



Ultrasonic GSM 3G User Manual



Ultrasonic GSM 3G User Manual

Contents

1.	Product Description	2
1.1	Abbreviations/Definitions	2
2.	Configuring Device	3
2.1	Network Server Response	3
2.2	Message Types	3
2.2.1	Header Message	4
2.2.2	Message Type 4 & 8	6
2.2.3	Message Type 6	8
	Message Type 6 (Sample Payload Continued)	9
2.2.4	Message Type 16	9
2.2.5	Message Type 17	10
3.	Description of Data Transmission	11
3.1	S-Parameters (Settings)	11
3.2	Data recording – S0	12
3.3	GSM listen time – S1	12
3.4	Schedule configurator – S2	12
3.5	Communication channels – S3 & S26	12
3.6	CRC checking – S3	12
3.7	Bund Switch – S3	13
3.8	Alarms – S4, S5, S6, S7, S8 & S27	13
3.9	Standard communications – S9, S10, S12, S13, S14 & S15	13
3.10	System password – S11	14
3.11	Ultrasonic measurements – S17	14
3.12	Retry configurator – S23	14
3.13	Schedule delay – S24	14
3.14	Manual wakeup	14
3.15	SRC & SRSSI	14
3.16	Configuration Commands	15
3.16.1	S0: Logger Configuration	15
3.16.2	S1: GSM Listen Configuration	15
3.16.3	S2: Schedule Configuration	16
3.16.4	S3: Control Configuration	17
3.16.5	S4, S5, S6: Static Limit Configuration	17
3.16.6	S7, S8: Dynamic Limit Configuration	18
3.16.7	S9 – S18: SMS, APN, URL and Tank Details Configuration	18
3.16.8	S23: Message Deliver Configuration	19
3.16.9	S24: Schedule Delay	19
3.16.10	S26: Control2 Configuration	20
3.16.11	S27: Sonic Quality Filter	20
3.17	Request commands	21
3.18	SMS text back	21
4.	Technical Specification	22
4.1	Reed switch interface	22
4.2	LED output	22
4.3	Buzzer	22
4.4	TSP Interface	22
4.5	GSM Connectivity	22
5.	On-site Maintenance Checks	22
5.1	Mounting	22
5.2	Environment	22
6.	Trouble Shooting	23
6.1	LED Flash Code	23
6.2	LED Beep Pattern	23

Ultrasonic GSM 3G User Manual

1. Product Description

The Ultrasonic GSM 3G Sensor is a flexible and configurable battery-operated liquid level sensor with integrated GSM modem which uses ultrasonic technology to measure the liquid level of your tank and then communicates this data in a binary message to a remote server via a TCP connection.

The Ultrasonic sensor can communicate over GPRS or via SMS, contains an internal temperature sensor which measures the temperature and a reed switch for activation and initiating manual measurements.

1.1 Abbreviations/Definitions

The following is a list of terms that may be found in this document.

Ullage	The unfilled space between the sensor and the top of the liquid being monitored
RSSI	Received Signal Strength Indicator
SRSSI	Sonic Received Signal Strength Indicator
SRC	Sonic Results Code
CRC	Cyclic Redundancy Check
RTC	Real Time Clock
HW	Hardware
FW	Firmware
Ack	Acknowledgement from the LoRaWAN network server
Message	The data packet / payload / datagram sent across the network
MSB	The Most Significant Bit is the left-most bit in the string
Payload	Data transmitted between sensor and LoRaWAN network
0x	Identifies the number as hexadecimal. Note: numbers are assumed decimal unless specified otherwise.
0b	Identifies the number as binary. Note: numbers are assumed decimal unless specified otherwise.
Unsigned byte	Will only allow you to represent numbers in the positive range
Signed byte	Will allow you to represent numbers both in the positive and negative ranges
Waveguide	A waveguide option allows the ultrasonic reading to be measured through a waveguide pipe inserted into the tank to avoid any obstacles/obstructions that may affect the standard ultrasonic reading
IoT	Internet of Things
Dormant	Dormant units are inactivated to ensure the longest battery service life
POR	Power Out Reset
BOR	Brown Out Reset

2. Configuring Device

2.1 Network Server Response

Every time a sensor makes an outgoing status connection to the gateway, the network server has the option to respond with configuration settings to alter the operation of the device.

Sending responses to the sensor is very useful for tasks such as changing the ultrasonic profile or the connection schedule. Care must be taken, as sending the wrong settings could render the device incapable of correct operation.

2.2 Message Types

The sensor transmits or receives several packet types.

The standard message is referred to as a message type 4 and is transmitted based on a schedule defined by S2 Schedule Configurator register.

For message type 4, the unit transmits only the updates to the 28-position log i.e. only those values that have changed since the last transmission.

In the event of an alarm condition, the unit transmits a message type 8 which transmits the contents of the faster buffer log as this is the data that will have triggered the alarm. The exception is a no change alarm which is based on the log values in that case a message type 4 (with all 28 values in the logger buffer) is sent as this is what will contain the relevant data.

Message Type	Description
Message 4	Standard results from sensor. (Most common Message type) The scheduled data upload is referred to as a message type 4 and will contain new logging buffer values since the last schedule upload, along with additional information.
Message 6	Sensor Settings. A message type 6 can be requested from the sensor with the command R1=02, R1 = 04 or R1 = 08. A message type sends the contents of the S registers (and may be truncated to 140 bytes if configured to send data via SMS). The response to R1=02 is the settings starting from S0, R1=04 is the settings starting from S12 and R1=08 is the settings starting from S19.
Message 8	Similar to message 4 with alarms or sensor waking up. A message 8 is transmitted when an alarm is activated or when the sensor is activated with a magnet. A message type 8 contains the ullage values contained in the sampling buffer (because these are the values used to trigger the alarm). The exception to this is a no change alarm in which case a message type 4 is transmitted (with the logger buffer values as those are the data points used for that particular alarm).
Message 16	ICCID and modem information. A message type 16 is sent to the server when the command R6=02 is received by the sensor. This message type also contains additional status information.
Message 17	GPS details. A message type 17 is related to GPS information

2.2.1 Header Message

The header of the message is always the same for all message types up to byte 16.

The following table contains the 16-byte header message.

**Please note that all Hexadecimal entries require CAPITAL lettering.*

2.2.1.1 Product ID reference

TEK #	PROD ID field
TEK 586	02
TEK 733	05
TEK 643	06
TEK 733A	09

**See 9-5965 for full list of Product ID's*

Byte 15 highlights the message type and therefore how to interpret the rest of the message.

Sample Payload: (Payloads are Hexadecimal)

[illegible]

Byte#	Payload	Description	Notes	Result
0	05	Defines the product type	0x05 = TEK 733 (See section 2.2.1.1)	TEK 733
1	01	Defines the Hardware Revision Major 5 bits of Byte 1 = 0 -> UC20 Major 5 bits of Byte 1 = 1 -> UC15	Major 5 bits of 0x01 = 0b00000 = 0	UC20
2	C2	Defines the Firmware Revision Minor 5 bits of Byte 2 = FW Major Revision Major 3 bits of Byte 2 = FW Minor Revision	Minor 5 bits of 0xC2 = 0b00010 = 2 Major 3 bits of 0xC2 = 0b110 = 6	2.6
3	82	Defines the reason for contact (See Section 2.2.1.1)	0x82 = 0b10000010	DynLim2 Status Alarm
4	86	Defines the Status of Alarms (See Section 2.2.1.2)	0x86 = 0b10000110	Active Lim3 Lim2
5	14	Defines the RSSI value of the GSM module	0x14 = 20	20
6	75	Defines battery, RTC & 3G status and battery voltage (See Section 2.2.1.3)	0x75 = 0b01110101 Batt = (21 + 30) / 10	3G Act RTC Set Batt = 5.1V
7	08	Defines the IMEI number	Combination of bytes 7 to 14	IMEI = 0861075021004551
8	61			
9	07			
10	50			
11	21			
12	00			
13	45			
14	51			
15	74	Defines the Message Type Minor 6 bits = Message Type	Minor 6 bits of 0x74 = 0b000100 = 4	Message Type 4
16	7E	Defines the length of the following payload (Bit5&Bit4 of byte 15 x 256) + Byte 16	0x04 = 0b00000100 = 0 0x7E = 123 (0 x 2⁸) + 123 = 123	123

Ultrasonic GSM 3G User Manual

2.2.1.2 Contact Reason

Binary breakdown for contact reason:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Dynamic Limit2 Status	Dynamic Limit Status	TSP Requested	Reboot	Manual	Server Request	Alarm	Scheduled

0 = Inactive

1 = Active

2.2.1.3 Alarm/Status

Binary breakdown for alarm status:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Active	Reserved	Reserved	Reserved	Bund Status	Limit 3	Limit 2	Limit 1

0 = Inactive

1 = Active

Bit3: (Bund closed if Set)

Flag will be set if Bund switch closed.

2.2.1.4 Battery/Status

Binary breakdown for battery status:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	3G Act	RTC Set	Battery Volts				

0 = Inactive

1 = Active

- Battery Voltage = (5 Minor bits + 30) / 10

2.2.2 Message Type 4 & 8

The following table is for a standard Message type 4 payload. Message type 8 will also follow this format. This is a continuation of the preceding header message format, Section 2.2.1.

Sample Payload: (Payloads are Hexadecimal)

[illegible]

Byte#	Payload	Description	Notes	Result
15	34	Defines the Message Type Minor 6 bits = Message Type	Minor 6 bits of 0x04 = 0b000100 = 4	Message Type 4
16	7E	Defines the length of the following payload (Bit5&Bit4 of byte 15 x 256) + Byte 16	0x04 = 0b00000100 = 0 0x7E = 123 (0 x 2⁸) + 123 = 123	123
17	00	Defines the message count (Byte 17 x 2 ⁸) + Byte 18	(0x00 x 2 ⁸) + 0x01 (0 x 2 ⁸) + 1 = 1	1
18	01			
19	97	Defines the Try Tickets remaining Major 3 bits of byte 19	Major 3 bits of 0x97 0b10010111 → 100 = 4	4
20	00	Defines the last error code	0x0000 = 0	0
21	00	Combine Byte 20 & Byte 21		
22	00	N/A	N/A	N/A
23	82	Defines the logger speed (See Section 2.2.3.1)	0x82 = 0b10000010 → 2 x 15 = 30 mins → 0 hours 30 mins = 00:30	00:30
24	01	Count of 10-second increments taken for logging in to GSM network + seconds to connect to GPRS server	0x01 = 1	1
25	9F	Defines the Real Time Clock (hh:mm:ss) Minor 5 bits of Byte 19 : Byte 25 : 00	0x97 = 0b10010111 → 10111 = 23 hours 0x0F = 15 mins	23:15:00
26-29	0A5B2877	Data 0	See Section 2.2.3.2	See Section 2.2.3.2
30-33	0A5B2877	Data 1		
34-37	0A5B2876	Data 2		
38-41	0A5B2877	Data 3		
42-45	0A5B2877	Data 4		
46-49	0A5B2877	Data 5		
50-53	0A5B2877	Data 6		
54-57	0A5B2876	Data 7		
58-61	0A5B2876	Data 8		
62-65	0A5B2876	Data 9		
66-69	0A5B2877	Data 10		
70-73	0A5B2876	Data 11		
74-77	0A5B2876	Data 12		
78-81	0A5B2876	Data 13		
82-85	0A5D2877	Data 14		
86-89	0A5D2877	Data 15		
90-93	0A5D2877	Data 16		
94-97	0A5D2877	Data 17		
98-101	0A5D2877	Data 18		
102-105	0A5D2877	Data 19		
106-109	0A5D2877	Data 20		
110-113	0A5D2877	Data 21		
114-117	0A5D2877	Data 22		
118-121	0A5D2877	Data 23		
122-125	0A5F2877	Data 24		
126-129	00000000	Data 25		
130-133	00000000	Data 26		
134-137	00000000	Data 27		
138-139	FFFA	N/A		

Ultrasonic GSM 3G User Manual

2.2.2.1 Logger Speed

- If byte 23 = 00 then the result = 1 [Note: Special test setting, not advised for normal use]
- If byte 23 = 80 then the result = 15
- If byte 23 ≠ 00 & byte 23 ≠ 80 then use minor 7 bits of byte 23 and multiply the result by 15.
- Result in minutes, convert to hours and then to 24-hour format (hh:mm)

Example:

Byte 23 = 55

- 0x55 = 0b01010000 → 85
- 85 x 15 = 1275minutes = 21.25 hours = 21 hours 15 minutes = 21:15

2.2.2.2 Measurement

RTC	cm	SRC	RSSI	°C
RTC (Data 0): This is the measurement timestamp of the scheduled measurement sample taken immediately before the payload delivery. RTC: (Data 1 – 27) Subtract the logger speed from the RTC (Data 0) time to get this measurement timestamp.	This is the ullage measurement taken by the sensor. Combine Bit3&Bit2 with Bit1&Bit0. Result in cm of the 10 minor bits of this combination. Example: Bytes 26-29 = 0x0A5B2877 (0x28 = 0b00101000) (0x77 = 0b01110111) Combo = 0b0010100001110111 → 0b0001110111 = 119cm	This is the SRC measurement reported by the sensor. 4 major bits starting at bit 5 of Bit3&Bit2. Example: Byte26-29= 0x0A5B2877 0x28 = 0b00101000 0b00101000 → 0b1010 = 10	This is the SRSSI measurement reported by the sensor. 2 major bits of the byte. Example: Byte26-29= 0x0A5B2877 0x0A = 10	This is the temperature reported by the sensor, measured in °C. Bit5&Bit4 divided by 2. Subtract 30 from the result. Example: Byte26-29=0x0A5B2877 0x5B = 91 91/2 = 45.5 45.5 - 30 = 15.5°C

Description	Byte#	Payload	RTC	cm	SRC	RSSI	°C
Data 0	26	0A5B2877	23:15	119	10	10	15.5
Data 1	30	0A5B2877	22:45	119	10	10	15.5
Data 2	34	0A5B2876	22:15	118	10	10	15.5
Data 3	38	0A5B2877	21:45	119	10	10	15.5
Data 4	42	0A5B2877	21:15	119	10	10	15.5
Data 5	46	0A5B2877	20:45	119	10	10	15.5
Data 6	50	0A5B2877	20:15	119	10	10	15.5
Data 7	54	0A5B2876	19:45	118	10	10	15.5
Data 8	58	0A5B2876	19:15	118	10	10	15.5
Data 9	62	0A5B2876	18:45	118	10	10	15.5
Data 10	66	0A5B2877	18:15	119	10	10	15.5
Data 11	70	0A5B2876	17:45	118	10	10	15.5
Data 12	74	0A5B2876	17:15	118	10	10	15.5
Data 13	78	0A5B2876	16:45	118	10	10	15.5
Data 14	82	0A5D2877	16:15	119	10	10	16.5
Data 15	86	0A5D2877	15:45	119	10	10	16.5
Data 16	90	0A5D2877	15:15	119	10	10	16.5
Data 17	94	0A5D2877	14:45	119	10	10	16.5
Data 18	98	0A5D2877	14:15	119	10	10	16.5
Data 19	102	0A5D2877	13:45	119	10	10	16.5
Data 20	106	0A5D2877	13:15	119	10	10	16.5
Data 21	110	0A5D2877	12:45	119	10	10	16.5
Data 22	114	0A5D2877	12:15	119	10	10	16.5
Data 23	118	0A5D2877	11:45	119	10	10	16.5
Data 24	122	0A5F2877	11:15	119	10	10	17.5
Data 25	126	00000000	10:45	0	0	0	-30
Data 26	130	00000000	10:15	0	0	0	-30
Data 27	134	00000000	09:45	0	0	0	-30

Ultrasonic GSM 3G User Manual

2.2.3 Message Type 6

The Message type 6 will contain the header message, followed by the settings of the unit.
This is a continuation of the preceding header message format, Section [2.2.1](#).

Sample Payload: (Payloads are Hexadecimal)

05018224E0146F0861075021004551860953303D38302C53313D30352C53323D3746303033382C53333D36342C53343D303831452C53353D383833322C53363D383834362C53373D30302C53383D30302C53393D2B3335333836313735363336342C5331303D2B3335333836313735363336342C5331313D544548373332C5331323D73747265616D2E636F2E756B2C5331333D73747265616D69702C5331343D73747265616D69702C5331353D38342E35312E3235302E3130342C5331363D393030302C5331373D303034393030323832382C5331383D3530302C5331393D303030302C5332303D30302C5332313D2C5332323D2C5332333D31332C5332343D30302C5332353D30302C5332363D31302C5332373D3838D9BA,Z=BBBCB

Byte#	Payload	Description	Notes	Result
15	46	Defines the Message Type Minor 6 bits = Message Type	Minor 6 bits of 0x46 = 0b000110 = 6	Message Type 6
16	09	Defines the length of the following payload (Major 2 bits Byte 15 x 2 ⁶) + Byte 16	0x46 = 0b01000110 = 1 0x09 = 9 (1 x 2⁶) + 9 = 265	265
17-21	53303D3830	S-Logger Config (See Section 3.1)	0x53303D3830 ASCII: S0=80	S0=80
21-22	2C53313D3035	GSM listen Config (See Section 3.1)	0x2C53313D3035 ASCII: S1=05	S1=05
23-32	2C53323D374630303338	Schedule Config (See Section 3.1)	0x2C53323D374630303338 ASCII: S2=7F0038	S2=7F0038
33-38	2C53333D3634	Control configurator (See Section 3.1)	0x2C53333D3634 ASCII: S3=64	S3=64
39-46	2C53343D30383145	Static alarms (See Section 3.1)	0x2C53343D30383145 ASCII: S4=081E	S4=081E
47-54	2C53353D38383332	Static alarms (See Section 3.1)	0x2C53353D38383332 ASCII: S5=8832	S5=8832
55-62	2C53363D38383436	Static alarms (See Section 3.1)	0x2C53363D38383436 ASCII: S6=8846	S6=8846
62-67	2C53373D3030	Dynamic alarms (See Section 3.1)	0x2C53373D3030 ASCII: S7=00	S7=00
68-73	2C53383D3030	Dynamic alarms (See Section 3.1)	0x2C53383D3030 ASCII: S8=00	S8=00
74-90	2C53393D2B333533383631373536333634	Primary Server SMS Phone number (See Section 3.1)	0x2C53393D2B333533383631373536333634 ASCII: S9=+353861756364	S9=+353861756364
91-108	2C5331303D2B33353338363137353633363434	Secondary Server SMS Phone number (See Section 3.1)	0x2C5331303D2B33353338363137353633363434 ASCII: S10=+353861756364	S10=+353861756364
109-119	2C5331313D544548373333	Unit Password (See Section 3.1)	0x2C5331313D544548373333 ASCII: S11=TEK733	S11=TEK733
120-136	2C5331323D73747265616D2E636F2E756B	GPRS APN (SIM card) (See Section 3.1)	0x2C5331323D73747265616D2E636F2E756B ASCII: S12=stream.co.uk	S12=stream.co.uk
137-149	2C5331333D73747265616D6970	GPRS APN Username (SIM card) (See Section 3.1)	0x2C5331333D73747265616D6970 ASCII: S13=streamip	S13=streamip
150-162	2C5331343D73747265616D6970	GPRS APN Password (SIM card) (See Section 3.1)	0x2C5331343D73747265616D6970 ASCII: S14=streamip	S14=streamip
163-180	2C5331353D38342E35312E3235302E31303434	Destination Server IP address or URL (See Section 3.1)	0x2C5331353D38342E35312E3235302E31303434 ASCII: S15=84.51.250.104	S15=84.51.250.104
181-189	2C5331363D39303030	Destination Server Port number (See Section 3.1)	0x2C5331363D39303030 ASCII: S16=9000	S16=9000
190-204	2C5331373D30303439303032383238	Ultrasonic measurement settings (See Section 3.1)	0x2C5331373D30303439303032383238 ASCII: S17=0049002828	S17=0049002828
205-212	2C5331383D353030	Tank height (See Section 3.1)	0x2C5331383D353030 ASCII: S18=500	S18=500
213-221	2C5331393D30303030	N/A	0x2C5331393D30303030 ASCII: S19=0000	S19=0000
222-228	2C5332303D3030	N/A	0x2C5332303D3030 ASCII: S20=00	S20=00

Ultrasonic GSM 3G User Manual

Message Type 6 (Sample Payload Continued)

229-233	2C5332313D	N/A	0x2C5332313D ASCII: S21=	S21=
234-238	2C5332323D	N/A	0x2C5332323D ASCII: S22=	S22=
239-245	2C5332333D3133	Message deliver try configurator (See Section 3.1)	0x2C5332333D3133 ASCII: S23=13	S23=13
246-252	2C5332343D3030	Schedule delay (See Section 3.1)	0x2C5332343D3030 ASCII: S24=00	S24=00
253-259	2C5332353D3030	N/A	0x2C5332353D3030 ASCII: S25=00	S25=00
260-266	2C5332363D3130	Control2 configurator (See Section 3.1)	0x2C5332363D3130 ASCII: S26=10	S26=10
267-273	2C5332373D3838	Sonic quality filter (See Section 3.1)	0x2C5332373D3838 ASCII: S27=88	S27=88
274-275	D9BA	N/A		

Note: The settings string is separated by commas which are represented in the payload structure as '0x2C'.

2.2.4 Message Type 16

The following table is for a standard Message type 16 payload.

This is a continuation of the preceding header message format, Section 2.2.1.

Sample Payload: (Payloads are Hexadecimal)

0501E324EE10720861075021004551102B2C38393434313232363530343337383232353031462C554332304751415230334130344D313032342C2EE9,Z=28ED

Byte#	Payload	Description	Notes	Result
15	10	Defines the Message Type Minor 6 bits = Message Type	Minor 6 bits of 0x10 = 0b010000 = 16	Message Type 16
16	2E	Defines the length of the following payload (Major 2 bits Byte 15 x 2 ⁵) + Byte 16	0x10 = 0b0001000 = 0 0x2E = 43 (0 x 2⁵) + 43 = 43	43
17	2C	Comma Terminator. Marks Start of variable length string		,
18-38	38393434 31323236 35303433 37383232 35303146	Defines the ICCID number	0x3839343431323236353034333738323235303146 ASCII: 8944122650437822501F	8944122650437822501F
39	2C	Comma Separator	0x2C ASCII: ,	,
40-57	55433230 47514152 30334130 344D313 03234	Defines the Modem FW Revision	0x554332304751415230334130344D31303234 ASCII: UC20GQAR03A04M1024	UC20GQAR03A04M1024
58	2C	Comma Terminator. Marks end of variable length string	0x2C ASCII: ,	,
59-60	2EE9	N/A		

Note: The results string is separated by commas which are represented in the payload structure as '0x2C'.

Ultrasonic GSM 3G User Manual

2.2.5 Message Type 17

The following table is for a standard Message type 17 payload.

This is a continuation of the preceding header message format, Section 2.2.1.

Sample Payload: (Payloads are Hexadecimal)

0501E304E00E76086107502100455111492C33332C3137303935342E302C353235352E393933344E2C30303833322E34333935572C322E312C3133342E382C322C302E30302C302E302C302E302C3234303931352C30362C3C45,Z=3034

Byte#	Payload	Description	Notes	Result
15	1E	Defines the Message Type Minor 6 bits = Message Type	Minor 6 bits of 0x1E = 0b010001 = 17	Message Type 17
16	49	Defines the length of the following payload (Major 2 bits Byte 15 x 2 ⁸) + Byte 16	0x1E = 0b00010001 = 0 0x49 = 73 (0 x 2⁸) + 73 = 73	73
17	2C	Comma Terminator. Marks Start of variable length string	0x2C ASCII: ,	,
18-19	3333	GPS Time to Fix	0x3333 ASCII: 33	33
20-28	2C313730 3935342E 30	UTC: hh:mm:ss.sss	0x2C3137303935342E30 ASCII: ,170954.0	17:09:54.0
29-39	2C353235 352E3939 33344E	Latitude: ddm:mm.mmmm N/S dd 00-89 (degree). mm.mmmm 00.0000-59.9999 (minute)	0x2C353235352E393933344E ASCII: ,5255.9934N	5255.9934N
40-51	2C303038 33322E34 33393557	Longitude: ddd:mm.mmmm E/W ddd 000-179 (degree)	0x2C30303833322E3433393557 ASCII: ,00832.4395W	00832.4395W
52-55	2C322E31	Horizontal precision, 0.5-99.9	0x2C322E31 ASCII: ,2.1	2.1
56-61	2C313334 2E38	The altitude of the antenna away from the sea level (unit: m), accurate to one decimal place. N.B. This value should be interpreted with caution due to the manner in which the GPS fix information is collected, i.e. sporadically as opposed to continuously	0x2C3133342E38 ASCII: ,134.8	134.8
62-63	2C32	GPS Fix / GNSS positioning model	0x2C32 ASCII: ,2	2
64-68	2C302E30 30	Ground heading based on true north. Format: ddd.mm. N.B. This value should be interpreted with caution due to the manner in which the GPS fix information is collected, i.e. sporadically as opposed to continuously	0x2C302E3030 ASCII: ,0.00	0.00
69-72	2C302E30	Speed over ground. Format: xxxx.x, unit: Km/h, accurate to one decimal place. N.B. This value should be interpreted with caution due to the manner in which the GPS fix information is collected, i.e. sporadically as opposed to continuously	0x2C302E30 ASCII: ,0.0	0.0Kph
73-76	2C302E30	Speed over ground. Format: xxxx.x, unit: knots, accurate to one decimal place. N.B. This value should be interpreted with caution due to the manner in which the GPS fix information is collected, i.e. sporadically as opposed to continuously	0x2C302E30 ASCII: ,0.0	0.0Knots
77-83	2C323430 393135	UTC date when positioning. Format: ddmmyy	0x2C323430393135 ASCII: ,240915	24/09/15
84-86	2C3036	Number of satellites, from 00 to 12 (the first 0 will also be transferred)	0x2C3036 ASCII: ,06	06
87	2C	Comma Terminator. Marks end of variable length string	0x2C ASCII: ,	,
88-89	3C45	N/A		

Note: The results string is separated by commas which are represented in the payload structure as '0x2C'.

Ultrasonic GSM 3G User Manual

3. Description of Data Transmission

3.1 S-Parameters (Settings)

The sensor is configured using the following S parameters. Blank values are undefined and can lead to inconsistent operation.

S-	Parameter	Description
S0	S-Logger Config	- How often a unit should store a reading. - How often a measurement is taken.
S1	GSM listen Config	How long the unit remains active after powering up (Multiples of 5 minutes, Max of 155 minutes)
S2	Schedule Config	Set schedule for when unit is to log data to server (Maximum activity = daily, every 2 hours)
S3	Control configurator	- GPRS or SMS only? - Bund switch? - CRC checking? - Status Report?
S4 & S5 & S6	Static alarms	Alarm if measurement is higher or lower than a selected height.
S7 & S8	Dynamic alarms	Alarm if measurement is rising or falling at a rate greater than selected.
S9	Primary Server SMS Phone number	SMS fall back phone number.
S10	Secondary Server SMS Phone number	Back up SMS fall back phone number.
S11	Unit Password	Password required in order to update or change settings to unit.
S12	GPRS APN (SIM card)	Access Point Name. Name of the gateway to the server.
S13	GPRS APN Username (SIM card)	GPRS APN Username. (SIM card)
S14	GPRS APN Password (SIM card)	GPRS APN Password. (SIM card)
S15	Destination Server IP address or URL	IP address or URL for server that unit is required to issue data to.
S16	Destination Server Port number	Port number for server that the unit is required to issue data to.
S17	Ultrasonic measurement settings	Determined by tank size and type.
S18	Tank height	Height of tank in cm.
S23	Message deliver try configurator	- How many attempts to make data drop before falling back to SMS. - Time between attempts.
S24	Schedule delay	How many minutes of a delay from the schedule set as S2.
S26	Control2 configurator	- Disable SMS fall back (GPRS only). - SMS Alarm only fall back. - SMS Text back to mobile phone disable.
S27	Sonic quality filter	RSSI & SCR filter – Quality of ultrasonic measurement taken.

Note: Not used - S19, S20, S21, S22, S25

3.2 Data recording – S0

The ultrasonic sensor is sampled and stored at various rates and stored in 2 different buffers, referred to as "Logging buffer" (Message type 4) and "Sampling buffer" (Message type 8).

The rate at which the sampling buffer is filled is the sampling period and can be set at once per minute or once every 15 minutes (set by the MSB of S0). The sampling buffer has 10 positions so will fill in either 10 minutes or in 2 hours and 30 minutes, depending on the setting of S0.

The rate at which the logger is filled is referred to as the logger speed and the rate at which it is filled can be set from once every 15 minutes up to once every 31 hours (in increments of 15 minutes) using the lower 7 bits of S0. The log samples are synchronised to the real-time clock i.e. samples will be taken on the hour and multiples of 15 minutes after that. The log has 28 positions. Therefore, the logger will cover a minimum period of $28 \times 15 \text{ minutes} = 7 \text{ hours}$ or a maximum of $31 \times 28 \text{ hours} = 868 \text{ hours}$. Each time a new sample is taken the oldest sample "drops off" the end of the log.

3.3 GSM listen time – S1

Once the unit has delivered its payload it can be configured to stay on the GSM network in listen mode to pick up any SMS that the user may wish to send to it. The duration that the unit will stay in listen mode after a scheduled upload is defined by the S1 setting. The listen time is set in increments of 5 minutes up to a maximum of 155 minutes. When the unit receives an SMS or TSP command the timer is reset, with the exception of an R1=80 command (see Section 3.17) which will cause the GSM module to shut down and enter sleep mode.

The duration that a unit remains connected to the GSM network is critical for battery life which must be balanced with allowing sufficient time for SMS commands to be received.

Unit will emit a beep once every 4 seconds when not sending or receiving data.

When the unit receives data, it will emit a high beep followed directly by a low beep.

When the unit has sent data, it will emit a low beep followed directly by a high beep.

3.4 Schedule configurator – S2

The system will upload the data from the logging buffer at regular intervals defined by settings in the S2 register (only values since the last scheduled upload will be transmitted). (See Section 3.16.3)

The unit can be configured to send data once per day on particular days of the week or can be configured to send more regularly i.e. every hour, 2 hours or 4 hours between specific times. These settings can also be over written to have unit send data fortnightly or monthly.

3.5 Communication channels – S3 & S26

The unit can communicate over GPRS or via SMS. The default communication is over GPRS with the unit falling back to SMS in the event of the GPRS communications being unsuccessful. These settings can be changed using S3 and S26. GPRS communications can be disabled using bit 2 of S3 Control Configurator and only SMS is used.

Alternatively, S26 can be used to disable SMS fall back (bit 0) or S26 bit 1 can be set to allow SMS on alarm only (but not for scheduled uploads). Note that bit 1 over rides this setting i.e. bit 1 disables SMS in all instances. Bit 2 of S26 can be used to disable text back queries (see SMS text back section)

3.6 CRC checking – S3

CRC is a Cyclic Redundancy Check added to the end of any message sent to the unit and is used for basic message integrity. This feature can be enabled/disabled via bit 4 of S3.

Ultrasonic GSM 3G User Manual

3.7 Bund Switch – S3

A bund switch is a simple input switch that is normally closed. When enabled, if the switch opens, this alarm is triggered and a message type 8 is sent to the server. The bund switch alarm is enabled using bit 3 of S3.

Note that the sensor will only connect once unless there is a change in the switch status. See example below.

Device set to make a measurement every 15 minutes			
S3, bit 3 set to 1 so that the alarm on change is enabled.			
Time	Switch input	Measurement	Action
12:00	0	Yes	None
12:05	1	No	None
12:10	0	No	None
12:15	0	Yes	None
12:20	0	No	None
12:25	1	No	None
12:30	1	Yes	Connect and send alarm
12:35	1	No	None
12:40	1	No	None
12:45	1	Yes	None
12:50	0	No	None
12:55	1	No	None
13:00	1	Yes	None
13:05	1	No	None
13:10	0	No	None
13:15	0	Yes	Connect and send alarm
13:20	0	No	None

3.8 Alarms – S4, S5, S6, S7, S8 & S27

Static Alarm: Static alarms are based on the sampled values. There are three separate static alarms configured by S4, S5 and S6. These can be configured to alarm when the measured value is higher or lower than the defined threshold and a hysteresis value can also be defined. Note that the unit adds 3cm to the hysteresis value entered to compensate for any jitter in the ultrasonic measurement. Only values that meet the sonic quality criteria set in S27 will cause the alarm to trigger. When a static alarm is activated, an immediate message type 8 is sent to the server – see section on message types for further information.

Dynamic Alarm: Dynamic alarms are based on entries in the sample buffer. There are up to 2 dynamic alarms configured with S7 and S8. A least squares method is used to calculate the slope of the measurements in the sample buffer. Only valid readings are used based on the filter set by S27. A minimum of 6 valid readings in the sample buffer are required before a dynamic alarm is triggered. When a dynamic alarm is triggered an immediate message type 8 is sent to the server – see section on message types for further information.

Note that it is recommended that a minimum of 5cm change is looked for over the full log which sets limitations on possible settings.

3.9 Standard communications – S9, S10, S12, S13, S14 & S15

When communicating over GPRS, the unit connects to the GSM network with settings defined in S12, S13 and S14 (GPRS APN, username and password). The data will be sent to the IP address and port number stored in S15 and S16 respectively. The server at this IP address can then pick up communications coming on this port and parse as per detailed in Section [3.16.7](#).

In SMS mode, the unit can send an SMS to one of 2 numbers which are stored in S9 and S10. Bits 0 and 1 of S3 control configurator select which of the 2 numbers to use. The default telephone numbers are for a Clickatell service which interprets the machine-readable SMS and transmits the data to the Tekelek production server

3.10 [System password – S11](#)

Any commands sent to the unit need to start with the password set in S11. The default password is TEK733.

3.11 [Ultrasonic measurements – S17](#)

The product reads values from the ultrasonic sensor. The recommended setting for S17 is 0049351928 in standard mode or 0014FF3C3C in waveguide mode. Changes should not be made to these settings without help from technical support as incorrect values will compromise the validity of any measurements taken. When the ultrasonic sensor takes a reading, it applies a score to the quality of the reflected signal received (See Section [3.16.7](#)). All values are logged together with the SRC and SRSSI. S27 defines the limits for a valid measurement for use in triggering alarms to help avoid alarms being triggered incorrectly. The recommended setting for S27 is 49 and again should not be changed without input from technical support.

3.12 [Retry configurator – S23](#)

In the event of the unit not being able to deliver its payload successfully it can make a number of subsequent attempts to deliver the data. The total number of attempts that the unit will make can be configured using S23. Note that in the event of SMS being enabled (see section on Communication Channels), the last try attempt will be via SMS.

3.13 [Schedule delay – S24](#)

The S2 register can define the upload schedule in increments of 15 minutes. If a number of units are installed together this can lead to excessive network traffic at these times. A different schedule delay can be configured for each unit to overcome such a problem. S24 is used to configure the delay in minutes from the schedule upload time configured by S2.

3.14 [Manual wakeup](#)

Holding a magnet to the hot spot will cause the unit to take 10 ultrasonic samples in quick succession, filling the sampling buffer, and will transmit this data in a message type 8 to the server. Therefore, the contents of the sampling buffer are effectively cleared when the unit is activated with a magnet.

3.15 [SRC & SRSSI](#)

There are two parameters used with products capable of advanced sonics' SRC and SRSSI. Both parameters give a measure of validity to the measurement. See separate document *"9-6034-XX Advanced Sonics SRC Parameters"* for more information.

Ultrasonic GSM 3G User Manual

3.16 Configuration Commands

3.16.1 S0: Logger Configuration

Logger Speed:

- Range of 0 - 31.75 Hours
- Multiples of 0.25 hours
- 0 = Locked to Sampling Rate

Configuration	Command	Formula	Description
Logger Speed	0.00	A	Desired logger Speed, hours, in 0.25-hour increments. Max 31 hours
Sampling Period	1	B	Desired sampling period: 0 if once per min, 1 if once every 15 mins
RESULT:	S0=80		Data sample once every 15 mins, Logged ever 15 mins

Formula:

$$S0=(128 \times B) + (A \times 4)$$

Example:

- $S0=(128 \times 1) + (0.00 \times 4)$
- $S0=128 + 0$
- $S0=128$
- $S0=0 \times 80$

3.16.2 S1: GSM Listen Configuration

- Max of 155 minutes
- Multiples of 5 minutes

Configuration	Command	Formula	Description
GSM Listen Period	5	A	Desired GSM listen Period
RESULT:	S1=01		GSM listen period 5 minutes

Formula:

$$S1=(A/5)$$

Example:

- $S1= (5/5)$
- $S1=1$
- $S1=0 \times 01$

Ultrasonic GSM 3G User Manual

3.16.3 S2: Schedule Configuration

This parameter defines how the ECU is configured to regularly send logged measurement data in Data Message Type 4 to the server.

- If the End Time entered is before the Start time, no scheduled data will be transmitted

Configuration	Command							Formula	Description
	Sunday	Saturday	Friday	Thursday	Wednesday	Tuesday	Monday		
Day to upload	1	1	1	1	1	1	1	A	Enter '1' to select day(s) of week for data delivery
	8							B	Enter Time to Dial, Hours
	0							C	Enter Time to Dial, Minutes (Will be rounded to 15 min intervals)
Upload More than once per day	0							D	Enter '0' if once per day Enter '1' to dial every 2 hours Enter '2' to dial in every hour Enter '3' to dial in every 4 hours
	22							E	Enter End time (Hours) (> Start Time) (Ignored if once per day)
Weekly Override: > once per week	0							F	Override weekly schedule: Enter '1' if fortnightly or once per month delivery required.
	0							G	Enter '1' for once per month, on the 21st, <i>or</i> , enter '0' for Fortnightly on the 1st & 14th each month
RESULT:	S2=7F2016								Daily @ 08:00

Formula:

A=(Sunday,Saturday,Friday,Thursday,Wednesday,Tuesday,Monday)

1. **XX**= (F,**A**)
2. **YY**= (G x 128) + (B x 4) + (C/15)
3. **ZZ**= (D x 32) + E
4. **S2**=**XXYYZZ**

Example:

1. **XX**=(0b01111111)
XX=0x7F
2. **YY**=(0 x 128) + (8 x 4) + (0/15)
YY=(0 + 32 + 0)
YY=32
YY=0x20
3. **ZZ**=(0 x 32) + 22
ZZ=0 + 22
ZZ=22
ZZ=0x16
4. **S2**=7F2016

Ultrasonic GSM 3G User Manual

3.16.4 S3: Control Configuration

Configuration	Command	Formula	Description
Set HQ	00	A	Dial Number (SMS): 00=HQ1: 01=HQ2
GPRS Mode	1	B	1=Enable GPRS (SMS fall back), 0=SMS only
Bund Switch	0	C	1=Enable
CRC Check	0	D	CRC checking of incoming data. 1=Enable <i>Note! If set, will disable phone commands!</i>
Status Report	0	E	1=Enable. Recommended set. (used to count ACKS, and RTC setting)
	1	F	Not implemented
Verbose TSP	0	G	1=Enable additional TSP info
RESULT:	S3=44		

Formula:

S3=G,F,E,D,C,B,A

Example:

- S3=0b01000100
- S3=0x44

3.16.5 S4, S5, S6: Static Limit Configuration

Configuration	Command	Command	Command	Formula	Description
Limit Polarity	1	0	0	A	1= alarm when measured ullage value is higher than the threshold, 0 = alarm when measured ullage value is lower than the threshold
Alarm Enabled	1	0	0	B	1 = Enabled, 0 = Disable. N.B. Alarm Status flags in Message headers will be set, irrespectively.
Hysteresis	10	0	0	C	Reset level is 3 greater than value entered here
Threshold	150	0	0	D	The setting threshold for level alarm.
RESULT:	S4=E896	S5=0000	S6=0000		S4 Example: Alarm set if measured units are >150, reset level = 137

Formula:S4= D + C x (2¹⁰) + B x (2¹⁴) + A x (2¹⁵)**Example:**

- S4=150 + 10 x (2¹⁰) + 1 x (2¹⁴) + 1 x (2¹⁵)
- S4=150 + 10240 + 16384 + 32768
- S4=59542
- S4=0xE896

Ultrasonic GSM 3G User Manual

3.16.6 S7, S8: Dynamic Limit Configuration

- Range of 0 - 6.3, in increments of 0.1 units.
- Fixed Hysteresis of 0.1 units/min(15mins) will clear alarm flag

Configuration	Command	Command	Formula	Description
Polarity	1	0	A	1= Alarm if Rising Units (Tank Not Emptying) 0= Alarm if Falling Units (Tank Not Filling)
Alarm Enabled	1	0	B	1=Enabled, 0 = Disable (Alarm Status flags will be set, irrespectively)
Rate	4.0	0.0	C	CMs per minute or CMs per 15 minutes, depending on S0 Range 0-6.3, in increments of 0.1 units Alarm if change = C/15 (Round to 2 decimal places)
RESULT:	S7=E8	S8=00		S7 Example: Alarm if change >0.27 cms/min

Formula:

$$S7 = A \times (2^7) + B \times (2^6) + C \times 10$$

Example:

- $S7 = 1 \times (2^7) + 1 \times (2^6) + 4.0 \times 10$
- $S7 = 128 \times 64 + 40$
- $S7 = 232$
- $S7 = 0xE8$

3.16.7 S9 – S18: SMS, APN, URL and Tank Details Configuration

- The following Parameters S9 to S16 are Ascii, with max length of 20 characters (A20)
- If using a waveguide, the recommended value of S17 is 0014FF3C3C

S-	Description	Default
S9:	Primary Server SMS Phone Number (A20)	
S10:	Secondary Server SMS Phone Number (A20)	
S11:	Unit Password (A6)	TEK733
S12:	GPRS APN (A30)	
S13:	GPRS APN User Name (A20)	
S14:	GPRS APN Password (A20)	
S15:	Destination Server IP address or URL (A30)	
S16:	Destination Server Port Number (A5)	
S17:	Ultrasonic Measurement	0049351928
S18:	Tank Height	

Ultrasonic GSM 3G User Manual

3.16.8 S23: Message Deliver Configuration

- Try Tickets max of 8
- Try Period max of 320 seconds

Configuration	Command	Formula	Description
Try Tickets	4	A	Number of delivery attempts
Try Period	30	B	Time between tries (seconds)
RESULT:	S23=13		

Formula:

1. $X=A-1$
2. $Y=(B/10) -1$ {Note: Result of B/10 to be rounded down}
3. $S23= X + (Y \times 8)$

Example:

1. $X=4-1$
 $X=3$
2. $Y=(30/10) -1$
 $Y=3-1$
 $Y=2$
3. $S23=3 + (2 \times 8)$
 $S23=19$
 $S23=0x13$

3.16.9 S24: Schedule Delay

- Max delay of 14 minutes
- Default = No delay (0 minutes)

Configuration	Command	Formula	Description
Delay	5	A	Data Drop Delay from Scheduled
RESULT:	S24=05		

Formula:

$S24=A$

Example:

- $S24=5$
- $S24=0x05$

Ultrasonic GSM 3G User Manual

3.16.10 S26: Control2 Configuration

- 1 = Enabled, 0 = Disabled

Configuration	Command	Formula	Description
Waveguide Mode	0	A	Not Implemented
SMS Disable fall back (GPRS only)	0	B	If Enabled, last Try ticket will be GPRS only
SMS Alarm only fall back	0	C	If Enabled, last re-try attempt will be SMS if alarm only.
SMS Textback to mobile phone Disable	0	D	If Enabled, SMS TextBack requests via mobile phone are disabled
No Change Alarm / DynLim2 Alarm	0	E	Sets the Alarm Type to be used. 1 = No Change Alarm, 0 = DynLim2 Alarm
Not used	0	F	N/A
Turn off Cell location service	1	G	If Enabled, this will turn off Cell location service
Not used	0	H	N/A
RESULT:	S26=40		

Formula:

S26=H,G,F,E,D,C,B,A

Example:

- S26=0b01000000
- S26=0x40

3.16.11 S27: Sonic Quality Filter

- SRC = 9 (recommended normally), SRC = 10 (is recommended for Wave Guide applications)

Configuration	Command	Formula	Description
RSSI	4	A	RSSI Filter
SCR	9	B	SCR Filter
RESULT:	S27=49		

Formula:

S27=A,B

Example:

S27=0x49

Ultrasonic GSM 3G User Manual

3.17 Request commands

Commands can be sent via SMS or via GPRS (converted to hex)

Request commands are available as follows:

<password>, R2= yy/mm/dd:hh/mm/ss	set RTC
<password>, R3=ACTIVE	sets units to active state
<password>, R4=DEACT	de-activates scheduled uploads
<password>, R6=03	close TCP connection
<password>, R1=80	shutdown modem and sleep

S parameters can be programmed using the following format:

password,Sx = yyyy

where x is the number of the S parameter that is to be set and yyyy is the value to which it will be set. Note that commands can be concatenated (separated by commas).

Note: The command R3=ACTIVE should be issued to the sensor upon first activation.

3.18 SMS text back

Details of SMS text back queries are in the commands and config file. When a text back query is received the reply is sent to the number from which the query came.

Default Password (S11) = TEK733			
Command	Meaning	Response Example	Note
Ullage=?	TextBack to me the Tank Fuel level reading	Ullage=63, (Older Readings= 63,0,0,0,0,0,cms).	Ullage is the term used for the air space between the liquid level and the top of the tank. The readings are from the sampling buffer.
TEK733,INFO=?	(Password Protected) Status Information: IMEI, HW Version, FW Version, Battery, RSSI, Network Operator, RTC, Active/Deactive, Location	IMEI=863835020373234 HW=1 FW=3.7 Bat=47 RSSI=23 SERV="02 IRL",3G,R RTC 24/9/15 13:12:1 (0) Act LOC=52.905273,-8.546389	LOC (location) is optionally available If location is returned. For UC15, this will be approximate location based on Cell positioning. Response is dependent on FW version of the GSM module and may not be supported. Format DD, Latitude/Longitude. The position is refreshed after this message, or after manual activation. For UC20, if GPS location is requested, then this field will be GPS, in degrees.
TEK733,SET=?,n	(Password Protected) Textback of S parameters, starting at n. (If 'n' omitted, will start at S0)	S0=01,S1=02,S2=7F0036,S3=04,S4=8832,S5=0000,S6=0000,S7=CA,S8=9E,S9=+447624811142,S10=+447624811142,S11=TEK733,S13=streamip,S14=streamip,S15=84.51.244.10	The starting number "n" can be varied. In the example of using start number=0, not all of the S-parameters may fit into 160 characters. Therefore, more than 1 Textback may be needed. In the example shown, the 1st 15 S=params occupies 152 chars. Another Textback command Set=?,16 would be needed to follow.

Ultrasonic GSM 3G User Manual

4. Technical Specification

4.1 [Reed switch interface](#)

A reed switch provides a user interface input for the Ultrasonic GSM 3G sensor. The reed switch is triggered by a user held magnet.

4.2 [LED output](#)

The Ultrasonic GSM 3G sensor status feedback will be provided via a bicolour LED. Detailed further in document.

4.3 [Buzzer](#)

The Ultrasonic GSM 3G sensor status feedback will also be provided via a buzzer. Detailed further in document.

4.4 [TSP Interface](#)

Test interface (transponder) can be used for test and parameter programming purposes. The transponder does not form part of the product.

4.5 [GSM Connectivity](#)

GSM Communications is provided by an on-board GSM Module. The Ultrasonic GSM 3G sensor communicates using standard GSM protocols / services available from a common-carrier.

5. On-site Maintenance Checks

5.1 [Mounting](#)

During on-site maintenance, the operator must ensure that the Ultrasonic sensor is still securely tightened.

5.2 [Environment](#)

During on-site maintenance, the operator must check that external environment does not degrade the performance of the sensor, such as clay, dust, water, etc.

Ultrasonic GSM 3G User Manual

6. Trouble Shooting

6.1 LED Flash Code

LED Pattern	Function
Green / Red / Off	LED test: When a magnet is held against the hot spot the LED will briefly indicate Green followed briefly by Red and then off.
Red LED - On continuous	Awake: Dial-up to a 2G/3G GSM network but not in a GPRS session with the server.
Green LED - On continuous	GSM Awake: Data packet was transmitted successfully

6.2 LED Beep Pattern

Beep Pattern	Definition
Low beep once per second	Network Registration
High beep once per second	GPRS Registration
Low beep once every 4 seconds	Network / TCP Listen
Low beep once every 2 seconds	Re-establish Network / TCP
High / Low combination beep	Incoming Data
Low / High combination beep	Outgoing Data
Low double-beep every 4 seconds	Network Listen (Data Received & Unit Active)
Low double-beep every 2 seconds	Re-establish Network
High double-beep every 4 seconds	TCP Listen (Data Received & Unit Active)
High double-beep every 2 seconds	Re-establish TCP

For further details please see additional documents:

- *DS-5037-XX TEK 733 UC15A and UC20G Datasheet*
- *9-5895-XX TEK 733 Ultrasonic GSM 3G Tekelek Installation Guide*
- *9-6034-XX Advanced Sonics SRC Parameters*
- *9-6035-XX Advanced Sonics SRC Parameters – French*
- *9-5965-XX Product ID reference document*
- *MI-5247-XX TEK 733 Battery Replacement*
- *MI-5250-XX TEK 733 SIM Card Replacement*