

Guardian™

Vektek's Machine Tool Protector



VEKTEK, LLC
1334 East Sixth Avenue
Emporia, KS 66801
1-800-992-0236
www.vektek.com

**BASE SYSTEM
CONTINUOUS
MONITOR
33-0111-20**



The Productivity Devices Company

PL-3302 REV. A IAW ECN-3627
PAGE 1 of 36

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VekteK, LLC
1334 East Sixth Avenue
Emporia, KS 66801
1-800-992-0236
sales@vektek.com
www.vektek.com

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Overview

The Guardian™ is a wireless pressure monitoring system designed to communicate pressure feedback from hydraulic workholding fixtures to a CNC machine controller. The Guardian™ System consists of three pieces, the MASTER CONTROL UNIT, MACHINE TOOL RECEIVER and the FIXTURE TRANSMITTER.

The FIXTURE TRANSMITTER is a sealed (IP67 rated), compact, low power device that does not require batteries. The FIXTURE TRANSMITTER is powered by Focused Field communication with the MACHINE TOOL RECEIVER. This Focused Field communication allows the FIXTURE TRANSMITTER to be battery free and quickly identified by the MACHINE TOOL RECEIVER. The FIXTURE TRANSMITTER accepts an input from a non-powered/dry contact sensing switch via an M8 IP67 shielded cable and continuously reports the status of this switch over a radio link. Vektek recommends pressure switch, P/N 70-7500-78, for hydraulic pressure monitoring. This makes the FIXTURE TRANSMITTER a virtually maintenance free part of your Guardian machine tool monitoring system.

The MACHINE TOOL RECEIVER is the communication gateway communicating with both the FIXTURE TRANSMITTER and the MASTER CONTROL UNIT. The MACHINE TOOL RECEIVER connects to the MASTER CONTROL UNIT via an M12 cable. The M12 IP67 shielded cable carries information from the MACHINE TOOL RECEIVER to the MASTER CONTROL UNIT. The MACHINE TOOL RECEIVER connects to the FIXTURE TRANSMITTER wirelessly. The MACHINE TOOL RECEIVER is a fully sealed unit (IP67 rated) that will mount within the machine enclosure or external to the enclosure to communicate with the FIXTURE TRANSMITTER unit as well as isolate communication to only the FIXTURE TRANSMITTER located within the Focused Field.

The MASTER CONTROL UNIT (IP65 rated) features an LCD display to communicate with a human operator as well as a digital interface allowing the device to communicate with an external machine controller or PLC (Programmable Logic Control). The MASTER CONTROL UNIT is the hub of the Guardian System. The Guardian system allows your pressure switch on the fixture to wirelessly communicate with your machine tool through the MASTER CONTROL UNIT.

Guardian Pre-installation Checklist *(what to know before your start)*

- What do you want to happen if low pressure is detected? Where are the In-Cycle, Feed-Hold or E-Stop terminals on my machine tool, are they open or will I need to tie into currently dedicated In-Cycle, E-Stop, Feed Hold wiring?
- Where are the M-Code terminals on your machine, and do you have any available (if using)?
- Is your machine positive or negative case ground (which is switched on/off)?
- Where do you want to locate the Guardian Master Control Unit?
- Where do you want to locate the Guardian Receiver inside or outside the machine enclosure?
- What length of cables is going to be necessary to mount the Machine Tool Receiver to the Master Control Unit, ≤ 32.8 feet?
- Where will you get power for the Master Control Unit?
- Where will you locate the Guardian Fixture Transmitters on your pallet?
- Will you need a Pressure Switch Setter/Checker from Vektek?
- What is the critical pressure at which you want the machine to stop or is it to stop only if pressure falls to Zero?
- Will you need help from my Machine Tool Distributor's service staff or does my staff have the knowledge and ability to install the Guardian?

Installation:

Installing the FIXTURE TRANSMITTER

Mounting Considerations

The Fixture Transmitter should be mounted in a secure location out of paths of interference for line of sight communication to the Machine Tool Receiver. Due to the ability of the Guardian to identify the Fixture Transmitter under interrogation, the units should be mounted to provide the best possible clear path of communication and within 6 feet of the Machine Tool Receiver. The figure below shows both good and bad examples of three transmitters in different positions; however, only one Fixture Transmitter per fixture is allowed but a single transmitter can monitor 1, 2 or 4 pressure switches. Note: Shielding is not necessary or allowed. The transmitter is IP 67 rated and any metal shielding will interfere with communication.

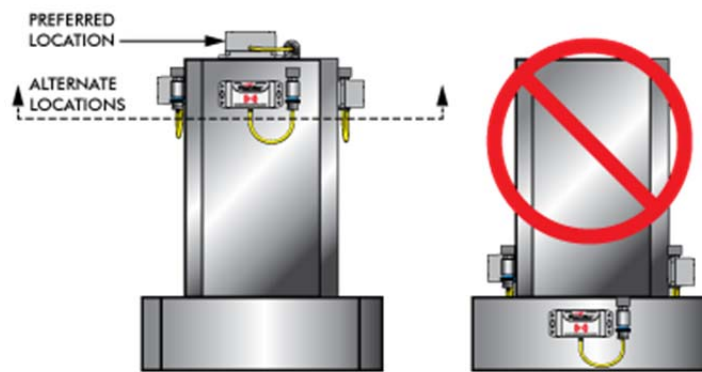
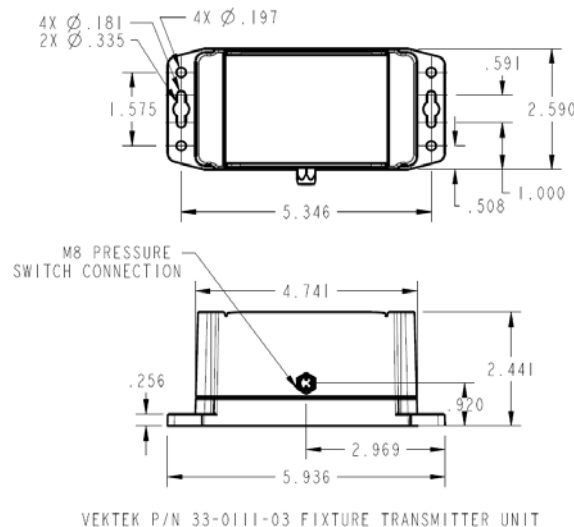


Figure 1: Best Fixture Transmitter Placement

Step 1: Mount the transmitter using 2 ea ¼” or 2 ea 6mm bolts oriented so the M8 connector is readily accessible to connect the switch cable. For proper operation, The Fixture transmitter will need to be elevated from the surface of the fixture use a single washer under each tab. Below are mounting dimensions for the Fixture Transmitter available with 1, 2 (-04) or 4 (-05) pressure switch connectors.

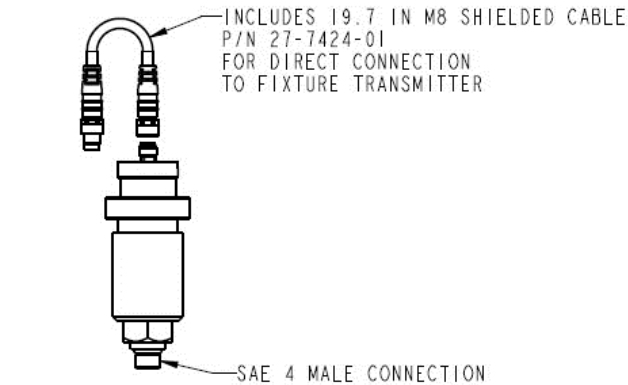


VEKTEK P/N 33-0111-03 FIXTURE TRANSMITTER UNIT

Figure 2: Fixture Transmitter 33-0111-03 -04 and -05 mounting dimensions

GUARDIAN FIXTURE TRANSMITTER ACCESSORIES	
70-7500-78	750-5000PSI PRESSURE SWITCH WITH 19.7 IN CABLE (SHOWN)
70-7500-74*	750-5000PSI PRESSURE SWITCH WITH M8 MALE CONNECTION ONLY
27-7424-01	M8 SHIELDED PATCH CABLE (MALE TO FEMALE) FOR USER PROVIDED NON-POWERED SWITCH OR REPLACEMENT FOR 70-7500-78

*70-7500-74- REQUIRES USER PROVIDED 3 PIN M8 SHIELDED CABLE



ORDER VEKTEK PRESSURE SWITCH P/N 70-7500-78 FOR DIRECT CONNECTION TO FIXTURE TRANSMITTER

Figure 3: Pressure Switch Options

Step 2: Connect the switch cable to the transmitter.

Step 3: Set pressure switch to minimum desired pressure.

NOTE: Vektek recommends the pressure switch to be set just above the minimum good part producing operating pressure of the fixture in order to account for small variations in pressure, minimize false alarms and assure the greatest fixture up time. Switch must be adjusted while pressure is descending to open the contact at the critical low pressure setting to send a signal to your machine. Use of this signal is determined by the user (E-Stop, Feed Hold, Alarm are possible choices).

WARNING: It is the customer's responsibility to determine the minimum safe operating pressure for the system. Please test your system to ensure proper switch set pressure. A pressure switch setter is available from Vektek 33-0110-15 to make setup easier.

Transmitter Wiring Options: We recommend use of a Vektek 70-7500-78 unpowered mechanical pressure switch. An appropriate quantity is enclosed with each Guardian package. Other sealed, unpowered mechanical Normally Open pressure switches may be acceptable for use. They must have shielded cables and be M8 connection, rated IP67 or better. The coolant often used in machining operations may enter non-water-tight switches and cause switch malfunctions. Use alternate pressure switches at your own risk.

Setting the pressure switch

The purpose of the Pressure Switch Setter/Checker is to assist the user of Vekttek Mechanical Pressure Switches in the setting of the pressure switch point and operation of the switch. It allows instant feedback of the pressure switches NO contacts and if it opens or closes at a specific set point.



1. Make sure you have good batteries in the Pressure Switch Setter/Checker. (Depending on the model it will be 2-AAA or 1-9V batteries.)
2. Connect the attached cable to the Vekttek Mechanical Pressure switch connector.
3. Apply the amount of hydraulic pressure you want the pressure switch to activate at. We recommend 250-400 psi below your fixture/pump operational pressure. The exact pressure will need to be determined by the fixture designer. You want the pressure switch to open its contacts before enough pressure is lost to damage a part or let the part shift or come out. If the pressure is set to close to the full operational pressure of the fixture then there could be false alarms caused by normal pressure fluctuations in the system.
4. Turn the adjustment ring of the pressure switch until the LED lite is NOT illuminated. (clockwise)
5. Then turn the pressure setting ring back up (counter clockwise) until the LED lite IS illuminating.
6. Now turn the adjustment ring of the pressure switch until the LED lite is just NOT illuminated. (clockwise)
7. You now have set the pressure switch at a point so that when the pressure drops below the critical set point the switch opens.

MACHINE TOOL RECEIVER Installation

Mounting Considerations

The Machine Tool Receiver would typically be mounted within the machining enclosure with line of sight to the fixture without obstruction by machine operation, spindle park location or being directly subjected to high pressure coolant spray. The door brace looking inward is a great place for pressure verification while machining. For the best performance, the Machine Tool Receiver should be within 6 feet of the Fixture transmitter at all times and remain within line of sight. If possible, while monitoring inside the machine line of sight to multiple fixtures should be avoided. Mounting the Machine Tool Receiver above the door looking inward is often the best place to give the best view and look away from the inactive pallet. See the illustrations below.

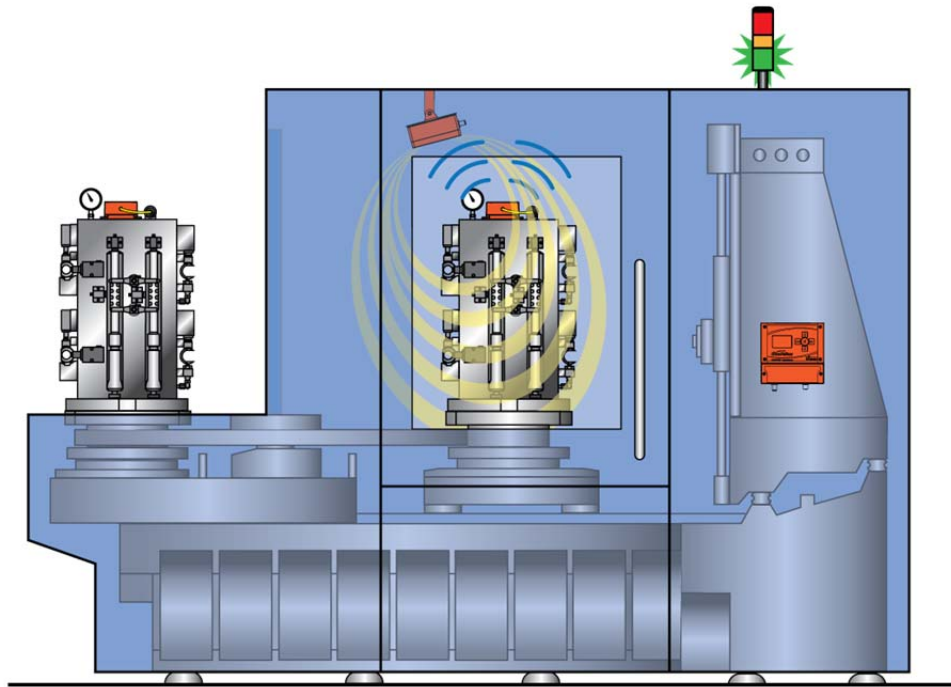


Figure 4: Guardian Base monitoring inside pallet

The lines in the figure below show the communications paths of the Machine Tool Receiver. If the face of the fixture is “visible” to the Machine Tool Receiver a Fixture Transmitter will be “seen” and monitored. Otherwise, if the Fixture Transmitter is on a face opposite the Machine Tool Receiver, the Fixture transmitter will be “shadowed” by the fixture and not effectively monitored. Only 1 transmitter may be used on a fixture.

Step 1: Use the bracket provided or direct mount the Machine Tool Receiver. The mounting dimensions are on the next page. The Machine Tool Receiver should be mounted such that when Fixture Transmitters are to be monitored they are within 6 ft at all times. The Machine Tool Receiver also needs line of sight to the Fixture Transmitter at all times. The dimensions are shown in the Figure 6.

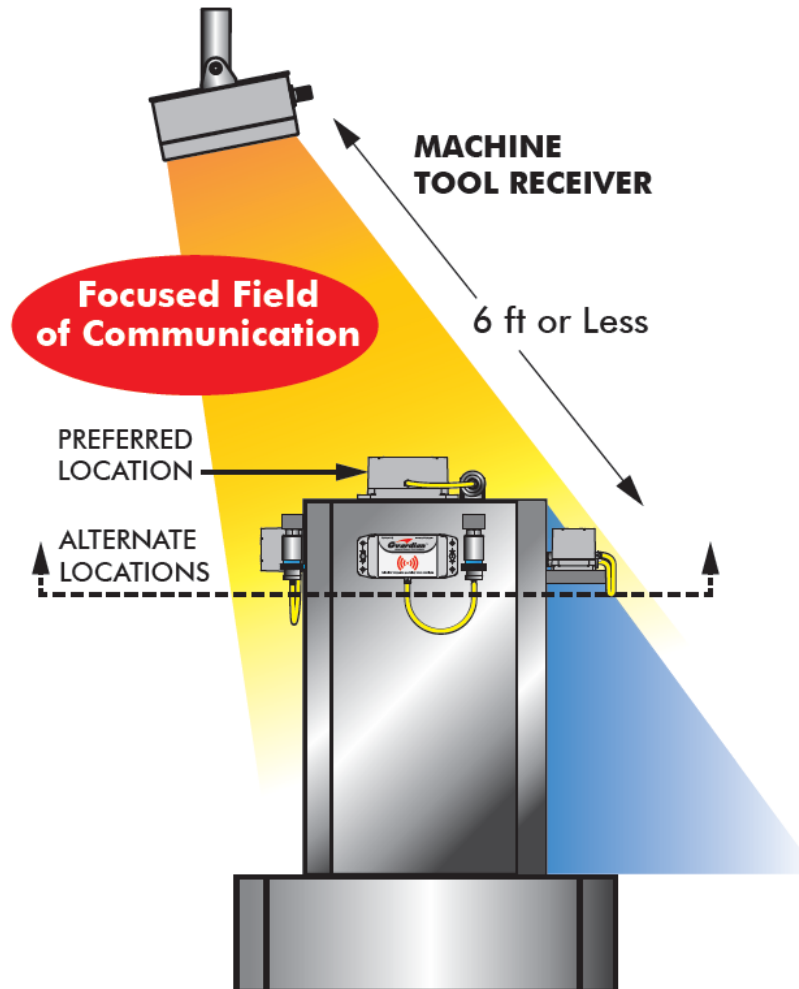


Figure 5: Machine Tool Receiver Mounting Considerations

Note: The label on the front of the Machine Tool Receiver should face the monitor area where the Fixture Transmitter will be located. The Focused Field of Communication is broadcast from the face of the Machine Tool Receiver in the direction of the label.



THIS SIDE TOWARDS FIXTURE

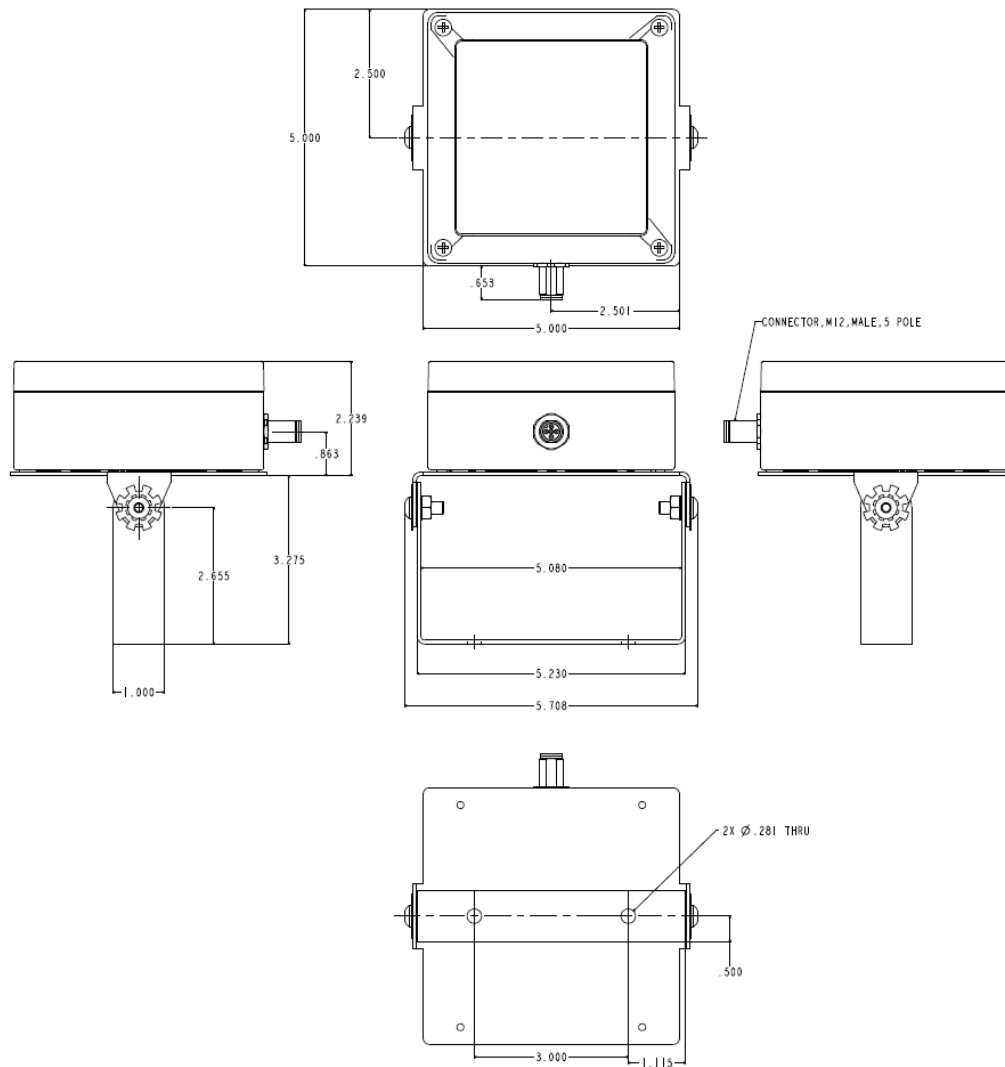


Figure 6: Machine Tool Receiver 33-0111-02 with Mounting Bracket Dimensions

Step 2: With the Machine Tool Receiver mounted, connect the female end of the shielded 5 Pin M12 communication cable to the Machine Tool Receiver. **IMPORTANT: Ensure the side of the Machine Tool Receiver with the Decal in Figure 7 is pointed toward the location of the Fixture transmitter during monitoring.**



Figure 7: Direction Label Machine Tool Receiver

Step 3: Route the 5 Pin M12 communication cable to the Master Control unit. Plug the Male M12 Connector into the M12 communication port on the Master Control Unit. Any excess cable can be coiled and hidden somewhere along the cable route.

Note: The communication cable should be routed to prevent contact with moving parts and sharp edges. Also avoiding contact with machine wiring will ensure maximum performance of the system. Also avoid installing near high interference loads like servo motors, spindle motors and other RF/electromagnetic field generators.

Step 4: Set pressure switch to desired minimum pressure.

NOTE: Vektek suggests the pressure switch be set just above the minimum good part producing operating pressure of the fixture in order to account for small variations in pressure, minimize false alarms and assure the greatest fixture up time. Switch must be set to open contact in pressure descending mode to function properly.

Transmitter Wiring Options: We recommend use of a Vektek 70-7500-78 unpowered mechanical pressure switch. An appropriate quantity is enclosed with each Guardian package. Other sealed, unpowered mechanical Normally Open pressure switches may be acceptable for use. They should be M8 connection and clearly specified IP67. The coolant often used in machining operations may enter non-water-tight switches and cause switch malfunctions. Use alternate pressure switches at your own risk.



Figure 8: Guardian™ Base and Base Package Hardware

MASTER CONTROL UNIT Installation

Step 1: Mount the Master Control Unit to the CNC machine in a location easily viewed by the operator. Following are dimensions for the mounting holes and possible mounting options on figure 9 (Not to scale). The Master Control Unit can also be mounted via a 35mm DIN rail (included)

CAUTION!

NOTE: The MASTER CONTROL UNIT is a sealed unit rated IP65 rated, not designed to be mounted within the wet machine environment.

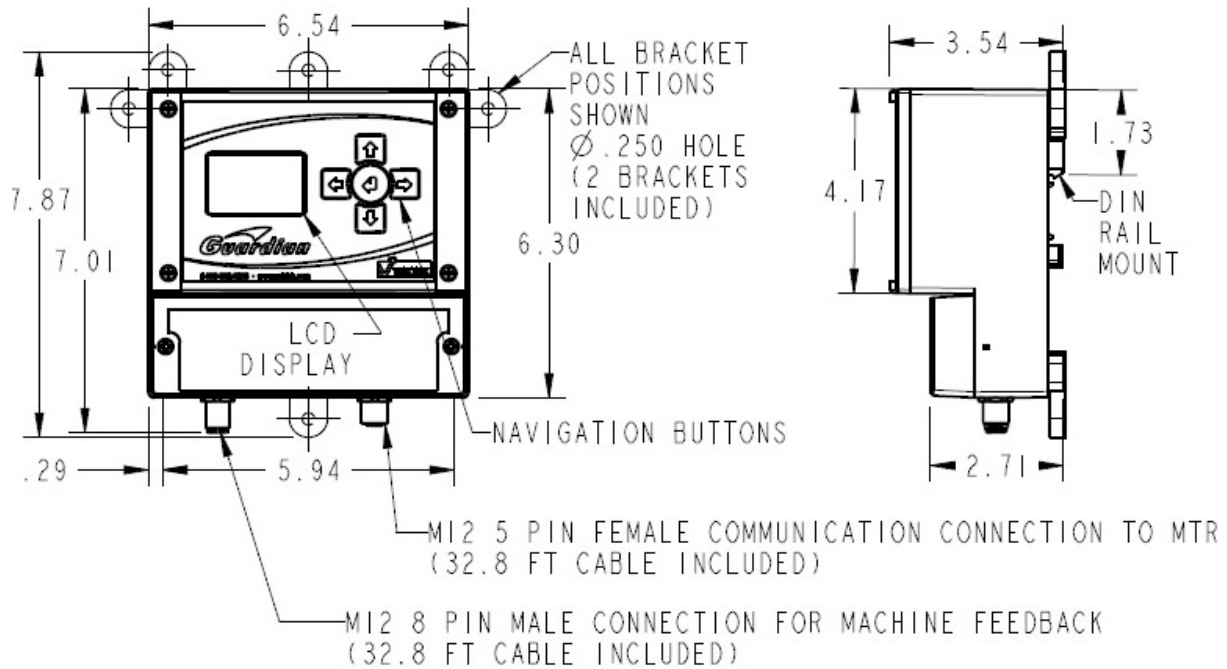


Figure 9: Master Control Unit mounting dimensions

Step 2: Connect the 8 pin M12 cable to the Master Control Unit. Route the cable to machine tool controls electrical enclosure. Find an entrance to the enclosure and determine the longest wire needed. Cut the cable to length, and discard excess cable. Remove cable outer insulation as needed.

Step 3: Unplug the Master Control Unit before continuing.

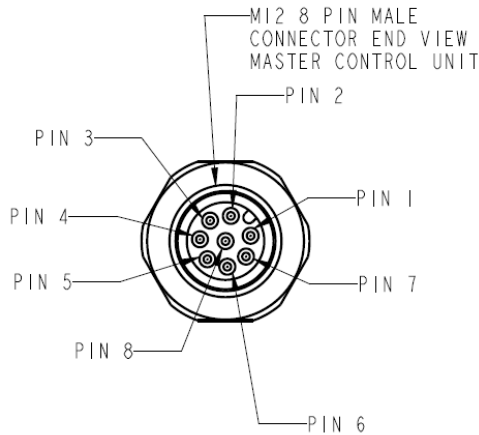
Step 4: Connect power as instructed in Figures 10 and 11.

Step 5: See the Basic Master Control Unit Wiring below to complete installation.

Read and understand this section fully before attempting to wire the Guardian™ Master Control Unit. If any of the wiring information remains unclear after reading this section, please contact Vektek Customer Support at 1-800-992-0236 for additional assistance.

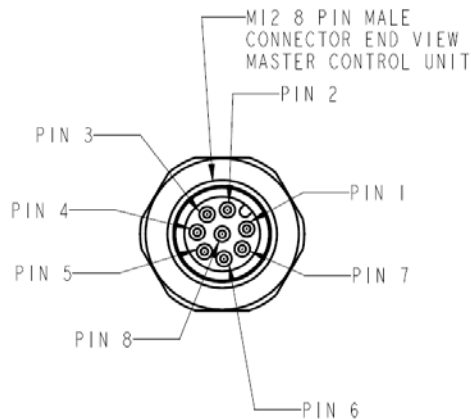
Base Master Control Unit Wiring

This section will cover the basic information needed to hook up the Master Control Unit. Below is the wiring chart for the Master Control Unit. The implemented pins for each Model is described below.



GUARDIAN MASTER CONTROL UNIT M12 8 PIN MALE CONNECTOR WIRING		
PIN NUMBER	STANDARD WIRE COLOR	FUNCTION
1	WHITE	0V
2	BROWN	+10-36 VDC
3	GREEN	CONDITION RELAY
4	YELLOW	RELAY COMMON
5	GRAY	N/A
6	PINK	N/A
7	BLUE	INPUT COMMON
8	RED	IN-CYCLE INPUT

Guardian Master Control Unit
P/N 33-0110-24, M-CODE = 0
M12 8 Pin Male Connector Pinout



GUARDIAN MASTER CONTROL UNIT M12 8 PIN MALE CONNECTOR WIRING		
PIN NUMBER	STANDARD WIRE COLOR	FUNCTION
1	WHITE	0V
2	BROWN	+10-36 VDC
3	GREEN	CONDITION RELAY
4	YELLOW	RELAY COMMON
5	GRAY	M-CODE OUTPUT ACK/FIN
6	PINK	M-CODE INPUT/IN-CYCLE OFF
7	BLUE	INPUT COMMON
8	RED	M-CODE INPUT/IN-CYCLE ON

Guardian Master Control Unit
P/N 33-0110-24, M-CODE = 1
M12 8 Pin Male Connector Pinout

Figure 10: Master Control Unit Wiring

Powering the Master Control Unit

There are 2 wires needed to power the unit. These are illustrated below.

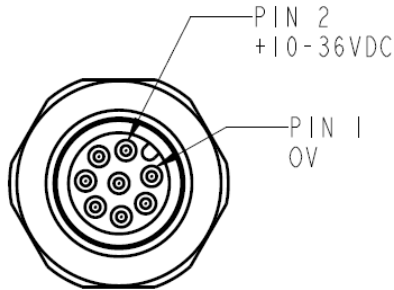


Figure 11: Master Control Unit Power Connection

1. Connect Pin 2 (Brown) to +10-36VDC.
2. Connect Pin 1 (White) to 0 Volts:

Inputs

In Cycle input pins:

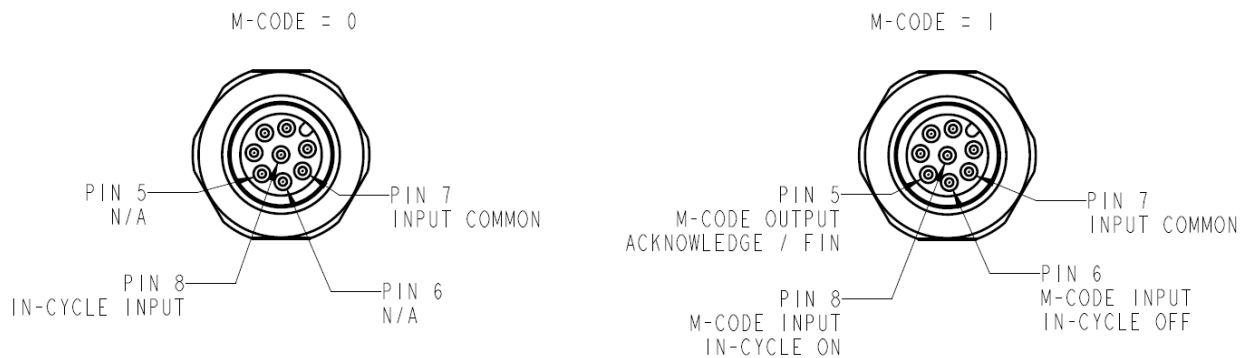


Figure 12: Master Control Unit Input Pins

Input Pin Functions

- In Cycle- Controls the Behavior of the Output Relay. The Output Relay will only toggle to the position of the monitored switch with the Pin 7 In-Cycle input confirmed.
 - Base System- With In-Cycle input on, Condition Relay (see output) will toggle according to the status of the switch monitored within the machine enclosure.

For Machine Outputs providing 24 Volts (PNP):

- Connect the Master Control Unit inputs to the machine tool outputs.
- Connect Pin 7 (BLUE) to 0 Volts

For Machine Outputs providing 0 Volts (NPN):

- Connect the Master Control Unit inputs to the machine tool outputs.
- Connect Pin 7 (BLUE) to the +DC source of the control.

Outputs

The output of the Master Control Unit is a dry contact relay. It toggles in relation to the switch being monitored through the Fixture Transmitter and Machine Tool Receiver.

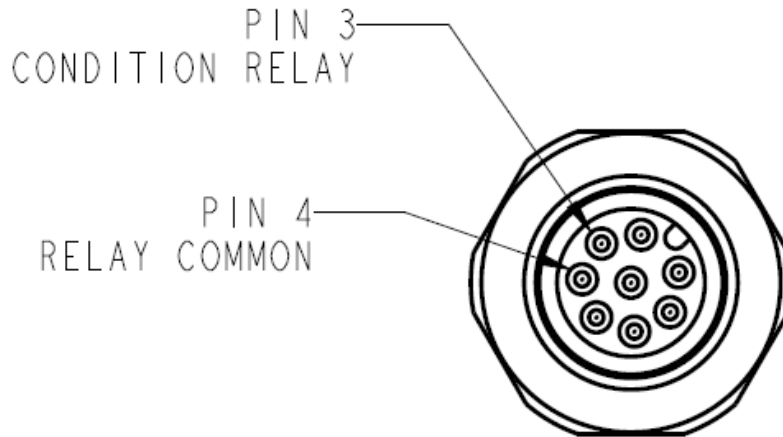


Figure 13: Master Control Unit Output Relay

Machine Inputs Requiring 24V:

- Connect the Guardian Output Pin 3 (GREEN) to selected machine input.
- Connect Pin 4 (YELLOW) to +DC source of the control.

Machine Inputs Requiring 0 Volts:

- Connect the Guardian Output Pin 3 (GREEN) to Machine Inputs
- Connect Pin 4 (YELLOW) to 0 Volts

NOTE: It is the user's responsibility to connect the output to the appropriate circuit for machine protection. It is also the responsibility of the user to determine the monitoring frequency, method and appropriate action based on expertise and availability of functions within the controller and software available on user's machine. (Typical actions; Do not Index, Feed Hold or E-Stop.)

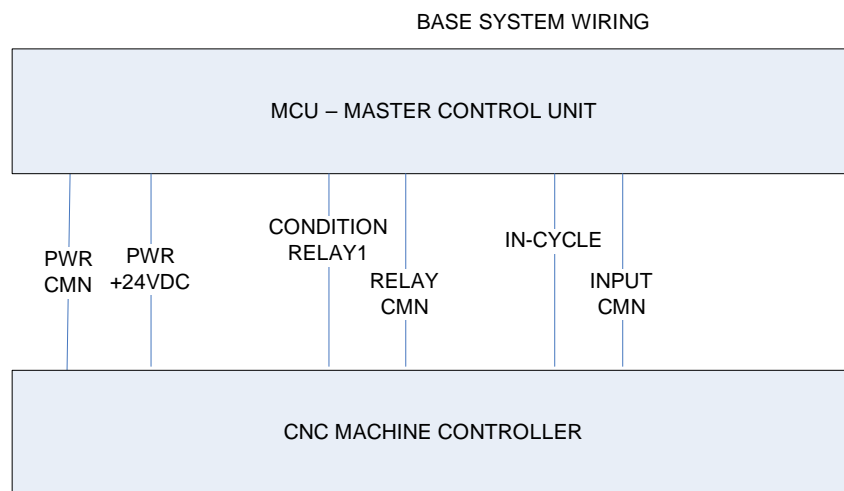


Figure 14: Master Control Unit Wiring

Using the Master Control Unit

Condition Relay Output (Base Model)

The Condition Relay is used to communicate the status of the pressure switch to the machine tool. When in cycle the Base System, the Condition Relay ONLY when enabled will directly follow the status of any Fixture Transmitter pressure switch within the Focused Field of Communication. At any time the Fixture Transmitter sees a pressure switch state change the Base System will immediately communicate the change via the condition relay. The default condition as shipped from the factory is Relay Normally Open (closed when a positive signal is confirmed), this can be adjusted to be Normally Closed by changing jumpers as illustrated below. For simplicity this manual is written assuming Relay Normally Open and if the jumper is reset as on the next page, the user must understand that the logic is reversed. Note: the Base Model Guardian relay will not change state unless the In Cycle signal is present.

There are 2 ways that the Guardian Base System can be integrated into different applications as the machine may dictate.

The STANDARD mode requires the In-cycle input to remain high during the entire cycle. This can be accomplished by tying this into another output, such as the green light, or using an available M-code if the machine leaves the output high.

The M-CODE ACKNOWLEDGE mode allows integration into machines, such as Okuma, DMG Mori, and others, that require an M-CODE ACKNOWLEDGE to continue on with the program. In this mode, the Guardian must be wired to output the pulse signal for an acknowledgement. The system will then remain IN-CYCLE until another M-code turns it off. The Guardian will then output a pulse acknowledge signal once again.

The Guardian comes with the relay jumper in the Normally Open position. (two left hand pins are jumpered) You can move the jumper to the two right hand pins to change the relay to the Normally Closed position.

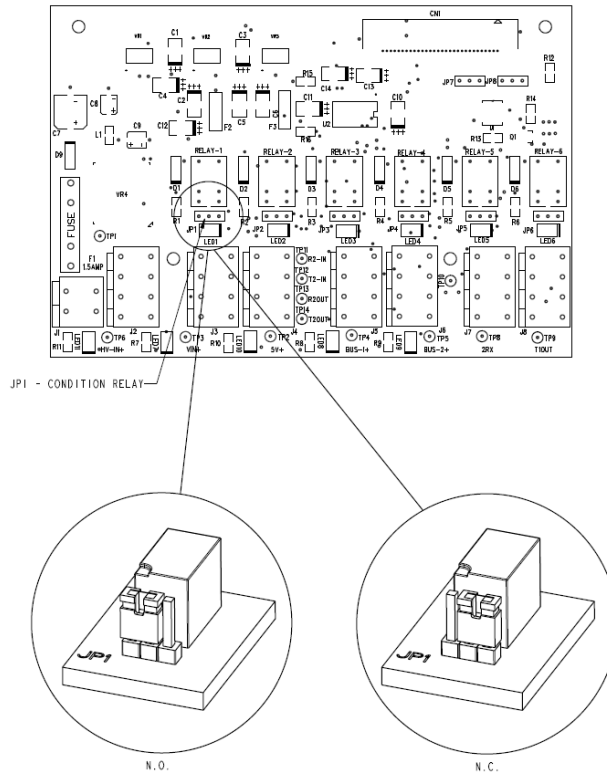


Figure 15: Jumper Settings, Default on Left (33-0110-24)

Run Mode Screen

When the Master Control Unit is powered and operating properly the following screen will be present. If this screen is not present, use the **↓↑** keys to undo any selections and hit **<ENTER>**. If the screen does not display RUN MODE, **Contact Vekttek Customer support at 1-800-992-0236 for additional assistance.**



Figure 16: Run Mode Screen Base System (33-0110-24)

The Base System shows information about the pallet currently in communication and the condition of the relay CONFIRMED (closed) or FAULT (open). Note: Early models may say RESET rather than CONFIRMED indicating the relay condition is confirmed.

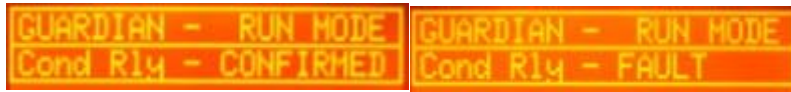


Figure 17: Condition Relay Status

The Condition Relay status is shown above. The Status of the Condition Relay will either be CONFIRMED or FAULT depending on the status of the Fixture transmitter within the Focused Field of Communication. If there is no Fixture Transmitter present the Condition Relay will default to the CONFIRMED Position and no pallet id will be displayed. There are only 2 values for the Condition Relay:

- CONFIRMED- The Condition Relay is Closed (Output ON). The Closed Position indicates that a Fixture Transmitter is within Range and its pressure switch is at or above its set pressure.
- FAULT- The Condition Relay is Open (Output OFF). The Open Position can indicate 3 distinct sub-states.
 - State 1- No Fixture Transmitter Present. There are no Fixture transmitters within the Focused Field of Communication. Confirm this state by looking at the Pallet ID status shown in Figure 16.
 - State 2- A Fixture Transmitter is present and the Pressure switch is below its setpoint (pressure loss). Again this can be confirmed using the Pallet Id and Status at the bottom of the screen.
 - State 3- No In-Cycle signal has been given to enable the Condition Relay status. A pallet may or may not be within the Focused Field. This prevents Guardian from sending any change of state message to the Machine Tool Controller for action.



Figure 18: Pallet ID and Status

The Figure 18 shows the display of the Pallet ID and Status. When a Fixture Transmitter is within the Focused Field of Communication, the Pallet ID will display the last 2-4 digits of the Unique ID of the Fixture Transmitter. If no Fixture Transmitter is available, the display will be like Figure 16. There are 3 statuses available for the Fixture Transmitter being monitored. They are as follows:

- GOOD- The pressure switch is at or above the set point. If a customer provided switch is used this would show that the switch is closed (Normally Open switch type must be used)
- NO PRS- The pressure switch is below the reset point or a pressure. If a customer provided switch is used, this would show that the switch is open (Normally Open Switch Type must be used)
- NO PALLET- No pallet fixture transmitter is within the Focused Field.



Figure 19: Base Model Run Mode Screen

The IN CYCLE input line will show the status of the input. The IN CYCLE input can have 2 distinct values.



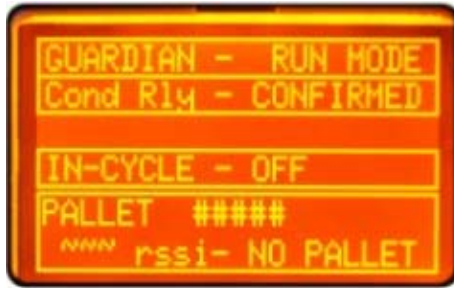
Figure 20: IN CYCLE Input Status Line

- OFF- The IN CYCLE input is not asserted. In this state the Condition Relay will remain in its default RESET, confirmed state regardless of the status of any Fixture Transmitter being monitored to avoid sending false stop signals to the machine.
- ON- the IN CYCLE input is asserted from the machine tool. The Condition Relay will change states to send the machine the change of state of the Fixture Transmitter. NOTE: If the switch on the Fixture Transmitter is open the Condition Relay WILL NOT confirm pressure to the machine tool.

Additional information about the use of the IN-CYCLE input is shown in Figure 27, Signal Logic Chart. The chart explains how the IN CYCLE input will modify the Condition Relay output.

NOTE: The Base Units do not use the Pallet ID, it is displayed for convenience only. Only the IN CYCLE input is used on the Base system.

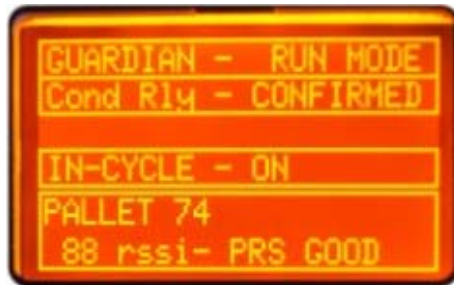
Run Screens



Startup screen, no pallet.



In-Cycle signal received and arming.



In-Cycle ON with pressure confirmed.



In-Cycle ON loss of pressure fault signal sent.



In-Cycle OFF no pressure, machine OK.



In-Cycle OFF pressure restored indexed, Ready to arm.

Figure 21: Run Screen examples and explanations

Guardian Base system menu adjustments:

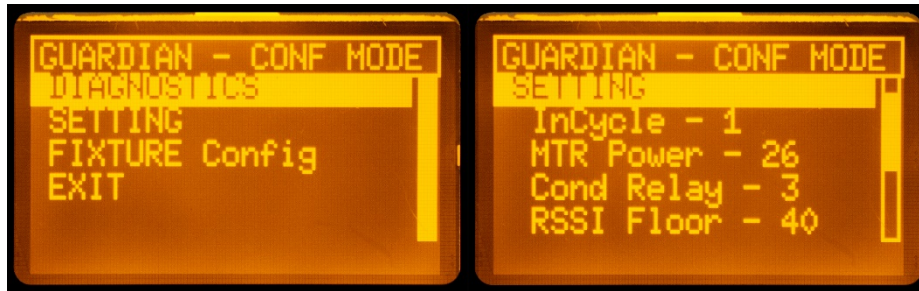


Figure 22: Configuration Menu and Settings

Hold the enter button for 4 seconds to access the configuration menu.



Figure 23: InCycle arming delay

InCycle - Is the delay in seconds that the Guardian is "Arming" the InCycle function before it turns On. The factory default setting is 15 seconds. If used on a horizontal pallet changer that doesn't turn the InCycle signal on and off via programming, this time should be set to the amount of time it takes the pallet changer to fully change a pallet. If the machine controls the InCycle programmatically with an M-Code or other signal that only comes on when the machine is just in the machining cycle, then set this to something low, like 1 second.

- To set the in-cycle, hold the enter button for 4 seconds. This accesses the configuration menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to In-Cycle. Press Enter
- Change value to something within the parameters*

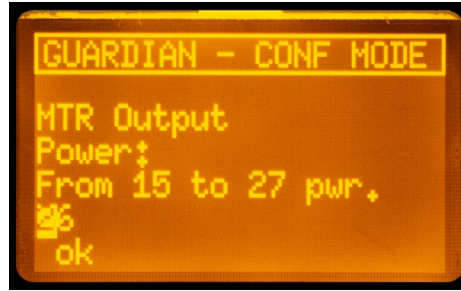


Figure 24: Machine Tool Receiver power level

MTR Power - This is the output power from the Machine Tool Receiver to power the Fixture Transmitter, it has a factory default setting of 26. This is close to maximum power and should be lowered to prevent cross talk from multiple Fixture Transmitters. Example: A pallet is in the load station and the machining area and the Guardian system bounces back and forth between the two pallets. Lower the setting to reduce cross talk.

- To set the MTR Power, hold the enter button for 4 seconds. This accesses the diagnostics menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to MTR Power. Press Enter
- Change value to something within the parameters*



Figure 25: Condition Relay dwell time

Condition Relay Timer - This is the amount of time that the Guardian System holds the Condition Relay in when a pressure loss fault occurs. The factory default setting is 25 seconds. It may be adjusted depending on what the condition relay is connected to determine its setting. If the Condition Relay is connected to a Feedhold button then this should be set to the minimum amount of time that the system needs to recognize the command. If connected to an external relay that is in the Emergency Stop circuit, it should be a minimum of 5 seconds.

- To set the Cond Relay, hold the enter button for 4 seconds. This accesses the diagnostics menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to Cond Relay. Press Enter
- Change value to something within the parameters*



Figure 26: RSSI Floor

RSSI Floor – The factory default setting for this parameter is 40. The RSSI Floor setting is used by the FTU interrogation algorithm to determine which Fixture Transmitters to ignore if multiple FTU respond to communication requests from the MTR. This can help in the situation where two pallets are close together in the pallet changer and the system can't determine which FTU to pay attention too. The lower the number the weaker the signal, the higher the number the stronger the signal.

- To set the RSSI Floor, hold the enter button for 4 seconds. This accesses the diagnostics menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to RSSI Floor. Press Enter
- Change value to something within the parameters*

Msngr FTU Mode - The factory default setting for this parameter is 0. Missing FTU Mode allows you to change the fault status when the system loses communication. In your machine, there will potentially be instances in which communication is interrupted temporarily due to constraints in locating the MTR and FTU. In Mode 0, the system will fault when communication is lost (the amount of time allowable for lost communication is also settable by adjusting the FTU Time Out parameter). In Mode 1, the system ignores all communication loss, and only faults when a positive fault signal is received and the guardian is "In-Cycle – ON"

- To set the Msngr FTU Mode, hold the enter button for 4 seconds. This accesses the diagnostics menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to Msngr FTU Mode. Press Enter
- Change value to the correct mode
 - 0 – Fault when communication is lost
 - 1 – Ignore lost communication with FTU

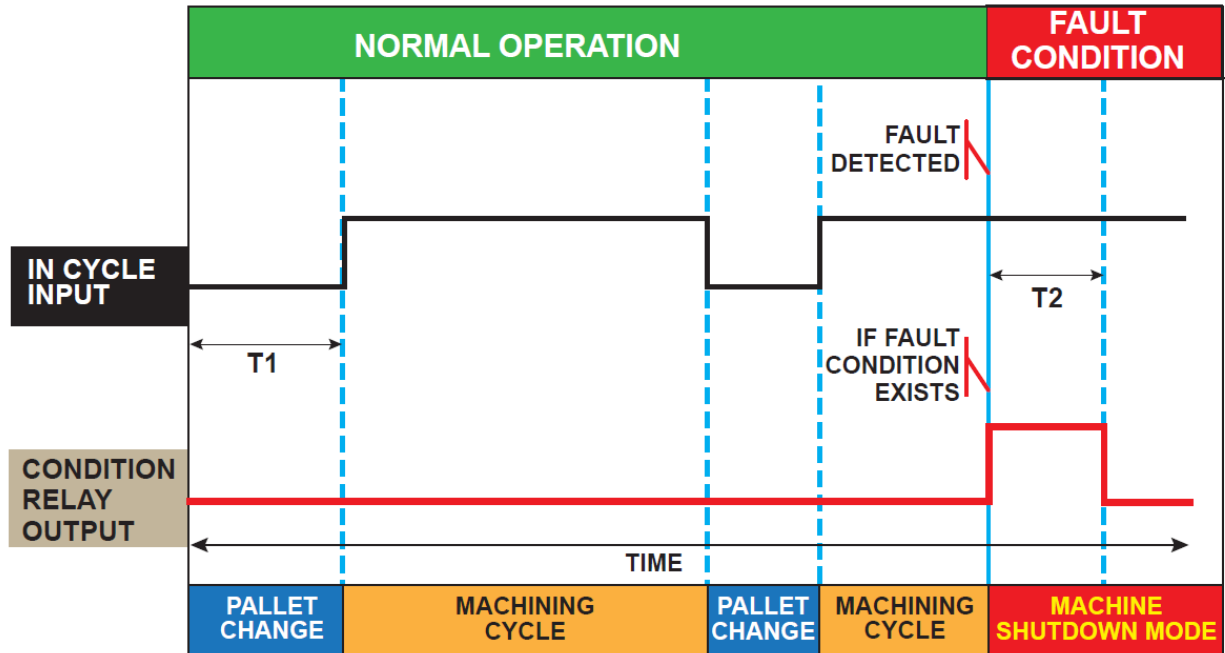
FTU Tout – The factory default setting for this parameter is 15.0. FTU Time out is a parameter that only applies during Msng FTU Mode setting of 0. This setting is the allowable amount of time that communication can be lost before it faults. This has units based in tenths of a second. The timer resets after communication is reestablished.

- To set the FTU Tout, hold the enter button for 4 seconds. This accesses the diagnostics menu.
- Use the down arrow to scroll to settings. Press enter.
- Scroll to FTU Tout. Press Enter
- Change value to something within the parameters*

**** If the value is outside the range, you may have to edit the value, back out of the menu and re-enter to allow adjustment within the range. If you experience any difficulties with configuration, please contact VekteK support at 1-800-992-0126 or +1-913-365-1045.***

Signal Logic

SIGNAL LOGIC



T1= In Cycle Arming Time T2= Fault Dwell Time

Figure 27: Signal Logic Chart

Additional Logic Information

The signal logic chart is for Base Systems only. This chart shows the behavior of the Condition Relay in relation to the IN-CYCLE inputs.

The Base Guardian Unit logic is a single switched circuit activated through a relay which will **ONLY** change state when the In-Cycle Input from the machine tool is given to Guardian.

- 1) Relay is off or relay is on (continuity or switching a supplied voltage), sent to user determined function of the machine tool (change of state can only happen when In-Cycle signal is present).
- 2) **How do you want to monitor fixture pressure? What do you want to be the result?**
 - a. The switched Guardian output relay must be connected to an appropriate User Defined function. **A change of state happens ONLY when In-Cycle signal is present.**
 - i. E-Stop. This may or may not be preferred depending on the steps to recover after E-stop.
 - ii. Feed hold is often a good choice as your machine will stop cutting but recovery is often easier than from a full E-stop.
 - iii. Pressure Low alarm to your controller with an appropriate corrective action.
 - b. M-Code monitor for change of state. If your machine tool can sense a change of state (open to closed or closed to open) during the load or cutting time of your operation, it can be monitored via M-code in "real time."

Interrogating the pallet upon indexing into a machine or during transportation to the machine on a pallet spooler or rail transport system can pre-verify pressure when pallets are stored at a distance. In this case, please refer to the PLC for appropriate inputs and resulting actions. This is one of the exclusive advantages of the Focused Field Communications only available with Guardian Simple rather than the more sophisticated Base Unit. Please contact us for help.

Maintenance

The entire Guardian system is designed to be nearly maintenance free. There is a 1.5A fuse to protect the Machine Tool Receiver, all of the units require no periodic maintenance. Vekttek does recommend that the face of the Master Control Unit be cleaned periodically with a mild cleaner (i.e. non-ammonia glass cleaner) to remove foreign matter from the screen. The Fixture Transmitter and Machine Tool Receiver should be inspected occasional to check for damage to the enclosures.

Specifications

Guardian Specification Chart				
Machine Tool Receiver P/N 33-0111-02	Power	<i>Negative Case Ground</i>	+10-36 VDC	
	Frequency		900 MHz	
	Connection	<i>Power & Inputs/Outputs</i>	M 12	
	Cable		32.8ft	
	Fixture Transmitter Capacity		Unlimited	
	Inputs	<i>Number</i>		1
		<i>Type</i>		Sourcing/Sinking
		<i>Rating</i>		5-50 VDC
	Outputs	<i>Number</i>		2
		<i>Type</i>		Sourcing/Sinking
		<i>Rating (Total for all outputs)</i>		2 amps
	Fixture Transmitter P/N 33-0111-03	Batteries (Not required)		
Frequency			900MHz	
Machine Receiver Capacity			Unlimited	
Input			3 Pin M8	

Figure 28: Guardian Specifications

Guardian Accessory Parts and Dimensions

GUARDIAN ACCESSORIES				
Cables				
Model No.	Description	End 1 Connection	End 2 Connection	Length (ft)
27-6424-04*	Cable, M12 8 Pin MCU Machine Tool Feedback	Male Straight	Open End	32.8
27-9422-01**	Extension Cable M12 5 Pin	Male Straight	Female Straight	32.8
27-7422-03**	Master Control Unit to Machine Tool Receiver Communication Cable	Male Straight	Female Straight	16.4
27-7424-01	Extension Cable M8 3 Pin Shielded Pressure Switch to Fixture Transmitter	Male Straight	Female Straight	1.6
Pressure Switches				
70-7500-78	750-5000PSI Pressure Switch with 19.7 IN Cable (Shown)			
70-7500-74***	750-5000PSI Pressure Switch with M8 Male Connection Only			

- *Included with 33-0110-14/24/34 can be purchase seperately for replacement or additional hook up.
- **27-9422-01 is included with 33-0110-14/24/34.
- Cables can be purchased seperately for extension or replacement
- *** 70-7500-74- Requires User Provided 3 Pin M8 Shielded Cable
- **** All cables are shielded and PUR jacketed.

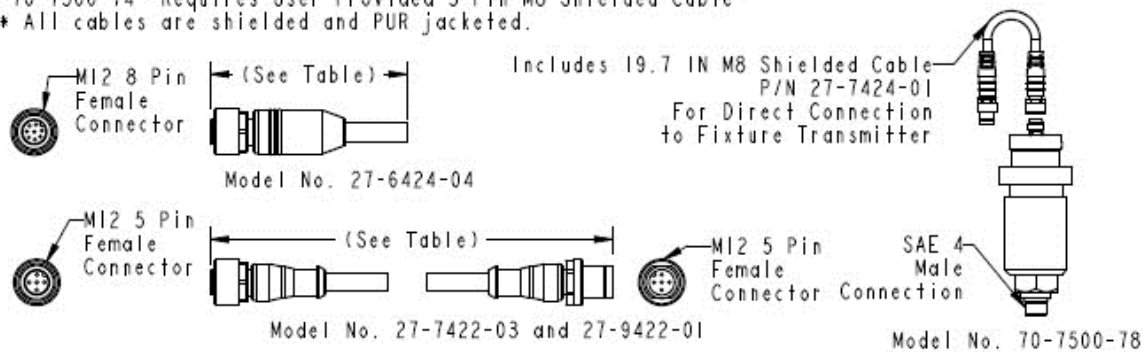


Figure 29: Guardian Accessories

Troubleshooting

Symptom	Cause	Solution
MCU does not power on.	<ol style="list-style-type: none"> 1. No power 2. Bad Ground 	<ol style="list-style-type: none"> 1. Check ground connection 2. Check Fuse 3. Check from Positive pin 2 to pin 1 Ground for +10-36VDC
MCU does not communicate with FIXTURE TRANSMITTER	<ol style="list-style-type: none"> 1. Out of Range (over 6 ft) 2. FTU is covered in chips. 3. FTU is damaged 4. MTR is unplugged 5. MTR is damaged 6. MTR is blocked or covered with chips 	<ol style="list-style-type: none"> 1. Move FTU closer 2. Clear chips. 3. Replace FTU. 4. Reattach cable or replace cable. 5. Replace MTR. 6. Clear chips or relocate MTR.
Machine always shows the alarm.	<ol style="list-style-type: none"> 1. FTU reporting no pressure 2. Machine is not using correct logic to interpret Guardian output. 3. Main Contact or jumpers are not wired correctly 4. Logic of Guardian outputs not correct. 	<ol style="list-style-type: none"> 1. Use Pressure Switch Setter/Checker to determine if continuity is present (pressure switch contact is closed). 2. Invert Machine Logic or output jumpers. 3. Check wiring. 4. Use Diagnostics menu to toggle Main Contact and check function of input to machine. 5. Verify that the Guardian relay output is set as expected to either Normally Closed or Normally Open. 6. Check connection of Relay Common. Connect Relay Common to the voltage for the proper signal, 24V for a 24V signal and 0V for a 0V signal.

Figure 30: Guardian Base Troubleshooting

If the preceding chart does not correct the problem, please contact Vekttek Customer Support at 1-800-992-0236 for additional assistance. Please have MACHINE TOOL RECEIVER version and ID number available for technical support.

Quick Start Users Guide

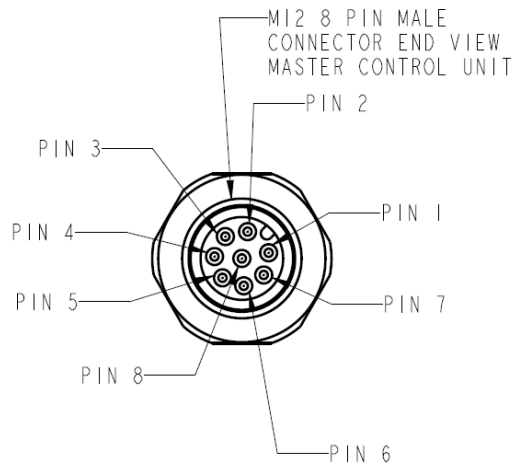
Congratulations on purchasing the Vektec Guardian™! The following is a step by step quick start instruction guide to help you get the Guardian™ up and running with ease.

What's in the package?

The Guardian™ Base system includes: 2 Fixture Transmitters P/N 33-0111-03, Machine Tool Receiver P/N 33-0111-02, Master Control Unit P/N 33-0110-24, Master Control Cable and Communication IP67 rated cables for connection of the Master Control Unit and the Machine Tool Receiver. Also included are 2X Vektec Pressure Switches P/N 70-0750-78 and 2X M8 IP67 rated shielded switch to transmitter cables.

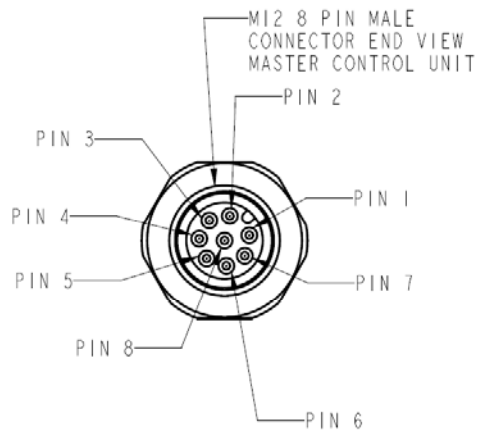


How to hook it up (wiring only):



GUARDIAN MASTER CONTROL UNIT M12 8 PIN MALE CONNECTOR WIRING		
PIN NUMBER	STANDARD WIRE COLOR	FUNCTION
1	WHITE	0V
2	BROWN	+10-36 VDC
3	GREEN	CONDITION RELAY
4	YELLOW	RELAY COMMON
5	GRAY	N/A
6	PINK	N/A
7	BLUE	INPUT COMMON
8	RED	IN-CYCLE INPUT

Guardian Master Control Unit
P/N 33-0110-24, M-CODE = 0
M12 8 Pin Male Connector Pinout



GUARDIAN MASTER CONTROL UNIT M12 8 PIN MALE CONNECTOR WIRING		
PIN NUMBER	STANDARD WIRE COLOR	FUNCTION
1	WHITE	0V
2	BROWN	+10-36 VDC
3	GREEN	CONDITION RELAY
4	YELLOW	RELAY COMMON
5	GRAY	M-CODE OUTPUT ACK/FIN
6	PINK	M-CODE INPUT/IN-CYCLE OFF
7	BLUE	INPUT COMMON
8	RED	M-CODE INPUT/IN-CYCLE ON

Guardian Master Control Unit
P/N 33-0110-24, M-CODE = 1
M12 8 Pin Male Connector Pinout

Figure 31: Guardian Base interface wiring only

System Start Up

Step 1: Once wired, plug in the Master Control Unit. It should power up automatically. The following screen should appear momentarily with information about the Master Control Unit.



Figure 32: Guardian Boot Screen

Step 2: No pairing is required for the Guardian System. Once a transmitter comes within range of the Machine Tool Receiver, the Fixture Transmitter will be identified and when the In-Cycle is turned on, communication will begin, the condition of the Transmitter is confirmed by the Master Control Unit. The screen below will be the operational screen of the Guardian Base.

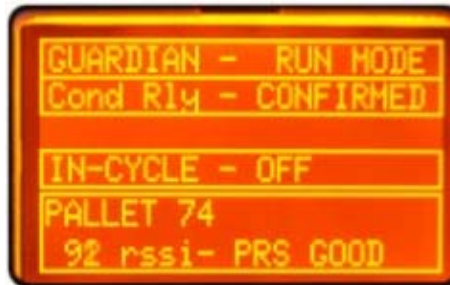


Figure 33: Guardian Base (33-0110-24) Main Screen

Step 3: Set up your pressure switch and Fixture Transmitter to open the pressure switch contacts and send a signal when it reaches the determined critical low pressure. NOTE: This MUST be done when the pressure is falling, pressure switch contacts close at a different pressure than they reopen. Different pressure switches have a different percent of their range as a “dead band” so it is CRITICAL to set this during a falling pressure condition.

Congratulations! You have just setup the Vekte Guardian™ system and are ready for operation.

Appendix A – Example Machine hookup schematic and example in-program interrogation call programming:

**BASE GUARDIAN SYSTEM
(MAZAK VCU 400/500 W/ MAZATROL SMART CONTROLLER)**

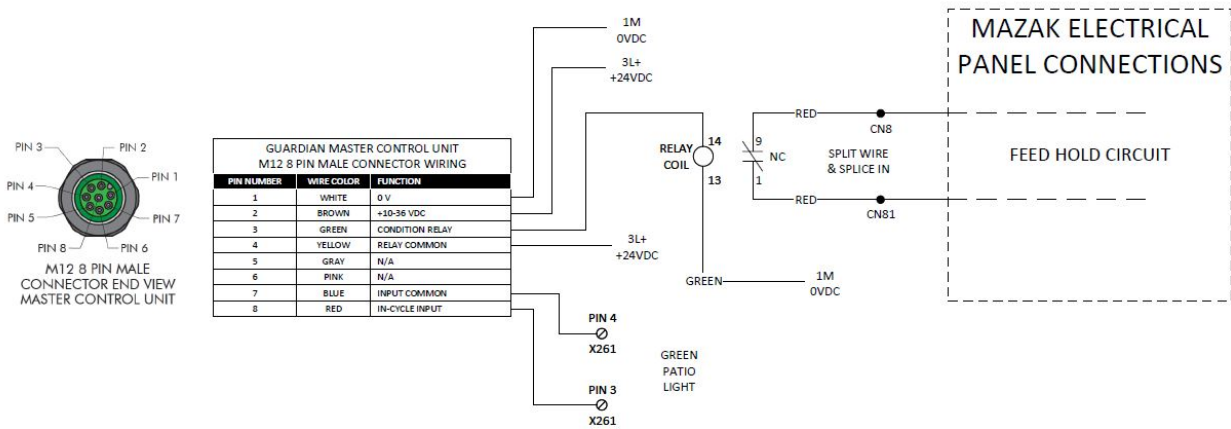
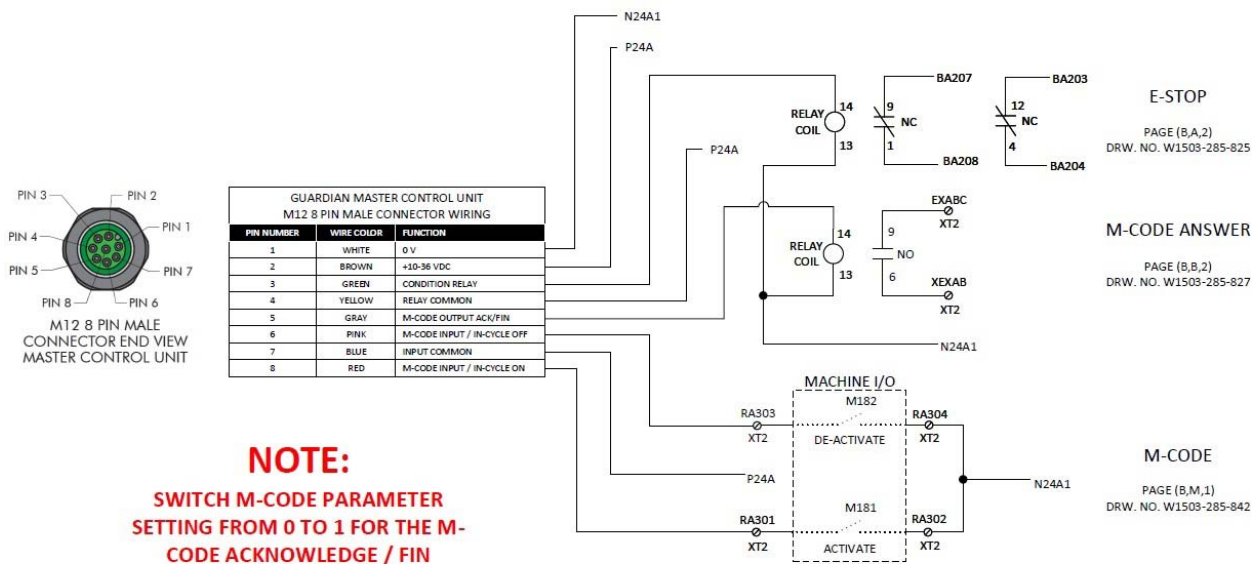


Figure 34: Wiring schematic for a Guardian Base Continuous as it is integrated into a Mazak

**BASE GUARDIAN SYSTEM
(OKUMA MA0500H II / 600H II)**



NOTE:
SWITCH M-CODE PARAMETER
SETTING FROM 0 TO 1 FOR THE M-
CODE ACKNOWLEDGE / FIN

REFER TO OKUMA ELECTRICAL DRAWING MANUAL W6000-285-764-4
REFERENCE TO THE RIGHT OF THE RELAY SCHEMATIC FOR THE INDIVIDUAL PAGE
NUMBERS & DRAWING NUMBERS

Figure 35: Wiring schematic for a Guardian Base Continuous as it is integrated into an Okuma with M-code Acknowledge / Fin

Program Example:

EXAMPLE PROGRAM OKUMA HORIZONTAL:

M1

N1G116 PT=76 PQ=19 (.843 ISCAR CARBIDE THRU COOLANT DRILL)

M181 (IN CYCLE ON SIGNAL TO GUARDIAN)

G90G15H64 B180.

G0G56HA DA

S1600M3

M8

VMPC2=1(MOP ON)

VMPT=0 (#1 CUTTING CONDITION)

G0X5.715Y-1.0235Z3.0

M51(THRU COOLANT)

Z1.0

CALL O71(FOR CLEARANCE FOR 3/4 ENDMILL)

G15H66

CALL O71

G0Z6.0

G15H63 B60.

CALL O71

G15H65

CALL O71

VMPC2=0(MOP OFF)

G0Z6.0

G0

G80

M9

CALL OBLow

G113 TOL=.01

M1

N2G116 PT=19 PQ=18 (1/2 HSS SPOT DRILLS)

G90G15H45 B270.

G56HA DA

S2200M3

M8

G0X.371Y-1.0235Z12.0

M182 (IN CYCLE OFF SIGNAL TO GUARDIAN)

M1

M02