CNC Touch Probe

M4, ±X ±Y −Z, 0.002 mm 2σ, 2 ms response

TP1-IR

HIGHLIGHTS

- High repeatability, 0.002 mm 2σ (0.00008 in)
- Five measuring directions, ±X, ±Y, −Z
- Wireless infrared transmission, up to 5 m (16 ft)
- Receiver with an 8 m, 5-wire flying-lead cable
- DIP switches set the NO or NC output function
- Battery life, 800 days
- Compact size, Ø1.614 × 2.480"



Parameter	Value
Model No.	TP1-IR
Connection	Infrared (receiver)

APPLICATIONS

- Multidirectional measurement
- Workpiece measurement
- Tool measurement
- Broken tool detection
- Tool wear measurement
- Tool length measurement
- Tool diameter measurement
- Thermal axis compensation
- Low- and high-volume production

PRODUCT OVERVIEW

The TP1-IR is a general-purpose, wireless touch-trigger probe designed for a wide range of workpiece setup and tool measurement applications on CNC machines. It provides 0.002 mm 2σ repeatability (30 mm stylus), with a kinematic 3-point seat that returns the stylus to the same rest position after every deflection.

The unit is housed in a compact, IP65-sealed body with an M4 stylus thread and a Ø12h7 mounting pin, and transmits each stylus deflection by 950 nm infrared to its receiver at up to 5 m. The receiver's 8 m, 5-wire cable with flying leads carries the 5–24 V DC supply and the PNP TOUCH, READY, and BATTERY-LOW outputs. TOUCH connects directly to the skip input of the machine control.

KEY FEATURES

Feature	Advantages
0.002 mm 2σ repeatability	A kinematic 3-point seat returns the stylus to the same rest position after every deflection for precise probing in ±X, ±Y, and −Z.
Wireless	The probe transmits by 950 nm infrared to its receiver at up to 5 m and runs approx. 800 days in standby on one SAFT LS14250 battery.
IP65 sealed body	Dust-tight and protected against water jets according to IEC 60529.
NO and NC output function	A DIP switch on the receiver sets each output to NO or NC. PNP switching provides broad compatibility with Fanuc, Haas, Siemens, Mazak, and other CNC controls.

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MECHANICAL SPECIFICATIONS

Parameter	Conditions	Value	Unit
Measuring directions	-	±X, ±Y, −Z	-
Repeatability, 2σ	Stylus length 30 mm	0.002	mm
Measuring force, XY	Stylus length 30 mm	2	N
Measuring force, Z	Stylus length 30 mm	6	N
Stylus overtravel, XY	-	±10	°
Stylus overtravel, Z	-	4.5	mm
Maximum probing speed	-	2	m/min
Stylus thread	-	M4	-
Degree of protection	IEC 60529	IP65	-
Probe weight	-	260	g
Receiver weight	-	135	g

ELECTRICAL SPECIFICATIONS

Parameter	Applies to	Conditions	Min.	Typ.	Max.	Unit
Supply voltage, DC	Receiver	-	5	-	24	V
Current consumption	Receiver	-	-	-	< 100	mA
Output current	Receiver	-	-	-	200	mA
IR wavelength	Probe	-	-	950	-	nm
Transmission range	Probe	Default settings, depending on conditions	-	-	5	m
TOUCH signal delay	Probe	From stylus deflection	-	2	3[1]	ms
TOUCH signal delay	Probe	From stylus return	-	10	-	ms
READY signal delay	Probe	From standby	-	3	-	ms
BATTERY-LOW signal delay	Probe	From standby	-	-	< 70	ms
Battery voltage	Probe	SAFT LS14250 lithium	-	3.6	-	V
Battery capacity	Probe	SAFT LS14250 lithium	-	1.2	-	Ah
Battery life, standby	Probe	Default settings	-	800	-	days
Battery life, operating	Probe	Default settings	-	150	-	h

[1] *3 ms on the first deflection, while the probe wakes from standby mode.*

ABSOLUTE MAXIMUM RATINGS

Parameter	Value
Operating temperature	+10 °C to +40 °C
Storage temperature	−20 °C to +70 °C
Supply voltage, DC	24 V
Output current	200 mA
Stylus overtravel, XY	±10°
Stylus overtravel, Z	4.5 mm

Permanent damage may occur if any of these limits are exceeded.

CONNECTIONS

Model	Cable	Conductors	Output Signals
TP1-IR receiver	8 m, flying leads	5 × 0.25 mm^2	TOUCH, READY, BATTERY-LOW

OUTPUT CONFIGURATION

Setting	Value
Output type	PNP
Output function	NO or NC
Selected by	DIP switch on receiver board, one per output
Switch position	OFF = NO, ON = NC

WIRE ASSIGNMENT

Color	Signal	DIP switch
White	GND	-
Brown	VCC	-
Green	READY	1
Yellow	TOUCH	2
Gray	BATTERY-LOW	3

PROBE SETTINGS

Parameter	Function	Values	Default
P1	IR LED power	1 = 20 %, 2 = 40 %, 3 = 60 %, 4 = 80 %, 5 = 100 %	2
P2	Time to standby after the last touch	1 = 1 min, 2 = 2 min, 3 = 5 min, 4 = 10 min, 5 = 20 min	1
P3	Switch-on method	1 to 5; see the table below	1
P4	Number of touches	Read-only; one green LED flash for every 10 000 touches	-

P3	Switch-on method
1	Touch
2	Spin (approx. 520 rpm, held for 2 s)
3	Touch or spin (approx. 520 rpm, held for 2 s)
4	Spin (approx. 240 rpm, held for 2 s) or tilt (change in orientation of approx. 50°, held for 2 s)
5	Touch, spin (approx. 240 rpm, held for 2 s) or tilt (change in orientation of approx. 50°, held for 2 s)

TYPICAL PERFORMANCE CURVES

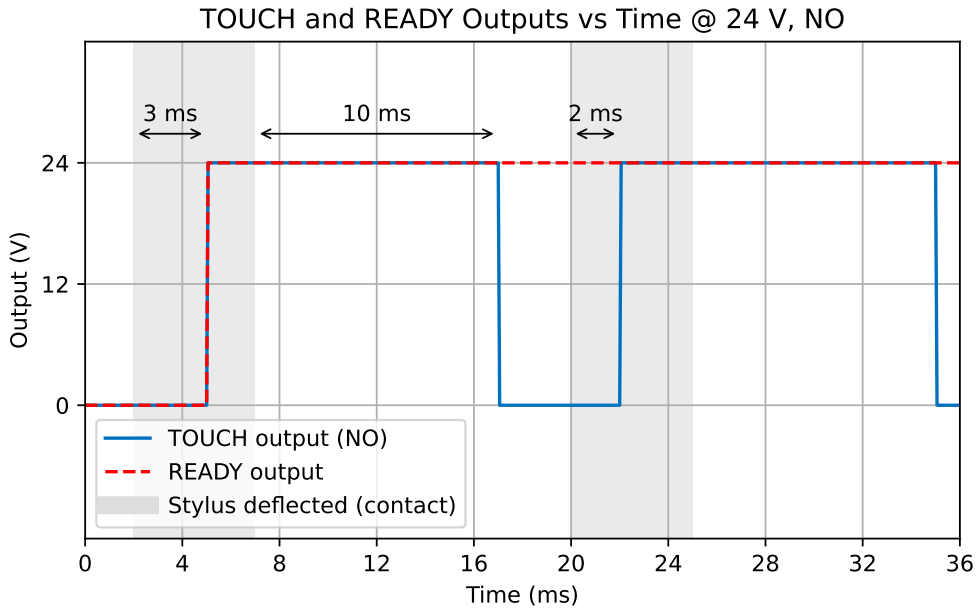


Figure 1: Output vs. Time

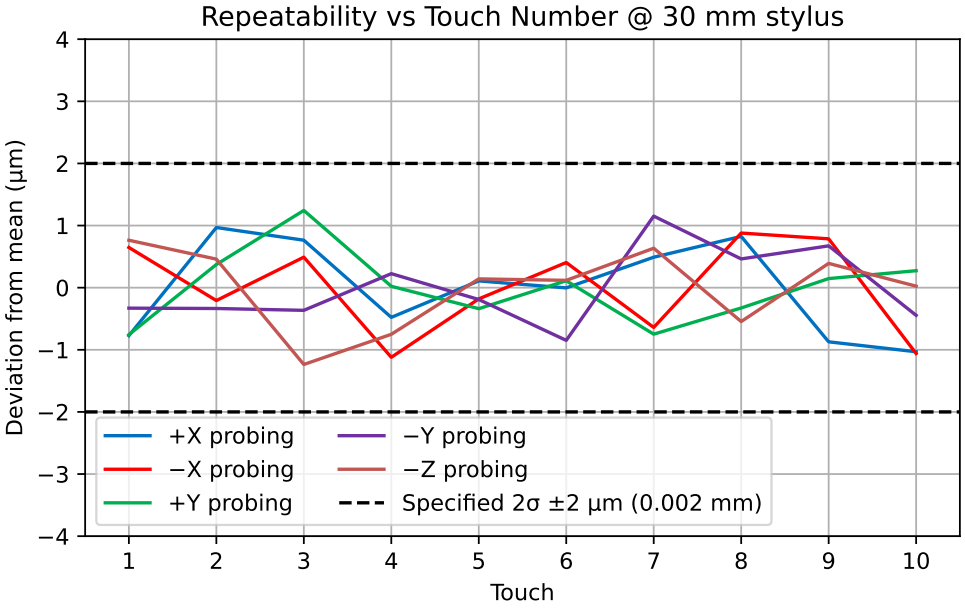


Figure 2: Repeatability vs. Touch Number

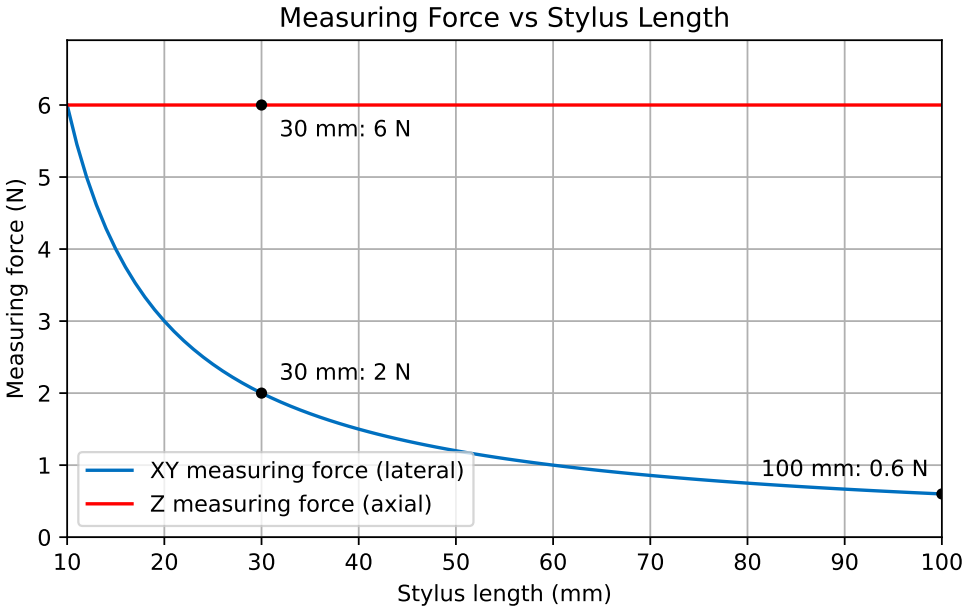


Figure 3: Measuring Force vs. Stylus Length

WEB INTERFACE (WEBUI)

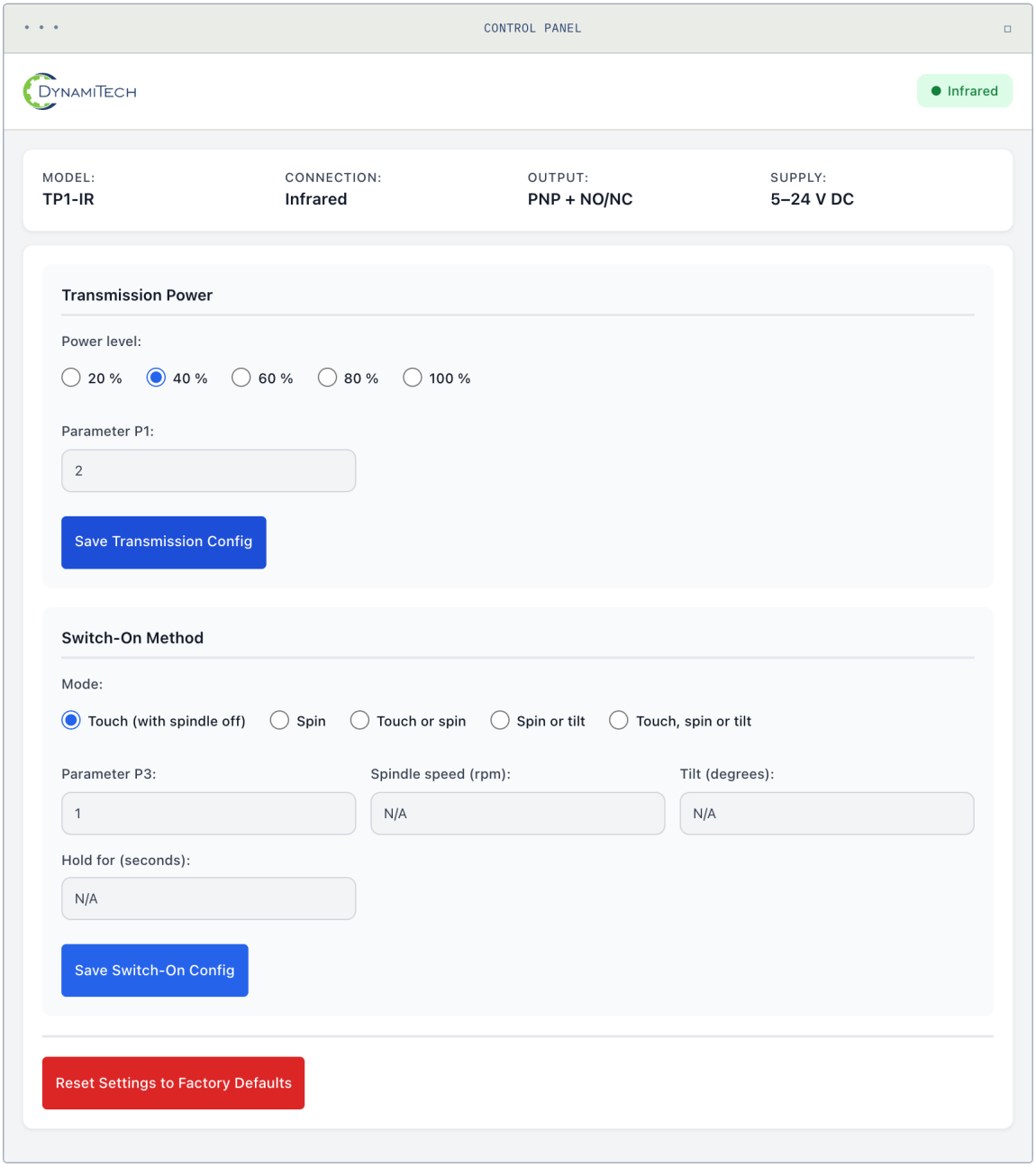


Figure 4: Web Interface (WebUI), settings

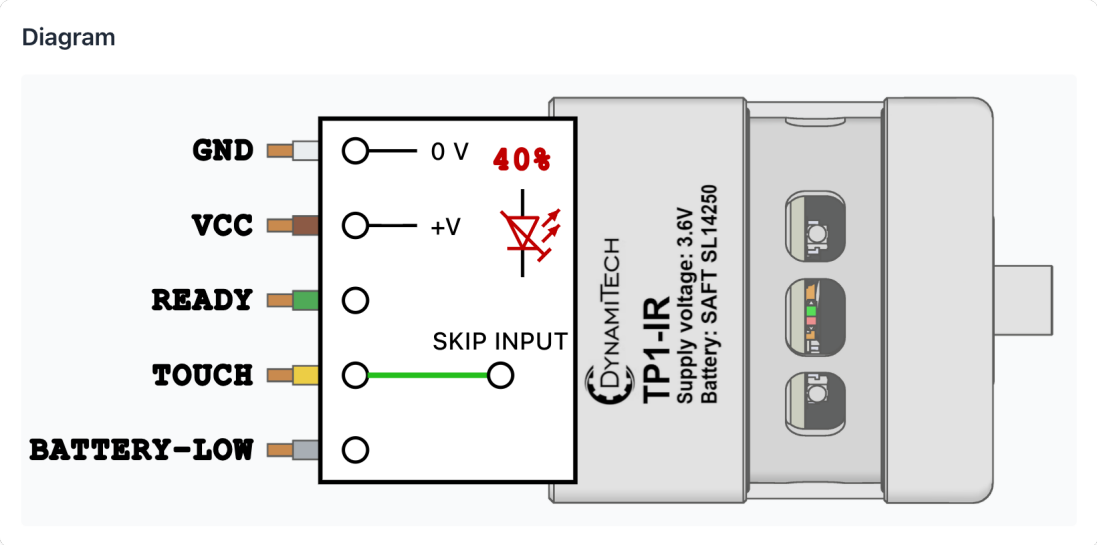


Figure 5: Web Interface (WebUI), diagram