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Document Title: RMP40 system description and functional block diagrams.
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Summary/Scope: This document provides a description and block diagram as required for Type Approval Testing. This document applies to RMP40, RMP40M and RLP40 probes.

Reason for Issue/Nature of change: This document has been derived from the RMP60 and RMI document as the original RMP40 one could not be found. It will be supplied to the Type Approval Test House as an exhibit for the type approval applications for RMP40, RMP40M and RLP40.
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Summary of RMP40 system

RMP40 is a point to point touch trigger probe radio transmission device for use on CNC (computer numerically controlled) machine tools. It is half of a measurement system that consists of itself; the RMP (Radio Machine Probe) and the RMI (Radio Machine Interface).

RMP40M and RLP40 contain the same circuits as RMP40, the only difference between them is the mechanical housing.

Radio details

RMP40 uses FHSS (frequency hopping spread spectrum) transmission in the frequency band from 2400 to 2483.5 MHz. There are 79 * 1 MHz wide channels. The maximum ERP (emitted radio power) is 1mw (0dBm) and the transmission range is up to 15m. The radio link is bi-directional with half duplex transmission. Both RMP and RMI use a nRF2401A Nordic radio modem. The nRF2401A is a transceiver circuit.

When transmitting the modem uses a synthesiser to generate the desired carrier from the 16MHz clock. The modem then modulates this carrier using the input serial data and then amplifies it for transmission to the antenna via a filter. When receiving, the signal from the antenna is fed via the filter to a low noise amplifier and then to the built in heterodyne receiver. The receiver circuits generate intermediate frequencies of 350MHz and 3 MHz which are used to down mix the signal. Following the mixers the signal is demodulated and the resulting serial received data is output.

RMP (see Fig 1)

The RMP40 is 40mm diameter, and 50mm long, and has a standard mounting face for fitment to a machine tool shank on one end and a M4 stylus mount on the other. The RMP contains a touch trigger probe. The RMP is battery powered by 2* ½AA LTC batteries, the total voltage of which must be between 4V and 7.2V. The RMP contains the electronic circuitry needed to process the probe signals and convert them into radio transmissions. The RMP is controlled by a microprocessor. The microprocessor encodes and decodes the radio messages that are sent or received via the FPGA to or from the radio modem. The FPGA contains a correlator which is used to recognise messages addressed to the RMP. The FPGA contains the timing logic required for the radio modem. The microprocessor and the FPGA use the 4MHz clock. There is a radio standby mode of operation during which most of the circuitry is switched off and only the microprocessor runs continuously using the 32768Hz clock.

Fig 1 RMP40, RMP40M and RLP40 Functional Block Diagram

