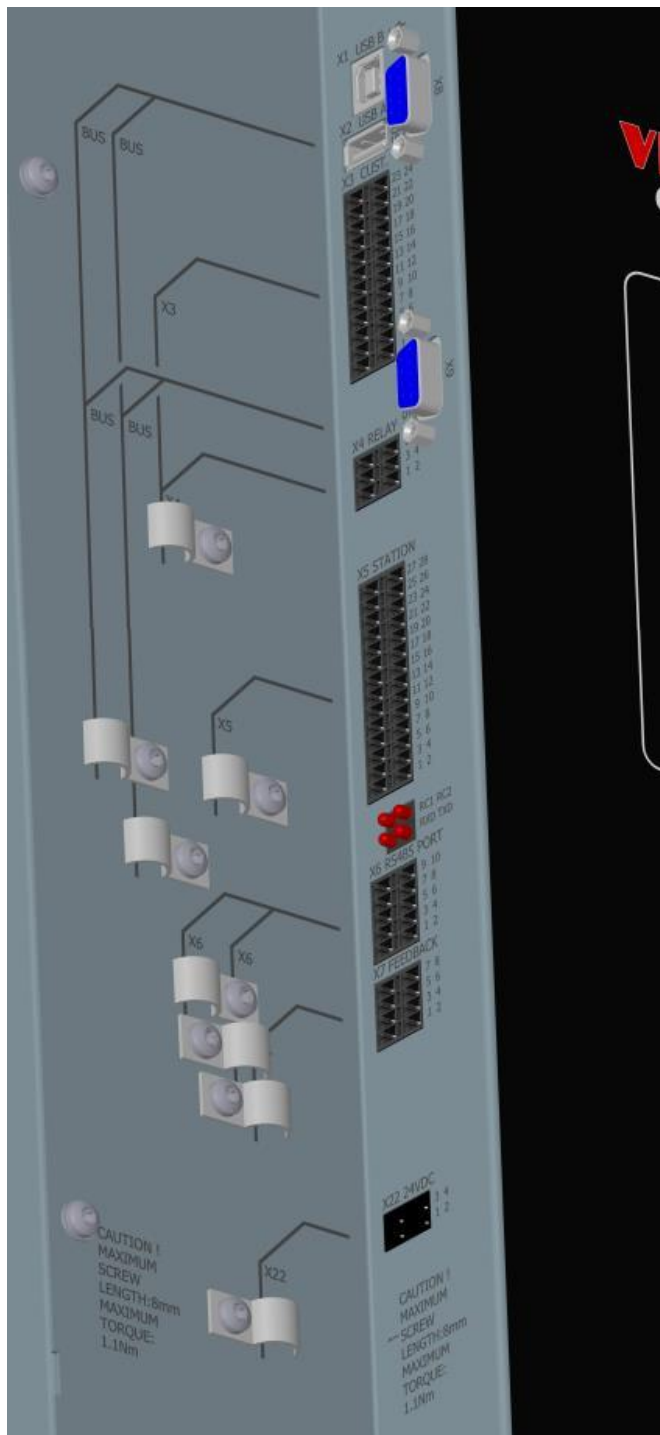


Figure 5.2 Terminals on the iPM200

Terminal name	Cable	Description
X1 - USB B	Vetaphone service port	Used by Vetaphone technician
X2 - USB A	Customer USB interface	For download of log files and up-/download of software
X3 - CUST.	Customer interface connection	Customer control of generator input and output
X4 - RELAY	Relay interface connection	Alarm relay
X5 - STATION	STATION CABLE	(Standard but please refer to - electrical diagrams) The station-cable is a screened cable that is connected to generator and station. It is a multi function cable, that carries information from auxiliary components such as information about safety switches and rotation control.
X6 - RS485 PORT	REMOTE CONTROL	(If included - See order confirmation) A remote control is connected to the -X6 terminal on the generator. Several remote controls can be connected in parallel on the 5 wires in -X6.
X7 - FEEDBACK	MULTI CABLE	The multi-cable is a screened cable that is connected between the transformer and X7 terminal on the generator. This cable carries overload and feedback information from the transformer to the generator control.
X8 & X9 FIELDBUS	BUS INTERFACE	Used for connection of PROFIBUS (X8) or CANBUS (X8)
X22	24Vdc Output	24Vdc Auxiliary supply
X18	HA-CABLE	The HA-cable is a screened power cable that is connected to generator and-transformer. Please do not shorten the length of the HA cable, unless accepted by a Vetaphone technician.
X19	MAINS CONNECTION	Apply the correct mains supply to the equipment. The correct mains voltage is stated in the order confirmation and on the generator rating plate (also indicating name of model and serial number). The mains cable is connected to the supplied connector and mounted in X19 on the iPM200 generator module. Safety earth must be connected at the mains connection terminal. To meet the UL guidelines (Underwriters Laboratories), a UL-approved copper cable with a minimum thermal resistance of 70°C should be used.

5.3.1 Cable installation

Please note that all screened cables should have the outer jacket stripped around the support clamp, see picture

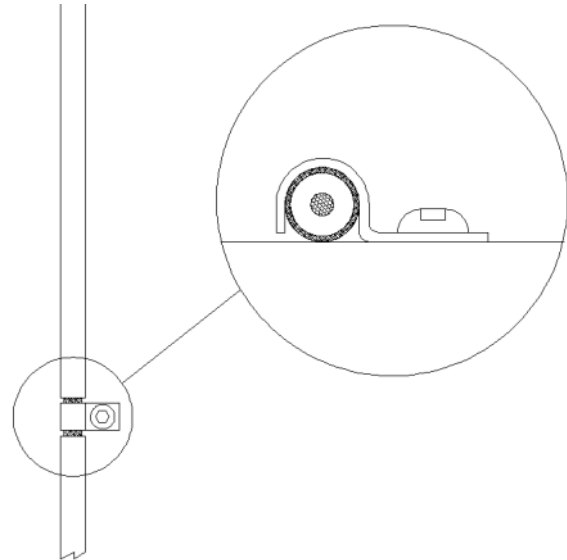


Figure 5.3 Stripped cable for screening

OZONE EXTRACTION FAN


The fan can be connected to an external mains supply, having the voltage specified in the order confirmation. It is important that the fan continues to extract air from the station for another 20-60 seconds after the corona discharge has stopped, for cooling of electrode bars and removing the remaining ozone.

Unless specified otherwise in the electrical diagrams, a 24VDC relay for controlling an ozon extraction fan can be connected between Digital output 9- (X3-13) and Digital output 9+ (X3-14) (opto-coupler output) on the generator. When the generator is switched ON the output is activated, but the generator itself remains on STAND-BY until the airflow is correct (typically 10 sec).

The opto-coupler Digital output 9 (X3-13 and X3-14) has a maximum current rating of 25 mA, and should not be subjected to more than 30 VDC

EARTH WIRING

The earth cable (yellow/green) comes with the equipment as one complete piece, together with a number of cable shoes. It is IMPORTANT that the cable is connected between station

and transformer, at the screws marked  (earth connection).

The cable is to be kept as short as possible.

For safety purposes, the conductivity of the earth wiring must be verified after installation.

6 Checklist – Start up

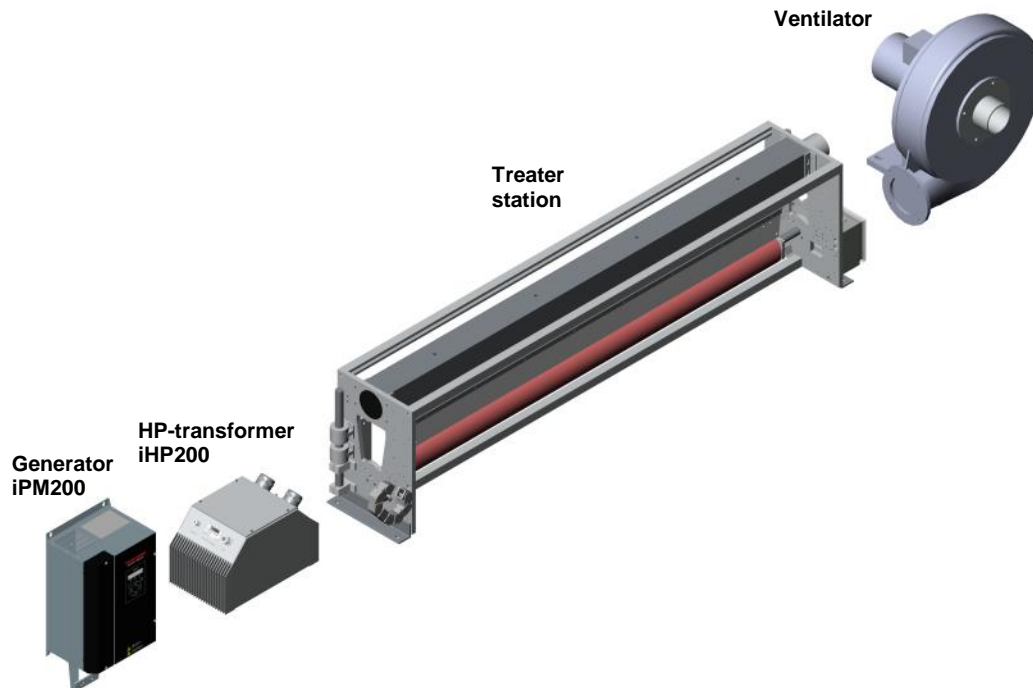
GENERATOR:

- 1) Is the generator mounted at the desired location?
- 2) Is the mains cable supplied and connected correctly to terminal -X19
and does it carry the correct voltage?
Voltage and recommended prefuse, see cable drawing diagram.
- 3) Is the HA-cable (do not shorten) connected correctly to terminal -X18?
- 4) Is the MULTI cable mounted correctly to terminal -X7?
- 5) Is the STATION cable connected correctly to terminal -X5?
- 6) Is the remote-control panel (if supplied) mounted and connected correctly to terminal -X6?

7 General information

7.1 The corona equipment

In order to improve the adhesion on a web surface the web is moved through a treater station in which an electrical energy, called the Corona, is discharged on the surface of the web.



Example of a corona equipment

The equipment is composed of 4 basic parts: a generator module (power module), a high voltage transformer, treater station and an exhaust system (optional). The pre-treatment itself is carried out in the treater station, where a system of electrodes gives an efficient electrical discharge on the film. The electrical power comes from the generator and the high voltage transformer. During the discharge in the treater station, heat and ozone are created, which is why an exhaustion of the air in the treater station is necessary.

The electrical system consists of a strong power supply, ensuring an efficient DC tension to the output stage. The output amplifiers are designed with IGBT transistors in order to ensure a reliable working of the high effects. The output signal from the generator is connected to the high voltage transformer, which step up the power to the electrodes.

The control and monitoring parts are taken care of by a generator, to which the remote control/BUS interface and the control signals are connected.

The electrical Corona principle is centered around a resonant circuit, that the web material is a part of. The working frequency of the electronic system is controlled automatically by a feedback system to a frequency between 10 - 40 kHz. This ensures a maximum efficiency and thus an optimum pre-treatment.

The Corona effect comes from a specially designed iHP-transformer with a minimum power loss and optimum output voltage. The discharge emanates from the electrodes on to the film surface on the roll. The generator output power is controlled by a pulse width-modulation principle (PWM-power). Keeping the power supply constant to the IGBT-switch-transistors and adjusting the power –i.e. the treating effect - according to the time factor. This way you avoid the dangerous high tension potential, which causes pinholes.

7.2 Operating the iPM200

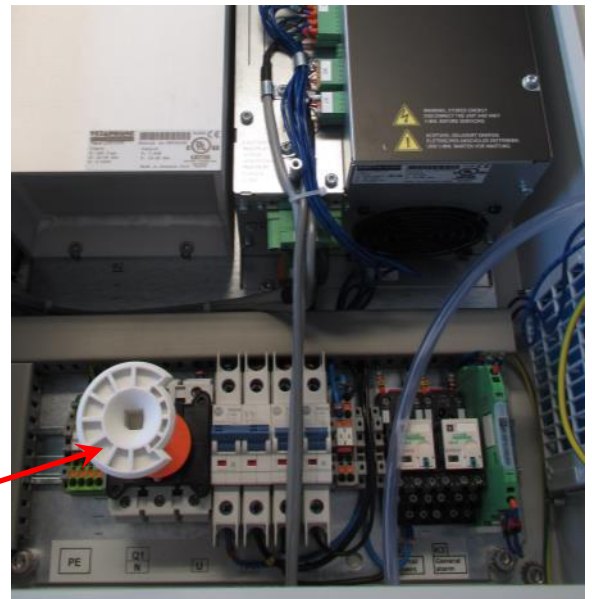
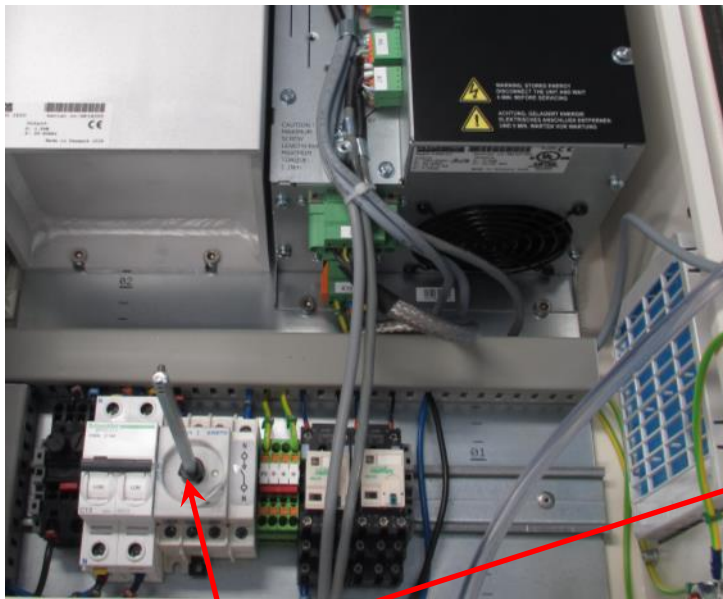
In case the iPM200 module is built into a cabinet and parameters needs to be changed, please proceed as follows:



Warning! High Voltage

The following operation may only be done by qualified and trained personnel

1. Switch OFF the mains supply by turning the ON/OFF switch in OFF position.
2. Wait at least 4 minutes to ensure all internal components have discharged.
3. Unlock and open the cabinet door.
4. By means of a wrench key turn the extension shaft in ON position (clockwise) in order to power up the iPM200 module.
5. Change the desired parameter accordingly to this chapter. When the parameters are stored, power off the module by turning the extension shaft in OFF position (counter-clockwise).
6. Close and lock the cabinet door. Turn the ON/OFF switch in ON position.



Examples of extension shaft



Warning! High Voltage

Possibility of electric shock.
Do NOT touch any other components than the extension shaft and the iPM200 control panel

7.2.1 Control unit

On the front of the iPM200 generator, there is a control panel.

LCD Display

Status LEDs

**OPERATION
and
NAVIGATION
KEYS**

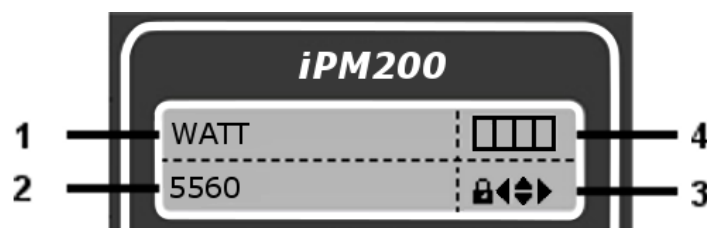


The control panel is divided into three sections:

- 1) LCD Display
- 2) 3 Status LEDs
- 3) Keys for operating, navigating the menu and changing parameters.

7.2.2 LCD Display

The LCD is divided into 4 sections



1. Menu title
2. Current value
3. Navigation Icons
4. Status Icons

7.2.3 Status LED

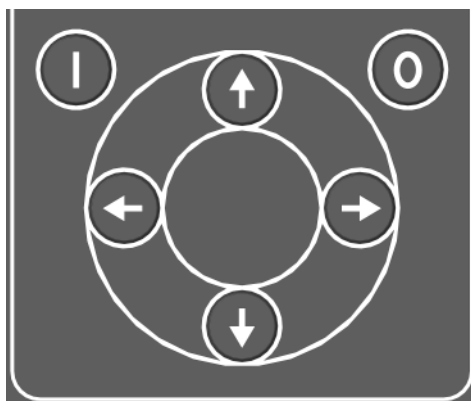


As a supplement to the display, there are three LEDs for indication of electrical signals (READY), (WORKING) and alarm (FAULT).

Most of the iPM200 parameters can be changed immediately via the control panel, unless this function is locked. An access code will then be required, and can be obtained from Vetaphone service department.

LED	STATUS	FUNCTION
Working	ON (yellow)	Corona output
Ready	ON (green)	Generator ready to operate
Ready	Blinking (green)	In automatic mode, rotation signal is missing
Fault	ON (red)	Error

7.2.4 Control keys



Start button

- Starts the generator



Stop button

- Stops the generator or clear error



Arrow UP

- Scroll upwards through the menu topics or
- Increase the editable value



Arrow DOWN

- Scroll downwards through the menu topics or
- Decrease the editable value



Arrow LEFT

- Go backwards in menu or
- Cancel the changed value

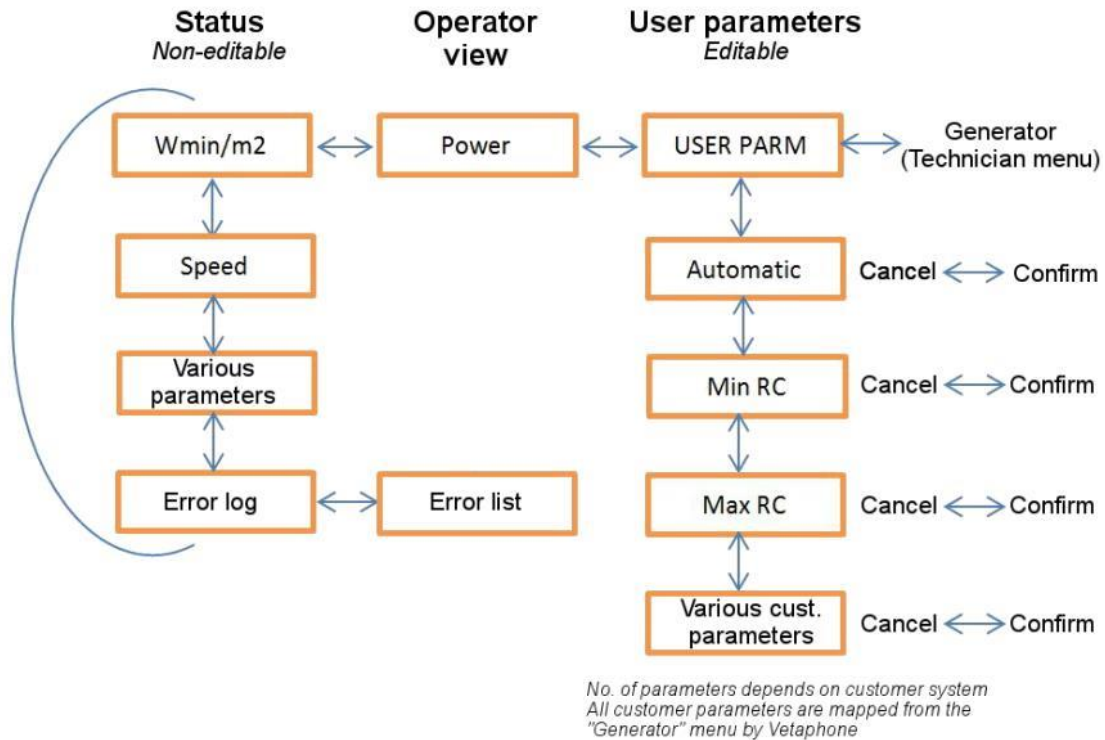



Arrow RIGHT

- Go forwards in the menu topics or
- Confirm the changed value
- Edit parameters



7.2.5 Menu structure user

The menu structure is as shown in the below picture.



To change a parameter press  (right arrow) once and the value will start to blink.

Use the  (up arrow) or  (down arrow) to change the value.

Confirm by pressing the  (right arrow). Alternatively press  (left arrow) to cancel the changed value.

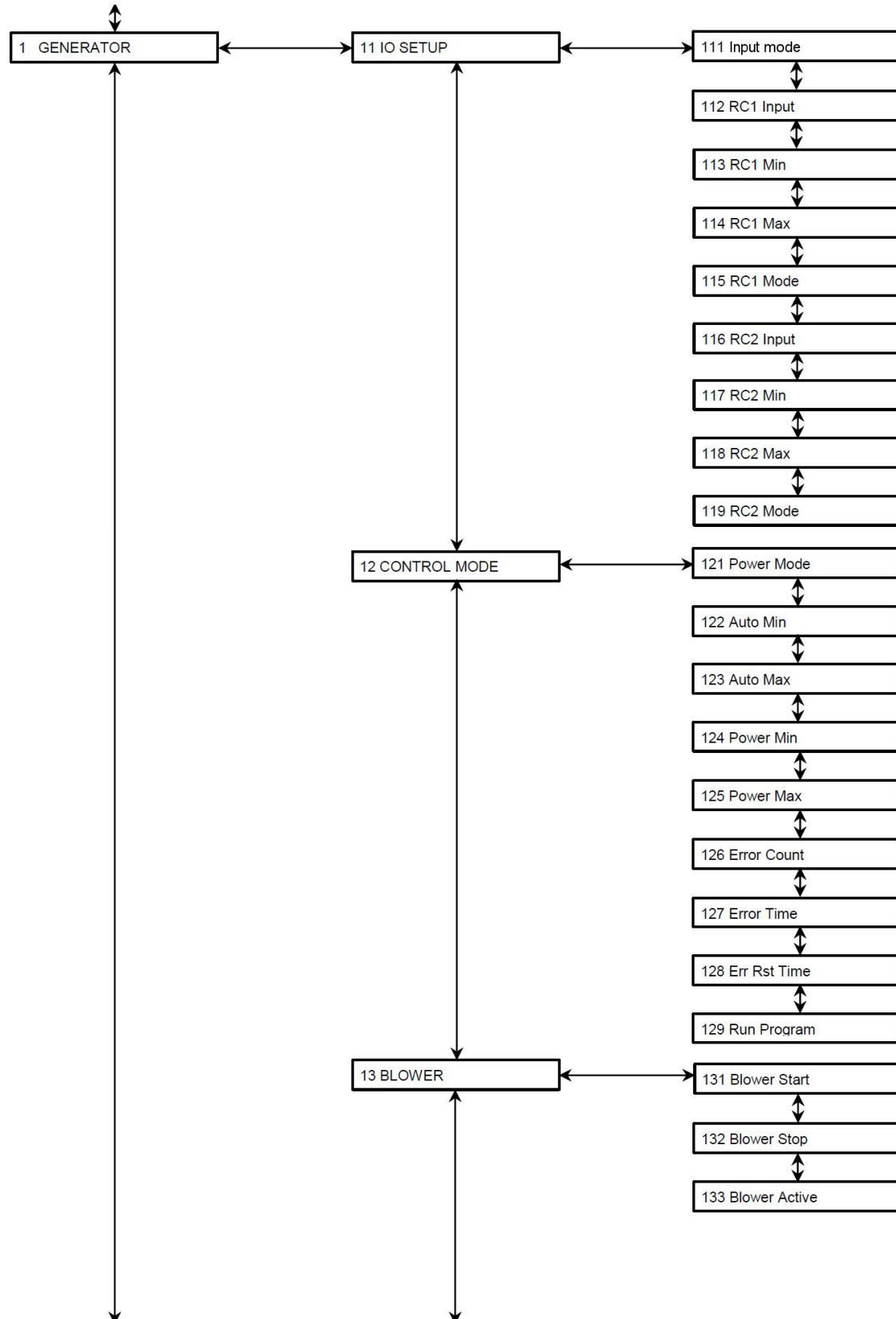
In the **Status** menu the parameters can NOT be changed and are for status show purpose only. The user may scroll through the menu with the UP and DOWN arrow.

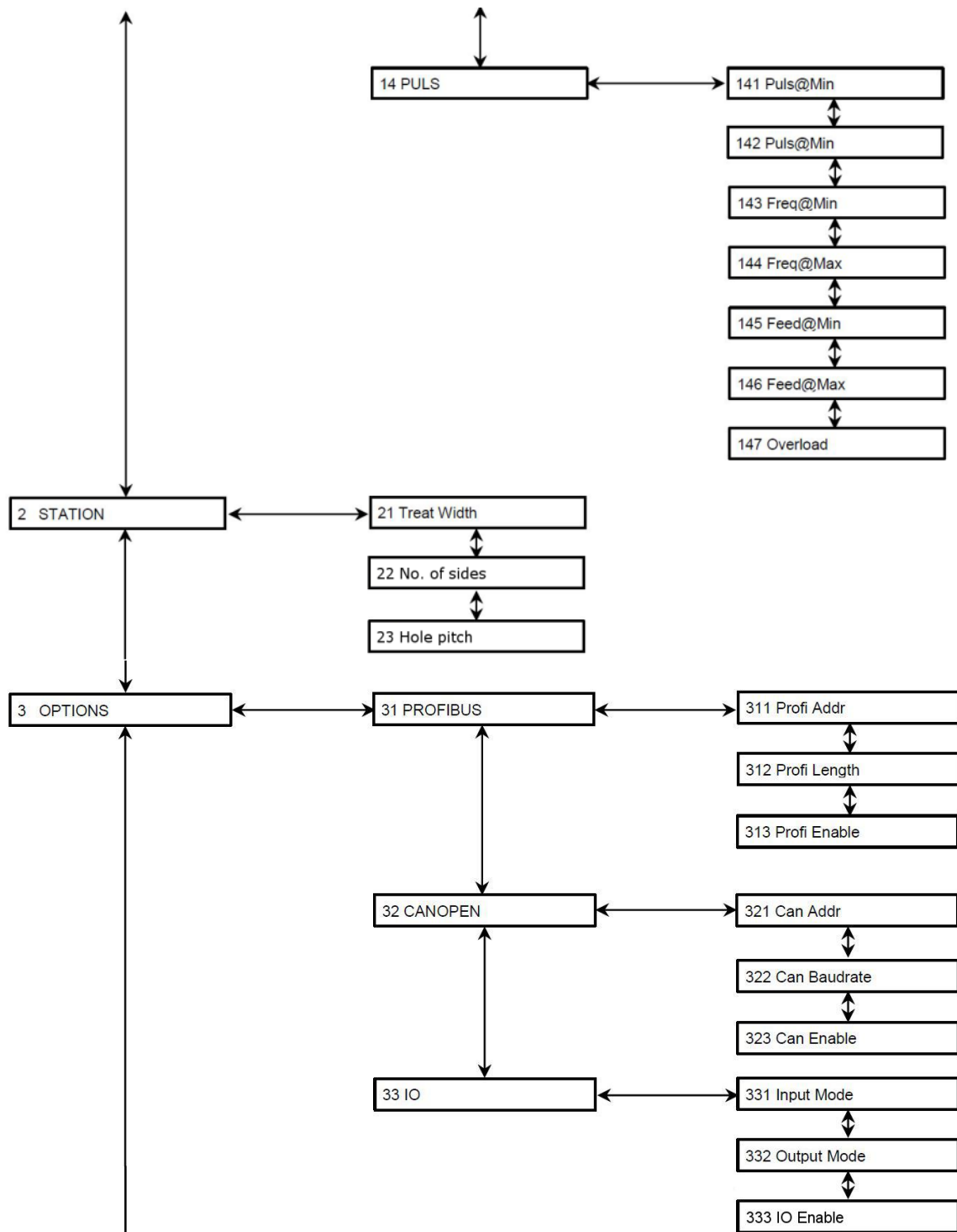
In the **Operator view** the power parameter (Watt or Wmin/m²) is shown, depending on system setup

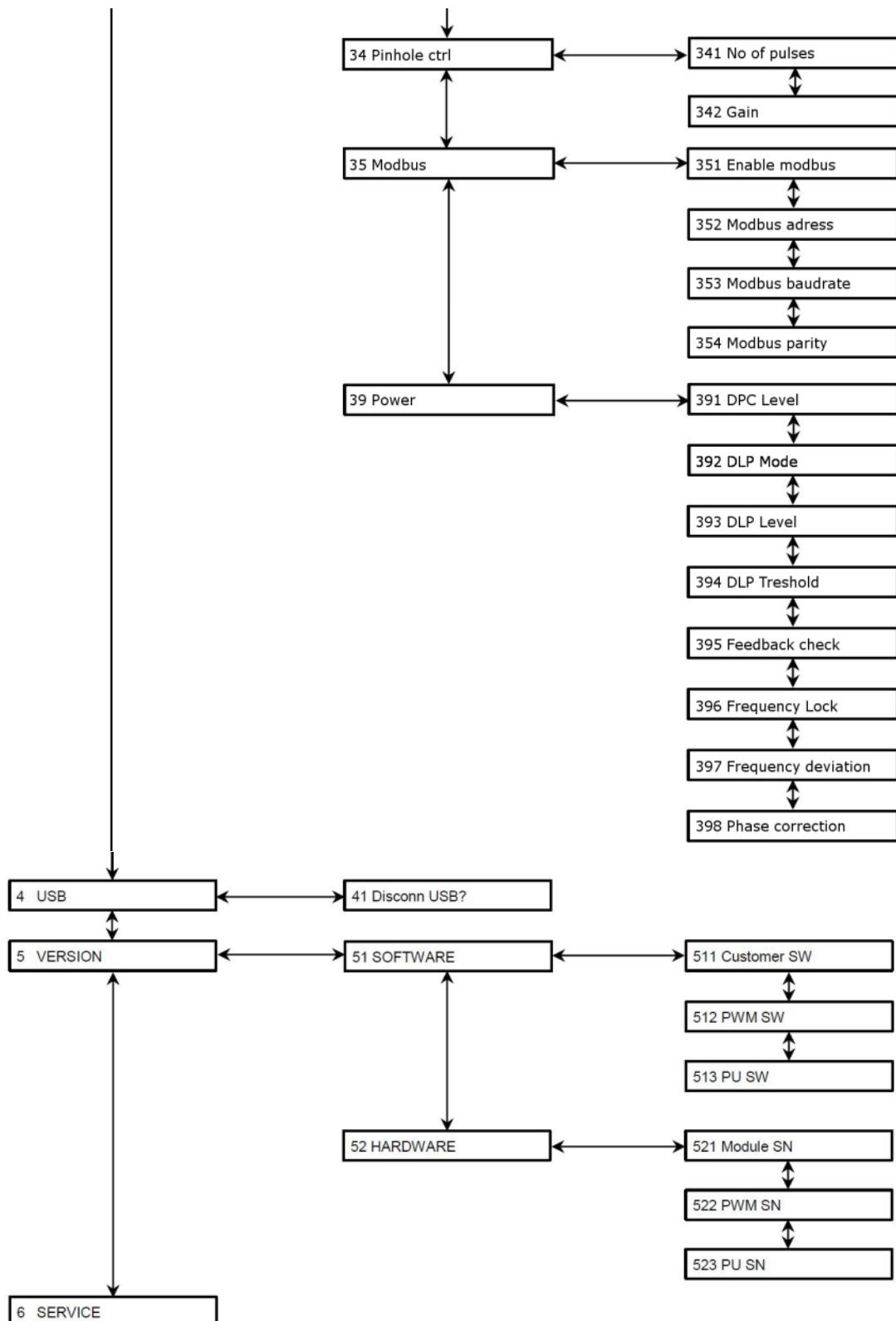
In the **User parameters** the user can scroll UP or DOWN through the submenus.

7.2.6 Menu structure technical level

This menu is editable for Vetaphone approved technician only, but the user can scroll through the menus to see the values. The values are protected by a code, which can be obtained from the Vetaphone's service department if required. Menu structure is shown below.







7.3 System parameters

All * menus are protected by a user access code which is 246813

All § menus are protected by a technician access code.

Menu No.	Title	Description
1	GENERATOR	Menu
1.1	IO SETUP	Submenu
1.1.1*	Input mode	Configure Polarity of inputs (NPN, PNP)
1.1.2*	RC 1 Input	Configure Type of rotation sensor (NPN, PNP, NAMUR)
1.1.3*	RC 1 Min	Configure minimum rotation speed
1.1.4*	RC 1 Max	Configure maximum rotation speed
1.1.5*	RC 1 Mode	Configure Rotation control (0=OFF / 1=ON / 2=AUTO)
1.1.6*	RC 2 INPUT	Configure Type of rotation sensor (NPN, PNP, NAMUR)
1.1.7*	RC 2 Min	Configure minimum rotation speed
1.1.8*	RC 2 Max	Configure maximum rotation speed
1.1.9*	RC 2 Mode	Configure Rotation control (0=OFF / 1=ON / 2=AUTO)
1.2 §	CONTROL MODE	Submenu
1.2.1§	Power Mode	Configure system to run in Power mode (watt) or in W*min/m2 mode
1.2.2§	Auto Min	Automatic Power Control Min. watt*min/ m2
1.2.3§	Auto Max	Automatic Power Control Max. watt*min/ m2
1.2.4§	Power Min	Min. total output power in kW
1.2.5§	Power Max	Max. total output power in kW
1.2.6§	Error Count	Error counts before alarm
1.2.7§	Error Time	Error time before restart in 1 second
1.2.8§	Err Rst Time	Error time before reset in 1/10 second
1.2.9§	Run Program	
1.3	BLOWER	Submenu
1.3.1	Blower Start	Blower start delay in seconds
1.3.2	Blower Stop	Blower stop delay in seconds
1.3.3	Blower Active	Activates blower

Menu No.	Title	Description
1.4§	PULS	Submenu (This menu is locked. Vetaphone technician access only)
1.4.1§	Puls@Min	Min PWM threshold at minimum Power
1.4.2§	Puls@Max	Max PWM threshold at Maximum Power
1.4.3§	Freq@Min	Max Allowed Frequency at Minimum Power
1.4.4§	Freq@Max	Min Allowed Frequency at Maximum Power
1.4.5§	Feed@Min	Min Allowed Feedback threshold at Minimum Power
1.4.6§	Feed@Max	Max Allowed Feedback threshold at Maximum Power
1.4.7§	Overload	Over current protection threshold
1.4.8§	PID Enable	PID Power regulation
1.4.9§	Peak Enable	Flashover detection
1.5	DATE / TIME	
1.5.1	Date	Set date
1.5.2	Time	Set time
1.6	DISPLAY§	
1.6.1	User menu en§	Enable custom user menu
1.7	SELF-TEST	
1.7.1*	Extern self-test	
1.7.2	Reset internal self-test	
1.8*	UNIT	
1.9	POWER	
1.9.1*	Min. DLP	Minimum limit when DLP enabled
1.9.2*	DLP AUTOTUNE	Autotune enable/disable in DLP
1.9.3*	FB Amplitude	Feedback amplitude check enable/disable
1.9.4*	Max Amp faults	Maximum number of amplitude faults
1.9.5*	FB ZeroCross	Feedback ZeroCross check enable/disable
1.9.6*	Max ZC fault	Maximum of missing zero cross
1.9.7*	Gen.. Mode	Generator mode (standalone, master or slave)
2	STATION	Menu
2.1*	Treat width	Treating width in millimetres
2.2*	No. of sides	No. of sides to be treated
2.3*	Hole Pitch	Distance between pitch holes on roller
3	OPTIONS	Menu
3.1	PROFIBUS	Submenu
3.1.1*	Profi Addr	Profibus node address (default 10)
3.1.2*	Profi Length	Select data length 2-byte, 8-byte or 16-byte (The length is locked to 8-byte)
3.1.3§	Profi Enable	Activate or deactivate the PROFIBUS interface
3.2	CANOPEN	Submenu
3.2.1*	CAN Addr	CANOpen Node id (default 10)
3.2.2*	CAN Baudrate	Select communication speed for the CANBUS interface
3.2.3§	CAN Enable	Activate or deactivate the CANBUS interface
3.2.4*	CAN Auto start	CANbus interface automatically goes to operational mode. no need for NMT manager

3.3	IO	Submenu
3.3.1	Input Mode	Select mode 0-10V or 0-20mA or 2-10V or 4-20mA
3.3.2	Output Mode	Select mode 0-10V or 0-20mA or 2-10V or 4-20mA
3.3.3	IO Enable	Activate or deactivate the IO interface
3.4	Pinhole ctrl	Submenu
3.4.1*	No of pulses	Number of pulses, before a reject signal
3.4.2*	Gain	In- or decrease the amplification of the feedback signal
3.4.3*	SKIP mode	Enable skip mode
3.4.4*	Max pinholes	Limit for allowed pinholes
3.4.5*	FB Chk delay	Delay for feedback check
3.4.6*	FB Chk count	
3.5	Modbus	
3.5.1§	Enable Modbus	Enables the Modbus interface (Note, it's not possible to run with both an TF415 and the Modbus interface at the same time)
3.5.2*	Modbus Address	Sets the Modbus slave address (1-127) (Note, has to be set prior to enabling the interface)
3.5.3*	Modbus Baud rate	Sets the Modbus baud rate, (Note, has to be set prior to enabling the interface)
3.5.4*	Modbus Parity	Sets the Modbus parity mode, (Note, has to be set prior to enabling the interface)
3.5.5*	Modbus PollTime	Set the timeout time. (Note, has to be set prior to enabling the interface)
3.5.6*	Modbus Dev type	Set which device is connected. (Note, has to be set prior to enabling the interface)
3.6	UNITS	
3.6.1	Unit 1 type	Unit 1 type
3.6.2	Unit 1 tddr	Unit 1 address
3.6.3	Unit 2 type	Unit 2 type
3.6.4	Unit 2 tddr	Unit 2 address
3.6.5	Unit 3 type	Unit 3 type
3.6.6	Unit 3 tddr	Unit 3 address
3.6.7	Unit 4 type	Unit 4 type
3.6.8	Unit 4 tddr	Unit 4 address
3.9*	POWER	Submenu
3.9.1*	DPC Level	DPC power mode. 0 = Max., 1-3 < stepwise power
3.9.2*	DLP Mode	Dynamic Low Power mode selection
3.9.3*	DLP Level	Dynamic Low Power Level, meaning of this parameter depends DLP mode
3.9.4*	DLP threshold	DLP threshold in watt, DLP function activates when requested power are below this level
3.9.5*	Feedback chk	Turns on or off check for transformer Feedback.
3.9.6§	Autotune	Enable autotune
3.9.7*	Freq. devia.	Allowed frequency deviation
3.9.8*	Phase corr.	Phase correction for Autotune
3.9.9*	NAL delay	Delay for Level alarm checking
4	USB	Menu
4.1	Disconn USB?	Disconnection of USB-stick (Note: Menu 4 has been removed from firmware version 5.20)
5	VERSION	Menu
5.1	SOFTWARE	Submenu
5.1.1	Customer SW	Customer software version
5.1.2	PWM SW	PWM software version
5.1.3	PU SW	PU software version

5.2	HARDWARE	Submenu
5.2.1	Module SN	Module Serial Number
5.2.2	PWM SN	PWM Serial Number
5.2.3	PU SN	PU Serial Number
5.2.4	PWM REVISION	PWM Revision
6	SERVICE	Special menu (locked) for Vetaphone technician
7	UPGRADE	Submenu
7.1	USER PROGRAM	upload/update internal customer program
7.2	PARAMETERS	upload/update parameters
7.3§	Factory Reset parameters	
7.4§	Reset to default parameters	

7.4 Error indications

When an error occurs, the menu will automatically show the error code

All errors are cleared by pressing the "0" (stop) button. The generator will then return to the Operator view.

If a remote TF415/iCC7 is connected to the iPM200:

7.4.1 Error codes and troubleshooting

Error Code	Description	Possible Solution
E - 1	High temperature in Generator	Check that the internal cooling fans operate correctly, and that they are not blocked with dirt. Check for high ambient temperature Check for easy airflow around the generator.
E - 2	Overload: Too high output current from the generator.	Electrode adjusted too close to roller. Overload can also be caused by a flash over in the treater station Clean insulators and electrode. Adjust electrodes, see station manual .
E - 3	No HF Feedback from transformer	Clean electrode and insulators, 80% of E-3 errors are caused by this. The air gap distance between electrode and backing roller in the treater station can be too big. Check for flashover at the electrode (defective HP-cable) or missing ground cable. Adjust electrodes, see station manual
E - 4	Station is open when it should be closed	Close the station and make sure that all the cartridge on the station are closed. Check sensor on station and check station cable.
E - 5	A flashover has occurred more than 3 times within one second	Check for pinholes in the roll-covering, burned insulators or defective HP - cable. At high humidity the insulators must be dried and cleaned before start up. Clean insulators and electrodes with alcohol. Make sure that any carbon residue is removed from insulators or electrodes
E - 6	No air flow could be detected within the blower start delay (default 20 sec)	Check that the extraction fan works and it's rotating in the correct direction. Check that there is airflow through the station. If the generator controls the extraction fan, the generator will flash "stand by" in the ON-button until the airflow is correct. When the problem is solved the generator automatically starts up again.
E - 9	No rotation could be detected.	The minimum speed is lower than set in parameter [1.1.3].
E - 91	On rotation sensor 1	Check that the roller on the treater station is actually moving.
E - 92	On rotation sensor 2	Check connection of the Rotation sensor on X5:3 for rotation sensor 1 Check connection of the Rotation sensor on X5:4 for rotation sensor 2

		<p>The rotation sensor is not in correct position at the roll-end (max. 1mm), or it is defective.</p> <p>In connection with exchange of roll-covering the roll can have been turned around, that the roll-end with the metal knobs is not placed in the same end as the sensor.</p>
E – 10	DC charge-up error.	<p>An error occurred while trying to charge the internal capacitors</p> <p>Take note that this error is allowed 3 timers within 1 second</p> <p>Reset error and wait 10 seconds and try again</p>
E – 11	Internal inter-lock missing.	<p>Check Inter-lock switches connected to X5 pin 27 & 28 NB: Can be used for safety and doors see electrical diagram See also E-12</p>
E – 111	Blocking input signal missing	<p>Check X5 pin 9 is connected to gnd.</p>
E – 12	Customer inter-lock missing	<p>Check Inter-lock switches connected to X3 pin 1 & 2</p> <p>The inter-lock input is typically connected in series with door switches, check that all doors etc. are closed</p>
E – 13	Warning: Mains Power was removed while generator was ON	<p>This is only a warning,</p>
E – 14	Repetitive charge-up:	<p>The power supply charge-up error (E-10) has occurred more than 3 times in a row.</p> <p>Generator defect. Contact support department</p>
E – 144	Communication error between master and slave generator	<p>The generator has lost contact with the master generator during discharge. This can occur if the generator is in a noisy environment. If the generator or the cable is too close to the discharge this could cause this error.</p>
E – 15	Power board not present: <i>(In Firmware versions prior to 5.20 this error can mean several things. Please contact support department for help)</i>	<p>Generator defect. Contact support department.</p>
E – 150	Power board are in Boot mode <i>(Only exists in Firmware version 5.20 and up)</i>	<p>Upload PU Firmware if possible or contact support department.</p>
E – 151	Internal PFC Error <i>(Only exists in Firmware version 5.20 and up)</i>	<p>Generator defect. Contact support department</p>
E – 152	Overvoltage Protection	<p>The measured voltage on the primary side of the transformer is too high. The generator has been shut down to prevent further damage.</p>
E – 16	Saturation error.	<p>This error can occur due to high surge or burst pulses on the mains supply lines.</p> <p>Reset the error and wait 10 seconds and try again.</p> <p>If the error persists, contact the support department</p>

E – 17	Self-test (Power Stage error) <i>(Only exists in Firmware version 5.21 and up)</i>	if this error persists the generator is defect, contact support department
E – 18	Power unit error.	Generator defect. Contact the support department
E – 19	Mains overload	This error can occur due to high surge or burst pulses on the mains supply lines. Reset the error and wait 10 seconds and try again. If the error persists, contact the support department
E - 200	Power limit exceeded	Clean insulators and electrode and adjust electrode. Can also be caused by a flash over or defective cable (check cables) Reset the error and wait 10 seconds and try again. If the error persists, contact the support department
E – 21	Mains tolerance error	Check input supply voltage are within range 380-520Vac
E – 22	The output power has been lower than minimum limit for more than 3 seconds.	Reset the error, if the error persists contact the support department.
E - 30	Too low feedback signal	Clean electrode and insulators, 80% of E-30 errors are caused by this. Check for flashover, flame or electrode adjustment. For electrode adjustment, see station manual.
E – 37	Custom Error.	This is a customer specific error code and mean different things. The codes meaning is determent in agreement with the customer.
E – 38	Custom Error.	This is a customer specific error code and means different things. The codes meaning is determent in agreement with the customer.
E – 39	Custom Error.	This is a customer specific error code and means different things. The codes meaning is determent in agreement with the customer.
E – 40	Custom Error.	This is a customer specific error code and can mean different things. Typically, the error code shows cartridge is missing/not detected when cartridge sensors (dummy cartridge) are installed. Check the distance between sensor and cartridge (should be 1 mm). The code meaning is determent in agreement with the customer. If the error persists, contact the support department.

E – 81 - 89	Communication error to external unit 1 to unit 9. There are no responds from the external unit (No.)	Verify that the external unit are connected. If the error persists, contact the support department
E – 81	Profibus Network Error	There is no response from the profibus master. Check the connection on the profibus.
E – 83	Modbus Communication Error	Communication error on the MODBus.
E – 84	Modbus Poll Timeout	The generator has lost contact with the modbus master during discharge. This can occur if the generator is in a noisy environment. If the generator or the cable is too close to the discharge this could cause this error.

8 Ozone extraction

8.1 What is ozone?

Ozone is a gas that is formed during the process of corona discharge and plays an important part in the chemical and molecular changes that takes place in the surface of the plastic.

Ozone is hazardous to health and has an unpleasant smell, even at relatively low levels. The average human can smell ozone at 0.01 ppm. and the threshold of safety of the gas in the area occupied by personnel is 0.1 ppm. All of VETAPHONE's equipment is therefore designed to remove ozone effectively from the treater station by means of an ozone-protected fan, and a specially designed exhaust system.

An option instead of ducting the ozone through the roof to the atmosphere is to use an ozone eliminator. This is an independent, catalytic filter system that accelerates the decomposition ozone, eliminating it completely.

9 Maintenance



IMPORTANT

Before any maintenance work, always turn off the power.

9.1 Lubrication and cleaning

Once every 3 months, or after 500 hours of operating

GENERATOR

If the generator is dirty on the inside, use compressed air (oil and water free) very gently to clean. Avoid physical contact with the components.

CABLES

Check that all cables and cable connection points are without any damages. If damaged, it is important to repair them or replace the damaged parts.



IMPORTANT!

A damaged cable is dangerous and can cause an electric shock.

10 Mechanical trouble shooting

10.1 Service / Trouble shooting

CHECKLIST

STATION :

- | | |
|---|--|
| 1) Is the electrode air gap distance set correct? | Check distance is max. 1,5 mm between electrode and roll face. |
| 2) Is the electrode completely straight? | Check air gap / alignment along the whole electrode. |
| 3) Is the HP-cable mounted correctly? | |
| 4) Is the EARTH-cable connected? | (Between station and transformer) |
| 5) Is the STATION cable connected? | (Between the iPM200 generator and station) |

GENERATOR / HP-TANSFORMER:

- | | |
|--|---|
| 1) Is the HP-cable mounted correctly? | |
| 2) Is the HA-cable connected correctly to terminal -X18? | (Between the high voltage transformer and iPM200 generator) |
| 3) Is the MULTI cable mounted correctly to terminal -X7? | (Between the high voltage transformer and iPM200 generator) |
| 4) Is the STATION cable connected correctly to terminal -X5? | (Between the iPM200 generator and station) |
| 5) Is the mains cable supplied and connected correctly to terminal -X19 and does it carry the correct voltage? | |

FAN:

- 1) Check visually that the external fan is rotating the correct way according to the arrow on the fan (If not, swap two of the phases if not).

11 Cable drawing

12 Electrical documentation

13 Mechanical documentation

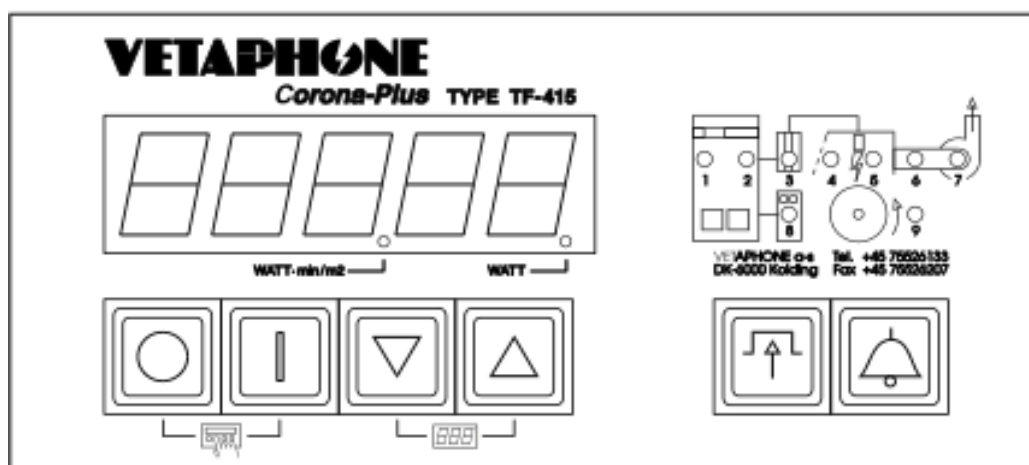
14 Appendix

14.1 Optional

The Vetaphone Corona system can be delivered with remote control for easy control.

14.1.1 General instruction for use

Remote control TF415 / TF420



The generator is turned ON and OFF by using the mains switch on the front of the generator.

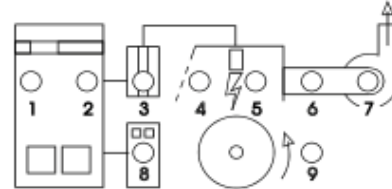
	ON	- Start generator	- Flashing = Automatic start.
	OFF	- Stop generator	- Cancel error message
	DOWN	- Power down	
	UP	- Power up	
	OPEN UP	- Open electrode	- The button can be set to other functions
	BELL	- Stop alarm relay	- The button can be set to other functions

PRESETTING OF POWER LEVEL

Before pressing the ON-button the power level can be adjusted with the ▽ and ▲ buttons.

READY TO START

The generator is ready to start when OFF is displayed and all LED's are **GREEN**.



ERROR INDICATION – Red LED's indicate the following errors:

- | | |
|--|------------------------------------|
| 1) Generator, internal error | 5) Station, HP-flashover to ground |
| 2) Generator, external error | 6-7) Fan, no ozone extraction |
| 3) HP-transformer, missing feedback | 8) Remote control, error |
| 4) Station open, or door switches not closed | 9) Station, roll not rotating |

For further information see "Control panel error messages AFTER start up" in separate manual.

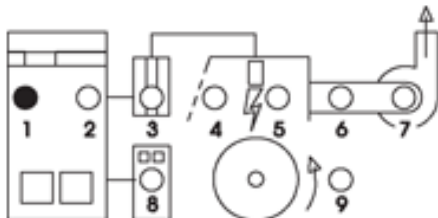
OPEN TREATER STATION

If the treater station is open the display shows OPEN:



Control panel messages BEFORE start up

Red LED's



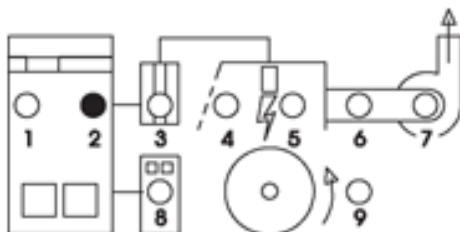
MESSAGE

High temperature in power unit

Check that the internal cooling fans operate correctly, and that they are not blocked with dirt.

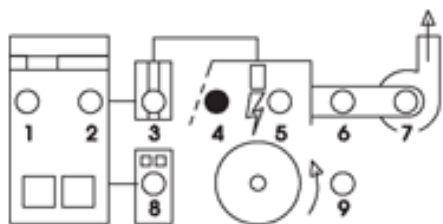
Check for high ambient temperature

Check for easy airflow around the generator.



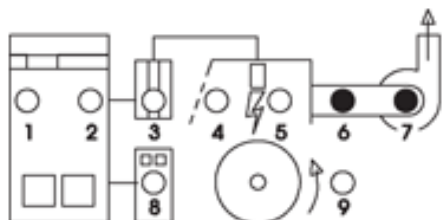
Mains tolerance error

Mains input voltage is out of tolerance



Station is not closed

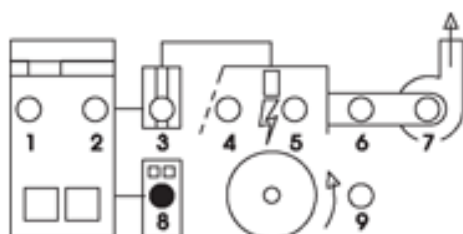
Close the station and make sure that the cartridge on the station are closed.



No air flow

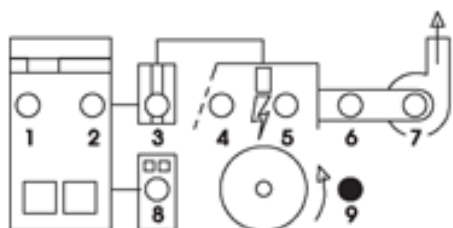
Check that the extraction fan works and that there is airflow through the station.
If the generator controls the extraction fan, the generator will flash "stand by" in the ON-button until the airflow is correct. When the problem is solved the generator automatically starts up again.

Check rotation of the fan.



Communication error

Check the cable between the remote control and generator.



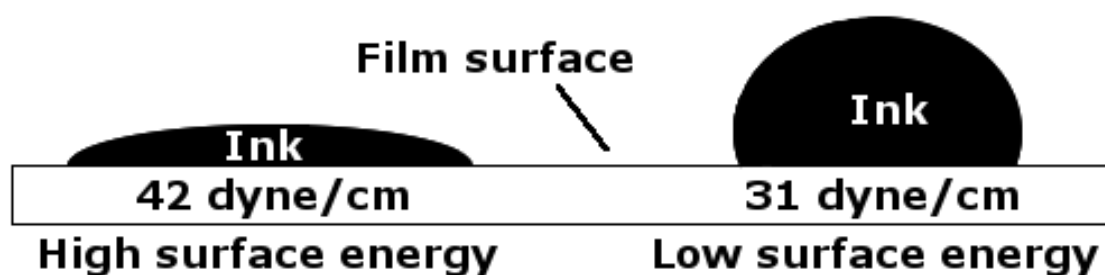
Roller not rotating

The minimum speed of the line is not reached or the rotation sensor is not in correct position.

14.2 Treatment of plastic

It is often very difficult to make printing ink, lacquer and glue bond effectively to plastic. This is because plastics have a low surface energy, a force that is closely related to adhesion. The commonly used units that describe surface energy are dynes/cm. It has been shown that, to be sure of a good bond between printing inks and plastic substrates, the surface energy of the substrate must be appreciably higher than that of the ink.

If a plastic material has a surface energy of, for example, 31 dynes/cm, as is the average for freshly produced polyethylene film, the result will be a very poor bond. It is therefore necessary to raise the surface energy of the plastic.



Examples of how ink bonds to plastic with high and low surface energy

14.2.1 The purpose of treatment

In order to carry out a particular process, the surface energy of the material needs to be raised from the basic surface energy to one of the level ranges prior to application.

Material – Basic	Dynes/cm
PP	29
PE-LD	31
PE-HD	32
BOPP	32
Process – Application	Dynes/cm
Print - solvent based ink	40-42
Print - water based ink	46-48
Coating	44-54
Lamination	46-56

Basic surface energy of materials, and required dyne level for various applications

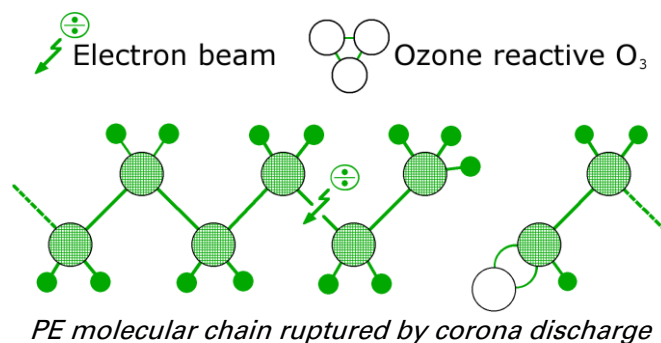
14.2.2 The electrical process

ALTERING THE SURFACE ENERGY

This can be done in several ways. VETAPHONE uses electrical Corona-plus discharge, which is the most suitable treatment method for plastic films, cables and tubes. It is easy to control, requires little maintenance and the system is inexpensive to run.

Plastic is a man-made synthetic material, which contains long homogeneous molecular chains that form a strong and uniform product. The chains of molecules are normally joined end to end forming even longer chains, leaving only a few open chain ends, thus providing only a small amount of bonding points at the surface.

During corona discharge treatment, electrons are accelerated into the surface of the plastic causing the long chains to rupture, producing a multiplicity of open ends and free valences are formed. The free valences are then able to form carbonyl groups with the atoms from the ozone created by the electric discharge, which gives the improved adhesion.



The adhesion is further enhanced by the cleaning effect that the ozone causes, by oxidation on the surface of the material.

In spite of the fact, that accelerated electrons cause rupturing of the surface, the strength of the material is not affected, as the reactive force of the upper molecular layers dramatically reduces the acceleration. Thus, the essential properties of the material are maintained, and less than 0,1µ of the material is penetrated.

POWER CALCULATION

The generator power required to treat the plastic sufficiently on various types of materials and various treatment areas, can be calculated by using the following formula:

$$\text{Power} = T \cdot S \cdot W \cdot M$$

P = Total Power (Watt) required

T = Number of sides to Treat (single/double sided)

S = Line Speed (in meters per minute)

W = Film Width (in meters)

M = Material factor (required Watt per m² per minute)

The material factor is the number of watts needed to raise the surface energy of a film to a sufficient level. The factor typically varies between 10 and 50 Watt·m²/min for most materials, depending on type of material, age, additive content, etc. The exact value is best determined by testing a sample of the actual film that is used for a specific application.

Table showing required power for different materials

POLYETHYLENE PE (LDPE, HDPE):

LOW SLIP	Fresh extruded	PE	Curve	1
MEDIUM SLIP	Fresh extruded	PE	-	2
HIGH SLIP	Fresh extruded	PE	-	3
LOW SLIP	Aged	PE	Curva	2
MEDIUM SLIP	Aged	PE	-	3
HIGH SLIP	Aged	PE	-	4
EMBOSED PE		PE	-	2
POST TREAT. PE (on paper or board)		PE	-	2
POLYPROPYLENE (Copolymer)		PP	-	1
POLYPROPYLENE (Homopolymer)		PP	-	3
ORIENTED POLYPROPYLENE		OPP	-	3
BIAXIAL ORIENTED POLYPROPYLENE		BOPP	-	4
POLYESTER Pure material		PET	-	1
POLYESTER With additives		PET	-	3
ALU. FOIL		AL	20 watt m ² /min	
KRAFT PAPER (before coating)			16 watt m ² /min	
PE FOAM (more than 30 kg/m ³)		per 56 dyne/cm	50-200 watt m ² /min	

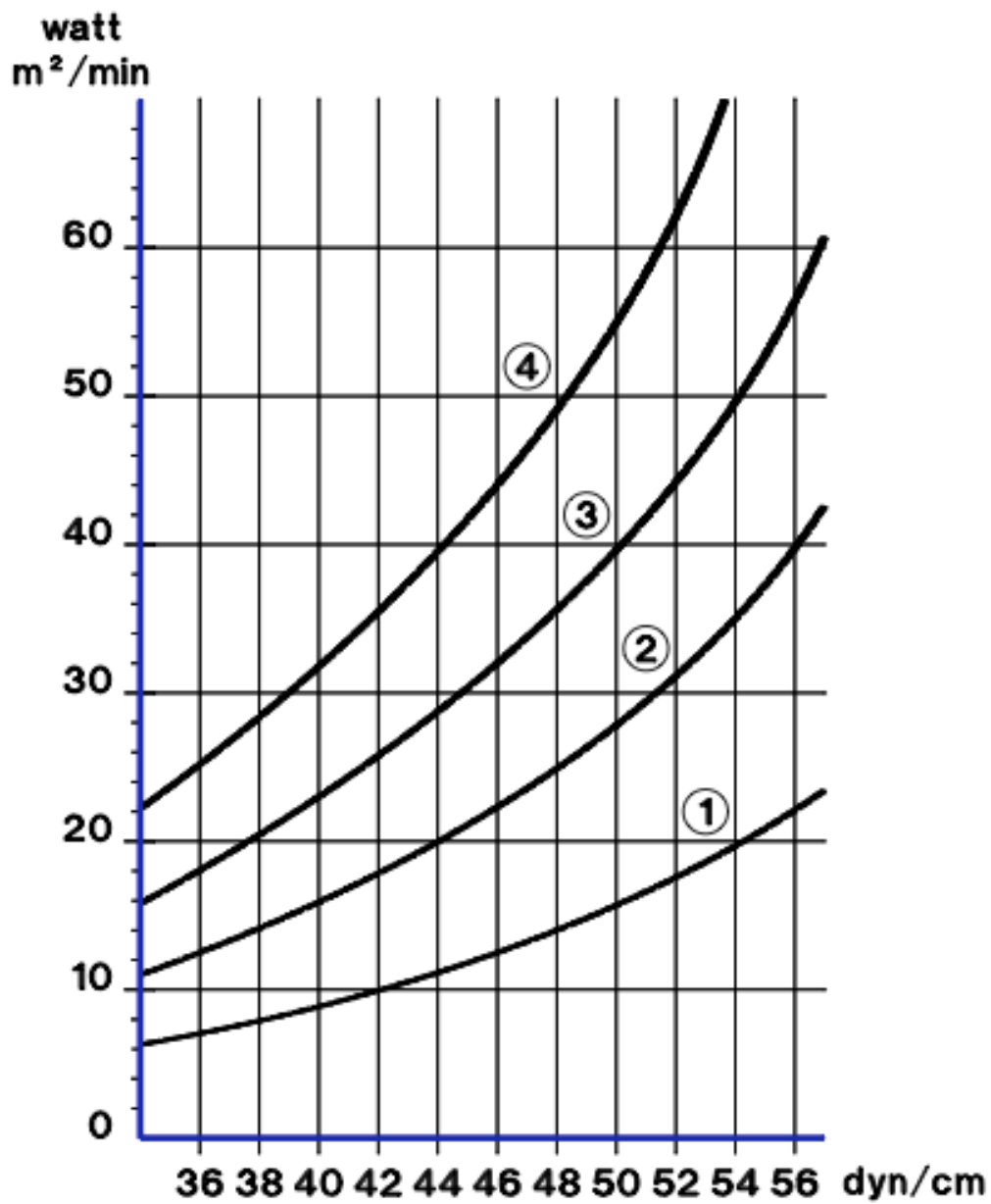
Typical required dyn/cm level for:

PRINTING	: 40 - 42 dyne/cm.	For solvent inks
-	: 46 - 48 dyne/cm.	For water based inks
COATING	: 44 - 54 dyne/cm.	Depending on coating type
LAMINATING	: 46 - 48 dyne/cm.	Solvent adhesives
	54 - 56 dyne/cm.	Water based adhesives

Typical values for slip additives (Ole amide & Eruc amide)

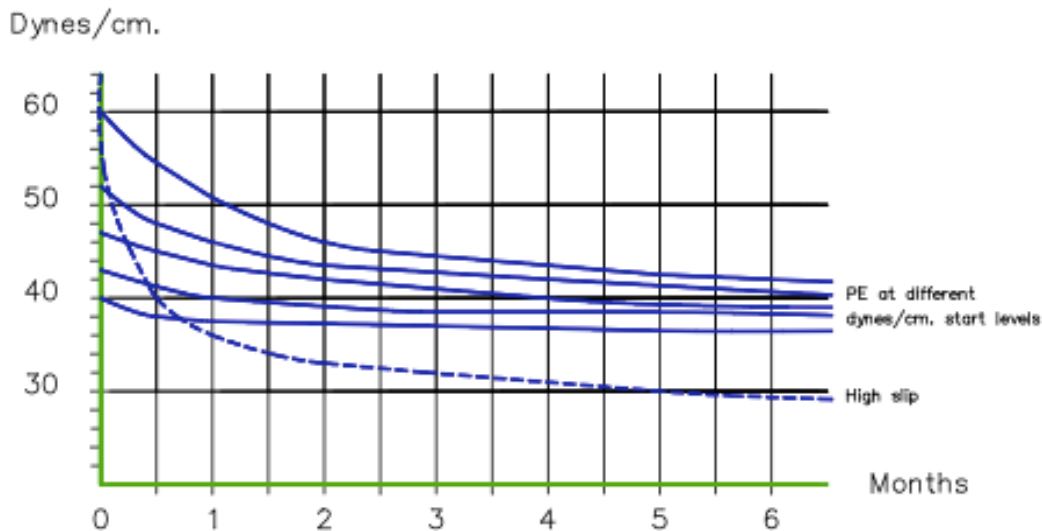
0	-	400 PPM	: Low slip
400	-	700 PPM	: Medium slip
700	-	1200 PPM	: High slip
1200	-	2000 PPM	: Extremely high slip

Material-factor curves



DURABILITY OF THE TREATMENT

The increase in surface energy (dynes/cm), that is induced into a film begins to decay immediately following treatment, and again this depends upon the same factors mentioned above, with the additional considerations of storage conditions and temperatures. Generally speaking, the more difficult a material is to treat the quicker it is likely to decay with time. It has been established, that film with very high slip additives (over 1200 ppm) can be totally resistant to printing just 24 hours after treatment, and it may be necessary to process the film immediately following treatment, or boost the treatment in line with the printer. Ageing of such films can render them impossible to treat if they are not treated during production.



Typical decay in surface energy on PE-materials over a 6-month period

As can be seen from the graph, the level of treatment decays more quickly immediately following treatment, and less rapidly as the time passes, depending on different dynes/cm start levels.

MEASURING THE SURFACE ENERGY

Using the test method described by DIN 53364 and ASTM D2578-67, which is a liquid test, carries out the measurement of surface energy of a film. Vetaphone supply test liquid. The liquid is applied as a broad line in a thin layer with either a brush or a pen.

The surface tension is then determined visually by estimating how the liquid reacts within the first two seconds following application. The test liquid can shrink and/or form itself into globules (individual droplets) or it can remain unchanged.

When a test liquid shrinks or forms into droplets it indicates that the film has a lower surface energy than the liquid applied. The test should be repeated as many times as necessary with a liquid of a lower surface tension until it remains unchanged for a period of two seconds or more. Once that has been achieved, the film can be said to have that level or surface energy at least equal to that of the liquid applied. Further applications should be made until shrinkage or droplets occur within two seconds. This last measurement should be taken as failure, and the surface energy of the liquid used for the previous measurement should be taken to be the surface energy of the film.