



DIAGNOSTICS GUIDE enviolo AUTOMATiQ internal gear hub

AFFECTED MODELS:

YEAR	DESCRIPTION
2022 and later	All Turbo bikes with enviolo AUTOMATiQ hubs (e.g. Vado/Como 5.0 IGH)

INTRO:

This checklist will help you diagnose the enviolo AUTOMATiQ internal gear hub systems on Specialized Turbo bicycles.

FURTHER IMPORTANT RESOURCES ARE:

- Turbo Studio Diagnostics Guide (general Turbo diagnostics) and Knowledge Base articles
- [enviolo's education program](#)



SELECT YOUR TASK / ISSUE

GENERAL FUNCTION CHECK

INTERFACE DOES NOT CALIBRATE

HUB DOES NOT PROVIDE FULL GEAR RATIO

HUB DOES NOT SHIFT AT ALL OR INCORRECTLY

NO MOTOR / MOTOR ERROR ON BIKE DISPLAY

BIKE DOES NOT TURN ON

RATTLING NOISE

BUZZING BELT NOISE

GEAR SHIFTER ERROR - TIMEOUT


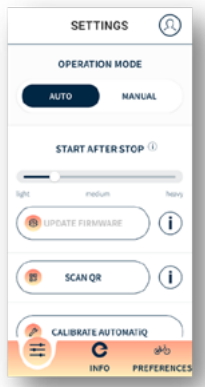
GEAR SHIFTER ERROR - ENVIOLLO STALL




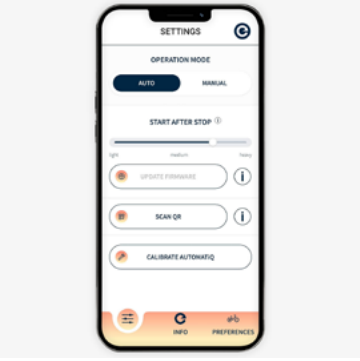
Use the icons in TS to access the Diagnostics Guide and Knowledge Base

GENERAL FUNCTION CHECK

These basic tests are first check items when dealing with functional issues, e.g. the hub not shifting or remaining stuck in one gear.

#	Function Check	Action(s)	Result
1	<p>Ensure that the hub interface is running on the latest enviolo firmware.</p> <p>As with other electronic systems, outdated firmware can lead to functional issues. Since updating firmware is quick and easy, it should be the first check item within diagnostics.</p>	<p>Refer to the enviolo video Download & Installation.</p> <p>Quick steps:</p> <ol style="list-style-type: none"> 1. Download the enviolo app 2. Connect app to hub interface 3. Go to SETTINGS menu 4. Update the interface to the latest firmware 	<p>Result 1: Firmware was up-to-date; continue diagnostics</p> <p>Result 2: Firmware got updated, but issue persists; continue diagnostics</p> <p>Result 3: Firmware got updated and issue is solved.</p>
2	<p>Verify general function: test CAN communication</p> 	<ol style="list-style-type: none"> 1. Ensure that the cable at the hub interface is undamaged and correctly connected 2. Turn bike on 3. Short-press the F2 remote button 	<p>Result 1: Cadence selection screen appears and is able to be changed - indicates the CAN communication is functioning.</p> <p>Result 2: The MasterMind does not go to a cadence selection screen and instead goes to Micro Tune - indicates a failure of CAN component communication.</p>
3	<p>Calibrate the hub interface.</p> <p>Note that manual calibration is not required with AH1 3.1 interfaces with firmware v10 or higher; these interfaces will calibrate automatically in the background. Check hardware version in enviolo app.</p> 	<p>Calibrate the hub interface through the enviolo app:</p> <ol style="list-style-type: none"> 1. Turn bike on and set it to ECO or SPORT mode 2. Connect with the enviolo app and calibrate the hub in the SETTINGS menu, using one of these methods: <ul style="list-style-type: none"> • Rotate cranks consistently in workstand • Ride at slow speed in flat/safe environment 3. During calibration, the hub will shift through the gearing ratio 4. Calibration success will be confirmed in the app 	<p>Result 1: Calibration was successful: indicates working CAN communication and hub settings are applied.</p> <p>Result 2: Calibration was not successful:</p> <ol style="list-style-type: none"> 1. Restart bike and re-calibrate 2. Run further diagnostics (Interface does not calibrate)

GENERAL QUICK FUNCTION CHECK (CONT.)


#	Function Check	Action(s)	Result / Note
4	<p>Verify general function: test CAN communication</p> <p><i>Interface LED allows testing if CAN signals are detected.</i></p> <p>Note that LED behaviour depends on interface hardware and firmware; use enviolo app to check hardware version and always update interface to the latest firmware.</p> 	<p>Update the interface to the latest version, using the enviolo app.</p> <p>Run these tests to check CAN communication:</p> <ol style="list-style-type: none"> 1. Ensure the hub interface is connected 2. Turn the bike on 3. Pedal the bike 4. Check interface LED behaviour <p>Depending on hardware and firmware, the LED will either blink green every 1-2 seconds or be constantly green when the bike is not moving; when the wheel/crankarms are moving, the LED pattern will change and the LEDs may turn off completely at bike speeds greater 5 kph.</p> <ol style="list-style-type: none"> 5. Select a cadence option through the display, using a short press on the F2 button. Being able to select a cadence setting indicates the CAN communication between enviolo and the Turbo System is working 	<p>Result 1:</p> <p>Interface LED indicates both magnets are there and detected by interface. Continue diagnostics as needed.</p> <p>Result 2:</p> <p>Interface LED indicates missing or undetectable magnet ring(s): check/ install missing ring(s). Use enviolo article on rings</p>
5	<p>Check general function: check for firmware updates and verify automatic setting in enviolo app.</p> 	<ol style="list-style-type: none"> 1. Download the enviolo app 2. Connect app to hub interface 3. Go to SETTINGS menu 4. Run available firmware updates 5. Verify that OPERATION MODE is set to "AUTO" <p>For details on firmware updates see here, top of page.</p> <p>Context:</p> <p>"Operation Mode" set to "Manual" would lead the hub to be stuck in one gear, but after pressing the remote F2 button and selecting some cadence it goes automatically to automatic control.</p>	<p>Result 1:</p> <p>Firmware is up-to-date and setting is correctly set to "AUTO". Continue diagnostics as needed.</p> <p>Result 2:</p> <p>Firmware was outdated and/or operation mode setting was wrong; interface got updated and/or operation mode was changed to "AUTO" in app, or applied by using the remote to choose a cadence setting: correct function restored.</p>

INTERFACE DOES NOT CALIBRATE

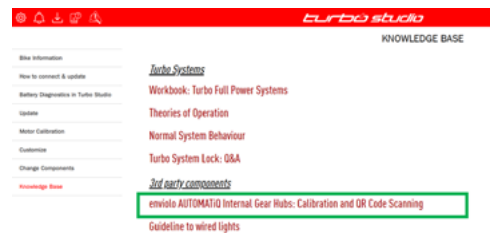
#	Action(s)	Result / Note
1	<p>Ensure that the hub interface is running on the latest firmware and shows no signs of physical damage.</p> <p>For details on firmware updates see here, top of page.</p>	<p>Result 1: Interface firmware is up-to-date and shows no signs of physical damage: move to step 2.</p> <p>Result 2: Interface cannot be updated and/or shows signs of physical damage: replace hub interface following the required procedure; see here for enviolo service/warranty conditions</p> <p>If your region is not covered for enviolo service/warranty, please contact your local Specialized Rider Care team.</p>
2	<p>Check the connection of the interface and calibrate. Note that manual calibration is not required with AHI 3.1 interfaces with firmware v10 or higher; these interfaces will calibrate automatically in the background. Check hardware version in enviolo app.</p> <p>Unplug the cable at the interface, check for any damage or connection issues and then plug back into the interface.</p> <p>Calibrate the hub interface through the enviolo app:</p> <ol style="list-style-type: none"> 1. Turn bike on 2. Connect with the enviolo app and calibrate the hub in the SETTINGS menu, using one of these methods: <ul style="list-style-type: none"> • Rotate cranks consistently in workstand • Ride at slow speed in flat/safe environment 3. During calibration, the hub will shift through the gearing ratio 4. Calibration success will be confirmed in the app 	<p>Result 1: Connection is ok and calibration was successful: problem is solved</p> <p>Result 2: Connection/cables are bad and/or calibration was not successful: replace needed hardware and/or move to step 3.</p>



INTERFACE DOES NOT CALIBRATE (CONT.)

#	Action(s)	Result / Notes
3	<p>Check cadence and speed sensor functionality.</p> <p>Context: There are 2 magnet rings installed on enviolo AUTOMATiQ hubs that measure cadence and speed. Watch this video on magnet ring installation</p>  <ul style="list-style-type: none"> ▪ Cadence (A): Located over the snap ring of the rear sprocket; this ring has 12 magnets ▪ Speed (B): Located around hub shell on the drive side; larger of the 2 rings and with 6 magnets 	<p>Result 1: Magnet rings are installed, but LEDs are not blinking as intended: move to step 4.</p> <p>Result 2: A magnet ring is missing: contact enviolo for replacement.</p> <p>Testing the magnet rings</p> <ul style="list-style-type: none"> ▪ Power the bike on and rotate the cranks forward slowly ▪ When pedaling forward slowly, the hub interface LED must show a green/red pattern; this indicates both magnets are there and detected; note that the LED behaviour can vary depending on hardware and firmware version, but all types should give you a green/red pattern when both crank and hub are moving at a speed < 5ph. <ul style="list-style-type: none"> • green LED = cadence / input speed • red LED = hub speed / output speed
4	<p>Diagnose for communication issue between the AUTOMATiQ unit and the Turbo CAN system.</p> <ol style="list-style-type: none"> 1. Test a new/working hub interface or matching complete rear wheel 2. Externally test a new main harness 	<p>Result 1: Known functional test interface resolved the issue: replace hub interface following the required procedure; see here for enviolo service/warranty conditions</p> <p>Result 2: The externally tested main harness solved the issue: install new harness and create a warranty claim if applicable.</p> <p>Result 3: No issues detected, but also no solution: please contact Specialized Rider Care.</p>

HUB DOES NOT PROVIDE FULL GEAR RATIO

#	Action(s)	Result / Note
1	<p>Inspect the enviolo unit for any physical damage especially the hub interface and its cabled connection.</p> <p>Unplug the cable at the interface, checking for any damage or connection issues and then plug back into the interface.</p>	<p>Result 1: Interface/cabling shows no signs of physical damage and connects normally: move to step 2.</p> <p>Result 2: Interface/cabling shows signs of physical damage: replace hub interface or main harness, using the required procedure.</p>
2	<p>Check for interface firmware updates and calibrate the hub interface through the enviolo app.</p> <p>For details on firmware updates see here, top of page.</p> <p>Note that manual calibration is not required with AHI 3.1 interfaces with firmware v10 or higher; these interfaces will calibrate automatically in the background. Check hardware version in enviolo app.</p> <p>Calibration steps:</p> <ol style="list-style-type: none"> 1. Turn bike on 2. Connect with the enviolo app and calibrate the hub in the SETTINGS menu, using one of these methods: <ul style="list-style-type: none"> • Rotate cranks consistently in workstand • Ride at slow speed in flat/safe environment 3. During calibration, the hub will shift through the gearing ratio 4. Calibration success will be confirmed in the app 	<p>Result 1: Firmware updating and/or calibration was successful: system should work as intended.</p> <p>Result 2: Firmware updating and/or calibration was not successful so that hub is still not shifting the full range: move to step 3.</p>
3	<p>Ensure the AUTOMATiQ interface has the correct settings applied for the bike.</p> <ol style="list-style-type: none"> 1. Open the shown Turbo Studio Knowledge Base article and familiarize yourself with the procedure of QR code scanning 2. Download and open the enviolo app, then pair to the enviolo unit. Refer to the video Download & Installation. 3. Find the correct QR code in the Turbo Studio Knowledge Base and scan the QR code under the SETTINGS menu in the enviolo app. 4. Calibrate the hub interface in the enviolo app after QR code scanning 	<p>Result 1: QR code scanning and calibration solved the issue.</p> <p>Result 2: Issue persists, hub does not provide full gear ratio: try different hub interface and/or contact enviolo service.</p> 

HUB DOES NOT SHIFT AT ALL OR INCORRECTLY

#	Action(s)	Result / Note
1	<p>Ensure that the OPERATION MODE is set to “AUTO”.</p> <p>While in the enviolo app, ensure that the automatic shifting mode is selected and not the manual mode. (this is something a rider could have changed; see also ‘General Quick Function Check’)</p>	<p>Result 1: Mode changed to “AUTO”: all works as intended.</p> <p>Result 2: “AUTO” mode was set, but issue persists: move to step 2.</p>
2	<p>Check cadence and speed sensor functionality.</p> <p>Click here to go through steps.</p>	<p>Result 1: Magnet rings are installed, but LEDs are not blinking as intended: move to step 3.</p> <p>Result 2: A magnet ring is missing: contact enviolo for replacement.</p>
3	<p>Follow the steps under “hub does not provide full gear ratio”.</p>	<p>Result 1: Calibration was successful: system should work as intended.</p> <p>Result 2: Calibration not successful or hub is still not shifting the full range: move to step 4.</p>
4	<p>Contact enviolo service for guidance.</p>	<p>See here for enviolo service/warranty conditions</p> <p>If your region is not covered for enviolo service/warranty, please contact your local Specialized Rider Care team.</p>

NO MOTOR / MOTOR ERROR ON BIKE DISPLAY

Note that this error can have a root cause unrelated to enviolo. Please use the Diagnostics Guide in Turbo Studio and check the Turbo Studio Event Log after connecting the bike to Turbo Studio.



#	Action(s)	Result / Note
1	<p>Unplug the connector at the hub interface and check both terminals for physical damage.</p> <p>Leave hub interface unplugged for this test.</p>	<p>Result 1: Error code disappears when the hub interface is unplugged: move to step 2.</p> <p>Result 2: Error code does not disappear with unplugged hub interface: issue not related to enviolo. Use digital diagnostics / the Diagnostics Guide in Turbo Studio.</p>
2	<p>Reconnect the hub interface. switch on bike, and check if “No Motor” or “Motor Error” returns on bike display.</p>	<p>Result 1: No, the error does not return when reconnected: root cause was a bad connection. Issue solved.</p> <p>Result 2: Yes, error returns on display: move to step 3.</p>
3	<p>Ensure the hub interface features the latest enviolo firmware and has the correct settings applied for the bike.</p> <p>For details on firmware updates see here, top of page. For details on QR code scanning click here, end of page.</p>	<p>Result 1: QR code scanning and calibration solved the issue.</p> <p>Result 2: QR code scanning and calibration did not solve the issue: externally test a known functioning main harness; if this solved the issue, proceed to complete installation of new main harness.</p>

BIKE DOES NOT TURN ON

Note that this error can have a root cause unrelated to enviolo. Please use the Diagnostics Guide in Turbo Studio and check the Turbo Studio Event Log after connecting the bike to Turbo Studio.

#	Action(s)	Result / Note
1	<p>Check if the internal MasterMind display battery has enough charge left to power the bike on. (note that this check step is unrelated to enviolo)</p> <ul style="list-style-type: none"> Connect a powered USB-C cable to the display Once you have plugged it in, the display will power on, but it is advisable to keep the MasterMind display connected to a charge source for min. 30 minutes 	<p>Result 1: The bike powers on with a powered USB-C cable connected to the display and keeps powering on after charging the display battery: issue solved.</p> <p>Result 2: The bike does not power on with a powered USB-C cable connected and a charged display battery: move to step 2.</p>
2	<p>Unplug the connector at the hub interface and check both terminals for physical damage.</p> <p>Leave the hub interface unplugged for this test.</p>	<p>Result 1: Bike powers on when the interface is unplugged: move to step 3.</p> <p>Result 2: Bike does not power on when the interface is unplugged: start diagnostics process for Turbo system.</p>
3	<p>Reconnect the hub interface and check if the bike turns on.</p>	<p>Result 1: Yes, the bike powers on: issue solved.</p> <p>Result 2: No, the bike does not power on or shuts down again: use the Diagnostics Guide in Turbo Studio.</p>

RATTLING NOISE

Note that this error can have a root cause unrelated to enviolo. Please use the Diagnostics Guide in Turbo Studio and check the Turbo Studio Event Log after connecting the bike to Turbo Studio.

#	Action(s)	Result / Note
1	Check the torque of the 17 mm nut that secures the enviolo interface to the hub. <ul style="list-style-type: none"> Torque of 17 mm nut: 15 Nm Watch this how-to-video 	Result 1: Rattling is gone: issue solved. Result 2: Rattling is still present: narrow down the root-cause by checking all parts and bolts that could cause the noise.

BUZZING BELT NOISE

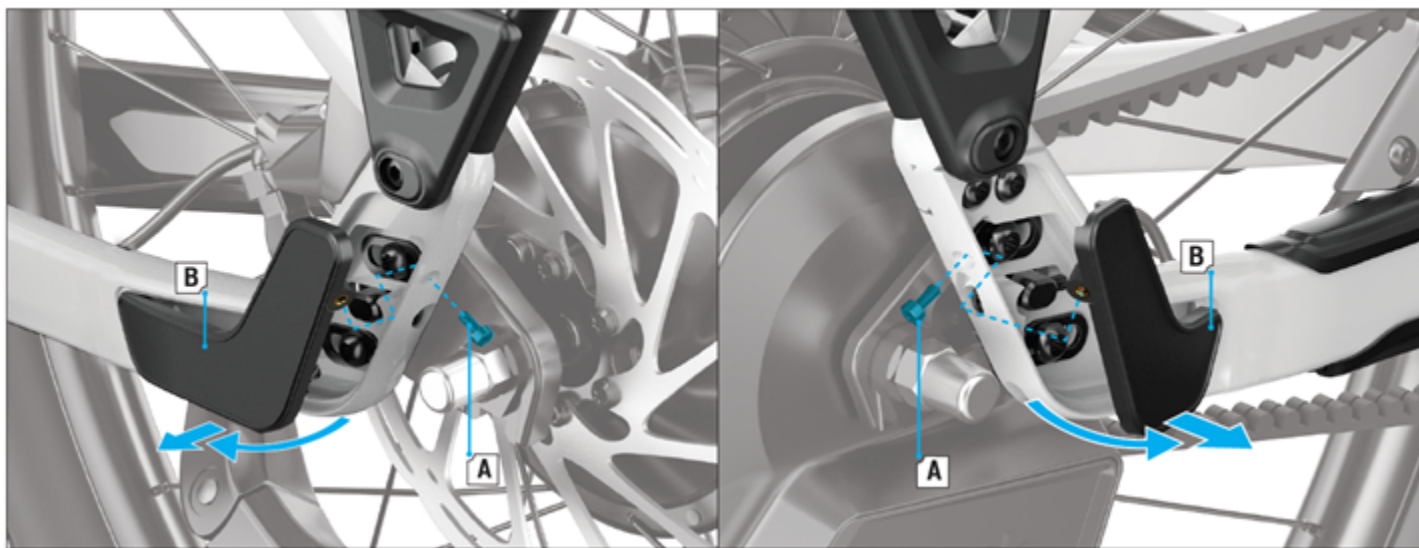
#	Action(s)	Result / Note
1	Check the belt for any physical damage or excessive wear. Please use this Gates resource .	Result 1: Belt in good condition: move to next step. Result 2: Belt in bad condition: replace the belt.
2	Check the belt tension. Low tension causes the belt to ride up over the sprocket and settle back in violently. Rider will experience a “pop” in the pedals with a loud bang.	Result 1: Belt tension adjusted and buzzing noise gone: issue solved. Result 2: Belt tension adjusted, but buzzing noise continues: move to step 3. Important: on models with enviolo AUTOMATiQ, tooth skipping under heavy loads can occur despite correct belt tension since no belt retainer (“snubber”) can be installed. Watch these belt tension videos for further information: <ul style="list-style-type: none"> Measuring the belt tension with the Spring Tension Tester Measuring belt tension with the app
3	Slowly pedal the bike in the stand with the assist off and determine if the buzzing is constant throughout the belt rotation or intermittent.	Result 1: Buzzing is constant: move to step 4. Result 2: Buzzing is not constant: please use the common issues and solutions outlined in online Gates technical manual .

BUZZING BELT NOISE (CONT.)

#	Action(s)	Result / Note
4	<p>If buzzing is constant, this is likely due to misalignment, which requires dropout adjustment.</p> <p>The following steps and images are taken from the Technical Bulletin “TURBO VADO/COMO INCORRECT BELT TENSION.”</p> <ul style="list-style-type: none"> To access the adjustable slide bolts, remove the covers located on the rear dropouts (B). Using a 2.5 mm hex key, remove both bolts from the rear of the non-drive side and drive side dropouts (A). Use a flat head screwdriver to lift the covers, then rotate the covers forward toward the front of the bike and remove them (B). CAUTION: Do not force the cover open as this damages the molded clips on the covers. Using a torque wrench and T30 Torx bit, loosen the sliding dropout tensioning bolts on both non-drive side and drive side rear dropouts (A). Using a torque wrench and a T30 Torx bit, loosen but do not remove the kickstand bolts (C). Starting on the drive side (right), use a 3 mm hex key to tighten or loosen the adjustable slide bolt (B) in small increments to achieve the correct belt tension. Always mirror each action on the non-drive side to ensure the rear wheel stays aligned. Check the belt tension by using the Bicycle Belt Tension Meter app or the Spring Tension Tester tool to ensure you have achieved the desired tension. 	

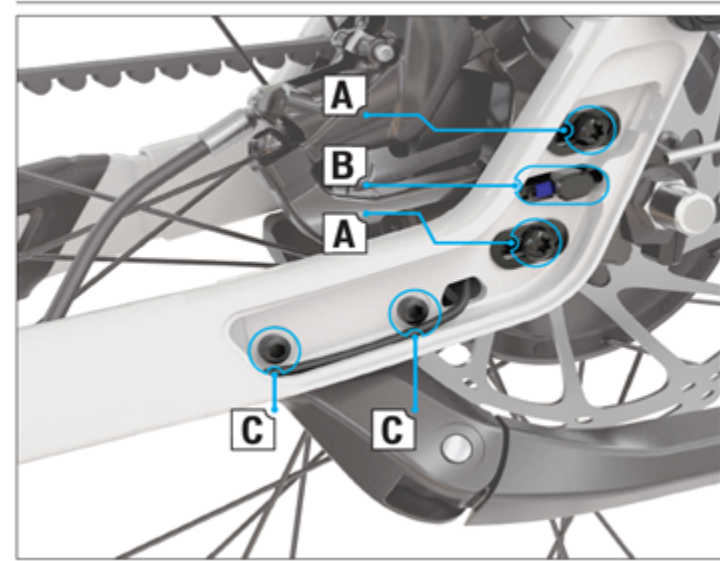
BUZZING BELT NOISE (IMAGES ON STEP 4)

REMOVE THE DROPOUT COVERS

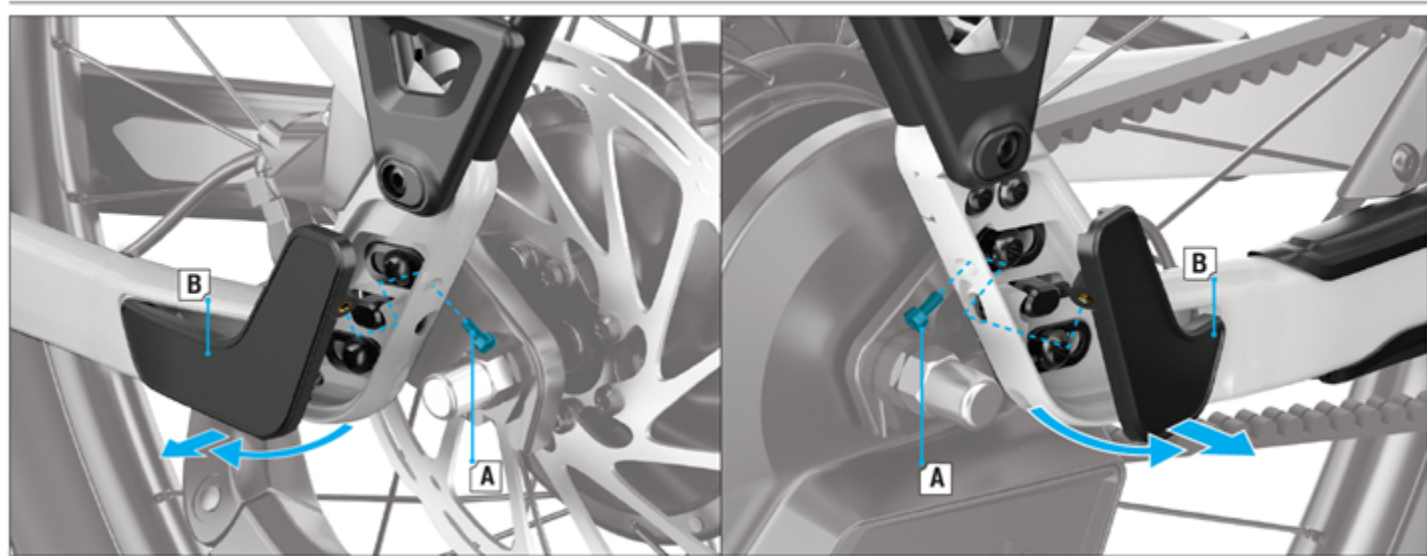


BUZZING BELT NOISE (IMAGES ON STEP 4)

SLIDING DROPOUT SPECS

	DESCRIPTION	TOOL	TORQUE SPEC
	A Sliding dropout tensioning bolts	T30 Torx	13 Nm / 115 in-lbf
	B Adjustable slide bolt	3 mm hex key	belt tension
	C Kickstand bolts	T25 Torx	9 Nm / 80 in-lbf

REMOVE THE DROPOUT COVERS



GEAR SHIFTER ERROR - TIMEOUT

#	Action(s)	Result / Note
1	<p>Ensure that the hub interface is running on the latest firmware, shows no signs of physical damage and is connected correctly.</p> <p>Unplug the cable at the interface, checking for any damage or connection issues and then plug back into the interface.</p> <p>For details on firmware updates see here.</p>	<p>Result 1: The error does not return after firmware updating and/or reconnecting: issue solved.</p> <p>Result 2: The error returned after firmware updating and/or reconnecting: move to step 2.</p>
2	<p>Connect the bike to Turbo Studio and follow related Service Actions in the Event Log.</p> <p>This is important in case of intermittent or continuous issues with the automatic gear shifter.</p>	<p>Result 1: Using the Event Log and related Service Actions solved the issue.</p> <p>Result 2: Using the Event Log and related Service Actions did not solve the issue: move to step 3.</p>
3	<p>Test new/working hub interface or contact enviolo/QPB for interface replacement.</p> <p>Important: a new interface requires QR code scanning and calibration.</p>	<p>Result 1: New harness solves the issue: install harness in bike.</p> <p>Result 2: New harness does not solve the issue: move to step 4.</p>
4	<p>Externally test a new main harness.</p>	<p>Result 1: New harness solved the issue: install harness in bike.</p> <p>Result 2: New harness does not solve the issue: contact enviolo service.</p>



GEAR SHIFTER ERROR - ENVILO STALL

#	Action(s)	Result / Note
1	<p>Ensure that the hub interface is running on the latest firmware and calibrate the hub interface through the enviolo app.</p> <p>For details on firmware updates see here, top of page.</p> <p>Note that manual calibration is not required with AHI 3.1 interfaces with firmware v10 or higher; these interfaces will calibrate automatically in the background. Check hardware version in enviolo app.</p>	<p>Result 1: Firmware update and/or calibration fixed the issue.</p> <p>Result 2: Firmware update and/or calibration did not fix the issue: move to step 2.</p> <p>Calibration steps:</p> <ol style="list-style-type: none"> 1. Turn bike on 2. Connect with the enviolo app and calibrate the hub in the SETTINGS menu, using one of these methods: <ul style="list-style-type: none"> • Rotate cranks consistently in workstand • Ride at slow speed in flat/safe environment 3. During calibration, the hub will shift through the gearing ratio 4. Calibration success will be confirmed in the app
2	<p>Connect the bike to Turbo Studio and follow related Service Actions in the Event Log.</p> <p>This is important in case of intermittent or continuous issues with the automatic gear shifter.</p>	<p>Result 1: Using the Event Log and related Service Actions solved the issue.</p> <p>Result 2: Using the Event Log and related Service Actions did not solve the issue: move to step 3.</p>
3	<p>Test new/working hub interface or contact enviolo/QPB for interface replacement.</p> <p>Important: a new interface requires QR code scanning and calibration.</p>	<p>Result 1: New hub interface solved the issue.</p> <p>Result 2: New interface did not solve the issue: contact enviolo service for further advice.</p>

