adphos

User Manual

NIR120 M – series

(Serial- No. >10240)

Version 3.0 (USA_UL)
6th August 2013

adphos
Innovation in thermal processing

Thank you for purchasing an adphos NIR drying system.

This manual will help to show the proper installation, operation and maintenance of your NIR drying system and how it can be safely and efficiently operated with your inkjet printing system.

NIR drying systems were developed with regard to the highest safety standards. Proper installation, operation and maintenance of the system never places trained operators or maintenance personnel at risk.

For your own safety and the safety of others, please read the following procedures in this manual and follow all safety instructions.

adphos Innovative Technologies GmbH
Bruckmuehler Str. 27
83062 Bruckmuehl-Heufeld
Germany
Phone: +49-8061-395-0
Fax: +49-8061-395-395

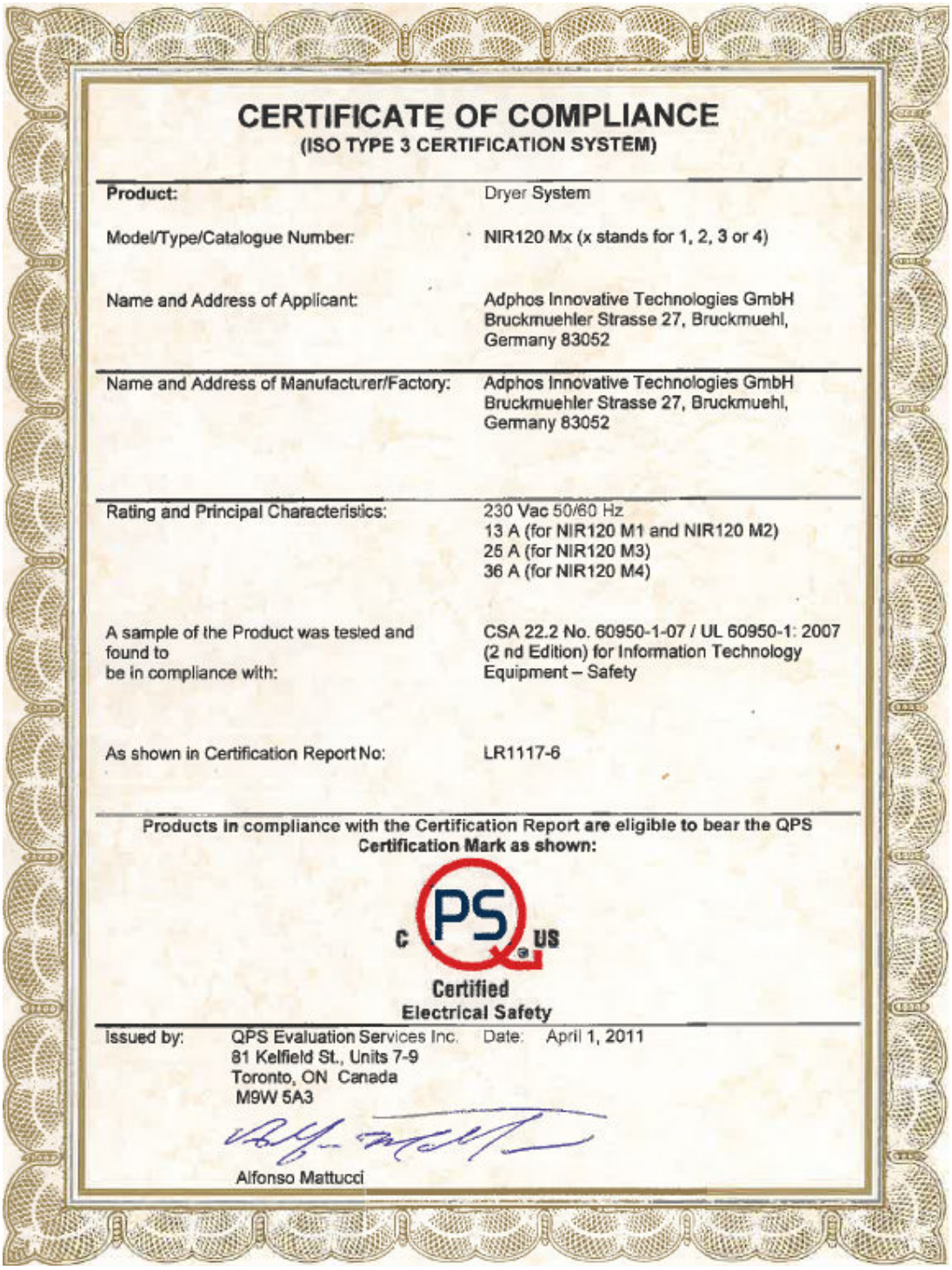
Technically Trained Representation:

adphos North America, Inc.
3490 North 127th Street
Brookfield WI 53005
USA

info@adphosna.com

Phone: +1 (262) 790-9100
Fax: +1 (262) 790-1132

Certificate of compliance



CERTIFICATE OF COMPLIANCE
(ISO TYPE 3 CERTIFICATION SYSTEM)

Product:	Dryer System
Model/Type/Catalogue Number:	NIR120 Mx (x stands for 1, 2, 3 or 4)
Name and Address of Applicant:	Adphos Innovative Technologies GmbH Bruckmuehler Strasse 27, Bruckmuehl, Germany 83052
Name and Address of Manufacturer/Factory:	Adphos Innovative Technologies GmbH Bruckmuehler Strasse 27, Bruckmuehl, Germany 83052
Rating and Principal Characteristics:	230 Vac 50/60 Hz 13 A (for NIR120 M1 and NIR120 M2) 25 A (for NIR120 M3) 36 A (for NIR120 M4)
A sample of the Product was tested and found to be in compliance with:	CSA 22.2 No. 60950-1-07 / UL 60950-1: 2007 (2 nd Edition) for Information Technology Equipment – Safety
As shown in Certification Report No:	LR1117-6

Products in compliance with the Certification Report are eligible to bear the QPS Certification Mark as shown:

C PS US
Certified
Electrical Safety

Issued by: QPS Evaluation Services Inc.
81 Kelfield St., Units 7-9
Toronto, ON Canada
M9W 5A3

Date: April 1, 2011

Alfonso Mattucci

1. Indented use

The adphos NIR120 M-series drying systems were developed for complete and secure drying of **water-based and soft solvent non-flammable inks** for continuous and drop-on-demand inkjet systems.

It was designed for **build-in use** in commercial printing devices.

Warning

Fire hazard

The drying of hard solvent based flammable inks and the use in hazard areas are not permitted with this adphos NIR drying system configuration.

For solvent applications special available NIR systems are required!

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

The standard mounting position of the NIR120 M(x) drying system is horizontal (see chapter 3.3). As a result of the special design, the modules can be mounted in any orientation parallel to the paper surface.

Depending on operating conditions, the NIR drying power of the module is adjustable by varying the input signal and additionally the onboard power level selector.

2. NIR120 M - series

The NIR 120 M - series is available in four different versions.

They differ in the installed maximum NIR Emitter power and in the capability to control the drying system via USB interface (see table 1).

The version is listed on the type plate at the backside of the dryer top.

Table 1: available NIR120 M versions

Version	Emitter power class	Total power (max.)	USB - interface	adphos-no. (module only)
NIR120 M1	LB-11/230V	3 kW	no	735 891
NIR120 M2	LB-11/230V	3 kW	yes	735 892
NIR120 M3	NB-21/230V	5,8 kW	yes	735 893
NIR120 M4	HB-31/230V	8,3 kW	yes	735 894

3. General safety instructions

3.1. Symbols

Different symbols are used in this user manual to point out potential risks during operation or maintenance of NIR drying modules.
Table 1 shows the symbols used and their meanings.
These symbols are also placed on appropriate parts of the drying system.
Please adhere to the safety instructions and procedures described in this manual.

Table 1: Symbols and their meanings

Symbol	Meaning
	**Attention!** Exclamation point: This symbol is used for safety notes.
	**Attention: hot surface, do not touch!** Every attempt has been made to keep all surfaces as cool as possible. However, some surfaces such as emitters and reflectors can become very hot so that serious burns can occur by touching these areas.
	**Attention: electrical voltage!** Only electrical trained personnel is allowed to work at current carrying parts. Before starting work, the complete drying system has to be strictly cut off from power and power cables have to be disconnected.
	**Attention: NIR radiation!** This sign indicates a possible hazard by NIR radiation during the drying process. Generally NIR radiation does not damage human tissue. However, at close distances to the radiation source, burns to the skin can occur. Very close and direct view of the radiation source without eye protection can cause damages to the eyes.

3.2. **Safety**

The adphos NIR drying systems are designed to be safe and effective when operated according to the guidelines outlined in this user manual.
As with other industrial systems, there is a risk of personal injury if the products are not used according to the guidelines outlined in this manual.

Warning: There is a risk of personal injury by improper use of this equipment.

The following sections include information regarding operational safety for different aspects of the dryer system.

Important: To ensure safe operation of this unit, personnel must be trained regarding the proper use of this equipment.
Installation and operation of the system according to the instructions as outlined in this user manual by properly trained personal will avoid unforeseeable safety risks.

3.3. **High Temperature**

In spite of the cooling of the high temperature NIR emitters, the temperature of the reflector system and parts of the housing will exceed 49° C (120° F). Therefore **do not touch** the NIR drying module and assembled parts during and within five minutes after operation.

3.4. **Electrical voltage**

NIR emitters operate at a voltage of 230 VAC.
Do not replace NIR emitters or attempt to repair drying systems with electrical power running to the units.
Before replacing NIR emitters, opening the power cabinet or removing any protection plates, **make certain there is no electrical current going to the power cabinet.**

3.5. **NIR radiation**

NIR emitters send out an electromagnetic spectrum with a wavelength around 1μm.
Because of the high yield of visible light during operation, do not look directly into the radiation source without eye protection. Looking directly at the radiation source may cause eye damage.
If direct exposure of the light to the eyes occurs, please seek medical attention immediately.
For further protection wear class 4 protective goggles (optional, adphos no. 008857).

To minimize the NIR radiation to the surrounding area use optional light shield.

4. System description

4.1. General

The NIR120 M is a high power drying system with intelligent dryer control.

The module has a drying width of 4.7” (120mm) and a drying length of 9.8” (250mm).

Each module is 5.6” (143mm) wide x 14.6” (370mm) long x 9.5” (241mm) high.

It consists of the housing with the control/power unit, a high efficiency reflector and three adphos NIR emitters.

The module is cooled by an internal fan and additionally monitored by a thermostat and three temperature sensors.

An integrated onboard CPU supervises most drying functions, reacts to operating situations and reports/indicates them to the user.

The USB interface allows updates, diagnostics, remote control, parameterization and customizing of the NIR120 M2/3/4 drying systems.

An integrated inclination sensor senses the actual 3D position and reacts accordingly to avoid an accidental switch-on of the drying system in a non-operating-position e.g. during maintenance.

4.2. NIR Emitter

The NIR radiation is generated by a special NIR emitter, which includes a tungsten filament, which is heated up to 3000K by an electrical voltage.
To increase the lifetime of the emitters, a small amount of halogen gas is added.
All materials used to manufacture the emitters are environmentally friendly.
Burned out or broken emitters can be disposed of as part of regular household waste.
No special disposal is required.
The chemical compounds (tungsten-halides, deposition of tungsten at the quartz glass), which may build up during improper use, are harmless in these concentrations.
Injuries can occur through the breakage of the quartz glass tube.
Wear protection gloves and eye protection when handling broken emitters or glass parts to avoid injuries.
Wear clean cotton gloves (optional adphos no. 403 166) when handling NIR emitters.
Greasy residues on the glass surface will reduce operation time dramatically.
Clean emitters with water and/or Isopropyl alcohol before inserting into module.

Note:

Use original adphos emitters only!

Use correctly specified emitter!

Each adphos emitter is labeled on the left-hand front side immediately after the 90° bend.
The label shows the power class and charge number underneath the adphos logo.
e.g.: NIR LB-11/230V y1 (➔ 1100 W @ 230V production charge y1)

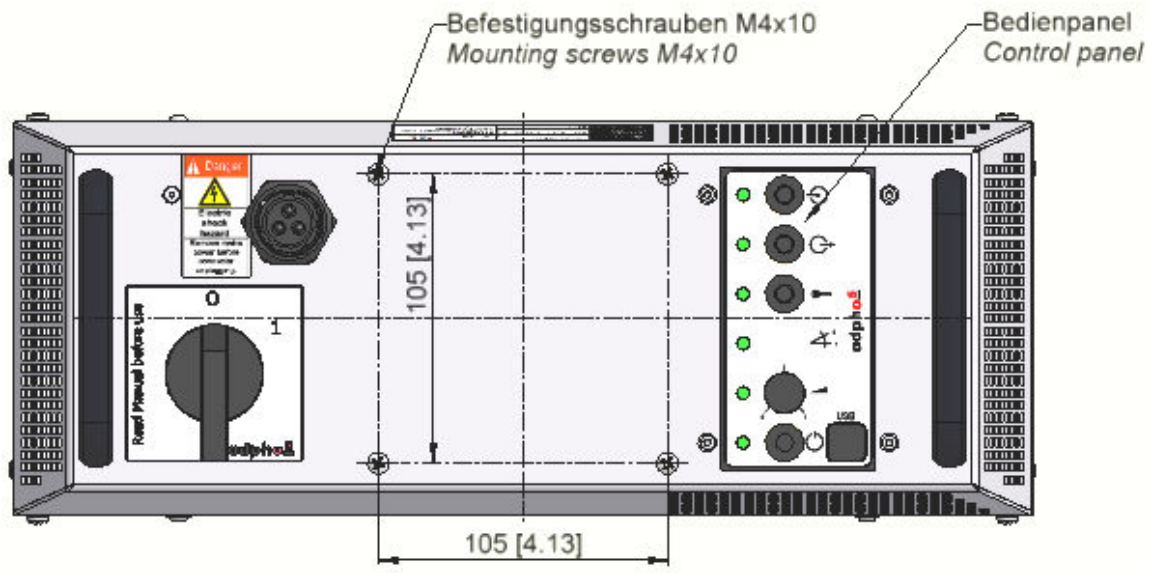
4.3. **Mounting**

Four fastening points with an M4 thread with screws are placed on the top side of the NIR module (see figure 1). The distance between the threads is 4.13” (105mm).

Note:

Use original screws with a thread length of maximum 0.3” (8 mm) only to avoid contact with built-in components!
The maximum torque to fasten the screws is 2 Nm (1.5 ft.lb)!

Figure 1: Fastening points on the upper side of the NIR120 M module



To ensure proper operation of the dryer, the distance between paper and bottom edge of the module must be a minimum of 0.2” (5 mm).

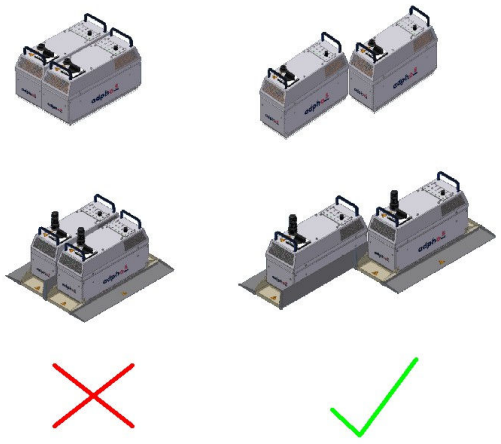
Caution

Burn hazard

Due to NIR radiation the surface temperature opposite the modules could exceed 120°F (49°C) .
Do not touch the surfaces during operation!
Ensure that no thermally sensitive devices are present in the heating area.

For the drying of large scale papers, two NIR120 M can be mounted side by side. Do not place the modules directly side by side, since this will result in cooling problems. Instead, stagger them as shown in figure 2 for a proper cooling.

Figure 2: Two drying modules mounted side by side

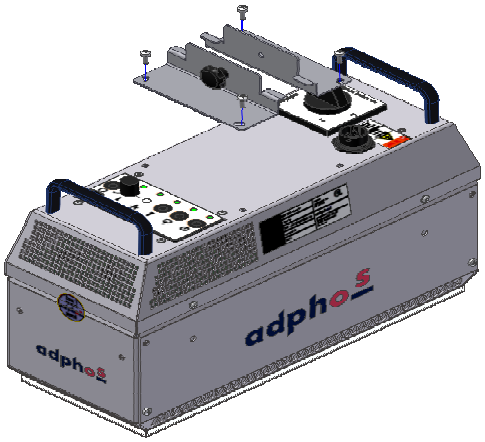


4.3.1. Fastening kit (included, adphos no.: 735 640)

To attach the NIR120 M on the mount arm (optional, adphos no.: 735305), a special fastening kit is assembled.
The kit consists of two brackets with a sliding nut and a lock washer each.
Elongated holes in the brackets allow for adjusting of the mounting angle by up to 3° between the arm and NIR120 M(x).
The fastening kit can be used to affix the module at the four fastening points described in chapter 3.3 (see figure 3).

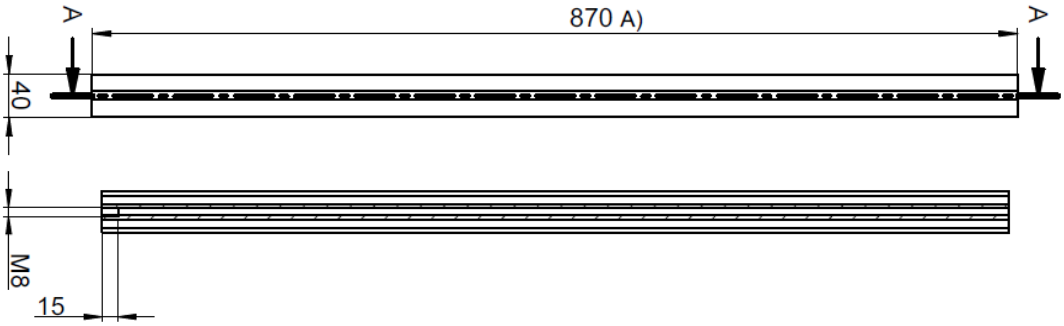
Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Figure 3: mounting the fastening kit at the NIR120 M module



4.3.2. Mount arm (optional, adphos no.: 735 305)

The optional mount arm is a modified Item-profile size 8, with a length of 870mm and a frontal center thread M8/15mm (M8, 0.6” deep) on one side for the handle.



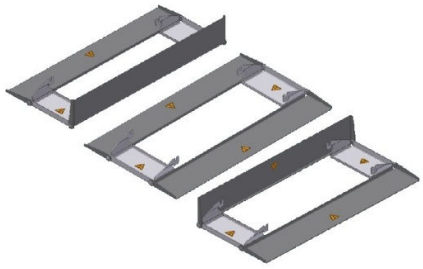
If needed, the arm can be cut to a customized length. Watch out for threaded side!

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

4.3.3. Light shield (optional, adphos no.: 735 294)

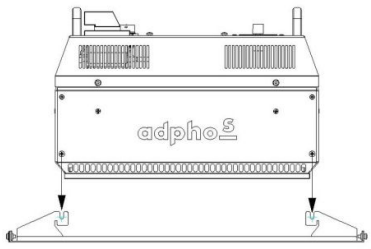
The optional available light shield is shown in fig. 6 and can be mounted at the base of the NIR120 M drying modules to avoid a possible blinding of the operator by the intensive light emission of the NIR-Emitter.
The physical dimensions of the light shield are 11.5” (292mm) in width x 20” (507,5mm) in length.
To mount NIR120 M modules side by side, both shields on the side can be folded up as shown in fig. 6

Figure 6: optional light shield



To mount the light shield on the lower edge of the NIR120 M drying module, unscrew the mounting screws on the long side until the screws latch into the four supports of the shield (see fig. 7). Then tighten the four screws evenly with a maximum torque of 2 Nm (1.5 ft.lb).

Figure 7: fastening of the light shield on a NIR120 M module



Note:

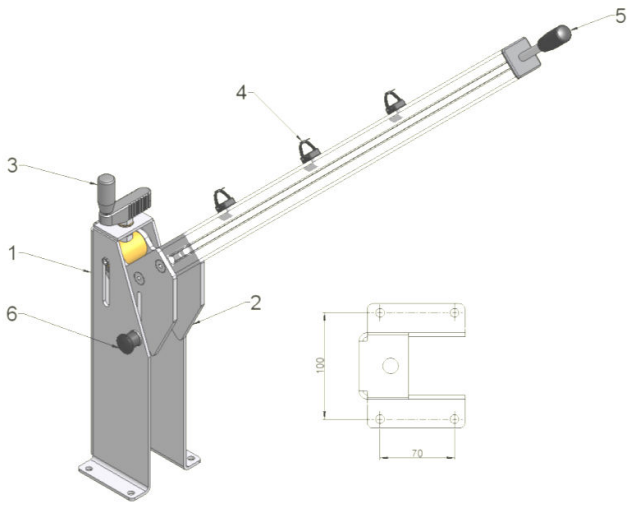
If a customized light shield is used, the light shield must not prevent the cooling air from exiting the dryer module. This may cause overheating!

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

4.3.4. Mount (optional, adphos no.: 735 294)

The optional available mount is designed for a safe and quick on site positioning of the NIR120 M with the mount arm (735305) .
The mount has a total height of 16.5” (419 mm) and a square base of 4.6” (117mm).
To fix the mount on the machine base four mounting holes with 0.33” (8,5mm) in diameter are integrated in the square base.

Figure 4: mount

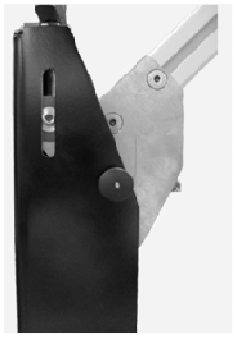


The mount consists of a tie bar (1) with a movable attachment (2) for the mount arm (735305). The mount arm will be fixed to the attachment with four sliding nuts.
Cables will be fixed with cable ties at the 3 fixing points (4) on top of the arm.
To adjust the correct distance to the paper, the attachment can be adjusted over a range of 2.4” (60 mm) in height with the crank handle (3) on the top of the tie bar.
To get easy access to the paper, the position of the module to the substrate can be changed and fixed in three positions (see fig. 5). To do so the latching bolt (6) on the side of the tie bar must be pulled and then the mount arm can be tilted by lifting the handle (5) to the designated position (see fig. 5).

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Figure 5: operating and two maintenance positions of the mount

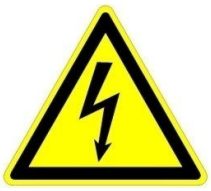
0° operating position



45° maintenance position

80° maintenance position

4.4. Electrical connection



Danger

Electric shock hazard

Only a certified electrician may connect the NIR120 M system to the main electrical panel.
It is only allowed to terminate the NIR drying system to mains specified on the type plate (max. voltage, current, frequency)

4.4.1. Main power supply

The NIR120 M drying modules are designed for use with 230 VAC 2-phase 50Hz/60Hz mains (1PE). Depending on the NIR dryer type, the following fuse rates for external line breakers (both lines) are required (table 2):

Table 2: Required voltages and fuse rates for the different NIR120 M versions

Version	Voltage	Fuse rate	Phase
NIR120 M1	230 VAC (50 or 60Hz) ±10%	20 A	2-phase
NIR120 M2	230 VAC (50 or 60Hz) ±10%	20 A	2-phase
NIR120 M3	230 VAC (50 or 60Hz) ±10%	32 A	2-phase
NIR120 M4	230 VAC (50 or 60Hz) ±10%	40 A	2-phase

4.4.2. Main power cord/cable

To order your customized main power cord, get in contact with:
adphos North America, Inc.,3490. North 127th Street, Brookfield WI 53005

The connection of the power cord to the NIR120 M module is carried out by a Souriau UTS connector (3 Pin).

Note:

The module may only be connected to the main power supply by using a 3x 6 mm² (AWG 10) UL approved cable.

National standards and regulations on ampacities must be observed!

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information

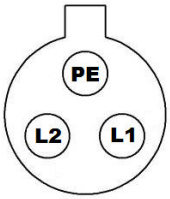
4.4.3. Main power connector

The main power connector is located on the left side of the upper edge of the NIR120M module.

Figure 8: main connector of NIR120 M dying modules

pin assignment see fig. 9

Figure 9: pin assignment of Souriau UTS connector (plan view of the mounted male connector)



Danger

Electric shock hazard

Before handling, connecting or disconnecting the Souriau UTS connector (in case of service or maintenance) the module must be switched off and physically disconnected from the main electrical supply.

4.4.4. Main power switch

The main power switch is located on the left side of the upper edge of the NIR120 M module (see figure 8) and serves for connecting the power to the drying system. Two conditions are available.

Table 3: Conditions of the main switch

Position	Condition
0	drying system off
1	drying system on

4.5. Monitoring functions

4.5.1. Power supply monitoring

The controller of the NIR120 M drying module will permanently check the applied power voltage.
If the power voltage is out of the specified range, the module will be locked and the status LED of the analog input and output as well as the status LED near the push button will be blinking red fast.
If this error occurs, check your main and connect the NIR120 M dryer to the correct main power.

4.5.2. Emitter power monitoring

NIR120 M dryers can be equipped with emitters of different power classes.
The installed power of the emitters must not exceed the total power of the dryer.
A permanent emitter power monitoring prevents damage to the NIR120 M1, NIR120 M2 and NIR120 M3 drying systems due to using NIR emitters out of the specified range. If the system detects emitters with too much power, the dryer will be locked and the LED near by the push button will blink green. This fault cannot be reset by any function. You will need to shut down the system and install a correct NIR emitter set.

4.5.3. Input / Output control signal monitoring

An internal controller monitors the incoming and outgoing signal of the NIR120 M dryer.
The majority of incorrect signals will be detected and signalized with the status LEDs. (See troubleshooting).

- Wrong polarity at input signal
- Too high at input signal (voltage or resistance)
- Too high current at output signal circuit
- Voltage at Remote on/off

Notice

Three color LED combinations will inform the user when incorrect signals are detected.

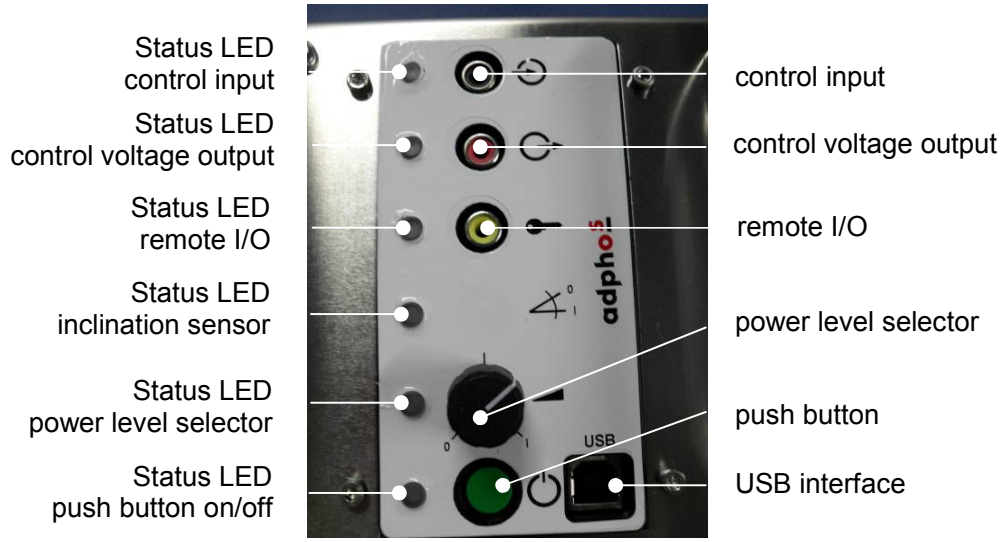
Damage cannot be ruled out.

Follow manual instructions for the control elements!

4.6. **Control elements**

All control elements of the NIR120 M drying modules are located on the top right of the NIR120 M drying modules. The control elements include RCA connectors for control voltage in- and output, an RCA connector for the remote I/O, a potentiometer, a start push bottom and, finally, the USB plug socket.
There are also six multi-LED indicator lamps for indicating the module status.
An overview of the control elements is shown in fig. 11.
The connectors for the control voltage input and output and remote I/O are RCA-connectors (“RCA jack”)

Figure 11: control elements of the NIR120 M drying module



4.6.1. Input connector (white color)

	**Notice**
	Damage of the module by using input voltage higher of 15 VDC or using AC voltage.
	Use only a control voltage of less than 15 VDC.

In default configuration an external control input signal of 0-10 VDC (= 0-100%) is required for operating the NIR120 M drying module.
The power of the emitters can also be aligned with the power level selector (potentiometer).
To connect your external control voltage to the NIR120 M drying module, use a white standard industrial RCA plug. The standard configuration of the RCA-plug is Pin1 (pin contact):+-wire and pin 2 (annular contact): –wire.
If the maximum external control voltage signal is higher than 10 VDC the status LED near by the input connector will be blinking red fast.

Note:

At the output connector (red color) a constant voltage of 10 VDC is applied.
If external control voltage is not available, this constant control voltage output of the module can be used for the input voltage signal.
Use a cable with two standard industrial RCA plugs and connect the control input connector (white) to the internal output connector (red).

To adjust the power of the dryer dependent upon print speed, an external control voltage from a tachometer or other device can be also applied.

Table 4: meanings of status LED control voltage input

Status	**Meaning**
Blinking red, fast	Supply voltage or input voltage are out of range
Red	Input value is less than 1%
Green	Input value is greater than or equal to 1%

4.6.2. Control voltage output connector (red color)

The control voltage output is a voltage signal. Use a minimum resistance of 10kOhm.

At the control voltage output connector a constant voltage of 10 VDC is applied.
Note for model NIR120 M2, NIR120 M3, NIR120 M4:

These models can be configured via USB.
Option to be configured:

- ***Power relation to output signal e.g. 0-10V DC = 0-100% power***

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Notice

Damage of the module by connecting an input voltage.

Never connect input voltage to the control voltage out connector.

To use the external control voltage from the control voltage out connector of the NIR120 M drying module use a red standard industrial RCA plug.
The standard configuration of the RCA-plug is Pin1 (pin contact):+-wire and pin 2 (annular contact): –wire.

Table 6: meanings of status LED control voltage output

Status	Meaning
Blinking red, fast	Supply voltage or output voltage are out of range
Red	Output value is less than 1%
Green	Output value is greater than or equal to 1%

4.6.3. Remote I/O (yellow color)

Caution

Fire hazard

Do not use the NIR120 M module with a jumpered Remote I/O. In case of an unforeseen belt or paper stop, the NIR module will not shut down.

Notice

Damage of the module by using a control voltage for the Remote I/O.

Connect the Remote I/O only to a non-potential contact in the machine control.

Link the Remote I/O signal with your paper/web transport, so that Remote I/O signal is active only during working paper/web transport.

By using the Remote I/O the NIR emitters can be switched on and off by an external control signal from a conveyor system, mailerbase or web system.

The Remote I/O requires a potential-free (dry contact) only!

For operation of the emitters, the remote I/O contact must be closed.

Do not attach AC or DC voltage directly to remote I/O (use Interface box Remote I/O)

Table 7: meanings of status LED Remote I/O

Status	Meaning
Red	Unlocked, contact open
Green	Locked, contact closed

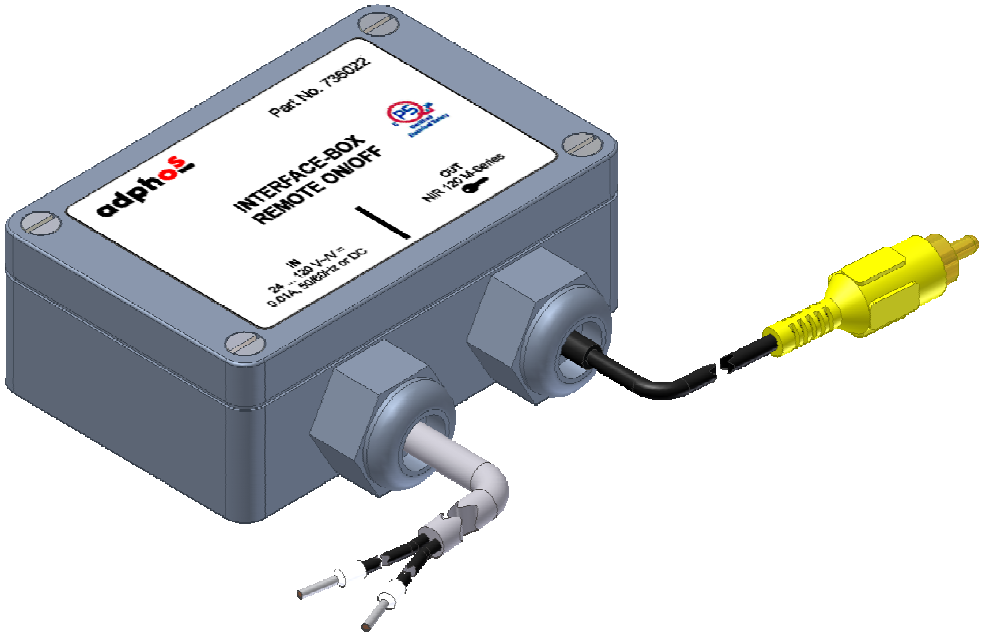
4.6.3.1. Interface-Box Remote I/O (optional adphos- no.:736022)

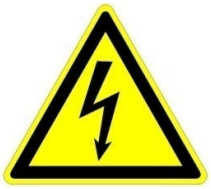
If a potential-free contact (dry contact) is not available in the machine control, a control voltage can be used in combination with the Interface-box Remote I/O (see figure 12).

The optional Interface-box Remote I/O consists of an electronic relay for control voltages in a range of 24….120 VDC/VAC.

The relay is integrated in a plastic box.
A 16 feet (4.9 m) long 2x 0,75 mm^2 (AWG 19) cable with cable end sleeves is available to connect the relay to the machine control.
A 4.5 feed (1.4 m) long coaxial cable with a yellow RCA connector is provided as a connection to the NIR120 M drying module.

Figure 12: optional Interface-box Remote I/O



	**Danger**
	Electric shock hazard
	Only a certified electrician may connect electric voltages in a range of 24….120 VDC/VAC

4.7. **Inclination sensor**

An inclination sensor on the control board of the NIR120 M drying module watches the operating position of the module (default configuration horizontal alignment). If the positional deviates more than ~10° from the horizontal, the module will be locked. The status LED turns red and the push button status LED will blink red. To unlock put the device in the operating position and push the push button (both status LEDs will turn green).

Note for NIR120 M2, NIR120 M3, NIR120 M4:

These models can be configured via USB.
Option to be configured:

- ***Operating position***
- ***Tolerance of inclination angle***

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Table 8: meanings of status LED Inclination sensor

Status	**Meaning**
Blinking red, fast	Signal from sensor is invalid (e.g. not calibrated)
Red	Out of operating position, module ready
Green	In operating position, module is ready or running

4.8. **Power level selector**

The power level selector is a potentiometer located below the Remote I/O connector (see figure 11).

By rotating the knob of the potentiometer, the power of the drying system will be adjusted.

The effect of adjustment depends on the kind of external control voltage (default).

If a constant external power control of 10 VDC is used, the power of the NIR dryer continuously varies between 0% and 100% of the possible drying power (default).

If a variable external control device (e.g., tachometer signal) is used, the potentiometer is used to tune the power for the external control voltage for the drying power. Detailed information can be found in chapter 3.5.1. Optimal adjustment of the dryer is described in chapter 7.

Note for NIR120 M2, NIR120 M3, NIR120 M4:

These models can be configured via USB.
Option to be configured:

- ***Enable /disable***
- ***Function***

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Table 9: meanings of the different indicators for the power level selector

Status	**Meaning**
Off	Potentiometer disabled
Red	Value is less than 1%
Green	Value is greater than or equal to 1%

4.9. **Push button**

The push button is located below the power level selector (see figure 11).
The push button will be used to unlock the NIR120 M dryer after any system error.
It can also be used by the operator to lock the operating NIR120 M dryer manually (remote I/O closed). To restart the dryer, push the button again (remote I/O closed).

Note for NIR120 M2, NIR120 M3, NIR120 M4:

These models can be configured via USB.
Option to be configured:

- ***Enable/disable***
- ***function***

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

Table 10: meanings of the different indicators for the power level selector

Status LED pushbutton	
red	device is ready and is waiting for a start signal
green	a start signal has been detected and the device is running now (the requested power may still be 0%)
blinking red vs. green	device is not ready, an error condition remains
blinking red	device is initializing
blinking green	device is suspended; the button must be pressed to resume the device
yellow	temperature error (temperature switch set)
blinking yellow vs. green	temperature threshold reached (IRS / environment 40°C, IRL CPU 65°C, IRL controller 85°C)
blinking green fast	one or several emitters are not working (power too low or too high)
blinking red, fast	device is locked (an error occurred while the device was running or has been suspended); the pushbutton must be pressed to unlock the device

4.10. **USB interface**

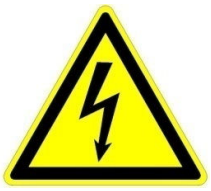
The internal USB-interface is only installed in the NIR120 M2, NIR120 M3 and NIR120 M4 version and will be used for parameterization and customizing the accordingly NIR120 M drying system.

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

5. **System installation**

Important:

During operation of the drying systems, significant heat will be produced in the proximity of the dryer module. The installation location of the dryer module must be selected in such a way, that no damage will be caused to the production line or objects in the surrounding area by the thermal effects of the drying system(s).
When mounting the dryer module on a web transport, make sure no components may be damaged by the thermal effects both beneath and to the sides of the web.
When mounting the dryer module on a sheet-feed transport, make sure to use "high-temp" transport belts, and ensure that the “top deck” of the transport is suitable for high temperatures.



Danger

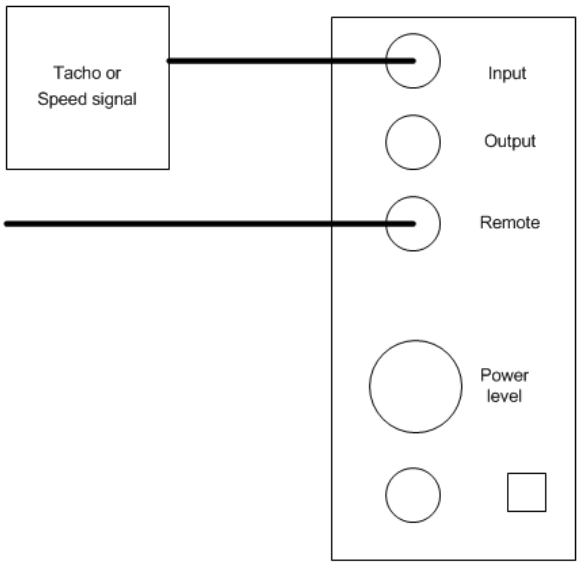
Electric shock hazard

Installation of NIR drying systems to be performed by trained personnel only. Only a qualified electrician may connect the module to the main.

1. Remove packaging and check that the contents are complete and undamaged.
2. Check proper position of all three inserted emitters
3. Attach the light shield at the module (optional).
4. Check proper torque of all screws that are accessible from outside the module.
5. Mount the NIR dryer module on the line. Make sure that the dryer module is parallel to the paper in a horizontal position and the distance to the paper surface complies with the specifications.
6. Mount the tachometer on the line according to the manual (optional).
7. Wire all cables as described in sections 3.4 and 3.5.
   (Input signal / Output signal / Remote I/O signal)
8. Double check Remote I/O function (safety related function).
9. Make sure the main power switch is in the “Off” position.
10. Set the power level selector to the “0” position (turn left as far as it will go).
11. Plug the power cable into the NIR120 M before connecting the cable to the mains. Mains line breakers must be open for connection
12. Close breakers to power mains connection.
13. Switch the main power switch to “1” position (on). The cooling fans in the dryer module will turn on.
14. Self-test-procedure of status LEDs.
15. Turn on the mailbase or web transport thus supplying the proper Remote I/O signal to the NIR120 M drying module and allowing operation of the NIR emitters.
16. Be sure that a proper control voltage is applied correctly at the input control voltage connector.
17. Slowly turn the power level selector clockwise until a glowing light is visible under the NIR dryer module. Raising the power the visible light will turn from orange “glowing” up to bright white shinning at 100% power.

6. Operation

6.1. Tachometer operation



As described above, the NIR dryer system can operate with an external control voltage. To control the drying system proportional to the paper speed in an open loop control, a control voltage in the range of 0 VDC and 10 VDC must be available.

If the control voltage is not available from the central controlling system (now base or web transport) an external tachometer must be mounted (e.g. on a roller or conveyor).

Optional adphos tacho´s

Speed m/min	ft/min	adphos- item	Adphos-No.
75	246	Tachometerkit 75 m/min	557153
100	328	Tachometerkit 100 m/min	557155
150	492	Tachometerkit 150 m/min	557156

“

7. Adjustment of the dryer

7.1. General

Turn the power level selector and the main switch to the “0” position, to avoid any damages of the paper. Be sure that the module is mounted to the mailerbase or paper feeder properly.

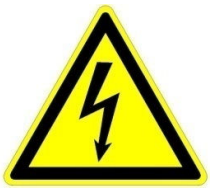
7.2. Adjustment procedure

After successful installation the next step is to adjust the degree of dryness.
Therefore follow the next instructions step by step.

1. Switch the main power switch to “1”position (on), the cooling fans in the dryer module will turn on. Additionally all Status LED’s are blinking red one after the other for a short time.
2. Turn on the mailbase or web transport thus supplying the proper control voltage to the NIR120 M module and allowing operation of the NIR emitters.
3. Slowly turn the power level selector clockwise until a steady glowing light is visible under the NIR dryer module.
4. Start the inkjet printing system printing and make test prints at the desired running speed.
5. Rotate the power level selector clockwise until the test prints reach the optimal drying quality.

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

8. Maintenance



Danger

Electric shock hazard

Maintenance of electrical components to be performed only by trained electricians.

Before disconnect the mains connector at the NIR120 M (in case of handling or maintenance), the module must be switched off and physically disconnected from the main.

adphos NIR drying systems are designed to require minimal maintenance. The following components as described in table 11 should be checked according to the specified service interval.

Table. 11: Service intervals of components NIR dryer system.

No.	Component	Interval	Description
1	Error / alarm condition	daily	Check status LED´s during operation
2	Reflector of the NIR dryer module	2 weeks	Visually inspect the reflector for dust, dirt and damage
3	NIR emitter	Monthly	Visually inspect the emitter(s) for dust, dirt and damage
4	Wiring	Monthly	Visually inspect all wires and cables for damage

8.1. Cleaning of NIR emitter

For cleaning the NIR emitter follow the instructions below step by step:

Before cleaning remove the dryer module(s) and place on a soft pad to avoid damage.
NIR emitters are only be touched or handled with protective clean cotton gloves. Sebaceous residues on the glass surface will reduce operation time dramatically. Before cleaning the emitters remove them out of the dryer module.

To remove the emitters out of the dryer module, with cotton gloves, gently grab the emitter on both ends by the 90 degree bend in the emitter and pull the emitter straight out of the dryer module. Avoid touching of the emitter contact to the reflector (optional emitter extraction tool adphos part number 726 174).

Light contamination can be removed with water and/or Isopropyl alcohol. Persistent contamination can be removed with a gentle polishing paste (see opposite figure).

If after cleaning the quartz glass bulb is still cloudy or damage is visible (specifically by the contact area) the emitter should be replaced.

To reinstall the emitters be sure that the connecting contacts at the ends of emitters are straight and not bent (straighten them if bent). Insert the clean NIR emitter into reflector by taking the emitter in both hands (wearing protective cotton gloves!) and plug the contacts completely into the jackets of both ends of the reflector until the contacts are securely in place (be sure not to force or jam the contacts into the jackets!).

Important:

New emitters should always be cleaned with alcohol to remove any possible contaminants which may have been deposited during the manufacturing, shipment and storage of the emitters.

8.2. Cleaning of NIR reflector

Danger

Electric shock hazard

Maintenance of electrical components to be performed only by trained electricians.

Before disconnect the NIR20 M main connector (in case of handling or maintenance) the module must be switched off and physically disconnected from the main.

Note!
Before cleaning remove the dryer module(s) and place on a soft pad to avoid damage. Remove NIR emitter first! (see chapter 7.1)

Note!
Avoid any flow or contamination of water or cleaning agents into the module. A damage of the module will occur.

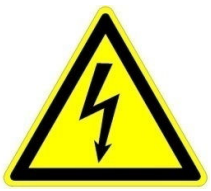
NIR reflectors are manufactured out of specially coated aluminum sheets. Contamination of the reflectors results in a reduction of reflectivity which under certain circumstances can damage the reflectors or cause over temperature emergency stop.

Clean NIR reflectors only with a slightly damp micro fiber cloth (see fig. 13) to prevent any damages on the electrical components of the module.

Figure 13: cleaning of NIR reflector by slightly damp micro fiber cloth.

Generally, for each NIR reflector a clean, soft und lint-free cleaning tissue, e.g. cotton tissue, should be used.
Do not apply force during cleaning and do not try to remove insistent contaminations by using sharp objects as damage to the reflector surface will occur.

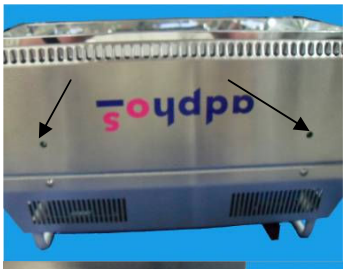
8.3. **Replacement of NIR reflector(s)**

	**Danger** **Electric shock hazard** **Maintenance of electrical components to be performed only by trained electricians.** **Before disconnect the Souriau UTS connector (in case of handling or maintenance) the module must be switched off and physically disconnected from the main.**

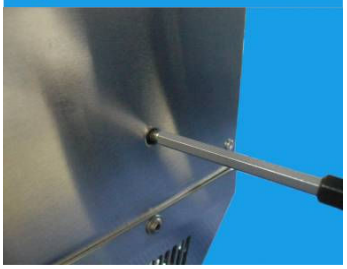
Note!
Before cleaning remove the dryer module(s) and place on a soft pad to avoid damage. Remove NIR emitter first! (see chapter 7.1)

If contaminations cannot get removed from the surface, the reflector must be replaced.

Therefore follow the instructions below step by step

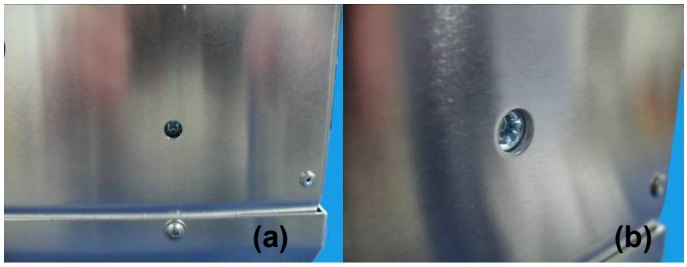


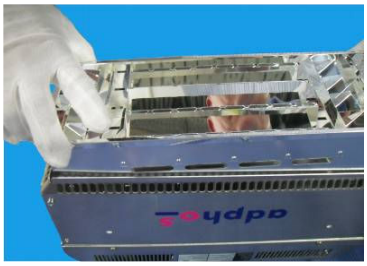
The reflector is fixed on the module by 4 screws inside the NIR120 M drying module. The access is carried out by 4 holes in both long sides exterior plates (see opposite fig.).



To bold the screws use a Phillips recessed head screwdriver (size PHX). Turn the screwdriver counter-clockwise and unscrew the screws up to the stop.

The opposite figures shows the position of the screws tighten (a) and bold (b)

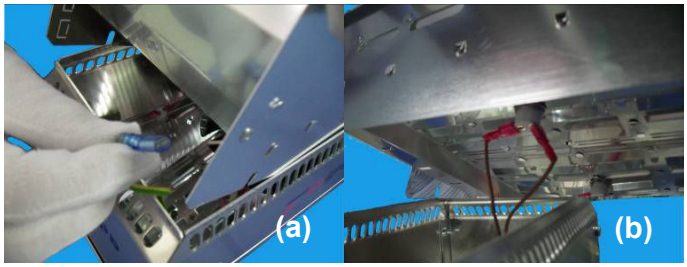




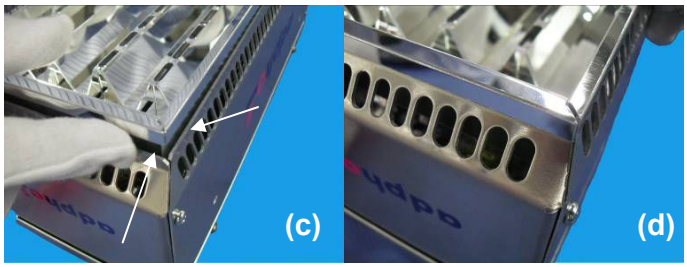
Extract the reflector assembly upward.

The reflector assembly is connected with three wires, a green-yellow grounding wire and two brown wires for the thermo-switch to the control unit.

First strip the ground cable from the contact tab at the edge the long side plate (a). Then strip both cables from the thermo switch in the middle of the reflector unit (b). Now the reflector unit can be replaced with a new one.



The assembly of the module with the new reflector will be carried out in the reverse order. Make sure that the edges of the module housing(see arrows in c)) are completely fitted in the framed notch of the reflector assembly (d).



Finally tighten the four screws as described above.

8.4. **Maintenance kit (optional)**

Required tools and materials (except liquid solvents and micro fiber cloth) are arranged in an optional maintenance kit, adphos-no. 712 373.

Call +1 262-790-9100 (US) or +49-8061-395-0 (GER) for detailed information.

9. Component and spare part list

9.1. NIR120 M1 and NIR120 M2

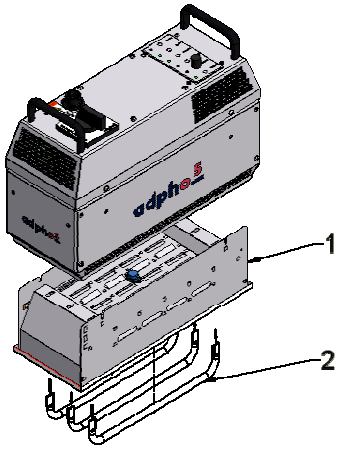
Description	Quantity	adphos-order-no.	Parts list position
NIR120 M1 - drying module (without NIR emitters)	**1**	**735 891**	
NIR120 M2 - drying module (without NIR emitters)	**1**	**735 892**	
Light Weight Reflector (LWR), complete for NIR120 M1 or NIR120 M2	1	735 353	1
NIR Emitter LB-11/230V (1.1kW)	3	735 679	2

9.2. NIR120 M3

Description	Quantity	adphos-order-no.	Parts list position
NIR120 M3 - drying module (without NIR emitters)	**1**	**735 893**	
Light Weight Reflector (LWR), complete for NIR120 M3	1	736 142	1
NIR Emitter LB-11/230V (1.1kW)	3	735 679	2
NIR Emitter NB-21/230V (2.1kW)	3	735 677	2

9.3. NIR120 M4

Description	Quantity	adphos-order-no.	Parts list position
NIR120 M43 - drying module (without NIR emitters)	**1**	**735 894**	
Light Weight Reflector (LWR), complete for NIR120 M4	1	736 143	1
NIR Emitter LB-11/230V (1.1kW)	3	735 679	2
NIR Emitter NB-21/230V (2.1kW)	3	735 677	2
NIR Emitter HB-31/230V (3.1kW)	3	735 263	2



10. Optional equipment and maintenance material

Description Maintenance materials / Option	**Quantity**	**adphos order-no.**
NIR protective goggles	1	408 857
NIR emitter removal tool	1	726 174
cotton gloves	1 package	403 166
Complete maintenance set in a case , includes - NIR protective goggles - Emitter removal tool - Cotton gloves - Cleaning paste for NIR emitters	1	712 373

11. Troubleshooting

Danger

Electric shock hazard

Maintenance of electrical components to be performed only by trained electricians.

Before disconnecting the Souriau UTS connector (in case of handling or maintenance) the module must be switched off and physically disconnected from the main.

If issues cannot be solved by using the troubleshooting matrix described below, call the central adphos service point (phone +49-8061-395-0 or +1 262-790-9100)

11.1. **Meaning of the status LED´s**

Status LED analogue input	
off	analogue input is disabled
blinking red, fast	input signal is out of range
red	input value is less than 1%
green	input value is greater or equal than 1%

Status LED analogue output	
off	analogue output is disabled
blinking red, fast	supply voltage or output voltage are out of range
red	output value is less than 1%
green	output value is greater or equal than 1%

Status LED remote on/off input	
off	remote on/off input is disabled
red	Unlocked, contact open
green	Locked, contact closed

Status LED inclination sensor	
off	Inclination sensor is disabled
blinking red, fast	signal from inclination sensor is invalid (e.g. not calibrated)
red	out of operating position
green	in operating position

Status LED power level selector	
off	Power level selector is disabled
red	value is less than 1%
green	value is greater or equal than 1%

Status LED pushbutton	
red	device is ready and is waiting for a start signal
green	a start signal has been detected and the device is running now (the requested power still may be 0%)
blinking red vs. green	device is not ready, an error condition holds
blinking red	device is initialising
blinking green	device is suspended; the button must be pressed to resume the device
yellow	temperature error (temperature switch set)
blinking yellow vs. green	temperature threshold reached (IRS / environment 40°C, IRL CPU 65°C, IRL controller 85°C)
blinking green fast	one or several emitters are not working (power too low or too high)
blinking red, fast	device is locked (an error occurred while the device was running or has been suspended); the pushbutton must be pressed to unlock the device

11.2. **Trouble shooting list**

Failure	Cause	Display status LED	Action
NIR emitter doesn't work	Module not connect with main	-	First plug Souriau connector into socket second connect power cable to main
	Main switch in "0" position (off)	-	Set main switch to "1" position (on)
	Main power out of range	AI[1]: blinking red fast AO[2]: blinking red fast	Check the main source
	Module not in horizontal position	Pi[3]: red Pb[4]: blinking red fast	Set module in horizontal position Press push button to unlocked the dryer
	Remote I/O contact open	IO[5]: red	Check the Remote I/O signal
	Control voltage too low	AI[1]: red AO[2]: red	Check the control voltage, dryer will start at a control voltage ≥ 100 mV DC
	Control voltage more the 11VDC	AI[1]: blinking red fast AO[2]: red Pb[4]: blinking red fast	Check the control voltage; control voltage max. 10 VDC. Press push button to unlocked the dryer
	Power level selector "0" position	Ps[6]: red	Turn the knob clockwise until the emitter work correctly
NIR emitters work but shut down after a present time	Temperature switch set	Pb[4]: yellow	Check the position of the module regarding accessibility cooling air, check the reflector regarding pollution.
	Internal temperature threshold reached	Pb[4]: blinking yellow vs. green	Check the position of the module regarding accessibility cooling air and environmental temperature
	Installed emitters out of the allowed range	Pb[4]: blinking green	Install the correct emitter types

[1]AI = Analog input Pi[3] = Inclination sensor IO[5] = Remote I/O
[2]AO = Analog output Pb[4]: = Push button Ps[6] = Power level selector