

## 1. Introduction

The following document is intended to describe the G31 primitive in the 6000M, 5000M 4200T and 3000M CNC software and the process of how to interface Heidenhain and Renishaw Touch probes to the control. This feature is not available on earlier 3000M, 4200T and 5000M; on 6000M a software update may be necessary.

## 2.- G31 primitive

G31 is to be issued with an associated axis move (i.e. G31 X10). When the primitive is executed, it will move at any feedrate selected for G1 until the touch probe selected is deflected. At this point the move is stopped and the latched position where the probe touched the part is read and passed to a system variable only for the axis selected in the primitive (#1060 to #1063 for X to U).

G31 is aborted if any of the following situations happens:

- The primitive is issued while the probe is still deflected (touching the part).
- The ready signal is not present.
- Hardware malfunction: Trigger signal engaged but no position is latched.
- Start pulse is issued but probe is not ready after 5 msec. (Only cordless probes).
- Cordless probe still in “sleeping mode”.
- Low battery signal becomes active. (Only cordless probes).

## 3- Touch probes

### 3.1- Analyzed Models

- Heidenhain:
  - TS-220 (Corded 3D touch probe). Tested.
  - TT-130 (Tool touch probe). Tested.
  - TS-632 (Cordless infrared 3D touch probe). NOT Tested.
- Renishaw:
  - MP-11 (Corded 3D touch probe). Tested.
  - TS-27R with MI-8 interface (Tool touch probe). Tested.
  - MP-12 (Not Tested) and OMP-40 (Tested) with MI-12 interface or OMI interface (Cordless infrared 3D touch probe).

### 3.2- Transmission systems in 3D triggering touch probes

Heidenhain and Renishaw 3D touch probes come in various different transmission systems: corded or cordless (infrared, radio or inductive). When a corded 3D touch probe is connected to the control, the spindle is automatically disabled by means of the “ready” signal which is hardwired to its active state. When a cordless 3D touch probe is connected to the control, low

battery and not ready (e.g. transmission medium obstructed or probe in “sleeping mode”) conditions are continuously monitored. Cordless probes usually go into a “sleeping mode” to conserve battery charge. These probes are awakened by the CNC by means of a mcode.

A setup parameter (MC\_4400) for the 6000M and a setup menu selection under “Miscellaneous” for the rest of the products were created to select the transmission system used for the 3D triggering touch probes: corded (default) or cordless.

### 3.3- 6000M systems

The 6000M hardware platform offers two inputs for touch probes:

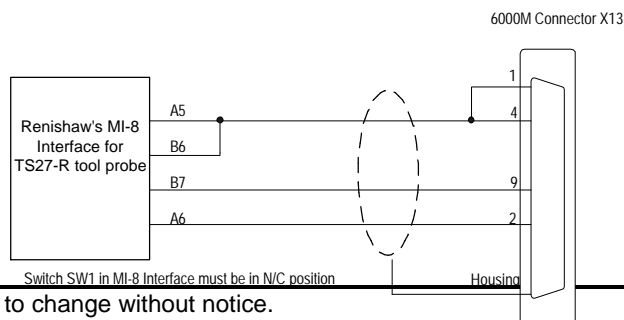
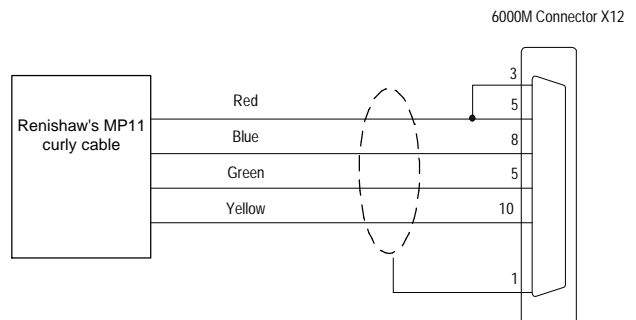
- X12 connector: 3D Touch probe for part measurement or digitizing.
- X13 connector: Touch probe for tool measurement.

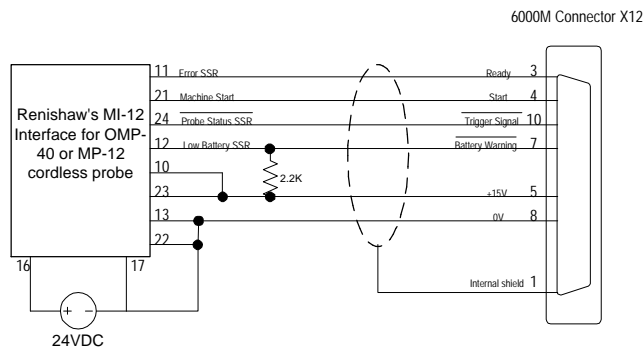
A mcode M9387 is provided to select which probe G31 is going to be used:

- M9387X0 selects the Tool touch probe (X13).
- M9387X1 selects the 3D touch probe (X12) (default).
- M9387Y0: copies Tool touch probe state (deflected or not) into a system variable (#1066).
- M9387Y1: copies 3D touch probe state (deflected or not) into a system variable (#1066).
- M9387Z0: Turns off cordless probe.
- M9387Z1: Turns on cordless probe.

Corded Heidenhain probes only need an interface cable to either X12 or X13 depending on the type of probe used. See reference 1, “Touch Probe”.

Corded Renishaw probes have to be interfaced to the control signal levels in either connector X12 and/or X13. The following figures represent the connection of the MP11 3D corded touch probe, the TS27R tool probe and the OMP-40 cordless touch probe to the 6000M system:



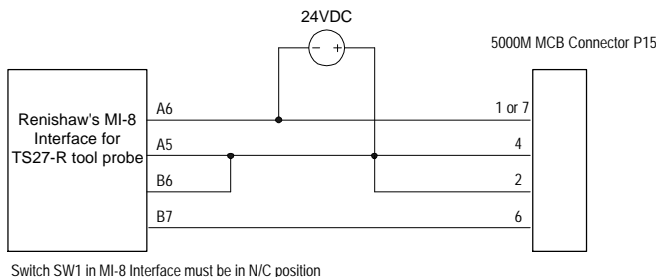
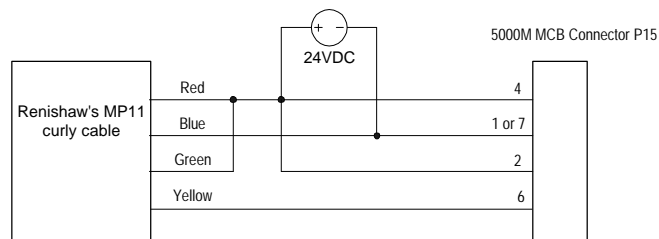


Check reference 2 for MP11 Touch probe installation and user's guide, reference 3 and 4 for MI-8 Interface and TS27-R installation and user's guide, reference 5 and 6 for MP12, OMP40 Touch probe installation and user's guide and reference 7 for MI-12 interface user's and installation guide.

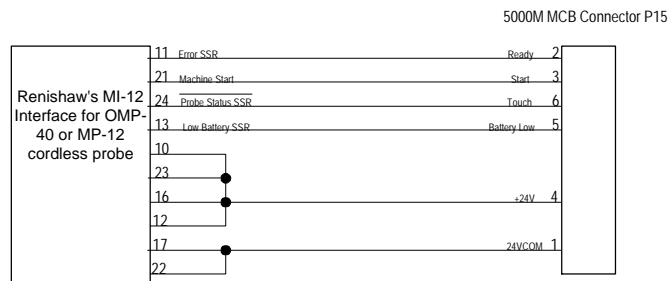
### 3.4- 5000M, 4200T and 3000M Systems

The same mcodes used for probing in 6000M systems are also used in non-6000M systems.

Renishaw probes used in 5000M, 4200T and 3000M systems have to be interfaced to the control in the following way (MP11, TS27R and OMP40 (same for MP12)):



Switch SW1 in MI-8 Interface must be in N/C position



#### 4. References

No.	Specification	Description
1.	Mounting and Electrical Installation of CNC Chassis.	Anilam technical documentation: 70000485B.
2.	MP11 Installation and user's guide	H-2000-5007.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
3.	MI-8 Interface installation and user's guide	H-2000-5015.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
4.	TS27-R Installation and user's guide	H-2000-5018.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
5.	MP12 Installation and user's guide	H-2000-5121.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
6.	OMP-40 Installation and user's guide	H-2000-5022.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
7.	MI-12 Interface installation and user's guide	H-2000-5073.pdf. Available at <a href="http://www.renishaw.com">www.renishaw.com</a>
8.	Tool Setting Cycles	Anilam Technical Documentation: 70000557

#### 5. Record Of Revisions

Rev	Date	Author	Description
A	08/27/01	Cesar Aguilar	Original
B	10/19/01	Ramon Rivas	Updated to include 3000M and 4200T; replace ref #1 with Anilam manual.
C	04/24/02	Cesar Aguilar	Updated for new C33 DSP board on 3X,4X and 5X00 systems
D	05/28/02	Cesar Aguilar	Added interface for cordless probes OMP-40 and MP-12
E	11/08/02	Ramon Rivas	Added reference to Tool Setting Cycles (70000557)

