

# Krautkrämer CL Go+

## Operating Manual



This Rev. - (03/2024) applies to software version:

**1.0 (February 2024)**

You will find the software version and the serial number of your instrument at **CONFIG – ABOUT**.

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# Overview







## Function groups and functions

PROBE&CAL	MEASURE	GATE	DR
PROBE A-2 DFR	MODE THICKNESS	gate a start 14.75mm	EXPLORER
THK CAL 1-PT	display delay 7.000µs	gate a width 29.50mm	PROPERTIES SHOW
CALIBRATION START	display range 40.00mm	GATE A THR. 80%	VIEW OFF
velocity 5920.0m/s CUSTOM	FREEZE OFF	gate b start 1.03mm	MASTER CMT EDIT
CAL REMINDER OFF	MAX GAIN MODE HIGH	gate b width 26.55mm	EXPORT
probe delay 3.500µs	max gain 66.0dB	GATE B THR. -40%	OVERWRITE OLD
	RESULTS CONFIG	gate c start 0.06mm	
		gate c width 14.75mm	
		GATE C THR. -30%	




Function groups and functions (cont'd)

ALARM	PARAM	CONFIG		
MIN ON	LOAD P-SET	UPDATE RATE 16Hz	DATE TIME 09.11.2023 10:59 AM	SD FORMAT START
min alarm 5.00mm	SAVE P-SET	RECTIFY RF	POWER DOWN MANUAL	ABOUT SHOW
MAX ON		RADIX PERIOD	UNIT mm	
max alarm 7.50mm		ROUND ROUND	RESOLUTION X.XXX	
		LAST READING HOLD	ZERO BLOCK ----- mm ----- m/s	
		BRIGHTNESS 10	LOCKOUT CONFIG	
		COLOR SCHEME3	MENU MODE EXPERT	
		LANGUAGE English	FUNC KEY NOT DEFINED	
		ORIENTATION RIGHT HAND	PASSWORD	
		DT FMT D.M.Y 12H	CODE	

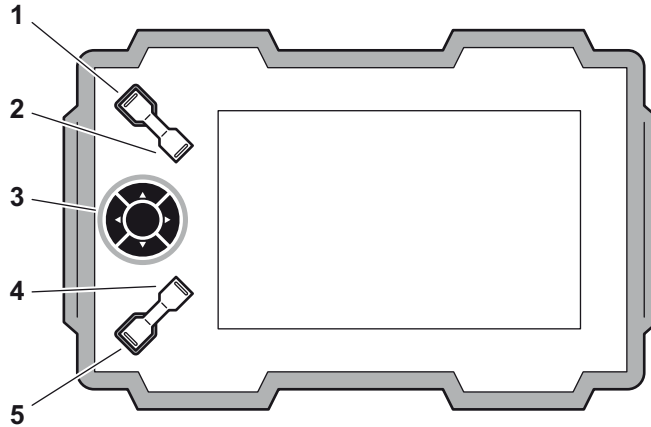
## Status display icons

Icon	Meaning
	SD memory card is inserted, flashes when the SD card is accessed
	Display memory active (Function FREEZE), display is „frozen“.
	Measurement mode IP to 1st echo
	Measurement mode Multi Echo
	Alarm threshold exceeded or fallen below
	Reminder for calibration

## Power level indicators

Icon	Meaning
	Battery charge level, remaining operating time in hours (approximate value)
	Charger/power adapter is connected, percentage of battery charge level (approximate value)
	Warning: Low battery charge level, remaining operating time in minutes (approximate value)

### Basic key functions



- 1 Function key 1, functions are context-dependent
- 2 Function key 2, functions are context-dependent; keys **1** and **2** simultaneously: Save screen shot
- 3 Keypad, navigation between function groups and functions, changing settings
- 4 Function key 3, functions are context-dependent
- 5 Function key 4, function individually assignable (**CONFIG – FUNC KEY**),

## Navigation

### Keys

### Function

---



Navigation between function groups,  
adjusting values



Navigation between functions  
within a function group



Changing the display orientation (landscape - portrait)

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# Introduction 1

## 1.1 Safety information

The CL Go+ has been designed and tested according to IEC 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use, and was technically in perfectly safe and faultless condition when leaving the manufacturing works.

In order to maintain this condition and to ensure a safe operation, you should always read the following safety information carefully before putting the instrument into operation.



### ATTENTION

**The CL Go+ is an instrument for materials testing. Any use for medical or any other applications is not permitted!**

The instrument may only be used in industrial environments.

The CL Go+ is waterproof according to IP67. It can be operated either with the corresponding lithium-ion batteries or with the charger/power adapter. The charger/power adapter meets the requirements of electrical safety class II.

## Battery operation

For the battery operation of the CL Go+, we recommend the corresponding lithium-ion battery. You should only use this battery for the battery operation.

You can charge the lithium-ion battery either within the instrument itself or in an external charger. If a lithium-ion battery is inserted, charging starts automatically as soon as you connect the charger/power adapter to the CL Go+ and to the mains power supply.

For power supply, please also see Chapter 3.2 **Power supply**, page 40. For the use of batteries, please also see Chapter 7.2 **Battery care**, page 154.

## Software

According to the current state of the art, software is never completely free from errors. Before using any software-controlled test equipment, it is therefore necessary to make sure that the required functions operate perfectly in the intended combination.

If you have any questions about the use of your test equipment, please contact your nearest representative of Waygate Technologies.

## Defects/errors and exceptional stresses

If you have reason to believe that a safe operation of your CL Go+ is no longer possible, you have to disconnect the instrument and secure it against unintentional reconnection. Remove the lithium-ion battery.

A safe operation is no longer possible for example

- if the instrument shows visible damages,
- if the instrument no longer operates perfectly,
- after prolonged storage under adverse conditions (e.g. exceptional temperatures or especially high air humidity, or corrosive environmental conditions),
- after being subjected to heavy stresses during transportation.

## 1.2 Important information on wall thickness measurement



### ATTENTION

Please read the following information before using your thickness gauge. It is very important that you understand and observe this information to avoid any errors when using the instrument that might lead to false measurement results. Decisions made on the basis of false measurement results may lead to property damages and personal injuries.

### Prerequisites for the use of ultrasonic thickness gauges

This operating manual contains essential information on how to operate your thickness gauge. In addition, there are a number of factors that affect the measurement results. A description of all these factors would go beyond the scope of an operating manual. Therefore, only the most important prerequisites for a safe and reliable ultrasonic thickness measurement are mentioned here:

- Training of the instrument operator (operator)
- Knowledge of special technical measurement requirements and limits
- Choice of the appropriate measuring device

The operation of an ultrasonic measuring device requires proper training in ultrasonic thickness measurement. Proper training comprises for example adequate knowledge of the following:

- Theory of the propagation of sound waves in materials
- Effects of the sound velocity of test material
- Behavior of sound waves at interfaces between different materials
- Propagation of the sound beam within the material
- Effect of the surface quality of test material.

Lack of such knowledge could lead to false measurement results with unforeseeable consequences. Information about the existing training opportunities for ultrasonic inspectors and about the qualifications and certificates that can finally be obtained is available at the national NDT societies.

## Limits of ultrasonic testing

The information obtained from ultrasonic tests only refers to those parts of the test object which are covered by the sound beam of the probe used. Should any conclusions from the tested parts be applied to the untested parts of the test object, they should therefore be made with extreme caution. Such conclusions are generally only possible in cases where extensive experience of the components to be tested and proven methods of statistical data acquisition are available.

Boundary surfaces within the test object can completely reflect the sound beam, resulting in reflection points which lie beyond this, for example the component's backwall, remaining undetected. It is therefore important to make sure that all areas to be tested in the test object are covered by the sound beam.

## Ultrasonic wall thickness measurement

All ultrasonic wall thickness measurements are based on a time-of-flight measurement of the sound pulse in the test object. Accurate measurement results therefore require a constant sound velocity in the test object. This requirement is generally met in test objects made of steel, even with different alloying constituents. The variation of sound velocity is so slight that it is only of importance for high-precision measurements. In other materials, for example nonferrous metals or plastics, the sound velocity is nevertheless subject to larger variations. These may affect the measuring accuracy.

## Effect of the test object material

If the material is not homogeneous, the sound waves may propagate at different velocities in different parts of the test object. In this case, an average sound velocity should therefore be taken into account for the instrument calibration.

However, the best results are obtained when the instrument is calibrated using a reference block made of the same material as the test object. This calibration block should have plane-parallel surfaces and a thickness corresponding to the maximum thickness of the test object. The operator should additionally keep in mind that the sound velocity is liable to vary substantially due to heat treatments. This fact must be taken into account when assessing the accuracy of the wall thickness measured by the instrument.

If substantial sound velocity variations are expected, then the instrument calibration should be adjusted to the actual sound velocity values at shorter time intervals. Failure to do so may lead to false thickness readings.

## Effect of temperature variations

The sound velocity within the test object also varies along with material's temperature. This can cause appreciable errors in measurements if the instrument has been calibrated on a cold reference block, whereas the thickness measurement is carried out on a warm test object. Such measurement errors can be avoided either by adjusting the temperature of the reference block used for calibration or by taking the temperature effect on the sound velocity into consideration on the basis of a correction factor obtained from published tables.

## Choice of the probe

The probe used for the measurement must be in good condition, i.e. its coupling face or delay line should not show any considerable wear. The measuring range (application range) specified for the corresponding probe in the data sheets must cover the complete thickness range to be inspected. The temperature of the test object must be within the permissible temperature range of the selected probe.

## Use of couplants

The operator must be familiar with the use of the ultrasonic couplant to the effect that the couplant is applied equally during every measurement so that variations in the couplant layer thickness and errors in the subsequent measurement results are avoided. The instrument calibration and the actual wall thickness measurement should be carried out under identical coupling conditions. During this process, the quantities of couplant used should be as small as possible and a constant pressure should be applied to the probe.

## 1.3 Important information on wall thickness measurement using the CL Go+



### ATTENTION

Please always read the following information about the special features in wall thickness measurement using the CL Go+. It is absolutely necessary that you observe this information in order to always obtain correct measurement results.

### High differences in temperature

If the differences in temperature between the storage and inspection site are high, it is necessary that you wait approx. 2 minutes before you use the instrument after connecting the probe.

### Measuring accuracy

Keep in mind that the measuring accuracy is not identical with the display accuracy. The measuring accuracy depends on the following factors:

- Temperature
- Probe delay line
- Constancy of sound velocity
- Uniformity of surface quality

### Probes

Only the following probes are accepted for the CL Go+:

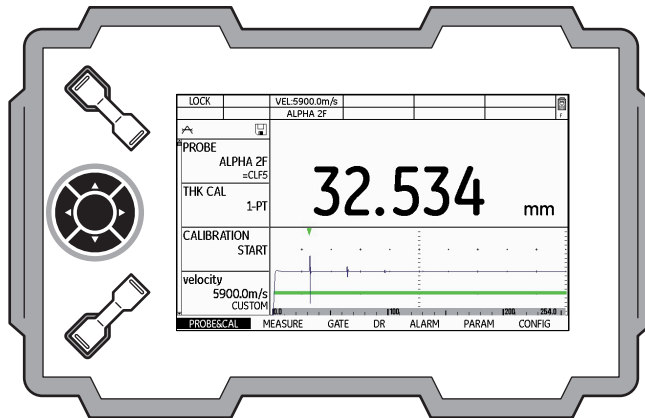
- CA 211 A
- A2 DFR = CLF 4
- Alpha 2F = CLF 5



## 1.4 The CL Go+

### Overview of functions

The CL Go+ is a portable thickness gauge with an integrated data recorder. You can use this instrument for measuring the wall thickness on a large variety of components.



### Special features of the CL Go+

- High precision measurement with digital resolution up to 0.001 mm / 0.0001 in
- High measuring stability and reliability due to zero crossing measurement
- Automatic gain control for an improved reproducibility during tests
- Dust-tight and waterproof housing according to IP67
- Low weight (845 g incl. batteries)
- Long operating time (8 hours) due to lithium-ion battery with internal and external charging possibility
- One-handed operation is possible
- High-resolution color screen (800 x 480 pixels) for the display of measured values and A-scan
- Enlarged display of measured values which are easy to read even from a greater distance
- Color-coded display of gates for easy differentiation
- High memory capacity with SD card.
- Display range 3.76 ... 15000 mm (steel), measuring range depending on the probe, material and surface

- Units selectable between inch and mm
- Integrated data recorder for 100,000 measurements per file. Several files can be saved to the SD card.
- Up to 16 user-definable comments for every file format with up to 16 alphanumeric characters per measuring point
- MicroGrid function for testing the direct surroundings of the measuring point
- Operating modes: Thickness, Velocity, Quality, A-scan, B-scan, Min/Max, Diff
- Adjustable minimum and maximum limits with alarm signaling through color change of the reading
- Locking function to prevent unintentional changes to the adjustment values

## Options

### CL Go+

contains all basic functions for ultrasonic high precision wall thickness measurement, including live A-scan.

### CL Go+ DL

contains all CL Go+ functions and the extended data recorder. This licensed software option can be enabled by a code (see page 111).

## 1.5 Wall thickness measurement using the CL Go+

### Principle of ultrasonic measurement

At first, the CL Go+ generates an electric initial pulse which is guided to the transmitter element of the probe. Once there, it is converted into a mechanical ultrasonic pulse.

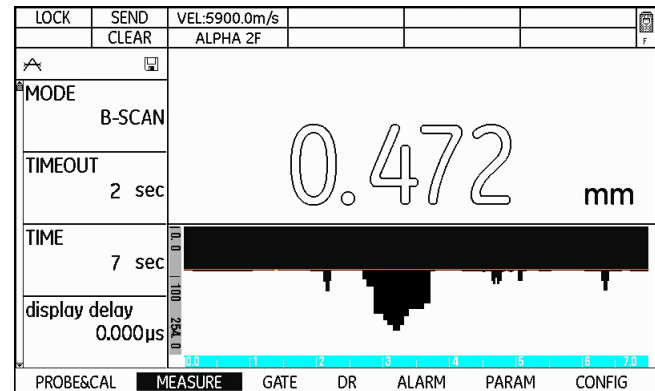
By means of a couplant, the ultrasonic pulse is transmitted from the probe to the material to be tested which it passes through at a velocity typical of the material (sound velocity of the material) until it encounters a change in the material. Part of the pulse energy is reflected from there and sent back to the probe (echo). If the signal reaches the backwall of the test object before that, the reflected pulse is called backwall echo.

For the wall thickness measurement, the CL Go+ determines the time of flight between the entry echo and the first echo exceeding the gate. The entry echo (interface echo) is generated at the transition of the initial pulse from the probe to the test object.

### B-scan

The B-scan is a special, path-dependent representation of the test object's wall thickness. This representation is ideal for the display of corroded sections. The probe is guided over the section to be tested of the component for this representation.

The cross section of the test object shown in the display of CL Go+ gives the operator a quick overview of the thickness distribution on the component. In this regard, the minimum wall thicknesses become especially well visible. The following display shows a typical B-scan in the display of CL Go+.

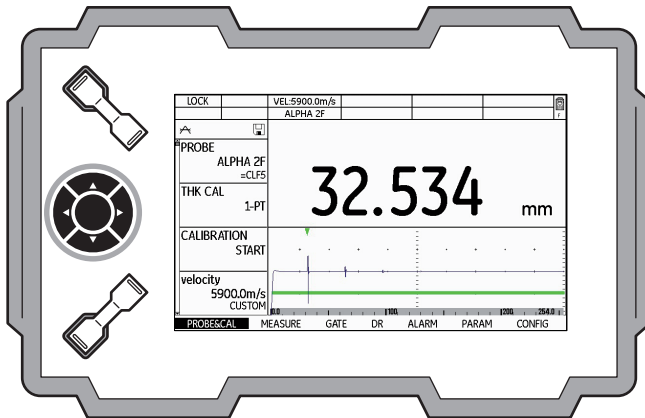


## Display orientation

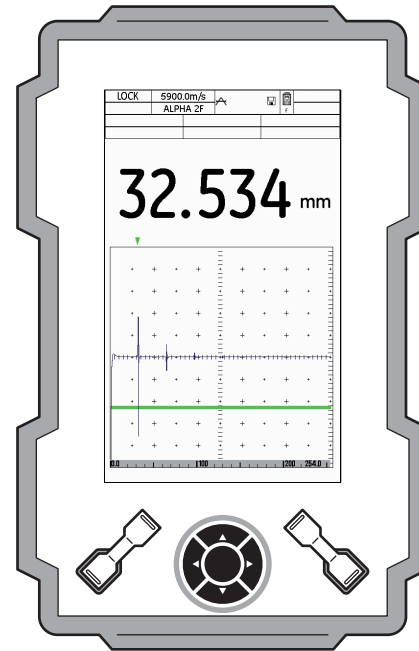
You can change the screen display of CL Go+ from landscape to portrait mode (see Section **Display orientation**, page 68).

In addition, you can toggle between right-hand and left-hand operation (see Section **Selecting the instrument orientation**, page 68).

### Display orientation in landscape mode



### Display orientation in portrait mode



## 1.6 DMS Go+ and USM Go+

The CL Go+ uses the same hardware as the thickness gauge DMS Go+ and the flaw detector USM Go+.

Your CL Go+ can use all functions of the other two instruments by means of simple software upgrades. You will then have three instruments available in one housing. When you power the instrument on, you can choose the instrument that you want to use (see Chapter 3.5

**Starting the CL Go+**, page 49).

A separate operating manual is available for each instrument. The functions of the DMS Go+ and the USM Go+ are therefore not described in the operating manual of the CL Go+.

## 1.7 How to use this manual

This operating manual applies to all instrument versions of the CL Go+. Any differences in the functions or adjustment values are marked in each case.

Before operating the instrument for the first time, it is absolutely necessary that you read the chapters 1, 3, and 4. They will inform you about the necessary preparations of the instrument, give you a description of all keys and displays, and explain the operating principle.

In doing this, you will avoid any errors or failures of the instrument and be able to use the full range of instrument functions.

You will find the specifications of the instrument in Chapter 10 **Specifications**.

## Overview

The operation of the CL Go+ is easy and quick to learn. To be able to use the instrument quickly, you should make yourself familiar with its preparation for use and its basic functions. Please read the following chapter carefully for this purpose:

### Chapter 3 **Initial start-up**

This is where you'll find all the preparatory measures required for using the instrument.

### Chapter 4 **Principles of operation**

Here you find an overview of the operating principle of the instrument and of the basic operating steps.

### Chapter 5 **Operation**

This chapter shows you the settings that you can define and the operating steps needed for the measurement. It shows the further options and functions presented by the CL Go+.

### Chapter 6 **Data Recorder**

This chapter describes the functions and options for using the data recorder, as well as the documentation of the measurement results.

### Chapter 9 **Appendix**

You can find additional information about special measurements, the data recorder files types, a function reference, and tables with typical sound velocities in the Annex.

## 1.8 Layout and presentation in this manual

To make it easier for you to use this manual, all operating steps, listings, and special notes are always presented in the same way. This will help you find individual pieces of information quickly.

### Attention and note symbols



#### ATTENTION

The **ATTENTION** symbol indicates peculiarities and special aspects in the operation which could affect the accuracy of the results.



#### Note

**Note** contains e.g. references to other chapters or special recommendations for a function.

### Listings

Listings are presented in the following form:

- Variant A
- Variant B
- ...

### Operating steps

Operating steps appear as shown in the following example:

- Loosen the two screws at the bottom.
- Remove the cover.
- ...

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# Standard package and accessories **2**

## 2.1 Standard package

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
CL Go+	Thickness gauge CL Go+	
TC-096	Transport case	168M5220
LI-138	Lithium-ion battery, 7.4 V, 4.0 Ah, rechargeable	GEIT1255323
LiBC-139	AC power adapter/charger, 100V ... 260V AC	GEIT1255477
SD card	SD memory card 32 GB	1255478
Protector foil	Display screen protector foils (10 pieces)	GEIT1305847
Hand strap	Hand strap	1255325

## 2.2 Add-on functions

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
DL	Extended Data Recorder	179M5151

## 2.3 Preconfigured function packages

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
CL Go+	Precision thickness gauge CL Go+	179M5147
CL Go+ DL	CL Go+ with extended Data Recorder	179M5148

## 2.4 Recommended probes

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
CA 211 A	Contact probe, 5 MHz, measuring range 2 ... approx. 380 mm	113-544-000
A-2 DFR	Delay probe, 15 MHz, measuring range 0.25 ... approx. 25 mm	113-527-660
Alpha 2F	Contact probe, 10 MHz, measuring range 1 ... approx. 50 mm	113-526-000
CLF 4	Delay probe, 15 MHz, measuring range 0.25 ... approx. 25 mm	113-527-665
CLF 5	Contact probe, 10 MHz, measuring range 1 ... approx. 50 mm	113-526-005
H-007 SPRNG HOLDER	Spring loaded DFR case with reversible front collar (works with Alpha-2 DFR and Alpha DFR-P)	118-480-007
DLY SET (10) .375	Pkg of 10 ea. 0.375 length delays for Alpha 2 DFR	118-440-050
DLY SET (10) .50	Pkg of 10 ea. 0.500 length delays for Alpha 2 DFR	118-440-051

## 2.5 Recommended probe cables

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
CL 331	MD-00 LEMO straight, 2.0 m (for CLF 4, CA 211 A)	0058160
Probe cable	PTPA-CBL MD-00 LEMO 90°, 1.8 m	022-505-604

## 2.6 Recommended accessories

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
ZGS	Couplant, 5 × 250 g	199M0001
LI-138	Lithium-ion battery, 7.4 V, 4.0 Ah, rechargeable	GEIT1255323
LiBC-139	AC power adapter/charger, 100 V ... 260 V AC	GEIT1255477
CA-040	Battery adapter for external charging of battery	GEIT1255324

<b>Product code</b>	<b>Description</b>	<b>Order number</b>
TC-096	Transport case	168M5220
CH-097	Shoulder strap	GEIT1254633
WH-098	Shoulder bag for instrument and couplant	GEIT1254634
WS-342	Wrist strap	GEIT1312406
EK-492	Ergonomic set (CH-097, WH-098, WS-342)	GEIT1312444
BLK 5 STEP STL	5-step steel calibration test block	118-540-310
BLK 4 STEP STEEL	4-step calibration test block	118-540-320
CABLE,COMMUNICATION USB,DM5E	USB cable	022-509-994

# Initial start-up **3**

## 3.1 Instrument positioning

Fold out the prop-up stand on the rear side of the CL Go+ and position the instrument on a flat base so that you can easily read the display.

If the instrument has been brought from a cold room into a warmer one, wait until it has adapted to the room temperature before you power it on (to avoid condensation).

If (in rare cases) condensation has developed inside the instrument, the cover may mist up from the inside. In this case, open the top cover until the damp has dried up. You should not power the instrument on until this has happened.



### Note

Don't leave the cover and the lid of the battery compartment open for any longer than is needed for exchanging the memory card or the battery. Otherwise, moisture may penetrate into the instrument.

## 3.2 Power supply

The CL Go+ can be operated either with an external charger/power adapter or with the corresponding lithium-ion battery.

You can also connect the CL Go+ to the mains power supply if the battery is in the instrument. A discharged battery is charged in this case, during the instrument operation.

### Operation with charger/power adapter

#### Connection to power supply

For the operation using a charger/power adapter, you should only use the charger/power adapter included in the standard package.

The charger/power adapter is automatically adjusted to every AC voltage between 90 V and 240 V (nominal voltage).



## Connecting the instrument

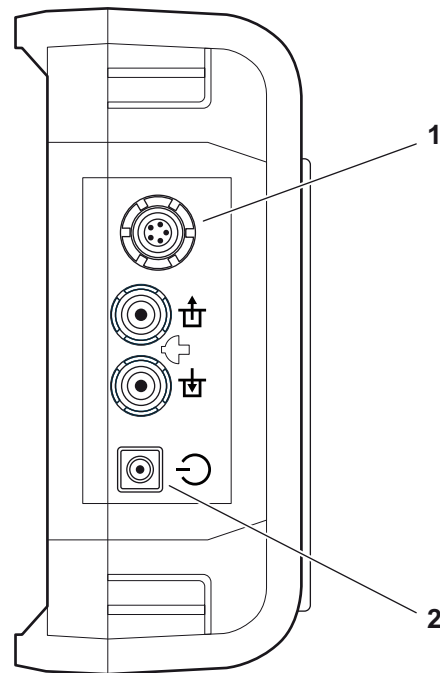
Connect the CL Go+ to the mains socket-outlet by means of the corresponding charger/power adapter. The socket-contact for connecting the charger/power adapter is located on the side of the CL Go+.

- Align the Lemo plug of the charger/power adapter with the red mark on the socket (1).
- Push the plug into the socket until it locks into place with a clearly audible click.
- When removing the Lemo plug, pull the metal sleeve on the plug back first in order to open the lock.



### ATTENTION

In order to power the instrument off correctly, press the power On/Off key (2) on the side of the instrument. If the power supply is interrupted (removing the battery, disconnecting the power plug), the operation does not end correctly.



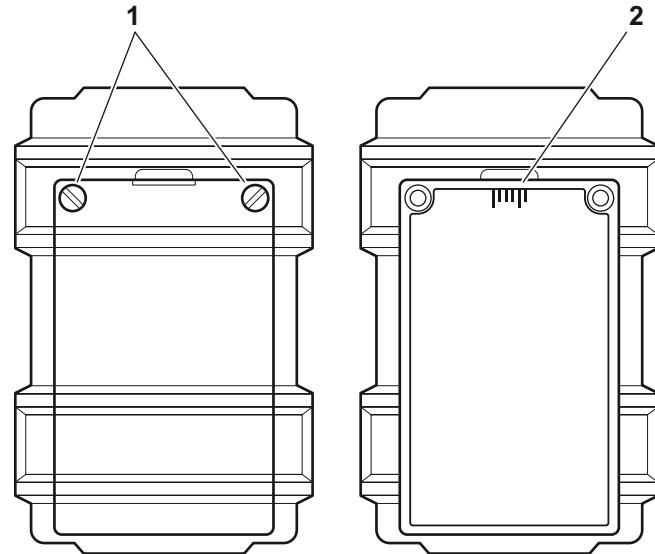
## Operation using batteries

For the battery operation you should only use the corresponding lithium-ion battery GEIT1255323.

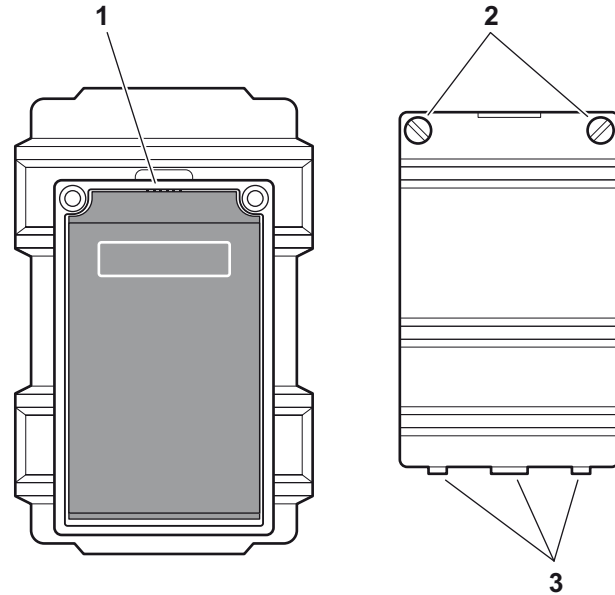
### Inserting batteries

The battery compartment is located on the rear of the instrument. The cover is fastened with two attachment screws.

- Turn the two attachment screws (1) of the battery compartment counterclockwise by one quarter of a turn each in order to loosen them.
- Lift the cover off upward. In the open battery compartment, you will see several connector pins (2) on one side.



- Place the battery in the battery compartment so that the marking faces upwards and the contacts are pushed against the connector pins (1).
- Insert the cover of the battery compartment with the side opposite to the screws at first, and push the lugs (3) into the housing recesses.
- Press the cover firmly down on the side of the screws and turn the two screws (2) clockwise by one quarter of a turn each in order to lock the cover.

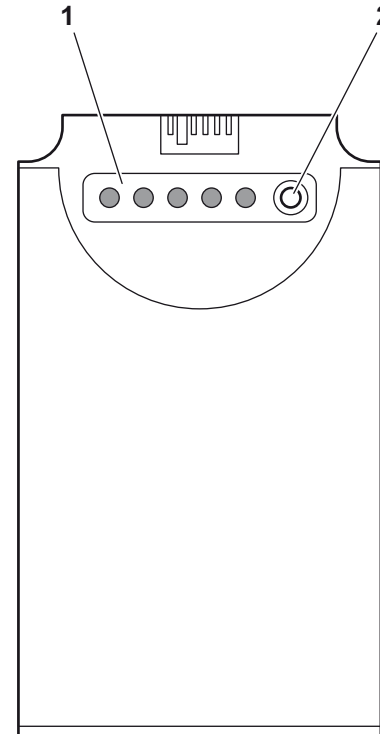


### Checking the charge level of the lithium-ion battery

The lithium-ion battery is provided with a battery charge level indicator. Five light-emitting diodes (1) indicate the level of battery charge. Check the battery charge level before inserting it into the instrument.




The number of diodes that are lit up has the following meaning:

- 5 LEDs: Battery charge level 100 ... 80 %
  - 4 LEDs: Battery charge level 80 ... 60 %
  - 3 LEDs: Battery charge level 60 ... 40 %
  - 2 LEDs: Battery charge level 40 ... 20 %
  - 1 LED: Battery charge level 20 ... 10 %
  - 1 LED is flashing: Battery charge level <10 %
- Press the key (2) next to the LEDs. The LEDs indicate the battery charge level.



## Power level indicator

The CL Go+ is equipped with a power level indicator that allows to estimate the remaining operating time of the instrument. A battery icon with the corresponding charge level is displayed in the top right corner on top of the A-scan. The battery icon indicates the remaining operating time or the battery charge level.

Icon	Meaning
	Battery charge level, remaining operating time in hours (approximate value)
	Charger/power adapter is connected, percentage of battery charge level (approximate value)
	Warning: Low battery charge level, remaining operating time in minutes (approximate value)

The CL Go+ is automatically powered off if the operation is no longer ensured. All settings are retained during battery exchange and are immediately available again afterwards.



### Note

If the battery charge level is low, it is absolutely necessary that you finish your test job, power off the instrument, and replace the battery. You should carry a second battery along with you if you cannot use mains power supply to operate the instrument.

## **Charging the batteries**

You can charge the lithium-ion batteries either directly within the instrument or in an external charger (adapter GEIT1255324).

### **Internal charging**

If a lithium-ion battery is inserted, charging starts automatically as soon as you connect the charger/power adapter to the CL Go+ and to the mains power supply. You can carry out ultrasonic tests and charge the batteries at the same time.

The charging time is approx. ten hours with simultaneous ultrasonic testing. If the instrument is not used for ultrasonic testing, the charging time is approx. eight hours. This charging time applies to ambient temperatures of 25 ... 30 °C.

## **Charging status**

All battery charge controls and status updates are internal to the instrument. Updates are given at the upper right corner of the display as described on the previous page.



The charger/power adapter is a simple power supply with no charging controls or intelligence. The LED on the charger is a power indicator only and will show a steady green light when AC power is provided at the input.

### **External charging**

You can charge lithium-ion batteries with an external charger of the CL Go+. Do not use any other chargers for charging the lithium-ion batteries for the CL Go+.

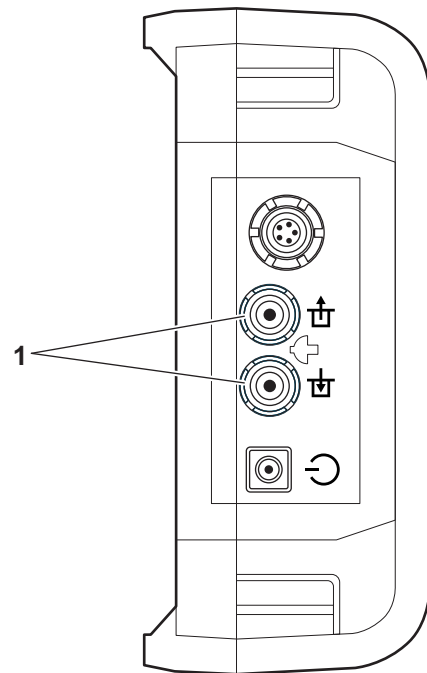
### 3.3 Connecting a probe

You can connect all probes recommended in chapter 2 of this manual. In addition to the probe, you need a suitable probe cable for the connection between the probe and the instrument. The probe connectors are located on the side of the instrument:

Icon	Meaning
	Transmitter connection
	Receiver connection

Both connector sockets are equally suitable (connected in parallel) for connecting single-element probes so that it does not matter which one of the two sockets is used.

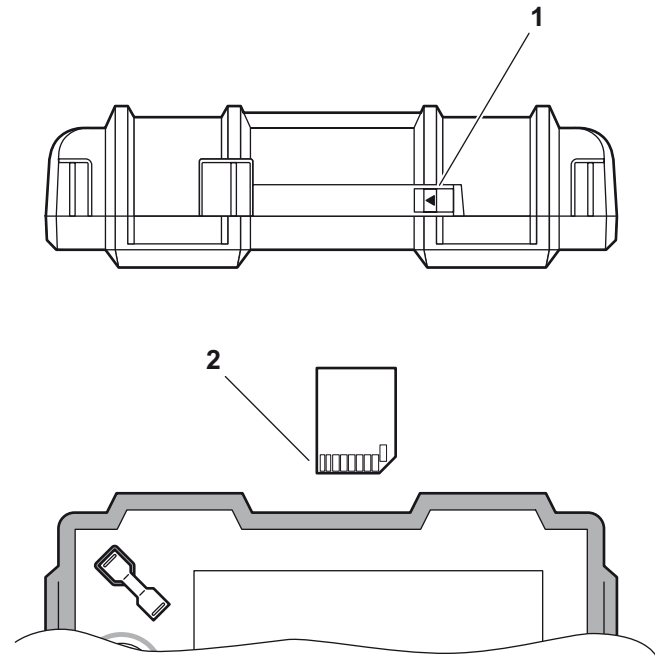
- Connect the probe cable with the probe.
- Connect the probe cable with a probe connector (1) on the side of the instrument.



## 3.4 Inserting the SD memory card

You can use any standard SD memory card in the CL Go+. To insert and to remove the memory card, you have to open the watertight cover at the top of the instrument.

- Push the lock of the hinged cover (1) in the direction of the arrow in order to open the cover.
- Insert the SD memory card into the card slot so that the contacts (2) of the card face the instrument front side.
- Press the card down into the card slot until it locks into place.
- Close the cover and make sure that it is locked tightly. If necessary, push the lock up to the limit stop in the opposite direction of the arrow in order to close the cover watertight again.
- To remove the SD card, open the cover and shortly press down the card to unlock it.





## 3.5 Starting the CL Go+

### Powering On

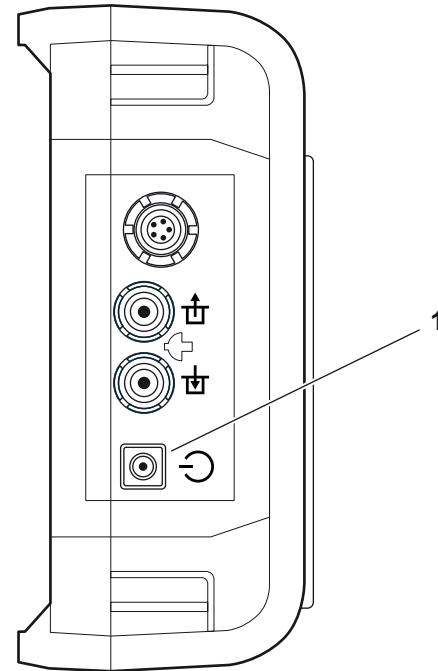
To start the CL Go+, shortly press the Power key (1) on the side of the instrument with your finger. Do not use sharp objects to operate the device..

The software is initialized. During this, the display will remain blank for about 3 seconds. If licenses for other instruments are also installed, the display will show the page for selecting the required instrument. Choose the required instrument using the arrow keys on the keypad.

After that, the start display showing the name of the instrument and information on the software, serial number, and the installed options will appear.

The instrument carries out a self-check and then switches over to stand-by mode.

The settings of all function values and the default settings (language and units) are the same as before powering the instrument off.



## Powering Off

To power the CL Go+ off, shortly press the Power key on the side of the instrument with your finger. Do not use sharp objects to operate the device.

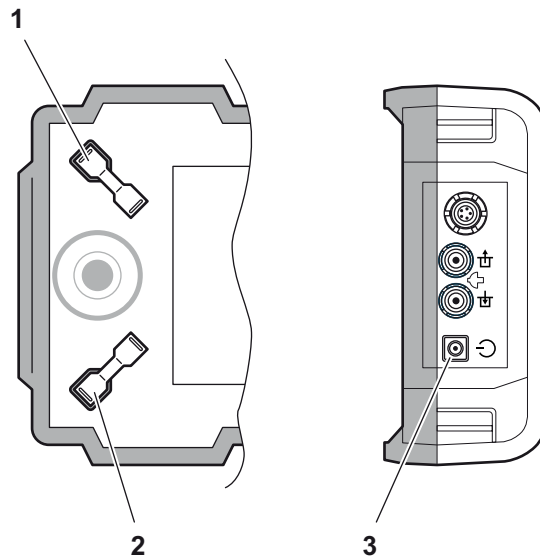
The settings of all function values and the default settings (language and units) are retained after powering off.

## Factory default setting (Reset)

If you can no longer use the functions of your instrument or if the instrument no longer reacts as expected, you can reset it to the factory default settings. Any data saved to the SD card will be retained, all other individual settings, e.g. language and units, will be reset to the factory default settings.

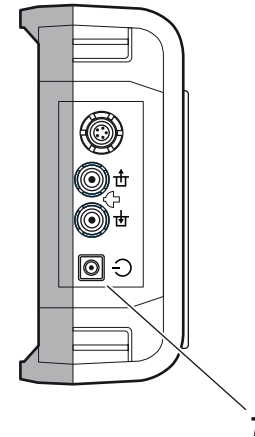
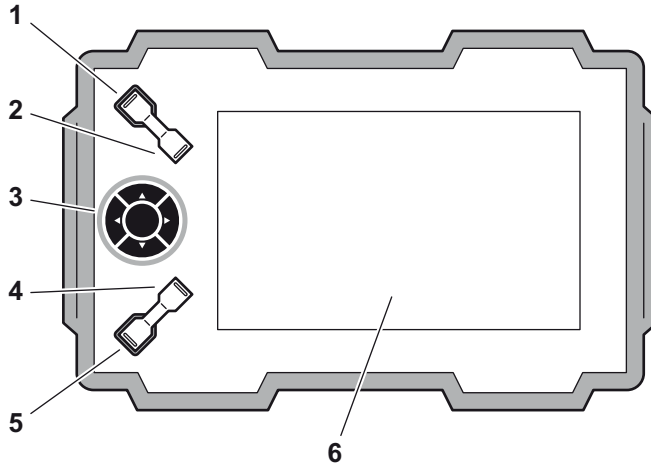
- Power the instrument off.
- Press the further ends of the two Function keys (1 and 2), and the Power key (3) simultaneously, and hold all three keys pressed until the start display or the page of the instrument selection appears.

The instrument starts with the factory default settings (for language selection, see Section **Language setting**, page 64).



# Principles of operation 4

## 4.1 Overview of operator's controls



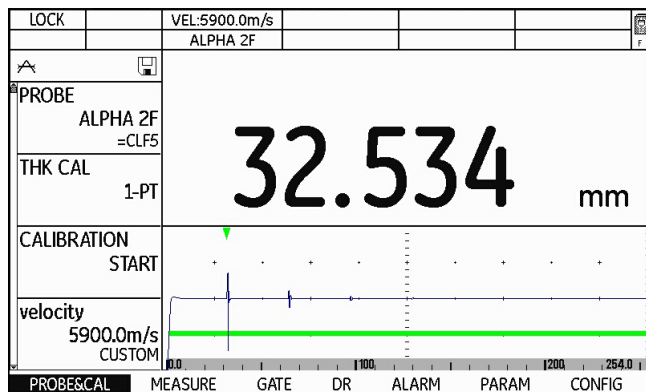
- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1 Function key 1, functions are context-dependent</li> <li>2 Function key 2, functions are context-dependent; keys <b>1</b> and <b>2</b> simultaneously: Save screen shot</li> <li>3 Keypad, navigation between function groups and functions, changing settings</li> <li>4 Function key 3, functions are context-dependent</li> </ul> | <ul style="list-style-type: none"> <li>5 Function key 4, function is individually assignable (<b>CONFIG – FUNC KEY</b>),</li> <li>6 Display for representation of readings, A-scan, B-scan, functions, and data</li> <li>7 Power key for powering on and off</li> </ul> |
|---|---|

## 4.2 Display screen

### Display modes

The CL Go+ has a high-resolution display screen for the representation of the A-scan or the B-scan, for the display of readings, important setup parameters and icons, as well as for the representation of different menus.

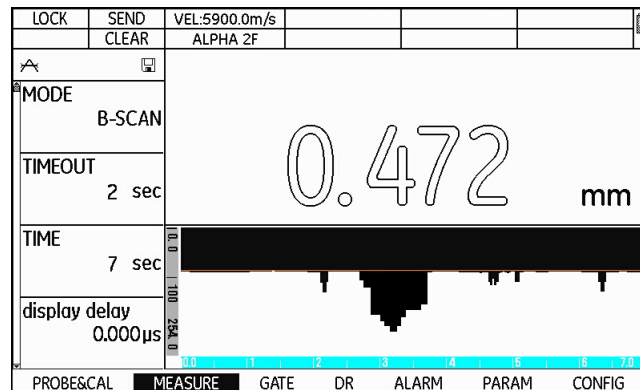
#### Normal display mode reading and A-scan



### Note

For toggling between the different display modes and operating modes, see Section **Operating modes and views**, page 79.

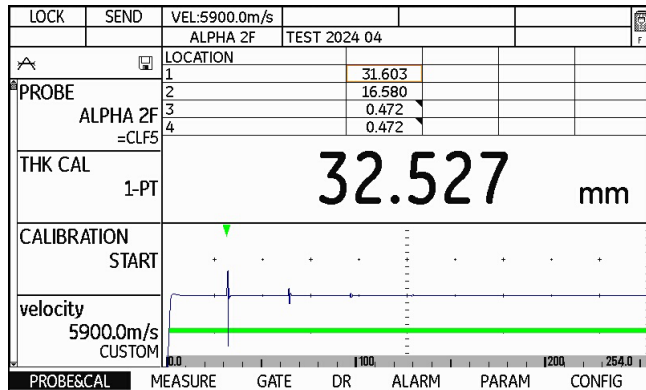
#### Display mode reading and B-scan



### Display mode Data Recorder

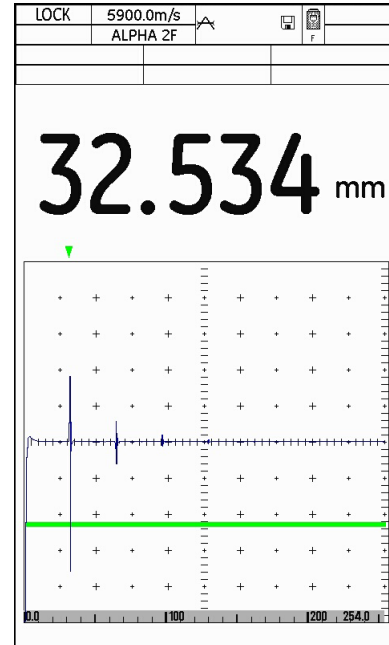
If a data recorder file is loaded, you will see the name and the structure of the data recorder file above the current reading.

The functions to the left on the display screen are used for navigating within the data recorder file.



### Landscape and Portrait mode

You can change the screen display of CL Go+ from landscape to portrait mode.



## Functions on the display screen

### Function groups

The names of the seven function groups are shown at the bottom of the display screen. The currently selected function group is highlighted.

PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG
-----------	---------	------	----	-------	-------	--------

### Functions

The functions of the currently selected function group are shown on the left side of the display screen.

LOCK	
⌂	📄
PROBE	
ALPHA 2F	
=CLF5	
THK CAL	
1-PT	
CALIBRATION	
START	
velocity	
5900.0m/s	
CUSTOM	
PROBE&CAL	ME

## Icons and information

### Keypad functions

You can see the current functions of the four function keys in the top left corner of the display screen. The functions are context-dependent and change during the operation.

LOCK	SEND	VEL:5900.0m/s					
		ALPHA 2F	TEST 2024 04				F

### Data boxes

The current sound velocity of the material and the name of the selected probe are displayed at the top center.

Six other data boxes are user-assignable for different data and information.

HOME		VEL:5900.0m/s	P-DLY:0.300us	GAIN:27.2dB			
		CA211A	THK:31.648mm	M-GAIN:50.0dB	LOC:		F

## Status display icons

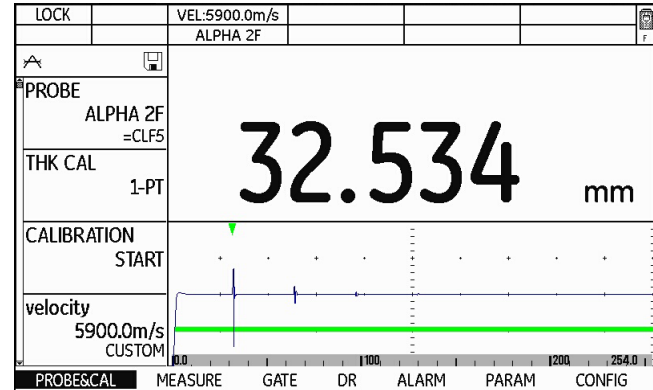
The status displays in the top left corner of the display screen, above the functions, inform about certain active functions, operating modes, or operating status (see Section **Status display icons**, page 13).

LOCK	
PROBE	ALPHA 2F =CLF5
THK CAL	1-PT
CALIBRATION	START
velocity	5900.0m/s CUSTOM
PROBESCAL	ME

## Display of reading

The current reading is always displayed in enlarged mode above the A-scan or B-scan.

If an alarm threshold is exceeded, the displayed reading is red.





## 4.3 Navigation and function keys

### Keypad

The five keys of the keypad next to the display screen are used

- for navigation between and within the function groups,
- for changing settings, and
- for selecting adjustment values.



#### Note

If a key is pressed for a longer time, the adjustment values change in larger increments.

The center key of the keypad is normally used for toggling between the display modes Landscape and Portrait.

In special contexts, the keys have further functions which are described together with the corresponding action in this manual.

### Function keys

Apart from the keypad, two groups of keys, including two function keys each, are arranged next to the display screen (see Section **Overview of operator's controls**, page 52).

The functions of three function keys are context-dependent and change automatically during the operation. The current functions are displayed in the top left corner of the display screen (see Section **Keypad functions**, page 55).

The function of the function key number 4 is user-assignable (see Section **Assignment of function key 4**, page 69).

### Power key

The key for powering the instrument on and off is located on the instrument side, next to the probe connectors.

## Key combinations

You can carry out some functions by means of key combinations. To achieve this, you have to press several function keys at the same time (see Section **Overview of operator's controls**, page 52).

Function	Keys
Screen shot	Function key 1 + function key 2
Update	Function key 2 + function key 4 + Power key
Reset	Function key 1 + function key 4 + Power key

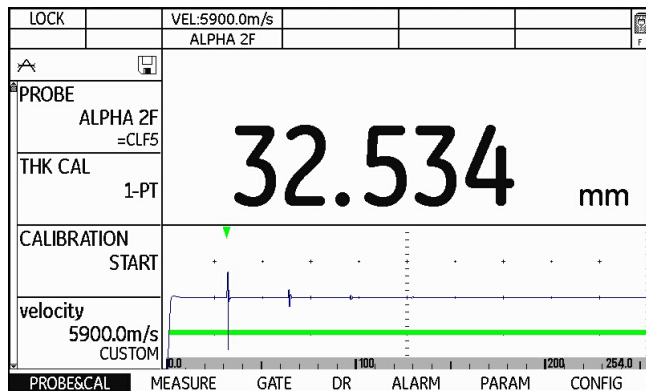
## 4.4 Operational concept

### Changing the display views

The display view changes automatically after selecting the corresponding instrument function or the operating mode (function **MODE**).

#### Normal view reading and A-scan

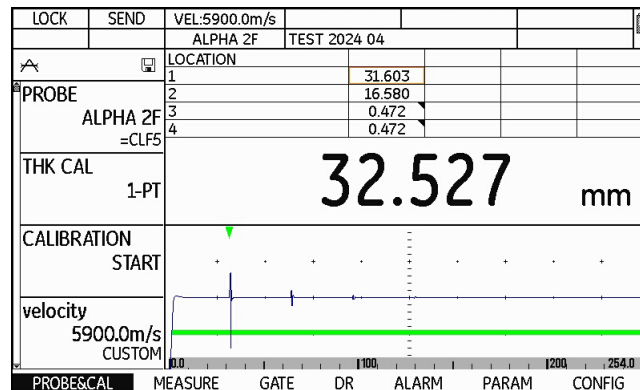
Every time the CL Go+ is powered on, the normal view with the large display of reading and the functions groups and functions can be seen.



### View Data Recorder

If a data recorder file has been loaded, additional information about the file is automatically displayed above the reading together with the file structure including the saved readings.

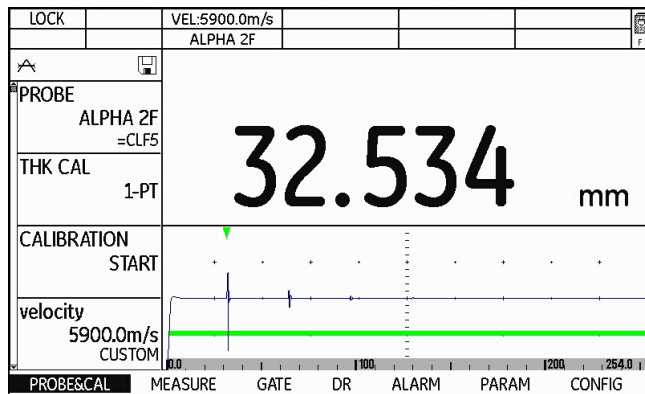
A description of how to handle data recorder files is given in Chapter 6 **Data Recorder**.



## Selecting and setting functions

Shown below the A-scan are the seven function groups which you can directly select using the keys of the keypad. The name of the currently selected function group is highlighted and the corresponding functions are displayed in a list at the left screen edge.

A vertical scroll bar at the utmost screen edge shows the current position in the list for function groups containing more than four functions.



- Press the **left** or **right** arrow keys in order to choose a function group.
- Press the **down** arrow key in order to select the first function of the function group chosen previously.
- Press the **left** or **right** arrow keys in order to change the setting.
- Press the function key 1 (function **HOME**) in order to exit the function.

## Coarse and fine adjustment of functions

You can choose between coarse and fine adjustment for some functions.

Use the lower function keys to make the coarse adjustment. The value will then change either in large increments (e.g. for the function **DISPLAY RANGE**) or you can choose from a series of factory-saved values (e.g. for the function **VELOCITY**)

The fine adjustment is made by means of the **left** and **right** arrow keys of the keypad. The fastness of change is influenced by the duration of the key depression during this (e.g. for the function **VELOCITY**).

During the coarse adjustment, the name of the function is displayed in capital letters (**DISPLAY RANGE**), whereas it is displayed in lower-case letters during the fine adjustment (**display range**).

As long as a function is selected, you cannot toggle between the function groups. To toggle between the function groups, you have to press the function key 1 (function **HOME**) first in order to exit the function.

### Key lock

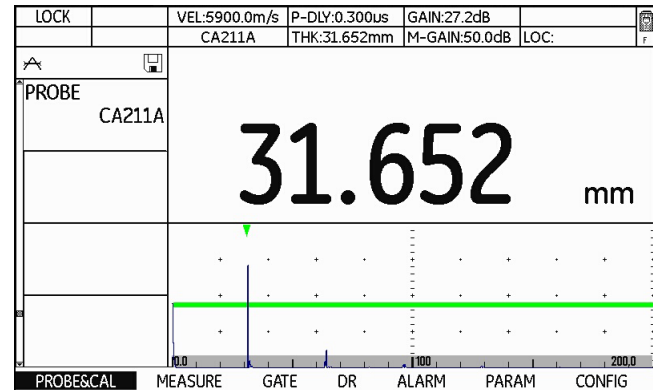
If no function is selected, you can activate the key lock. If the key lock is active, all keys except for the function key 1 are locked and the instrument no longer reacts if a key is pressed.

- Press the function key 1 (function **LOCK**) in order to activate the key lock. The key function **LOCK** is then displayed in the top left corner of the display screen.
- Press the function key 1 (function **LOCK**) once more in order to deactivate the key lock. The instrument reacts again when a key is pressed.

### Disabled functions

If the option **INSPECTOR** is chosen in the function **MENU MODE**, the functions are suppressed and cannot be set.

Depending on other settings, individual functions can be visible (see Section **Function lockout**, page 70)



[empty page]

# Operation **5**

## 5.1 Default settings

### Language setting

BRIGHTNESS	10
COLOR	SCHEME3
LANGUAGE	English
ORIENTATION	RIGHT HAND
DT FMT	D.M.Y 12H

You can choose the language for the displayed texts.

- In the function group **CONFIG**, select the function **LANGUAGE**.
- Choose the required language. The language changes immediately.

### Units setting

DATE TIME	09.11.2023 10:59 AM
POWER DOWN	MANUAL
UNIT	mm
RESOLUTION	X.XXX
ZERO BLOCK	----- mm ----- m/s
LOCKOUT	

You can use the function **UNIT** (function group **CONFIG**) to select the required units (mm or in). You can change the units any time. All values are adjusted accordingly.

- In the function group **CONFIG**, select the function **UNIT**.
- Choose the required unit. The unit changes immediately.



## Resolution setting

DATE TIME	09.11.2023 10:59 AM
POWER DOWN	MANUAL
UNIT	mm
RESOLUTION	X.XXX
ZERO BLOCK	----- mm ----- m/s
LOCKOUT	

You can use the function **RESOLUTION** (function group **CONFIG**) to select the resolution for the display of readings. If the setting **AUTO** is selected, the readings up to 100 mm are displayed with three decimal places (up to 10 in with four decimal places).

- In the function group **CONFIG**, select the function **RESOLUTION**.
- Choose the required resolution. The display of readings changes immediately.

## Radix

UPDATE RATE	16Hz
RECTIFY	RF
RADIX	PERIOD
ROUND	ROUND
LAST READING	HOLD
RESOLUTION	

You can choose the radix symbol. All data are displayed and saved using the selected radix.

- In the function group **CONFIG**, select the function **RADIX**.
- Choose the required radix. The display of readings changes immediately.

## Round

UPDATE RATE	16Hz
RECTIFY	RF
RADIX	PERIOD
ROUND	ROUND
LAST READING	HOLD

You can display the measured values rounded or rounded down. This setting applies to all readings. The actual reading is not changed. You can switch the rounding on or off at any time.

- In the function group **CONFIG**, select the function **ROUND**.
- Choose the required rounding option. The display of readings changes immediately.

## Last reading

UPDATE RATE	16Hz
RECTIFY	RF
RADIX	PERIOD
ROUND	ROUND
LAST READING	HOLD

You can choose the display mode for the thickness value measured last – after uncoupling and before coupling the next time.

- In the function group **CONFIG**, select the function **LAST READING**.
- Choose the required display mode. The display of readings changes immediately.

## Date format, Date, and Time

BRIGHTNESS	10
COLOR	SCHEME3
LANGUAGE	English
ORIENTATION	RIGHT HAND
DT FMT	D.M.Y 12H

- In the function group **CONFIG**, select the function **DT FMT**.
- Choose the required date format. The time format is changed together with the date format.
- Select the function **DATE TIME**.
- Press the **left** or **right** arrow keys.
- Use the navigation to change the highlighted value and switch over to the next value.
- Change the other values in the same way.
- Finally, press the function key 1 to exit the function. The new values apply immediately.

You can set the date format, the date, and the time using the corresponding functions of the function group **CONFIG** on the second operating level.



### ATTENTION

In view of a correct documentation, always make sure that you are using the correct date and the correct time. Remember to turn the clock during the change from winter time to summer time.

## Selecting the instrument orientation

LAST READING HOLD
BRIGHTNESS 10
COLOR SCHEME3
LANGUAGE English
ORIENTATION RIGHT HAND

You can configure the instrument for right-handed or left-handed operation (referred to the probe). The screen display is then rotated through 180°, the functions of navigation and function keys are adjusted accordingly.

- In the function group **CONFIG**, select the function **ORIENTATION**.
- Choose the required orientation. The screen display is immediately switched over.

## Display orientation

You can change the screen display of CL Go+ from landscape to portrait mode.

It is not possible to access the settings and parameters in the portrait mode.

- Briefly press the center key of the keypad in order to rotate the screen display by 90 degrees.
- Press the center key one more time in order to see the original display mode again.

## Assignment of function key 4

LOCKOUT CONFIG
MENU MODE EXPERT
FUNC KEY NOT DEFINED
PASSWORD
CODE

You can assign a function to the function key 4 (see Section **Overview of operator's controls**, page 52) to be able to trigger this function any time. In this way, you can switch for example from right-handed operation over to left-handed operation by pressing the function key 4 (option **LH/RH**).

The following settings are possible:

- **NOT DEFINED** (no function assigned)
  - **NOTE** (choosing a comment, see page 131)
  - **μGRID** (adding a MicroGrid, see page 140)
  - **LH/RH** (instrument orientation, see page 68)
  - **OBSTR/CLEAR** (no measurement possible or delete reading, see page 126 f.)
  - **FREEZE** (display freeze, see page 110)
  - **CAL** (calibration start, see page 84)
  - **ZOOM** (gate magnifier, see page 110)
- In the function group **CONFIG**, select the function **FUNC KEY**.
  - Choose the required function.
  - Press the function key 4 to test the function.

## Function lockout

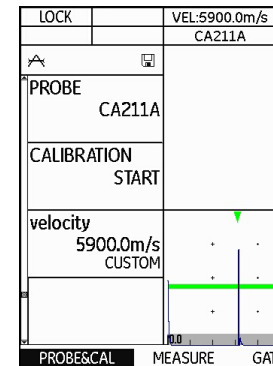
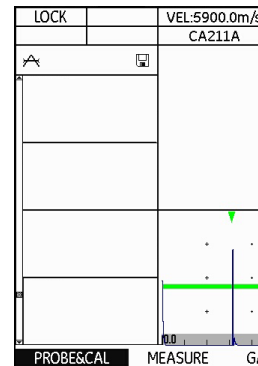
LOCKOUT	CONFIG
MENU MODE	EXPERT
FUNC KEY	NOT DEFINED
PASSWORD	
CODE	

You can disable the access to the setup functions of the instrument in order to prevent, for example, any accidental changes to settings. The functions are then no longer displayed on the screen.

When the access to the functions is disabled, you can exclude individual functions from the lockout and make them visible. These functions are then selectable and can be changed or set in spite of the general lockout.

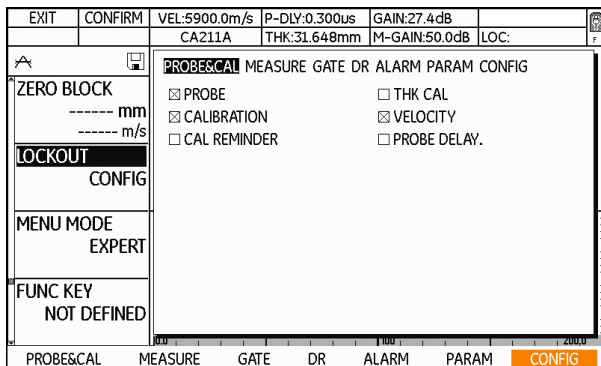
## Disabling all setup functions

- In the function group **CONFIG**, select the function **MENU MODE**.
- Choose the option **INSPECTOR** in order to disable the access to all setup functions.
- Choose the option **EXPERT** in order to enable the access to all setup functions.
- Check whether the functions are visible or not according to the selected setting.



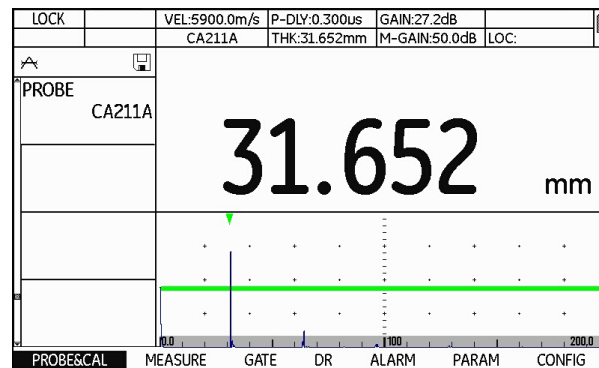
## Enabling individual setup functions

- In the function group **CONFIG**, select the function **LOCKOUT**.
- Press the **left** or **right** arrow keys. A selection menu is displayed.



- Press one of the **left** or **right** arrow keys in order to select the function group.
- Press one of the **up** or **down** arrow keys in order to select the function.

- Press the center key of the keypad in order to exclude the selected function from the general lockout. The function is marked with a cross.
- Select other exceptions in the same way.
- Finally, press the function key 2 (function **CONFIRM**) in order to exit the selection menu and to save the selection.
- Check whether the marked functions are visible in the corresponding function groups and can be changed or set.



## Password protection

You can protect the access to the setup functions with a password. This makes the access to the disabled functions only possible after entering a password (see Section **Function lockout**, page 70).

To activate the password protection, you have to set a password. After saving the password, it is only possible to switch to the **EXPERT** mode after entering the password.

### Saving a new password



#### ATTENTION

After saving the password, it is only possible to have full access to the instrument functions after entering the password. If the password is lost, you have to reset the instrument (see Section **Factory default setting (Reset)**, page 50).

You can save a password only if there is no password protection yet or if the **EXPERT** mode is active (see Section **Function lockout**, page 70).

- In the function group **CONFIG**, select the function **PASSWORD**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to mark the first character for the password.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 2 (function **BKSP**) in order to delete the last character.
- Press the function key 4 (function **NEXT**) and set the password again to check it.
- Press the function key 4 (function **NEXT**). The password is saved and immediately valid.



## Changing a password

You can change the password at any time. To do this, you must first enter the current password.

- In the function group **CONFIG**, select the function **PASSWORD**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to mark the first character for the current password.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 4 (function **NEXT**).
- Set the new password (see Section **Saving a new password**, page 72).

## Deactivating password protection

To deactivate the password protection, proceed in the same way as for changing the password. Instead of a new password, however, you don't choose any characters.

- In the function group **CONFIG**, select the function **PASSWORD**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to mark the first character for the current password.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 4 (function **NEXT**). However, do not choose any characters at this point.
- Press the function key 4 (function **NEXT**) and, to check, the function key 4 one more time (function **NEXT**). The password protection is deactivated.

## Power saving mode

DATE TIME	09.11.2023 10:59 AM
POWER DOWN	MANUAL
UNIT	mm
RESOLUTION	X.XXX
ZERO BLOCK	----- mm ----- m/s
LOCKOUT	

To save power during longer stops or breaks, you can activate the automatic power down function of the instrument after a preset time. The instrument is powered down if no operation takes place during this time. After that, you have to power the instrument on again using the Power key.

If you choose the option **MANUAL**, the instrument is not powered down automatically.

You have a choice between the following automatic power down times:

- 1 min
- 2 min
- 3 min
- 4 min
- 5 min
- 10 min
- 15 min
- 30 min

- In the function group **CONFIG**, select the function **POWER DOWN**.
- Choose the required power down time or the option **MANUAL**.

## Configuring data boxes

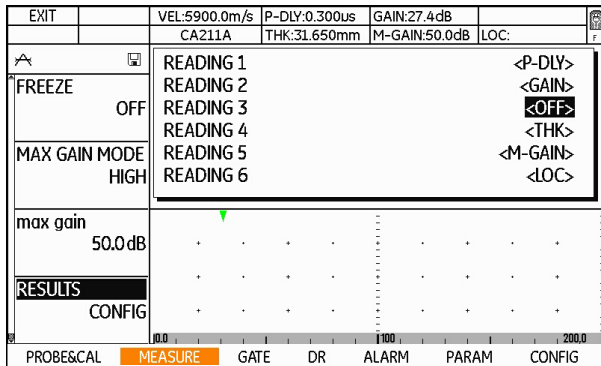
FREEZE	OFF
MAX GAIN MODE	HIGH
max gain	66.0dB
RESULTS	CONFIG

You have a choice between the following data:

- **OFF** (no display)
- **P-DLY** (probe delay)
- **LOC** (measuring location)
- **M-GAIN** (maximum gain setting)
- **GAIN** (current gain)
- **THK** (measured wall thickness)

You can use the function **RESULTS** to choose the data to be displayed in the six data boxes at the top of the screen display (see Section **Icons and information**, page 55).

- In the function group **MEASURE**, select the function **RESULTS**.
- Press one of the **left** or **right** arrow keys. A selection menu is displayed.



- Press one of the **up** or **down** arrow keys in order to mark the required data box.
- Press one of the **left** or **right** arrow keys in order to select the content for the marked data box.
- Configure the other data boxes in the same way.

- Finally, press the function key 1 (function **EXIT**) in order to exit the selection menu and to save the selection. The selected data are then displayed in the data boxes.

HOME	VEL:5900.0m/s	P-DLY:0.300us	GAIN:27.2dB		
	CA211A	THK:31.648mm	M-GAIN:50.0dB	LOC:	

## 5.2 Default settings of the display

The CL Go+ is equipped with a high-resolution color display. You can optimize the display according to your own viewing habits and to the operating environment.

### Setting the brightness

UPDATE RATE	16Hz
RECTIFY	RF
RADIX	PERIOD
ROUND	ROUND
LAST READING	HOLD
BRIGHTNESS	

You can set the brightness of the display and select a value from **1** to **10** for this purpose.



#### Note

A high brightness value increases the power consumption, due to which the operating time is reduced in battery operation.

- In the function group **CONFIG**, select the function **BRIGHTNESS**.
- Choose the required value. The display brightness changes immediately.



#### Note

You can extend the operating time by means of the power saver function (see Section **Power saving mode**, page 74).

## Selecting the color scheme

LAST READING HOLD
BRIGHTNESS 10
COLOR SCHEME3
LANGUAGE English
ORIENTATION RIGHT HAND

You can choose one of four color schemes. The color scheme determines the color of all displays and of the background.



### Note

All color schemes are suitable for indoor use. For outdoor use, we recommend **SCHEME 3** and **SCHEME 4**.

- In the function group **CONFIG**, select the function **COLOR**.
- Select the required color scheme. The screen display changes immediately.

## 5.3 Operating modes and views

You can choose from different operating modes and display views for different tasks.

- **THICKNESS** Default setting for general thickness measurements, see page 90
- **VELOCITY** Velocity view, see page 105
- **QUALITY** Quality view, see page 106
- **A-SCAN** A-scan view, see page 107
- **B-SCAN** B-scan profile, see page 100
- **MIN/MAX** MIN/MAX mode, see page 98
- **DIFF** Differential value display, see page 104

## Changing the operating mode or view

- In the function group **MEASURE**, select the function **MODE**.
- Select the required operating mode or view. The display view changes immediately.

## 5.4 Saving the settings

LOAD P-SET
SAVE P-SET

You can save the current instrument settings to a file on the SD memory card. The files for the CL Go+ have the file extension DGO and are saved to the directory CLGO\DATASETS on the memory card.



### Note

The file name can consist of a maximum of 20 characters.

- In the function group **PARAM**, select the function **SAVE P-SET**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to mark the first character for the file name.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 2 (function **BKSP**) in order to delete the last character.
- Finally, press the function key 4 (function **CONFIRM**) in order to save the file with the parameter data set under the specified name.



## Loading settings

You can load and use instrument settings saved to the SD memory card.



### Note

You can only load files with the file extension DGO in the directory CLGO\DATASETS. Other files are not displayed for selection.

- In the function group **PARAM**, select the function **LOAD P-SET**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to select the required file.
- Press the function key 2 (function **ENTER**) to load the selected file.

The instrument settings of the selected dataset are loaded, and they are immediately active after closing the loading process.

## Deleting settings

You can delete instrument settings saved to the SD memory card.



### Note

You can only delete files with the file extension DGO in the directory CLGO\DATASETS. Other files are not displayed for selection.

- In the function group **PARAM**, select the function **LOAD P-SET**.
- Press one of the **left** or **right** arrow keys.
- Press the arrow keys to select the required file.
- Press the function key 3 (function **DELETE**) to delete the selected file.
- Confirm the safety prompt. The dataset file is deleted.

## 5.5 Preparing for measurements

You can use the CL Go+ to measure wall thicknesses or distances with high precision in a simple way. The measured value is displayed directly.

To prepare for measurements, you have to:

- Select a suitable probe.
  - Calibrate the A-scan display.
  - Calibrate the instrument for the selected probe.
- 
- Connect a suitable probe (see Section **Connecting a probe**, page 47).
  - Power the instrument on (see Section **Starting the CL Go+**, page 49).

The further steps are described in detail in the following.

## Choosing the probe

After connecting a suitable probe for the task, you have to select the probe to adjust the CL Go+ to the probe.

You have a choice between the following probes:

- CA 211 A
- A2 DFR = CLF 4
- Alpha 2F = CLF 5

The following settings are made automatically by the device when the probe is selected:

- All gates settings
- Frequency
- Filter
- Probe delay
- Display range



### Note

Some of these settings can be changed. The manual selection of gates for the measurement is not possible.

- In the function group **PROBE&CAL**, select the function **PROBE**.
- Choose the connected probe. The instrument is immediately adjusted.

## 5.6 Carrying out the calibration

### Calibration to the sound velocity

You have to calibrate the CL Go+ to the sound velocity of the test object before you can start with measurements. The determination of the sound velocity in the test object is necessary for the exact calculation of wall thickness.



#### ATTENTION

The same probe has to be chosen for the calibration as for the subsequent measurement operation. Otherwise, measuring errors may occur. Every time the probe has been changed, you have to carry out a calibration again.

For delay line probes, e.g. CLF4, only the 1-point calibration is applicable. The probe must be connected to the calibration standard only. The probe delay which refers to the delay line length here is set via the probe selection.

For contact probes the calibration options are:

- 1-point calibration
- 2-point calibration
- Velocity

As an alternative, if the sound velocity is known, you can set it directly on the instrument (see Section **Setting the sound velocity**, page 89).

Zeroing is always carried out first during the 1-point calibration.



#### ATTENTION

The reference block at the instrument rear is only used for carrying out a zeroing process.

Only use the calibration blocks recommended by Waygate Technologies for further calibrations (please refer to chapter 2).

## 1-point calibration

The 1-point calibration is carried out using the reference block at the instrument rear and a calibration block with known thickness which is made of the same material as the test object.

Ideally, the wall thickness of the calibration block is the equal to or slightly greater than the expected readings from the test object.

- In the function group **PROBE&CAL**, select the function **THK CAL**.
- Choose the option **1-PT**.
- In the function group **PROBE&CAL**, select the function **CALIBRATION**.
- Press one of the **left** or **right** arrow keys in order to start the calibration. The message **Put probe on zero block - use couplant** is displayed on the screen.
- Apply some couplant to the instrument reference block and couple the probe. The zeroing is started. After finishing it, the message **Probe zero complete. Remove probe from zero block.** is displayed on the screen.
- Uncouple the probe. The message **Couple to Cal standard (displayed below) or press ENTER to change cal. block thickness.** is displayed on the screen.
- If the wall thickness displayed on the screen is not identical with the thickness of the calibration block, press the function key 2 (function **ENTER**).
- Select the digits that you wish to change using the **left** and **right** arrow keys, and change the value using the **up** and **down** arrow keys.
- Press the function key 2 (function **DONE**) in order to close the process of changing the thickness value.

- Apply some couplant to the calibration block with known thickness and couple the probe.
- When the message **Remove probe from Cal Std.** is displayed on the screen, you can uncouple the probe. The 1-point calibration is finished, the instrument is calibrated to the zero and to the sound velocity in the calibration block. The new sound velocity is displayed at the top edge of the display screen.

### 2-point calibration

A stepped calibration block with 2 different thicknesses is required for the 2-point calibration. The wall thicknesses must be selected in such a way that they cover the expected measurement readings.

- In the function group **PROBE&CAL**, select the function **THK CAL**.
- Choose the option **2-PT**.
- In the function group **PROBE&CAL**, select the function **CALIBRATION**.
- Press one of the **left** or **right** arrow keys in order to start the calibration. The message **Couple to Low Cal Std. (displayed below) or press ENTER to change low cal. block thickness.** is displayed on the screen.

- If the wall thickness displayed on the screen is not identical with the low-calibration thickness calibration block, press the function key 2 (function **ENTER**).
  - Select the digits that you wish to change using the **left** and **right** arrow keys, and change the value using the **up** and **down** arrow keys.
  - Press the function key 2 (function **DONE**) in order to close the process of changing the thickness value.
  - Apply some couplant to the low-calibration thickness calibration block and couple the probe. After finishing the measurement, the message **Remove probe from Cal Std.** is displayed on the screen.
  - Uncouple the probe. The message **Couple to High Cal Std. (displayed below) or press ENTER to change high cal. block thickness.** is displayed on the screen.
- If the wall thickness displayed on the screen is not identical with the high-calibration thickness calibration block, press the function key 2 (function **ENTER**).
  - Select the digits that you wish to change using the **left** and **right** arrow keys, and change the value using the **up** and **down** arrow keys.
  - Press the function key 2 (function **DONE**) in order to close the process of changing the thickness value.
  - Apply some couplant to the high-calibration thickness calibration block and couple the probe.
  - When the message **Remove probe from Cal Std.** is displayed on the screen, you can uncouple the probe. The 2-point calibration is finished, the instrument is calibrated to the zero and to the sound velocity in the calibration block. The new sound velocity is displayed at the top edge of the display screen.

## Velocity calibration

The velocity calibration is a special calibration mode for the Velocity view (see page 105). This calibration is necessary to determine the probe delay so that the CL Go+ can correctly measure the sound velocity in the test object.

The velocity calibration is carried out using the zero block at the instrument rear.

- In the function group **PROBE&CAL**, select the function **THK CAL**.
- Choose the option **VELOCITY**.
- In the function group **PROBE&CAL**, select the function **CALIBRATION**.
- Press one of the **left** or **right** arrow keys in order to start the calibration. The message **Put probe on zero block - use couplant** is displayed on the screen.
- Apply some couplant to the instrument zero block and couple the probe. The zeroing is started. After finishing it, the message **Probe zero complete. Remove probe from zero block.** is displayed on the screen.



## Setting the sound velocity

If the sound velocity in the test object is known, you can also set it directly without applying one of the calibration methods using a calibration block.

You can find a list of typical sound velocities in different materials in this manual (see Section **Sound velocities**, page 165).



### Note

It is recommended to verify the velocity setting by means of an object with known thickness which is made of the same material as the test object.

- In the function group **PROBE&CAL**, select the function **VELOCITY**.
- Press the function keys 3 and 4 in order to select a material with the corresponding sound velocity.
- Press the **left** and **right** arrow keys in order to manually adjust the sound velocity in increments.

The current velocity setting is displayed at the top of the display screen.

## 5.7 Carrying out measurements



### Note

Please observe the application notes in chapter 10 of this manual when carrying out measurements by means of the CL Go+ (see Section **Application notes**, page 164).

A prerequisite for the measurement is always the correct calibration.

The following steps describe the principle of wall thickness measurement process. Further details depend on the corresponding requirements in each case.

- Clean the surface of the test object from any dirt and loose parts.
- Apply some couplant to the surface of the test object.
- Place the probe carefully but firmly on the material surface. Apply a uniform pressure in order to obtain a stable reading.

If the coupling was successful, the digits in the display of readings are shown in solid mode.

- Watch the A-scan and the display of readings, and wait until both of them are stable.
- Use the function **FREEZE** (see page 110) in order to freeze the screen display. You can uncouple the probe afterwards.
- If a data recorder file is active: Press the function key 2 (function **SEND**) in order to save the displayed reading.



### Note

The processes of saving readings and documenting measurement results are described in detail in chapter 6.

## 5.8 A-scan configuration

You can adjust the A-scan display on the screen to your requirements.



### Note

Some of these parameters are automatically set by the instrument during calibration.

### Setting the display range

You can set the display range for the echoes on the screen on the basis of the measurement results to be expected. This includes the setting of display range and display delay.

#### Display range

You can use display range to set the display screen to the thickness range you wish to use for your measurements.

- In the function group **MEASURE**, select the function **DISPLAY RANGE**.
- Select the required display range.

#### Display delay

Make your choice of displaying the set display range starting from the surface of the test object or in a section starting earlier or later.

This allows you to shift the complete screen display and consequently also the display zero.

If the display should start from the surface of the test object, you have to set the display delay to 0.

- In the function group **MEASURE**, select the function **DISPLAY DELAY**.
- Choose the required display delay.

## Setting the gain

You can use the gain to adjust the sensitivity necessary for making the backwall echoes visible on the display screen at the required height.



### ATTENTION

Structural noise etc. is likewise amplified and can interfere with the measurement evaluation.

You can choose between different amplification methods and adjust the maximum gain to your requirements.

You have a choice between the following amplification methods:

### AUTO

The automatic gain control is turned on. The instrument selects one of the values set in the function **MAX GAIN** for the options **HIGH** and **LOW** depending on the sound velocity in the material.

### AGC OFF

The automatic gain control is switched off. The gain setting is fixed and corresponds to the value selected in the function **MAX GAIN**.

### HIGH

The automatic gain control is switched on. The maximum gain is set to the preset (different for each probe) maximum gain value (suitable for attenuative material like stainless steel).

### LOW

The automatic gain control is switched on. The maximum gain is set to the preset (different for each probe) minimum gain value (suitable for less attenuative material like aluminum).

## MANUAL

The automatic gain control is switched on. The maximum gain setting is fixed and corresponds to the value selected in the function **MAX GAIN**.

- In the function group **MEASURE**, select the function **MAX GAIN MODE**.
- Select the required amplification method.
- Select the function **MAX GAIN**.
- Select the required gain value for the method chosen previously or option.

## Selecting the display update rate

You can select the interval for measurements and the A-scan update, as well as for the display of readings. When using the B-scan and MIN/MAX mode, this value is automatically set to 32 Hz.

You have a choice between the following display update rates:

- 4 HZ
- 8 HZ
- 16 HZ

- In the function group **CONFIG**, select the function **UPDATE RATE**.
- Select the required display update rate.

## Selecting the rectification mode

You can select the rectification mode of echo pulses according to your application.

You have a choice between the following rectification modes:

### POS/NEG

Positive/negative half-wave: Only the positive or negative half-waves are displayed.

### FULL

FULL WAVE All half-waves are displayed above the base line on the screen.

### RF

Radio-frequency display: All signals are displayed in their original form.

- In the function group **CONFIG**, select the function **RECTIFY**.
- Select the required rectification mode.

## Setting the probe delay

Every probe is equipped with a delay line between the transducer and the coupling face. The sound pulse must first pass through this delay line before it can enter the test object. You can compensate for this influence of the delay line in the probe in the function **PROBE DELAY**.



### Note

- In the function group **PROBE&CAL**, select the function **PROBE DELAY**.
- Set the probe delay of the connected probe.

## 5.9 Setting the gates

### Task of the gates

The gates are used for selecting the measuring point for the digital time-of-flight measurement to determine the wall thickness.

The CL Go+ uses three gates depending on the probe selected. With a contact probe, the CL Go+ only uses gate A measuring from IP to 1st echo. With a delay line probe, the measurement is taken from the entry echo to the 1st or from the 1st to the 2nd backwall echo (multi echo).

The position of the gates is defined by three parameters: start, width, and threshold height.

The start of gate B is coupled to the first echo in gate A. If you shift the starting point of gate A, the starting point of gate B is automatically shifted by the same value. If there is no echo, the starting point of gate A applies.

Gate B follows gate A, and gate C follows gate B.



### Note

The functions of the gates are only effective within the display range. The gates B and C are only visible and adjustable when using specific probes.

### Gate start

**Gate start**, **gate width** and **gate threshold** are set automatically with probe selection and can be adjusted as required.

You can set the starting points for gate A and gate B.

- In the function group **GATE**, select the function **GATE A START**.
- Set the required starting point for gate A.
- If the selected probe allows it, select the function **GATE B START** and set the required starting point for gate B.

## Gate width

You can set the width of gate A and gate B.

- In the function group **GATE**, select the function **GATE A WIDTH**.
- Set the required width for gate A.
- If the selected probe allows it, select the function **GATE B WIDTH** and set the required width for gate B.

## Gate threshold

You can set the vertical position of the gate in percentage of screen height (A-scan).



### Note

In RF mode, the values between +100% and –100% are possible. When changing from **RF** to **NEG**, **POS**, or **FULL**, negative signs are replaced by positive signs (see Section **Selecting the rectification mode**, page 94).

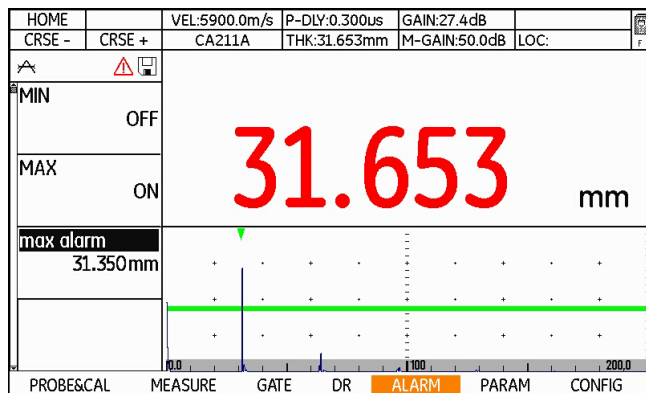
- In the function group **GATE**, select the function **GATE A THR**.
- Set the required position of gate A.
- If the selected probe allows it, select the function **GATE B THR** and set the required position of gate B.



## 5.10 Configuring alarm functions

The CL Go+ can trigger an alarm signal if preset readings are exceeded or fallen below.

If an activated alarm is triggered, the displayed value on the screen flashes red and the red alarm icon flashes in the status display box (see Section **Status display icons**, page 13).



### Minimum value alarm

The alarm is triggered if the set minimum value is fallen below.

- In the function group **ALARM**, select the function **MIN**.
- Choose the option **ON** in order to activate the minimum value alarm.
- Select the function **MIN ALARM** and set the thickness value which should trigger an alarm if fallen below.

### Maximum value alarm

The alarm is triggered if the set maximum value is exceeded.

- In the function group **ALARM**, select the function **MAX**.
- Choose the option **ON** in order to activate the maximum value alarm.
- Select the function **MAX ALARM** and set the thickness value which should trigger an alarm if exceeded.

## 5.11 MIN/MAX mode

The CL Go+ enables you to determine the minimum and the maximum thickness reading of a series or sequence of measurements.

A sequence of measurements is defined by the waiting time between two measurements. If you couple the probe again within this time, the sequence of measurements is continued. If the waiting time has expired without the probe being coupled, the sequence is automatically terminated. The next time the probe is coupled, a new sequence of measurements starts automatically.

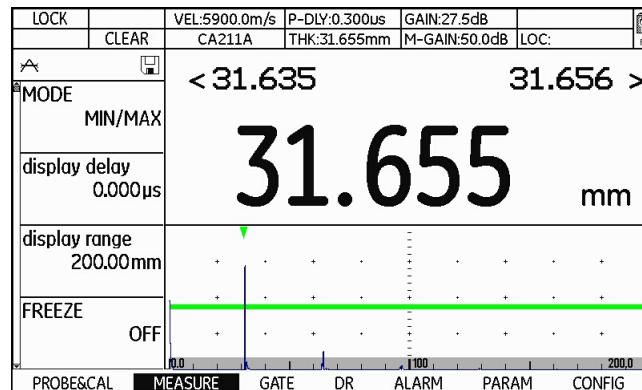


### Note

The display update rate is automatically increased to 32 Hz during the MIN capture mode.

The minimum and the maximum value of the current sequence are displayed in small digits above the last reading obtained.

The expiring waiting time is displayed at the top right corner of the screen display in the power display box.



## Switching the MIN/MAX mode on

You can switch the MIN/MAX mode on any time. The first sequence of measurements starts automatically at the first successful coupling after switching the MIN/MAX mode on.

You can save the current minimum reading during the MIN/MAX mode by pressing the function key 4 (function **SEND MIN**). A new sequence of measurements starts automatically as soon as saving takes place.



### Note

The processes of saving readings and documenting measurement results are described in detail in chapter 6.

- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **MIN/MAX** in order to switch the MIN/MAX mode on.

## Clearing a sequence of measurements

You can clear all readings of the current sequence of measurements.

- Press the function key 3 (function **CLEAR**). The readings of the current sequence of measurements are cleared.
- Couple the probe in order to start a new sequence.

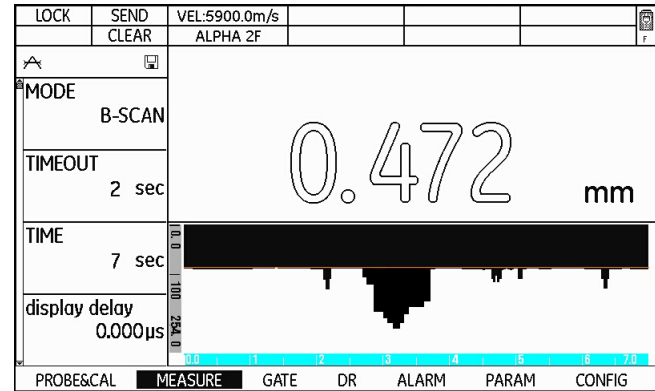
## 5.12 Thickness profiles with B-scan

Apart from the A-scan, the CL Go+ presents another possibility of graphical evaluation: the B-scan.

The B-scan enables you to display a thickness profile of the test object on the screen of the CL Go+.

You can carry out measurements continuously over a maximum period of 30 seconds for the B-scan display with the values from these measurements being used by the CL Go+ for displaying a subsection of the test object. For this purpose, guide the probe over the section to be displayed during the measurement period.

The display opposite shows the typical B-scan of a test object with a corroded backwall.



### Note

A valid calibration must be carried out for the display of the B-scan.

The display update rate is automatically increased to 32 Hz during the measurements for the B-scan.

## Switching the B-scan display on

You can switch the B-scan display on any time.

The display of the thickness profile starts automatically at the first successful coupling after switching the B-scan display on.

Simultaneously with the B-scan display, the CL Go+ determines the minimum reading detected during the measurements. At the end of the selected display time, this value is displayed above the B-scan, and you can save the reading by pressing the function key 2 (function **SEND**).



### Note

The processes of saving readings and documenting measurement results are described in detail in chapter 6.

- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **B-SCAN** in order to switch the B-scan display on.

## Setting the display time

The display time (in seconds) defines the period of time during which the thickness profile should be recorded. At the end of this time (maximum 30 seconds), the instrument stops the measurements.


The scaling of the X-axis in the B-scan corresponds to the selected display time.

- In the function group **MEASURE**, select the function **TIME**.
- Set the required display time.

## Setting the waiting time

You can set a waiting time (in seconds) for interruptions. The waiting time starts as soon as the probe is uncoupled during a B-scan recording. As long as you couple the probe again within this time, the B-scan display is continued. Otherwise, the instrument will end the B-scan display.

The expiring waiting time is displayed at the top right corner of the screen display in the power display box.

LOCK	SEND	VEL:5900.0m/s					
	CLEAR	ALPHA 2F					

- In the function group **MEASURE**, select the function **TIMEOUT**.
- Set the required waiting time.

## Minimum value line

You can display a minimum reading as a line in the B-scan. The adjusted minimum value is identical with the minimum value which triggers an alarm when fallen below (see Section **Configuring alarm functions**, page 97). However, the alarm functions are completely independent of the visible minimum value line. The minimum value line is meant for visual orientation.

- In the function group **ALARM**, select the function **MIN**.
- Choose the option **ON** in order to activate the minimum value alarm.
- Select the function **MIN ALARM** and set the thickness value which should be displayed as a line in the B-scan.

## Recording a B-scan

After setting the display time and the waiting time, you can start recording and displaying the thickness profile.

- Apply some couplant to the complete section of the test object to be scanned.
- Couple the probe and guide it uniformly over the section to be displayed.

The B-scan is generated evenly starting from the edge. As soon as the end of the display range is reached, the display of the thickness profile ends.

The minimum reading of the section is displayed above the B-scan.

- To save, press the function key 2 (function **SEND**).
- Press the function key 3 (function **CLEAR**) in order to clear the B-scan and to start a new recording.



### Note

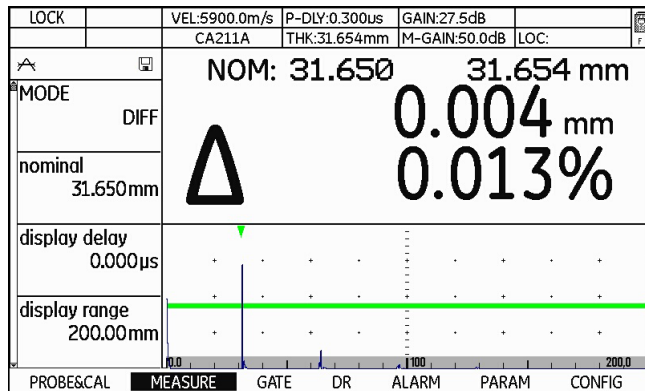
The processes of saving readings and documenting measurement results are described in detail in chapter 6.

## 5.13 Differential value display

The differential value display shows the difference between a nominal value setting and the measured thickness value. The difference is displayed as an absolute value and as a percentage of nominal value.

A differential value with a positive sign means that the measured value is above the nominal value, a negative sign means that the measured value is below the nominal value. With a nominal wall thickness of 7.00 mm, for example, the value 6.27 mm is displayed as -0.73 mm and -10.43%.

- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **DIFF** in order to switch the differential value display on.
- Select the function **NOMINAL** and set the required nominal value.

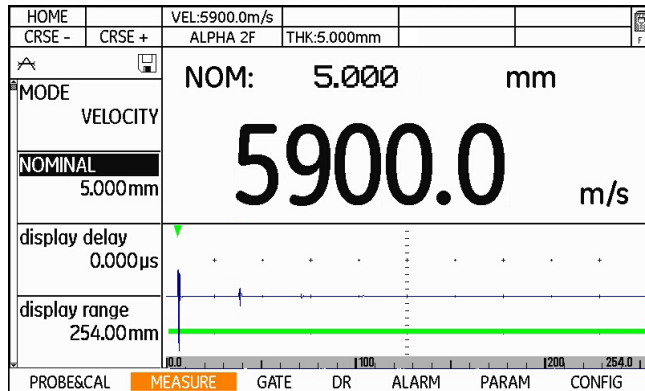




## 5.14 Velocity view

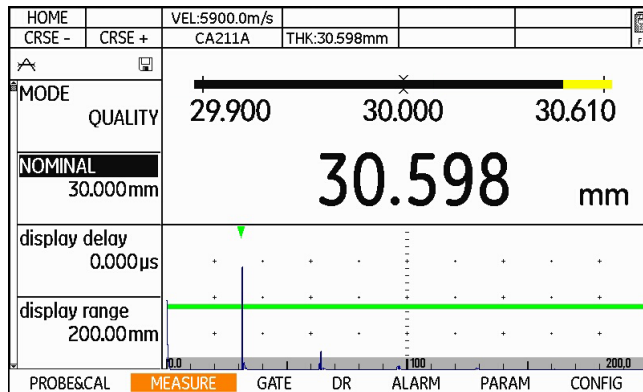
You can display the sound velocity in the test object determined by the CL Go+ based on the time-of-flight and the nominal thickness. By comparing this with the expected sound velocity, it may be possible to draw conclusions about impurities in the material.

- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **VELOCITY** in order to switch the velocity view on.
- Select the function **NOMINAL** and set the thickness of the test object.



## 5.15 Quality view

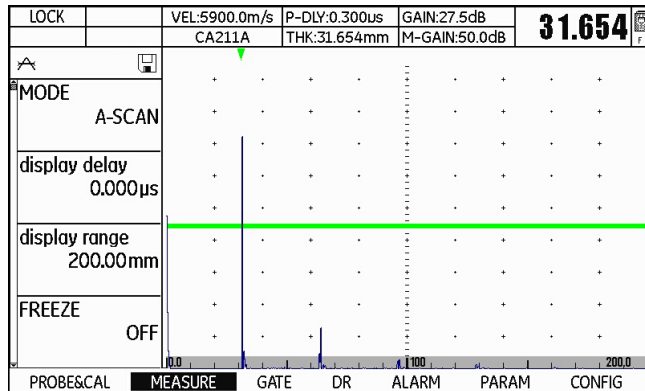
The quality view shows the current measured value together with a graphical representation of the range between the minimum and maximum value. The color change of the bar shows the position of the measured value within this range. The selected nominal value of the material thickness is displayed in the middle of the bar. The minimum and maximum values correspond to the settings for alarms (see page 97).



- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **QUALITY** in order to switch the quality view on.
- Select the function **NOMINAL** and set the required nominal value.
- If necessary, check and change the settings in the function group **ALARM** (see page 97).

## 5.16 A-scan view

If necessary, you can display the A-scan so that it covers the complete display screen height. The current thickness reading is then no longer shown in enlarged mode above the A-scan but in reduced from at the top right corner of the display screen.



- In the function group **MEASURE**, select the function **MODE**.
- Choose the option **A-SCAN** in order to switch the A-scan view on.



## Calibration reminder

PROBE	A-2 DFR
THK CAL	1-PT
CALIBRATION	START
velocity	5920.0m/s CUSTOM
CAL REMINDER	OFF

Certain measurement tasks require a regular calibration of the gauge.

The reminder function of the CL Go+ uses three criteria from which you can choose one:

- Time in minutes
- Number of readings
- Power On and Off

If you switch on the reminder functions of CL Go+, a reminder icon is displayed at the top left corner of the display screen once the selected criterion is reached (see Section **Status display icons**, page 13).

- In the function group **PROBE&CAL**, select the function **CAL REMINDER**.
- Press one of the **left** or **right** arrow keys. A selection menu is displayed.
- Press one of the **left** or **right** arrow keys in order to select the required criterion.
- If necessary, press one of the **up** or **down** arrow keys in order to define additional settings for the selected criterion.
- Press one of the **left** or **right** arrow keys in order to set the additional data.
- Finally, press the function key 2 (function **CONFIRM**) in order to save the data. The selection menu disappears, and the selected settings are displayed at the function **CAL REMINDER**.

## Display freeze (FREEZE)

You can freeze the display screen of the CL Go+. The A-scan and the displayed thickness value are then frozen and no longer updated.

This function is available in all measurement modes and display views.

When the function is active, a corresponding icon is displayed at the top left corner of the display screen (see Section **Status display icons**, page 13).

- In the function group **MEASURE**, select the function **FREEZE**.
- Press one of the **left** or **right** arrow keys in order to switch the function on.



### Note

You can assign the function **FREEZE** to the function key 4 (see Section **Assignment of function key 4**, page 69).

## Gate magnifier (ZOOM)

The function **ZOOM** expands the gate A up to a maximum covering the entire display width. This enables you to examine the signal in gate A in more detail.

You can only switch on the zoom function if a signal is positioned in the gate.



### Note

The function **ZOOM** is not available in the function groups. You have to assign the function **ZOOM** to the function key 4 to be able to use it (see Section **Assignment of function key 4**, page 69).

## 5.18 Enabling options (Upgrade)

LOCKOUT CONFIG
MENU MODE EXPERT
FUNC KEY NOT DEFINED
PASSWORD
CODE

The CL Go+ can be equipped with various options. You can enable these options by entering the corresponding codes.



### Note

To order options, you need the serial number of your instrument (please see function **ABOUT** in the function group **CONFIG**).

- In the function group **CONFIG**, select the function **CODE**.
- Press one of the **up** or **down** arrow keys and enter the first character of the code.
- Press the **left** arrow key in order to select the next character of the code, and enter the other characters of the code.
- Finally, press the function key 2 (function **CONFIRM**).

If the code you have just entered is correct, the option is enabled and is immediately available.

- Select the function **ABOUT**.
- Press one of the **left** or **right** arrow keys in order to display the start display including the information about the options available.





# Data Recorder **6**

## 6.1 Overview of functions

The Data Recorder of CL Go+ is a flexible and powerful tool for the organization of measurement tasks and the management of measured values.

EXIT		VEL:5900.0m/s				
		A-2 DFR	TEST 2024 04			
AA	<input type="checkbox"/>	LOCATION	VALUE	COMMENTS	FLAGS	
POINT	L	ELEV1.4.R	6.95		<	
		ELEV1.4.B	15.29		>	
		ELEV1.5.L	EMPTY			
		ELEV1.5.F	EMPTY			
EXPLORER		RECORD STATS HEADER EDIT COMMENT				
PROPERTIES	SHOW	ELEVATION			ELEV1	
		TUBE			5	
VIEW	LIST	POINT			L	
		VALUE			EMPTY	
		ATTACHMENT TYPE			NO ATTACHMENT	
		SEND FUNCTION			THICKNESS + ASCAN	
		ADVANCE TIME			OFF	
		1ST ADVANCE BY			POINT	
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG

You can use the Data Recorder e.g. to

- save measurement results to the CL Go+
- save graphical measurement data (A-scan, B-scan)
- evaluate measurement results statistically
- display saved numerical and graphical measurement data
- create and use comment lists
- organize and prepare for measurements by creating empty files with ready-made descriptions of measurement locations and measuring points
- use different file types with a different organization of measurement results for different applications
- export measurement results (CSV, PDF, XML, DAT)

The elements described below are generally stored in a Data Recorder file. Details depend on the selected file type (please refer to section below).

## File name

The file name is meant for the clear identification of the file and it must always be entered.

## File header

Important information about the file is stored in the file header. This includes e.g. the file name, the date of creation, the name of the inspector, as well as remarks, and a memo text.

## Readings

After loading the file, a reading is saved by pressing the function key 2 (function **SEND**) in each case.

## Comments

A comment can be saved on every measuring point.

## Flags

Flags are automatically added to a reading if additional information is stored, for example the A-scan, or a minimum value or maximum value alarm.

You can find a list of flag symbols in Chapter 9.4 **Flag symbols**, page 177.

## A-scan

If necessary for the evaluation of measurement results, the signal waveforms on which the readings are based can be saved in the form of an A-scan.



## Note

A-scans require considerably more memory capacity than pure readings.



## File type CUSTOM LINEAR

This file type has two structural elements (measurement location and measuring point) Measurement locations must be identified by specific names, measuring points are consecutively numbered. The required number of measuring points can be assigned to each measurement location. The number of measuring points is determined during file creation.

Typical application: Measurements on pipelines.

EXIT		VEL:5900.0m/s				
NEXT		A-2 DFR	TEST 2024 04			
AA	<input type="checkbox"/>	LOCATION ELEV1	1.L	1.F	1.R	1.B
TUBE	1	FILE TYPE	CUSTOM LINEAR			
POINT	L	READING TYPE	STANDARD			
EXPLORER		NUMBER OF LOCATIONS	1			
PROPERTIES SHOW		LOC. LABEL LENGTH	16			mm
		START POINT	1			
		END POINT	1			
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG

## File type GRID

This file type is especially suitable for testing areas in which the measurement locations are arranged on a grid. The file can contain several grids. Each grid contains a maximum of 9 measuring points.

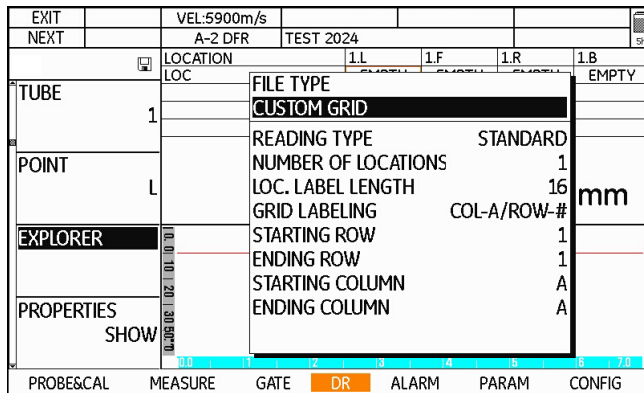
Typical application: Measurements on tanks, large-diameter liquid pipes.

EXIT		VEL:5900.0m/s				
NEXT		A-2 DFR	TEST 2024 04			
AA	<input type="checkbox"/>	LOCATION ELEV1	1.L	1.F	1.R	1.B
TUBE	1	FILE TYPE	GRID			
POINT	L	READING TYPE	STANDARD			
EXPLORER		GRID LABELING	COL-A/ROW-#			mm
PROPERTIES SHOW		STARTING ROW	1			
		ENDING ROW	1			
		STARTING COLUMN	A			
		ENDING COLUMN	A			
		START POINT	1			
		END POINT	1			
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG

## File type CUSTOM GRID

This file type is suitable for applications in which each measurement location consists of a grid of the same size. The file can contain the required number of grids. The grid size is determined during file creation, and each measurement location must be identified by a specific name.

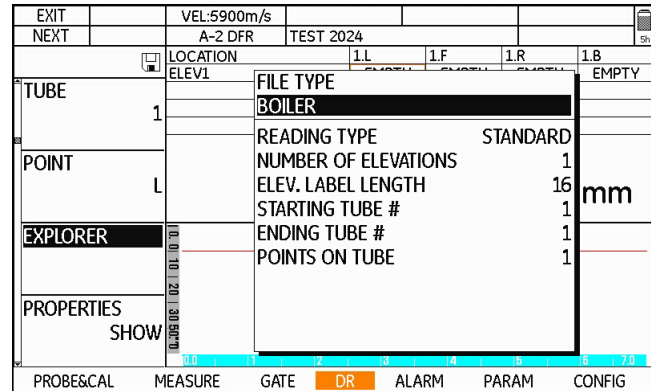
Typical application: Measurements on tank bottoms, ship's hulls.



## File type BOILER

The measurement results are organized in a structure with 3 elements (Elevation, Tube, Point). In this type, every elevation is identified by a specific name. The number of measuring points is determined during file creation. The advantage of this file type is the free choice of the tubes to be tested during the measurements.

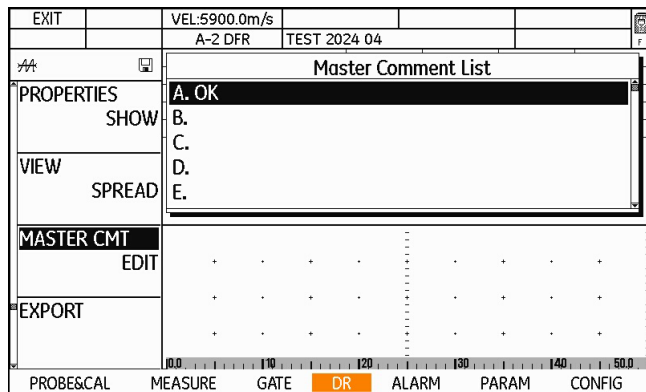
Typical application: Measurements on steam boilers.



## 6.3 Master comment list

You can save a comment to each measurement result. You can choose the corresponding comment from a comment list. To do this, you have to start by creating a master comment list with a maximum of 16 entries.

You can change this list at any time, add more comments, and delete comments.



## Creating a master comment list

- In the function group **DR**, select the function **MAS-TER CMT**.
- Press one of the **left** or **right** arrow keys. A form window appears.
- Press one of the **up** or **down** arrow keys in order to select a list item.
- Press one of the **left** or **right** arrow keys in order to start the entry of the comment.
- Press the arrow keys to mark the first character.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 2 (function **BKSP**) in order to delete the last character.
- Press the function key 4 (function **CONFIRM**). The comment is saved.

- Enter the comments for the other list items in the same way.
- Finally, press the function key 1 (function **EXIT**). The master comment list disappears.

**Note**

The master comment list created in this way forms the basis of subsequent file comment lists, each belonging to a certain file (see Section **Adding comments**, page 131).

## Changing master comments

You can change the comments of master comments at any time. To delete a comment, just delete all characters one by one using the function **BKSP**.

- In the function group **DR**, select the function **MAS-TER CMT**.
- Press one of the **left** or **right** arrow keys. A form window appears.
- Press one of the **up** or **down** arrow keys in order to select the list item.
- Press one of the **left** or **right** arrow keys in order to start the editing process of the comment.
- Press the arrow keys to mark the first character.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.



- Press the function key 2 (function **BKSP**) in order to delete the last character.
- Press the function key 4 (function **CONFIRM**). The comment is saved.
- Change the comments for the other list items in the same way.
- Finally, press the function key 1 (function **EXIT**). The master comment list disappears.

## 6.4 Working with files

You can create Data Recorder files in order to load them for subsequent measurement tasks and to save measurement results to them in a structured mode.

You can edit, change, copy, or delete stored files at any time.

When creating a file, you have to define different file parameters, e.g. the number of measuring points. The type and scope of these parameters depend on the selected file type.



### Note

The file parameters are fully described in Chapter 9.3 **Data Recorder file types**, page 167.

## Creating a new file



### Note

If you wish to create a file by copying an already existing file, you have to load the existing file first (see Section **Loading a file**, page 125). The file type **COPY** is then available as an additional option. In a copy, all properties of the currently loaded file apply but you can change all parameters.

- In the function group **DR**, select the function **EXPLORER**. The file directory of the memory card appears.
- Press the arrow keys to mark the directory to which the file should be saved.
- Press the function key 4 (function **NEW**).
- Press one of the **left** or **right** arrow keys in order to select the file type.

- Press one of the **up** or **down** arrow keys in order to mark the basic parameters available in the selected file type.
  - Press the **left** or **right** arrow keys in order to select or set the values of the individual parameters.
  - Press the function key 4 (function **NEXT**) in order to enter the file name.
  - Press the arrow keys to mark the first character.
  - Press the center key of the keypad to select the marked character.
  - Choose other characters in the same way.
  - Press the function key 3 (function **BKSP**) in order to delete the last character.
  - Press the function key 4 (function **NEXT**) in order to switch to the next area of file definition.
  - Press one of the **up** or **down** arrow keys in order to select the individual parameters.
- Select the individual parameters and set the required values.
  - If the selected file type allows it, press the function key 4 (function **NEXT**) in order to switch to the next area of file definition.
  - Finally, press the function key 2 (function **DONE**) in order to save the new file.

The file is saved and is available for recording readings.



### Note

You can already enter the values for the functions **T-MIN** and **T-MAX** at this point.

These settings will subsequently apply when the file is loaded (see Section **Configuring alarm functions**, page 97).

## Deleting files

If you don't want to use a file any longer, you can delete it at any time.



### ATTENTION

You cannot undo the deletion of files!

- In the function group **DR**, select the function **EXPLORER**. The file directory of the memory card appears.
- Press the arrow keys in order to select the directory and to mark the files that you wish to delete.
- Press the function key 3 (function **DELETE**). A message prompting you to confirm is displayed.

The file is deleted and is no longer available for recording readings.

## 6.5 Saving measurement results

After creating a Data Recorder file, you can carry out measurements and save the measurement results to this file.



### Note

A description of how to carry out measurements is given in chapter 5 of this manual.

## Loading a file

Before starting the measurements, you have to select the required file for saving the measurement results first.



### ATTENTION

Always make sure that the correct file is selected. The file name is displayed at the top of the display screen during the measurement operation.

- In the function group **DR**, select the function **EXPLORER**. The file directory of the memory card appears.
- Press the arrow keys in order to select the directory and to mark the files that you wish to load.
- Press the function key 2 (function **ENTER**).

The file is loaded and is then ready for recording readings.

## Saving readings

After selecting a file, the empty data points for saving the readings are displayed above the A-scan. The display mode and designation of the measuring points depends on the file type and on the options chosen for the file.

The current target data point for saving the next reading is marked with a broader frame.

HOME	SEND	VEL:5900.0m/s							
	CLEAR	A-2 DFR	TEST 2024 04						
AA		LOC1	A	B	C	D			
		1	EMPTY	EMPTY	EMPTY	EMPTY			
ROW		2	EMPTY	EMPTY	EMPTY	EMPTY			
		3	EMPTY	EMPTY	EMPTY	EMPTY			
COL		4.28 mm							
A									
EXPLORER		+ . + . + . + . + . + .							
PROPERTIES		+ . + . + . + . + . + .							
SHOW		+ . + . + . + . + . + .							
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG			

- Carry out a measurement as usual (see Section **Carrying out measurements**, page 90).
- Press the function key 3 (function **SEND**). The reading is saved to the marked data point. The marking advances automatically to the next data point.
- Save other readings in the same way.

If a measurement cannot be carried out at the planned measuring point, you can save a corresponding remark for this measuring point.

- Press the center key of the keypad *long*. The functions of the function keys change.
- Press the function key 3 (function **OBSTR**). The remark **OBSTR** is saved to the marked data point.



### Note

You can assign the function **OBSTR** together with function **CLEAR** to the function key 4 (see Section **Assignment of function key 4**, page 69).

## Special measuring point functions

Special functions are available for editing individual measuring points.

- **μGRID** (see page 140)
  - **SEND** (see page 126)
  - **NOTE** (see page 131)
  - **CLEAR** (see page 128)
  - **OBSTR** (see page 126)
- Press the center key of the keypad *long*. The functions of the function keys change.

μGRID	SEND	VEL:5900.0m/s				
NOTE	CLEAR	A-2 DFR		TEST 2024 04		
μ	☐	LOC1	A	B	C	D
1		14.18	14.17	14.18	14.18	
2		14.20	14.20	14.57	14.57	
3		EMPTY	EMPTY	EMPTY	EMPTY	
ROW	1					

- Press one of the function keys to trigger the corresponding function.
- Press the center key of the keypad *long*. You will see the default functions of the function keys again.

## Selecting individual measuring points

If necessary, you can mark a certain data point (measuring point) in order to save a reading specifically to this data point.

- In the function group **DR**, select one of the functions **ROW**, **COLUMN**, **ELEVATION**, **TUBE**, or **POINT**, depending on the file type.
- Press the **left** or **right** arrow key in order to choose another measuring point. The marking in the overview of measuring points at the top of the display screen is moved.

or

- Press the center key of the keypad *long*. The functions of the function keys change.
- Press the arrow keys in order to choose another measuring point. The marking in the overview of measuring points at the top of the display screen is moved.

## Clearing a reading

You can clear a stored reading at any time.

- In the function group **DR**, select one of the functions **ROW**, **COLUMN**, **ELEVATION**, **TUBE**, or **POINT**, depending on the file type.
- Press one of the **left** or **right** arrow keys in order to select a data point with a stored reading. The marking in the overview of measuring points at the top of the display screen is moved.
- Press the center key of the keypad *long*. The functions of the function keys change.
- Press the function key 3 (function **CLEAR**). The reading is cleared.



### Note

You can assign the clearing function **CLEAR** together with the function **OBSTR** to the function key 4 (see Section **Assignment of function key 4**, page 69).

## Overwriting readings

By selecting a data point which already has a reading assigned to it, you cannot normally overwrite the reading saved there.

However, you can cancel this write protection if necessary. In that case, the previously saved readings can be overwritten at any time.

You have a choice between the following options:

- **NO** (overwriting is not possible)
- **OLD** (overwriting of old files)
- **ALL** (overwriting without confirmation)
- **ASK** (overwriting after confirmation)

- In the function group **DR**, select the function **OVERWRITE**.
- Choose the required option.



## Saving readings with A-scans

You can save readings with or without an A-scan. To do this, you have to configure the send function accordingly.

You have a choice between the following options:

### THICKNESS

Only the reading without an A-scan is always saved.

### THICKNESS / THICKNESS + A-SCAN

If the key is pressed only briefly, the reading is saved, and if the key is pressed long, the A-scan is saved additionally to the reading.

### THICKNESS + A-SCAN

The A-scan is saved additionally to each reading.

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press either the **up** or **down** arrow key in order to select the property **SEND FUNCTION**.
- Press one of the **left** or **right** arrow keys in order to choose the required option.
- Carry out a measurement as usual.

If you have selected **THICKNESS / THICKNESS + A-SCAN**:

- Press the function key 3 *briefly* (function **SEND**). The reading is saved without an A-scan.
- Press the function key 3 *long* (function **SEND**). The reading is saved with an A-scan.

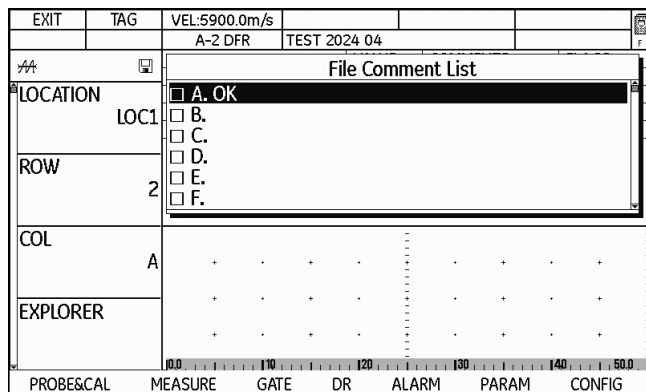
If the reading was saved with an A-scan, a small triangle is shown in the top right corner of the corresponding data point.

A	B	C	D
14.18	14.17	14.18	14.18
14.20	14.20	14.57	14.57
EMPTY	EMPTY	EMPTY	EMPTY

## Adding comments

If necessary, you can add one or several comments to each reading. To do this, choose the required comments from a ready-made list of comments.

Each file has a separate comment list automatically generated on the basis of the master comment list (see Section **Master comment list**, page 119).



- Select a measuring point which has a reading saved to it (see Section **Selecting individual measuring points**, page 127).
- Press the center key of the keypad *long*. The functions of the function keys change.
- Press the function key 3 (function **NOTE**). A selection menu is displayed.
- Press one of the **up** or **down** arrow keys in order to mark a comment.
- Press the function key 2 (function **TAG**) in order to select the marked comment. Selected comments are marked with a cross before the code letter.
- If necessary, choose other comments in the same way.
- If a selected comment is marked, press the function key 2 (function **UN-TAG**) in order to cancel the selection.

- Finally, press the function key 1 (function **EXIT**) in order to end the selection of comments.

The code letters of the selected comments are displayed in the column **COMMENTS** in the list view.

LOCATION	VALUE	COMMENTS	FLAGS
ELEV1.1.L	14.27	ABC	>
ELEV1.1.F	EMPTY		
ELEV1.1.R	EMPTY		
ELEV1.1.B	EMPTY		



### Note

You can assign the function **NOTE** to the function key 4 (see Section **Assignment of function key 4**, page 69).

You cannot add any comments to empty data points (no reading saved). If the marking has automatically advanced to the next, empty data point after saving the reading, you have to select the data point with the corresponding reading again first before selecting the comment (see Section **Selecting individual measuring points**, page 127).



### Note

You can deactivate the automatic advance feature (see Section **Automatic advance**, page 144).

## Editing a file comment list

If necessary, you can change and complete the comments of a file comment list which have been automatically generated from the master comment list.

EXIT		VEL:5900.0m/s				
		A-2 DFR	TEST 2024 04			
AA	<input type="checkbox"/>	LOCATION	I.L	I.F	I.R	I.B
POINT	R	ELEV1	14.27	14.28	EMPTY	EMPTY
EXPLORER		RECORD STATS HEADER EDIT	<b>COMMENT</b>			
PROPERTIES		<input type="checkbox"/> A. OK				
SHOW		<input type="checkbox"/> B.				
VIEW		<input type="checkbox"/> C.				
SPREAD		<input type="checkbox"/> D.				
		<input type="checkbox"/> E.				
		<input type="checkbox"/> F.				
		<input type="checkbox"/> G.				
		<input type="checkbox"/> H.				
PROBE&CAL	MEASURE	GATE	<b>DR</b>	ALARM	PARAM	CONFIG

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press the **left** or **right** arrow key in order to select the group **COMMENT**.

The file comment list is displayed, and the comments already used are marked with a cross before the code letter.

- Press one of the **up** or **down** arrow keys in order to select a list item.
- Press one of the **left** or **right** arrow keys in order to start the entry of the comment.
- Press the arrow keys to mark the first character.
- Press the center key of the keypad to select the marked character.

- Choose other characters in the same way.
- Press the function key 2 (function **BKSP**) in order to delete the last character.
- Press the function key 4 (function **CONFIRM**). The comment is saved.
- Edit other comments in the same way.
- Press the function key 1 (function **HOME**) in order to end the editing process of the file comment list.

## 6.6 Editing files

You can edit stored files at any time in order to adjust the requirements to the corresponding measurement task and to e.g. make changes to the designations of measurement locations.

EXIT		VEL:5900.0m/s				
		A-2 DFR	TEST 2024 04			
AA	<input type="checkbox"/>	LOCATION	VALUE	COMMENTS	FLAGS	
POINT	L	ELEV1.4.R	6.95		<	
		ELEV1.4.B	15.29		>	
		ELEV1.5.L	EMPTY			
		ELEV1.5.F	EMPTY			
EXPLORER		RECORD	STATS	HEADER	EDIT	COMMENT
PROPERTIES	SHOW	ELEVATION			ELEV1	
		TUBE			5	
VIEW	LIST	POINT			L	
		VALUE			EMPTY	
		ATTACHMENT TYPE			NO ATTACHMENT	
		SEND FUNCTION			THICKNESS + ASCAN	
		ADVANCE TIME			OFF	
		1ST ADVANCE BY			POINT	
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG

## Expanding the file capacity

If necessary, you can expand a file for saving additional measurement results. Depending on the file type, you can then add optional measuring points, elevations, columns, or rows.

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.

- Press the **left** or **right** arrow key in order to select the group **EDIT**.

HOME	APPEND	VEL:5900.0m/s					
INSERT	DELETE	A-2 DFR	TEST 2024 04				F
		LOCATION	1.L	1.F	1.R	1.B	
		LOC	EMPTY	EMPTY	EMPTY	EMPTY	
		NEWLOC2	EMPTY	EMPTY	EMPTY	EMPTY	
		ELEV1	14.27	14.28	EMPTY	EMPTY	
POINT		RECORD STATS HEADER EDIT COMMENT					
EXPLORER		FILE TYPE					BOILER
PROPERTIES		ELEVATION					ELEV1
SHOW		TUBE					1
VIEW		POINT					L
SPREAD							
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG	

- Press either the **up** or **down** arrow key in order to select the required parameter.
- Press either the **left** or **right** arrow key in order to select the position into which other items should be inserted.

- Press the function key 4 (function **INSERT**). A form window appears.

EXIT	DONE	VEL:5900.0m/s					
		A-2 DFR	TEST 2024 04				F
		INSERT 2 ELEVATIONS.					
EXPLORER							
PROPERTIES							
SHOW							
VIEW							
SPREAD							
MASTER CMT							
EDIT							
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG	

- Press either the **left** or **right** arrow key in order to select the required number.
- Press the function key 2 (function **DONE**). The additional items are inserted into the selected position.



As an alternative to inserting between items already existing, you can append additional items to the end of the file.

**Note**

You can append a maximum of 99 items to a file in one process.

- Press either the **up** or **down** arrow key in order to select the required parameter.
- Press the function key 4 (function **APPEND**). A form window appears.
- Press either the **left** or **right** arrow key in order to select the required number.
- Press the function key 2 (function **DONE**). The additional items are appended.

## Deleting parts of a file

You can remove empty items which are no longer needed from a file. Depending on the file type, you can delete measuring points, elevations, columns, or rows.

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press the **left** or **right** arrow key in order to select the group **EDIT**.
- Press either the **up** or **down** arrow key in order to select the required parameter.
- Press the function key 3 (function **DELETE**). A form window appears.
- Press either the **left** or **right** arrow key in order to select the required number.
- Press the function key 2 (function **DONE**). The items are deleted.

## Editing header data

If necessary, you can change some information normally stored in the file header when creating a new file. The access to other parameters, e.g. serial number, unit, or velocity is disabled. The following parameters can be edited:

- **DESCRIPTION** (4 lines)
- **PROBE**
- **CALIBRATION**
- **TEMPERATURE**
- **INSPECTOR**
- **COMPANY**
- **T-MIN**
- **T-MAX**
- **ABSOLUTE LOSS**
- **% LOSS**
- **ABSOLUTE GROWTH**
- **% GROWTH**
- **MEMO**

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press the **left** or **right** arrow key in order to select the group **HEADER**.

HOME		VEL:5900.0m/s				
		A-2 DFR	TEST 2024 04			F
///		LOCATION	4.L	4.F	4.R	4.B
		LOC	EMPTY	EMPTY	EMPTY	EMPTY
POINT		NEWLOC2	EMPTY	EMPTY	EMPTY	EMPTY
	F	ELEV1	14.42	14.35	6.95	15.29
		RECORD	STATS	HEADER	EDIT	COMMENT
EXPLORER		DESCRIPTION				
		SERIAL NUMBER	GOPLS13040052			
PROPERTIES		PROBE				
	SHOW	CALIBRATION	CAL			
		TEMPERATURE				
VIEW		INSPECTOR				
	SPREAD	COMPANY	NAME			
		UNIT	mm			
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG

- Press either the **up** or **down** arrow key in order to select the required parameter.
- Press the **left** or **right** arrow key in order to mark the first character.
- Press the center key of the keypad to select the marked character.
- Choose other characters in the same way.
- Press the function key 3 (function **BKSP**) in order to delete the last character.
- Press the function key 4 (function **CONFIRM**) in order to save the changes.
- Press one of the **up** or **down** arrow keys in order to select the individual parameters.

## Adding a Microgrid

If you wish to record additional measurement values, lying in the immediate vicinity of the measuring point, to a certain individual measuring point, you can store these additional measurement values in a so-called Microgrid.

The Microgrid is a grid consisting of the same number of rows and columns. This makes a kind of square coordinate system available to you for the coordination of additional measuring points in terms of space.

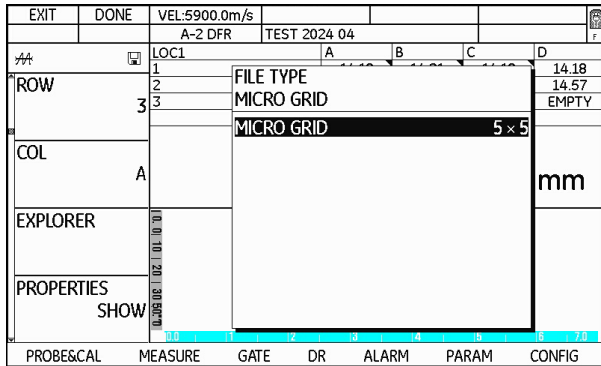
The Microgrid is stored together with the underlying measured value. You always have to save a measured value first before you create a Microgrid for it.

Microgrids can have the following sizes:

- $2 \times 2$  (= 4 measuring points)
- $3 \times 3$  (= 9 measuring points)
- $4 \times 4$  (= 16 measuring points)
- $5 \times 5$  (= 25 measuring points)
- $6 \times 6$  (= 36 measuring points)
- $7 \times 7$  (= 49 measuring points)
- $8 \times 8$  (= 64 measuring points)
- $9 \times 9$  (= 81 measuring points)

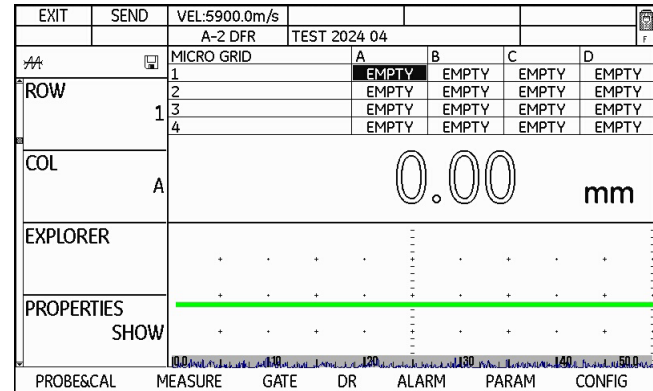
- Select a measuring point which has a reading saved to it (see Section **Selecting individual measuring points**, page 127).
- Press the center key of the keypad *long*. The functions of the function keys change.

- Press the function key 1 (function **µGRID**). A selection menu is displayed.



- Press one of the **left** or **right** arrow keys in order to choose the size of the Microgrid.
- Press the function key 2 (function **DONE**) in order to save the selected size of Microgrid.

The grid of the Microgrid is then displayed above the A-scan instead of the usual file structure. You can then enter data in the data points of the Microgrid by saving readings. After saving the last reading for the Microgrid, the normal file structure is displayed again.



- Carry out the measurements as usual (see Section **Carrying out measurements**, page 90).
- Press the function key 2 (function **SEND**). The reading is saved to the marked data point of Microgrid. The marking advances automatically to the next data point.
- Press the function key 1 (function **EXIT**). The Microgrid is closed and you will again see the normal file structure.

**Note**

You can assign the function **μGRID** to the function key 4 (see Section **Assignment of function key 4**, page 69

You cannot add any Microgrids to empty data points (no reading saved). If the marking has automatically advanced to the next, empty data point after saving the reading, you have to select the data point with the corresponding reading again first before creating a Microgrid (see Section **Selecting individual measuring points**, page 127).

**Note**

You can deactivate the automatic advance feature (see Section **Automatic advance**, page 144).

## Reloading a Microgrid

You can reload a previously created Microgrid at any time in order to save other readings to it. You have to select the data point containing the corresponding reading first (see Section **Selecting individual measuring points**, page 127).

- Press the center key of the keypad *long*. The functions of the function keys change.
- Press the function key 1 (function **μGRID**). The Microgrid is displayed.
- Press the function key 1 (function **EXIT**). The Microgrid is closed and you will again see the normal file structure.

## Automatic advance

After saving a reading using the function **SEND**, the next data point is usually selected automatically in order to save the following reading to that position.

You can switch off this automatic data point selection or define other details for it.



### Note

These settings only apply to the currently loaded file in each case.

By configuring this function, you can adjust the order for saving measurement results to the corresponding test task. In this way, you can e.g. determine whether you wish to proceed by rows or by columns for saving measurement results to a grid (file type **GRID**).

HOME	VEL:5900.0m/s								
		A-2 DFR		TEST 2024 04					
AA	LOCATION	VALUE	COMMENTS		FLAGS				
POINT	ELEV1	14.27	14.28	EMPTY	EMPTY				
L									
EXPLORER		RECORD STATS HEADER EDIT COMMENT							
		SEND FUNCTION		THICKNESS + ASCAN					
PROPERTIES		ADVANCE TIME		0.5 sec					
SHOW		1ST ADVANCE BY		POINT					
		1ST ADVANCE DIR		FORWARD (+)					
		AUTO REVERSE		OFF					
VIEW		2ND ADVANCE BY		TUBE					
LIST		2ND ADVANCE DIR		FORWARD (+)					
		AUTO REVERSE		OFF					
PROBE&CAL		MEASURE	GATE	DR	ALARM	PARAM	CONFIG		



Depending on the file type, you can define the following parameters:

### **ADVANCE TIME**

Time after saving a reading at the end of which the next data point is selected automatically. If you choose the option **OFF**, the automatic advance feature is deactivated.

### **1ST ADVANCE BY**

First category for the advance feature. For example, if you choose **COLUMN**, the same measuring point is selected in the next column after saving. If you choose **ROW**, the next measuring point in the same row is selected.

### **1ST ADVANCE DIR**

You can use this parameter to determine the advance direction of the first category.

### **AUTO REVERSE**

You can choose whether to start from the beginning again after saving the last reading in a category or whether to edit the grid by meandering (for example, the first column from the top to the bottom, the second column from the bottom to the top, the third column from the top to the bottom, etc.).

### **2ND ADVANCE BY**

Second category for the advance feature. For example, if you choose **COLUMN**, the first measuring point in the next column is selected after saving all measuring points of a row. Pay attention to the correlation with the parameter **1ST ADVANCE BY**.

### **2ND ADVANCE DIR**

You can use this parameter to determine the advance direction of the second category.

## AUTO REVERSE

In this case, the parameter refers to the second category.

## ADVANCE TUBE BY

You can use this parameter to determine the increment for the automatic advance feature.

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press either the **up** or **down** arrow key in order to select the required parameter.
- Press either the **left** or **right** arrow key in order to choose the required option.
- Press the function key 1 (function **HOME**) in order to make the file properties disappear.

## 6.7 Evaluations

### Viewing statistical evaluations

Taking the stored data as a basis, the CL Go+ makes different statistical evaluations available for each file that you can view in an overview.

EXIT	VEL:5900.0m/s	A-2 DFR		TEST 2024 04			
LOC1	A	B	C	D			
1	14.18	14.17	14.18	14.18			
2	14.20	14.20	OBSTR	14.57			
3	EMPTY	EMPTY	3.20	3.45			
RECORD <b>STATS</b> HEADER EDIT COMMENT							
EXPLORER	READINGS			10			
	<input type="checkbox"/> EMPTY PNTS			1			
	<input type="checkbox"/> OBSTRUCTED PNTS			1			
<b>PROPERTIES</b>	<input type="checkbox"/> MIN READING			3.20			
SHOW	# MIN PNTS			1			
	<input type="checkbox"/> <-MIN PNTS			0			
VIEW	<input type="checkbox"/> MAX READING			14.57			
SPREAD	# MAX PNTS			1			
PROBE&CAL	MEASURE	GATE	<b>DR</b>	ALARM	PARAM	CONFIG	

The following data are available:

- Number of readings saved
- Number of measuring points without a reading
- Number of obstructed measuring points (**OBSTR.**)
- Minimum reading saved
- Number of minimum readings saved
- Number of readings saved below a MIN value
- Maximum reading saved
- Number of maximum readings saved
- Number of readings saved above a MAX value
- Number of readings with an additional A-scan
- Number of readings with an additional B-scan
- Number of readings with an additional Microgrid
- Difference between the stored maximum and the minimum reading
- Statistical mean value of the stored readings
- Statistical standard deviation of the stored readings

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.
- Press the **left** or **right** arrow key in order to select the group **STATS**.
- Press either the **up** or **down** arrow key in order to view the statistical data.

### Searching for certain data

You can search the statistics for certain data. Only the data of one or several statistical parameters are then displayed, e.g. all data points without a reading.

- Press either the **up** or **down** arrow key in order to mark a parameter of the statistics.
- Press the function key 2 (function **TAG**) in order to select the marked parameter.
- If necessary, choose other parameters in the same way.
- Press the function key 3 (function **SEARCH**) in order to start the search for the corresponding data. The corresponding data points are displayed above the statistics.
- Press the function key 3 (function **STOP**) in order to end the search.



## Viewing stored reading attachments

You can view the attachments, A-scan, B-scan, or Microgrid stored for a reading at any time on the display screen. For this purpose, you have to first choose the reading for which an attachment has been stored.

- Select a reading which has an A-scan stored for it (see Section **Selecting individual measuring points**, page 127).
- In the function group **DR**, select the function **PROPERTIES**.
- Press one of the **left** or **right** arrow keys. The file properties are displayed.

- Press either the **up** or **down** arrow key in order to select the parameter **ATTACHMENT TYPE**.

HOME	VEL:5900.0m/s		A-2 DFR		TEST 2024 04		
///	LOC1	VALUE	COMMENTS	FLAGS			
	1.D	14.18					
EXPLORER	2.A	14.20					
	2.B	14.20		A			
	2.C	OBSTR					
	RECORD STATS HEADER EDIT COMMENT						
PROPERTIES	LOCATION						LOC1
SHOW	ROW						2
VIEW	COL						B
	LIST	VALUE					
	ATTACHMENT TYPE						A-SCAN
MASTER CMT	SEND FUNCTION		THICKNESS / THICKNESS + ASCAN				
EDIT	ADVANCE TIME		0.0 sec				
	1ST ADVANCE BY		ROW				
PROBE&CAL	MEASURE	GATE	DR	ALARM	PARAM	CONFIG	

- Press the center key of the keypad. The attachment is displayed.

A-scans and B-scans are displayed in a new window on the display screen, Microgrids are displayed at the top of the display screen.

## 6.8 Documenting measurements

### Data export

You can export the measured values recorded and the attachments to the measured values for documentation purposes.

You have a choice between the following file formats:

- **CSV**
- **PDF**
- **XML**
- **DAT**

The export file is stored in the directory CLGO on the memory card.



#### Note

Only data of the currently loaded file are exported.

- Load a Data Recorder file (see Section **Loading a file**, page 125).
- In the function group **DR**, select the function **EXPORT**.
- Press one of the **left** or **right** arrow keys in order to select the file type to be exported.
- Press the function key 2 (function **EXPORT**) in order to start the export. The export file is stored on the memory card.



#### Note

You can read, copy, or delete files by inserting the SD memory card into the SD card reader of your PC or by connecting the CL Go+ to a PC via a USB cable (see Section **USB interface**, page 161).

## Screen shots

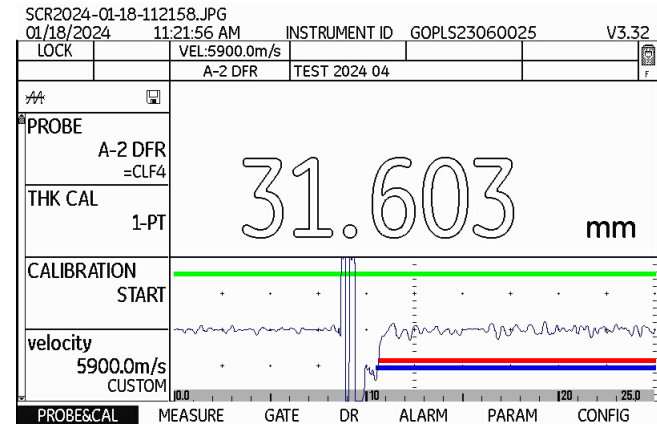
You can save screen shots (images of the current screen display content) independently of the Data Recorder at any time. These screen shots can likewise be used for documentation purposes. The following additional information about the screen display content is displayed:

- File name
- Date
- Time
- Serial number of the instrument
- Software version

The name of the screen shot is automatically generated and is composed of the abbreviation SCR, the date, the time, and a consecutive number, e.g. SCR2024-01-18-112158.JPG.

The screen shots are stored in the format JPG in the directory CLGO/SHOT on the memory card.

- Press the function keys 1 and 2 at the same time. The screen shot is saved. The memory card icon flashes during saving (see Section **Status display icons**, page 13).





# Maintenance and care 7

## 7.1 Instrument care

Clean the instrument and its accessories using a moist cloth. The following are exclusively recommended for cleaning:

- Water,
- a mild household cleaner, or
- alcohol (no methyl alcohol).



### **ATTENTION**

Do not use any methyl alcohol, and no solvents or dye penetrant cleaners! The plastic parts may be damaged or become brittle due to them.

## 7.2 Battery care

### **Battery care**

The capacity and life of batteries mainly depend on the correct handling. Therefore, please observe the tips below:

You should charge the batteries in the following cases:

- before the initial startup,
- after a storage time of 3 months or longer,
- after frequent partial discharge.

## Charging the batteries

You can charge the lithium-ion battery either within the instrument itself or by means of the external charger recommended by us (adapter GEIT1255324). Please observe the operating instructions for the charger in this regard.

The handling of batteries, the charging process, and the meaning of LEDs and power indicators is described in detail in Chapter **Operation using batteries**, page 42.



### ATTENTION

You should only use the batteries recommended by us and the corresponding charger. Any improper handling of the batteries and charger involves an explosion hazard.

## 7.3 Maintenance

The CL Go+ requires basically no maintenance.



### ATTENTION

Any repair work may only be carried out by members of authorized Waygate Technologies service staff.

## 7.4 Software updates

You can install the latest software updates for the CL Go+ yourself. Software updates are available here:

<https://www.bakerhughes.com/waygate-technologies/consulting-services-ultrasound/portable-ultrasound-equipment/ultrasonic-flaw-detectors/krautkramer-usm-go-portable-ndt-ultrasonic-flaw-detector-inspection-ndt>



### Note

It is recommended to check for latest updates before using the instrument.

- In the function group **CONFIG**, select the function **ABOUT**.
- Press one of the **left** or **right** arrow keys. The start display of the instrument appears.

The line **MAIN CODE** shows the version number and the date of the installed software.

- Press the function key 1 in order to switch back to the normal view again.

## Installing an update



### Note

Only one file with the extension **.sdu** may be located in the main directory of the SD memory card for the installation. If several update files are located in the main directory, the installation process is aborted and an error message is displayed.

- Unzip the downloaded archive file (.zip) and save the update file (.sdu) to the SD memory card.
- Check whether the file has the extension **.sdu**. If not, the file is not suitable for the CL Go+ and must not be used.
- Power the CL Go+ off.
- Insert the SD memory card containing the update file into the CL Go+ (see Chapter 3.4 **Inserting the SD memory card**, page 48).

- Press the function key 2 (1), the function key 4 (2), and the Power key (3) at the same time, and hold all three keys pressed until the display screen is turned on and the message **FLASH UPGRADE MODE** appears.

The installation process will then start. The following messages are displayed one by one:

**LOADING FILE**

**VERIFYING FILE**

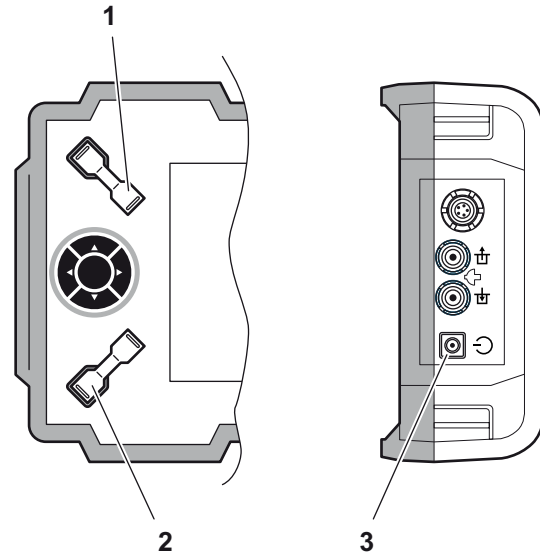
**PROGRAMMING FLASH**

At the end of the installation, the instrument is powered off automatically. After this, you can power the CL Go+ on again and use the new software version.



### Note

For resetting the instrument to factory default settings, see Section **Factory default setting (Reset)**, page 50.



## 7.5 Formatting the SD card

You can format the SD memory card installed in the CL Go+.



### ATTENTION

Formatting deletes all data saved on the SD memory card.

- In the function group **CONFIG**, select the function **SD FORMAT**.
- Press one of the **left** or **right** arrow keys. A message prompting you to confirm is displayed.
- Press the function keys 3 and 4 at the same time. The formatting starts immediately.

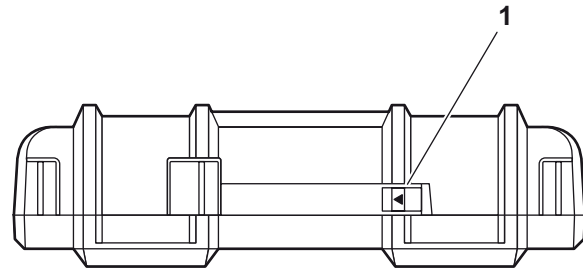
# Interfaces and Peripherals 8

## 8.1 Interfaces

### Overview

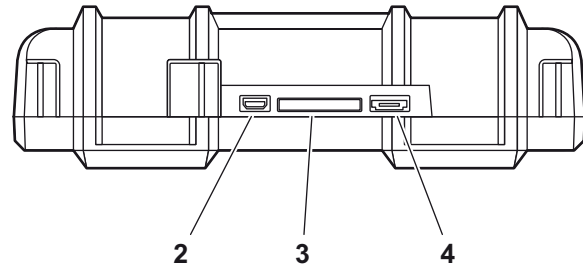
The interfaces are located under the watertight cover on the top of the instrument.

- Push the lock of the hinged cover (1) in the direction of the arrow in order to open the cover.
- Close the cover and make sure that it is locked tightly. If necessary, push the lock up to the limit stop in the opposite direction of the arrow in order to close the cover watertight again.



The following are located under the cover:

- USB interface (2)
- Card slot for SD memory cards (3)
- Service interface (4)





## USB interface

The USB interface is executed as micro USB connector and is used for data exchange with a PC.

When you connect the instrument to a PC via a standard USB cable, the SD memory card inserted into the instrument is added to the list of active drives on the PC.

After this, you can carry out all normal file operations on the SD memory card, e.g. copying and deleting of files.

To learn more about handling of the SD memory card, see Chapter 3.4 **Inserting the SD memory card**, page 48.



### Note

If the instrument is connected to a PC via the USB interface, it functions as an external drive. It is then not possible to use the instrument. After disconnecting the USB cable, the normal operation is possible again.

## Service interface (Mini RS232-C)

The service interface is only meant to be used for service purposes by the Waygate Technologies customer service.

## 8.2 Peripherals

The CL Go+ is not provided for the direct connection of peripherals, e.g. printers or monitors.

For more details on documentation, see Section **Documenting measurements**, page 151.

# Appendix 9

## 9.1 Application notes

### General notes

The CL Go+ is easy to use and produces reliable and reproducible measurement results if handled correctly and in consideration of all the conditions which may affect the accuracy of measurements. Some of the most common influential factors are explained in this chapter.

### External inclusions inside the material

If the CL Go+ displays a value during a sequence of measurements which is considerably smaller than the one obtained from a measuring point lying in the close vicinity, this may have been caused by a material defect (for example external inclusion) reflecting the sound pulses instead of the backwall. If this occurs, this area should be checked by means of another suitable NDT method in order to find out the cause for the conspicuous reading.

### Surface quality

Tool marks running parallel to the coupling face may cause measurement errors in the case of a great peak-to-valley height. If the acoustic separation layer of the probe is set at right angles to the marks, this effect does not occur.

Incorrect readings are obtained in some cases due to a too rough test surface because of excessive couplant accumulating between the probe and the test object surface. Very rough surfaces can totally prevent the coupling (no coupling signal). A surface treatment is required in such cases.

## 9.2 Sound velocities

The table shows typical sound velocities in different materials (longitudinal wave).

The actual sound velocities depend on the exact composition, temperature, and treatment of the material and may vary largely, especially in the case of metal alloys and plastics.

<b>Material</b>	<b>m/s</b>
Aluminum (alloy)	6380
Aluminum (pure)	6320
Aluminum oxide	9000 ... 9850
Lead	2150
Iron (pure)	5960
Epoxy resin	2600 ... 2840
Glass (window glass)	5790
Glass (crown glass)	5800
Glass (safety glass)	6080

<b>Material</b>	<b>m/s</b>
Gold	3240
Rubber (hard)	220 ... 2540
Material	m/s
Rubber (soft)	1460 ... 2200
Cast iron (lamellar)	3800 ... 4700
Cast iron (vermicular)	4700 ... 5500
Cast iron (nodular)	5100 ... 5700
Inconel	5700
Copper	4700 ... 5000
Magnesium	5800
Brass (CuZn30)	4700
Brass (CuZn40)	4400
Monel	5300 ... 6000
Nickel (hard)	5810
Nickel (soft)	5610

<b>Material</b>	<b>m/s</b>	<b>Material</b>	<b>m/s</b>
Platinum	3960	Steel (duplex)	5750 ... 5950
Plexiglas (PMMA)	2730	Steel (ferritic)	5920
Polyamide (6.6 Nylon)	2600	Cast steel (austenitic)	5730
Polyethylene (PE hard)	2530	Teflon (PTFE)	1340 ... 1400
Polyethylene (PE soft)	2000	Titanium	6100 ... 6230
Polypropylene (PP hard)	2600	Uranium	3200 ... 3380
Polypropylene (PP soft)	2000	Uranium dioxide	4520 ... 5160
Polystyrene (PS)	2350	Uranium carbide	4010 ... 4640
Polyvinyl chloride (PVC hard)	2400	Tungsten	5200 ... 5460
Polyvinyl chloride (PVC soft)	2200	Tungsten carbide	6660
Silver	3600	Zinc	4190
Silicon	8950	Tin	3320
Silicon carbide	12180	Zircaloy 4	4700
Silicon nitride	10000 ... 13000	Zircon (pure)	4300
Steel (austenitic)	5650 ... 5850	Zirconium oxide	7040

## 9.3 Data Recorder file types



### Note

In the file format **STANDARD**, only the wall thickness is recorded. In the file format **EXTENDED**, the recording includes extended data (e.g. date and time of recording, probe type, sound velocity, measurement mode).

### File type LINEAR

<b>READING TYPE</b>	File format: <b>STANDARD</b> or <b>EXTENDED</b>
<b>START POINT</b>	First measuring point (1 ... 99,999)
<b>END POINT</b>	Last measuring point (1 ... 99,999)
<b>FILE NAME</b>	Free text, up to 16 characters
<b>PROBE</b>	Free text, up to 16 characters

---

<b>CALIBRATION</b>	Free text, up to 16 characters
<b>UNITS</b>	Units: <b>mm</b> or <b>in</b>
<b>COMPANY</b>	Free text, up to 16 characters
<b>DESCRIPTION</b>	Free text, 4 lines with up to 16 characters each
<b>INSPECTOR</b>	Free text, up to 16 characters
<b>TEMP</b>	Free text, up to 16 characters
<b>T-MIN</b>	Minimum value which triggers an alarm if fallen below
<b>T-MAX</b>	Maximum value which triggers an alarm if exceeded
<b>MEMO</b>	Free text, up to 16 characters



## File type GRID

<b>READING TYPE</b>	File format: <b>STANDARD</b> or <b>EXTENDED</b>
<b>GRID LABELING</b>	Alphabetic or numeric labeling of rows and columns: COL-A/ROW-# (columns alphabetically, rows numerically), COL-#/ROW-A (columns numerically, rows alphabetically)
<b>STARTING ROW</b>	Number of the first row (1 ... 702)
<b>ENDING ROW</b>	Number of the last row (1 ... 702)
<b>STARTING COLUMN</b>	Number of the first column (A ... ZZ)
<b>ENDING COLUMN</b>	Number of the last column (A ... ZZ)
<b>START POINT</b>	First measuring point (1 ... 99,999)
<b>END POINT</b>	Last measuring point (1 ... 99,999)
<b>FILE NAME</b>	Up to 16 characters
<b>PROBE</b>	Free text, up to 16 characters
<b>CALIBRATION</b>	Free text, up to 16 characters
<b>UNITS</b>	Units: <b>mm</b> or <b>in</b>

---

<b>COMPANY</b>	Free text, up to 16 characters
<b>DESCRIPTION</b>	Free text, 4 lines with up to 16 characters each
<b>INSPECTOR</b>	Free text, up to 16 characters
<b>TEMP</b>	Free text, up to 16 characters
<b>T-MIN</b>	Minimum value which triggers an alarm if fallen below
<b>T-MAX</b>	Maximum value which triggers an alarm if exceeded
<b>MEMO</b>	Free text, up to 16 characters

## File type CUSTOM LINEAR

<b>READING TYPE</b>	File format: <b>STANDARD</b> or <b>EXTENDED</b>
<b>NUMBER OF LOCATIONS</b>	Number of measurement locations (1 ... 999)
<b>LOC. LABEL LENGTH</b>	Maximum number of characters for labeling measurement locations (1 ... 16)
<b>START POINT</b>	First measuring point (1 ... 99,999)
<b>END POINT</b>	Last measuring point (1 ... 99,999)
<b>FILE NAME</b>	Up to 16 characters
<b>PROBE</b>	Free text, up to 16 characters
<b>CALIBRATION</b>	Free text, up to 16 characters
<b>UNITS</b>	Units: <b>mm</b> or <b>in</b>
<b>COMPANY</b>	Free text, up to 16 characters
<b>DESCRIPTION</b>	Free text, 4 lines with up to 16 characters each
<b>INSPECTOR</b>	Free text, up to 16 characters
<b>TEMP</b>	Free text, up to 16 characters

<b>T-MIN</b>	Minimum value which triggers an alarm if fallen below
<b>T-MAX</b>	Maximum value which triggers an alarm if exceeded
<b>MEMO</b>	Free text, up to 16 characters
<b>PREFIX TEXT</b>	Text before the automatic numbering
<b>STARTING NUMERIC</b>	Start value for the automatic numbering
<b>INCREMENT BY</b>	Increment value for the automatic numbering
<b>SUFFIX TEXT</b>	Text after the automatic numbering

## File type CUSTOM GRID

<b>READING TYPE</b>	File format: <b>STANDARD</b> or <b>EXTENDED</b>
<b>NUMBER OF LOCATIONS</b>	Number of measurement locations (1 ... 999)
<b>LOC. LABEL LENGTH</b>	Maximum number of characters for labeling measurement locations (1 ... 16)
<b>GRID LABELING</b>	Alphabetic or numeric labeling of rows and columns: COL-A/ROW-# (columns alphabetically, rows numerically), COL-#/ROW-A (columns numerically, rows alphabetically)
<b>STARTING ROW</b>	Number of the first row (1 ... 702)
<b>ENDING ROW</b>	Number of the last row (1 ... 702)
<b>STARTING COLUMN</b>	Number of the first column (A ... ZZ)
<b>ENDING COLUMN</b>	Number of the last column (A ... ZZ)
<b>FILE NAME</b>	Up to 16 characters
<b>PROBE</b>	Free text, up to 16 characters
<b>CALIBRATION</b>	Free text, up to 16 characters
<b>UNITS</b>	Units: <b>mm</b> or <b>in</b>

---

<b>COMPANY</b>	Free text, up to 16 characters
<b>DESCRIPTION</b>	Free text, 4 lines with up to 16 characters each
<b>INSPECTOR</b>	Free text, up to 16 characters
<b>TEMP</b>	Free text, up to 16 characters
<b>T-MIN</b>	Minimum value which triggers an alarm if fallen below
<b>T-MAX</b>	Maximum value which triggers an alarm if exceeded
<b>MEMO</b>	Free text, up to 16 characters
<b>PREFIX TEXT</b>	Text before the automatic numbering
<b>STARTING NUMERIC</b>	Start value for the automatic numbering
<b>INCREMENT BY</b>	Increment value for the automatic numbering
<b>SUFFIX TEXT</b>	Text after the automatic numbering

## File type BOILER

<b>READING TYPE</b>	File format: <b>STANDARD</b> or <b>EXTENDED</b>
<b>NUMBER OF ELEVATIONS</b>	Number of elevations (1 ... 999)
<b>ELEV. LABEL LENGTH</b>	Maximum number of characters for labeling elevations (1 ... 16)
<b>STARTING TUBE #</b>	First measuring point of the first tube (1 ... 999)
<b>ENDING TUBE #</b>	Last measuring point of the last tube (1 ... 999)
<b>POINTS ON TUBE</b>	Identification of the points on the tube (L = left, C = center, R = right, B = back, F = front)
<b>FILE NAME</b>	Up to 16 characters
<b>PROBE</b>	Free text, up to 16 characters
<b>CALIBRATION</b>	Free text, up to 16 characters
<b>UNITS</b>	Units: <b>mm</b> or <b>in</b>
<b>COMPANY</b>	Free text, up to 16 characters
<b>DESCRIPTION</b>	Free text, 4 lines with up to 16 characters each
<b>INSPECTOR</b>	Free text, up to 16 characters

<b>TEMP</b>	Free text, up to 16 characters
<b>T-MIN</b>	Minimum value which triggers an alarm if fallen below
<b>T-MAX</b>	Maximum value which triggers an alarm if exceeded
<b>MEMO</b>	Free text, up to 16 characters
<b>PREFIX TEXT</b>	Text before the automatic numbering of measurement location
<b>STARTING NUMERIC</b>	Start value for the automatic numbering of measurement location
<b>INCREMENT BY</b>	Increment value for the automatic numbering of measurement location
<b>SUFFIX TEXT</b>	Text after the automatic numbering of measurement location



## 9.4 Flag symbols

The flag symbols are displayed on the screen in addition to the readings in the column **FLAGS** if the spread viewing format is selected.

- > maximum value alarm triggered
- < minimum value alarm triggered
- A an A-scan is stored for the reading
- B a B-scan is stored for the reading
- # a Micro Grid has been created for the reading
- %– percentage loss
- %+ percentage growth
- absolute loss
- + absolute growth
- () old reading exists

## 9.5 Function directory



### Note

Some functions are only available if the corresponding options are enabled by entering the license code.

Function	Function group	Description	see page
ABOUT	<b>CONFIG</b>	Display of the instrument version and the options enabled.	111
BRIGHTNESS	<b>CONFIG</b>	Setting of display brightness.	77
CAL REMINDER	<b>PROBE&amp;CAL</b>	Configuring the reminder function for calibrations.	109
CALIBRATION	<b>PROBE&amp;CAL</b>	Start of calibration to the sound velocity.	84
CODE	<b>CONFIG</b>	Entry of the enabling code for optional functions and extensions.	111
COLOR	<b>CONFIG</b>	Choice of color scheme for the display screen.	78
DATE FORMAT	<b>CONFIG</b>	Choice of date format.	67
DATE TIME	<b>CONFIG</b>	Setting of date and time.	67
DISPLAY DELAY	<b>MEASURE</b>	Display start shift.	91
DISPLAY RANGE	<b>MEASURE</b>	Width setting of display range.	91
EXPLORER	<b>DR</b>	Creating, selecting, and deleting Data Recorder files.	122
EXPORT	<b>DR</b>	Exporting readings.	151
FREEZE	<b>MEASURE</b>	Holding and freezing the screen display.	110

<b>Function</b>	<b>Function group</b>	<b>Description</b>	<b>see page</b>
FUNC KEY	<b>CONFIG</b>	Choice of the function for function key 4.	69
GATE A START	<b>GATE</b>	Setting of the starting point for gate A.	95
GATE A THR.	<b>GATE</b>	Setting of the vertical position of gate A in percentage of screen height.	96
GATE A WIDTH	<b>GATE</b>	Width setting of gate A.	96
GATE B START	<b>GATE</b>	Setting of the starting point for gate B.	95
GATE B THR.	<b>GATE</b>	Setting of the vertical position of gate B in percentage of screen height.	96
GATE C WIDTH	<b>GATE</b>	Width setting of gate C.	96
GATE C START	<b>GATE</b>	Setting of the starting point for gate C.	95
GATE C THR.	<b>GATE</b>	Setting of the vertical position of gate C in percentage of screen height.	96
GATE B WIDTH	<b>GATE</b>	Width setting of gate B.	96
LANGUAGE	<b>CONFIG</b>	Choice of the language for the texts on the display screen.	64
LAST READING	<b>CONFIG</b>	Display of the thickness value that was measured last.	66
LOAD P-SET	<b>PARAM</b>	Loading of instrument settings from a file on the memory card.	81
LOCKOUT	<b>CONFIG</b>	Enabling of individual functions if lockout of all setup functions has been activated with the function MENU MODE.	70
MASTER CMT	<b>DR</b>	Editing the master comment list.	119
MAX	<b>ALARM</b>	Alarm function for exceeding a maximum value.	97
MAX ALARM	<b>ALARM</b>	Wall thickness value which triggers an alarm if exceeded.	97

<b>Function</b>	<b>Function group</b>	<b>Description</b>	<b>see page</b>
MAX GAIN	<b>MEASURE</b>	Setting of gain values for the selected amplification method.	92
MAX GAIN MODE	<b>MEASURE</b>	Choice of amplification method.	92
MENU MODE	<b>CONFIG</b>	Disabling the access to the instrument setup function.	70
MIN	<b>ALARM</b>	Alarm function for falling below a minimum value.	97
MIN ALARM	<b>ALARM</b>	Wall thickness value which triggers an alarm if fallen below.	97
MODE	<b>MEASURE</b>	Choice of the operating mode.	79
NOMINAL	<b>MEASURE</b>	Setting of nominal value for the differential value display.	104
ORIENTATION	<b>CONFIG</b>	Configuration of the instrument for left-handed or right-handed operation.	68
OVERWRITE	<b>DR</b>	Choice of the mode of proceeding for overwriting measured values.	128
PASSWORD	<b>CONFIG</b>	Setting of a password for the protection of setup functions.	72
POWER DOWN	<b>CONFIG</b>	Power saving function, powers down the instrument after a preset time if no operation takes place.	74
PROBE	<b>PROBE&amp;CAL</b>	Choice of the connected probe type.	83
PROBE DELAY	<b>PROBE&amp;CAL</b>	Setting of probe delay line.	94
PROPERTIES	<b>DR</b>	Displaying and editing Data Recorder files.	135
RADIX	<b>CONFIG</b>	Choice of the character for decimal notation. Period or comma.	65
RECTIFY	<b>CONFIG</b>	Choice of the rectification mode for the echo pulses.	94

<b>Function</b>	<b>Function group</b>	<b>Description</b>	<b>see page</b>
RESOLUTION	<b>CONFIG</b>	Choice of the resolution for the display of readings.	65
RESULTS	<b>MEASURE</b>	Choice of data for the six data boxes at the top of the display screen.	75
ROUND	<b>CONFIG</b>	Rounding the displayed measurement values.	66
SAVE P-SET	<b>PARAM</b>	Saving the current instrument settings to a file on the memory card.	80
SD FORMAT	<b>CONFIG</b>	Formatting the SD card in the device.	158
THK CAL	<b>PROBE&amp;CAL</b>	Choice of the method for the calibration to sound velocity.	84
TIME	<b>MEASURE</b>	Setting of display time for the B-scan.	101
TIMEOUT	<b>MEASURE</b>	Setting of waiting time when recording the B-scan.	102
UNITS	<b>CONFIG</b>	Choice of units.	64
UPDATE RATE	<b>CONFIG</b>	Choice of the display update rate.	93
VELOCITY	<b>PROBE&amp;CAL</b>	Choice and setting of material velocity.	89
VIEW	<b>DR</b>	Display of the readings in spread or list format.	149
ZERO BLOCK	<b>CONFIG</b>	Data of the reference block for the probe zero offset.	108

## 9.6 EU Declaration of Conformity

The CL Go+ conforms to the requirements of the following EU directives:

- 2014/30/EU (Electromagnetic compatibility)
- 2014/35/EU (Low voltage)
- 2011/65/EU (RoHS) +  
Commission Delegated Directive (EU) 2015/863

The conformity with the requirements of the EU directives is proven by the observance of the standard specifications

- EN 61 326-1:2021
- EN 61 010-1:2010

## 9.7 UK Conformity Assessment

The mark **UKCA** indicates that this product complies with all of the applicable requirements for Great Britain in order to place it on the market.



UK Local Importer:

**Druck Limited**  
Fir Tree Lane, Groby,  
Leicester LE6 0FH

## 9.8 Manufacturer

The ultrasonic thickness gauge CL Go+ is manufactured by:

Baker Hughes Inspection & Control Technologies  
(Shanghai) Co., Ltd.  
AC-7, 4F, No.500, Bingke Rd.  
Waigaoqiao Free Trade Zone  
Shanghai 200131  
China

The CL Go+ is manufactured according to the state-of-the-art methods using high-quality components. Thorough in-process inspections or intermediate tests and a quality management system certified to ISO 9001 ensure an optimum quality of conformance and workmanship of the instrument.

Should you nevertheless detect an error on your instrument, power the instrument off and remove the batteries. Inform your local Waygate Technologies customer service and support, indicating the error and describing it.

Keep the shipping container for any repairs possibly required which cannot be made on the spot.

If there is anything special that you would like to know about the use, handling, operation, and specifications of the instruments, please contact your nearest Waygate Technologies representative or turn directly to:

Baker Hughes Digital Solutions GmbH  
Service-Center  
Robert-Bosch-Straße 3  
50354 Hürth  
Germany

or:

Postfach 1363  
50330 Hürth  
Germany

T +49 (0) 22 33 601 111  
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North America	USA	waygate.usa@bakerhughes.com	+1 832 325 4368
Russia	Russia	wt.service.RCIS@bakerhughes.com	+7 495 771 72 40 4320



## 9.10 Environmental protection regulations

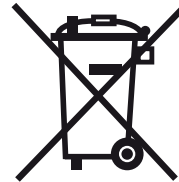
### WEEE directive (Waste Electrical and Electronic Equipment)

Waygate Technologies is an active participant in Europe's Waste Electrical and Electronic Equipment (WEEE) take-back initiative, directive 2012/19/EU.

The instrument that you have bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in the environment and to diminish the pressure on our natural resources, we advise you to use the appropriate take-back systems. Those systems will reuse or recycle in an environmentally safe way most of the materials of your instrument which is no longer capable of functioning.

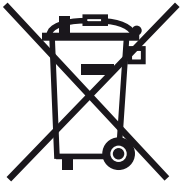
The crossed-out wheeled bin symbol invites you to use those systems.



If you need more information on the collection, reuse, and recycling of recyclable material, please contact your local waste management company.

## Disposal of batteries

This product contains batteries that cannot be disposed of as unsorted municipal waste in the European Union. Please read carefully the data sheets for the battery type used. Each battery is marked with this symbol which indicates that the product may contain cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the batteries to the manufacturer or to a designated collection point.



## What do the markings mean?

Batteries and accumulators must be marked (either on the battery, on the accumulator, or on their packaging, depending on the size) with the separate collection symbol. In addition, the marking must include the chemical symbols of specific levels or toxic metals as follows:

- Cadmium (Cd) over 0.002 %
- Lead (Pb) over 0.004 %
- Mercury (Hg) over 0.0005 %

## The risks and your role in minimizing them

By participating in the proper waste disposal, you would make a valuable contribution towards reducing the damages possibly caused to the environment and human health by the batteries or accumulators. For proper recycling, you should return the instrument and/or the batteries it contains to the manufacturer or to a designated collection point.

Some batteries or accumulators contain toxic metals that pose serious risks to human health and to the environment. When required, the product marking may include chemical symbols that indicate the presence of toxic metals in the product: Pb for lead, Hg for mercury, and Cd for cadmium.

- **Cadmium** poisoning can result in cancer of the lungs and prostate gland. Chronic diseases may include kidney damage, pulmonary emphysema, as well as bone diseases such as osteomalacia and osteoporosis. Cadmium may also cause anemia, discoloration of the teeth, and anosmia (loss of smell).
- **Lead** is poisonous in all compounds. It accumulates in the body so that any form of exposure is critical. Ingestion and inhalation of lead can cause severe internal injuries. These may result in brain damage, convulsions, malnutrition, and sterility.
- **Mercury** creates hazardous vapors already at room temperature. Exposure to high concentrations of mercury vapor can cause a variety of severe symptoms. These include e.g. chronic inflammation of mouth and gums, personality change, nervousness, fever, and rashes.

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# Specifications **10**

## 10.1 Specifications of the CL Go+

### Display screen

Active range (W × H)	108.0 × 64.8 mm, diagonal 5 inches
Size	5 inches
Resolution (W × H)	800 × 480 pixels
Contrast ratio	≥300
Brightness	≥200 cd/m <sup>2</sup>
Range (display width)	max. 14 m (551 inches) in steel, in normal mode, depending on the probe, material, and surface

## Display

Display shift (display delay)	0 ... 3,500 $\mu$ s
Probe delay	0 ... 1,000 $\mu$ s
Velocity	250 ... 16,000 m/s
Resolution of readings	0.001, 0.01 or 0.1 mm (0.0001, 0.001 or 0.01 in), selectable over the entire measuring range
Display modes	Thickness Velocity Quality A-scan B-scan MIN/MAX Difference Data Recorder

## Connectors

Probe connectors	2 × LEMO-00, mechanical reverse polarity protection
USB interface	Micro USB connector
Service interface	1 × Mini-RS232C, only used for service purposes

## Pulser

Pulser mode	Square-wave pulser
Pulser voltage	automatically matched to the probe (120 V or 250 V)
Pulser falling/rising time	max. 10 ns
Pulser width	automatically matched to the probe



## Receiver

Digital gain 110 dB dynamic range, automatic gain control with manual (set by user) High, Low, and Auto gain limit

## Memory

Card slot SD card slot for standard SD cards

Capacity 32 GB, SD card

Datasets 100,000 measurements per file. Several files can be saved to the SD card.

## Environment

Battery	Operating time: 6 hours with full charge Charging method (standard): internal with charger/power adapter Charging method (optional): external charger Charge level: proportional charge level indicator
Charger/power adapter	Universal power supply unit 100 ... 240 VAC, 50/60 Hz, meets the requirements of CCC, CE, UL, CSA, and PSE
Size (W × H × D)	175 × 111 × 50 mm
Weight	850 g incl. battery

## Protection

Damp heat and humidity (storage)	10 cycles: 10 hrs at +60 ... +30 °C, 10 hrs at +30 ... +60 °C, transition within 2 hrs (507.4)
Temperature shock (storage)	3 cycles: 4 hrs at -20 ... +60 °C, 4 hrs at +60 °C transition within 5 minutes (503.4, Procedure II)
Vibration:	General exposure: 1 hr per axis, 514.5-5 Procedure I, Annex C, Figure 6
Shocks	6 cycles per axis, 15 g, 11 ms, half-sine (516.5 Procedure I)
Loose cargo (in shipping containers)	514.5 Procedure II
Transit drop (packaged for shipment)	26 drops, 516.5 Procedure IV

---

Enclosure	IP67 according to IEC 529
Operating temperature range	0 ... 55 °C
Storage temperature range	-20 ... +60 °C, 24 hrs including battery

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