PANDROL

Preheater HFP 36V

OPERATION AND MAINTENANCE MANUAL

ENGLISH

S0000473
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Instruction video

Partners in excellence

Revision

Revision	Date	Writer	Comments
V1	20/04/2021	ND	Creation
V2	06/12/2021	ND	Updated translation – remove e+
V4	08/12/2021	ND	Updated weight - added type DIN9 line
V5	15/12/2021	ND	Added the list of all HFP set up. Added instruction when when using the HFP with strong wind.
V6	21/01/2022	ND	Modification of several spare parts code. Added instruction to replace the nozzle and handling the HFP. Added QR code for online training video.

Content

1. EXPLANATION OF SYMBOLS

Read the instruction manual carefully before operating or any maintenance.

Disconnect the HFP preheater before any maintenance.

Risk of contact with parts with electrical current inside the HFP.

Accessible parts that may remain hot after using the HFP, especially the tip of the torch.

2. GENERAL SAFETY INSTRUCTIONS

The HFP is only intended to be used for the preheating of rail ends in the moulds prior to welding with our Aluminothermic Welding Process.

• In the event of use other than that recommended, PANDROL declines all responsibility.

• Never use the HFP without first reading and understanding its instructions for use.

• The user must always work with material in good order.

• Never use the machine if you are tired or if you are taking substances, such as drugs, alcohol, which could impair vision, dexterity or the ability to judge.

• The HFP user must comply with the regulations, procedures and site safety instructions in force.

• The HFP is a dangerous machine which must be operated by a single user; practical training should be given to any new user.

• Use and maintenance must be carried out by qualified personnel.

• The operator must wear the necessary PPE for preheating operations: goggles, gaiters, overalls, gloves, etc.

• Handling and positioning of the HFP can be done by one person.

• The operator must ensure that his working area is clear (People, animals, electric cables, flammable substances, etc.)

• The user should not make any changes to the design or configuration of the machine without consulting PANDROL.

• The operator must have a stable position before starting to work.

• Ensure correct positioning of the HFP on its support when in use.

• Ensure that the propane cylinder is properly supported during use, keep it vertical, never lay the cylinder down during use.

• Replace the protective cap of the propane cylinder valve before any handling, never handle the cylinder by its valve directly.

• Use of gas cylinders must be in a well-ventilated area at all times.

• Transport and store the HFP in its protective case.

• Secure the propane cylinder on a support linked to the vehicle during transportation.

• Position the flexible hoses straight with no kinks and away from sharp objects.

• Always use this HFP under supervision; never let the HFP run alone.

• Use lighting or install temporary lighting when carrying out work at night or in dark places.

• During maintenance operations, the instructions and instructions given in this instruction manual must be observed.

• Wearing Personal Protective Equipment (PPE) is advised !

In the event of use in a confined space, or of small volume, or enclosed in a low point, such as for example a tunnel, forced ventilation should be implemented in this room. This ventilation will be arranged so as to ensure the permanent evacuation of burnt gases and any unburned gases.

• It is strictly forbidden to intervene on or in the HFP during operation and bring your hands or other parts of the body in contact with the flame.

• It is forbidden to operate the device outside of its possibilities and capacities predetermined by the factory settings and stated in this document.

- Wearing Personal Protective Equipment is necessary for the use of this HFP Preheater. This list is a prerequisite; it is liable to be modified with regard to the constraints specific to each particular environment that each site constitutes, which remains the choice and decisions of the user.

Suitable flame retardant work clothing, preferably cotton or similar material, covering the legs and arms.

A pair of high-top safety shoes with good heat resistance.

A pair of handling gloves adapted to the risk of burns category 3.

A pair of safety goggles suitable against projections of hot particles, white glass with side shields or Welding goggles

Approved hearing protection.

- In the event of a fire, shut off the gas supply at the cylinder and use an extinguisher to extinguish the fires. CO2 extinguishers are preferred.

- In the event of an accident, refer to the worksite safety instruction.

3. DESCRIPTION

This HFP preheater is a device for heating the rails as part of the realization of a weld of rails by the thermite welding process.

This manual is written in conjunction with the instructions for installing the welds. These documents should be referred to for the welding and installation procedure.

The unit is composed of:

- The Preheater, which integrate
  - a variable speed air blower powered by battery
  - a propane gas injection device,
  - a control panel
  - a control unit

  The HFP is equipped with a connector for the gas connection.
  Protections are installed to protect the gas connector against shocks and the batteries against rain.
  A carrying handle is installed on the top of the box.
  The equipped box weighs 18 kg without battery and 19 kg with batteries.
  Its overall dimensions are (L x W x H): 750 x 340 x 295 mm approximately.

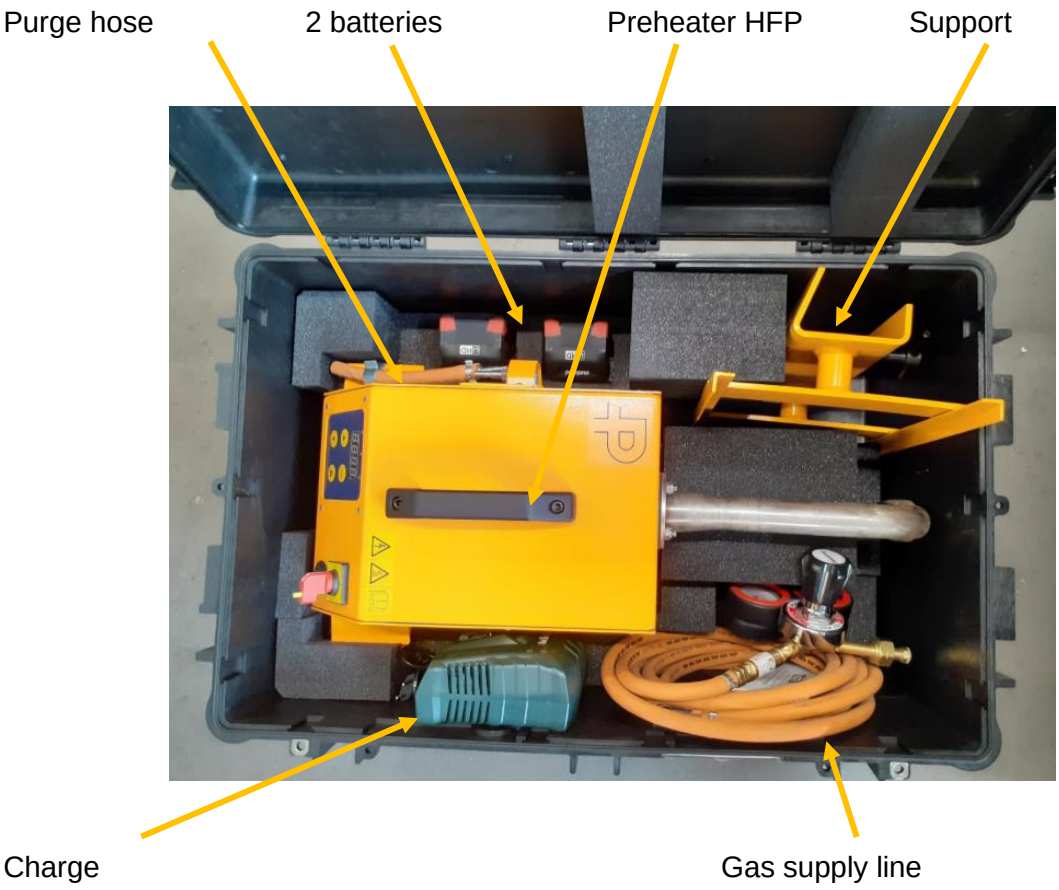
• A preheating torch attached to the HFP.

• 2 batteries 18V Metabo 8Ah

• A gas supply line comprising:
  - a HARRIS Model 25 GX brand pressure regulator adjustable from 0 to 4 bars to be screwed onto a conventional 13 kg propane gas cylinder,
  - a flame arrestor valve,
  - a gas pipe standard EN 559 10/17 mm length 5 meters,
  - a STAUBLI type RBE female coupler,
  - a bleeding tube of the HFP preheater and its STAUBLI RBE connection.

• A support to be screwed onto the rail allowing the HFP preheater to be placed in the working position.

• A specific storage case for this set.
  - The fitted suitcase weighs approximately 46 kg.
  - It is used to store a second set of battery and a charger (Sold separately)
  - Its closed overall dimensions are (L x W x H): 1000 x 500 x 400 mm approximately.



4. INSTRUCTION FOR USE

4.1 Storage

- Do not expose the machine to rain, this could cause a malfunction.
- Pack the HFP in its suitcase.

Be careful, do not store it immediately after preheating, let the nozzle cool down. for about 15 minutes.

4.2 Personal Protective Equipment

It is necessary to wear Personal Protective Equipment when using the HFP Preheater. You must have :

- Suitable flame retardent clothing covering the arms and legs.
- Welders boots with heat resistant soles or high top safety shoes with heat resistant soles and gaiters.
- A pair of handling gloves adapted for the risk of burns Category 3.
- Pair of fireproof gloves.
- A pair of safety glasses suitable for the protection against hot particles, white glass with side sheilds.
- Shaded Welding goggles.
- Ear Protection.

This list is a prerequisite, it is likely to be modified with regard to the constraints specific to each particular

environment that each site constitutes. This remains the choice and decisions of the user.

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4.3 Safety checks before welding commences

Make sure that the propane gas cylinder is sufficiently filled to carry out the preheating correctly, which takes about eight minutes (variable depending on the nature of the weld) under a gas pressure of 1 bar, i.e. a minimum quantity of gas of 1 kg to maintain correct propane vaporization and therefore correct preheating.

The use of scales or equivalent can be used to find out the amount of gas remaining in the cylinder.

With the HFP and its connection hose in its transport and storage case, carefully remove the HFP.

Examine the condition of each element of the HFP for:

- the pressure gauge must be in good condition, the windows not broken and the boxes not distorted,
- the gas hose must not be split, cracked or cut,
- the connections at both ends of the hose must be in good condition and correctly tightened.
- the body of the HFP must be clean, not show any signs of damage,
- the outlet nozzle of the HFP preheater must not be scaled or damaged by oxidation,

If any of these conditions are not met, the HFP must be immediately removed from service.

4.4 Handling the HFP

To preserve health and wellbeing of the users, the following rules must be followed when handling the HFP.

4.4.1 Handling the HFP box

1. The full HFP set is sold with a transport box. The box weight 49kg.
2. To reduce stress on the user body, the users must avoid when possible, to carry the HFP:
    a. Use lifting equipment such has hoist whenever it is possible. In that case, web sling must be put around the handles.
    b. Use the wheels to transport the box whenever it is possible.
3. If the HFP case must be transported by hand, 2 persons are required; The HFP case must be put down every 10m to allow the users to have a rest.

4.4.2 Handling the HFP unit

The HFP weight 19kg. An ergonomic handle has fixed on the top of the unit to facilitate the handling. It is preferable to keep the HFP in its transport box on the railborne trolley at site and to take it out when needed.
If the HFP has to be carried on long distance, the user must put down the HFP every 10m to have a rest or when not possible switch hand to avoid reduce upper limb stresses.

4.4.3 Positioning the preheater

- Position the HFP support and tighten the fixing screw.

- Place the HFP on its support frame so that the spout of the HFP is positioned in the centre of the moulds. When placing the HFP on the railhead, stand face on/perpendicular to the rail, move the unit round in front of your body, and lean forwards to place it on and off the rail. Do not stand side on to the rail and bend sideways and/or twist your torso when doing this task.
- If necessary, loosen the support in order to position the HFP correctly.
- Ensure the good stability of the HFP unit and support.
- In case of strong wind, set up the HFP back to the wind so the flames are now blown on the HFP when it runs at low speed during the first seconds of preheating.

- The user's workstation area is represented by a white perimeter and 4 arrows.

4.4.4 Batteries

The HFP36v works with two 18v batteries in series. It is necessary to have 2 batteries to make it work.

Before use, check the charge level of the batteries by pressing the test button. If a battery shows only one light, remove it and use a different one.

The HFP checks the battery voltage before starting each cycle. If the voltage is too low to complete a cycle, the HFP will not start and illuminate the low battery indicator. (see 4.4.6 Control panel)

To preserve the longevity of the batteries, it is advisable to avoid using a full battery with an empty battery.

Charging a battery takes about an hour. The autonomy of the HFP with 2 full batteries is 8 preheating cycles of 8 minutes.

Checking the charge level

4.4.5 Installation of the gas line

Position the propane cylinder near the HFP on the side of the track.

Make sure the cylinder is stable before removing the protective cap from the valve.

 Do not produce sparks, do not present a flame and do not smoke during this phase!

Take the regulator and gas line hose assembly.

Examine the condition of each item thoroughly for:

- the regulator must not have any trace of shock or damage,

- the pressure gauge must be in good condition, the glass not broken and the case not distorted (do not touch the setting),

- the hose must not be split, cracked or cut,

- the connections at both ends of the pipe must be properly tightened,

Remove the bleed hose from the retaining spring clip.

Connect the end of the gas line hose to the HFP fitting.

Clip the hose into the retaining spring clip.

Propane hose connected

Connect the regulator to the propane cylinder. The cylinder must remain vertical at all times during the welding operation. Tighten the screwed connection of the regulator on the propane cylinder very moderately (not to the left).

Open the cylinder valve a quarter turn and listen and / or feel for any leaks at the connection.

If a gas leak is discovered, immediately close the gas cylinder valve and remedy the fault before continuing with the work.

The adjustment of the propane gas outlet pressure must be established at the pressure defined in the welding instructions.

The pressure regulator pressure gauge must indicate the pressure specified in the instructions during the entire preheating cycle. Only adjust this pressure on the regulator if it’s necessary to maintain this value.

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The gas pressure reading on the manometer when stopped, will be slightly higher than the reading during the preheating operation.

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Never search for a gas leak with the help of a flame

If a gas leak is suspected, do not attempt to correct it by tightening the fitting, but dismantle the fitting in search of a foreign particle inserted in the parting hose. In the event of such discovery, change the seal.

4.4.6 Ignition of the HFP preheater

Make sure that the nozzle of the HFP is correctly centered in the moulds.

Set the main switch to position I.

Adjust the preheating time on the timer of the HFP Preheater. The up and down buttons allow you to adjust the time in 30s increments

Start the HFP preheater by pressing the “START” button.

The green "RUN" indicator lights up for the duration of the junction preheating cycle.

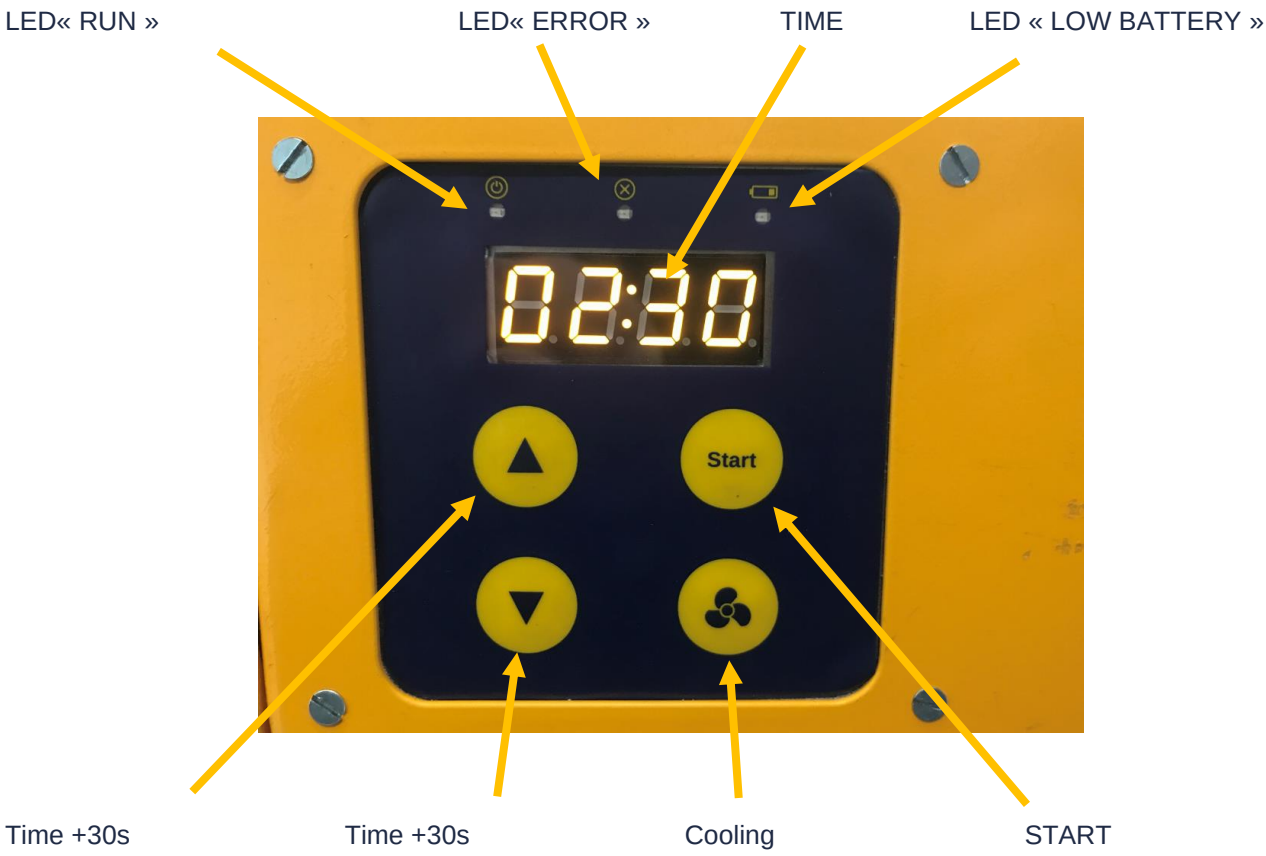
In the event of a fault or malfunction detected by the on-board PLC, the "ERROR" indicator light comes on and the HFP preheater goes off.

4.4.7 Control panel

Keyboard and display | Main switch | Charge USB socket

The USB port is used to recharge an external device (Phone, etc.). The HFP must be turned on for charging to work.

4.4.8 Keyboard and display



4.4.9 HFP preheater operating cycle

Two operating phases are carried out by the HFP preheater:

1. The start-up for a duration fixed at about 35 seconds, phase in which the blower turns, gradually accelerates to reach the final speed. This phase is used to preheat the torch and the mold. In this phase, the flames reach about 60 cm high at the start and 20cm at the end.

2. Full power for a period set by the previously set time delay. In this phase, the flames reach 20 to 25 cm in height (The height increases during preheating). On the timer, the countdown of the remaining time is displayed.

In the event of a malfunction, first close the gas cylinder valve, then position the handle of the general switch on O.

Let the HFP preheater operate for the entire time delay preselected on the timer.

4.4.10 HFP Operation

Monitor the HFP for the time required during preheating, you can also use this time to prepare the crucible and the portion. The noise of the turbine and the HFP provides information on its operating state; monitoring this operating parameter requires staying in the immediate vicinity.

If the HFP does not start or does not create a flame, refer to the malfunctions table.

In the event that the problem arises from a fault in the high voltage generator generating the spark, the HFP can be ignited with a bell igniter.

Start the cycle, position yourself with your back to the wind, reach out and activate the igniter over a pipe. Do not position yourself above the moulds, this will avoid any risk of burns when the flame emerges. This operation must be carried out during the first 20 seconds of the cycle, before the maximum speed is reached. After 20 seconds, switch off the HFP and start again.

4.4.11 Stopping and removing the HFP

When the required operating time has elapsed, the HFP will shut down on its own.

Close the gas supply valve on the cylinder.

Return the main switch to position O,

The following operations are carried out on very hot parts and objects, sources of risk of serious burns. Wearing personal protection against the risk of burns and the use of handling tools are required.

Carefully remove the HFP, along with the gas hose and the electric cable from its support, taking care not to damage the internal walls of the moulds.

Carefully place the HFP in a safe area away from the casting operation, taking care not to touch the torch nose, or to place it near or against anything flammable. Take care not to bang the nose as this can result in damage to it.

Loosen the thumbscrew on the rail of the HFP support and remove it.

Resume the aluminothermic welding procedure, by the casting operation, which must very quickly follow the preheating phase.

4.4.12 Storing the HFP

Once the weld has been made, store the HFP in its case. Wait 15 minutes after the end of the last preheating to ensure that the torch nose has cooled sufficiently:

- Disconnect the hose from the gas line on the HFP side.

- Disconnect the power supply,

- Place the HFP in its location in the suitcase

- Store the HFP support in the case

- Bleed the gas by connecting the purge hose, then remove it,

- Disconnect the regulator from the cylinder, replace the bottle cap,

- Put it in the suitcase, in the housing provided for this purpose,

- Coil the hose over the regulator,

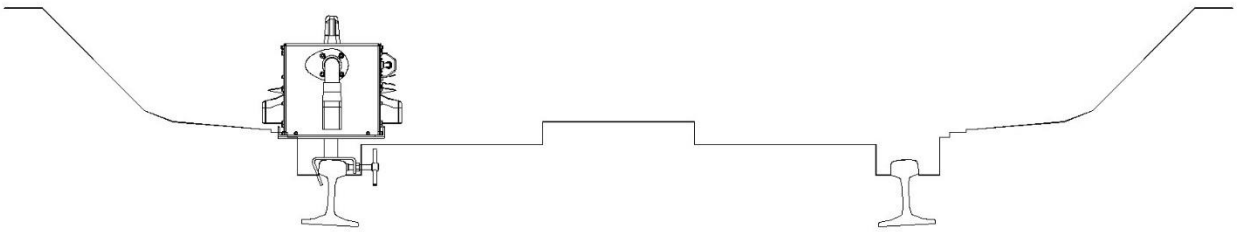
- Coil the power adapter,

- Close and remove the suitcase.

Take the propane cylinder to the transport vehicle and secure it from movement (or to the next work location).

The securing of the gas cylinder must be achieved by a reliable means, such as a strap and secure housing for clamping the gas cylinder, or any other means of equivalent effectiveness. The use of bungee cords or elastic bands is prohibited.

5. LAYOUT ON THE TRACK ACCORDING TO NF EN 13977



6. MAINTENANCE

6.1.1 Installation of the gas line

The responsibility for maintenance is the responsibility of the owner of the equipment.

Maintenance should be performed at least once a year by a competent and qualified person.

iTEM	OPERATION	PERIODICITY		
		Before use	After use	Presence of signs of wear or improper operation
Complete HFP	Machine inspection	X		
Complete HFP	Clean the machine using a clean cloth or a compressed air gun to remove dirt		X	
Complete HFP	Contact the after-sales service			X

After 2 years or 400 welds, a control and calibration must be done by Pandrol

(The number of welds made is automatically counted in each HFP. The error indicator flashes at start-up when the HFP has made more than 350 welds in order to be able to schedule the maintenance)

After 1 year or 200 welds, a check of the pressure gauges and

preheating must be done by Pandrol or by an authorized company.

Oxidation from preheating the welds wears down the torch nose. The torch should be replaced when the nose is bent or nibbled. The possible tripping of one of the circuit breakers protecting the electrical circuits is visible through the window for checking the status of these circuit breakers, which you only need to raise to reset the faulty circuit breaker. A second trip of the circuit breaker following a reset requires the device be sent to an approved repair workshop.

In the event of a fault signaled by the PLC, the power supply must be cut for 30 seconds, then the HFP switched on again. If the fault persists, the device should be sent to an authorized repair workshop.

6.1.2 Replacing the nozzle

There are 2 reasons for replacing the nozzle:

1. Changing nozzle type to weld another welding processes (Round nozzle / Rectangular nozzle)
2. Replacing a damaged or used nozzle by a new one.

After replacing the nozzle, it is important to adjust the perpendicularity to ensure a good preheating.

Procedure

3. Untighten the 4 nuts that hold the nozzle
4. Replace the nozzle
5. Put back the 4 nuts – Do not tighten it so it stays loose.
6. Align the perpendicularity with the ground. To facilitate the operation, the HFP should be put on a flat and horizontal surface.
7. Tighten slightly the 4 nuts
8. Align the vertical and horizontal perpendicularity. Those perpendicularities are obtained by adjusting the compression level of the seal.
    - Tightening the upper nuts / loosing the lower nuts makes the nozzle to rise. (And opposite)
    - Tightening right nuts / losing left nuts make the nozzle to turn right. (And opposite)

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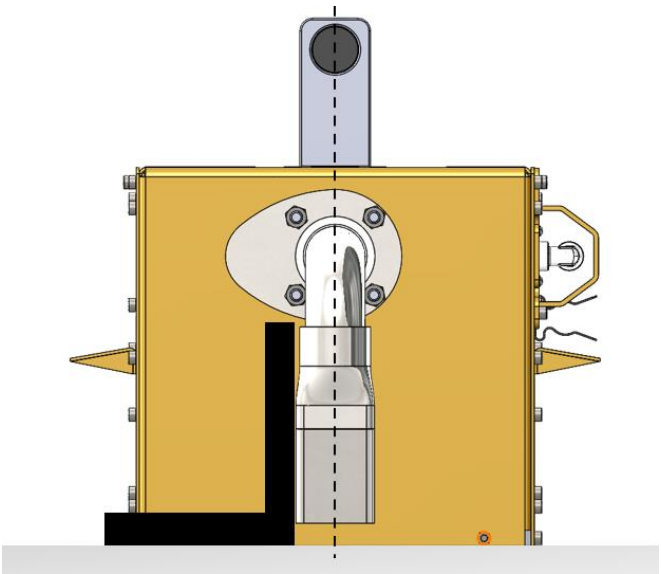
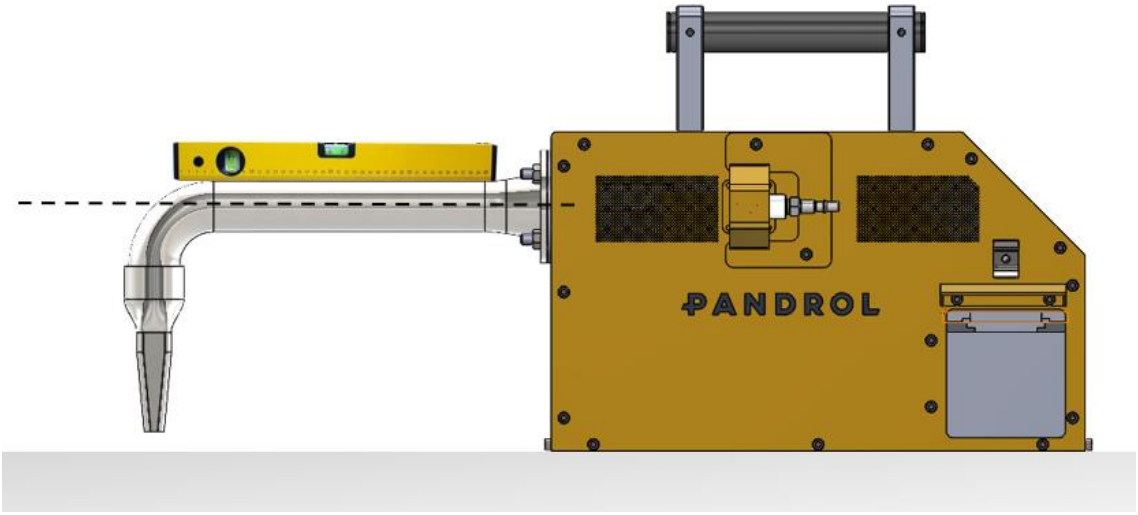
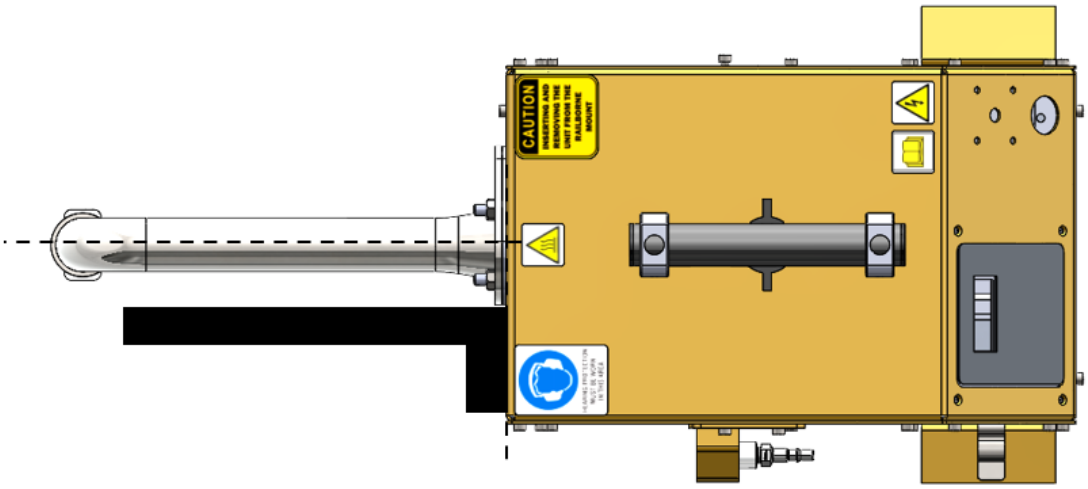






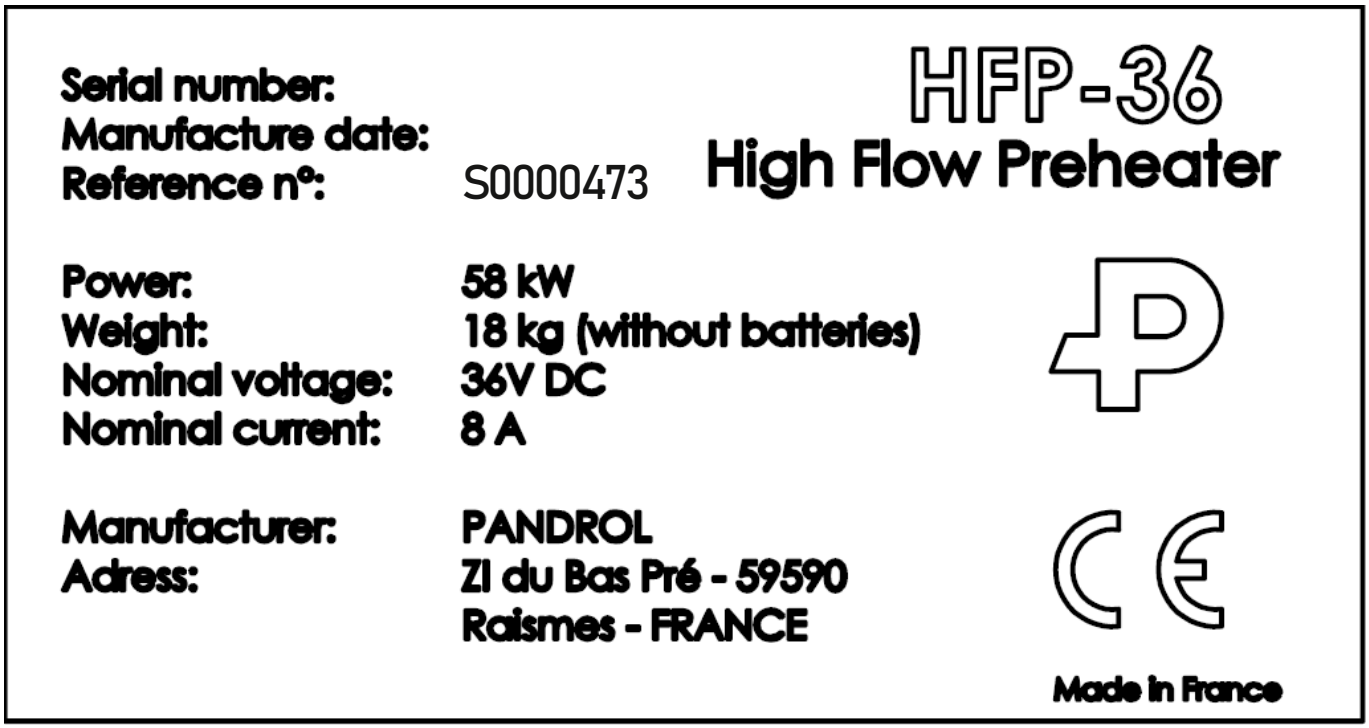
7. TROUBLESHOOTING GUIDE

Fault	Possible causes	Solutions
The HFP does not turn on.	Batteries are empty	Check the batteries level. If the problem persists, contact the after-sales service.
	Batteries not fully pushed into the sockets	Push the batteries to the end
	Internal problem	Contact after-sales service
The HFP displays a red light on startup or the HFP does not start.	Batteries are empty	Check the batteries level. If the problem persists, contact the after-sales service.
	Engine damaged	Contact after-sales service
HFP starts, but does not create a flame	The gas supply is not connected or the gas cylinder is not opened.	Check the gas supply
	The solenoid valve is damaged	Listen if the solenoid valve is functioning or if gas is coming out.
	Damaged high voltage generator	Check that a cracking noise can be heard within the first 5 seconds after pressing START. If no noise, contact the after-sales service.
		The HFP can be ignited with a bell igniter. (See procedure)
The HFP starts up, but the flame is blown out.	Wind	Restart the cycle. Ignition is more stable when the nozzle is hot. If the problem persists, contact the after-sales service.
The nozzle is damaged	The nozzle has overheated	Contact the after-sales service
The time cannot be set or the display stops responding	Display damaged	Contact after-sales service

8. IDENTIFICATION

The HFP benefits from a traceability code shown on this name plate.

COMPANY PLATE



9. TECHNICAL CHARACTERISTICS

Nature:	Forced air propane burner
Power:	58 kWh
Nominal propane flow rate:	4.5 kg / h
Dimensions (L x W x H):	750 x 305 x 295 mm approx.
Weight:	17 kg
Weight with batteries	19 kg
Storage case (L x W x H):	1000 x 500 x 400 mm approx
Case weight (Full) :	46kg
Fuel:	commercial propane gas, packaged in 13 kg cylinders.
Nozzle:	Special refractory steel nozzle.
Operating temperature:	-5 to + 40 ° C
Protection index:	IP42
Noise emissions in operation:	90 dB (A) at the workstation 1 m from the torch.
Vibration:	None
Acoustic power:	103 dB (Lwa)
Sound pressure:	92 dB (Lpa)

9.1 Dismantling and disposal

The disposal of this HFP does not present any difficulties; its dismantling will be carried out in accordance with the previous sections.

The materials used can be disposed to a recycling center.

10. CONFIGURATIONS OF THE HFP

The HFP can be used to weld a large variety of welding processes. The preheater is always the same, but the **torches** and **support** change depending on the welding process. To know which configuration should be used, report to the welding manual.

Additional torches and supports can be bought to weld other type of welding process.

Configuration	HFP A0	HFP B0	HFP C1
Description	For PLA, PLR…	For SRG, SRGN, SRGR…	For PLA Evo
Nozzle	Rectangular **35210008**		Round **35210009**
Support	Height 90mm for vignole **21245008**	Height 90mm for groove rail **21245016**	Height 70mm for vignole **21245017**

Parameters to be taken into account when selecting an HFP are:

- The configuration (A0, B0, C1) – Report to table above or welding manual
- The regulator connector: Type E (AFNOR) or type DIN9
- The presence of a charge. The HFP is delivered with a standard 230V 50hz charge. If the HFP is to be used in a country with another current standard, it is necessary to purchase a case without charger and to buy the charger separately.

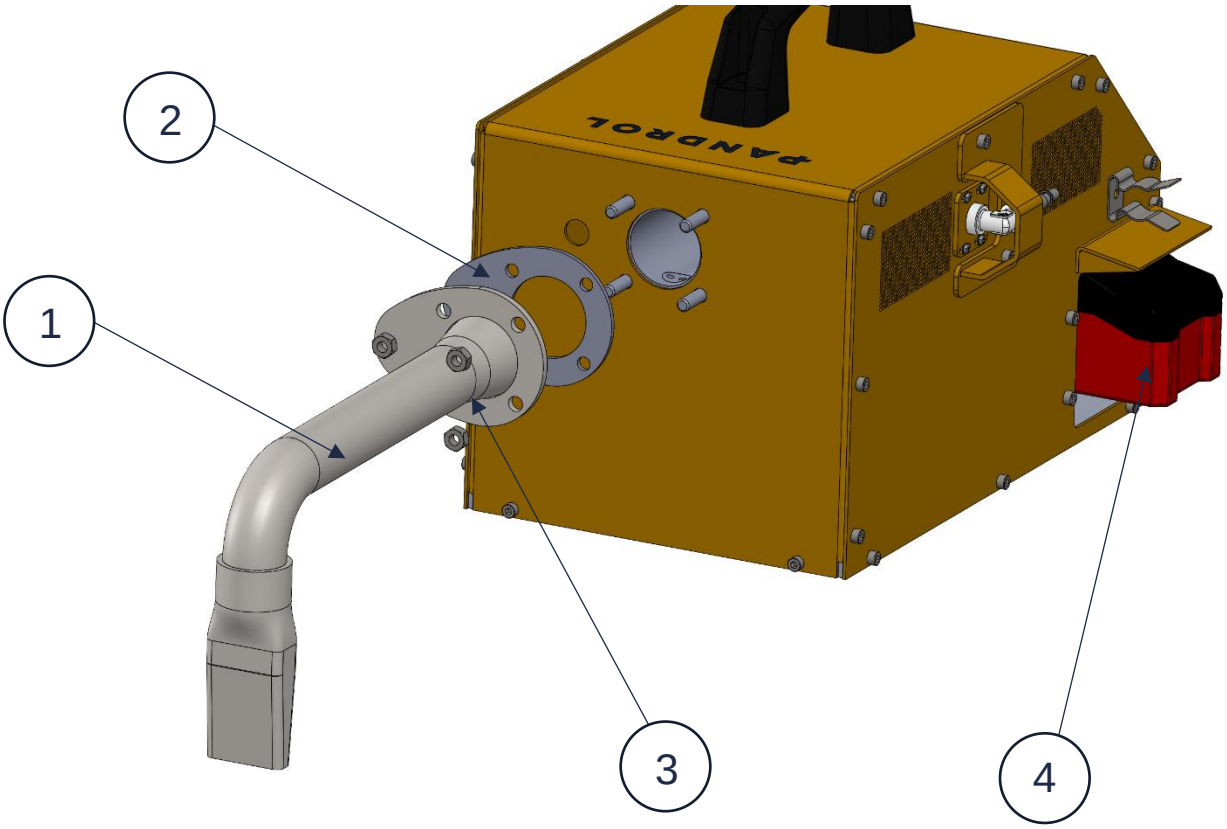
S000A473	HFP36V complete rectangular nozzle without charger type E (A0)
S000B473	HFP36V complete rectangular nozzle without charge type E (B0)
S001C473	HFP36V complete round nozzle without charger type E (C1)
S010A473	HFP36V complete rectangular nozzle without charger DIN9 (A0)
S010B473	HFP36V complete rectangular nozzle without charger DIN9 (B0)
S011C473	HFP36V complete round nozzle without charger DIN9 (C1)
SC00A473	HFP36V complete rectangular nozzle with charger type E (A0)
SC00B473	HFP36V complete rectangular nozzle with charger type E (B0)
SC01C473	HFP36V complete round nozzle with charger type E (C1)
SC10A473	HFP36V complete rectangular nozzle with charger DIN9 (A0)
SC10B473	HFP36V complete rectangular nozzle with charger DIN9 (B0)
SC11C473	HFP36V complete round nozzle with charger DIN9 (C1)

Picture of the 2 regulators connectors available.

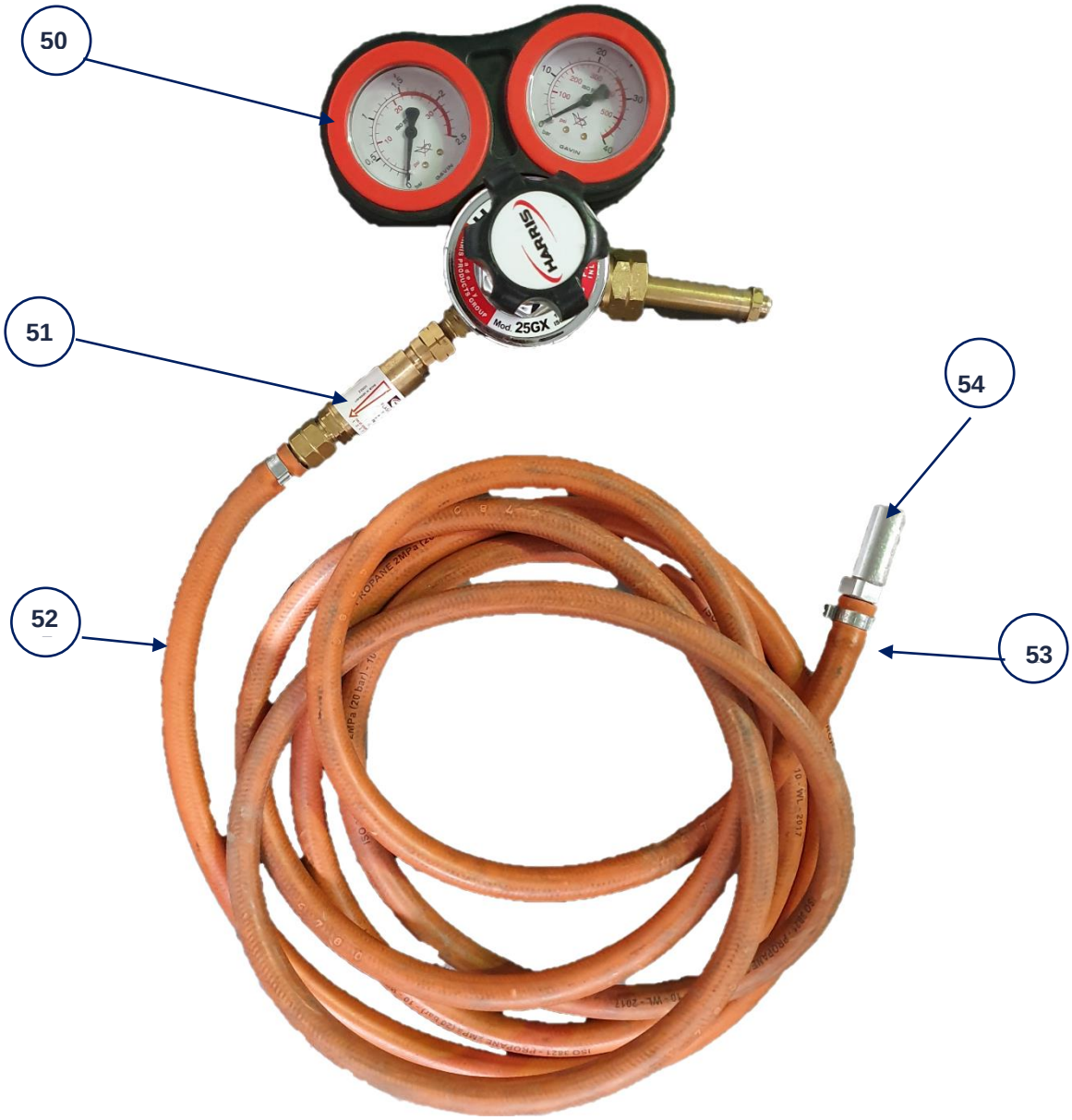
Square nozzle

Round nozzle

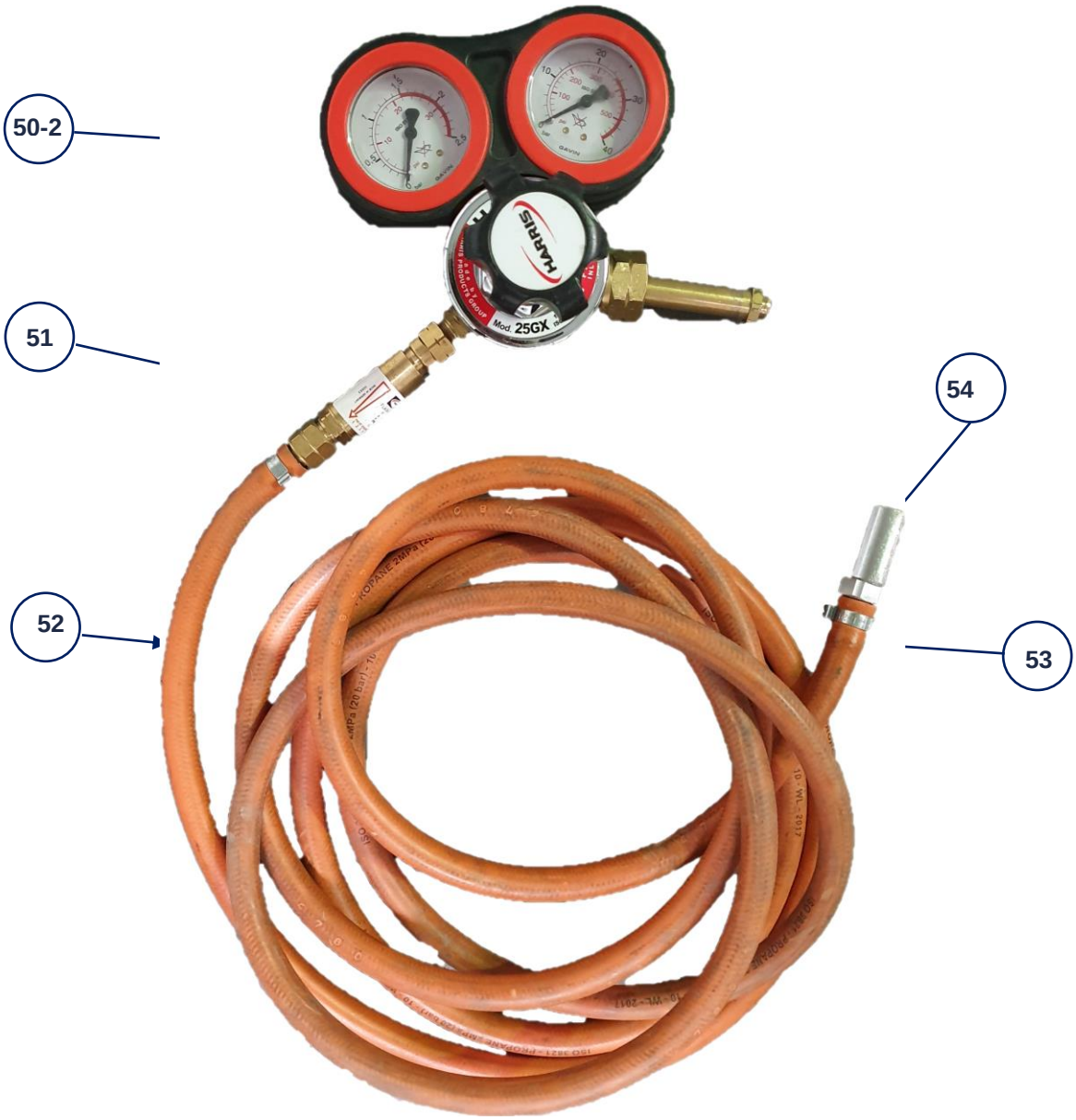
11. LIST OF SPARE PARTS AVAILABLE FOR MAINTENANCE



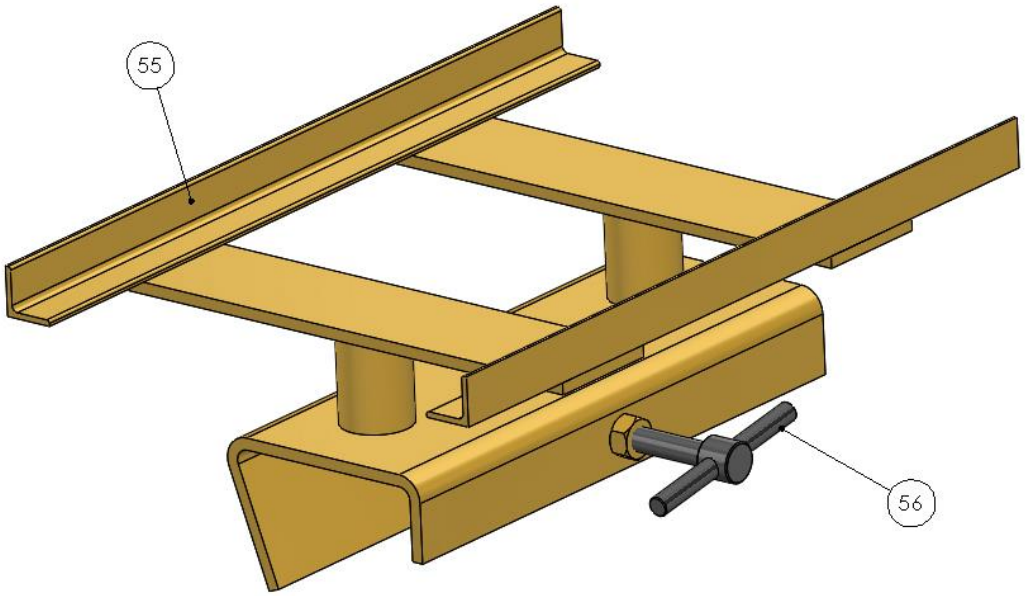
Preheater			
N°	N°	Description	Quantity
1	35210008 or 35210009	HFP Complete rectangular nozzle for HFP or HFP Complete round nozzle for HFP	1
2	31260007	Torch seal	2
3	40908001	Nut nylstop M8	4
4	48402027	Battery METABO 18v 8Ah	2



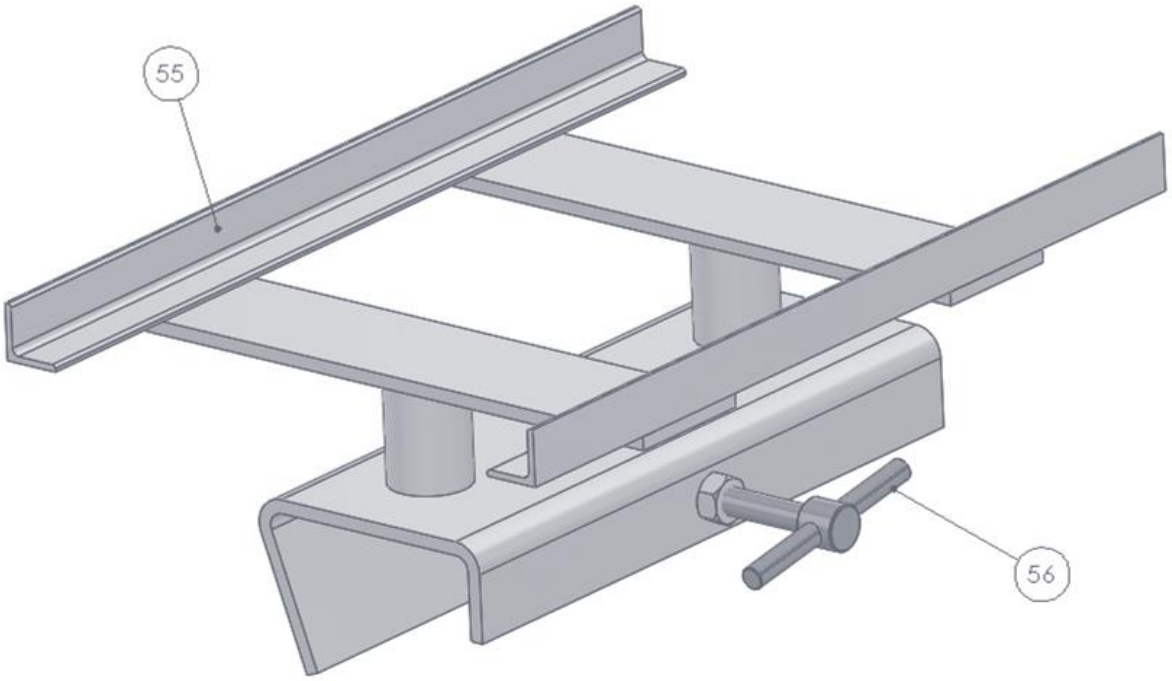
S0000425 Propane fuel system Type E AFNFOR			
Rep	**No.**	**Designation**	**QTY**
50	48102016	Harris 25 propane pressure regulator type E	1
51	48302028	Gas regulator flame arrestor	1
52	S0000176	Propane hose 10/17 NF-EN 559	5m
53	48301073	Clamp CL1020	2
54	48301008	RBE.06 splined sleeve coupler	1



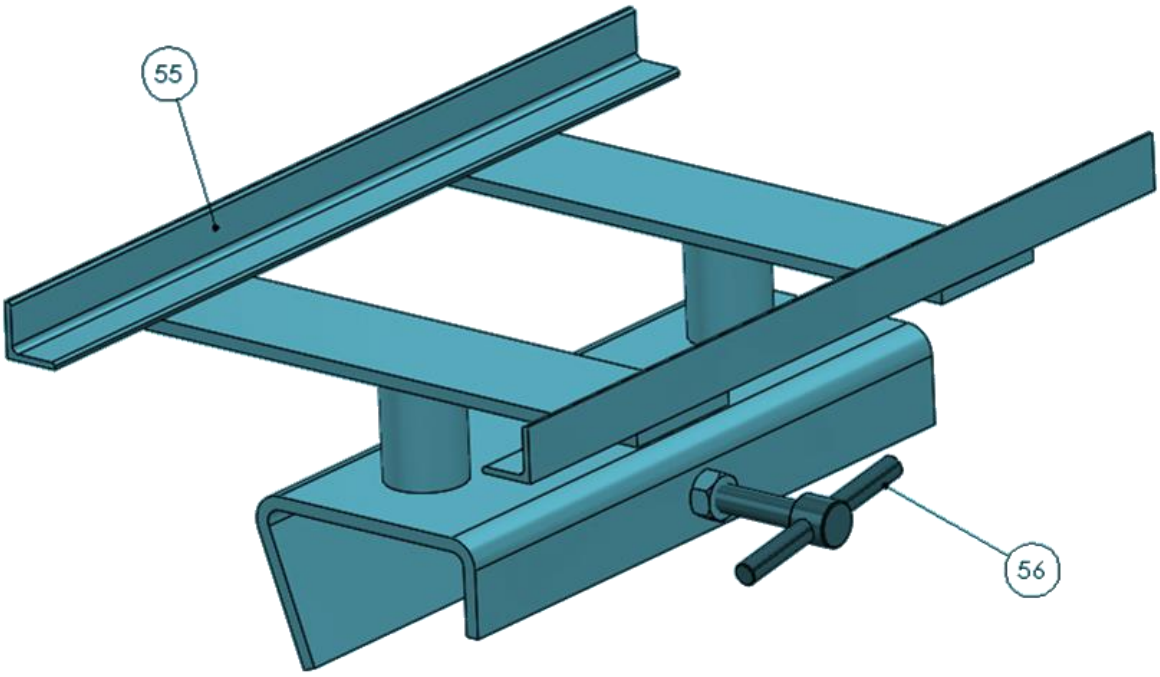
S0000477 Propane fuel system Type DIN9			
Rep	**No.**	**Designation**	**QTY**
50-2	S0000213	Harris 25 propane pressure regulator Type DIN9	1
51	48302028	Gas regulator flame arrestor	1
52	S0000176	Propane hose 10/17 NF-EN 559	5m
53	48301073	Clamp CL1020	2
54	48301008	RBE.06 splined sleeve coupler	1



21245008 HFP support H90mm for vignole rail - A (Yellow)			
N°	**N°**	**Description**	**Quantity**
55	35910533	Support foot	1
56	47403007	M16x60 screw with Ø25 pad	1



21245016 HFP support H90mm for groove rail - B (Grey)			
N°	**N°**	**Description**	**Quantity**
55	35910535	Support foot	1
56	xx	xx	1



21245017 HFP support H70mm for vignole rail - C (Blue)			
N°	**N°**	**Description**	**Quantity**
55	35910537	Support foot	1
56	47403007	M16x60 screw with Ø25 pad	1

12. DECLARATION OF CONFORMITY

The undersigned manufacturer

PANDROL *(DIVISION MATERIEL)*
Z.I DU BAS PRE
59590 RAISMES

Certifies that the new equipment designated below

BATTERY PREHEATER HFP e+

Ref. S0000473

Sérial 000 to 999

Is conform to:

- THE REGULATORY PROVISIONS DEFINED BY DIRECTIVE 2006/42 / EC

- ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 2014/30 / EU

- The requirements of article R4313-20 (self-certification procedure)

- The relevant provisions of the following standards have also been used:

- Standard NF EN 746-2: 2010 - Industrial thermal equipment - Part 2 Safety requirements concerning combustion and handling of fuels

- Standard EN 60204-1: 2006 - Safety of machines - Electrical equipment of machines PART 1: General rules

Raismes, 04/2021

Mr. Thibaut DESCAMPS is the holder of the technical file

Jérôme VIENNE
Directeur du site de Raismes et PTF

Thibaut DESCAMPS
Directeur Ligne Produit ATW

PANDROL

More on

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