HydroMet

User Manual

CMCbt

KISTERS
Empowering decisions of tomorrow

12-2023 – 01-02-002

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I Disclaimer

The information provided in this manual was deemed accurate as of the publication date. However, updates to this information may have occurred.

This manual does not include all of the details of design, production, or variation of the equipment nor does it cover every possible situation which may arise during installation, operation or maintenance. KISTERS shall not be liable for any incidental, indirect, special or consequential damages whatsoever arising out of or related to this documentation and the information contained in it, even if KISTERS has been advised of the possibility of such damages.

Any errors found in any KISTERS product should be reported to KISTERS where every effort will be made to quickly resolve the problem.

This document is public.

II Safety Instructions

- Read the user manual including all operating instructions prior to installing, connecting and powering up the KISTERS CMCbt. The manual provides information on how to operate the product. The manual is intended to be used by qualified personnel, i.e. personnel that have been adequately trained, are sufficiently familiar with installation, mounting, wiring, powering up and operation of the product.
- Keep the user manual on hand for later reference!
- If you encounter problems understanding the information in the manual (or part thereof), please consult the manufacturer or its appointed reseller for further support.
- KISTERS CMCbt is intended to be used in hydrometeorological or environmental monitoring applications.
- Before starting to work, you have to check the functioning and integrity of the system.
  - Check for visible defects on the CMCbt, this may or may not include any or all of the following mounting facilities, connectors and connections, mechanical parts, internal or external communication devices, power supplies or power supply lines, etc.
  - If defects are found that jeopardize the operational safety, work must be stopped. This is true for defects found before starting to work as well as for defects found while working.
- Do not use the KISTERS CMCbt in areas where there is a danger of explosion.
- The present user manual specifies environmental/climatic operating conditions as well as mechanical and electrical conditions. Installation, wiring, powering up and operating the KISTERS CMCbt must strictly comply with these specifications.
- Perform maintenance only when tools or machinery are not in operation.
- If guards are removed to perform maintenance, replace them immediately after servicing.
- Never make any electrical or mechanical diagnostics, inspections or repairs under any circumstances. Return the product to the manufacturer's named repair centre. You can find information on how to return items for repair in the relevant section of the KISTERS website.
-  Disposal instructions: After taking the KISTERS CMCbt out of service, it must be disposed of in compliance with local waste and environmental regulations. The KISTERS CMCbt is never to be disposed in household waste!
-  Inputs and outputs of the device are protected against electric discharges and surges (so-called ESD). Do not touch any part of the electronic components! If you need to touch any part, please discharge yourself, i.e. by touching grounded metal parts.

1 Introduction

Thank you for choosing our product. We hope you will enjoy using the device.

KISTERS manufactures, sells, installs and operates quality instrumentation, data loggers and communication technology. Products are designed with passion for environmental monitoring and with a deep understanding of the quality, accuracy and robustness needed to fulfil the requirements of measurement practitioners in the field.

The present User Manual will help you understand, install and deploy the device. If, however, you feel that a particular information is missing, incomplete or confusing, please do not hesitate to contact us for further support!

The CMCbt is a Bluetooth Current Meter Counter that provides an interface between any rotating mechanical Current Meter and a user interface such as the HydroTab Application running on a Samsung Galaxy Tab Active.

2 Operation

This chapter contains the following subsections:

2.1 Power On / Off

To turn the CMCbt 'on', press and hold the Power button – the sounder will beep once, and the 3 x LED's will turn on while the button is pressed. Release the button.

To turn the CMCb 'off', press and hold the Power button – the sounder will beep twice, and the 3 x LED's will again turn on while the button is pressed. Release the button.

When the CMCbt is on, and there is no Bluetooth connection or contact closures for 10 minutes, the CMCbt will automatically turn off.

2.2 Indicators

The 3 x LED indicators and sounder operate as follows:

Indicator	State	Condition
Blue LED	Short flash once a sec	Bluetooth 'discovery' mode. (Waiting for a connection)
	50% on/off flash once a sec	Internal Bluetooth module fault.
	On steady	Bluetooth connected.
Red LED	Off	Battery OK (>2.8V).
	Flash once per sec	Battery low (> 2.4V and < 2.8V).
	On steady	Battery flat (< 2.4V.)
Yellow LED	Short flash	Sounder 'Off' or 'Momentary' mode, current meter contact closure.
	Long flash	Sounder 'Full' mode, current meter contact closure.
	On steady	Sounder 'Full' mode, current meter contact shorted.
Sounder	Off	Sounder doesn't operate.
	Momentary	Sounder beeps momentarily as the contact close.
	Full	Sounder continues to operate while the contacts are closed.

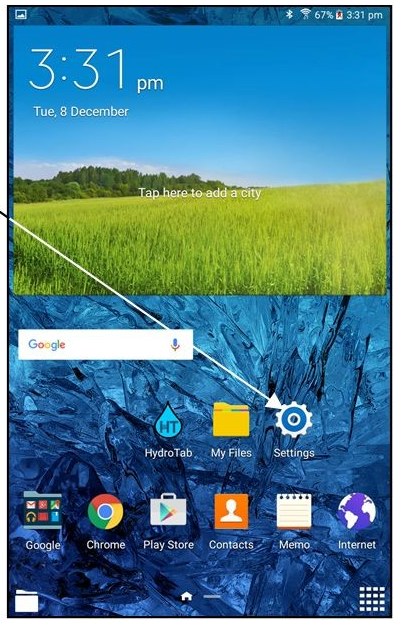
2.3 Bluetooth Device Connection

When the tablet requires a Bluetooth connection with a Current Meter Counter, it will pop up a list of the devices found nearby – simply select the required device and operation will begin.

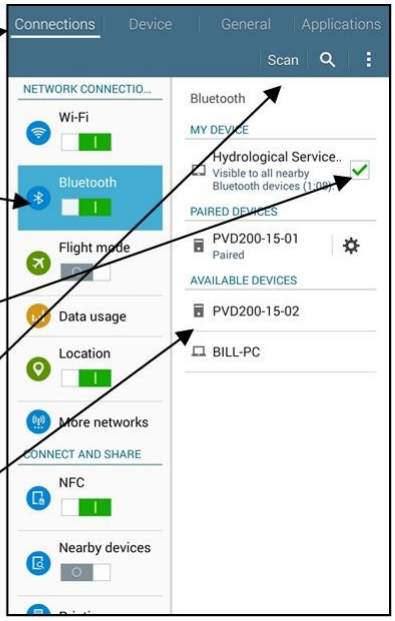
NOTE: The Bluetooth device should be paired with the tablet in the Settings - Connections - Bluetooth, before connecting with the HydroTab Application.

The pairing function can be started by going to the Tablet Settings as follows:

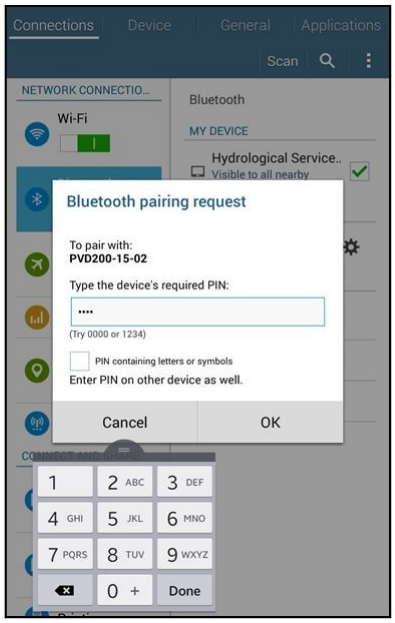
1. Click on the Tablet Settings icon.



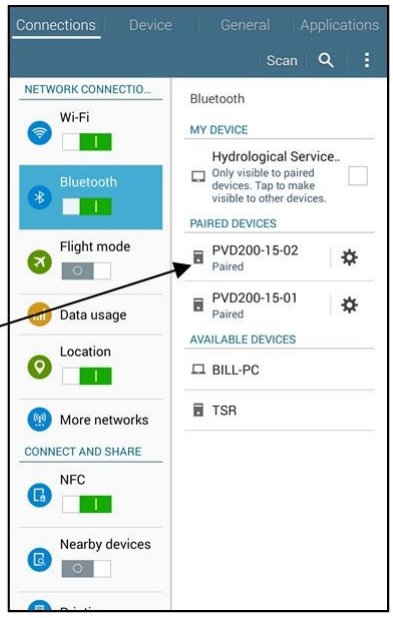
2. Click on Connections.
3. Click on Bluetooth.
4. Check the box "to make visible to other devices"
5. Click on Scan.
6. Select the device you wish to pair.



7. Enter the device PIN 1234 and click OK.



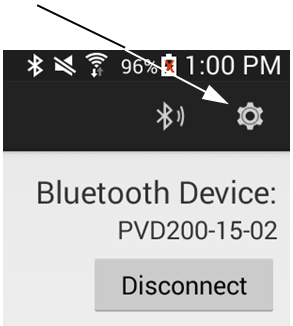
8. The new device will appear in the "Paired" list.



Now that the desired device is "paired" with the Tablet, the HydroTab Application will bring up a list of devices if it requires a Bluetooth connection – be patient, sometimes this may take a minute or so – select one to make the connection.

2.4 Operator Options / Settings

Once the connection is made in the HydroTab App, click on the Settings symbol at the top right of the screen, and the following dialog will appear.

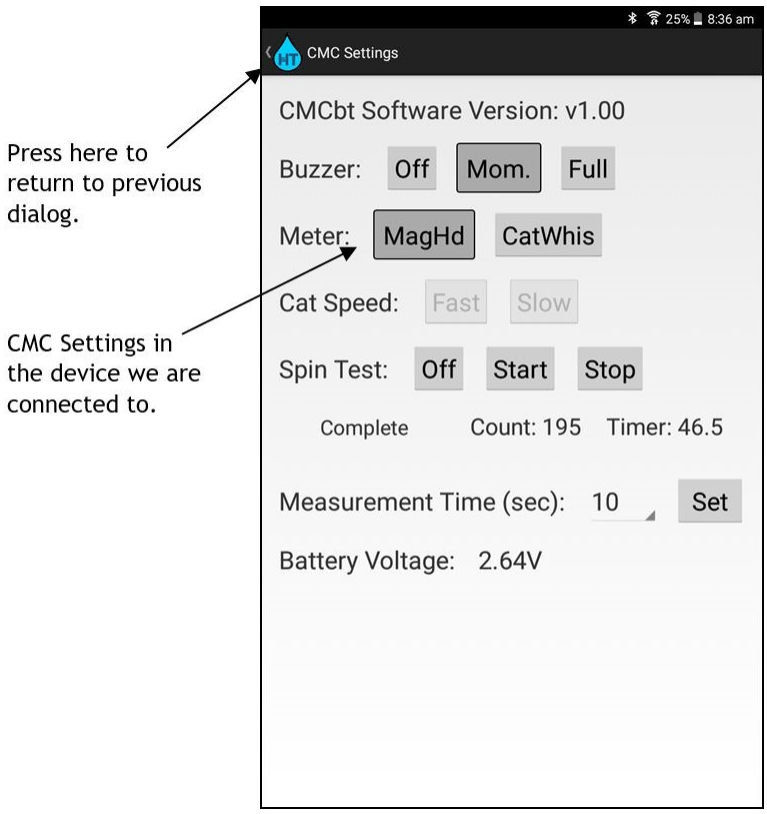


This shows:

- CMCbt software Version

- Buzzer to be set Off, Momentary, Full
- Meter type selection Mag Head, Cat Whisker Slow / Fast
- Spin Test
- Sample Measuring Time 10 secs - 90 secs (in 10 sec steps)
- Battery Voltage

(The highlighted buttons indicate the present settings)



The Spin Test has a feature – if no pulses are detected in a 10 second period, the test is deemed complete (as no more pulses are expected), and the time to the last detected pulse is returned.

3 Maintenance

The CMCbt does not require any calibration or adjustments – it is self-calibrating and will perform this operation whenever a start measurement command ('S') is received through the Bluetooth interface.

There is no routine maintenance, but a few simple precautions will ensure a long life for this product.

3.1 Connector Care

If the CMCbt is used in a salt water environment, at the end of the session, rinse the banana sockets briefly in fresh water, then blow out the excess from the socket and dry with a tissue to soak up the excess water.

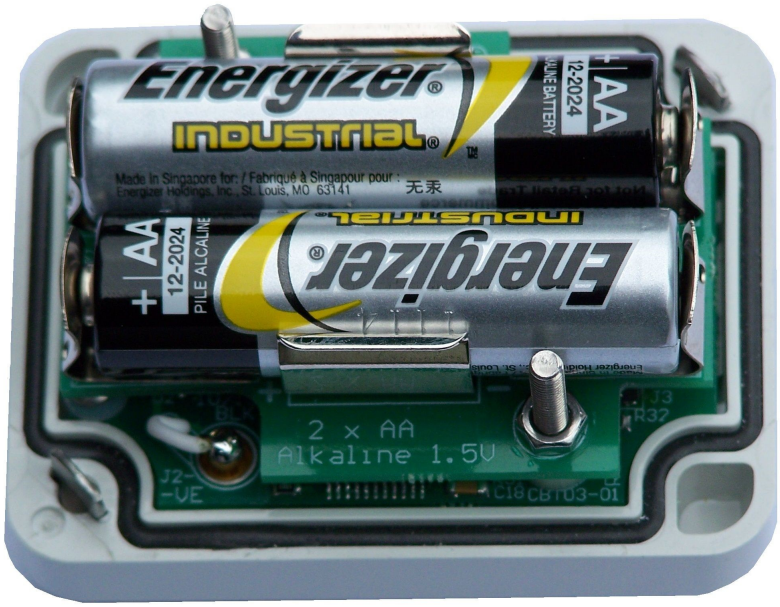
3.2 Battery Care / Replacement

Do not store the CMCbt for more than 2 months with the batteries installed, to prevent the possibility of battery acid leakage. Make sure good quality AA alkaline batteries are used to achieve maximum battery life.

To replace the batteries :

- Undo the 2 x ¼ turn screws on the lid. (Push + ¼ turn)
- Remove the lid (the electronics and batteries are inside the lid)
- Remove the 2 x old batteries.
- Insert 2 x new alkaline 1.5V AA batteries into the battery clips.
  Note: Do not use 1.2V NiMH or 3.6V Lithium batteries!
- Refit the CMCbt lid.


CMCbt
Bluetooth
Batt Low
Count
HYQUEST SOLUTIONS
www.hyquestsolutions.com


Energizer
INDUSTRIAL
AA
12-2024
Made in Singapore for: / Fabriqué à Singapour pour :
Energizer Holdings, Inc., St. Louis, MO 63141
2 x AA
Alkaline 1.5V

4 Troubleshooting

Please have a look through this list to solve possible problems before contacting the factory.

The App asked me to pair the Bluetooth device – what device PIN do I use?

- Use the PIN 1234 and press "Done".

The pulses from the Current Meter do not seem to be recognised by the Current Meter Counter?

- Maybe the counter buzzer is turned off – go into the HydroTab CMC settings (see section Operator Options / Settings 8) and press the Buzzer **MOM** button.
- Maybe the counter has been accidentally changed to CatsWhisker mode - this type of current meter contact offers the poorest quality of input signal to a counter and is typically adjusted to a dwell angle of about 60 degrees, whereas a mag head meter such as the OSSPC1 has a dwell angle of about 180 degrees and the OSSB1 has a dwell angle of about 150 degrees. A mag head meter pulses may not be recognised when the counter is in **CATWHIS** mode.
  Go into the HydroTab CMC settings (see section Operator Options / Settings 8) and press the **MAGHD** button.
- Check the current meter is actually rotating, and the fan is not jammed by weeds or debris.
- Remove the current meter cable from the CMCbt, and using a piece of wire, or metal paper clip, short the red and black banana plug sockets on the counter and check the pulses can be recognised.
- Check the current meter cable – plug the cable into the counter and remove the connection from the current meter itself – short the current meter end connections and check the pulses can be recognised.
- Check the current meter itself – using a multimeter in "continuity mode", touch one probe on the current meter body and the other probe on the meter connector, while rotating the current meter – the multimeter should "beep".
- Each time a 'Start' measurement is done, the CMCbt does a quick calibration (which measures the water salinity and chooses an optimum contact open/closed threshold). If the Start button is pressed while the Current Meter is in the air, and then the Current Meter is lowered into extremely salty water, it may have selected an incorrect threshold for the water conditions – it is extremely unlikely that this scenario has occurred. Make sure the Current Meter is in the water when the Start button is pressed.

How do I change the measurement time of a current meter sample?

- The measurement time can be changed via the Counter Settings dialog in the HydroTab App – see section Operator Options / Settings 8 for an example.

The blue LED is flashing with a 50% duty cycle ? (Equal on and off time)

- When powering up, the CMCbt checks to see if the Bluetooth module is installed – this flash sequence indicates the Bluetooth module was not detected – and is not a normal flash sequence. Contact the factory for advice.
- **Do not** confuse this 50% duty cycle blue LED flash sequence with Bluetooth **DISCOVERY** mode which is a short flash once a second – this is normal.

The red LED is flashing, what does this mean?

- This means the internal AA batteries are low (2.4V - 2.8V), but there is no need to panic quite yet. You can check the exact battery voltage in the **HYDROTAB APP CMC SETTINGS** dialog.
- When the red LED is on steady, it is time to change the batteries. Always keep 2 fresh AA batteries on hand.

The red LED is on steady, what does this mean?

- This means the internal AA batteries are flat (< 2.4V), and it is time they were changed.

5 Repair

KISTERS precision instruments and data loggers are produced in quality-controlled processes. All KISTERS production and assembly sites in Australia, New Zealand and Europe are ISO 90001 certified. All equipment is factory tested and/or factory calibrated before it is shipped to the client. This ensures that KISTERS products perform to their fullest capacity when delivered.

Despite KISTERS most rigorous quality assurance (QA), malfunction may occur within or outside of the warranty period. In rare cases, a product may not be delivered in accordance with your order.

In such cases KISTERS' return and repair policy applies. For you as a customer, this means the following:

- Contact KISTERS using the Repair Request Form and the Declaration of Contamination made available online:

Region (Language)	Download Link
Asia-Pacific (English)	Repair Request Form (APAC) Declaration of Contamination (APAC)
Europe, the Middle East and Africa (English)	Repair Request Form (EMEA) Declaration of Contamination (EMEA)
Germany (German)	Repair Request Form (DE) Declaration of Contamination (DE)

  In response you will receive a reference number that must be referenced on all further correspondence and on the freight documents accompanying your return shipment.
- Please provide as much information and/or clear instructions within the return paperwork. This will assist our test engineers with their diagnosis.
- Please do not ship the goods prior to obtaining the reference number. KISTERS will not reject any equipment that arrives without reference number; however, it may take us longer to process.

Custom requirements for items sent to KISTERS for warranty or non-warranty repairs: Check with your national customs/tax authorities for details, processes and paperwork regarding tax exempt return of products. Typically, special custom tariff codes are available (such as HS Code = 9802.00) that verify the item is being returned for repair and has no commercial value. Please note that the customs invoice / dispatch documents should also clearly state: "Goods being returned to manufacturer for repair – No Commercial value". It is mandatory to have any returned goods accompanied by a commercial invoice on headed paper. KISTERS reserves the right to charge the customer for time spent rectifying incorrect customs documents.

Note: Please ensure that your goods are packed carefully and securely. Damage that occurs during transit is not covered by our warranty and may be chargeable.

6 Technical Data

This chapter contains the following subsections:

6.1 Mechanical Features

Case Dimensions	50 mm (W) × 65 mm (H) × 45 mm (D)
Weight	0.15 kg (with batteries)
Operating Temperature	-20 °C to 60 °C
Humidity	0 - 100 % waterproof
Enclosure Rating	IP66

6.2 Electronic Features

Power Source	2 × alkaline 1.5 V AA batteries
Power Consumption	▪ 16 µA turned off; 62 mA Bluetooth 'connected' ▪ Estimated operating battery life 40 hours
On / Off	Push button
Auto-off	10 minutes (no Bluetooth or count)
Bluetooth®	▪ Class 2 / Output power 2.5 mW (4 dBm) ▪ Compliant Bluetooth® specification V 1.2 ▪ Nominal range 30 m (100 ft) - tested with Samsung Tablet up to 80 m (260 ft)
Indicators	▪ Blue LED – Bluetooth status ▪ Red LED – Battery low ▪ Yellow LED – Count, audible sounder

6.3 Connectors

Colour-coded (red and black) gold plated banana sockets

7 Obligations of the Operator and Disposal

This chapter contains the following subsections:

7.1 Obligations of the Operator

European Union

In the Single European Market it is the responsibility of the operator to ensure that the following legal regulations are observed and complied with: national implementation of the framework directive (89/391/EEC) and the associated individual directives, in particular 2009/104/EC, on minimum safety and health requirements for the use of work equipment by employees at work.

Worldwide

Regulations: If and where required, operating licences must be obtained by the operator. In addition, national or regional environmental protection requirements must be complied with, regardless of local legal provisions regarding the following topics:

- Occupational safety
- Product disposal

Connections: Local regulations for electrical installation and connections must be observed.

7.2 Dismantling / Disposal

When disposing of the units and their accessories, the applicable local regulations regarding environment, disposal and occupational safety must be observed.

Before dismantling

- Electrical Devices:
  - Switch off the units.
  - Disconnect electrical appliances from the power supply, regardless of whether the appliances are connected to the mains or to another power source.
- Mechanical devices:
  - Fix all loose components. Prevent the device from moving independently or unintentionally.
  - Loosen mechanical fastenings: Please note that appliances can be heavy and that loosening the fastenings may cause them to become mechanically unstable.

Disposal

Operators of old appliances must recycle them separately from unsorted municipal waste. This applies in particular to electrical waste and old electronic equipment.

Electrical waste and electronic equipment must not be disposed of as household waste!

Instead, these old appliances must be collected separately and disposed of via the local collection and return systems.

Integrated or provided batteries and accumulators must be separated from the appliances and disposed of at the designated

collection point. At the end of its service life, the lithium-ion battery must be disposed of according to legal provisions.

EU WEEE Directive

As players in the environmental market, KISTERS AG is committed to supporting efforts to avoid and recycle waste. Please consider:

- Avoidance before recycling!
- Recycling before disposal!

This symbol  indicates that the scrapping of the unit must be carried out in accordance with Directive 2012/19/EU. Please observe the local implementation of the directive and any accompanying or supplementary laws and regulations.

8 Appendices

This chapter contains the following subsections:

8.1 Bluetooth Serial Comms Commands (2)

This Appendix describes the serial data requirements, commands, and data formats that are used for the Bluetooth serial communications interface :

Baud Rate	19,200
Format	8 data bits, no parity, 1 stop bit
Flow Control	None

The following list shows the commands and functions that can be performed.

Command	Function Performed
S	Start a measurement (or Start a Spin Test)
A	Stop the Spin Test
T	Terminate the measurement
N	Enable the Spin Test mode
I	Abort the measurement (Disable Spin Test mode)
R	Resend the last data string
z (lower case)	Get the Buzzer state (F or U or Z)
F	Buzzer Full
U	Buzzer Momentary
Z	Buzzer Off
g (lower case)	Get Processing type (M or H or L)
M	Select Magnetic Head meter processing
C	Select Cat Whisker Head meter processing
H	Speed Select, Cat Whisker set to Fast
L	Speed Select, Cat Whisker set to Slow
P	Start a measurement without performing a calibration

Command	Function Performed
Q	Start a measurement with no time limit (contin. measure)
V	Read Software Version
B	Read Battery Voltage
r (lower case)	Get the measurement time (rXX)
i (lower case)	Set the measurement time to 10 secs
j (lower case)	Set the measurement time to 20 secs
k (lower case)	Set the measurement time to 30 secs
l (lower case)	Set the measurement time to 40 secs
m (lower case)	Set the measurement time to 50 secs
n (lower case)	Set the measurement time to 60 secs
o (lower case)	Set the measurement time to 70 secs
p (lower case)	Set the measurement time to 80 secs
q (lower case)	Set the measurement time to 90 secs

Note: Commands sent to the **CMCbt** are case sensitive.

8.2 Bluetooth Measure Example

When the commands `S`, `T`, and `I` are received by the **CMCbt** from an externally connected device, the **CMCbt** sends an acknowledge character `A` back to the device. For the `S` command, the **CMCbt** sends acknowledge character `A` after the **CMCbt** performs and completes the calibration. **Note** that invalid or unrecognized commands will result in a `?` reply.

<table>
<tr>
<td>S</td>
<td>Start a measurement: Begins a measurement at the first contact closure detected. Number of contact closures and elapsed time counts are accumulated. At the first contact closure, the CMCbt begins sending the accumulated contact closures and elapsed time counts through the serial port every second. The first data string transmitted through the serial port begins the start of the measurement interval with the meter contact closure count tally and elapsed time tally of '0'. Note that when this command is received by the CMCbt, it automatically performs a calibration then monitors the input for meter contact closures. Following is the output data format sent to the externally connected device at the 1-second output rate:

dnn,xxxx_

<table>
<tr><td>d</td><td>preamble for indicating display data</td></tr>
<tr><td>nn</td><td>number of meter contact closures, transmitted in HEX ASCII (hexadecimal notation)(i.e. 0-9,A-F)</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>,</td><td>delimiter</td></tr>
<tr><td>xxxx</td><td>counts of elapsed time measured as 0.003333 seconds/count,
transmitted in HEX ASCII (i.e. 0-9,A-F) while in Normal mode
and 0.03333 seconds/count while in Slow mode.</td></tr>
<tr><td>_</td><td>space</td></tr>
</table>

This data format that is transmitted to the externally connected device can be used to display elapsed time and velocity while the measurement is being performed.

At the end of the measurement interval or if the T command is received, the CMCbt sends the last tally of accumulated counts and time in the following format:

fnn,xxxx (f = final data)

The measuring interval is based on the user selected measurement time. When the measuring interval has been reached, (or the T command is received) the CMCbt, upon the next meter contact closure, will send the final data for that measurement. If there is no contact closure detected when the measurement interval has been reached, the CMCbt will continue to send data and the user must send the I command to abort the function. Note that the meter contact number, nn, is limited to a total of 255 counts (hexadecimal notation FF). If more than 255 counts are detected throughout the measurement interval, the count will rollover to 00 and continue to accumulate counts. No fault condition is set if this occurs. This allows for continuous counting in excess of 255 counts occurring during the measuring interval. External processing software can easily detect this condition and process total meter counts when the measuring interval is completed.</td></tr>
<tr><td>T</td><td>Terminate the measurement: CMCbt stops the measurement at the next contact closure and, at the next contact closure (which is counted), sends the last tally of accumulated counts and elapsed time as previously described.</td></tr>
<tr><td>I</td><td>Abort the measurement: The CMCbt aborts the measurement. No final measurement data is transmitted.</td></tr>
<tr><td>P</td><td>Start a measurement without doing a calibration: This command is used to begin a measurement without performing a calibration. The command should only be used for a high velocity measurement that does not allow a calibration to be performed due to the rapid rotation of the meter cups.</td></tr>
<tr><td>Q</td><td>Continuous measurement: This command is used to continuously output a 1-second data display without a time limit. The T or I command must be used to terminate the operation.</td></tr>
</table>

Data Conversion

The data format of the **CMCbt** is transmitted in HEX ASCII (base 16 numbers using the ASCII code which is displayable on any terminal) to provide efficiency in the number of data characters sent through the serial interface. Following is an example of the interpretation of the data. The example is given with the **CMCbt** in Mag Head mode.

<table>
<tr><td>Example</td><td>d0C,0AF6

Accumulated meter counts = $0C_{16} = 12_{10}$

Elapsed time = $0AF6_{16} = 2806_{10}$ = (2806 counts x 0.003333 sec/count) = 9.35 secs

The data format says a total of 12 meter counts have been accumulated in 9.35 seconds.</td></tr>
</table>

Contact Data

Europe	KISTERS Europe	+49 2408 9385 0 hydromet.sales@kisters.eu www.kisters.eu
Australia	KISTERS Australia	+612 9601 2022 sales@kisters.com.au www.kisters.com.au
New Zealand	KISTERS New Zealand	+64 7 857 0810 sales@kisters.co.nz www.kisters.co.nz
Latin America	KISTERS Latin America	+57 350 575 4079 sales@kisters-latam.com www.kisters-latam.com
North America	KISTERS North America	+1 561 459 4876 kna@kisters.net www.kisters.net
Spain	KISTERS Ibérica	info@kisters.es www.kisters.es

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16/03/2024

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