

**MANUAL
ELECTRIC BENDING MACHINE**



CONTENTS (VERSION 1.4 15 june 2023)

Chapter & Title	Page
Contents	2
User manual	3
Chapter 1.0 Machine description	5
Chapter 2.0 Safety	7
Chapter 3.0 Operation	11
Hoofdstuk 4.0 Installation & Settings	12
Hoofdstuk 5.0 Maintenance / Repairation	13
Hoofdstuk 6.0 Malfunctions	14
Attachments	
1 EC declaration of conformity	15
2 Manual Frequency Controller	16
3 Electrical diagram	53
4 Parameter settings	54

USER MANUAL

READ THIS MANUAL CAREFULLY!
FOLLOW THE INSTRUCTIONS BEFORE
USING THE MACHINE



This manual has been prepared in accordance with the legal requirements laid down in the Machinery Directive, which in the Netherlands is included in the Machinery Decree.

ALSO READ THE MANUALS OF THE
OTHER MACHINES USED WITH THIS
MACHINE



This manual describes the operation and maintenance of the machine. Other machines and devices, such as electric hand tools, that are used with this machine are **NOT** described in this manual. Please refer to the manuals provided by the relevant manufacturers for information on those products.

CONTACT THE MANUFACTURER FOR
SUBJECTS NOT COVERED IN THE USER
MANUAL OR IN CASE OF AMBIGUITIES.



This manual should be made available to anyone carrying out work with or on the machine. The user manual should be kept in an accessible place. Preferably in the machine's storage compartment.

LAYOUT

This user manual contains information for users of the machine. The manual is divided into several chapters, the title of which is given at the top of each page.

USERS

User here means anyone who operates, maintains, adjusts, cleans, repairs, etc. the machine.

The user should be given this manual and/or instruction on how to use the machine. This should take into account the level of training.

Work with or on the machine may only be carried out by personnel who:

- is capable of performing the work independently and safely;
- is supervised by someone familiar with the work who has provided instruction;
- competent by virtue of education and/or experience.

The data and recommendations in this manual are based on the latest information available prior to printing. The manufacturer reserves the right to make and pass on changes or additions to the user manual without giving reasons.

This manual has been produced with the greatest care. Should it nevertheless contain any imperfections, please contact the manufacturer.

The manufacturer accepts no liability for damage caused by using the manual and/or the machine.

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1.0 DESCRIPTION MACHINE

The electric bending machine is a machine intended for bending curtain tracks.

Any other use of the machine, than described above is not allowed!



The manufacturer has made every effort to provide you with a safe product that allows you to perform your work in a more pleasant and easy way.

Remember that the machine is only safe if it is used correctly. Therefore, read this manual carefully and make sure that anyone working with the machine has done the same.

The machine contains the following parts, see fig.1:

1. Fixed bending wheels
2. Adjustable bending wheel
3. Manual wheel
4. Manual control
5. Power cord
6. Speed selector switch
7. Frequency switch
8. Electric motor
9. Storage box

Note:

Various bending wheels are available with other dimensions.

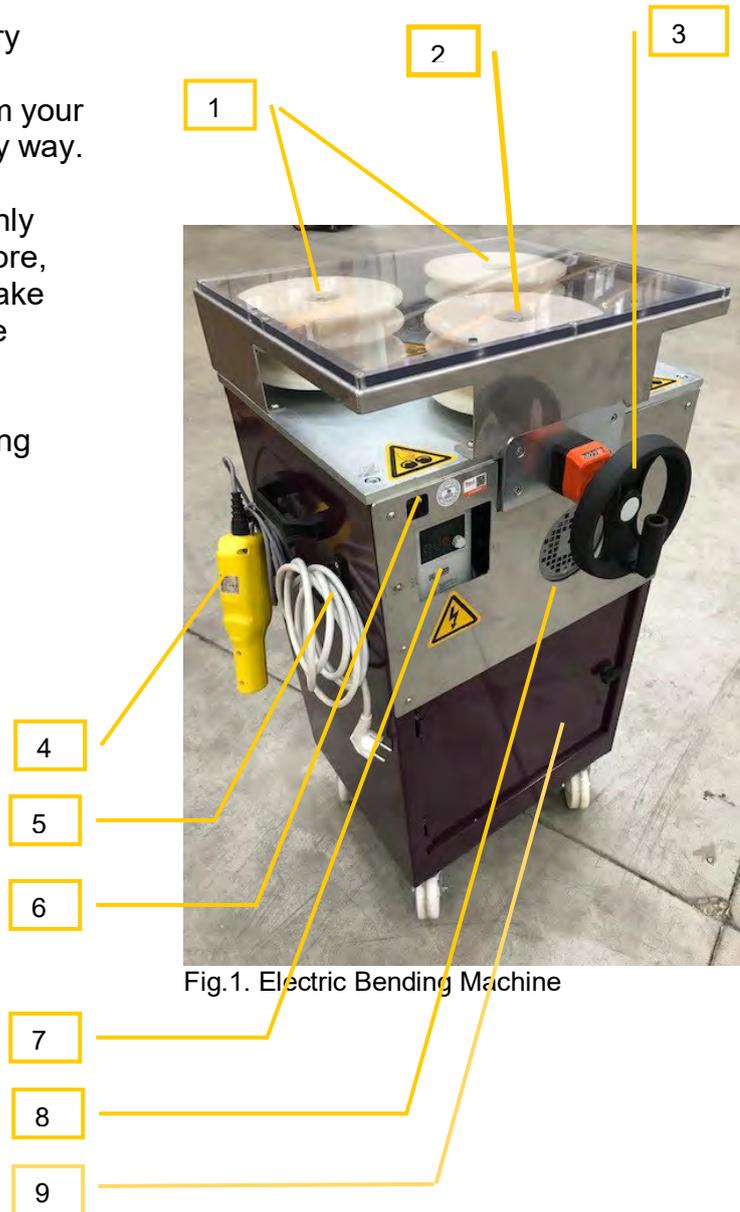


Fig.1. Electric Bending Machine

TECHNICAL SPECIFICATIONS

Tabel 1

Dimensions	Height	1030 mm
	Width	650 mm
	Depth	600 mm
Weight	50 kg	
Voltage	230* V AC 50 Hz	
Power consumption	750 W	
Maximum rotation speed	1 m / minute*	
Noise level	60 dBA	

* Speed is adjustable using the selector switch next to the inverter

* Depending on the country, the bender can be 110v or 230v

TRANSPORT & STORAGE

Always secure the machine during transport.

Always store the machine in a dry place.

MOVING OF THE MACHINE

Always move the machine by grasping it by a handle.

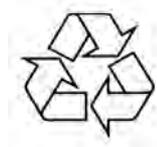
Do cautiously and slowly at thresholds and obstacles due to tipping.



WARNING

RECYCLING

When the machine has reached the end of its lifespan after years of use, it is important to unplug it and properly dispose of it.



The machine is mainly made of steel and plastic and can be recycled in the usual way, separating the different types of materials as much as possible for reuse. Please observe the regulations in force at the time of disposal.

The following materials were used with the machine:

- Steel
- Copper
- Plastic (various types)
- Stainless Steel
- Polycarbonate

2.0 SAFETY

Accidents are often caused by a succession of special and deviating circumstances from the normal situation.
If an abnormal, unsafe or special circumstance occurs, remedy it first.



The machine complies with all relevant safety regulations and is therefore CE marked.

Based on CE directives and harmonised standards, various technical measures have been taken to ensure the machine meets safety requirements according to the current state of the art.

A risk analysis was carried out by the manufacturer based on NEN EN-ISO 12100:2010. A technical construction file of the machine was also prepared.

Appendix 1 in this manual contains the EC declaration of conformity. This states which directives and standards the machine complies with.

A type plate with CE mark is attached to the machine in the form of fig.2.

Name machine	Bending Machine
Serial number	*****
Year of construction	****
Connection voltage	*** V AC 50/60 Hz
Power consumption	750 W
	Forest Group (Nederland) B.V. Teugseweg 42 7418 AM Deventer Nederland

Fig.2. Nameplate on machine

Definitions

In de tekst van deze handleiding worden de volgende begrippen en symbolen gebruikt:

TIP
CAUTION
WARNING
LIFE DANGER

These terms indicate important information.
Be sure that anyone working with the machine understands this information well.

MEANING OF TERMS

TIP:
gives you suggestions and advice to perform certain tasks more easily or more conveniently performed.



CAUTION
a note with additional information, makes you aware of possible problems



WARNING
failure to perform the procedure may cause (serious) injuries or fatal consequences.



WARNING

LIFE DANGER
failure to perform the procedure may cause (serious) injuries or fatal consequences.



LIFE DANGER

Safety regulations

SHIELDS

Due to risks of moving parts of the machine, the machine is equipped with a shield around the bending rollers of the drive.

Due to entrapment hazards between the bending rollers, it is **strictly forbidden** to dismantle or otherwise remove the shield.

It is strictly forbidden to work with the machine without shielding.



WARNING

EMERGENCY STOP

The machine is equipped with an emergency stop button. In special situations, immediately remove the plug from the socket. For this, the plug must be accessible at all times.

Icons

If icons are missing, reapply them immediately.



WARNING

The following pictograms are displayed on the machine:

- Live parts, Fig.3.
on frequency regulator



Fig.3.

This pictogram is posted to warn against touching parts under electric tension.

- Crushing hazard for hands, Rotating rollers, Fig. 4 on top plate with rotating rollers



Fig.4.

This pictogram is installed to warn against the danger of hand entrapment when rotating rollers.

**LOOSE-FITTING CLOTHES,
JEWELLERY**

Do not wear loose clothing, jewellery, watches, etc. when working with the machine. Loose clothing, jewellery may get caught somewhere, causing serious injury.

**WARNING****ALCOHOL, DRUGS, MEDICINES, etc.**

Het is verboden om onder invloed van alcohol, drugs, etc. te werken met de machine.

**WARNING**

Users of medicines, which affect reaction speed or judgement, are not allowed to operate the machine.

MACHINE REPAIR

Never repair the machine yourself, contact the manufacturer.

**WARNING**

Repairs to the machine should only be carried out by an authorised technical service.

ELECTRIC

An electric shock can cause serious injury or even death.
Always unplug the power cord first.

**WARNING**

Do not carry out any work on electrical parts. Only qualified personnel from an authorised technical service or manufacturer may work on this, under certain conditions.
Always disconnect the mains plug before carrying out any work on the electrical system.

3.0 OPERATION

Switching on the machine

- 1 Check that there are no objects on or between the bending rollers.
- 2 Plug the power cord into the wall socket.
- 3 Adjust the adjustable bending roller to the desired size using the handwheel.
- 4 Select the desired speed with the selector switch next to the frequency controller, see Fig. 5.
- 5 Place the material to be processed.
- 6 Press the hand control button to start bending.

The handwheel is equipped with a counter, to easily adjust the bending roller to self-determined distances, see fig. 5



speed selector switch

counter

Fig. 5 Counter & switch

Always ensure a clean and tidy working environment.

Stopping the machine

Temporary stop (while working)

- Release the hand control push button.

Long-term stop

- Remove the plug from the socket.

Close the transparent safety-cover.

Working height

When working with the bending machine for long periods, adjust the working height as favourably as possible by placing the machine on an elevation or else by standing on a platform yourself.

Emergency stop

Unplug immediately.

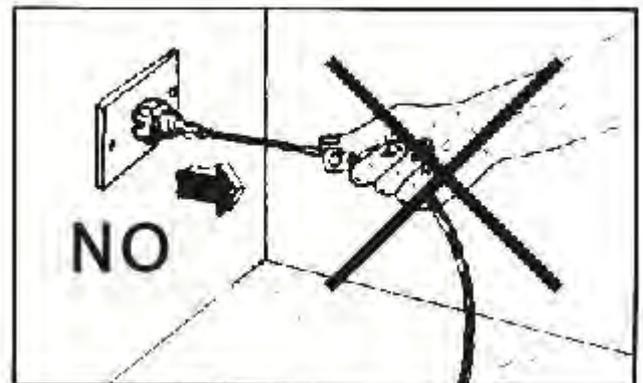


Fig. 6 Do not pull power cord

Do not pull the power cord to unplug the machine. Always unplug the machine when it is left unattended.

4.0 INSTALLATION/SETTINGS

INSTALLATION

The installation only involves placing the plug in the socket.

The following requirements are imposed on the socket:

- The electricity installation should comply with the applicable regulations;
- Use the connected power cord with plug;
- The plug should be easily accessible;
Use only a grounded, 230 V AC, 50 Hz, socket;
- The socket should be protected against overloading;

The plug should be easily accessible, to be able to switch off the power in an emergency!



WARNING

Operating conditions

The machine is for indoor use only at +5 to +40 °C and a maximum of 95% humidity. Prevent machine from getting wet by rain or other water.

Lighting

Only operate the machine in sufficient ambient light of at least 200 Lux.

SETTINGS

Frequency inverter settings are listed in Appendix 4.

Do not change these settings!

Only competent and authorised personnel may work on this.

Changing the bending rolls

The bending machine is designed to accommodate various bending rolls. To mount different rolls, the protective cover needs to be dismantled. This can be achieved by unscrewing the fixing screws. **It is important for safety reasons to always remount the protective cover on the bending machine.**

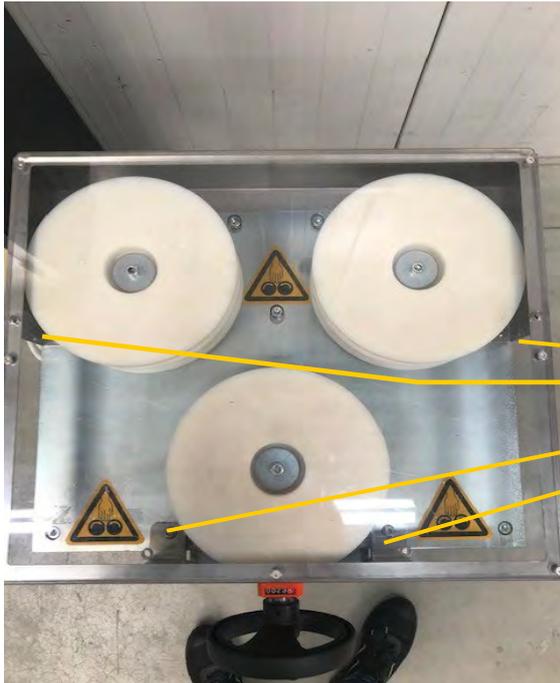


Fig. 7 Cover fixing screws

While changing the bending rolls, the plug should always be removed from the socket to prevent entrapment. After the bending rolls have been changed, the protective cover should be replaced to ensure the safe operation of the bending machine.



WARNING

5.0 MAINTENANCE/REPARATION

Repairing the machine is only allowed by authorised and qualified personnel, with sufficient training/experience to carry out maintenance and repair work.



WARNING

Carry out maintenance more often if required, e.g. due to intensive use. Report any faults, defects to the technical service. If in doubt, do not start the machine.



ALWAYS UNPLUG DURING MAINTENANCE!



WARNING

Part	Period	Description
Worktop with bending rolls	Daily	Cleaning with dry cloth
Transparent protective cap	Weekly	Clean carefully with damp cloth
Complete machine	Weekly	Cleaning with dry cloth
Power cord and control box cord	Weekly	Check for damages
Electrical installation	Yearly	NEN 3140 electrical safety inspection

Tabel 2

If necessary, also read the frequency controller instructions in Appendix 2.



6.0 MALFUNCTIONS

In case of a fault signal on the frequency controller, the machine stops or does not start operation.

Appendix 2 contains a failure analysis in the frequency controller manual.

If necessary, also read the frequency controller instructions in Appendix 2.

The troubleshooting of the frequency controller may only be carried out by authorised and competent technical personnel.
When making repairs, always disconnect the mains plug first.



WARNING

Frequency inverter settings are listed in Annex 2.

EC DECLARATION OF CONFORMITY

Forest Group (Nederland) B.V.
Teugseweg 42
7418 AM Deventer
Nederland

declares that the,

BENDING MACHINE

Bendingmachine E 230V/110V, serialnumber

complies with the following guidelines:

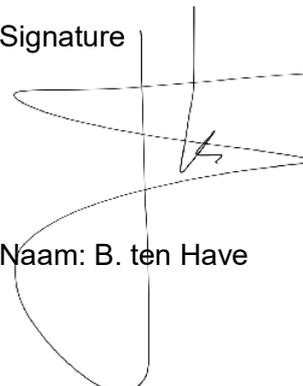
- Machinery directive 2006/42/EC with associated amendments
- Low voltage directive 73/23/EEC with associated amendments
- EMC directive 2014/30/EU with associated amendments

and complies with the following standards:

Safety of machinery	(Basic terminology)	NEN-EN 292-1:1994
Safety of machinery	(General design principles)	NEN-EN 292-2:1994
Safety of machinery	(Electrical equipment)	NEN-EN 60204-1: 1996
Safety of machinery	(Safety distances)	NEN-EN 294: 1994
Safety of machinery	(Risk rating)	NEN-EN-ISI 12100:2010

The Netherlands, Deventer, 06 February 2023

Signature



Naam: B. ten Have



Easy Start Guide
LS M100 Frequency Inverter



LS M100 Frequency Inverter Easy Start Guide



The LS M100 Frequency Inverter range is available to order from inverterdrive.com

This guide is intended to complement the user manual provided by the manufacturer. It is provided as a basic introduction to the product for Inverter Drive Supermarket customers. It should not be used as a replacement for the manual issued by the manufacturer.



This product is not a safety device. All safety considerations including but not limited to Emergency Stop provision should be assessed separately and are outside the scope of this guide.

Issue 1

Contents

Page 1	Contents
Page 2	Power and Motor Connections
Page 3	Motor Connections - Star and Delta
Page 4	Parameters - Overview
	Parameters to set before use
Page 5	How to set a Parameter value
Page 7	How to Operate the Inverter from the keypad
Page 8	How to connect and configure a Potentiometer for remote speed control
Page 9	How to connect and configure a Run Forward or Run Reverse switch
Page 10	How to connect and configure a Run/Stop switch with Forward/Reverse selection
Page 11	How to configure "3-Wire" control with Run Forward Run Reverse and Stop pushbuttons
Page 12	Brake Resistor Connection (size 2 only)
Page 13	How to Reset the Inverter to Factory Defaults

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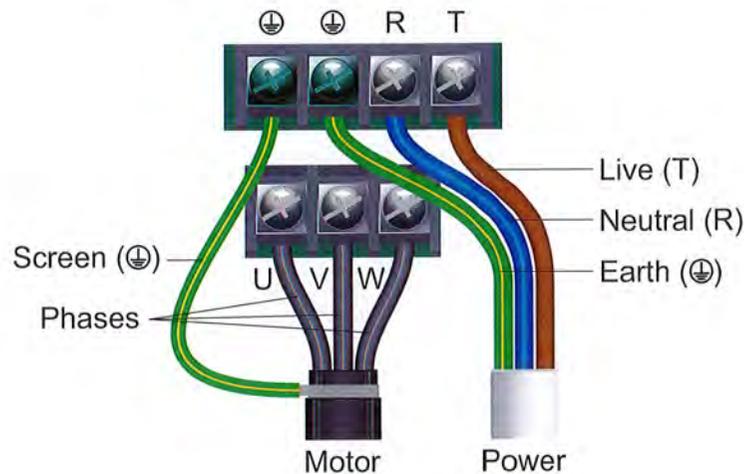
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LS M100 Frequency Inverter



1. Power and Motor Connections

Before commencing, confirm that the Inverter and all cables are completely isolated from the power supply, have been isolated for at least 5 minutes and that the motor is not turning.



Notes:

The illustration above is based on the 0.75kW rating (size 2). The terminals for other ratings are similarly labelled.

Connect the motor first as these terminals may not be accessible once power is connected.

The supply must match the Inverter specification and the motor must be separately earthed.

Important:

The order of the three motor phases determines the initial direction the motor turns.

This can be reversed by swapping any two phases or changing the inverter parameters.

Use screened or armoured cable between the Inverter and Motor and ensure it is grounded as shown.

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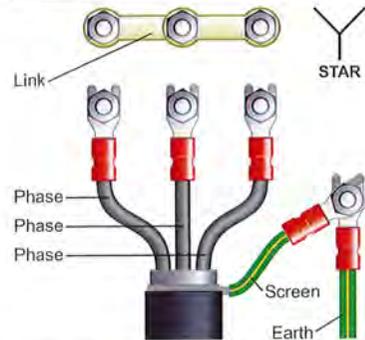
2. Motor Connections - Star and Delta

Dual voltage induction motors typically include terminal boxes with six points. The points can be connected together with links in one of two ways to suit one of the two rated voltages.

The two ways of connecting the links are shown below. These are known as "Star" (the higher voltage) or "Delta" (the lower voltage).

The selection of Star or Delta is not optional and must match the supply voltage.

Dual voltage motor nameplates include symbols to represent voltage and full load current in each configuration. Delta is represented by a triangle and star by a Y (Wye).



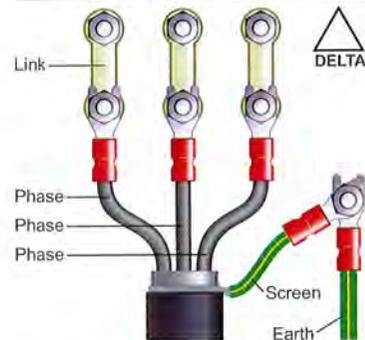
2.1 Motor connected in STAR (or Wye):

For safety purposes, Star (shown opposite) is the default configuration for small motors (usually to 3kW) and is sometimes known as "two at one side".

Only two links are required for Star. Double-up the links if changing from Delta to allow the motor to be changed back in future.

The order of the three phases determines the direction the motor turns.

Note that the manufacturer recommends that the cable screen is earthed at both ends and the motor and Inverter are earthed separately.



2.2 Motor connected in DELTA:

The link configuration is shown in the illustration opposite and is sometimes referred to as "three-a-breast".

The order of the three phases determines the direction the motor turns.

Note that the manufacturer recommends that the cable screen is earthed at both ends and the motor and Inverter are earthed separately.

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3. Parameters - overview

The Inverter contains a number of settings which can be changed to tailor it for use in a wide range of applications. These settings are known as parameters.

Parameters are typically referred to by code or number (eg. MrC = Motor Rated Current) with a description available in the manual.

The parameters contain critical information essential to the correct operation of the Inverter. Therefore, they should at least be checked by the user before the Inverter is operated for the first time.

The parameters listed in section 4 are intended to provide a starting point to allow for basic operation of the M100 Inverter.

4. Parameters to set before use

Set the following parameters to allow the M100 to control a motor with Run, Stop and Speed Control from the keypad.

If any of the parameters have been changed previously, follow the procedure in section 12 to reset the Inverter to Factory Defaults.

See section 5 to learn how to set a parameter value.

4.1 Parameters to check and values to set

Note: Unlike parameters in all other groups, parameters within the 0.00 (operation) group are not prefixed.

Parameter	Description	How to set
0.00 (or setpoint)	Command Frequency (Hz) (and top of operation group)	Default is 0.00 Hz (zero speed); change to desired speed eg 5.00 Hz. If an external potentiometer or other speed reference is to be used, ignore this step.
0.00 → ACC	Acceleration time (s)	Default is 5 seconds; increase or decrease if faster or slower acceleration is required.
0.00 → dEC	Deceleration time (s)	Default is 10 seconds; increase or decrease if faster or slower deceleration is required.
0.00 → drv	Command source	Default is 1 for run fwd / run rev via terminals. For alternate control selection is required.
0.00 → Frq	Frequency reference source	Default is 0 for keypad keys (not dial). Change to 1 for keypad dial.
0.00 → MKW	Motor Rated Power (kW)	Rated Power of the motor. Set to match the motor nameplate eg 0.75 kW
0.00 → MrC	Motor Rated Current (A)	Rated current of the motor. Set to match the motor nameplate eg 2.4 A
0.00 → MbF	Motor Rated Frequency (Hz)	Rated motor frequency. Default is 60 Hz; change to suit the motor, normally 50 Hz in UK.
0.00 → FrM	Maximum frequency (Hz)	Maximum frequency of the Inverter. Set to match MbF (see above) unless an extended speed range is required.
0.00 → IOv	Output voltage setting	Default is 0; suits applications where the motor Volts are the same as the mains supply.
0.00 → FtB	Forward torque boost (%)	Default is 4 %; will suit most applications.
0.00 → rtb	Reverse torque boost (%)	Default is 4 %; will suit most applications.
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters.
In0 → In39	Frequency corresponding to the V0 input minimum voltage (Hz) (minimum speed)	Default is 0Hz at 0V; increase if required. Effects the minimum speed in keypad dial control only. <i>Note: Hidden group; use "Mode" key to select In0 then up/down to select parameter.</i>
In0 → In09	Frequency corresponding to the V1 input minimum voltage (Hz) (minimum speed)	Default is 0Hz at 0V; increase if required. Effects the minimum speed using V1 terminal (Analogue Input) only.

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Easy Start Guide

LS M100 Frequency Inverter



5. How to set a Parameter value



5.1 Default display

When first powered up the M100 will display the speed setpoint (command frequency).

Note: this is 0.00 by default but may change once setup has been completed.



5.2 Select parameter.

Use the up and down arrow keys to select the required parameter. In this example, select OGr (Open Hidden Groups). By default, the M100 only shows the "Operation" group which contains basic parameters - OGr can be used to change this.

Press the "ENT" key to select this parameter and show the value.



5.3 Change the parameter value and save.

The default value for the OGr parameter is 0 which hides parameter groups. To show all parameter groups (and therefore all parameters) use the up arrow key to change this value to 1.

Press the "ENT" key to save the changes and return to the parameter list. Parameter groups will now be visible unless a factory reset is performed.



5.4 Select parameter group.

Once OGr has been changed to 1, the "MODE" key can be used to cycle through all 10 parameter groups:



All parameter groups have a two character prefix except the "Operation" group, which is displayed as 0.00.

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5.5 Select the In (Input) parameter group

Press the "Mode" key repeatedly to cycle through parameter groups until the "Input" parameter group is displayed.

The "Input" group can be identified by its "In" prefix.

In0 will be displayed.



5.6 Select parameter.

Use the up and down arrow keys to select the required parameter within the group. In this example, select In39 (Frequency corresponding to the V0 input minimum voltage). Press the "ENT" key to edit this parameter value.

Note: changing In39 sets the minimum speed in Hz that can be set via the keypad dial.



5.7 Select the digit (optional).

Use the "Shift" key to cycle through each digit. The currently-selected digit will flash to indicate that it can be changed.

This feature can make it easier to set a parameter value but is not required.



5.8 Change the parameter value and save.

Use the up arrow key to change the value to 5.00. Then, press the "ENT" key to save the changes.

All digits will flash and "ENT" must be pressed again to confirm the change and return to the parameter list.

To return to 0.00 press the "Mode" key repeatedly.

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6. How to operate the Inverter from the keypad



6.1 Select "local" control mode (keypad run/stop).

As default, the M100 is set to operate from the integrated IO terminals. To operate from the keypad, the "Command Source" needs to be changed. To do this, change parameter drv from 1 to 0.

Note: parameter drv can be found in the "Operation" (0.00) group.



6.2 Set the keypad dial as the speed reference.

As default, the M100 is set to operate at a fixed speed set by the 0.00 (Command Frequency) parameter. To operate from the keypad dial instead change parameter Frq (Frequency ref source) from 0 to 2.

Note: once Frq is set to 2, the value previously shown as 0.00 will change as the keypad dial is rotated. Use the up/down keys to show this if Frq is still displayed.



6.3 Press the green "RUN" key to start the motor.

The RUN key will start the motor. The display will increase as the motor accelerates and the RUN lamp will flash until the desired speed is reached. The time taken for the motor to accelerate to this speed is proportional to parameter ACC. Rotate the keypad dial to change the desired speed.

Note: the arrow keys can be used to access the "Operation" parameters; some of these can be used for monitoring such as Cur (motor current) or rPM (rpm).



6.4 Press the red "Stop" key to stop the motor.

The STOP key will stop the motor. The time taken (in seconds) to stop the motor is proportional to parameter dEC. The RUN lamp will flash as the motor decelerates. Once the motor is stopped, the display will show the current speed reference set by the keypad dial.

Note: the desired speed reference can be set via the keypad dial at any time, even when the M100 is powered down. This can be any value between the min and max specified by parameters In39 and FrM respectively.

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LS M100 Frequency Inverter



7. How to connect and configure a Potentiometer for remote speed control

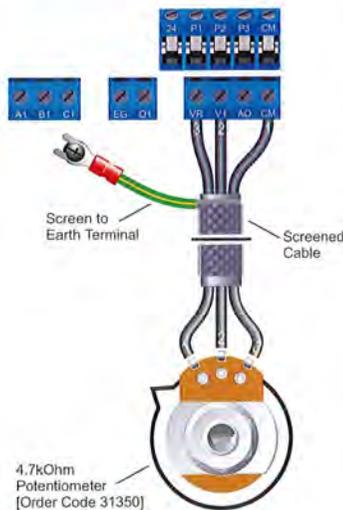
If speed control via the integrated keypad is unsuitable for the application, a remote Potentiometer can be used instead. This provides the benefit of allowing motor speed to be controlled from a more convenient location such as a cabinet door or on the machine itself.

Any potentiometer rated from 1kOhm to 5kOhm can be used.

The number of turns depends on the application. Both single and multiturn Potentiometers are available from The Inverter Drive Supermarket at InverterDrive.com.

7.1 Parameters to check for remote Potentiometer speed control

Parameter	Description	How to set
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters
0.00 → Frq	Frequency reference source	Default is 0 for keypad keys (not dial). Change to 3 for V1 terminal (remote potentiometer).
0.00 → FrM	Maximum frequency (Hz)	Default is 60 Hz; set to the desired speed when V1 is 10 Volts eg. 50 Hz.
In0 → In09	Frequency corresponding to the V1 input minimum voltage (Hz)	Default is 0 Hz; set to the desired speed when V1 is 0 Volts eg. 5 Hz. <i>Note: Hidden group; use "Mode" key to select In0 then up/down to select parameter.</i>



7.2 Connecting the Potentiometer

A wiring diagram is shown in the illustration opposite. The most important connection at the Potentiometer end is the centre terminal or "wiper". The wiper will output a variable voltage between 0 and 10 Volts and should be connected to the "V1" terminal on the Inverter. It is this voltage which provides the speed signal with 0V being slowest and 10V fastest.

When Frq = 3, the default output frequency at 0V is the minimum frequency of the Inverter. To change this, edit parameter In09. The default output frequency at 10V is 60Hz. To change this, edit parameter FrM.

If the rotation of the Potentiometer is the opposite to that required (ie. turn anti-clockwise to increase speed instead of clockwise) reverse connections GND and 10V.

Use shielded cable between Potentiometer and Inverter and ensure that the cable screen is connected to the Inverter earth terminal only.

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LS M100 Frequency Inverter



8. How to connect and configure a Run Forward or Run Reverse switch

The procedure described in section 6 enables Run/Stop operation via the start and stop buttons on the Inverter keypad.

This section explains how to enable 2-wire control with Run Forward / Stop / Run Reverse commands via a single selector switch.

When set to operate in this way, the Inverter can no longer be operated via the integrated keypad.

If this is unsuitable for the application, a remote switch can be used instead.

8.1 Parameters to check for remote Run/Stop

Parameter	Description	How to set
0.00 (or setpoint)	Command Frequency (Hz) (and top of operation group)	Default is 0.00 Hz (zero speed); change to desired speed eg 5.00 Hz. If an external potentiometer or other speed reference is to be used, ignore this step.
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters.
0.00 → drv	Command source	Default is 1 for FX: Run Fwd and RX: Run Rev, default is required for this example.
In0 → In65	Multi-function terminal P1 setting	Default is 0 for FX: Run Fwd (when drv is 1), default is required for this example. <i>Note: Hidden group; use "Mode" key to select In0 then up/down to select parameter.</i>
In0 → In66	Multi-function terminal P2 setting	Default is 1 for RX: Run Rev (when drv is 1), default is required for this example.

8.2 Connecting the Switch



A wiring diagram is shown in the illustration opposite. Ensure that the switch marked "SW1" is set to PNP as shown.

A suitable 3 position NO (Normally Open) switch should be installed between terminals 24, P1 and P2. The centre position should remain open circuit.

When a connection is made between terminals 24 and P1, the motor will run forward. When terminals 24 and P2 are connected, the motor will run in reverse.

If terminals P1 and P2 are connected to 24 at the same time the motor will stop. Parameter deC sets the time to stop in seconds.

If negative logic (NPN) is preferred ensure SW1 is set to NPN and use the CM terminal in place of 24.

Warning: Failure to select the correct logic (SW1) may result in unexpected operation or no operation.

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Easy Start Guide

LS M100 Frequency Inverter



9. How to connect and configure a Run/Stop switch with Forward/Reverse selection

The procedure described in section 6 enables Run/Stop operation via the start and stop buttons on the inverter keypad.

This section explains how to enable 2-wire control with Run/Stop and Forward/Reverse commands via separate selector switches. When set to operate in this way, the Inverter can no longer be operated via the integrated keypad.

If this is unsuitable for the application, remote switches can be used instead.

9.1 Parameters to check for remote Run/Stop

Parameter	Description	How to set
0.00 (or setpoint)	Command Frequency (Hz) (and top of operation group)	Default is 0.00 Hz (zero speed); change to desired speed eg 5.00 Hz. If an external potentiometer or other speed reference is to be used, ignore this step.
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters.
0.00 → drv	Command source	Default is 1; set to 2 for FX: Run/Stop and RX: Forward/Reverse.
In0 → In65	Multi-function terminal P1 setting	Default is 0 for FX: Run/Stop (when drv is 2); default is required for this example. Note: Hidden group; use "Mode" key to select In0 then up/down to select parameter.
In0 → In66	Multi-function terminal P2 setting	Default is 1 for RX: Forward/Reverse (when drv is 2); default is required for this example.

9.2 Connecting the Switch

A wiring diagram is shown in the illustration opposite. Ensure that the switch marked "SW1" is set to PNP as shown.

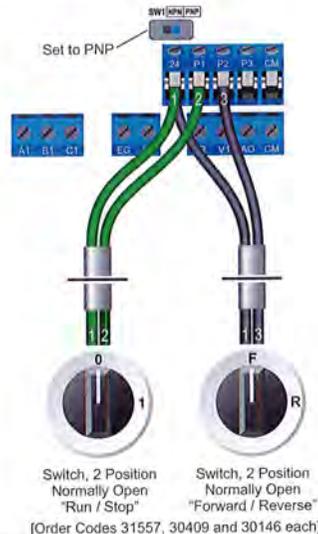
Two suitable 2 position NO (Normally Open) switches should be installed: One between terminals 24 and P1 (Run / Stop) and the other between terminals 24 and P2 (Forward / Reverse).

Note that the Forward/Reverse switch only selects the direction of rotation - it will not start or stop the motor. The direction can be set either before the motor is started or whilst it is running.

If the application only requires the motor to turn in one direction, the Forward/Reverse switch can be omitted.

If negative logic (NPN) is preferred ensure SW1 is set to NPN and use the CM terminal in place of 24.

Warning: Failure to select the correct logic (SW1) may result in unexpected operation or no operation.



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Easy Start Guide

LS M100 Frequency Inverter



10. How to configure "3-Wire" control with Run Forward Run Reverse and Stop pushbuttons

The procedure described in section 6 enables Run/Stop operation via the start and stop buttons on the Inverter keypad.

This section explains how to enable 3-wire control with Run Forward, Run Reverse and Stop commands via separate pushbuttons. When set to operate in this way, the Inverter can no longer be operated via the integrated keypad.

If this is unsuitable for the application, remote switches can be used instead.

10.1 Parameters to check for remote 3-wire control

Parameter	Description	How to set
0.00 (or setpoint)	Command Frequency (Hz) (and top of operation group)	Default is 0.00 Hz (zero speed); change to desired speed eg 5.00 Hz. If an external potentiometer or other speed reference is to be used, ignore this step.
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters.
0.00 → drv	Command source	Default is 1 for FX: Run Fwd and RX: Run Rev; default is required for this example.
In0 → In65	Multi-function terminal P1 setting	Default is 0 for FX: Run Fwd (when drv is 1); default is required for this example. Note: Hidden group; use "Mode" key to select In0 then up/down to select parameter.
In0 → In66	Multi-function terminal P2 setting	Default is 1 for RX: Run Rev (when drv is 1); default is required for this example.
In0 → In67	Multi-function terminal P3 setting	Default is 2; change to 17 for 3-Wire control.

10.2 Connecting the Switches

A wiring diagram is shown in the illustration opposite. Ensure that the switch marked "SW1" is set to PNP as shown.

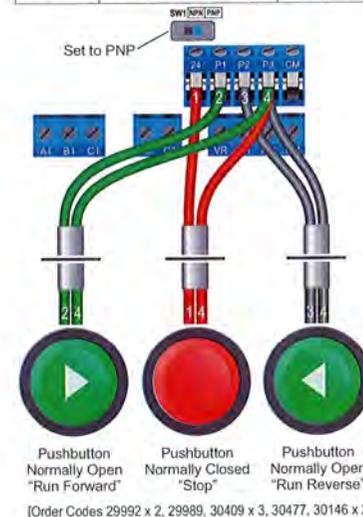
Three suitable pushbuttons should be installed:-
Stop: a normally closed contact between terminals 24 and P3.
Run Forward: a normally open contact between terminals P1 and P3.
Run Reverse: a normally open contact between terminals P2 and P3.

A momentary connection between P1 and P3 will start the motor (forward). It will continue to run until the connection between 24 and P3 is broken. A momentary connection between P2 and P3 will behave in the same way but the motor will run in reverse.

If the application only requires the motor to turn in one direction, the "Run Reverse" pushbutton can be omitted.

If negative logic (NPN) is preferred ensure SW1 is set to NPN and use the CM terminal in place of 24.

Warning: Failure to select the correct logic (SW1) may result in unexpected operation or no operation.



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Easy Start Guide

LS M100 Frequency Inverter



11. Brake Resistor Connection (size 2 only)

Before commencing, confirm that the Inverter and all cables are completely isolated from the power supply, have been isolated for at least 5 minutes and that the motor is not turning.

High inertia loads can cause overvoltage trips during deceleration and lead to "Ov!" error messages. In many cases, the solution is to increase the deceleration time to compensate.

A Brake Resistor is first installed to absorb braking energy and dissipate it as heat. The resistor must be correctly sized for both the Inverter and application.

However, if the application requires it, dynamic braking can be enabled to maintain or reduce deceleration times by absorbing the energy generated by such loads.

The "brake chopper" within the Inverter detects excessive braking energy and redirects it to the resistor when required.

11.1 Parameters to check for Dynamic Braking

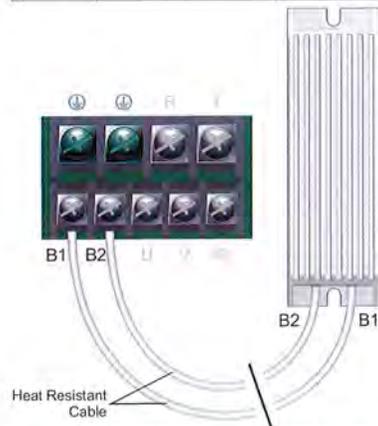
Parameter	Description	How to set
0.00 → OGr	Open hidden groups	Default is 0. Set to 1 to extend access to all parameters.
Pr0 → Pr65	DB resistor warning level setting	Default is 1 (warning enabled). Default is recommended. <i>Note: Hidden group; use "Mode" key to select Pr0 then up/down to select parameter.</i>
Pr0 → Pr66	DB resistor warning level (%)	Default is 10 %. Will suit many applications but can be increased to suit specific applications if required.

11.2 Connecting the Resistor

A wiring diagram is shown in the illustration opposite. Connect the brake resistor to the B1 and B2 terminals on the Inverter. The order of the connections is unimportant.

The braking resistor may get hot during operation. Ensure that it is suitably-mounted so any heat generated will not affect other equipment. Some resistors may include a thermal relay for additional protection.

It is essential that a resistor of the correct rating is used. Consult the Inverter product listing at InverterDrive.com or manual issued by the manufacturer for details.



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Easy Start Guide

LS M100 Frequency Inverter



12. How to reset the Inverter to Factory Defaults



12.1 Show hidden parameter groups

Access to hidden parameter groups is required to perform a factory reset. If step 12.2 (below) does not show CF0 then hidden parameter groups must be enabled. To do this:-
From 0.00, use the up and down arrow keys to select OGr then press the "ENT" key to edit its value. Use the up key to change the value to 1 then press "ENT" to save the changes and "ENT" again to confirm.



12.2 Select the "Configuration" parameter group

Once OGr is set to 1, press the "MODE" key repeatedly until the "Configuration" group is shown.

CF0 will be displayed.



12.3 Select parameter CF93

Use the up and down arrow keys to select parameter CF93. Once selected, press the "ENT" key to edit the parameter value.

Note: from CF0 it is quicker to use the down arrow key to reach CF93.



12.4 Change the parameter value to 1 and save

Use the up key to change the value to 1 then press "ENT" to save the changes and "ENT" again to confirm.

Once the reset is complete, the display will return to the parameter list.

To return to 0.00 press the "Mode" key.

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