Machine Data Collection is enabled by Setting 143, which allows the user to extract data from the control using a Q command sent through the RS-232 port (or by using an optional hardware package). This feature is software-based and requires an additional computer to request, interpret and store data from the control. Certain Macro variables can also be set by the remote computer.

Data Collection Using the RS-232 Port

The control only responds to a Q command when Setting 143 is ON. The following output format is used:

<STX> <CSV response> <ETB> <CR/LF> <0x3E>

STX (0x02) marks the start of data. This control character is for the remote computer.

CSV is Comma Separated Variables, one or more data variables separated by commas.

ETB (0x17) is the end of the data. This control character is for the remote computer.

CR/LF tells the remote computer data segment is complete and to move to the next line.

0x3E Displays the " > " prompt.

If the control is busy, it outputs "Status, Busy". If a request is not recognized, the control outputs "Unknown" and a new prompt " > ". The following commands can be used:

Q100 - Machine Serial Number	Q301 - Motion Time (total)
>Q100	>Q301
SOFTWARE, VER M16.01	C.S. TIME, 00003:02:57
Q101 - Control Software Version	Q303 - Last Cycle Time
>Q101	>Q303
SOFTWARE, VER M16.01	LAST CYCLE, 000:00:00
Q102 - Machine Model Number	Q304 - Previous Cycle Time
>Q102	>Q304
MODEL, VF2D	PREV CYCLE, 000:00:00
Q104 - Mode (LIST PROG, MDI, etc.)	Q402 - M30 Parts Counter #1 (resettable at control)
>Q104	>Q402
MODE, (MEM)	M30 #1, 553

Q200 - Tool Changes (total)	Q403 - M30 Parts Counter #2 (resettable at control)
>Q200	>Q403
TOOL CHANGES, 23	M30 #2, 553
Q201 - Tool Number in use	Q500 - Three-in-one (PROGRAM, Oxxxxx, STATUS, PARTS, xxxxx)
>Q201	>Q500
USING TOOL, 1	STATUS, BUSY
Q300 - Power-on Time (total)	Q600 Macro or system variable
>Q300	>Q600 801
P.O. TIME, 00027:50:59	ACRO, 801, 333.339996

The user has the ability to request the contents of any macro or system variable by using the Q600 command, for example, “Q600 xxxx”. This will display the contents of macro variable xxxx on the remote computer. In addition, macro variables #1-33, 100-199, 500-699 (note that variables #550-580 are unavailable if the mill is equipped with a probing system), 800-999 and #2001 thru #2800 can be “written to” using an “E” command, for example, “Exxxx yyyyyy. yyyyyy” where xxxx is the macro variable and yyyyyy.yyyyyy is the new value. Note that this command should only be used when there are no alarms present.

Data Collection Using Optional Hardware

This method is used to provide machine status to a remote computer, and is enabled with the installation of an 8 Spare M-code relay board (all 8 become dedicated to below functions and cannot be used for normal M-code operation), a power-on relay, an extra set of Emergency Stop contacts, and a set of special cables. Contact your dealer for pricing information on these parts.

Once installed, output relays 40 thru 47, a power-on relay and the Emergency Stop switch are used to communicate the status of the control. Parameter 315 bit 26, Status Relays, must be enabled. Standard spare M-codes are still available for use.

The following machine statuses will be available:

* E-STOP contacts. This will be closed when the E-STOP button is pushed.

* Power ON - 115 VAC. Indicates the control is turned ON. It should be wired to a 115 VAC coil relay for interface.

* Spare Output Relay 40. Indicates that the control is In-Cycle (running.)

* Spare Output Relay 41 and 42:

    11 = MEM mode & no alarms (AUTO mode.)
    10 = MDI mode & no alarms (Manual mode.)
    01 = Single Block mode (Single mode)
    00 = other modes (zero, DNC, jog, list prog, etc.)

* Spare Output Relay 43 and 44:

11 = Feed Hold stop (Feed Hold.)
10 = M00 or M01 stop
01 = M02 or M30 stop (Program Stop)
00 = none of the above (could be single block stop or RESET.)

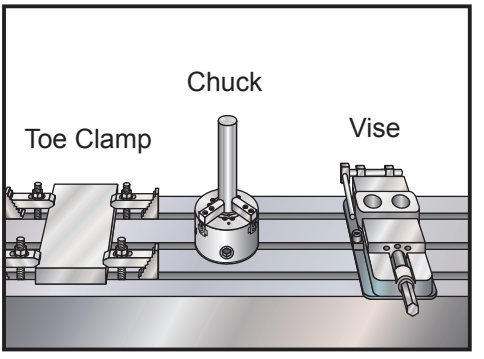
* Spare Output Relay 45 Feed Rate Override is active (Feed Rate is NOT 100%)

* Spare Output Relay 46 Spindle Speed Override active (Spindle Speed is NOT 100%)

* Spare Output Relay 47 Control is in EDIT mode

Part Setup

It is necessary to properly secure the part to the table. This can be done a number of ways, using vises, chucks or using T-bolts and toe clamps.



Tooling

Tool Functions (Tnn)

The Tnn code is used to select the next tool to be placed in the spindle from the tool changer. The T address does not start the tool change operation; it only selects which tool will be used next. M06 will start a tool change operation; for example, T1M06 will put tool 1 in the spindle.

Note: There is no X or Y motion required prior to performing a tool change; however, if the work piece or fixture is large, position X or Y prior to a tool change in order to prevent a crash between the tools and the part or fixture.

A tool change can be commanded with the X, Y, and Z axes in any position. The control will bring the Z axis up to the machine zero position. The control will move the Z axis to a position above machine zero during a tool change but will never move below machine zero. At the end of a tool change, the Z axis will be at machine zero.