EC DECLARATION OF CONFORMITY

MANUFACTURER

Business name :	Nutek Europe B.V.
Full address:	Bliek 23
Postal code:	4941 SG
Place:	Raamsdonkveer
Country :	The Netherlands

DESCRIPTION AND IDENTIFICATION OF THE MACHINERY

Generic name:	Turn conveyor
Function:	This machine is intended for changing the flow direction of PCBs in the production line (turns either clockwise or counter clockwise).
Model:	NTM 91/181/271/361M/L/XL
Type:	M-Size/L-Size/XL-Size
Serial number:	2015-0870A01
Commercial name:	Turn conveyor

COMPLIANCE

The manufacturer declares that the above mentioned installation fulfils all relevant provisions of

Machine Directive (2006/42/EC)	Low Voltage Directive (2006/95/EC)
EMC Directive (2004/108/EC)	Pressure Equipment Directive (97/23/EG)

In conjunction with the following harmonised standards and where appropriate other technical standards and specifications

for the risk assessment

NEN-EN-ISO 12100:2010

for the design and manufacture

NEN-EN-ISO 12100-1:2010; NEN-EN-ISO 12100-2:2010; NEN-EN-IEC 60204:2006; NEN-EN 349:1994+A1:2008; NEN-EN-IEC 61310:2008; NEN-EN-IEC 61439-1:2009; NEN-EN-IEC 61000-1-2:2008; NEN-EN-ISO 3744:2010; NEN-EN 764:2004;

The technical jurists of Certification Experts BV in Weesp, has determined the presumption of conformity of the above mentioned installation with the applicable Directives and standards.

Place: Raamsdonkveer

Identity: Mr. R. Stins
Position: Managing Director

Date: December 2011

Signature:

OPERATOR'S MANUAL

TURN CONVEYOR

NTM 91/181/271/361M/L/XL

In the compilation of this manual, attention has been given to avoid errors and mistakes in an attempt to provide a clear structure to the content.

In spite of this, errors cannot be completely avoided.

If in going through this manual should you:
- discover incorrectness
- encounter unclear statements
- meet with parts that in your opinion needs further explanation,

please inform us. We will appreciate any comments which will help us to improve this document.

For corrections or clarification, please contact:

Manufacturer: **NUTEK PTE LTD**

Address: *39 Joo Koon Circle*
Singapore 629105

Tel: *(065) 6862-0255*
Fax: *(065) 6862-0040*

E-mail Address: **feedback@nutek-sg.com**
Website: **http://www.nutek-sg.com**

or;

Authorized Representative: **NUTEK EUROPE B.V.**

Address: *Bliek 23*
4941 SG, Raamsdonksveer
The Netherlands

Tel: *(31) 162 578 578*
Fax: *(31) 162 578 579*

E-mail Address: **info@nutek-europe.com**
Website: **http://www.nutek-europe.com**

1.0 INTRODUCTION

1.1 Machine specification

Machine Name :	**Turn conveyor L-type, L-size**
Job Description :	NTM91L+0.5m Conveyor
Job No :	2015-0870A01
Voltage :	230 Vac
Phase :	1
Power Consumption :	250 VA Max
Product :	PCB
Product Size :	PCB - 50 ~ 407mm (W) / 80 ~ 457mm (L)
Product Edge Clearance :	3mm
Product Thickness :	0.60 ~ 1.60mm
Fix Rail :	Front
Component Height :	Top : 30mm (Max) Below : 30mm (MAX)
Transfer Height :	950 (+/- 25mm)
Weight :	200 kg (Approx)
Air Pressure :	4-6 bars
Machine Colour :	RAL 9002 (8093A)
Direction :	L to R
Magazine Type / Model :	-
Noise Level :	<70 dBA

* Please refer to 3D drawing for physical dimension.

1.2 Terms of Reference

The following list some of the terms that could be used in this Manual.

PCB	-	Printed Circuit Board;
Transfer of PCB	-	The process in which PCB is transported between machines;
Transfer height/ PCB height	-	Board flow height from the floor level;
Line A Upstream Board Available (UBAA)	-	A signal sent from the Line A Upstream machine to Nutek machine to inform the availability of a PCB at the Line A Upstream machine;
Line A Upstream Busy (USBA)	-	A signal sent from Nutek machine to the Line A Upstream machine to confirm ready to receive a PCB from the Line A Upstream machine;
Line B Downstream Board Available (DBAB)	-	A signal sent from Nutek machine to the Line B Downstream machine to inform the availability of a PCB at Nutek machine;
Line B Downstream Busy (DSBB)	-	A signal sent from the Line B Downstream machine to confirm ready to receive a PCB from Nutek machine.
Line C Downstream Board Available (DBAC)	-	A signal sent from Nutek machine to the Line C Downstream machine to inform the availability of a PCB at Nutek machine;
Line C Downstream Busy (DSBC)	-	A signal sent from the Line C Downstream machine to confirm ready to receive a PCB from Nutek machine.

1.3 Abbreviation Use in Manual

Abbreviation	Description
BK	Brake
BZ	Buzzer
C	Capacitor
CN	Connector
D	Diode
DBA	Downstream Board Available
DSB	Downstream Busy
E	Earth
EM	Emergency Switch
F	Fuse
FS	Foot Switch
H	Indicator light
K	Relay
L	Live
LS	Limit Switch
M	Motor
MCB	Main Circuit Breaker
N	Neutral
OL	Overload Relay
PB	Push Button
PCB	Printed Circuit Board
PHS	Photo Sensor, Gap Sensor
PS	Power Supply
RS	Reed Switch
SV	Solenoid Valve
SW	Switch
TB	Terminal Block
TP	Terminal Point
UBA	Upstream Board Available
USB	Upstream Busy

1.4 Expected use and limit of use

Important Note: All uses other than the described intended used must be regarded as unintended use and is thus not permitted; the manufacturer cannot be held responsible for any resulting damages!

1. This machine is intended for transferring PCB from an Upstream machine to a Downstream machine on a production line with the option of inspecting the PCB.

2. This machine is not intended to be a standalone unit and must always be installed beside a machine with no exposure to any dangerous movements at the vicinity for a PCB transfer.

3. During production, this machine operates under the Auto Mode with no operator intervention.

4. This machine is intended for use with the PCB size of maximum width of 407mm and length of 457mm for the L size machine.

5. This machine is intended for use in an industrial environment that is well ventilated, clean and dry with the maximum humidity at 90% and the temperature range from 15^{o}C to 35^{o}C.

6. This machine is intended for both air and electrical supplies stated on the specifications (see Section 1.0).

7. This machine is designed for a life of 7 years with adequate maintenance and replacement of worn parts.

8. Before start-up, operators are expected to have read and understood the Safety Section (see Section 2.0) of the instruction manual that accompanies the machine, and to be familiar with the location and operation of each control.

1.5 Operator's Workstation

The Operator's workstation is located in front of the machine where the Membrane Control Panel, E-Stop and other controls are easily accessible. Refer to Figure 1.

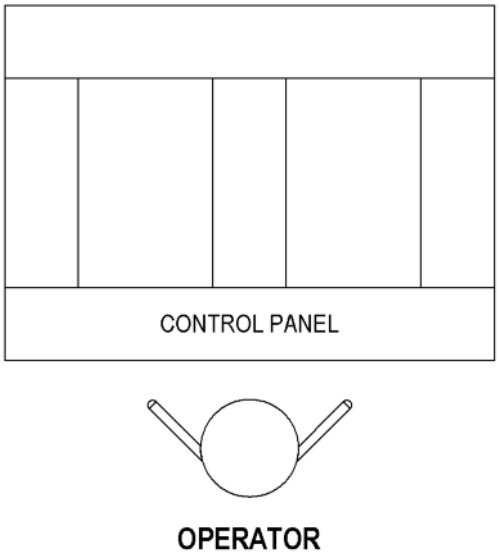


Fig. 1

2.0 Safety

It is essential for person-in-charge, an operator or technician level, to understand how the machine function and the component hazards before he/she handles the machine. Practice all plant and product safety instructions and precautions. Failure to follow instructions can cause personal injury or property damage. If the equipment is used in a manner not specified in this instruction manual, the protection provided by the equipment may be impaired and the user will take the responsibility of this action.

Production Operator, who operates the machine, requires training and briefing on the following aspect:

- Hazard Warning Definition (Section 2.1)
- Hazard Warning Labels (Section 2.2)
- Switches Description and Function (Section 6.0)
- Operating Sequence (Section 7.2)

Understanding the machine will help to create an awareness of the machine's capability and limitation which play an important role in safety. All personnel who work with or who are exposed to this equipment must take precautions to protect themselves against serious or possibly fatal bodily injury. Furthermore, a well-ventilated, well-lighted and spacious workstation for the Operator also plays an important role in safety.

Note:

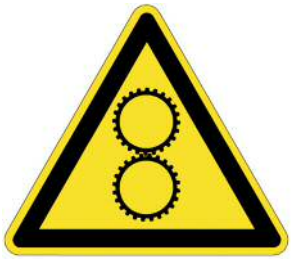
- ***Maintenance and repairs of the machine must be done by experts.***
- ***Correct lighting must be installed in the direct area of the machine by the end user.***
- ***The front door is accessible for the operator and technician. The switch box is accessible for technician only.***
- ***Always switch off the power supply before opening any protective cover over an electrical circuit.***

2.1 Hazard Warning Definitions

Hazard warning labels are an important part of the health and safety controls provided on equipment to warn personnel of potential hazards associated with the equipment. Hazard warning labels should be used when hazards have not been eliminated from equipment through other means (e.g. a complete enclosure of the hazard to exposure) and the potential for exposure to the hazards is still present. This applies both to hazards which can be present at all times during normal operation conditions and hazards which may be present only during specific conditions. Hazard warning labels should be used for the variety of hazards that can be present in equipment.

- **CAUTION**: Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.
- **WARNING**: Indicates a potentially hazardous situation, which could result in death or serious injury.
- **DANGER**: Indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury.

2.2 Warning and Hazard Labels

Label	Description
	**Danger- High Voltage** Danger! High Voltage! Do not detach the protective covers. Operating this equipment without covers may cause electric shock.
	**Careful- Moving Parts (General)** Do not touch the equipment while it is running. Working near moving machinery may result in getting entrapped in machine.
	**Careful- Moving Parts (Hand)** Do not touch the equipment while it is running. Working near moving machinery may result in getting the hand entrapped in machine.
	**Danger- Injury to the hand** Do not touch the equipment while it is running. Working near moving machinery may injury to the hand.

3.0 Machine Functions

This machine receives PCB from Line A Upstream machine and transfers the PCB to Line C Downstream machine.

Before receiving or transferring a PCB, the Conveyor will always shift towards the transfer line to reduce the gap between the Conveyor and its Upstream or Downstream machines.

4.0 Width Adjustment

A removable crank is provided for width adjustment. Clockwise rotation reduces the width and vice versa. Remove and keep the crank during operation to avoid accidental width change.

5.0 Operating Conditions

5.1 Start up check

- Ensure that there's no PCB on the Conveyor.
- Ensure that the width of the PCB is correctly adjusted.
- Ensure that any of the Emergency Switches (EM-1 or EM-2). If the Emergency Switch (EM-1 or EM-2) is activated, release it by turning it clockwise. Thereafter, press the **RESET** pushbutton (PB-1) to continue the operation.
- Ensure that all the Safety switches (if any) are closed.
- Turn on the Power Switch (SW-1). Note that the **POWER** indicator turns on.
- Press **AUTO** membrane switch to start the machine operation.

The machine is now ready for operation.

6.0 Switches Description & Function

6.1 Membrane Switches

FUNCTION	DESCRIPTION
POWER	Its indicator will turn on when the Power is supplied to the machine.
AUTO	Press **AUTO** membrane switch to operate the machine in Auto Mode.
STOP	Press **STOP** membrane switch to stop the machine in Auto mode or to switch the machine to Manual mode. Its Indicator will light on when all operations are stopped. During error condition, its Indicator will flicker, press **STOP** membrane switch once to reset the error. Its flickering Indicator will turn on permanently. Press **AUTO** or **MANUAL** membrane switch to change the machine functional mode.
MANUAL	Press **MANUAL** membrane switch to operate the machine in Manual Mode. If the machine is operating in Auto Mode, press **STOP** membrane switch and followed by **MANUAL** membrane switch to operate the machine in Manual Mode. In error and cycle stop condition, its Indicator light will flicker.
CONV.	Press **CONV.** membrane switch to manually turn on or off the Turn Conveyor and Attached Inlet Conveyor motors. It will be inhibited when the Conveyor is not at its home or remote position. Press and hold this membrane switch for 3 seconds/until its LED blinks to select Shutters' manual operation. *Note: This membrane switch can only be activated in Manual Mode.*
CONV. FWD.	Press **CONV. FWD.** membrane switch to manually traverse the Conveyor forward. It is inhibited when the Conveyor is not at its Home or Remote position. *Note: This membrane switch can only be activated in Manual Mode.*

FUNCTION	DESCRIPTION
CONV. REV.	Press **CONV. REV.** membrane switch to manually traverse the Conveyor backward. It is inhibited when the Conveyor is not at its Home or Remote position. *Note: This membrane switch can only be activated in Manual Mode. In addition, **MAINTENANCE SWITCH** (SW-3) must be turned on.*
0^o/ A Line Shutter	Press this membrane switch to manually turn the Conveyor to 0^o position. If **CONV.** membrane switch is blinking, pressing **0^o/ A Line Shutter** membrane switch will open/close Line A Shutter. *Note: This membrane switch can only be activated in Manual Mode*
90^o/C Line Shutter	Press this membrane switch to manually turn the Conveyor to 90^o position. If **CONV.** membrane switch is blinking, pressing **90^o/ C Line Shutter** membrane switch will open/close Line C Shutter. *Note: This membrane switch can only be activated in Manual Mode*
MODE	By default, LED 3 is always on indicating that the machine will only transfer PCBs from Line A Upstream machine to Line C Downstream machine only.

6.2 Pushbuttons

FUNCTION	DESCRIPTION
RESET (PB-1)	When either of the Emergency Switches (EM-1 or EM-2) is pressed, all operations will stop. Release the Emergency Switch (EM-1) by turning it clockwise. Thereafter, press the **RESET** pushbutton (PB-1) to reset the safety relay and resume machine operation.

7.0 Start Up Procedures and Operating Sequence

7.1 Start Up Procedures

1. Ensure that any of the Emergency Switches (EM-1 or EM-2) is not activated.
2. Ensure that all the Safety Switches (if any) are closed.
3. Turn on the Power Switch (SW-1).
4. Turn on the Air Regulator.
6. Press **AUTO** membrane switch to start machine operation.

7.2 Operating Sequence

1. Upon activation of the **AUTO** membrane switch, the machine will make an initial run for a few seconds.

2. If the Conveyor is not at its home position, Turn motor (M-4) will turn on to rotate the Conveyor to Turn 0º sensor (PHS-6) position.

3. Once the Turn 0º sensor (PHS-6) is activated, Turn motor (M-4) will stop and the Locking cylinder will extend to lock the Conveyor in place.

4. Upon the deactivation of Locking Cylinder's Reed Switch (RS-1), the machine will send a Line A Upstream Busy (USBA) to Line A Upstream machine when the Attached Input Conveyor is ready to receive a PCB.

5. A PCB will be transferred from Line A Upstream machine to the Attached Inlet Conveyor and at the same time, a Line A Upstream Board Available (UBAA) is received from Line A Upstream machine.

6. Upon the activation of Attached Conveyor's Inlet sensor (PHS-8), Conveyor's motors (M-5 & M-6) will turn on to transfer the PCB to the Exit sensor (PHS-9) position.

7. Once the PCB clears the Attached Conveyor's Inlet sensor (PHS-8), USBA signal will be cut off.

6. When the Attached Conveyor's Exit sensor (PHS-9) is activated, Conveyor's motors (M-5 & M-6) will stop.

7. Simultaneously, Traverse motor (M-3) will turn on to traverse the Conveyor backwards to minimize the gap between the Conveyor and the Line A Upstream machine.

8. When the Traverse Backward sensor (PHS-5) is activated, Traverse motor (M-3) will stop.

9. Line A Shutter will open, Attached Inlet Conveyor's motors (M-5 & M-6) and Conveyor's motors (M-1 & M-2) will turn on to transfer the PCB to the Conveyor's Exit sensor (PHS-2) position.

10. When the Inlet sensor (PHS-1) is activated, Conveyor's motors (M-1 & M-2) will turn on to transfer the PCB to the Conveyor's Exit sensor (PHS-2) position.
11. Once the PCB clears Attached Conveyor's Exit sensor (PHS-9), Conveyor's motors (M-5 & M-6) will stop.
12. The Attached Inlet Conveyor is now ready to receive the next PCB from Line A Upstream machine.
13. Traverse motor (M-3) will turn on to traverse the Conveyor to Traverse Center sensor (PHS-4) position.
14. Upon the activation of Traverse Center sensor (PHS-4), Traverse motor (M-3) will stop.
15. Locking Cylinder will retract to allow the Conveyor to be rotated to Turn 90° sensor (PHS-7) position.
16. Upon the activation of Locking Cylinder's Reed Switch (RS-1), Turn motor (M-4) will turn on to rotate the Conveyor to Turn 90° sensor (PHS-7) position to align with Line C Downstream machine.
17. When the Turn 90° sensor (PHS-7) is activated, Turn motor (M-4) will stop and Locking Cylinder will extend to lock the Conveyor in place.
18. When the Locking Cylinder's Reed Switch (RS-1) is deactivated, the machine will send a Line C Downstream Board Available (DBAC) signal to Line C Downstream machine.
19. Upon receiving a returned Line C Downstream Busy (DSBC) signal, Traverse motor (M-3) will turn on to traverse the Conveyor forward to minimize the gap between the Conveyor and the Line C Downstream machine.
20. When the Traverse Forward sensor (PHS-3) is activated, Traverse motor (M-3) will stop and Line C Shutter will open.
21. Thereafter, Conveyor's motors (M-1 & M-2) will turn on to transfer the PCB to Line C Downstream machine.
22. Once the PCB clears Exit sensor (PHS-2), DBAC signal will be cut off, Conveyor's motors (M-1 & M-2) will stop and Line C Shutter will close.
23. Traverse motor (M-3) will turn on to traverse the Conveyor back to Conveyor's Traverse Center sensor (PHS-4) position.
24. Upon the activation of Conveyor's Traverse Center sensor (PHS-4), Traverse motor (M-3) will stop.
25. Locking Cylinder will retract to allow the Conveyor to be rotated back to Turn 0° sensor (PHS-6) position.
26. Once the Locking Cylinder's Reed Switch (RS-1) is activated, Turn motor (M-4) will turn on to rotate the Conveyor back its home position.

27. Upon the activation of Turn 0° sensor (PHS-6), Turn motor (M-4) will stop.
28. Thereafter, Locking Cylinder will extend to lock the Conveyor in place.
29. When the Locking Cylinder's Reed Switch (RS-1) is deactivated, Traverse motor (M-3) will turn on to traverse the Conveyor backwards to minimize the gap between the Conveyor and Line A Upstream machine.
30. Once the Traverse Backward sensor (PHS-5) is activated, Traverse motor (M-3) will stop.
31. The machine is now ready to receive the next PCB from the Attached Inlet Conveyor.
32. The sequence repeats until **STOP** membrane switch is pressed.