LOAD MONITORING FUNCTION

Operation Manual

(For Version V1.9)

Before starting operation, setting or programming the load monitoring function, carefully read this manual so that you fully understand the information it contains . Keep the manual carefully so that it will not be lost.

CONTENTS

1. INTRODUCTION

The load monitoring function is used to detect abnormal load of tools by monitoring the variation in spindle motor and servo motor load during the cutting process. When abnormal load is detected, the machine will stop at program end (M30) or immediately (feed hold status) according to tool life value or tool break value respectively.

Function features:

1).TECH mode

The TECH mode is used to auto detect the reference value (maximum value at first cutting cycle) of the spindle and feed axis during the actual cutting process.

2).Manual setting and display of load monitoring table

The data necessary for load monitoring can be set and displayed on the LOAD MONITOR SETTING screen.

3).2 threshold levels of load limit

The function provides 2 threshold setting levels , tool life value and tool break value respectively (Tool break value must set bigger than tool life value).

4).Load monitoring

The torque load of the spindle or axis drive motor is detected to engage warning and alarm state.

Warning: Machine will stop at program end(M30).

Alarm: Machine will stop immediately
(feed hold status).

Note:

The load monitoring system is not sensitive enough to detect load variations when executing finishing cuts, small diameter drilling, and taps, even if the tool has wear down or breakage has occurred. Select appropriate axis to be monitored according to the type of tools and cutting conditions.

2. FUNCTION SPECIFICATIONS

The following table shows the specifications of the load monitoring function.

Item	Description
Number of monitoring	Max. 12 tools.(12 intervals)
Objective axes	2 axis 1- spindle [SP1, SP2 OR SP3] 2- X axis or Z axis [manual select]
operation modes	Teaching mode and monitoring mode are provided.
programming (M code)	Start of teaching or monitoring: M196.
	End of teaching or monitoring: M197.
Over load by setting the threshold levels	Tool Life value(warning): Machine will stop at program end (M30).
	Tool Break value(alarm):Machine will stop immediately (feed hold status).

2.1 Operation Modes

In this function, there are two operation modes, teaching mode and monitoring mode respectively. The mode selection is possible by pressing the [TECH] soft-key or [MONI] soft-key on the LOAD MONITOR SETTING screen.

They are briefly explained below:

[TECH] Mode

In this mode, the function detects and records the maximum(initial Max.) load value during cutting in the specified tool interval. The maximum load obtained in this operation is used as the reference of the value to be set to execute monitoring.

The maximum load value can be obtained by executing the program(actual cutting needed) once with a new tool.

[MONI] Mode

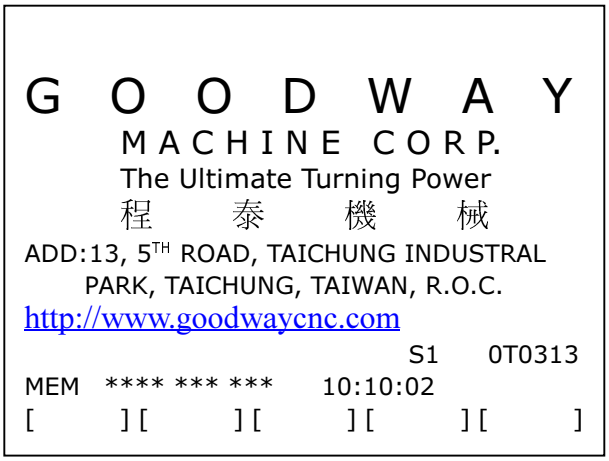
In this mode, current machining load value is compared with the preset tool life (warning) and tool break (alarm) detection threshold level values of the same tool intervals. If the detected current load value exceeds the preset threshold level of the tool life or tool break values, then the connected message is displayed on the screen.

3. The LOAD MONITOR SETTING SCREEN

This section describes the procedure to display the LOAD MONITOR SETTING screen and the contents of the information displayed on this screen.

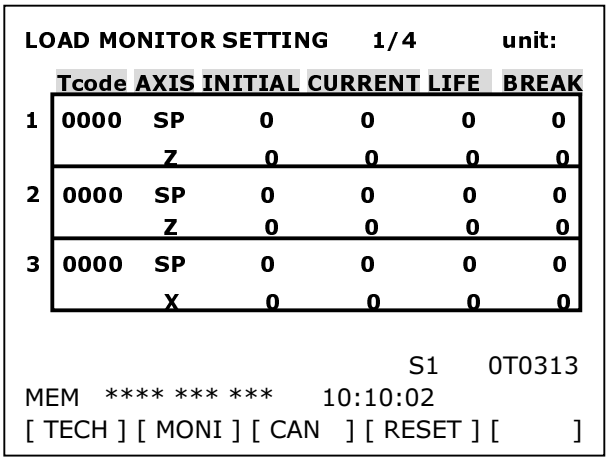
3.1 Screen Select and setting

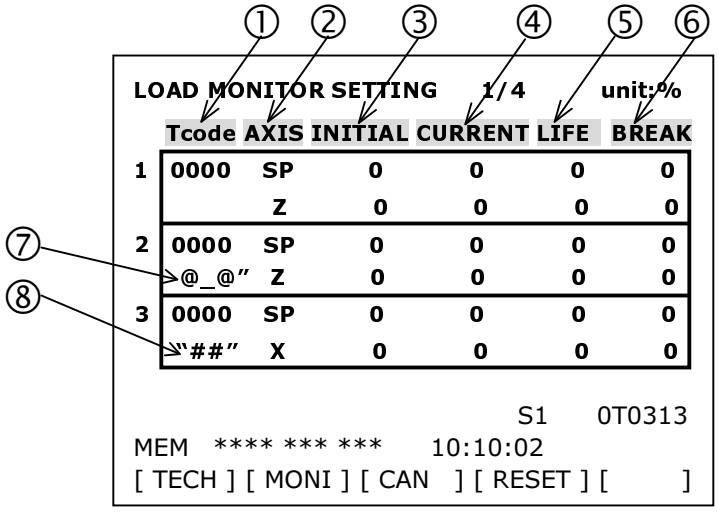
When you press the select key [CUSTOM] once, the information of the manufacturer will be displayed.



Information screen

Press the select key [CUSTOM] again the LOAD MONITOR SETTING screen is displayed.





①**Tcode :** Specify the tool and offset number in the program to be monitored or used in the teach mode. Input example:T0101,T0103… .

②**AXIS :** SP(spindle)is fixed in the detection of the load variation . X or Z axis must be selected according to cutting direction .

③**INITIAL :** Initial value: when the [TECH] mode is engaged, it detects and records the maximum(initial Max.) load value of this item during actual cutting, in the specified tool interval. The initial maximum load obtained in this item is used as the reference value. This value is used to obtain tool life and tool break values. The maximum load value can be obtained by carrying out actual cutting once with a new tool.

④**CURRENT :** Current load value: this value is the actual cutting load value of the motor , which is used by the control to compare with the tool life and tool break values to execute load monitoring.
(The Max. value will be shown on "current value" filed after each cutting step.)

⑤**LIFE:** Tool life value(0~999): The threshold level value to activate tool wear warning. Tool life value must be large than tool initial value.

⑥**BREAK:** Tool break value(0~999): The threshold level value to set off tool break alarm. Tool break value must be larger than tool life value.

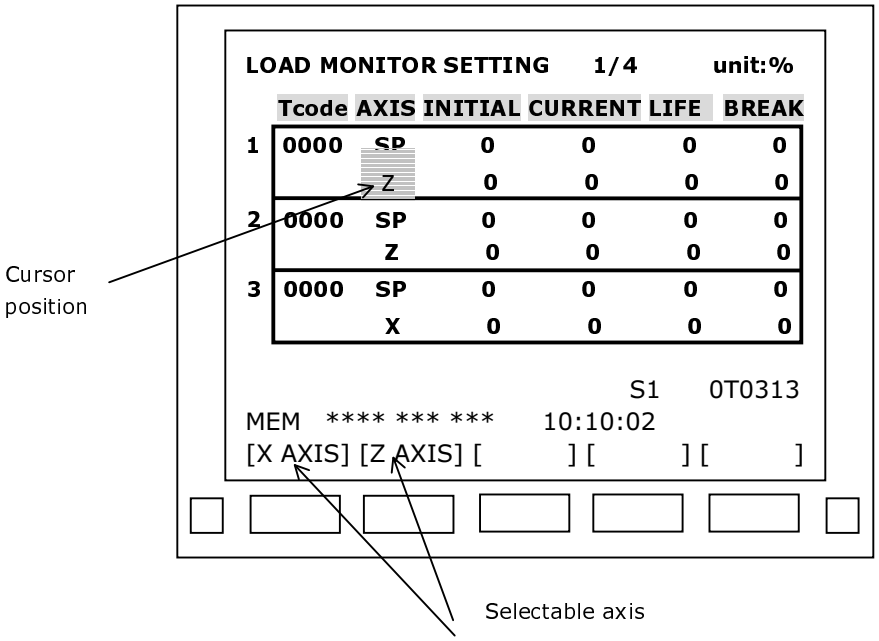
⑦**@@":** When tool wear warning occurs, this mark is displayed. (press RESET key to clear)

⑧**"##":** When tool break alarm occurs, this mark is displayed. (press RESET key to clear)

3.2 Mode Select and display

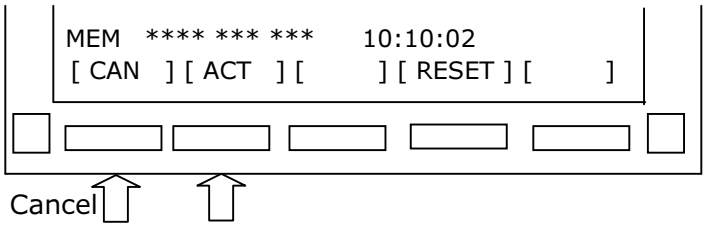
3.2.1 Axis select

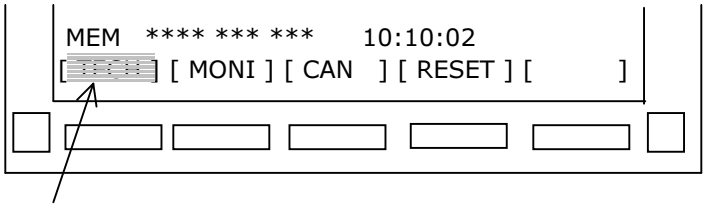
When the cursor is moved to the "AXIS" column, the screen is displayed as follows. Press the soft-key to specify it.

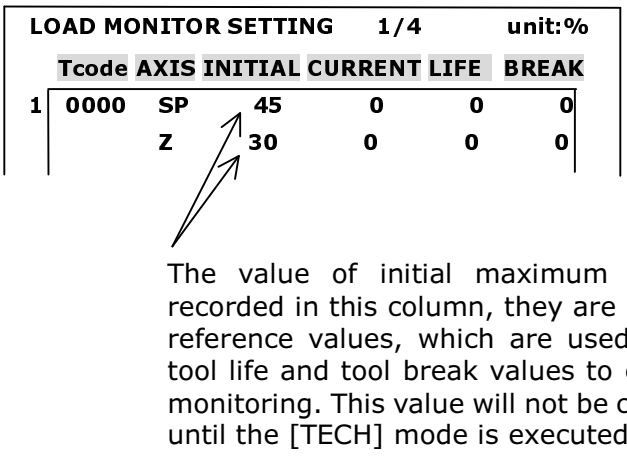


3.2.2 Teaching

When the soft-key [TECH] is pressed, soft-keys change to [CAN] and [ACT] for selection,

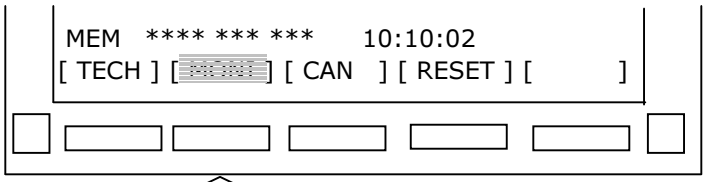






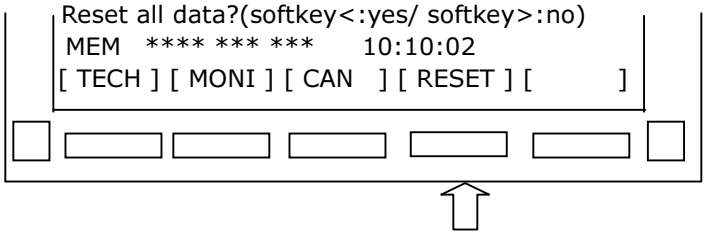
3.2.3 monitoring

Before the [MONI] mode is started, the threshold level value of tool life warning and the threshold level value of tool break alarm must be set according to the INITIAL value, work materials, and cutting conditions etc.

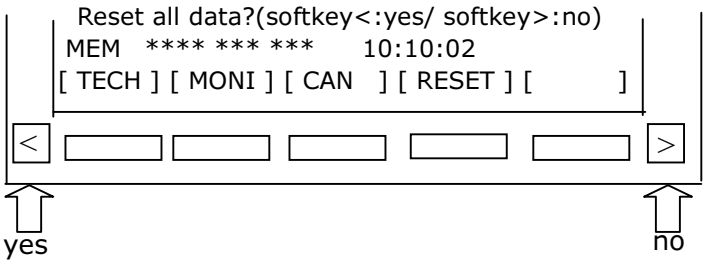


Press the [MONI] soft-key(will display on reverse color) which will activate the monitoring mode. Cancel the [MONI] mode by pressing the [CAN] soft-key.

3.2.4 reset

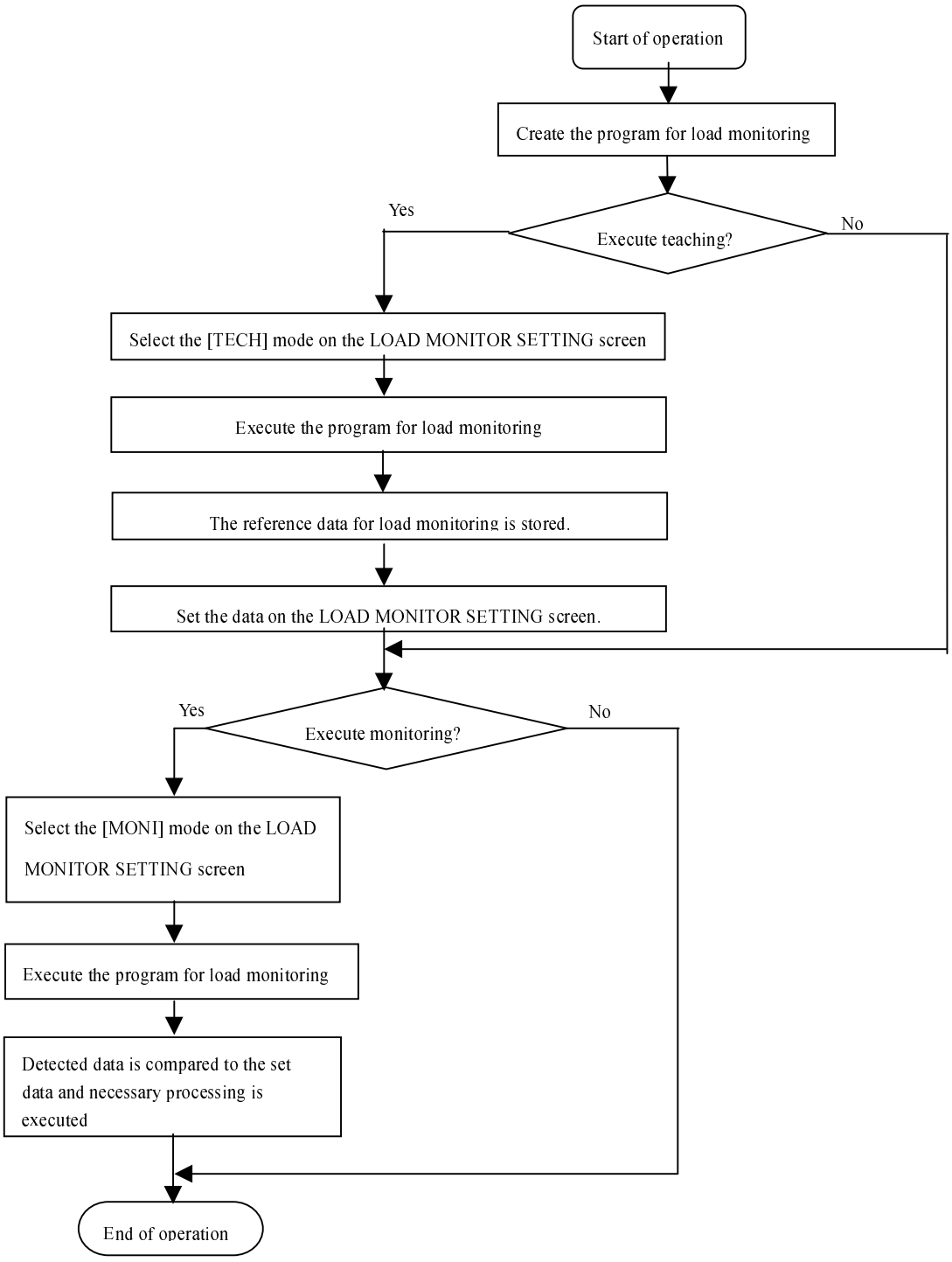


Press the [RESET] soft-key, and the above display warning message will appear.



4. OPERATION FLOW

The operation flow of using the load monitoring function is described below.



5. CREATING THE LOAD MONITOR PROGRAMS

This section describes the procedure for creating the load monitor program.

M196; Start of teaching or load Monitoring.

M197; End of teaching or load Monitoring.

EX.

```
O1111;
M11;
M196;
G00 T0302;
G97 M03 S2000;
X50.0 Z70.0;
G01 Z10.0 F1.3;
G00 U1.0 Z80.0;
M197;
X300.0 Z200.0;
…….;
…….;
M196;
G00 T0401;
…….;
…….;
…….;
.
.
M197;
……;
.
.

M30;
```

Note:
1).Enclose the interval with M code where load should be taught or monitored by M196 and M197 in units of operation processes.
2).In the specified interval correspond with tools number would be taught or monitored.
3).The specified interval may include acceleration/deceleration of the spindle and rapid traverse of the axis, but they would not be taught or monitored.