

KeyGree

MIG USER'S MANUAL

Do it easy, comfortable, trustable.

MODELS

NBM-280/NBM-350/NBM-500



PREFACE




Dear users, thank you for using our inverter welder. For your correct operation of our product, please read this manual carefully before use and keep it properly for future reference.

SPECIAL NOTICE:

1. When the welder is placed on an inclined plane, care should be taken to prevent it from tipping over;
2. As the protection level of this welder series is IP21S, it is not suitable for use in the rain;
3. The product conforms to GB15579 standard;
4. This product complies with the electromagnetic compatibility requirements for type A equipment.

SAFETY PRECAUTIONS

Precautions for Installation

	<p>ELECTRIC SHOCK!!!</p> <ul style="list-style-type: none">● Install the earthing device according to the applicable standard.● Do not touch live parts while bare skin or wearing wet gloves or clothes.● Insure you to insulate appearance with the ground and the work piece.● The cover plate must be covered before power on, otherwise it may cause electric shock.● Make sure that your workstation is in a safe state.
	<p>FIRE!!!</p> <ul style="list-style-type: none">● Please install the product on non-combustible objects, otherwise there is a risk of fire.● Do not put combustible materials nearby, otherwise there is a risk of fire.
	<p>EXPLOSION HAZARD!!!</p> <ul style="list-style-type: none">● Do not install the product in an environment containing explosive gas, otherwise there is a risk of an explosion.



Replacing parts and components may cause danger

- Only professionals can replace the parts.
- Do not drop foreign objects such as thread ends, screws, gaskets and metal bars into the welder when replacing parts.
- After replacing the circuit board, the internal connection of the welder shall be correct before the welder can be operated, otherwise there is a risk of property damage.

Precautions for Use

Fume/smoke dust — It may be harmful to health.

- Welding would produce lots of gases and fumes that are harmful to the body. Avoid inhalation into the respiratory tract.
- Keep your head away from fumes while welding. Adopt adequate ventilation or exhaust facilities to keep smoke and gas away from the breathing area, and maintain good ventilation in the working environment.

Arc radiation — It may damage your eyes and burn your skin.

- Use an appropriate welding mask and wear protective clothing to protect your eyes and body.
- Use an appropriate mask or curtain to protect bystanders from harm.

Magnetic field will affect pacemakers.

- The electric current from any conductor will produce electromagnetic fields. Welding operators with cardiac pacemakers should consult a doctor before welding.
- Stay away from power sources as much as possible to minimize the impact of electromagnetic fields.

Improper use and operation may cause fire or explosion.

- Sparks from welding may cause fire. Please confirm that there is no flammable material near the welding station and pay attention to fire safety.
- Ensure that there is a fire extinguishing device nearby and a trained person who can use fire extinguishers proficiently.
- Do not weld sealed containers.
- Do not use the welder for thawing pipelines.

Hot workpiece may cause severe burns

- Do not touch hot workpieces with bare hands.
- Let the welding gun cool down for a while after continuous operation.

Noise — Excessive noise is harmful to hearing.

- Protect your ears. Use ear shields or other hearing protectors.
- Warn bystanders of the potential damage to their hearing caused by noise.

Moving parts may cause personal injury

- Avoid moving parts (such as fans).
- Protective devices such as doors, panels, covers and baffles must be tightly closed and put in the right place.

Fault — Seek professional help when in trouble.

- If you encounter difficulties during installation and operation, please follow relevant contents of this manual for troubleshooting.
- If you do not fully understand it after reading, or if you cannot solve the problem according to the guidelines in this manual, you should contact your supplier immediately and seek professional help.

Precautions for Scrapping

When scrapping the welder, please note:

- The electrolytic capacitor of the main circuit and the electrolytic capacitor on the printed board may explode when burned.
- The plastic parts such as front panels will produce toxic gas when burned.
- Please dispose of it as industrial waste.

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Chapter I Product Overview

1.1 Model Explanation

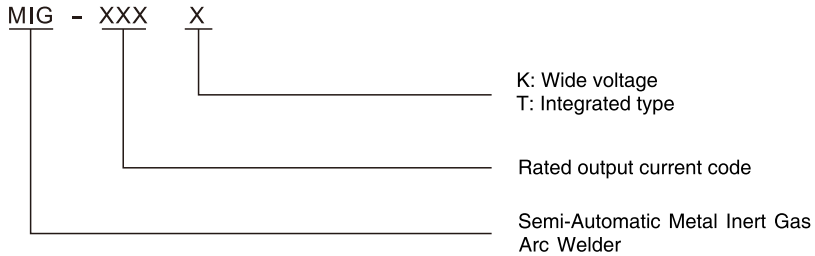


Fig. 1-1 Model Explanation

1.2 General Technical Parameters

See Table 1-1 for the general technical parameters of the welder.

Table 1-1 General Technical Parameters

MODEL	NBM-280	NBM-350	NBM-500
Rated Input Voltage(V)	3P 380V		
Frequency(Hz)	50/60		
Max Input Current(A)	18.4	25.1	42.2
Rated Input Capacity (KVA)	12.5	16.8	23
No-Load Voltage(V)	68	68	80
Voltage Range (V)	14-35	14-40	14-45
Rated Working Voltage(V)	28	31.5	39
Duty Cycle(%)	60		
Welding Wire Diameter (MM)	0.8/1.0/1.2	0.8/1.0/1.2	0.8/1.0/1.2/1.6
Spool Size (KG)	15		
Gross Weight(KG)	76	160	170
Package Dimension(MM)	820×495×760	1150×635×1575	1150×635×1575

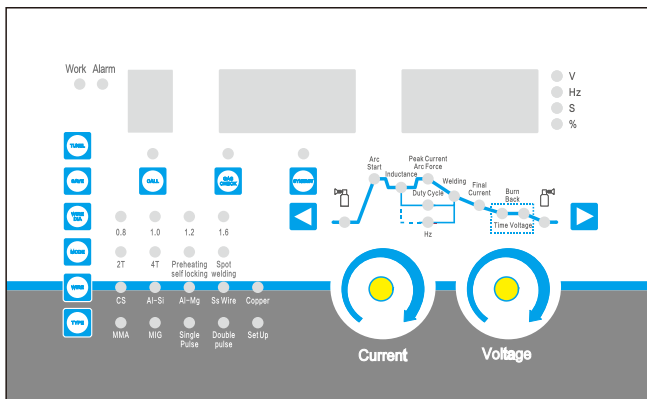
1.3 Product Introduction

NBM multi-function control set is a set of multi-function control board that our company launched after optimization and integration of various existing control panels. The mainboard adopts ARM+MCU structure, full digital control, achieving the effect of simple circuit structure, good reliability and strong expandability. The complete isolation of the peripheral circuit improves the stability of the welder. The wiring is simple, suitable for soft switching circuits. The traditional inverter NBC machine can be upgraded to a multi-function welding machine with slight modifications.

Characteristics:

1. It can provide several high performance welding modes, such as pulse gas shielded welding, double pulse gas shielded welding, CO₂ gas shielded welding, constant current argon arc welding, pulsed argon arc welding, manual welding.
2. It is suitable for welding of carbon steel, aluminum silicon, aluminum magnesium, stainless steel, copper and other materials with 0.8mm, 1.0mm, 1.2mm and 1.6mm wire diameter.
3. It adopts digital control technology with parameter presets and can preset welding current, voltage, welding consumables, wire diameter and so on.
4. 10 sets of welding specifications can be stored for convenient Storage and Recall
5. The mature soft switching circuit ensures maximum reliability of the welder.
6. There are three welding method, two steps, four steps and special four steps.

1.4 Display and Operating Panel Diagram



Function Description:

- Digital tube 1 displays channel
- Digital tube2 displays current
- Digital tube3 displays voltage, time, inductance, occupy duty, frequency, etc. The four LED lights on the right correspond to four units: V, Hz, S (0.1 seconds), and % (percentage). If none of the four lights are on, the unit is 1 or no unit.

- "Wire diameter" labeling box: 4 LED indicators correspond to the diameter of four kinds of welding wire: 0.8, 1.0, 1.2, 1.6; the button is the wire diameter selection button.
- "Welding" labeling box: 5 LED indicators correspond to 5 kinds of welding consumables: iron, aluminum silicon, aluminum magnesium, stainless steel, copper; the button is the welding selection button.
- Each LED of the "Process Indication" label box corresponds to a process and its corresponding parameters; the "→" and "←" keys are for the process to decrease or increase.
- "Channel" is the channel selection button. (select the appropriate channel to store or recall)
- The "Recall" button is an on-off key for setting whether to program the given current voltage. The LED above is the Recall indicator light. When the light is on, it indicates that the Recall is enabled. (After turning on the Recall function, the preset current and voltage can not be adjusted, only the parameters of the channel can be used).
- The "storage" button is used to store the given current and voltage. (Only stored parameters can be programmed)
- The "Gas Detection" button is used for gas inspection. The LED above is the gas detection indicator. When the light is on, it indicates that the gas is being detected.
- The "Unified" key is the selection key for parameter adjustment mode, and the LED light above is its indicator light. When the light is on, the adjustment mode is unified adjustment mode, otherwise it means adjusting separately.
- Encoder 1 and encoder 2 are both parameter adjustment encoders, respectively adjust the parameters displayed on the Digital tube 2 and Digital tube 3.
- "Welding method" labeling box: 4 LED lights correspond to two steps, four steps, special four steps and spot welding; the button is the selection button for adjustment mode .
- "Welding type" standard frame: 5 LED lights correspond to 5 working modes of welding machine: manual welding, gas shielded welding, pulse gas shielded welding, double pulse gas shielded welding and setting; the button is the selection button for welding mode .

Chapter II Operating Instructions

1. Short press the welding mode selection button to select the welding mode between manual welding, gas shielded welding, pulse gas shielded welding and double pulse gas shielded welding. In the state of the double pulse gas shielded welding mode, press and hold the welding mode selection button for 5 seconds to enter setup mode, then you can set common parameters or the system defaults will be loaded.
2. Short press the welding mode selection button to select the welding method between two steps, four steps and special four steps. In the state of manual welding, this setting function is invalid. Gas shielded welding has no mode of special four steps.
3. Short press the adjustment mode selection button to select unified or separated adjustment mode. When the light is on, the mode is unified adjustment mode,
4. Short press the wire diameter selection button to select the wire type: 0.8, 1.0, 1.2, 1.6.
5. Short press the welding material selection button to select the type of welding consumables: iron, aluminum silicon, aluminum magnesium, stainless steel, copper. Available ONLY in pulse gas shielded welding and double pulse gas shielded welding mode.
6. Press the gas detection button to start the gas inspection and the light is on. Release the button to finish the the gas inspection and the light is off.
7. Short press the "Recall" button to turn on or off the invocation functionality. When the invocation functionality is closed, the panel cannot be set. When the invocation functionality is turned on, the given current and voltage are set by the panel.
8. Short press the "storage" button to store the preset current and voltage, and the digital tube 2 and digital tube 3 will flash for two seconds.
9. Parameter setting: Short press increasing and decreasing buttons to switch procedure. When the corresponding process indicator light is on, please select the corresponding encoder to adjust the corresponding parameters. If you don't press increasing and decreasing buttons or don't rotate the encoder, it will return to the previous state after 3 seconds.
10. Restore the defaults: you can enter the setting mode and adjust to the process increasing and decreasing keys. When the digital tube displays "Lod dEF", please rotate the encoder 2, then the digital tube 2 and the digital tube 3 will flash for 2 seconds. The operation ends and the machine will restore the defaults.

Chapter III Parameter Specification

The maximum current and maximum voltage vary depending on the type of machine. For example, the maximum current value of NBM500 machine is 500A, and the highest voltage is $14+0.05 \times 500A$.

3.1 Manual Welding

Parameters	Maximum	Minimum	Default	Step	Unit
Welding current	400	10	100	1/5	A
arc starting current	200	0	0	1/5	A
push current	200	0	0	1/5	A

3.2 Double Pulse Gas Shielded Welding

Parameters	Maximum	Minimum	Default	Step	Unit
Inductance	10	1	5	1	-
Welding consumables	-	-	-	-	-
Wire diameter	-	-	-	-	-
Welding process	-	-	-	-	-
Regulating mode	-	-	-	-	-
Arc starting current	400	10	100	1/5	A
Arc starting voltage	40.0	14.0	0	0.1/0.5	V
Arc stopping current	400	10	120	1/5	A
Arc stopping voltage	40.0	14.0	0	0.1/0.5	V
Hybrid frequency	9.9	0.1	1.0	0.1/0.5	Hz
Hybrid occupy duty	90	10	20	1/5	%
Peak voltage	40.0	14.0	0	0.1/0.5	V
Peak current	400	10	300	1/5	A
Gas pre	3.0	0	0	0.1/0.5	S
Gas post	20.0	0	1.0	0.1/0.5	S
Burn-back time	0.5	0.01	0.20	0.01/0.05	S
Burn-backvoltage	5.0	-5.0	0	0.1/0.5	-
Welding current	400	0	-	-	V
Welding voltage	40.0	0	-	-	V
Recall	-	-	-	-	-

3.3 GMAWV

parameters	Maximum	Minimum	Default	Step	Unit
Inductance	10	1	5	1	-
Wire diameter	-	-		-	-
welding process	-	-		-	-
Regulating mode	-	-		-	-
Arc stopping current	400	10	100	1/5	A
Arc stopping voltage	40.0	14.0	18	0.1/0.5	V
Gas pre	3.0	0	0	0.1/0.5	S
Gas post	20.0	0	1.0	0.1/0.5	S
Burn-back time	0.5	0.01	0.20	0.01/0.05	S
Burn-backvoltage	25.0	10.0	14.0	0.1/0.5	V
Welding current	400	0		-	V
Welding voltage	40.0	0		-	V
Recall	-	-		-	-




3.4 Pulse Gas Shielded Welding

Parameters	Maximum	Minimum	Default	Step	Unit
Inductance	10	1	5	1	-
Welding consumables	-	-		-	-
Wire diameter	-	-		-	-
welding process	-	-		-	-
Regulating mode	-	-		-	-
Arc starting current	400	10	100	1/5	A
Arc starting voltage	40.0	14.0	0	0.1/0.5	V
Arc stopping current	400	10	120	1/5	A
Arc stopping voltage	40.0	14.0	0	0.1/0.5	V
Gas pre	3.0	0	0	0.1/0.5	S
Gas post	20.0	0	1.0	0.1/0.5	S
Burn-back time	0.5	0.01	0.2	0.01/0.05	S
Burn-backvoltage	5.0	-5	0	0.1/0.5	-

Welding current	400	0		-	V
Welding voltage	40,0	0		-	V
Recall	-	-		-	-

3.5 Setup

Corresponding Parameters	Display Character	Maximum	Minimum	Default	Step	Unit
Peak current offset	IP	150	-100	0	1/5	A
Peak time offset	TP	3,0	-1,5	0	0.1/0,5	mS
Base current offset	lb	20	-10	0	1	A
Slow wire feed speed	SF	10	3	3	1	-
Restore Defaults	DEF	-	-		-	-

After entering the state of setting, the parameter name will be displayed on the ammeter, and the parameter data will be displayed on the voltmeter, please press   to select the parameters, and use the encoder 2 to adjust the parameter content . Then please press  to exit the setup state when you complete setting up.

spark-submit

Ip:Peak current offset

Range of peak current when setting pulse welding current

Tp:Peak time offset

Range of Peak time when setting pulse welding current

lb:Base current offset

Range of Base current when setting pulse welding current

SF:Slow wire feed speed

If the speed of slow wire feeding is too fast, the wire will be easily broken when the arc is triggered, and the arc starting fails; if the speed slow wire feeding is too slow, the wire feeding speed will be less than the melting speed of wire when the arc is triggered, the arc is too long, then the contact tube will be easily burned.

3.6 Special Parameters Specification

3.6.1 Welding Consumables


You can only select welding consumables in pulse gas shielded welding and double pulse gas shielded welding mode. There are five types: aluminum-magnesium, aluminum-silicon, copper, carbon steel and stainless steel.




3.6.2 Wire Diameter

There are four sizes available: 0.8, 1.0, 1.2, 1.6.




3.6.3 Welding Method

There are 3 welding modes, two steps, four steps and special four steps.

Two steps: Press the welding gun to start welding, and release the gun to stop welding. The welding parameters used are the current voltage preset on the wire feeder (when no Recall) or preset on the panel (when Recall). When the process light displays that it is welding  , values on the ammeter and voltmeter are preset current and voltage (when not welding), and the actual current and voltage will be displayed during welding.

Four steps: press the gun to start welding, and then release the gun to keep the welding (using the preset current and voltage). press the gun again to enter the process of arc stopping . When the arc is stopped, the arc stopping current and voltage are used which can only be preset on the panel. press   to elect arc stopping indicator  .At that time,ammeter and voltmeterrespectively display the arc stopping current and arc stopping voltage parameters. You can use the encoder 1 to adjust the current, and the encoder 2 to adjust the voltage. If it is not adjusted for 5 seconds, it will automatically jump to the welding status light, and the adjusted parameters will be saved.

The special 4-step has the large current arc starting function. when the welding mode is the special 4-step in the state of single-pulse or double-pulse, the arc starting indicator in the parameter can be selected. Choose the arc-indicating position and use the encoder to adjust arc starting current and voltage.When working, press the gun to start arc starting current for the first time, release the gun to start normal welding current (the welding current is adjusted on the wire feeder), press the gun again to start arc stopping current (the arc stopping current can be adjusted on the panel), release the gun again, and the welding is stopped.

In general, aluminum is sensitive to temperature, so several sets of specifications are needed when aluminum is welded . First, the base material should be heated by the large current. Then turn to normal welding state with parameters on the wire feeder when the temperature of the base material is increased and the welding line open . Finally,transfer the parameters into arc stopping parameters when the arc is stopped. This process can ensure that there is no defect on the position of arc starting when the aluminum parts are welded. Press   to select  , the arc starting current and voltage are displayed at this time.

3.6.4 Adjustment Method

There are two adjustment methods, unified adjustment mode and separated adjustment mode

1) Unified adjustment mode: In this mode , the current preset potentiometer adjusts the preset current and the preset voltage synchronously, and the voltage preset potentiometer assists in adjusting the preset voltage.

2) Separated adjustment mode: In this mode, the current preset potentiometer adjusts the preset current, and the voltage preset potentiometer adjusts the preset voltage.

3.6.5 Recall

Recall is to program the preset current and preset voltage which are to be stored in the current channel, and make a given adjustment through the panel encoder. When “Yes” is selected, the adjustment preset potentiometer is invalid. When “No” is selected, the preset current and preset voltage are set by the preset potentiometer on the wire feeder.

3.6.5 Storage

Storage means storing the current preset current and preset voltage in the current channel.

3.6.7 Gas Detection

Press the “gas detection button” to start the gas inspection until it is released.

Chapter IV Announcements



4.1 Select The Parameters Corresponding To The Welding Wire

For different material, the diameter of the welding wire, the corresponding wire feeding speed and internal parameters are different. The user must select the corresponding parameters on the panel according to the actual wire material and diameter. Good welding effect cannot be achieved if there is no corresponding. There are five materials to choose, iron, aluminum silicon, aluminum magnesium, stainless steel, and copper. The user can select the aluminum silicon gear position if it is pure aluminum welding wire.

4.2 Adjustment Method For Single Pulse

When the PMIG is selected with the weld type key, the single pulse welding method is set. The user must use unified adjustment mode when pulse. The voltage is only fine-tuned, and the range is -5 to +5. In general, the voltage is selected to 0, and the actual voltage will change with the current. For example, when soldering 100A, the voltage is set to 0, and 200A is also set to 0. The voltage fine-tuning plays the role of adjusting the arc length. The arc length refers to the distance from the end of the wire to the molten pool. When the voltage is increased, the arc length will be long. When the voltage is lowered, the arc length will be short. When the arc length is long, there is no short-circuit transition in the welding process and there will be no splash, but it is easy to cause the base material to be over-burned, and the gas protection will also be worse. When the arc length is short, there will be splash during the welding process. There will be a slight short circuit in the good soldering condition. (Note: don't forget to trim voltage when current is adjusted.)

4.3 Adjustment Method For Double Pulse

The double pulse is generally used to weld aluminum. The pores in the welding process are discharged by stirring the molten pool, and fish scales are formed. The PMIG gear is the single pulse and the DPMIG gear is the double pulse. The double pulse is essentially a low-frequency pulse superimposed on a single pulse and formed by switching between two sets of welding parameters. There are two sets of welding parameters, base pulse parameter and the peak pulse parameter. The occupy duty and frequency of the two sets of parameter switching can be adjusted on the panel , wherein the occupy duty refers to the proportion of the peak pulse parameter. Generally, the frequency should be adjusted to 1.0-2.0HZ for double pulse, and the occupy duty should be adjusted to 10% - 30%. When the welding type is DPMIG, press the button  to select the process lamp of the peak value, occupy duty, frequency to adjust the corresponding parameters.

The base pulse parameter can be adjusted on the wire feeder potentiometer (non-recall mode) or panel (recall mode); the peak pulse parameter can only be adjusted on the panel.

For example, for an aluminum plate with a thickness of 2.0, the parameter is set to the base pulse current 60A, the voltage 0V, the peak pulse parameter 100A, the voltage 0V, the frequency 1HZ, the occupy duty 20%. During welding, the welder shall first output the peak pulse of 0.2 seconds (100A,0V), and then output the base pulse of 0.8 seconds (60A,0V),and so on.The greater the difference between the peak current and the base current, the more pronounced the fish scales will be, and vice versa.

(Note: don't forget to trim voltage when current is adjusted.)

4.4 Appropriate Peripherals

Pulse welding has high requirements for peripheral equipment, including gas, welding gun, wire feeder, and base metal and so on.

Gas: It must be protected with high-purity argon when welding aluminum, otherwise, the weld line will become black even can not be formed. Magnesium oxide is distributed around the weld line, so aluminum-magnesium is more susceptible to blackening than aluminum-silicon. The arc is unstable when welded with pure argon, so please use 98% argon with 2% CO₂ when welding stainless steel .If the argon content is high, the depth of fusion will be shallow. If the argon content is low, it will be not easy to form a pulse. Therefore Please use 80% argon + 20% CO₂, or 90% argon + 10% CO₂ when welding carbon steel. Never use pure CO₂ welding pulses.

Welding gun: The nozzle size and the shunt will affect the flow of the shielding gas, causing welding defects. The conductive nozzle should be 50 filaments larger than the diameter of the welding wire when weld aluminum, otherwise the aluminum will easily get stuck in the conductive nozzle after being heated and expanded. Teflon is recommended for wire feeding hoses.

Wire feeder: Carbon steel and stainless steel have no high requirement for wire feeder. It is necessary to use a double drive and a U-shaped wire feed wheel for aluminum.

Base metal: The base metal should be processed before welding. Please refer to welding manual for specific treatment

4.5 Welding Operation

In general, during hand-held welding, it should be pushed from right to left to facilitate gas protection on the weld pool, otherwise the gas protection will be poor when welding aluminum, and the weld line will become black.

Chapter V Debugging Specification

The main control board adopts a dual CPU structure and power supply isolates on both sides.

Debugging Steps:

1. After wiring correctly according to the wiring diagram, the user can give power to debug.
2. Select the CO₂welding type on the panel , and adjusts the preset voltage to 20V. Press the gun and load, adjust W2 to align the actual voltage with the display voltage, and adjust W3 to align the actual current with the display current.
3. Select the PMIG welding type on the panel,adjusts the preset current to 60V and preset voltage to 0 V, select the actual welding consumables, wire diameter and gas to weld.The user should check whether the actual current is consistent with the preset current or not (deviation should be within 10A)at this point.If not, please adjust W1 (wire feed speed) to make it accurate.
4. Remarks: Pulse welding is a unified control. If the current deviation is too large, welding effect will be affected.
5. Debugging is completed.

Chapter VI Requirements For The Main Circuit Of The Welder

Compared with other materials, welding carbon steel has different requirements for the main circuit. In order to maintain the pulse current, it is necessary to use main circuit with the high no-load power when pulse welding carbon steel and no-load voltage should be above 80V. The transformer turns ratio should be 22:4, the reactor should be about 15UH,the galvanometer resistance should be 5.1, and the IGBT should be more than 100A.

If the main application is welding aluminum, no-load voltage is available at 70V. Transformer turns ratio should be 20:3and the reactors should be 30UH.

The secondary Hall model should be 600A/4V.

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