DNC Drip Feed Unit Using USB Flash Drive

DNC One

User Manual

UserManual_DNC-One_En | 16032015 | Version 7.0

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1. DNC One introduction

1.1. Introductory

DNC One unit is used to transfer/drip feed a NC program (G, M codes) to CNC machines from USB flash drive (replacing PC) by the parallel port (50pins) or serial port (RS-232C), it also receives programs, parameters in CNC machine and saves to USB. **DNC One** is a compact design, pasted directly into the body through the magnet, not occupying an area of factories, quick and easy to use, etc., this is the new trend of DNC drip-feeding for CNC machine.

Traditional solution of DNC drip-feeding for CNC machines is using computers have been installed a dedicated DNC software (like CIMCO Edit, Dostek DNC, etc) to send or receive G,M-code programs.

But this solution has some drawbacks:

- Placing a computer near CNC causes to be waste workshop area.
- Manipulating on the computer takes a lot of time and many stages (booting the computer, launch the software, installation, selection, etc).
- Computers sometimes fail or suffer from virus attack, which causes delay jobs, reducing productivity.
- RS232 port of the computer sometimes damage the data transmission board of the CNC machine.
- You have to operate on PC after every time finishing a program

With the above drawbacks of the traditional solution, we have researched the functional integration necessary to target the most compact product manipulation and optimal operation, in order to improve productivity and economic performance in process using CNC machine, so the **DNC One** product to Send/Receive G-code for CNC machine was born.

1.2. Features of DNC One:

- **DNC One** compatible with almost CNC machines such as: Fanuc (Fanuc 3, 6, 10, 11, 12, 15, 0(i), 16(i), 18(i), 21(i), etc.), Okuma, Mitsubishi, Yasnac, Haas...
- Read the USB 2.0 of all brands and different capacities.
- Read the file names is long up to 255 characters and the files can be stored in a directory and subdirectories (this feature starting Version 6.0 onwards).
- **DNC One** can cut the program automatically, operation is very easy to cut programs (starting from Version 7.0 onwards).
- **DNC One** integrated a Timer, allowing installation time to stop periodically CNC machine to tool change when the tool over lifespan.
- In addition to sending the program to CNC machine, **DNC One** also receive the program, parameters from the CNC machine to store on USB.

- Return automatically to the top of the program after transferring finishes (very handy when running processing machine details).
- Select the file you want to transmit from the files list displayed on the LCD screen. For the convenience of the user, **DNC One** automatic filter common files for CNC machine like *.NC, *.TAP, *.TXT.
- Equipped with two USB ports to increase the life of the USB port.
- Install the parameters by pressing the button on the DNC One.
- The baudrate in serial mode is up to 115200bps (1200/ 2400/ 4800/ 9600/ 19200/ 38400/ 57600/ 115200).
- Change the speed of data transfer for parallel port communication.

1.3. The basic steps to use DNC One

- Step 1: The CNC programmer created the machining program (NC file) on PC.
- Step 2: Copy the machining program from the PC to USB Flash Drive.
- Step 3: Plug the USB to DNC One, select the desired file to transmit.
- Step 4: Transmit the machining program to CNC machine to execute, carry out the processing.

1.4. Design characteristics

- **(1) LED indicator**

LEDs name	Colour	Functions
POWER	Yellow	Power supply alert
READY	Green	Ready to send alert
DATA	Green	Data transferring alert
REQUEST	Green	Request to send signal from CNC machine in Parallel mode
ERROR	Red	Error alert

- **(2) LCD Screen**

LCD screen have 16x2 characters, display the file list, sending/receiving status, setting parameters, errors alert, etc.

- **(3) Buttons**

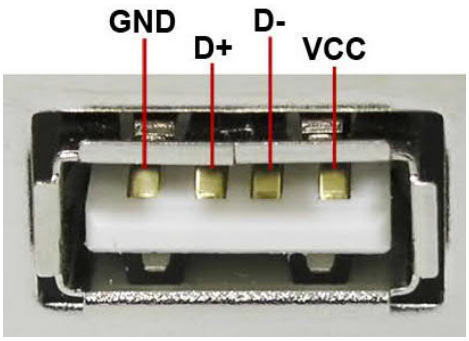
Buttons name	Functions
▲	Go UP
▼	Go DOWN
SET	Selection
RESET	Reset/Restart the DNC One

- **(4) Parallel port**

50 pin port of parallel transmission:

- **(5) USB ports**

DNC One have two USB port - *USB A type Female*.



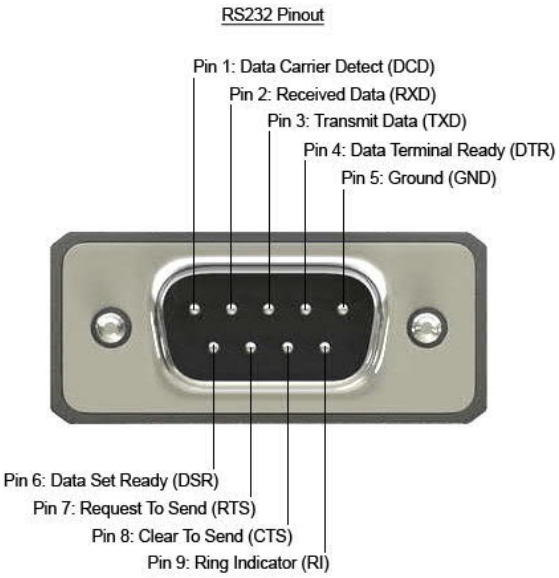
⚠ *At the same time only one USB plugged*

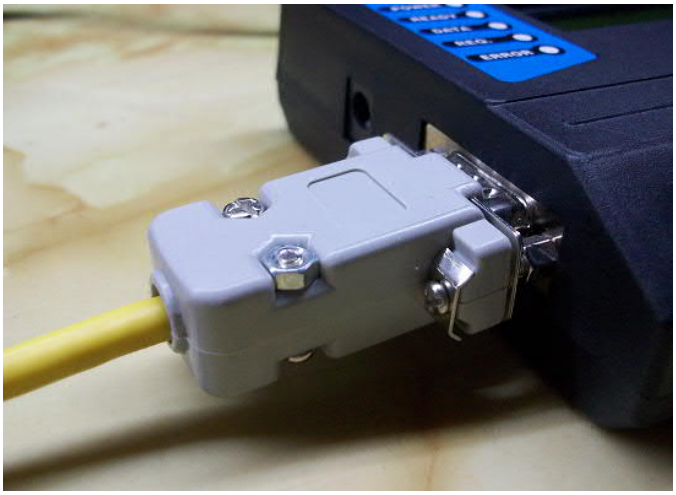
- **(6) Power supply port**

  Coaxial power connector, *Type A: 5.5 mm OD, 2.1 mm ID* .

- **(7) Serial port data transmission – RS232 port**

  RS232 port type *DB9 Male*.





1.5. Supply the power to DNC One

1.5.1. Using power from CNC machine

DNC One can get the power from the CNC machine via the data transmission cable.

- For RS232 serial line, the most of CNC machines communication via this port will also supply DC24V. Plug one end of the cable 25 pins port into the CNC machine, the cable 9 pins port to DNC One for the powered.

When you plugged RS232 cable that can not supply power to the DNC One, the installer can connect DC24V from the CNC machine to pin 25th of the DB25 port.

- For parallel line, CNC machines are always powered via the 50 pins cable. Plug the cable into the DNC One for the powered.

1.5.2. External power supply

When DNC One can not get the power from CNC, need external powered using adapter.

Input	100 ÷ 240 VAC 50/60 Hz
Output	7 ÷ 40 VDC Recommended 12V or 24V adapter
Out put current	≥ 1A

Recommended type of adapter has a wide input voltage range for take advantage of 1A 100VAC power available on CNC machines.

At the same time just choose one way to supply the power.

1.6. Installation Guide

DNC One is designed with 4 magnets on the back, so easily mounted on metal surfaces.

It should be installed so that:

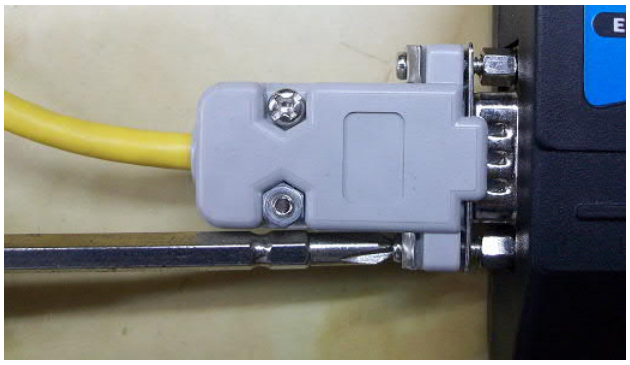
- Convenient for manipulation.
- Easy to observe the screen.
- Flat surface, less vibration when the machine running.
- The path of the cable as short as possible.
- Avoid water, avoid being splashed shavings, dirt restrictions.

Installation of the machine with RS232 connection, power by the cable:

Installation of the machine with RS232 connection, external powered adapter:

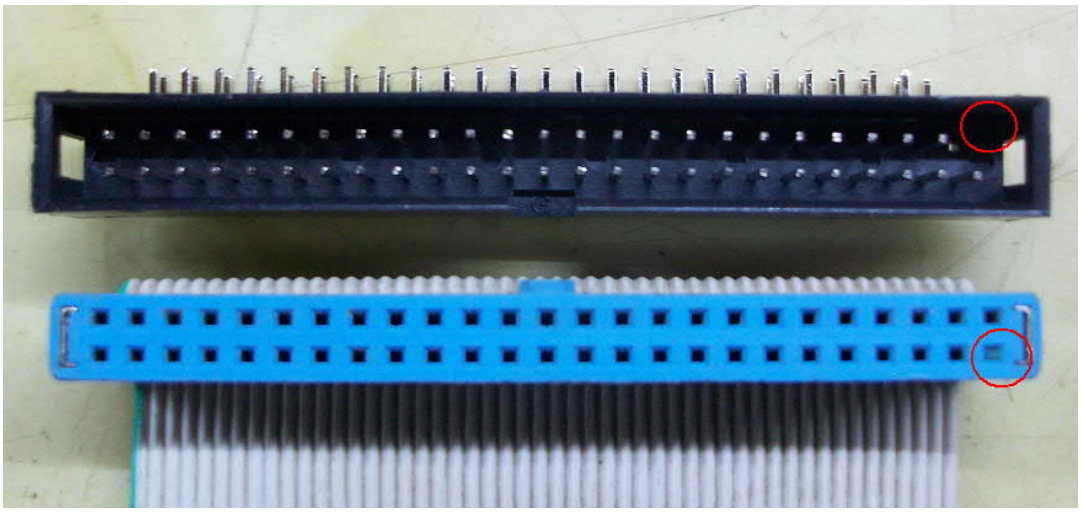
Need to turn off the power of CNC machines before installing DNC One, or before removal DNC One. The installation onine can cause problems for RS232 connection.

Tighten the screws fixed in head of communication port 9 pins and 25 pins for avoid the connection of the cable is not good during use, causing loss of data connection.



Installation of the machine with parallel line:

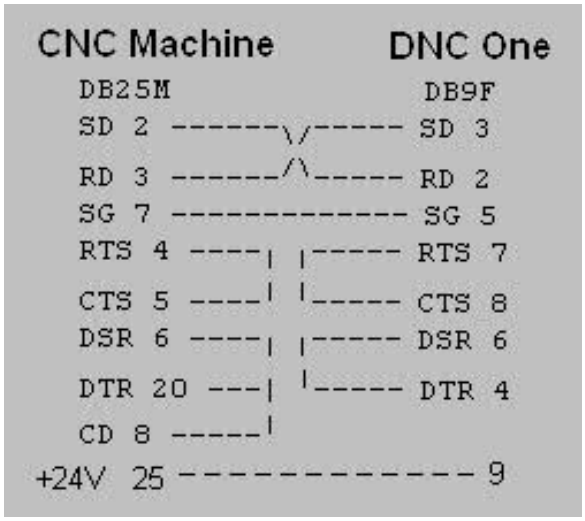
When you plug the cable into the socket 50 pins, note to plug the correct orientation. The 50 pins socket is actually only 49 pins, corresponding to the cable. Plug the cable reverse not only damage the DNC One that can be harmful to the CNC machine.



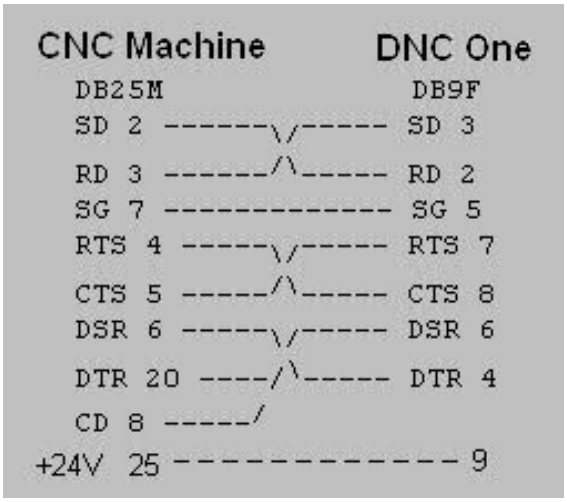
1.7. RS232 Cable

The RS232 cable have the *DB9 Female (DB9F)* and the *DB25 Male (DB25M)*.

Wiring with *Flow control* is *Software*:



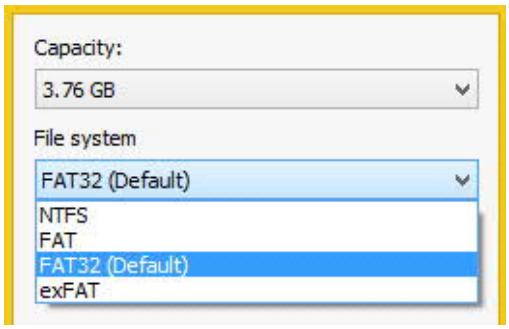
Wiring with *Flow control* is *Hardware*:



1.8. Using the USB Flash Drive

DNC One can read all types of USB available in the market with any capacity (Transcend, Kingston, Sandisk, Kingmax, Toshiba, Sony, HP ...). However, should to use the popular USB branded and genuine, full of labels, the warranty stamps, etc. for ensure stability during transmission. Some USB poor quality or incorrect USB 2.0 maybe occur cannot connecting or hot after a while connectivity, easy to lose connection when transmitting data.

Format the USB can be multiple choice. Here, it should be FAT/FAT32 formatted.



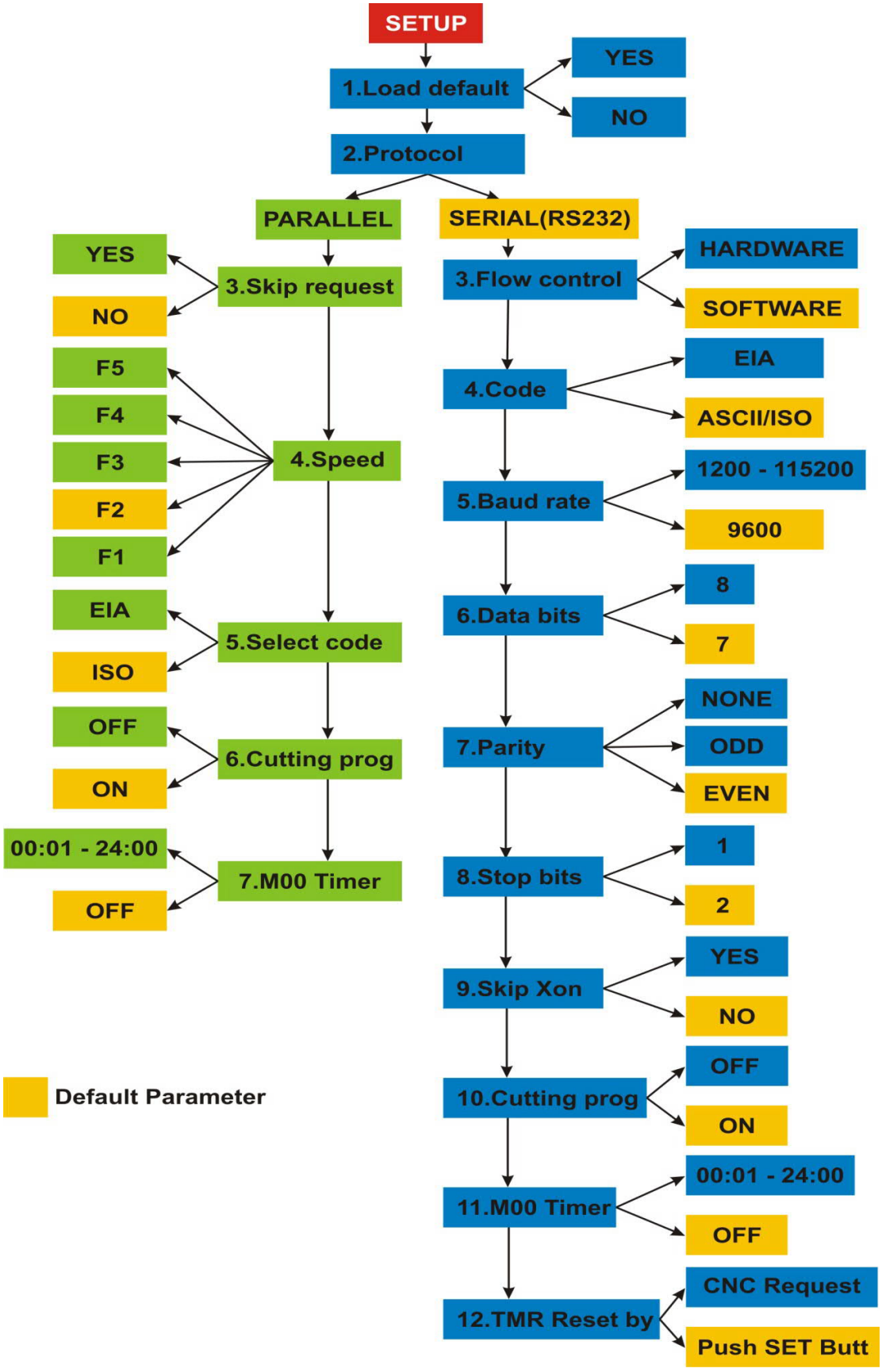
The USB Socket after many times plug/unplug will be broader mechanical, so the USB cannot be plugged tightly, while CNC machining vibrations could cause loss of connection. Need pressed the small steel sheets for increase friction to help plug USB is tighter. If stilling on warranty period, please return to suppliers for be replaced new Socket or users can replace it easily.

1.9. Characteristics of files in the USB

- It can be any file name, can reach 255 characters. However, file names can not contain a dot.
- DNC One can read all the file formats for CNC machine (*.nc, *.tap, *.txt, *.cnc, etc).
- File can be located in the root directory of the USB, or it may be stored in subfolders. Naming folders should not contain a dot.
- Not more than 50 files in USB.
- The folders should be created directly on a USB flash drive rather than copy all folders from the PC to USB.

2. Guide to setting and use.

2.1. Setting diagram


SETUP
1.Load default
YES
NO
2.Protocol
PARALLEL
SERIAL(RS232)
3.Skip request
YES
NO
4.Speed
F5
F4
F3
F2
F1
5.Select code
EIA
ISO
6.Cutting prog
OFF
ON
7.M00 Timer
00:01 - 24:00
OFF
3.Flow control
HARDWARE
SOFTWARE
4.Code
EIA
ASCII/ISO
5.Baud rate
1200 - 115200
9600
6.Data bits
8
7
7.Parity
NONE
ODD
EVEN
8.Stop bits
1
2
9.Skip Xon
YES
NO
10.Cutting prog
OFF
ON
11.M00 Timer
00:01 - 24:00
OFF
12.TMR Reset by
CNC Request
Push SET Butt
Default Parameter

- **Getting to the setting section:**
  When DNC One is supplied the power and USB is unplugged to the DNC One, press the SET button and keep it down in 3 seconds, then it has into the setting section.
  When USB is connected, press RESET button and then press the SET button immediately and keep it down in 3 seconds.

- **(1) Load default**
  If the user want to retain the previous settings, then select NO.
  If the user want to put the settings on default, select YES.
  Press the SET button to confirm and go to the next page.

- **(2) Protocol**

  For parallel transmission (Bus 50), choose PARALLEL.

  For transmit serial (RS232), select SERIAL (RS232).

  Press the SET button to confirm and go to the next page.

2.2. Setting for parallel transmission

After selecting the parallel transmission, the parameters to be installed in this mode are:

- **(3) Skip request**

  The default is NO. If the user select YES, DNC One will transfer immediately after selecting the file and push SET button, without waiting for the request signal from the CNC machine.

  Press the SET button to confirm and go to the next page.

- **(4) Speed**

  The transmission speed is divided into five levels:

F1	F2	F3	F4	F5
400 bytes/s	450 bytes/s	500 bytes/s	550 bytes/s	600 bytes/s

  Selection then press the SET button to confirm and go to the next page.

   *The upgrade to too high speed (F4, F5) can make CNC machine does not receive timely data, thus may miss the statement. The user should choose appropriate transmission speed according to the model of CNC machine.*

- **(5) Select code**

  Select the tape code chart ISO or EIA.

The default is ISO.

Selection then press the SET button to confirm and go to the next page.

- **(6) Cutting prog – Setting the automatic cutting program function**

  Select ON to enable the automatic cutting program function.

  Select OFF to disable this function.

  Press the SET button to confirm and go to the next page.

- **(7) M00 Timer – Setting the Timer to pause CNC machine**

  If the user want to periodically stop CNC machines by automatically adding M00 during transmission, setting the desired time from 1 minute to a maximum of 24 hours.

  Install OFF If do not want to use this feature.

  Press the SET button to confirm.

The DNC One saves the parameters just set when displaying the word SAVING. Then, the user can proceed to transfer parallel with the recently installed.

2.3. Setting for serial transmission (RS232)

- **(3) Flow control**

  Selection methods embarked SOFTWARE or HARDWARE, depending on CNC machines. Typically used methods should SOFTWARE this is the default option.

  Press the SET button to confirm and go to the next page.

- **(4) Code – Selection transfer encoding**

  Select the transfer encoding is ASCII / ISO or EIA.

  The default is ASCII / ISO.

  Press the SET button to confirm and go to the next page.

- **(5) Baud rate**

  The speed you can install is: 1200/2400/4800/9600/19200/38400/57600, 115200 (bps)

  The default value is 9600.

Press the SET button to confirm and go to the next page.

- **(6) Data bits**

  Data bits can be set to 7 or 8. The default value is 7.

  Press the SET button to confirm and go to the next page.

- **(7) Parity**

  Parity can be installed are: NONE / EVEN / ODD. Default is EVEN.

  Press the SET button to confirm and go to the next page.

- **(8) Stop bits**

  Stop bit can be set to 1 or 2. The default value is 2.

  Press the SET button to confirm and go to the next page.

- **(9) Skip Xon – Choose ignore signals required from the CNC**

  The default is NO.

  If the user choose YES, after selecting the file is complete, press the button SET, the DNC One immediately without waiting for the signal to request from the CNC.

  Press the SET button to confirm and go to the next page.

- **(10) Cutting prog and (11) M00 Timer like parallel communication settings section**

- **(12) TMR Reset by – Choosing how to reset the timer**

  This setting is only shown when the installation time for M00 Timer.

  There are two ways to Reset the Timer:

  Push the SET button: press the butt SET to Reset.

  CNC Request: Automatic Reset by signals required from the CNC.

  (The settings are explained in section 2.8)

  Press the SET button to confirm.

The DNC One saves the parameters just set when displaying the word SAVING. Then, the user can proceed to transfer serial with the recently installed.

2.4. Transmission processing programs for CNC machine via RS232 port

Steps to transfer through RS232 port:

- Installation DNC One and RS232 communication cable between the DNC One and CNC machines.
- Power supply for the DNC One and CNC machines.
- Setting the RS232 communication parameters for the DNC One.
- Setting the RS232 communication parameters for CNC machines compatible with the DNC One to be able to embark data exchange.
- The user manipulate at the DNC One to ready to transmit.
- The user manipulate at the CNC machines to start getting the program into memory or proceed to the DNC drip feed to machining.

The manipulation with the DNC One	
After supplied the power, DNC One standby to plug USB.	
After plug in the USB, the screen display options. To transfer files from USB to CNC machine, select **USB to CNC**.	
The screen shows: • The path of the directory. If the root folder is shown **H:** If the subfolder does show **H: [name subdirectories]** • A list of files in the selected folder. Press ▼/▲ to view a list of files. Press SET to select the desired file.	
After selecting the file, the DNC will open the file out. If the process of opening the file normally, the screen will display **READY** to ready to transmit. Now observe the LED **READY** light.	

After receiving the request signal transmitted from the CNC machine, the transmission will start. If the parameter setting Skip Xon is YES, there should press SET to begin. The parameters displayed in the transmission cover include: • File name are passed. • The percentage of the data transferred. • Number of times passed **T** The LED **DATA** will blink during transmission.	
After the transmission end, DNC One automatically return to the ready state in the next transmission time. T order number is automatically increased by one unit. A similar operation to continue transmitting. If the user want another file, press the **RESET** button to select the file from the beginning.	
Error warning	
If the DNC One lost connection with the USB while transmitting, the screen will display an error warning, at the same time the LED **ERROR** blink continuously. To transmit again, press the **RESET** button. Note on plugging the USB socket tightly to not get this error occurs.	

2.5. Receive CNC programs/parameters via RS232 port

The DNC One capable of receiving program or parameters from CNC machines for storage on USB. Steps to get through the RS232 port:

- Installation DNC One and RS232 communication cable between the DNC One and CNC machines.
- Power supply for the DNC One and CNC machines.
- Setting the RS232 communication parameters for the DNC One.
- Setting the RS232 communication parameters for CNC machines compatible with the DNC One to be able to embark data exchange.
- The user manipulate at the DNC One to getting ready.
- The user manipulate at the CNC machines to begin output the programs or parameters.

The manipulation with the DNC One	
After supplied the power, DNC One standby to plug USB. At the moment, the user manipulate at the CNC machine to output programs/parameters (PUNCH/OUTPUT)	
After plug in the USB, the screen display options. To receive a file from CNC, select **CNC to USB**.	
The display shows: • The file name is generated in USB format: **FILEx.TXT** ,in which x is the number of times the order received. After each receive, x increase by one unit. • Display **Ready to receive** notifications ready to receive data.	
The DNC One will begin the process of receiving data. Periodically screen will display number of bytes received. The **DATA** LED will blink during receive data.	
When the receiving end, the screen will display a message complete and total number of bytes received.	
Finally, the screen displays the process of waiting to receive the next file. **Push RESET to get another file**	

2.6. Transmission processing programs for CNC machine via parallel port

The steps proceed to transmit via the parallel port:

- Installation of the DNC One and connect the tape 50 port pins from CNC machine to DNC One (note the correct plug-way).
- Power supply for the DNC One and CNC machines.
- Set the parameters for the DNC One parallel transmission.
- The user manipulate at the DNC One ready to transmit.
- The user manipulate at the CNC machines to start receiving save program into memory or proceed to DNC drip feeding.

The manipulation with the DNC One to parallel transmission similar to the RS232 communication (Section 2.4), the only difference is have not SEND/RECEIVE choice. Because through the parallel port, the DNC One only have SEND function, donot have RECEIVE function.

2.7. The automatic cutting program function

2.7.1. When do we need to cut CNC programs ?

- When the machine is working then broken tool;
- When the machine is working then the power outage;
- When processing large mechanical parts, it takes several days to complete;
- Or any other reasons cause the processing interrupt;

Meanwhile, the operator will perform the operation using a computer to cut sections program were processed and retained the remaining sections program to continue processing, this in order to save processing time. This job need someone experienced, knowledgeable G-code and carefully, because the errors of the cut can cause problems when further processing.

2.7.2. Introduce the automatic cutting program function of DNC One

DNC One V7.0 is capable of performing the cutting program automatically. This enables the operator to save a lot of time as well as the operator does not need to have experience to cut programs.
DNC One program will skip sections that the operator wishes to transmit processing the rest of the mechanical parts.

The operations to cut the program automatically:

1	Settings allow automatic cutting program	In the settings, turn ON the feature “Cutting prog” 

2	Select the file name need to cut	Select the file name in the file list 
3	Hold down the SET button until the screen displays "Auto cutting" then stop pressing	
4	Settings percent want to cut	Settings percent based on the degree of completion of the mechanical parts are processed, from 0.1% to 99.9%. Press ▲ or ▼ to increase or decrease the percentage, press the SET button to select.  
5	Settings the format of program	If the processing program contains both G1 / G2 / G3 (which running arc), then choose:  If the processing program contains only G1 (only running points), then choose:  Press ▲ or ▼ to choose, press the SET button to select. Note: It must be the right choice for precision cutting program.

6	Wait for the cutting process is done	The display "Cutting ..." mean the cutting process is being handled. This process is faster or slower depending on the size to be cut off. Processor speed about 12Mbytes/min. At this time observe the USB LED will blinking repeatedly.  Note: When cutting capacity is too small, then the process very quickly, can not see the process.
7	Complete the cutting, ready to transmit	After processing is complete, the screen displays "Cutting OK" At this time it is ready to transmit to the program after cut off. 

2.7.3. Some notes about this function

- DNC One V7.0 can cutting the program contains the following code:

%	Signs % to start the program (required to have signs %)
O	Name of the program. Example: O001
S	Spindle speed. Example: S800
F	Feedrate. Example: F500.
M	M-code effective include: **M00, M01, M03/M04, M05, M06, M08/M09** If there are other M-code in the program segment to cut off, after the cutting is finished will not be effective.
T	Tool change command, comes with M06
G	G-code effective include: **G00, G01, G02, G03, G17/G18/G19, G28, G40, G43, G49, G54/G55/G56/G57/G58/G59, G80, G90/G91, G92** . If there are other G-code in the program segment to cut off, it will alert the error can not be cutting. Note: • When the program contains G28, it will transmit the following code: *G28Z0* *G28X0Y0* • When the program contains G43 (Example: G43H1), it will transmit the following code: *G0G43H1Z50.0*

- At the beginning of the program after cutting, DNC One always run this program is structured follows:

%	%	Start of program
…	…	Transfer the necessary code (S, M, G, T…)
F1000 *G1XxxxYxxx*	F1000 G1XxxxYxxx	Running to the point (X, Y) with speed F1000, in which (X, Y) is the point to start processing
F100 *Zxxx*	F100 Zxxx	Z axis down with speed F100, to start depth of working continue
Fxxx	Fxxx	Putting the right speed at the start working point
…	…	Continue transmit the program remains

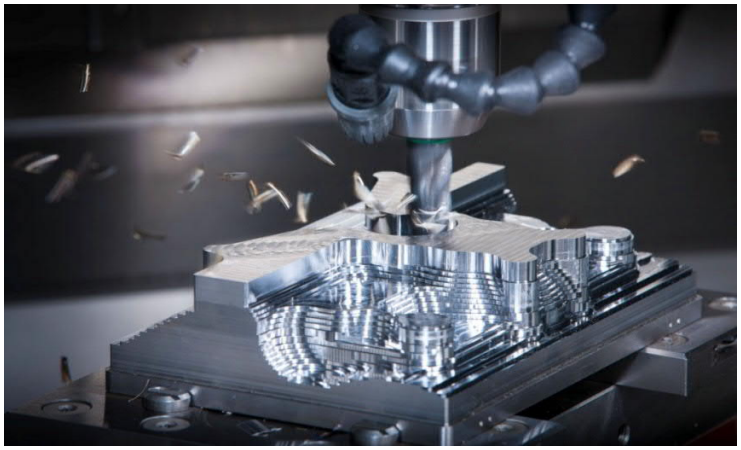
- Error warning while cutting:

Error 02: “Not support Gxx” 	Detected in the cutting process to cut off program segment containing G-code is not supported (eg, G81, G83 ...), it will alert the error: Can not cutting because not support this G-code.

- For the program has many tools, cutting process will make the CNC machine runs auto tool change from the beginning tool to the current tool.
- After the cutting is complete,CNC machine should run in Single Block and Dry Run to execute each command before, to check the percentage cutting was optimal or not.
- The nature of this function is skip transmit the section program selected, so files stored in USB remain intact as the original.

2.8. Automatic pause the CNC machine by Timer – M00 Timer

In the process of CNC machining, especially roughing out a large mold occurs case: after a period of processing, the tool was worn more or over tool lifespan, if not timely replacement will cause the error or broken tool, damaged the workpiece. To handle this problem, the operator often tracking processes, monitoring the time to pause the machine and replace the tool; or programmer estimate the time to add the M00 code into the machining program, when the machine is processing then meet M00 will automatically stop to replace the tool by operator.



DNC One V7.0 integrated features **M00 Timer** by creating a timer to automatically add the code M00 in the machining process. With this function, when the timer reaches the set value, *DNC One* would add code M00 makes CNC machine automatically stops, then the operator only needs to replace the tools and then continue processing.

User Guide M00 Timer function:

- **Setting the Timer:**

Push ▲ / ▼ to select the desired time CNC machine stops periodically.
The minimum value is 1 minute.
The maximum value is 24 hours.
Setting OFF to disable the timer.
Push the SET button to complete the installation.

- **Setting choose how to reset the Timer:**

When the timer reaches the setting value, CNC machine will stop when executing the command M00. Then the timer will be reset to count the time from the beginning to the next time. To reset the Timer, the operator can choose one of two ways according to the tables compare following:

The ways to RESET Timer	**1. Push SET Button**	**2. CNC Request Signal**
Setting screens		
The operation of *DNC One*	The DNC One passed the following	The DNC One passed the following

when the timer reaches value	code: ***M05;*** ***M00;*** ***M03;*** Then will stop transmitting and wait for the tool change operation is complete, press the SET button to continue the transmission.	code: ***M05;*** ***M00;*** ***M03;*** Then continue send to the CNC machine's buffer memory until the buffer is full, then the CNC machine required to stop transmission.
The operation of *DNC One* when the timer reaches value	✓ Push the Start Cycle button on CNC machines. ✓ Push the SET button on the *DNC One* to continue transmission and simultaneous reset the Timer.	✓ Push the Start Cycle button on CNC machine, the machine continues processing as part of the program are available in the buffer, then CNC machine sends a *Request Signal* to the DNC One to continue transmission, and this time Timer will be automatically reset.

The accuracy of the Timer depends on the Buffer to receive data of CNC machines. With the old model machine (e.g. FANUC 6M, 0M) then the buffer is negligible so very precise stop times compared to the time of installation. For machine with large Buffer, then the actual time is more than a set time interval to CNC machines to execute the program in the Buffer.

3. Warranty Policy - Maintenance products

WD Distributing wishes the customer satisfaction before and after the purchase. So, while using the product, if you experience any problems due to technical fault, the customer may contact us for free phone support.

Support info:

- Call: (405) 634-3603
- Email: wddistributing@gmail.com
- Web: www.wddistributing.com

We are pleased to advise and serve you!

After the purchase of our products, our customers please note:

- Transportation and storage before installation or use, as even electronic goods should responsible for shock, fall break, avoid water, high temperatures, humidity, etc.
- Carefully read the manual documents prior to installation: the customer please read carefully how to instal, surveyed the location and installation, the power supply, the installation parameters to avoid risks for the product and for your equipment.
- Please preserve and use the products carefully for more durable products work.
- Please do not tear the warranty stamps.
- Please do not voluntarily cover – replace – repair before contacting us.

The warranty period is two years, the cost of repairs after the warranty period is very low !

INFORMATION REFERENCE ABOUT ONE DNC

- Articles: **One DNC specifications**
  http://maycncvietnam.com/en/article/2014/10/19/dnc-one-specifications.52.html

- Articles: **Quick User Guide DNC One**
  http://maycncvietnam.com/en/article/2014/10/19/dnc-one-specifications.52.html

- Articles: **Automatic cutting program - New function of DNC One V7.0**
  http://maycncvietnam.com/en/article/2015/03/11/automatic-cutting-program-new-function-of-dnc-one-v70.80.html

- Articles: **RS232 Cable**

  http://maycncvietnam.com/en/article/2014/10/19/rs232-cable.50.html

- **Some video about DNC One** :

✓ DNC One with FANUC 0M :
https://www.youtube.com/watch?v=-Y0AJvIi_g4

✓ DNC One with FANUC 21i :
https://www.youtube.com/watch?v=IciHhytc0mo

✓ DNC One with FANUC 15M:
https://www.youtube.com/watch?v=X4CvMA_BBUc

✓ DNC One automatic cutting program:
https://www.youtube.com/watch?v=dO552hDQhmI

✓ DNC One automatic pause the CNC machine – YASNAC, FANUC 6M:
https://www.youtube.com/watch?v=ATl5cfKmJ3A