

# EasyOne Connect Message Numbers

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EasyOne Connect provides a result parameter called "Message No". This parameter contains information about error and warning messages associated with a particular trial. It is also available in the XML export file.

Warning messages in EasyOne Connect comply with the ATS/ERS Spirometry Standard 2019. For FVC/FVL tests performed according to Standard 2019, message numbers have been replaced by warning notes in the UI and in the XML export. However, the result parameter "Message No" is still available, and it can be displayed in the result table.

The parameter "Message No" contains a maximum of 7 error or warning codes using the following format: "aabbccddeeffgg.00". Each number consists of 2 digits, except the first number, which may consist of only 1 digit.

Example: 2.00	→ Warning 2
Example: 21415.00	→ Warning 2, 14, and 15
Example: 220211.00	→ Warning 22, 2, and 11
Example: 111234.00	→ Warning 11, 12, and 34

The following list indicates message number and message text, followed by a description of the problem and a suggestion for solutions. Some error or warning messages do not appear if another message is shown.

## 0 – [no error or warning]

Test is OK.

## 1 – Abrupt end of test detected

**Problem:** Patient may not have exhaled completely. Expiration time was <2 seconds; or volume during last 2 seconds was >30 ml (expiration time between 2 and 7 s) or >45 ml (expiration time >7 s).

**Solution:** The patient must exhale for longer and force as much air as possible out of his or her lungs.

**Remark:** This message was replaced by no. 39 in EasyOne Connect version 3.5.1.7.

## 2 – Patient hesitation detected

**Problem:** Patient hesitation detected. Back-extrapolated volume >150 ml, or 5% of FVC, whichever is greater (for age ≤6: 80 ml or 12.5% of FVC, whichever is greater).

**Solution:** The patient must blast out air as quickly and as hard as possible.

**Remark:** In versions 3.8.0.11 and higher, this message is only applicable for tests performed using the Spirometry Standard 2005 settings.

### **3 – Please blow out faster**

Problem: Peak flow was delayed. Time until peak flow was >160 ms.

Solution: The patient must blast out air as quickly and as hard as possible.

### **4 – Please blow out longer**

Problem: Patient may not have exhaled completely. Expiration time was <2 seconds. OR volume in the last 0.5 seconds of the expiration was >100 ml.

Solution: The patient must exhale for longer and force as much air as possible out of his or her lungs.

Remark: This message was replaced by no. 38 in EasyOne Connect version 3.5.1.7.

### **5 – Unable to detect forced maneuver**

Problem: Software was unable to detect a forced maneuver.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver.

### **6 – Unable to detect steady tidal breathing**

Problem: The software was unable to detect steady tidal breathing. All end-inspiratory volumes of 3 breaths are not within 200 ml, and/or the difference between the tidal volumes of 3 consecutive breaths is >200 ml.

Solution: Please instruct the patient to breathe steadily during the tidal breathing phase.

Remark: This message was replaced by no. 42 in EasyOne Connect version 3.9.2.4.

### **7 – Incomplete maneuver, unable to calculate IRV**

Problem: Unable to detect complete maneuver and to calculate IRV.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver. Complete in- and expiration are required.

### **8 – Incomplete maneuver, unable to calculate ERV**

Problem: Unable to detect complete maneuver and to calculate ERV.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver. Complete in- and expiration are required.

### **9 – Test started too early**

Problem: Early test-start detected. The time to peak flow (PEFT) was <30 ms, or flow was detected before test was started.

Solution: Please instruct the patient to wait until the baseline-setting has been completed and until the software signals to start the test.

### **10 – Cough detected**

Problem: A cough was detected.

Solution: Please instruct the patient to avoid coughing during the measurement.

### **11 – Gas inspiration time too long**

Problem: Long inspiration time detected. Inspiration time >4.0 seconds.

Solution: Please instruct the patient to inhale the test gas faster.

### **12 – Breath-hold time out of range**

Problem: Breath-hold time was outside of acceptable range (8-12 seconds).

Solution: Please instruct the patient to exhale as soon as he or she is prompted and the valve opens.

## **14 – Calibration result out of range – Check setup**

Problem: Calibration result is outside of acceptable range. The measured volume outside of  $\pm 3.5\%$  of the target value.

Solution: Please check the test setup and repeat the test. If the error persists, please contact ndd Support.

## **15 – Try again - Flow criteria not met!**

Problem: Cal-syringe flow rate too fast or too slow.

Solution: Please perform the calibration check at the appropriate flow speed.

## **16 – Inspiratory or expiratory maneuver not detected**

Problem: Only inspiratory or expiratory maneuver detected (but not both).

Solution: Please perform complete inspiratory and expiratory maneuvers and ensure you perform the maneuvers correctly.

## **17 – Check complete gas connection and valve assembly**

Problem: Inspiratory CO concentration outside of target range.

Solution: Please check complete gas connection and valve assembly. Ensure that the test is performed correctly.

## **18 – Low inspiratory volume detected**

Problem: The inspiratory volume of the DLCO test was  $<85\%$  of the target value.

Solution: Please encourage the patient to inhale at least up to the dotted volume line shown on the display's graph, which indicates 90% (for DLCO 2017) or 85% (for DLCO 2005) of the expected VC.

## **19 – Check complete gas connection and valve assembly**

Problem: Inspiratory CO concentration outside of target range.

Solution: Please check complete gas connection and valve assembly. Ensure that the test is performed correctly.

## **20 – Check patient technique, gas supply and valve assembly**

Problem: The alveolar helium concentration is outside of the acceptable range.

Solution: Please check complete gas connection and valve assembly. Ensure that the test is performed correctly.

## **21 – Check patient technique, gas supply and valve assembly**

Problem: The expiratory CO concentration is outside of the acceptable range.

Solution: Please check complete gas connection and valve assembly. Ensure that test is performed correctly.

## **22 – Check patient technique, gas supply and valve assembly**

Problem: The alveolar CO concentration is outside of the acceptable range.

Solution: Please check complete gas connection and valve assembly. Ensure that test is performed correctly.

## **23 – Check patient technique, gas supply and valve assembly**

Problem: The alveolar volume (VA) is outside of the acceptable of range.

Solution: Please check complete gas connection and valve assembly. Ensure that test is performed correctly.

## **24 – Check patient technique, gas supply and valve assembly**

Problem: The DLCO value is outside of the acceptable range.

Solution: Please check complete gas connection and valve assembly. Ensure that test is performed correctly.

## 25 – Unable to calculate FRC extrapol – Please check for leaks

Problem: The extrapolated MBW volume (i.e., the volume that could have been washed out after the washout was stopped) cannot be determined.

Solution: Do not stop the washout too early and/or check for leaks.

## 26 – FRC extrapol too high - Do not stop the washout too early

Problem: The extrapolated MBW volume (i.e., the volume that could have been washed out after the washout was stopped) >1 liter.

Solution: Do not stop the washout too early and/or check for leaks

## 27 – Inspiratory gas leak detected

Problem: Inspiratory gas leak detected. The end-inspiratory molar mass deviates from the tracer gas molar mass. This indicates that the patient must have breathed in ambient air during the maneuver.

Solution: Please check the valves and ensure that the FRC Barriette and Spirette are properly inserted. Make sure that the nose clip is properly positioned and that the patient is breathing normally.

Remark: This message only appears in EasyOne Connect versions lower than 2.1.0.9.

## 28 – High inspiratory or expiratory pressure detected

Problem: High inspiratory or expiratory pressure detected. Peak pressure at the flow sensor exceeds +/-5 mb.

Solution: Please check that the O2 inlet pressure is set to 3-4 bar or 44-58 psi. Only minimal pressure variations are allowed during the test. Ensure that the patient's breathing is neither too deep or too fast and is within the limits of  $\pm 1.5$  l/s.

## 29 – Check complete gas connection and valve assembly

Problem: Side-stream flow is outside of acceptable range (<6 ml/s or >12 ml/s).

Solution: Please ensure that the gas connection is set up properly and check whether the patient tube (maintenance kit) needs to be replaced. Contact ndd Support if the error persists.

Remark: This message only appears in EasyOne Connect versions lower than 1.9.0.19.

## 30 – Allow device to warm up.

Problem: CO sensor drift detected.

Solution: Please let the device warm up and repeat the test. If the error persists, please contact ndd Support.

## 31 – N2 concentration at end of test too high – Longer washout required

Problem: Tracer concentration at end of test too high. Tracer concentration at end of test >2% N2.

Solution: Repeat the test, encouraging the patient to continue breathing until at least 3 breaths with concentrations <2% N2 are achieved.

## 32 – The automatic calibration of the CO2 sensor failed

Problem: The automatic calibration of the CO2 sensor failed.

Solution: Repeat the test. If the error persists, contact ndd Support.

Remark: This message only appears in EasyOne Connect versions lower than 2.1.0.9.

## 33 – CO level too high – Please observe waiting time between trials

Problem: CO level during tidal breathing too high.

Solution: Wait at least four minutes between two DLCO tests. Please also check the DLCO valve unit. If the error persists, contact ndd Support.

## 34 – Tidal breathing volume too low

Problem: Tidal breathing volume too low. Tidal volume outside of 4 to 30 ml/kg body weight, OR outside of 0.25 to 0.3 L if body weight is not stated.

Solution: Ask the patient to breathe regularly, calmly, and within the required range.

## 35 – Check patient's technique and gas supply. Also check for leaks.

Problem: Volume drift during washout test detected. The volume drift correction could not be performed and/or the parameters IRV and/or ERV are <0.

Solution: Ensure that the patient performs the test correctly and check for gas leaks in the test setup. Check for correct test performance and/or for leaks. If the error persists, contact ndd Support.

## 36 – DLCO-Warning: Check patient technique

Problem: Measured Vd (Fowler dead space) is outside of acceptable range.

Solution: Ask the patient to exhale steadily after breath-hold.

## 37 – End of test criteria not met (short exhalation time)

Problem: Patient did not exhale for long enough, in accordance with ATS/ERS exhalation time criteria. Expiration time was <6 seconds for patients aged  $\geq 10$  years, or <3 seconds for patients aged 7-10 years. No criteria apply for patients <6 years (preschool age).

Solution: Please encourage the patient to exhale for longer and to force as much air as possible out of his or her lungs.

Remark: 1. This message was introduced with EasyOne Connect version 3.5.1.7.  
2. This warning can be enabled or disabled in the configuration (setting "Enforce minimum 6-second expiration").  
3. In version 3.8.0.11 and higher, this message only appears for tests performed using the Spirometry Standard 2005 settings.

## 38 – Abrupt end of test detected

Problem: Short expiration time or high flow at end of test detected. Patient may not have exhaled completely. For patients aged  $\geq 7$  years, volume during the last 0.5 seconds must be >100 ml, or expiration time <2 seconds. No criteria apply for ages  $\leq 6$  years (preschool age).

Solution: The patient must exhale for longer and force as much air as possible out of his or her lungs.

Remark: 1. This message was introduced with EasyOne Connect version 3.5.1.7.  
2. In version 3.8.0.11 and higher, this message only appears for tests performed using the Spirometry Standard 2005 settings.

## 39 – End of test criteria not met (plateau criteria)

Problem: Patient may not have exhaled completely, in accordance with ATS/ERS plateau criteria. For patients aged  $\geq 7$  years, volume during the last second must be >25 ml. No criteria apply for ages  $\leq 6$  years (preschool age).

Solution: Please encourage the patient to exhale for longer and to force as much air as possible out of his or her lungs.

Remark: 1. This message was introduced with EasyOne Connect version 3.5.1.7.  
2. In version 3.8.0.11 and higher, this message only appears for tests performed using the Spirometry Standard 2005 settings.

## **40 – VI <90% of largest VC**

**Problem:** Patient may not have inhaled completely. Note: ATS/ERS criteria are still fulfilled if VI is between 85% and 90% of the largest VC obtained in the same test session and VA is  $\geq 0.95 * V_{Amax}$  OR VA is  $\geq V_{Amax} - 200$  ml; where  $V_{Amax}$  is the largest VA of other maneuvers graded as A.

**Solution:** Please encourage the patient to inhale at least up to the dotted volume line displayed on the device's screen, which indicates 90% of the expected VC.

## **41 – VI <80% of largest VC**

**Problem:** Patient may not have inhaled completely.

**Solution:** Please encourage the patient to inhale at least up to the dotted volume line displayed on the device's screen, which indicates 90% of the expected VC.

## **42 – Unable to detect steady tidal breathing**

**Problem:** The software was unable to detect steady tidal breathing. The difference between the highest and the lowest points of any four consecutive end-expiratory volume points was >15% of the tidal volume.

**Solution:** Please instruct the patient to breathe steadily during the tidal breathing phase.

**Remark:** This message was introduced with EasyOne Connect version 3.9.2.4 and only appears for tests performed using the Spirometry Standard 2019 settings.

## **43 – Unable to detect steady tidal breathing and fewer than 10 tidal breaths were detected.**

**Problem:** Unable to detect steady tidal breathing and fewer than 10 tidal breaths were detected.

**Solution:** Please instruct the patient to breathe steadily during the tidal breathing phase or to perform more tidal breaths.

**Remark:** This message was introduced with EasyOne Connect version 3.9.2.4.

## **44 – End of test criteria not met (plateau criteria or expiratory time $\geq 15$ s)**

**Problem:** Patient may not have exhaled completely according to the end-of-test criteria. Criteria details: The change in volume over the last second of expiration must be  $\leq 25$  ml, or expiration time must be  $\geq 15$  s.

**Solution:** Please encourage the patient to exhale for longer and to force as much air as possible out of his or her lungs.

**Remark:** This message was introduced with EasyOne Connect version 3.9.2.4.

## **46 – Timeout identified**

**Problem:** A timeout occurred during the maneuver.

**Solution:** Please follow the test instructions.

## **47 – Device error**

**Problem:** An unexpected device error occurred.

**Solution:** Please check if the sensor is connected correctly and repeat the trial.

## **48 – Invalid trial, please repeat trial**

**Problem:** Trial does not meet acceptability criteria.

**Solution:** Please repeat trial.

## **50 – [no error or warning]**

Test is OK.

## **51 – Test started too early**

Problem: Early start detected.

Solution: Wait until the device signals to start the test.

## **52 – Unable to detect maneuver**

Problem: Unable to detect maneuver.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver.

## **54 – Unable to get sampling volume – Please blow out longer**

Problem: Unable to determine sampling volume.

Solution: Ask the patient to exhale enough volume after breath-hold.

## **55 – Incorrect test procedure**

Problem: Test was performed incorrectly.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver.

## **56 – Incorrect test procedure**

Problem: Test was performed incorrectly.

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver.

## **57 – Unable to detect DLCO inspiration – Please follow test instructions**

Problem: Unable to detect DLCO inspiration and to determine starting point of breath-hold time (Jones & Mead).

Solution: Please repeat the maneuver and follow the instructions shown during the maneuver.

## **59 – Inspiratory CO concentration error**

Problem: Unstable CO concentration during breath-hold. CO not within +50..-800 ppm.

Solution: Please check for leaks (valves, patient's mouth) and follow the instructions shown during the maneuver.

## **60 – Delay incorrectly determined**

Problem: Side-stream time-delay incorrectly determined.

Solution: Please check complete gas connection and valve assembly. Ensure that the test is performed correctly.

## **61 – CO sensor calibration failed**

Problem: CO sensor calibration failed.

Solution: Please check complete gas connection and valve assembly. Also check for leaks.

## **62 – CO sensor is clipping**

Problem: CO sensor is outside of acceptable range (clipping).

Solution: Please check complete gas connection and valve assembly. Also check for leaks.

## **63 – CO sensor 3-point cal error: S-Factor range**

Problem: CO sensor 3-point calibration error (S-Factor range).

Solution: Please check complete gas connection and valve assembly. Also check for leaks.



## **64 – CO sensor 3-point cal error: 3-point level outside of range**

Problem: CO sensor 3-point calibration error (3-point level outside of range).

Solution: Please check complete gas connection and valve assembly. Also check for leaks.

## **65 – CO sensor 3-point cal error: sd of 3-point level outside of range**

Problem: CO sensor 3-point cal error (sd of 3-point level outside of range).

Solution: Please check complete gas connection and valve assembly. Also check for leaks.

## **66 – No start of washout detected**

Problem: No start of washout detected.

Solution: Please follow the instructions shown during the maneuver.

Remark: This message only appears in EasyOne Connect versions lower than 2.1.0.9.

## **67 – Check gas supply and breathe regularly**

Problem: Side-stream time-delay incorrectly determined.

Solution: Please check complete gas connection and valve assembly. Also ensure that test is performed correctly (instruct the patient to breathe regularly).

## **68 – Not enough breaths for washout analysis**

Problem: Not enough breaths for washout analysis detected.

Solution: Repeat the test. Do not stop it early.

## **69 – Check gas supply and check for leaks**

Problem: Leak or wrong test gas detected.

Solution: Check test gas and gas supply. Also check for leaks.

Remark: This message only appears in EasyOne Connect versions lower than 2.1.0.9.

## **70 – Check gas supply, check for leaks and breathe regularly**

Problem: Unable to evaluate Multi-Breath-Washout.

Solution: Instruct the patient to breathe regularly. Check complete gas supply and check for leaks.

Remark: This message only appears in EasyOne Connect versions lower than 2.1.0.9.

## **71 – Allow device to warm up**

Problem: CO sensor drift detected.

Solution: Allow the CO sensor to warm up. If the error persists, contact ndd Support.

## **100 – BEV $\leq$ 5% of FVC or 0.100L**

Problem: Must have BEV  $\leq$  5% of FVC or BEV  $\leq$  0.100 L, whichever is greater.

Solution: Instruct the patient as follows: Take a deep breath to completely fill your lungs, then blast out as hard and fast as you can.

Remark: This message is only applicable for tests performed using the Spirometry Standard 2019 settings.

## **101 – Expiratory plateau**

Problem: Expiratory plateau  $\leq$  0.025 L in the last 1 s of expiration.

Solution: Instruct patient to exhale for longer and until lungs are completely empty.

Remark: This message only appears for tests performed using the Spirometry Standard 2019 settings.



## 102 – Expiratory time

Problem: Expiratory time  $\geq 15$  s.

Solution: Instruct the patient to exhale for longer and until his or her lungs are completely empty.

Remark: This message only appears for tests performed using the Spirometry Standard 2019 settings.

## 103 – FIVC-FVC $\leq 0.100$ L or 5% of FVC

Problem: If the maximal inspiration (FIVC) after EOFV is greater than FVC, then FIVC-FVC must be  $\leq 0.100$  L or 5% of FVC, whichever is greater.

Solution: Instruct the patient as follows: Take a deep breath to completely fill your lungs, then blast out as hard and fast as you can.

Remark: This message is only applicable for tests performed using the Spirometry Standard 2019 settings.

## 104 – Unable to detect steady tidal breathing

Problem: The software was unable to detect steady tidal breathing. The difference between the highest and the lowest point of any four consecutive end-expiratory volume points is greater than 15% of the tidal volume.

Solution: Please instruct the patient to breathe steadily during the tidal breathing phase.

Remark: This message was introduced with EasyOne Connect version 3.9.0.10.

## 105 – Unable to detect steady tidal breathing and fewer than 10 tidal breaths were detected.

Problem: Unable to detect steady tidal breathing and fewer than 10 tidal breaths were detected.

Solution: Please instruct the patient to breathe steadily during the tidal breathing phase, or perform more tidal breaths.

Remark: This message was introduced with EasyOne Connect version 3.9.0.10.

## 106 – End of test criteria not met (plateau criteria or expiratory time $\geq 15$ s)

Problem: Patient may not have exhaled completely according to the end of test criteria. Criteria details: The change in volume over the last second of expiration must be  $\leq 25$  ml, or expiration time must be  $\geq 15$  s.

Solution: Please encourage the patient to exhale for longer and to force as much air as possible out of his or her lungs.

Remark: This message was introduced with EasyOne Connect version 3.9.0.10.

## 107 – Exhale longer until completely empty.

Problem: FET  $> 1$  s.

Solution: Please instruct the patient to exhale for longer until his or her lungs are completely empty.

## 108 – Exhale longer until completely empty.

Problem: FET  $> 0.75$  s.

Solution: Please instruct the patient to exhale for longer until his or her lungs are completely empty.