AGATE TECHNOLOGY



PRX-300 / PRX-301

Automated DC Proximity Probe Testers

Operator Manual

agatetechnology.com | (951) 719-1032

PRX-300 (for use with the AT-2040) and PRX-301 (stand-alone, PC controlled)
Rev A · Released 11/16/2026

Two products in this manual

The **PRX-300** and the **PRX-301** are **separate products**. They share the same mechanism and run the same test, but they power and measure the proximity system differently.

	PRX-300	PRX-301
What it is	Motion fixture for the **AT-2040**. Cannot be used on its own.	**All-in-one** stand-alone tester. No AT-2040 needed.
Controlled from	AT-2040 touchscreen (Prox DC Linearity screen)	Windows PC
Serial connection	Same on both: M8 4-pin serial port on the tester and the same **USB serial cable C01** (USB-A to M8). PRX-300: cable to a USB port on the **AT-2040**. PRX-301: cable to a USB port on the **PC**.	
−24 V supply to the proximity driver	From the **AT-2040** proximity driver power output	Built in: **−24 V DC output** on the MS3102A10SL-3P driver connector
DC voltage measurement (driver OUT)	Read by the **AT-2040** DC input	Built in: **DC voltage input** on the same MS3102A10SL-3P connector
Driver connector on the tester	**None.** The driver is wired to the AT-2040.	**MS3102A10SL-3P** (A = −VT, B = COM, C = OUT), with driver cable C02
Reports	Stored on the AT-2040; export PDF or CSV to USB	Saved on the PC
Power	12 V USB-C Power Delivery supply (both)	

Sections 1 to 11, 13 and 14 apply to both products. Section 7 (set-up with the AT-2040) and the screen pictures in sections 8 to 10 are for the PRX-300. Section 12 covers the PRX-301.

Contents

1. Introduction, support and warranty 4
2. Safety and precautions 5
3. What's in the case 5
4. Specifications 6
5. Physical overview 7
6. How the test works 8
7. PRX-300: setting up with the AT-2040 10
8. Prox DC Linearity screen 11
9. Running a test 12
10. Results, reports and export 14
11. Understanding ISF and DSL 15
12. PRX-301: stand-alone operation 16
13. Troubleshooting 18
14. Care, storage and calibration 19
Appendix A: Glossary 20

1. Introduction

This manual tells the operator how to set up and use the PRX-300 and PRX-301 Automated DC Proximity Probe Testers, and how to read their results. It also covers specifications, care and troubleshooting.

The testers check an eddy-current proximity transducer system (probe, extension cable and driver) across its whole linear range, automatically. The probe is clamped in a fixed holder. A motorised AISI 4140 steel target moves away from the probe in exact 10 mil steps. At each step the driver's DC output voltage is recorded, and from those voltages the tester calculates the system's sensitivity (incremental scale factor, ISF) for every 10 mil segment, its average sensitivity and its linearity (deviation from straight line, DSL), and gives a PASS / FAIL verdict against the limits you set. Section 6 explains the test step by step.

For AT-2040 operation in general (power, menus, Reports screen, USB export), see the *AT-2040 Gen 2 Operator Manual*.

Product Technical Support

For technical support, email **help@agatetechnology.com** or call **951-719-1032**. Training webinars are also available; contact technical support for more information.

2-Year Limited Warranty

Agate Technology LLC warrants this product against defects in material and workmanship for a period of TWO (2) years from the date of purchase. Product documentation includes, but is not limited to, the product manual, datasheet, technical specifications, and communication with our service department. This warranty does not cover damage caused by operator negligence, misuse, abuse, accident, use inconsistent with product documentation, or unauthorized repair or modification by anyone other than Agate Technology and its authorized service providers. Any defective product meeting the above limited warranty requirements will be repaired or replaced at no charge.

Disclaimer

The PRX-300 and PRX-301 compute ISF and DSL using the definitions in API 670. API 670 is a standard of the American Petroleum Institute; the testers are not certified or endorsed by API. The acceptance limits are set by the user. It is the user's responsibility to set limits that match the probe system's specification and their own procedures. Specifications are subject to change without notice.

Copyright

© 2026 Agate Technology LLC. All rights reserved. No part of this manual may be reproduced without written permission from Agate Technology.

2. Safety and precautions

> **CAUTION — MOVING PARTS.** The target carriage is driven by a ball-screw actuator and can move at any time while a test or jog is running. Keep fingers clear of the target, the cover slot and the gap between the target and the probe. Press **Stop** before reaching in.

> **CAUTION — PROBE DAMAGE.** The target homes and then approaches the probe until it finds the −1 V reference. Mount the probe with its tip clear of the target before starting, and never push the probe against the target by hand.

> **CAUTION — −24 V SUPPLY.** The proximity driver is powered from −24 V (from the AT-2040 for the PRX-300, or from the PRX-301 driver connector). Connect and disconnect the driver wiring with the supply off.

- Use only the supplied 12 V USB-C Power Delivery supply, or a USB-C PD supply rated for 12 V at the same current or more. A 5 V-only USB charger will not run the motor.
- Use the tester on a flat, stable bench away from vibration, strong magnetic fields and other metal near the probe tip.
- Do not move the carriage by hand while the tester is powered. With power off the carriage can be moved gently by hand; the next test re-homes it, so this does not affect results.
- Travel limits are set in the motion controller so the target cannot be driven past the end of its stroke. Do not modify the controller firmware.
- Do not drop the tester or carry it by the probe holder. Transport it in the supplied case.
- There are no user-serviceable parts inside the cover or the controller housing. Return the unit to Agate Technology for service.

3. What's in the case

Item	PRX-300	PRX-301
Tester with probe holder	✓	✓
12 V USB-C Power Delivery supply	✓	✓
AISI 4140 steel target, 1/4-28 stud	✓	✓
Serial cable C01: USB-A to M8 4-pin (to the AT-2040 or PC)	✓	✓
Driver cable C02: MS3106 plug to Proximitor, 1.5 m	—	✓
Calibration certificate	✓	✓
Pelican 1400 case with custom foam	✓	✓

Check the contents against this list when you unpack. Keep the case and foam for transport and for return to Agate for calibration.

4. Specifications

Measurement	
Measured quantity	Proximity driver DC output vs. probe gap
Test range	0 to 90 mil in ten 10 mil steps (10 points), starting at the −1 V reference gap
Reference gap	Found automatically: the target finds the probe and settles at the −1.000 V point
Per-point sequence	Target stops, position settles, 10 s dwell, then the average of 20 readings is recorded
DC voltage measurement	PRX-300: AT-2040 DC input. PRX-301: built-in isolated DC voltage input (MS3102 pin C). No external DMM needed
Driver supply	PRX-300: AT-2040 −24 V output. PRX-301: built-in −24 V DC output (MS3102 pin A)
Probe reach	Long target travel, so short probes set far back in the holder are still found
Computation (API 670 basis)	
Incremental scale factor (ISF)	mV/mil for every 10 mil segment, 0–10 through 80–90 mil. Every segment is judged on its own
Average scale factor	Least-squares slope over 10–90 mil, judged against the same tolerance
Deviation from straight line (DSL)	Worst-point deviation from a line of nominal slope placed by the minimax rule, in mil, over 10–90 mil
Acceptance presets	1–5 m systems: ISF ±5 %, DSL ±1 mil. 9 m systems: ISF ±6.5 %, DSL ±1.5 mil. Nominal ISF (default 200 mV/mil) and limits adjustable; last settings remembered
Verdict	PASS / FAIL, with the failing criterion and segment named
Motion and protection	
Homing	The target homes before every test
Travel protection	Travel limits enforced in the motion controller
Screw slip check	After every test the target returns home and the controller checks it arrives where it should. Slip of more than 0.5 mil fails the result
Measured repeatability (Agate data, 10 runs, one 8 mm 9 m system)	
Segment ISF, same set-up	±1.2 mV/mil (±0.6 %) at 95 %, worst segment
Segment ISF, probe re-seated	±1.5 mV/mil (±0.75 %) at 95 %, worst segment
Average ISF	±0.35 mV/mil (±0.17 %) at 95 %
Point repeatability	0.01–0.04 mil (1σ) per gap point
Physical	
Host	PRX-300: AT-2040 test system. PRX-301: Windows PC
Serial link	M8 4-pin serial port; USB serial cable C01 (USB-A to M8) to the AT-2040 (PRX-300) or a PC (PRX-301); 115200 baud
Power	12 V via USB-C Power Delivery
Probe holder	Adjustable V-block clamp for probe bodies 5 to 19 mm (3/16 to 3/4 in), metric or imperial, threaded or smooth; height-adjustable
Target	AISI 4140 steel, 0.99 in diameter, black oxide, 1/4-28 stud. Other materials on request
Size / weight	240 × 60 × 107 mm (9.4 × 2.4 × 4.2 in) on rubber feet; 900 g (2.0 lb), tester only

Repeatability figures were measured by Agate on 2026-10-30. They are repeatability figures, not a full measurement-uncertainty statement. The proximity system's own tolerance includes interchangeability of probe, cable and driver; test each set as it will be used.

5. Physical overview

See *Figure 1*. The PRX-300 is shown; the PRX-301 is the same except for the taller controller housing with the PC and driver connectors (section 12).

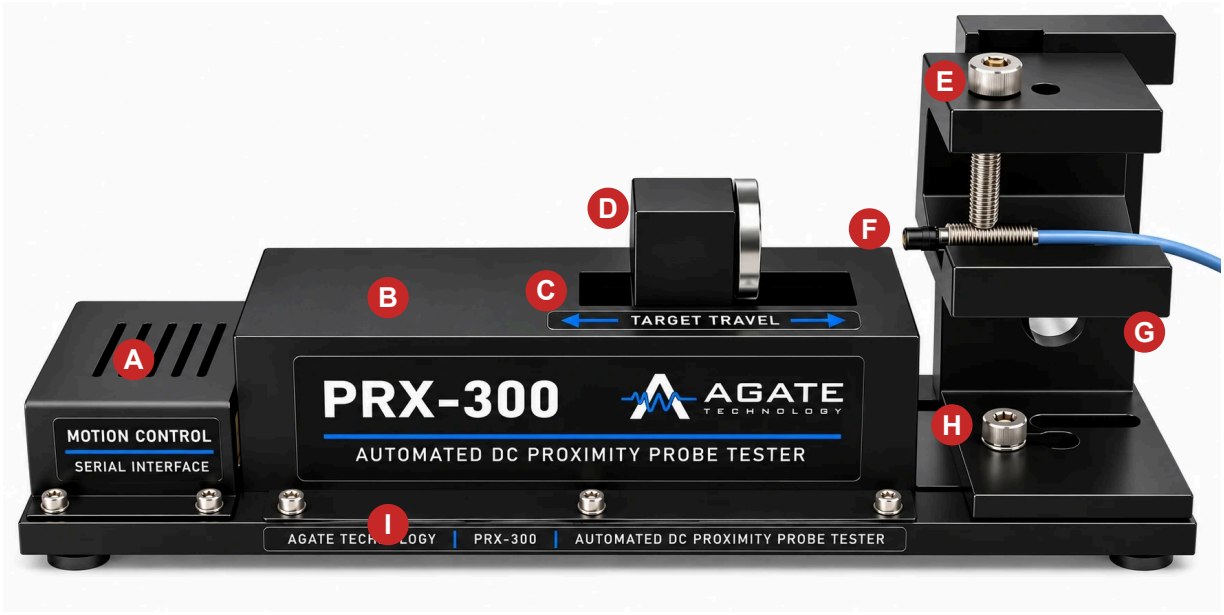

Figure 1 — PRX-300 (product rendering)

A. **Motion controller housing:** holds the stepper controller. The 12 V USB-C supply and the M8 serial port (cable C01, to the AT-2040 or PC) are here. On the PRX-301 this housing also holds the measurement board, with the PC and driver connectors on its end panel.

B. **Stage cover:** covers the ball-screw actuator. Do not remove.

C. **Target travel slot:** the target carriage runs along this slot. Keep it clear.

D. **Target carriage and AISI 4140 target:** the target screws onto the carriage by its 1/4-28 stud.

E. **Probe clamp screws (2 × M6 knurled thumb screws):** thread down through the top of the holder and press the probe into the V-block. Finger-tight only.

F. **Probe:** the probe under test, tip facing the target, cable leading away from the tester.

G. **Probe holder and elevator, with height lock:** the V-block holder rides on the L-shaped elevator. The height lock (M8 wing thumb screw) passes through the slot in the elevator wall into the side of the holder; loosen it to set the probe centreline level with the target centre.

H. **Elevator locks (2 × M5 socket head screws):** fix the elevator to the base through its slots. Loosen with a 4 mm hex key to slide the probe holder toward or away from the target; tighten before testing.

I. **Base:** 6061 aluminium base on rubber feet.

6. How the test works

A proximity driver gives a DC output that becomes more negative as the gap between the probe tip and the target grows, typically by 200 mV for every mil (7.87 V/mm). The tester measures that relationship directly: it moves the target in exact, known 10 mil steps and records the driver voltage at every step. The change in voltage over each step, divided by the 10 mil step, is the sensitivity of that part of the range.

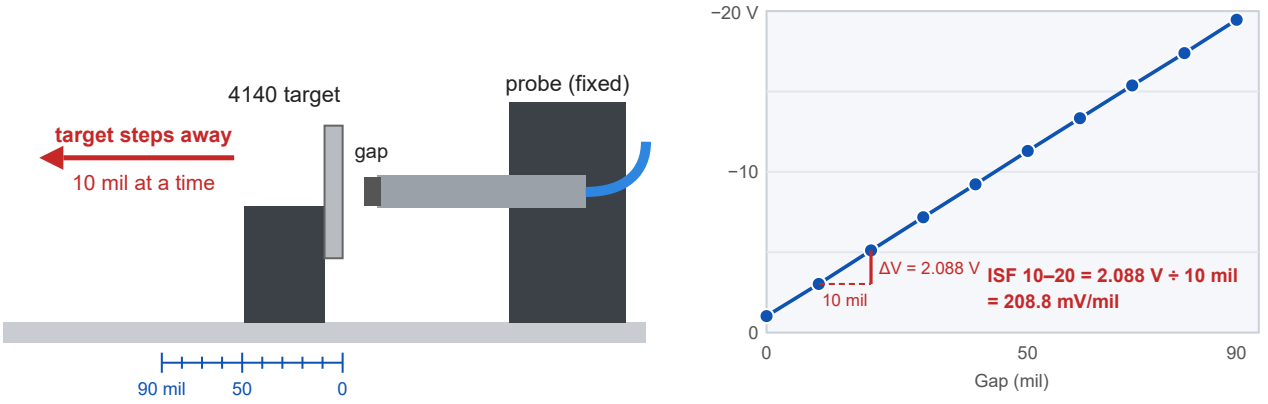

Figure 2 — The target steps away from the fixed probe (left). Each step's voltage change gives that segment's ISF (right, real data from a 9 m system).

The sequence

1. **Home.** The carriage drives to its home switch so every test starts from the same known position.
2. **Find the reference gap.** The target approaches the probe while the driver voltage is watched. It takes up the ball-screw backlash, then settles where the output is **−1.000 V**. This position is called **0 mil**. Because it is found from the probe's own output, it does not matter how far the probe was set by hand.
3. **Record point 1.** With the target stopped, the tester waits for the position to settle, waits a further 10 s for the driver output to settle, then averages 20 voltage readings. The average is recorded against the gap.
4. **Step and record.** The target moves exactly **10 mil further away** and the same settle–dwell–average is repeated. This continues at 20, 30 … 90 mil: **10 points** in all. The plot on screen grows one point at a time.
5. **Calculate.** From the 10 voltages the tester calculates the nine segment ISFs, the average ISF and the DSL (below), and compares each with the acceptance limits.
6. **Check the screw.** The target returns home and the controller checks that it arrives within 0.5 mil of where it should. This proves no steps were lost during the test.
7. **Verdict and report.** PASS or FAIL is shown with the reason, and the test report is saved.

A test takes about 3 minutes. The motion is controlled by a stepper motor and a 1 mm-lead ball screw, so each 10 mil step is a known, repeatable distance; the screw check at the end confirms it.

Worked example

These are the real points from one test of an 8 mm, 9 m system (nominal 200 mV/mil).

Point	Gap (mil)	DC output (V)	Change over the 10 mil step (V)	Segment	Segment ISF (mV/mil)	Off nominal
1	0	−1.0195	—	—	—	—
2	10	−3.0281	2.0085	0–10	200.9	+0.43 %
3	20	−5.1160	2.0879	10–20	**208.8**	**+4.40 %**
4	30	−7.1795	2.0635	20–30	206.3	+3.17 %
5	40	−9.2308	2.0513	30–40	205.1	+2.56 %
6	50	−11.3004	2.0696	40–50	207.0	+3.48 %
7	60	−13.3394	2.0391	50–60	203.9	+1.95 %
8	70	−15.3785	2.0391	60–70	203.9	+1.95 %
9	80	−17.3932	2.0147	70–80	201.5	+0.73 %
10	90	−19.4628	2.0696	80–90	207.0	+3.48 %

1. Segment ISF

Each segment ISF is the voltage change over that step divided by 10 mil. For 10–20 mil: (5.1160 − 3.0281) V ÷ 10 mil = 0.2088 V/mil = **208.8 mV/mil**. The worst segment here is 10–20 mil, 4.40 % above nominal. Every segment is judged on its own against the ISF tolerance.

2. Average ISF

A best-fit (least-squares) straight line is drawn through the points from 10 to 90 mil. Its slope is the average ISF: **205.13 mV/mil**, 2.56 % above nominal.

3. DSL

A straight line with the **nominal** slope (200 mV/mil) is placed through the points so that the largest deviation either side is as small as possible. Each point's distance from that line, converted to mil, is its deviation. The worst is the DSL: **1.087 mil**. Because this system is slightly more sensitive than nominal, the points drift away from a 200 mV/mil line; the DSL shows this as a gap error in mil.

4. Verdict

Criterion	Result	9 m limits	Verdict	1–5 m limits	Verdict
Worst segment ISF	+4.40 %	±6.5 %	PASS	±5 %	PASS
Average ISF	+2.56 %	±6.5 %	PASS	±5 %	PASS
DSL	1.087 mil	±1.5 mil	PASS	±1.0 mil	**FAIL**

This 9 m system passes its own (9 m) limits. The same readings would fail the tighter 1–5 m DSL limit, which is why the correct preset for the system's length must be chosen before the test.

7. PRX-300: setting up with the AT-2040

The PRX-300 uses the AT-2040's proximity driver supply and DC voltage input; it has no driver connector of its own. For the PRX-301, make the mechanical set-up in this section (fitting the target, mounting the probe), then follow section 12 for the connections.

Connections

1. **Place the tester** on a flat, stable bench next to the AT-2040, with room in front of the probe holder for the probe cable.
2. **Connect serial cable C01:** M8 plug to the serial port on the tester's motion controller, USB-A plug to a USB port on the AT-2040. (The PRX-301 uses the same cable, to a PC.)
3. **Connect the proximity driver** (Proximitor) to the AT-2040 proximity probe driver terminals: the AT-2040 −24 V supply to the driver's −VT, common to COM, and the AT-2040 DC input to OUT. See the *AT-2040 Gen 2 Operator Manual* for the AT-2040 terminals.
4. **Connect the probe** (and extension cable, if used) to the driver. Test the probe, cable and driver as the set that will be used in service.
5. **Plug in the 12 V supply** to the USB-C port on the motion controller. The controller needs 12 V USB Power Delivery to drive the motor.
6. **Power on the AT-2040** and open **Prox DC Linearity** from the main menu.

> **NOTE:** If the screen shows *"PD Stepper not responding"* or *"No 12 V to the stepper"*, check serial cable C01 and the 12 V supply. See section 13.

Fitting the target

Screw the AISI 4140 target onto the carriage stud by hand until it seats. Do not use tools. The target face must be clean, flat and free of rust, oil and marks. Use a target of your own shaft material if the probe system was calibrated to a different steel, and record the material in the calibration record (section 9).

Mounting the probe

1. Loosen the two **probe clamp screws** (E) and lay the probe body in the V-block with the tip toward the target.
2. Set the probe tip a few millimetres back from the target, so the target can approach it. Do not let the tip touch the target.
3. Tighten the clamp screws finger-tight. Over-tightening can damage threaded or plastic probe bodies.
4. Loosen the **height lock** (G) and set the probe height so the probe centreline is on the target centre. Tighten.
5. If the probe sits too far back for the target to reach, loosen the two **elevator locks** (H), slide the holder toward the target and tighten again.
6. Route the probe cable so it does not touch the target, the carriage or the cover slot.
7. On the Prox DC screen, use **JOG approach** and **retract** to check that the target moves freely and the DC voltage changes as the target nears the probe.

> **CAUTION:** Hold JOG approach only while watching the gap. The target moves toward the probe tip.

8. Prox DC Linearity screen

Open the screen from the AT-2040 main menu. With the PRX-300 connected and powered, the screen shows the live driver voltage and **Ready to test**. See *Figure 3*.

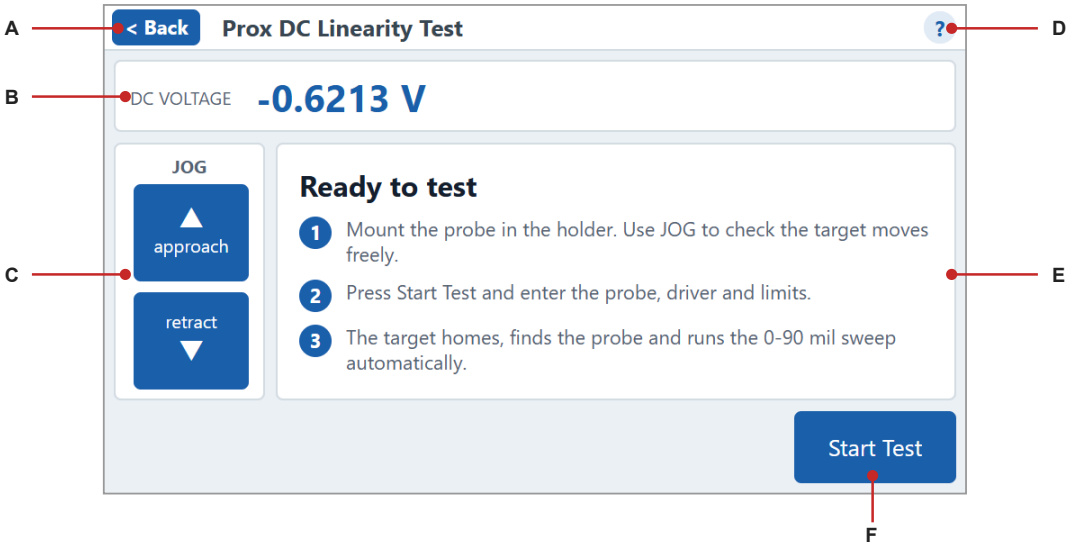

Figure 3 — Prox DC Linearity screen, ready to test

A. **Back:** return to the main menu.

B. **DC VOLTAGE:** live driver output, updated continuously. During the sweep the point number is shown at the right.

C. **JOG: approach** moves the target toward the probe, **retract** moves it away. Each tap moves 3 mil; hold to repeat.

D. **Help (?):** on-screen help for this test.

E. **Status panel:** instructions when ready, progress while testing, results when done, and a red panel with a plain-language explanation if something is wrong (section 13).

F. **Start Test:** opens the acceptance criteria and calibration record, then runs the test. While a test runs the buttons change to **SHOW** (switch view) and **Stop**; after the test, to **SHOW** and **New Test**.

9. Running a test

Press **Start Test**. The setup panel opens (*Figure 4*). Every value is remembered for the next test.

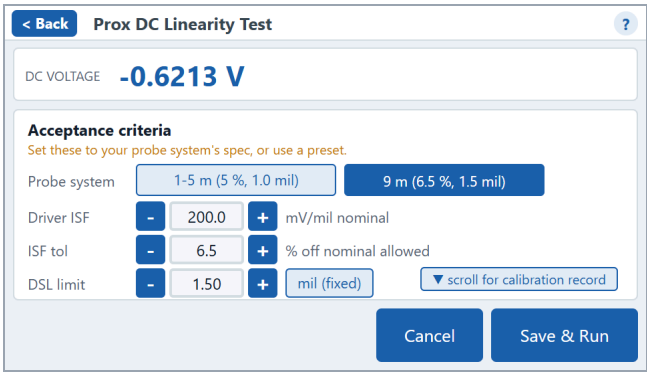

Figure 4 — Acceptance criteria. Tap the preset for the system's length, or set the nominal ISF, ISF tolerance and DSL limit with − / +.

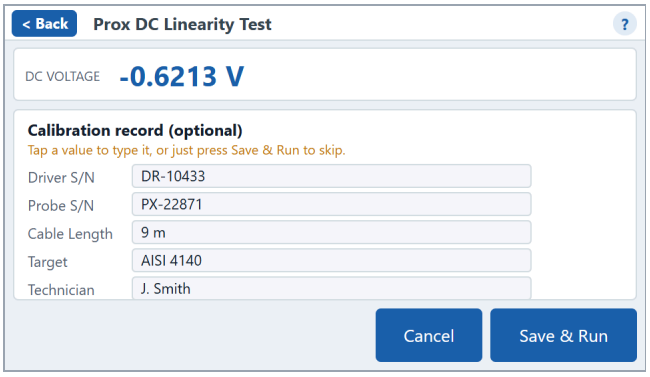

Figure 5 — Calibration record (scroll down). Optional; the entries are printed on the test report.

Acceptance criteria

Setting	Description
Preset: 1–5 m	ISF ±5 %, DSL ±1.0 mil. For 1 m and 5 m systems.
Preset: 9 m	ISF ±6.5 %, DSL ±1.5 mil. For 9 m systems.
Driver ISF (mV/mil nominal)	The system's nominal sensitivity. Default 200 mV/mil (7.87 V/mm).
ISF tol (%)	Allowed deviation of every segment ISF and of the average ISF from nominal.
DSL limit	Allowed deviation from straight line, in mil (normal). Tap **mil (fixed)** to switch to a percentage of range, for documents that state it that way.

Calibration record (optional)

Driver S/N, Probe S/N, Probe Model, Cable Length, Target material (AISI 4140 supplied) and Technician. Tap a value to type it, or press **Save & Run** to skip. Press **Cancel** to go back without testing.

Test progression

Press **Save & Run**. The test then runs on its own; do not touch the tester, the probe or its cable. Press **Stop** at any time to abort (no report is saved for a stopped test).

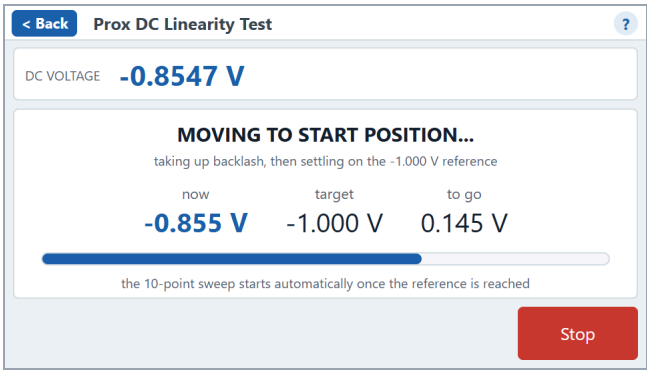

Figure 6 — Moving to start position. After homing, the target approaches the probe, takes up backlash and settles on the −1.000 V reference. *now / target / to go* and the bar show how close it is.

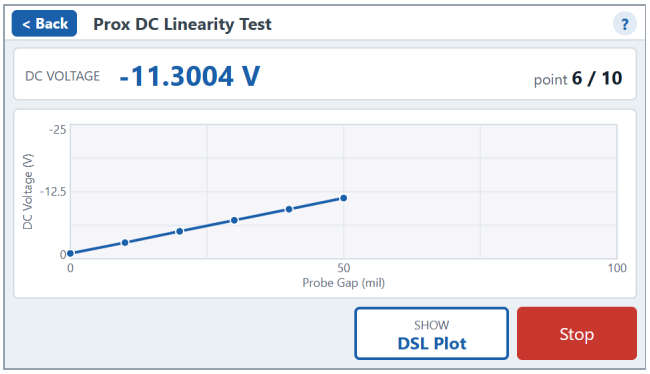

Figure 7 — Sweep in progress (plot). The 10-point sweep starts by itself. Each dot is one recorded point; here point 6 of 10 (50 mil) has just been recorded.

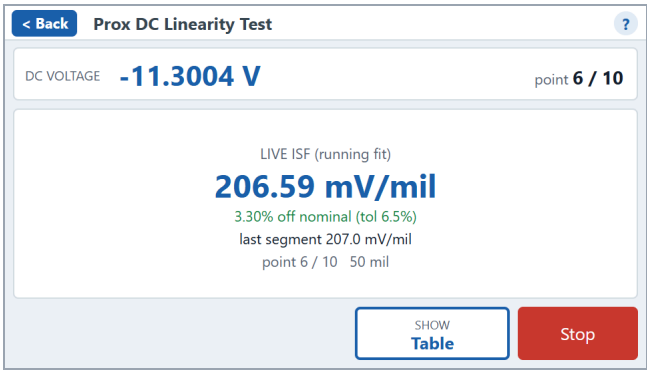

Figure 8 — Live ISF. Press SHOW to see the running best-fit ISF, how far it is from nominal, and the ISF of the last segment, while the sweep continues.

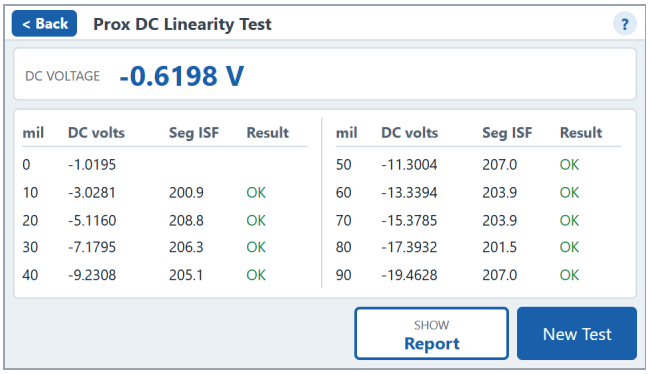

Figure 9 — Table. Gap, DC volts and segment ISF for every point, with OK / OUT against the ISF tolerance. Available during and after the sweep.

During the sweep, **SHOW** steps through **Plot** → **DSL Plot** → **Live ISF** → **Table**. The view you choose does not affect the test.

> **TIP:** Leave the probe and driver powered for a few minutes before the first test so the driver output is stable.

10. Results, reports and export

When the sweep is complete the target returns home, the screw check is made and the result is shown (*Figure 10*).

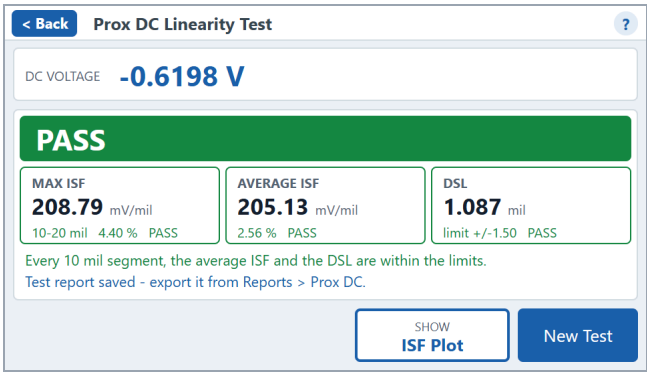

Figure 10 — Result. PASS / FAIL bar, three result tiles and the reason. The report is saved automatically.

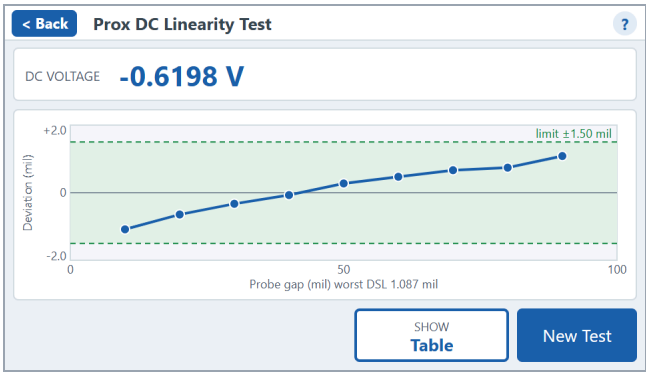

Figure 11 — DSL plot. Deviation of each point from the nominal-slope line, in mil. Points inside the green band are within the DSL limit.

Verdict and result tiles

The top bar shows **PASS** (green) or **FAIL** (red). Below it, the reason is given; on a FAIL it names the criterion and the segment that failed and by how much. A **SCREW SLIP** chip appears on the bar if the screw check failed.

MAX ISF	The worst segment ISF (furthest from nominal), in mV/mil, with its segment, % off nominal and verdict.
AVERAGE ISF	Best-fit slope over 10–90 mil, in mV/mil, with % off nominal and verdict.
DSL	Worst deviation from the nominal-slope line, in mil, with the limit and verdict.

Press **SHOW** to step through **Report** → **ISF Plot** → **DSL Plot** → **Table**. The report view also lists the free-fit DSL (straightness only; a diagnostic, not used for the verdict), the limits used and the calibration record.

Screw slip check

If the carriage did not return to its home reference within 0.5 mil, a **SCREW SLIP DETECTED** alert appears and the result fails, because the gap steps during the test cannot be trusted. Check for binding or an obstruction, then run the test again. **SCREW SLIP CHECK FAILED** means the check itself could not be completed.

Saving and exporting reports

1. Every completed test is saved automatically (*"Test report saved — export it from Reports > Prox DC."*).
2. Insert a USB flash drive into the AT-2040, go to **Reports** and choose **Prox DC**.
3. Select the test and export it as **PDF** (verdict, test information, criteria, results, plots, point table and signature line) or **CSV** (raw points).

If a test fails

First check the preset matches the system's length, the target and probe tip are clean, and the probe is centred and clamped with its cable clear. Then run the test again. If the same segment fails again, the probe system is the likely cause. See section 13.

11. Understanding ISF and DSL

Incremental scale factor (ISF)

```
ISF(segment) = |V(n+1) − V(n)| ÷ 10 mil   [mV/mil]
```

Nine segments are calculated, 0–10 through 80–90 mil, and each must be within the ISF tolerance of nominal. Judging every segment on its own means a bad part of the range cannot be hidden by a good average.

Average scale factor

The least-squares slope of the points over 10–90 mil. It must also be within the ISF tolerance.

Deviation from straight line (DSL)

A straight line with the **nominal** slope is placed through the points so that the largest deviation is as small as possible (the minimax rule). The deviation of each point from that line is converted to mil. The worst point is the DSL, and it must be within the DSL limit over 10–90 mil. DSL therefore catches both curvature and a sensitivity that is consistently off nominal.

The free-fit DSL (deviation from a best-fit line of any slope) is shown separately as a straightness diagnostic. It is not used for the verdict, and the tester never chooses whichever fit would pass.

Typical limits

System	ISF tolerance	DSL limit
1 m and 5 m systems	±5 %	±1.0 mil
9 m systems	±6.5 %	±1.5 mil

These limits include interchangeability of probe, cable and driver. Always check the probe system manufacturer's specification and your site procedure, and set the limits to match.

Why the −1 V reference?

Very close to the target the output is not linear. The test starts from the gap where the output is −1.000 V, which is at or before the start of the linear range for typical systems, and steps 90 mil from there. Finding this point automatically means the result does not depend on how far the probe was set from the target by hand.

12. PRX-301: stand-alone operation

The PRX-301 is an all-in-one tester. It has the same mechanism, test sequence, criteria and results as the PRX-300 (sections 5, 6 and 9 to 11), but it does not need an AT-2040:

- **Driver power:** it supplies **−24 V DC** to the proximity driver through its MS3102A10SL-3P driver connector.
- **Voltage measurement:** it measures the driver's DC output through the **same connector**, with its own built-in, isolated measurement board.
- **Control:** a Windows PC runs the test. It connects to the same M8 serial port with the same cable C01 as the PRX-300 uses; the only difference is that the USB end goes to the PC instead of an AT-2040. On the PRX-301 this port is marked **PC**, and is isolated from the tester and powered by the cable.

End panel

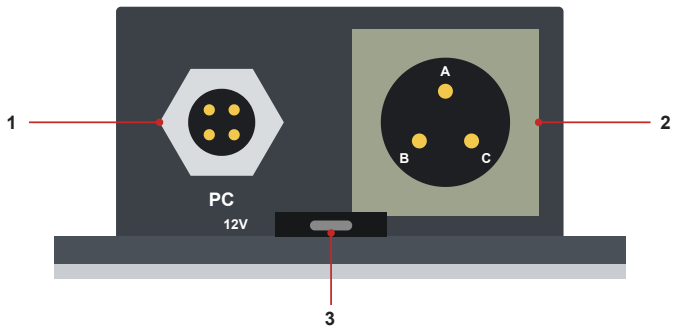

Figure 12 — PRX-301 end panel (illustration)

1. **PC (M8 4-pin, A-coded):** connect cable C01 to the PC. Isolated from the tester.
2. **Driver (MS3102A10SL-3P):** −24 V DC output and DC voltage input. A = −VT (−24 V out), B = COM, C = OUT (voltage in). Connect cable C02 to the Proximitor.
3. **12 V:** USB-C Power Delivery supply, through the opening at the bottom of the panel.

C01 — Serial cable (USB-A to M8), same as PRX-300

M8 pin	Signal
1	+5 V (from the USB port)
2	RX (data into the tester)
3	GND (isolated)
4	TX (data from the tester)

On a PC it appears as a USB serial (COM) port, 115200 baud, 8N1.

C02 — Driver cable (1.5 m)

Plug	Wire	Proximitor
A	red	−VT (−24 V)
B	black + shield	COM
C	yellow	OUT

The shield is connected to COM at the tester end only and cut back at the Proximitor end (single-point grounding). Ferrules fit spring-clamp terminals.

Connecting the PRX-301

1. Set up the tester, target and probe as in section 7 (place the tester, fit the target, mount the probe).
2. With the 12 V supply unplugged, connect cable C02: plug to the **driver** connector, ferrules to the Proximitor −VT, COM and OUT terminals by colour (red, black, yellow).
3. Connect the probe and extension cable to the Proximitor.
4. Connect cable C01 from the **PC** port to a USB port on the PC.
5. Plug the 12 V USB-C supply into the controller. The PRX-301 now powers the driver.
6. Start the PC software and select the tester's COM port.

Operating from the PC PRELIMINARY

The PC software mirrors the AT-2040 Prox DC Linearity screen: live DC voltage, JOG approach / retract, the same acceptance criteria and presets, the calibration record, the same test sequence (home, −1 V reference, 10-point sweep, screw check) and the same results views and verdict. Follow sections 9 and 10.

- Reports are saved on the PC as an HTML report and a CSV file in `Documents\PRX-300 Reports`.
- Settings are remembered between sessions.
- A **SIMULATOR** port can be chosen to demonstrate the software without a tester.

13. Troubleshooting

When something goes wrong the status panel turns red and shows a plain-language explanation (*Figure 13*). The common messages are below.

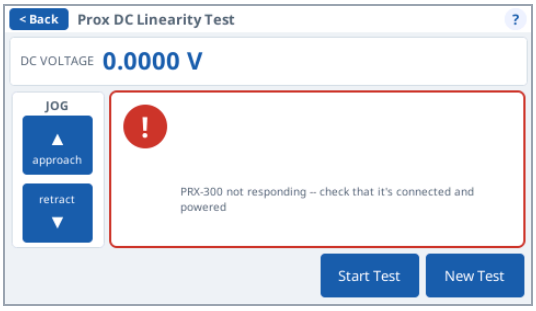

Figure 13 — Fault example: the AT-2040 cannot talk to the tester.

This screen appears when serial cable C01 is unplugged or the tester has no 12 V. Fix the cause, then press **New Test**.

Message	Likely cause	What to do
PD Stepper not responding / PRX-300 not responding	Serial cable unplugged, or the controller has no power	Check serial cable C01 between the tester's M8 port and the AT-2040 (or the PC on the PRX-301) and that the 12 V supply is plugged in. Unplug and replug the serial cable, wait a few seconds, then press New Test.
No 12 V to the stepper	Supply unplugged, or a supply that does not provide 12 V USB PD	Plug the controller's USB-C into the supplied 12 V supply. A phone charger that gives only 5 V will not work.
Reached the end of the slide without finding the probe	Probe set too far back, probe or driver not connected, or no driver power	Move the probe or holder closer to the target and start again. Check that the DC voltage changes when you JOG approach. Check the driver wiring and −24 V.
Home switch problem / Homing did not finish within 60 s	Carriage blocked, or home sensor fault	Check nothing blocks the carriage or the cover slot. Power cycle the tester. If it repeats, contact support.
SCREW SLIP DETECTED	The carriage did not return to home within 0.5 mil: binding, obstruction or a loose coupling	Check for anything touching the target or carriage (including the probe cable), then run the test again. If it repeats, contact support.
The carriage kept moving after a step	Binding or a loose coupling	Check for binding or obstruction. Contact support if it repeats.
Step check unavailable	Controller firmware older than v4	The test runs but the screw check is skipped. Contact support for a firmware update.
DC voltage reads 0 V or does not change with JOG	Driver not powered or not connected; probe not connected	Check the driver wiring (−VT, COM, OUT) and that the probe is connected to the driver.
DC voltage near −18 V or more negative and does not change	Probe too far from the target, or open probe circuit	Move the probe closer. Check the probe and extension cable connections.
FAIL on one segment only	Dirty or damaged target or probe tip, probe off-centre, or a probe-system fault	Clean the target and tip, re-centre the probe, run again. A repeat FAIL on the same segment points to the probe system.
FAIL on DSL, or every segment off by a similar amount	Wrong preset or nominal ISF, or the wrong target material	Check the preset (1–5 m or 9 m), the nominal ISF and the target material for this system (see the worked example in section 6).

For anything not listed, contact **help@agatetechnology.com** or **951-719-1032**. Have the tester serial number and the exported report ready.

14. Care, storage and calibration

Cleaning

- Wipe the target face with a lint-free cloth and isopropyl alcohol. Remove light rust with a fine abrasive pad only, and replace a target that is pitted or scratched.
- Wipe the base and cover with a dry or slightly damp cloth. Do not use solvents on the printed parts or labels.
- Keep the cover slot free of dust and metal chips. Do not oil the slot or the actuator.

Storage and transport

- Remove the probe from the holder after use.
- Leave the target fitted, or store it in its pocket in the case foam with a light coat of corrosion inhibitor.
- Transport the tester only in the supplied case, with all items in their foam pockets.
- Store indoors in a dry place.

Calibration

Each tester is supplied with a calibration certificate. The recommended recalibration interval is **12 months**. Return the tester in its case to Agate Technology for calibration; contact support for a return authorisation.

Recalibration checks the target displacement against a reference standard and, for the PRX-301, the driver supply and voltage measurement. For the PRX-300, the voltage input is calibrated with the AT-2040.

Firmware and software updates

AT-2040 software updates, including the Prox DC Linearity screen, are installed as described in the *AT-2040 Gen 2 Operator Manual*. Contact support for tester firmware updates.

Appendix A: Glossary

DSL	Deviation from straight line: how far the measured points lie from a line of nominal slope, in mil.
Free-fit DSL	Deviation from a best-fit line of any slope. A straightness diagnostic only.
Gap	Distance between the probe tip and the target face.
Homing	Returning the target carriage to its fixed reference position before every test.
ISF	Incremental scale factor: output change per mil over one 10 mil segment, in mV/mil.
mil	One thousandth of an inch (0.0254 mm).
Proximitor / driver	The proximity system's oscillator-demodulator that powers the probe and gives a DC output proportional to gap.
Reference gap	The gap at which the driver output is −1.000 V; the 0 mil point of the test.
Scale factor	The system's sensitivity, typically 200 mV/mil (7.87 V/mm).
Screw slip check	Check after every test that the carriage returns exactly home, proving the gap steps were accurate.
−VT	The driver's −24 V supply terminal.