

## **PREHEATER MCS120 /190 /280**

### **OPERATOR GUIDE**

- daily operation and routine maintenance -

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# Proprietary Statement

## Manufacturer/Distributor

NDC Technologies Inc., 8001 Technology Blvd., Dayton, OH 45424, USA

## About This Manual

This manual contains descriptions, drawings, and specifications for a NDC Technologies product. Equipment or products made prior to or subsequent to the publication date of this manual may have parts, features, options, or configurations that are not covered by this manual. Specifications contained herein are subject to change by NDC Technologies without prior notice. NDC Technologies is not responsible for errors or omissions that may be contained herein or for incidental or consequential damages in connection with the furnishing or use of this information.

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## Limited Warranty

NDC Technologies will correct by repair, or at NDC Technologies' option, by replacement, F.O.B NDC Technologies' plant, any defect in workmanship or material in any equipment manufactured by NDC Technologies which appears under normal and proper use within twelve months from the date of shipment (eighteen months for OEM's), provided NDC Technologies is given reasonable opportunity to inspect the alleged defective equipment at the place of its use and under conditions of its use.

**EXCLUSIONS:** This warranty does not cover products which have been modified, altered, or repaired by any other party than NDC Technologies or its authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, misuse, incorrect handling, servicing, or maintenance; or has been damaged as a result of excessive current/voltage or temperature; or has had its serial number(s), any other markings, or parts thereof altered, defaced, or removed will also be excluded from this warranty.

**WARRANTY SERVICE AT CUSTOMER SITE:** Warranty service performed at the customer's facility will be free of charge for parts and labor; however, the customer will be liable for transportation and living expenses of personnel dispatched to effect such repair. A purchase order or other written confirmation of the acceptance of these charges, signed by an authorized individual, will be required prior to commencement of repairs. Additional charges may be assessed the customer if: 1) The equipment is not made available on a timely basis, 2) The equipment is found to be without fault, and/or 3) It is determined the equipment is not under warranty, whether by expiration of the warranty or any act which voids the warranty.

**OTHER THAN AS SET FORTH HEREIN, NDC TECHNOLOGIES MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY AS TO THE EQUIPMENT MANUFACTURED BY IT, AND THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.** NDC Technologies' obligation to correct defects in such equipment by repair or replacement in accordance with the foregoing provisions is in lieu of any other warranties, expressed or implied, and in no event shall NDC Technologies be liable for incidental or consequential damages. No service of NDC Technologies' equipment is permitted during the warranty period without the specific written consent of NDC Technologies.

*Note:  
For information  
about servicing  
and returning  
your equipment,  
see the section at  
the end of this  
manual.*

## European Commission Requirements



This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other equipment. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other equipment, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orientate or relocate the equipment.
- Increase the separation between the pieces of equipment.
- Connect the pieces of equipment on separate mains circuits.
- Ensure that the relevant items of equipment are properly and securely earthed to a common earth point using adequately sized cable or other means of connection.
- Where supplied or specified, shielded interconnection cables must be employed with this equipment to ensure compliance with the pertinent RF limits.

This product has been rigorously tested to comply with the European EMC (Electromagnetic Compatibility) Directive. With regard to this, NDC Technologies recommends that any non-NDC Technologies peripheral equipment is CE marked. NDC Technologies also recommends that any cables not supplied by NDC Technologies, but used for powering NDC Technologies equipment, be built using good EMC practices (i.e. cables with braided shield, and connectors with 360° termination of the braid to a metal/metalised shell connector at both ends). If you have any questions regarding this, contact the NDC Technologies Service Department.

Declaration of Conformity for this product is available upon request.

## Safety Information

**Electrical connections should be performed by a suitably qualified person for the country of installation.**

**High Leakage Current. This equipment must be earthed.**

**Relays and associated wiring are rated for SELV levels i.e. 60vdc & 30vac rms. These levels must not be exceeded.**

**Fatal voltages are present within this equipment. The equipment must be isolated before any internal access is attempted. The residual voltages will take at least 5 MINUTES to discharge after disconnection from the main electrical supply.**

Operators need to read the relevant manuals, be trained in basic usage/safety and are advised to wear gloves when handling the wire as the wire can become hot and the pulleys also sharp after sustained use. Beware also of finger entrapment between the pulley and the wire and the possibility of a wire break.

Ear protection is recommended for prolonged periods next to the preheater.

### Warnings on Equipment



#### **HOT SURFACES SYMBOL**

This label is affixed to the pulley guard-door to warn of hot surfaces. The pulleys and the wire under production will be running at high temperature. The wire can remain at high temperature for considerable distance after exiting the preheater.



#### **HIGH VOLTAGE SYMBOL**

This label is affixed to the rear door of the electronics cabinet to warn that high voltages are present within the cabinet and the danger of electric shock or electrocution exists if the cabinet is opened.



#### **CAUTION SYMBOL**

This label is affixed to front and rear doors to warn that safety interlocks are in operation that can either electrically lock the doors or switch off the preheater and stop the production line as appropriate.



#### **READ THE MANUAL SYMBOL**

This label is affixed to the access panel to the filter.

**CHECK AND CLEAN/CHANGE FILTER REGULARLY**

## Intended Use

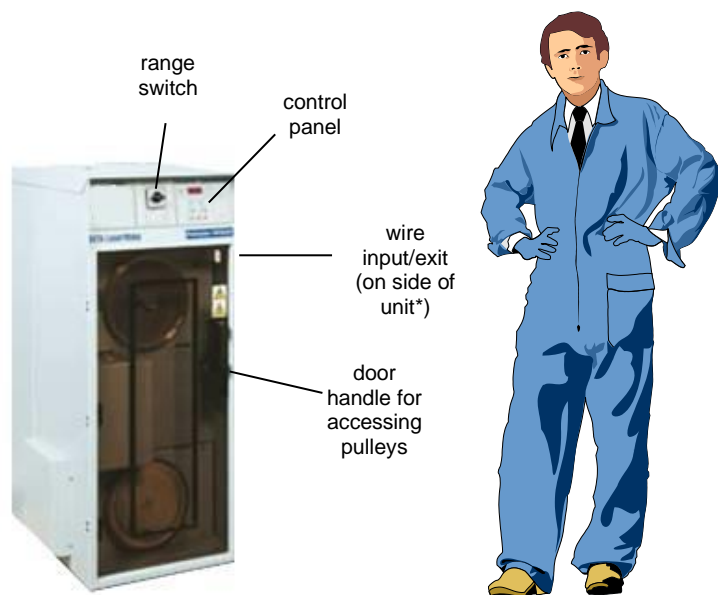
The preheater is for use on production lines manufacturing communication cables. The unit is installed immediately ahead of the extruder and is used to heat the metallic core of the cable, thereby improving the adhesion of the insulation to the core and, in the case of foam insulation, improving the bubble structure.

If you use the equipment in a manner not specified by the manufacturer \*or if an out-of-specification product is introduced, the protection provided by the equipment may be impaired. In this case, the customer is responsible for taking the necessary precautions to ensure operator safety.

\* For example, minimum cut on speed must be set greater than the operator can pull the product through the preheater during normal string up. This is to prevent the preheater from turning on during the stringing up the process.

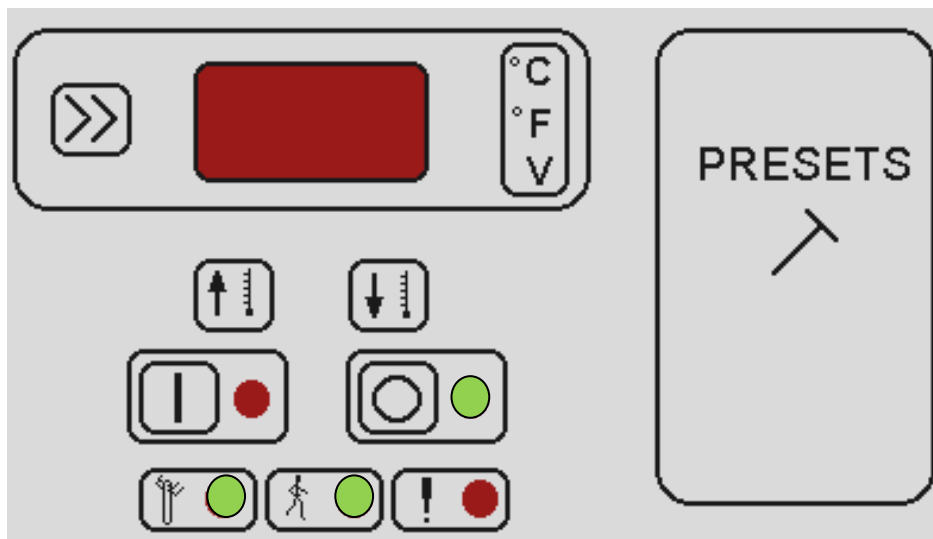
See also section 'Materials to be Processed' in the Specification.

## Workstation



\* wire input/output side can also be on other side depending on what was ordered.

## Controls



**Display** Shows the value of the preheating temperature set, or the actual voltage being applied to the product in the shorted loop.

**°C, °F, V** Illuminated icons associated with the display.

When the °C or °F icon is illuminated, the value displayed (in °C or °F respectively) is that set via the panel controls in the local mode or that set through the preset temperature input in the remote mode.

When the V icon is illuminated, the display shows the loop voltage.




Alternates the display between reading voltage or set temperature.




Sets the preheating temperature when in local mode. These buttons are disabled in remote mode and when the display is showing voltage.

Setting range is 1 to approximately 500°C (or 932°F). In practice the maximum safe setting is determined by the pulley material and is normally less than 500°C.



Sets the preheater ON or OFF. The button which is illuminated indicates the operating state. For power to be supplied to the wire, the  button must be illuminated and the line speed must exceed the cut-on point. When the ON / OFF state is being remotely controlled, the buttons are disabled but the currently illuminated button continues to


indicate the state correctly. The  button is also used to reset an overcurrent or wire break fault condition whether under local or remote control.

## State Indicator Icons

Three illuminated icons to show the preheater operating state as follows:

*Remote Icon* 

Illuminates when the set temperature is being remotely controlled. It does NOT indicate remote control of the ON/OFF state.

*Run Icon* 

Illuminates when power is being supplied to the wire.

*Fault Icon* 

Illuminates if an inverter fault, current overload, or wirebreak occurs or if the temperature in the lower part of the cabinet exceeds 43°C (109°F). No power is supplied to the wire in this state.

## Preset Control Panel

A number of presets are located beneath this panel as follows:

### Calib

Two rotary decade switches used to set a calibration factor to match the actual wire temperature to the value set. The scaling is 0 to 99%, in 1% increments. The setting depends on the preheater type and whether copper or aluminium is being processed. The switches are set to the nominal value unless a means of measuring the actual wire temperature is available.

### Bias

Two rotary decade switches used where the unit is required to give an accurate temperature over a wide speed range. Its effect is to increase the temperature at the low speeds. The scaling is 0 to 99%, in 1% increments. The switches are set to 0% unless a means of measuring the actual wire temperature is available.

### Cut-On Speed

Rotary decade switch used to set the speed above which power is supplied to the wire. The scaling is 0 to 90m/min (295.28feet/min), in 10m/min (32.81feet/min) increments. A high setting reduces the chance of an accident if the operator attempts to thread the production line whilst the unit is in the ON state. However, the value set must be lower than the intended running speed.

### Wire Break Threshold

Rotary decade switch used to set the change in load current required to trip the wire break detector. The scaling is 0 to 90% of the rated output current, in 10% increments. This function is particularly useful when a ring marker is in use since should the wire snap immediately after the extruder a fire can occur. In this event, the wire break circuit cuts the power instantly even though the preheater pulleys are still rotating. The threshold is set at the nominal load current. It will then reliably detect a change down to half and up to double the current. Do not use a low setting with a high current since this may result in nuisance tripping. Set to 90% if this function is not required. DO NOT set to 0.




### °C / °F Switch

Sets the units of measurement for the set temperature. It also sets the scaling of the remote set temperature input and the connections to the Rotatemp. The °C and °F icons reflect the switch setting.

### Rotatemp 1 / 0 Switch

When a Rotatemp is fitted it can be used purely as an indicator of the true wire temperature or in a feedback mode - where the power supplied to the wire is automatically trimmed to eliminate any error. Set this switch to "1" to enable the feedback loop. Set the switch to "0" if a Rotatemp is not fitted, otherwise a large temperature error will occur.

### RUN / TEST Switch

Changes the display function and overrides the  button. Set the switch to RUN for normal operation. Set the switch to TEST to display the Inverter percentage set point or current, as determined by the SP% / I% Switch described below. The switch does not affect the operation of the preheater and therefore it can be operated whilst heating wire.

### SP% / I% Switch

Only active when the RUN / TEST Switch is in the TEST position. Set the switch to SP% to display the percentage of the Inverter set point being used. The loop voltage and hence power delivered to the wire is at its maximum with a set point of 100. The reading can rise to approximately 140 but in this case the preheater has lost control and the actual wire temperature will be below the value set.

Set the switch to I% to display the percentage of available current being used. The current overload trips at approximately 110%.

## Threading the Wire

**Gloves must be worn for this procedure and eye protection is recommended.**

### MCS120

Starting at the inlet hole, pass the wire over the top pulley back groove and down through the core tube. Pass under the lower pulley and up through the second core tube. Pass over the upper pulley front groove and horizontally to the exit hole.

### MCS190

Starting at the inlet hole, pass the wire over the 200mm (7.87in) top pulley back groove and around the 120mm (4.72in) pulley just below. Pass over the 200mm top pulley front groove and down through the core tube. Pass under the 200mm lower pulley, over the second 120mm pulley and again over the upper pulley front groove, where it touches the wire laying in the groove over a 20° arc before exiting horizontally.

### MCS280

The MCS280 is similar to the MCS120, except there is only one core tube.

## Range Switch

The Range Switch maximises the transfer of power to the wire being processed. It alters the effective number of turns on the induction transformer primary winding. Choosing the correct range becomes important when the power required from the preheater is close to its rating. A low setting will match a large wire but will limit the maximum preheating speed. A high setting will match a small wire and enable a high preheating speed to be achieved.

The switch has to be pushed before it can be rotated. This operates an interlock, which stops preheating whilst changing the range.

The Range Switch provision varies according to the preheater type as follows:

### MCS120

No Range Switch. The units are individually wound to suit requirements. Only one wire size can be perfectly matched but a range of wires can still be processed if the power requirements are low.

### MCS190

A three-position Range Switch. This preheater is also individually wound to suit requirements, which, together with the relatively small range of wires sizes used on this unit, enables excellent matching to be achieved.

### MCS280

A three-position Range Switch. Individually wound.






## Range Switch Setting

Unit: MCS .....

Serial number:

Product Number	Wire Dia.	Wire Area	Range Switch Position	Wire Material	Speed m/min	Temp °C
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

## Operation procedure

- Ensure Threading the Wire has been carried out.
- Set the Range Switch [if fitted] to suit the wire size (see Range Switch heading).
- Check the display and use the  button, if necessary, so that Set Temperature is displayed.
- Set the required preheating temperature using the  and  buttons.
- When the production line is ready press the  button. It should illuminate to indicate the preheater is ready to supply power when the line starts. Note that the door bolt must be released to allow the unit to enter the ON state.
- Start the production line, the RUN icon  will be illuminated when the line speed exceeds the Cut-On Speed.

## Operator Maintenance

**Fatal voltages are present within this equipment. The equipment must be isolated before any cleaning or maintenance is attempted. The residual voltages will take at least 5 minutes to discharge after disconnection from the main electrical supply.**

**It is recommended to use gloves and eye protection when inspecting/cleaning pulleys, as they can become sharp due to wear and tear and metal dust can accumulate.**


The preheater pulley bearings are sealed and hence need no attention. The bearing for the Rotatemp needs occasional re-greasing. There are no brushes to change.

After sustained periods of use the pulleys can become sharp at their edges and can also show signs of wear in the pulley groove itself. Inspect the pulleys regularly for wear (especially in the case of the shorting rim units) and replace if necessary. A monthly inspection is recommended to help catch line tension and alignment problems before excessive damage occurs.

Once a month check interior of machine for hazardous build up of copper dust / flakes. At the same time inspect the core tube or tubes and check that filter fan is working.

When pulleys needs cleaning use a soft wire brush, wipe with a clean cloth/rag and finally vacuum up the loose copper dust in the unit.

## Troubleshooting

Description	Possible Cause	Action
<b>Preheater does not start</b> (fault contact open, but fault icon not illuminated)	No power	Check Isolator switch and mains supply.
	Both the remote start and stop contacts were closed while the door solenoid is energized	De-energize the door solenoid or open the remote stop contact.
	Both remote start and stop contacts were closed while the door is open.	Close the door or open the remote stop contact.
<b>Preheater power is cut off.</b> (fault contact open, but fault icon not illuminated)	Door solenoid is operated while the Preheater is running.	De-energize the door solenoid or open the remote stop contact.
<b>Preheater power is cut off</b> (fault contact open & fault icon is illuminated):  	Temperature of the lower part of the cabinet has exceeded 43°C (109°F).	Operate the local stop button or open the remote stop contact. Then try a lower range switch setting (see heading below).
	Wirebreak.	Rethread cable and restart Preheater. See heading on Wirebreak below.
	Current overload.	Check range switch setting.
		Check whether cable diameter exceeds maximum limit.
	Blown fuse.	Contact Beta LaserMike Support.
Inverter fault.		

### Accuracy

One source of temperature error is heat loss into the metal rim shorting pulley and this alters with wire size, speed and pulley diameter. The worst case is with a small wire at low speed with a large pulley. The MCS190 has low losses due to its ceramic pulleys.

A second source of error is due to the inlet wire temperature. This is assumed to be at ambient temperature but if the wire has been stored outside it may be at a considerably lower temperature. Alternatively, the preheater may be sited after an inline annealer, in which case the wire may be hot.

In general, an error of less than 10% occurs under typical conditions and the repeatability is far better. The accuracy can be improved for one wire size if a means of measuring the true temperature is available. Set as follows:


- Remove the preset panel cover.
- Run the line at the highest intended line speed.
- Adjust the Gain.
- Run the line at the lowest intended line speed.
- Adjust the Bias.
- Refit the cover.

### Wirebreak Function

To automatically cut the heating power when a wirebreak occurs the sensitivity must be set to suit the running conditions. This will minimise the possibility of nuisance tripping while ensuring a break is detected. Set as follows:

- Run the line under typical conditions.
- Remove the preset panel cover.
- Move the RUN / TEST Switch to the TEST position.
- Put the SP% /I% Switch to the I% position.
- Note the meter reading and set the Wire Break threshold to approximately this value. For example, if the meter reads 40% then set the sensitivity to 40%, i.e. position 4. Note that each step is 10%.
- Replace the cover.

### Range Switch Setting

If the fault icon  illuminates whilst running up the line and there has not been a wirebreak then try a lower Range Switch setting.

If the temperature is too low with the line running at the production speed and increasing the set point has no effect, then the unit is voltage limiting. This can be confirmed by checking the SP% as described Operator Guide. In this case try a higher range switch setting.

### Line tension

The following problems will result if the line tension is too low:

- The shorting pulley will erode rapidly.
- The wire surface will be lightly pitted due to sparking.
- The wire temperature will fluctuate.
- The wire may touch and wear the induction transformer core tube.
- The wirebreak detector may operate.

### Wire Sizes

Whilst some flexibility is allowed, do not grossly exceed the upper wire size limit since this will rapidly wear the pulleys and may overheat them. The bearings could also suffer since a large wire will need high tension.

## Servicing and Returning Your Equipment

Your instrument was carefully inspected electrically and mechanically prior to shipment. It should be free of surface marks and scratches, and it should be in perfect working order upon receipt. If any indication of damage is found, file a claim with the carrier immediately, prior to using the instrument. If no damage is apparent, proceed by using this manual to install and setup this instrument.

Save the shipping carton and packing material for future storing or shipment of the instrument. If, at some future time, the instrument must be returned to the factory for service, include a full description of the instrument failure and the mode of operation the instrument was in at the time of failure. Also include a contact person to discuss the instrument failure.

When returning equipment for service, it is important to first obtain a Return Material Authorization (RMA) number. The RMA number is needed for proper handling of returned equipment. To obtain an RMA go to <https://ndc.custhelp.com/> and click on link 'RMA Request'.

Ship the instrument in the original carton, or, if the original carton is unavailable, ship in a carton providing sufficient protection. Send the instrument to the Asia, Europe, or USA office, whichever is closest to you or to the office indicated by your sales engineer. Place the RMA number on the outside of the carton, and include a purchase order number and any other information specific to your instrument.

Field warranty service is available, if the customer pays travel expenses by advance purchase order. All service operations should be performed by skilled electronics technicians, who have been trained by NDC Technologies. For more information, see the Proprietary Statement at the beginning of this manual.

## Contact Information

U.S.A. Support Desk	
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China Support Desk	
Tel	+86-21-6113-3617
Fax	+86-21-6113-3616
Website	<a href="https://ndc.custhelp.com/">https://ndc.custhelp.com/</a>
APAC Support Desk	
Website	<a href="https://ndc.custhelp.com/">https://ndc.custhelp.com/</a>