[1]Scope

This document explains Soil sensor which can measure EC (Electrical conductivity), Moisture (Volumetric water content; VWC) and Temperature simultaneously in soil and water.

1-1 Specific applications

・Long term monitoring of temperature, moisture, fertilizer in the soil for agriculture.
・Agriculture irrigation system control
・Long term river and pond water condition monitoring
・Aquaculture pond water condition control
・Soil and water environment research

1-2 Unsuitable Application

Applications listed in “Limitation of Applications.” in this document.

[2] Part number

2-1	Part Description	Soil sensor
2-2	MURATA Part No.	SLT5008
	Customer Part No.	Please fill in your part number.

[3]Feature

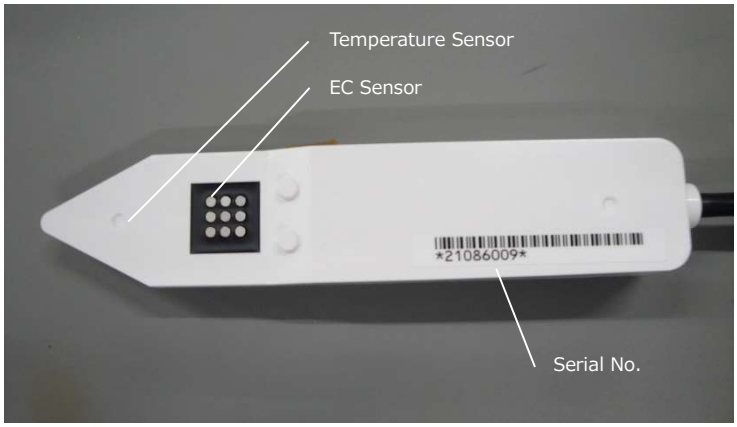
・ Simple user interface : three sensors in one package.
・ High accuracy moisture sensor : eliminate the effect of saline(ions).
・ High performance EC sensor : high accuracy with multi electrodes. it is possible to measure EC of pore water.
・ 3D environment measurement : Gathering 3D information with multi placement.
・ Rugged and water proof structure : IP68 equivalent. Sensors in strong package.
・ Corresponding for wireless system : Low voltage and Low power consumption.
・ Variety of interface : UART, RS232, RS485, RS485(MODBUS), SDI-12

[4]Sensing target

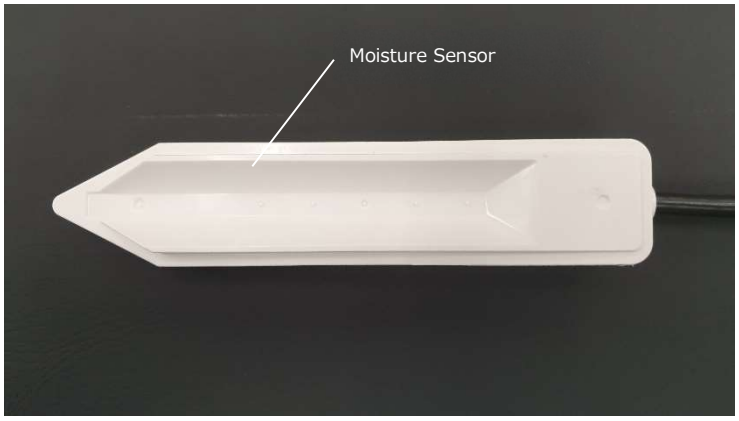
①EC sensor
Electrical conductivity depends on contained anion/ cation amount.
(NO3,NH4,H2PO4,K,Ca,Mg,NaCl etc..)
②Moisture sensor
Measure the electric permittivity, translate to VWC.
③Temperature sensor
Temperature in the soil and water environment.

[5]Sensor Figure

Sensor size: 132.5 x 27 x 16.2 mm ±0.2mm



Top side view



Back side view

[6]Specification

EC		Comments
Range[dS/m]	0－5	
Resolution[dS/m]	0.001	
Accuracy[%]	±3	FS
Temperature		
Range[℃]	-20 – 60	
Resolution[℃]	0.0625	
Accuracy[℃]	±1.0±1digit	r.d.g
Moisture		
Range[%]	0－60	
Resolution[%]	0.1	
Accuracy[%]	±3	FS

Items	minimum	typical	maximum	Remark
Power Supply[V]	9.6	-	16	
Active Current[mA]	5	8.3	15	@Measurement cycle
Idle Current[mA]	1	3.5	7	
Operating Temperature[℃]	-20	-	60	
Measurement Cycle [ms]	Free			
Enclosure Class	IP68			
Interface	SDI-12			
Cable length[m]	3			Standard

※Remark: In case of freezing condition, moisture sensor value and EC sensor value may vary drastically since the relative dielectric constant changes drastically.

[7]Weathering performance、Mechanical performance

	item	Method of test	Method of judgement
7-1	High Temperature bias test	Temperature 70±2℃ with 3.0V powersupply during 250 hours	Satisfy table1
7-2	Low Temperature bias test	Temperatue -20±2℃ with 3.0V powersupply During 250 hours	Satisfy table1
7-3	High Moisture bias test	Temperature 60±2℃, Humidity 90～95% with 3.0V powersupply during 250 hours	Satisfy table1
7-4	Temperature cycling test	Temperature -20±2℃ during 30minites Temperature 60±2℃ during 30minites 400 cycles	Satisfy table1
7-5	Salt spray test	Temperature 35±2℃ salt concentration 5±1% during 96 hours	Satisfy table1
7-6	Vibration test	10～55Hz/10G max stroke1.5mm 1octave/min 24times/1direction・3direction sweeptime 5min sweepmethod log	Satisfy table1
7-7	Electrostatic Breakdown test	Fig.1 ±2kV C1=100pF, R1=1.5k Ω	Satisfy table1
7-8	Water proof test	① Firstly, 8-4 Temperature cycling test, next, underwater with underwater pressure of 1.0m equivalent during 30minites ② Firstly, 8-3 High moisture bias test, next, underwater with underwater pressure of 1.0m equivalent during 30minites	
7-9	Dust proof test	Field test in the soil grain size under 20um over one year （ref : normal IP6 test, grain size is 75um）	

Table1. Method of judgement for weathering and mechanical performance

item	Method of judgement
EC、VWC	Change amount within ±3% for initial value

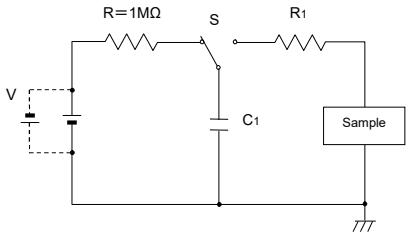


Fig.1

[8]Sensor operation

① EC sensor

EC sensor can measure electrical conductivity of surrounding environments. The basic method is the resistance measurement between two electrodes using alternating voltage. The electrodes need to be protected from corrosion. Therefore, it is important to use the low voltage and the high corrosive-resistant materials.

Normally EC sensor measures the bulk EC(total resistance of soil material, pore water and air). Bulk EC is influenced by water and ions in the soil. Now to know the Pore EC(resistance only in pore water) is important as an indicator of the concentration of fertilizer in the soil. Pore EC is not influenced by volume of water, it is a measurement value which reacts for only volume of ions in the soil.

- Bulk EC is a value suitable for measurement of ions in the water.
- Pore EC is a value suitable for measurement of ions in the soil.

Murata sensor extracts pore EC value by murata original algorithm.

All sensors have the high accuracy by calibration compensated the temperature dependence also before shipment.

Furthermore, EC sensor outputs the raw A-D converter values also, the customer can examine the essential quality for the environments.

② Moisture sensor

Moisture sensor can measure VWC(volumetric water content) of surrounding environments. The basic method is the electric permittivity measurement between two electrodes using alternating voltage with 200MHz. The electric permittivity bears a proportionate to VWC. The electric permittivity at air(no water) becomes close to 1. On the other hand, the electric permittivity at water(100%) becomes close to 80.

High frequency of 200MHz can eliminate the error effect by the content of ions.

All sensors have the high accuracy for the temperature compensation.

Furthermore, moisture sensor outputs the raw A-D converter values also, the customer can examine the essential quality for the environments.

③ Temperature sensor

Temperature sensor utilizes application of diode K factor. It realizes to measure with a high speed and a high accuracy.

[9]Communication specification

Applicable Model

SLT5008

Interface

Connection Type	SDI-12
Signal	Data
Baud rate	1200
Data	7bit
Parity	Even
Stop	1 bit
Data Format	**Binary**
Note:	If you want to connect your PC and a soil sensor with a USB port, you may use a SDI-12/USB Converter (TBS03 from TEKBOX etc.)

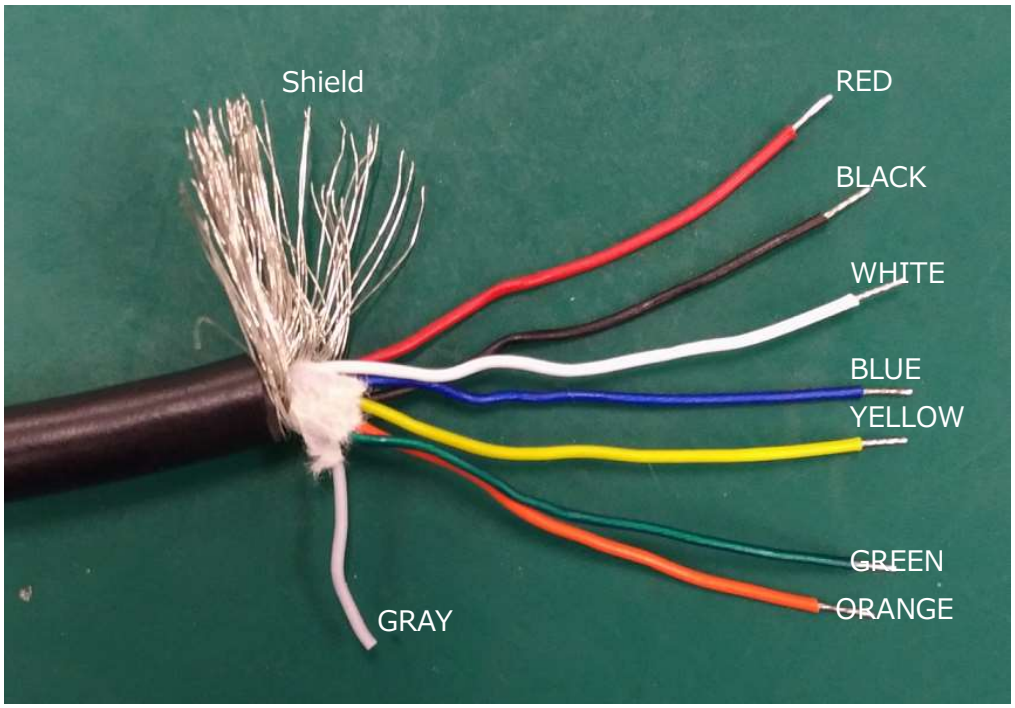
Cable

No.	Color	Input/output						Remark
		Name	Symbol	IO		Min	Max	
1	RED	Supply Voltage	Vcc	-		9.6	16.0	[V]
2	BLACK	Ground	Gnd	-		0.0	0.0	[V]
3	BLUE	SDI-12 data	Data	INOUT	VIH VIL	3.5 -0.5	5.5 1.0	[V] Negative logic [V]
4	WHITE	No connected	NC	-				
5	YELLOW	No connected	NC	-				
6	GREEN	No connected	NC	-				※1
7	ORANGE	No connected	NC	-				※1
8	GRAY	-	-	-				※2
-	-	Internal Voltage	VINT	-			3.3	[V]

Remarks:

※1 : GREEN and ORANGE cables must be floating. Because they are pulled up to VINT(Internal voltage) internally.

※2 : GRAY cable and Shield line are connected to GND(VSS) is recommended for the stability of communication.



SDI-12 Communication

The communication method of SLT5008 conforms to the standards of SDI-12 Ver1.3. The maximum cable length is 200 feets , Maximum 10 pieces of sensor can be connected.

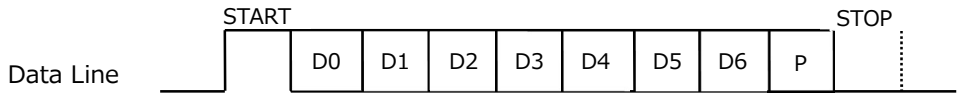
SDI-12 Data line

The data line of SDI-12 is bidirectional communication that is defined by following voltage levels. The data line uses negative logic.

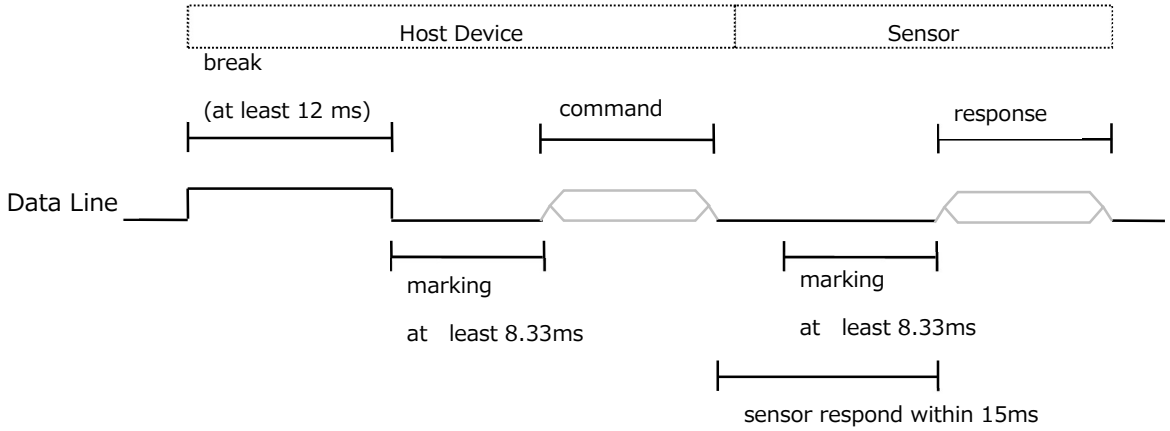
Condition	Binary state	Voltage range[V]
marking	1	-0.5 ～ 1.0
spacing	0	3.5 ～ 5.5
transition	Undefined	1.0 ～ 3.5

SDI-12 Timing

The baud rate for SDI-12 is 1200bps. 7 data bits are used and least significant bit transmitted first. 1 parity bit with even parity. 1 stop bit. All characters transmitted on the SDI-12 bus must be printable ASCII.
Following is communication format.



Host Device transmits a break by setting data line to spacing for at least 12ms due to sensor wake up. Upon receiving a break, a sensor must detect 8.33ms of marking on the data line before it looks for an address. After Host Device transmits the last character of command, it must relinquish control of the data line within 7.5 ms following the end of the stop bit. After receiving the break and the command, the addressed sensor sets the data line to marking for 8.33 ms and then send the response. The start bit of the first response byte must start within 15 ms after the stop bit of the last byte of the command.



SDI-12 Basic Commands

SLT5008 supports following the standard SDI-12 command.
※The first character “a” of all command shows the target sensor address.

①Send Identification Command : (aI!)

This command is used to query sensors for the information.

● Example description:

0I!

013MurataCoLT500814016048001<CR><LF>

Parameter	Char length	Description
0I!	3	Request from Host Device. In this case, sensor address is 0.
0	1	Target sensor address
13	2	SDI-12 version　Indicating SDI-12 ver1.3 compatibility
MurataCo	8	Company name
LT5008	6	Sensor model number　※Not “SLT5008”
140	3	Sensor version　“140” means “ver1.4.0”
16048001	Up to 8	Sensor serial number
<CR><LF>	2	Terminates the response

②Start Measurement Command : (aM!)

This command is used to start a measurement.

● Example description:

0M!

00058<CR><LF>

0<CR><LF>

Parameter	Char length	Description
0M!	3	Request from Host Device.　In this case, sensor address is 0.
0	1	Target sensor address
005	3	Sensor measuring time. Host device must wait for the specified time to elapse. (seconds) If the sensor has the measurement ready before the specified time, it will send a service request to the host device. When Host device issues an M command, it must complete the command or the response sequence with the sensor before it sends any command to any other sensor. Service request example description: 0<CR><LF> 0: sensor address <CR><LF>: Terminates the response
8	2	Number of measurement data. In case of SLT5008 , 8 data are measured.
<CR><LF>	2	Terminates the response

※Abort function: If a sensor detects a break after it receives an M command, but before it issues a service request, it must abort its measurement procedure.

Subsequent D command(D0!, D1!) after abort requests a sending data to the sensor, but the data is responded with all “0”.

④ Send Data0 Command : (aD0!)

Send data0 command is used to get the measurement data. In case of “aD0!”command for SLT5008, the sensor sends 6 data in all 8 data.

● Example description:

0D0!

0+3076+2762+2379+2641+23.5+1.22<CR><LF>

（In case of SLT5008, plus ' + ' is used as delimiter character of measurement data.）

Parameter	Char length	Description	Range
0D0!	4	Request from Host Device.　In this case, sensor address is 0.	-
0	1	Target sensor address	-
3076	Variable	DDS.Output of 12-bit Analog-to-Digital(AD) converter which represent EC reference value for calibration.	0 ～ 4095
2762	Variable	ADC_EC.Output of 12-bit Analog-to-Digital converter which represent EC sensor output.	0 ～ 4095
2379	Variable	ADC_PERMITTIVITY. Output of 12-bit Analog-to-Digital converter which represent moisture sensor output.	0 ～ 4095
2641	Variable	ADC_BATTERY.Output of 12-bit Analog-to-Digital converter which represent half of power-supply voltage..	0 ～ 4095
23.5	Variable	TEMP. Calibrated temperature in ℃.	-128～ 127.9375[℃]
1.22	Variable	EC_BULK. Calibrated Electrical Conductivity (Bulk) in dS/m. It is suitable for ion quantity measurement in water.	0 ～ 65.535[dS/m]
<CR><LF>	2	Terminates the response	-

⑤ Send Data1 Command : (aD1!)

Send data0 command is used to get the measurement data. In case of “aD1!”command for SLT5008, the sensor sends 2 data in all 8 data.

● Example description:

0D1!

0+7.1+5.64<CR><LF>

（In case of SLT5008, plus ' + ' is used as delimiter character of measurement data.）

Parameter	Char length	Description	Range
0D1!	4	Request from Host Device.　In this case, sensor address is 0.	-
0	1	Target sensor address	-
7.1	Variable	VWC. Calibrated Volumetric Water Content.	0 ～ 100.0[%]
5.64	Variable	EC_PORE. Calibrated Electrical Conductivity (Pore water) in dS/m. It is suitable for ion quantity measurement in soil.	0 ～ 99.99[dS/m]
<CR><LF>	2	Terminates the response	-

⑤Change Address Command : (aAb!)

Change address command is used to change a sensor address. The sensor can change the address from 0 to 9, The original address(fab shipping out) is 0.
If the battery is off, the changed address is kept.

●Example description :

0A1!

1<CR><LF>

Parameter	Char length	Description
0A1!	4	Request from Host Device. In this case, sensor address is changed from 0 to 1.
1	1	New sensor address
<CR><LF>	2	Terminates the response

⑥Address Query Command : (?!)

Address query command is used to query the sensor address. The sensor will respond as if it is being addressed on SDI-12 bus. The user must care that if more than on sensor is connected to the bus, they will all respond and cause a bus contention.

●Example description:

?!

0<CR><LF>

Parameter	Char length	Description
?!	2	Request from Host Device. Host devise query the address to the sensor.
0	1	Target sensor address
<CR><LF>	2	Terminates the response

⑦Start Concurrent Measurement Command : (aC!)

Start concurrent measurement command is used to measure concurrently. If some sensors are connected to a bus, during a sensor is measuring , host device can start to issue the request of measurement for any other sensor.

●Example description:

0C!

00058<CR><LF>

Parameter	Char length	Description
0C!	3	Request from Host Device. In this case, sensor address is 0.
0	1	Target sensor address
005	3	Sensor measuring time. Host device must wait for the specified time to elapse. (seconds). But Host device can send a command to any other sensor during a waiting time of response from the sensor. The sensor does not have a response of service request even if the measurement completes before this measuring time.
8	2	Number of measurement data. In case of SLT5008, 8 data are measured.
<CR><LF>	2	Terminates the response

※Abort function: If a sensor detects an efficient command during concurrent measurement, it must abort its measurement procedure.

Subsequent D command(D0!, D1!) after abort requests a sending data to the sensor, but the data is responded with all “0”.

⑧Start Measurement and Request CRC Command : (aMC!)

Start measurement and request CRC command is used to get a measurement data with CRC. The sensor has the response of measurement data with 16bit-CRC as the response of subsequent D command. The 16bit CRC is encoded as three ASCII characters . The three ASCII characters are placed after the data before the <CR><LF>.

●Example description:

0MC!

00058<CR><LF>

Parameter	Char length	Description
0MC!	4	Request from Host Device. In this case, sensor address is 0.
0	1	Target sensor address
005	3	Sensor measuring time. Host device must wait for the specified time to elapse. (seconds). If the sensor has the measurement ready before the specified time, it will send a service request to the host device. Host device must complete the command or the response sequence with the sensor before it sends any command to any other sensor. Service request example description: 0<CR><LF> 0: sensor address <CR><LF>: Terminates the response
8	2	Number of measurement data. In case of SLT5008, 8 data are measured.
<CR><LF>	2	Terminates the response

※Abort function: If a sensor detects a break after it receives an M command, but before it issues a service request, it must abort its measurement procedure.
Subsequent D command(D0!, D1!) after abort requests a sending data to the sensor, but the data is responded with all “0”.

●Example description for CRC;

0MC!

00058<CR><LF>

0D0!

0+3085+2748+764+2632+29.6+0.03Fgd<CR><LF> Fgd =CRC Code

0D1!

0+14.2+2.46HcB <CR><LF> HcB =CRC Code

●16bit CRC is encoded as three ASCII characters.

1st character = 0x40 OR (CRC shifted right 12bits)

2nd character = 0x40 OR ((CRC shifted right 6bits) AND 0x3F)

3rd character = 0x40 OR (CRC AND 0x3F)

⑨Start Concurrent Measurement Command : (aCC!)

Start concurrent measurement command is used to get a measurement data with CRC. The sensor has the response of measurement data with 16bit-CRC as the response of subsequent D command. The 16bit CRC is encoded as three ASCII characters . The three ASCII characters are placed after the data before the <CR><LF>.

●Example description:

0CC!

00058<CR><LF>

Parameter	Char length	Description
0CC!	4	Request from Host Device. In this case, sensor address is 0.
0	1	Target sensor address
005	3	Sensor measuring time. Host device must wait for the specified time to elapse. (seconds). But Host device can send a command to any other sensor during a waiting time of response from the sensor. The sensor does not have a response of service request even if the measurement completes before this measuring time.
8	2	Number of measurement data. In case of SLT5008, 8 data are measured.
<CR><LF>	2	Terminates the response

※Abort function: If a sensor detects an efficient command during concurrent measurement, it must abort its measurement procedure.
Subsequent D command(D0!, D1!) after abort requests a sending data to the sensor, but the data is responded with all “0”.

●Example description for CRC:

0CC!

00058<CR><LF>

1CC!

10058<CR><LF>

0D0!

0+3085+2748+764+2632+29.6+0.03Fgd<CR><LF> Fgd =CRC Code

0D1!

0+14.2+2.46HcB<CR><LF> HcB =CRC Code

1D0!

1+3084+2780+733+2632+31.0+0.03G[A<CR><LF> G[A =CRC Code

1D1!

1+15.1+2.22N`E<CR><LF> N`E =CRC Code

●16bit CRC is encoded as three ASCII characters.

1st character = 0x40 OR (CRC shifted right 12bits)

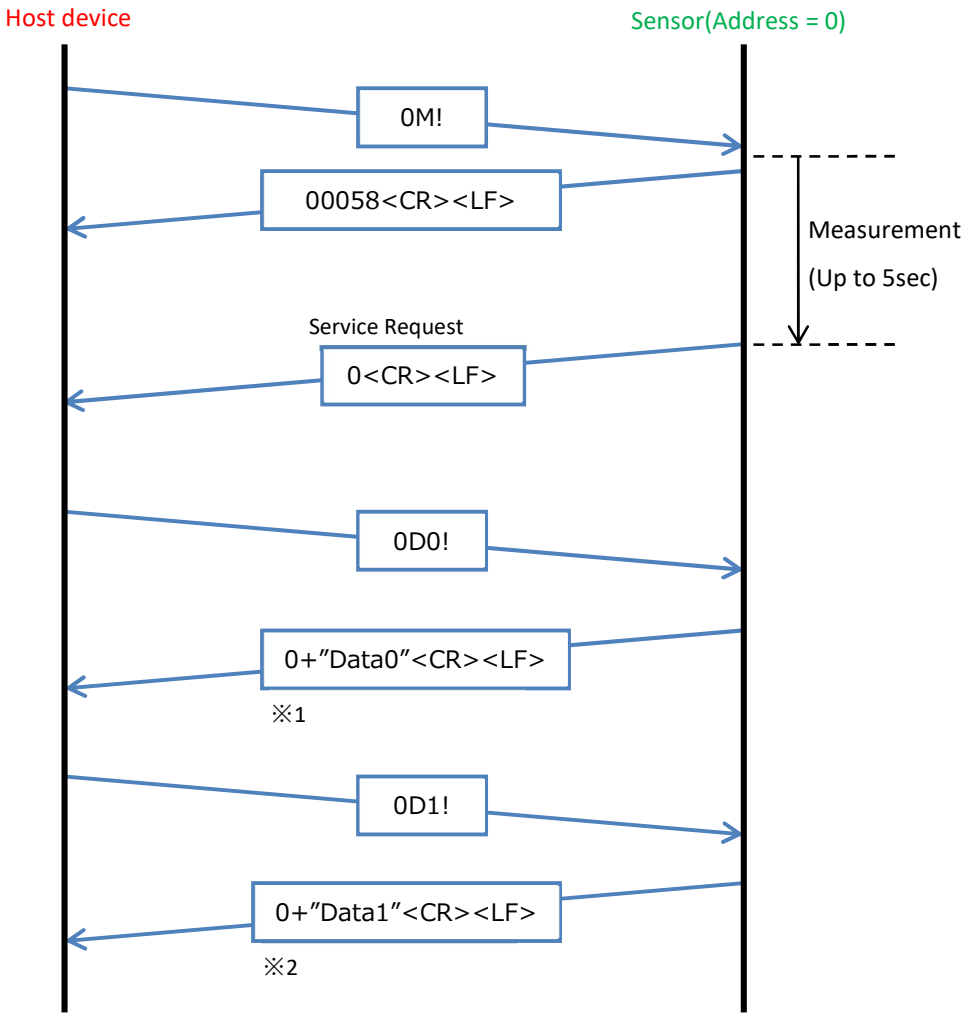
2nd character = 0x40 OR ((CRC shifted right 6bits) AND 0x3F)

3rd character = 0x40 OR (CRC AND 0x3F)

Time Chart

Example description of communication by SDI-12 command:

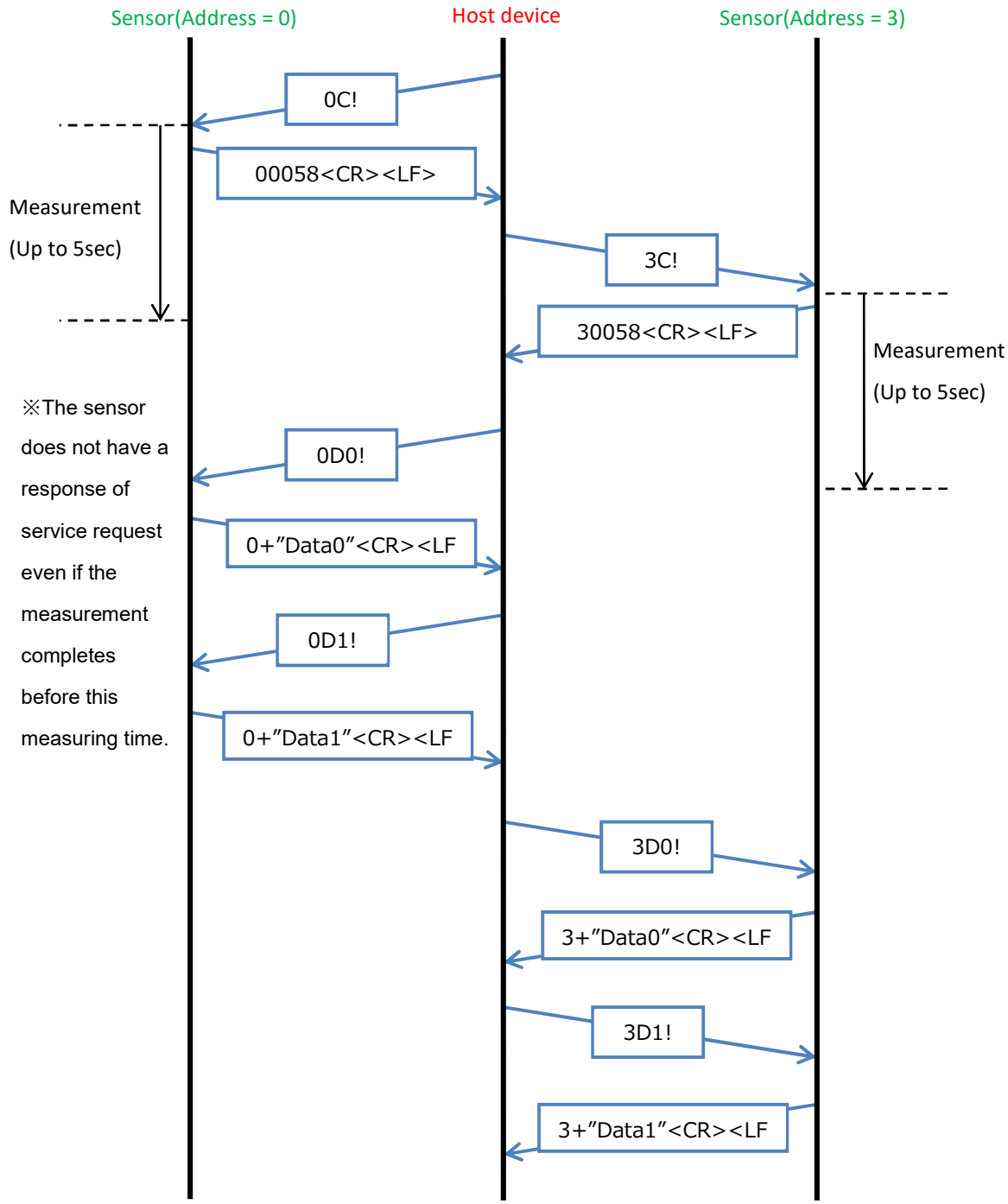
①Normal Measurement



※1 "Data0" = DDS, ADC_EC, ADC_PERMITTIVITY, ADC_BATTERY, TEMP, EC_BULK

※2 "Data1"= VWC, EC_PORE

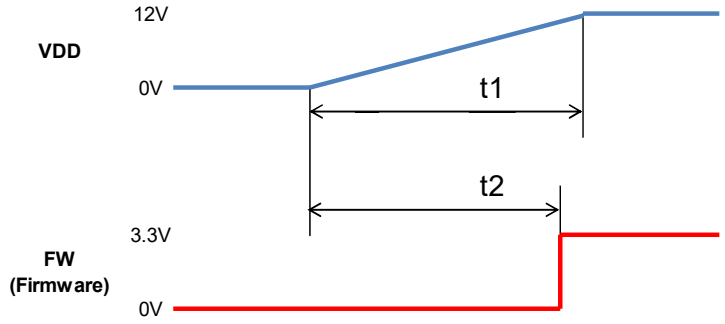
②Concurrent Measurement



Power On Timing

* Cable length 3m

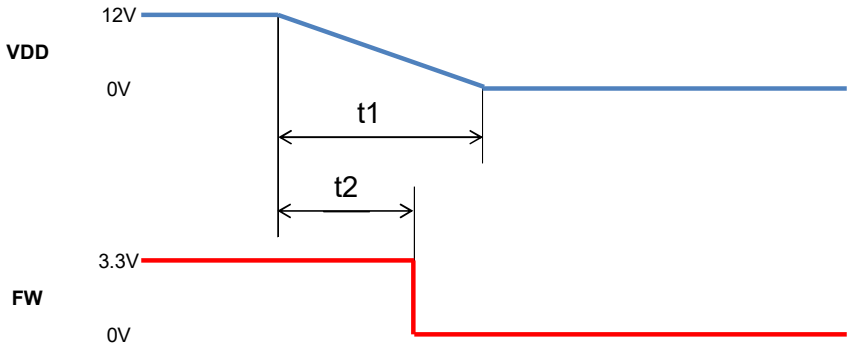
Timing case : VDD "High"



items	symbol	Typ	unit
VDD rise time	t1	13	ms
VDD "start" ～ FW "start" time	t2	12	ms

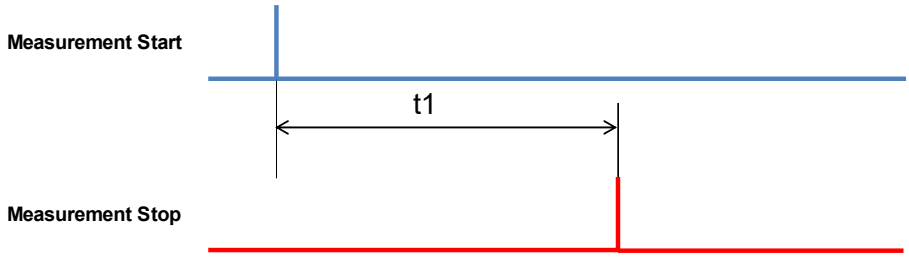
Power Off Timing

Timing case : VDD "Low"



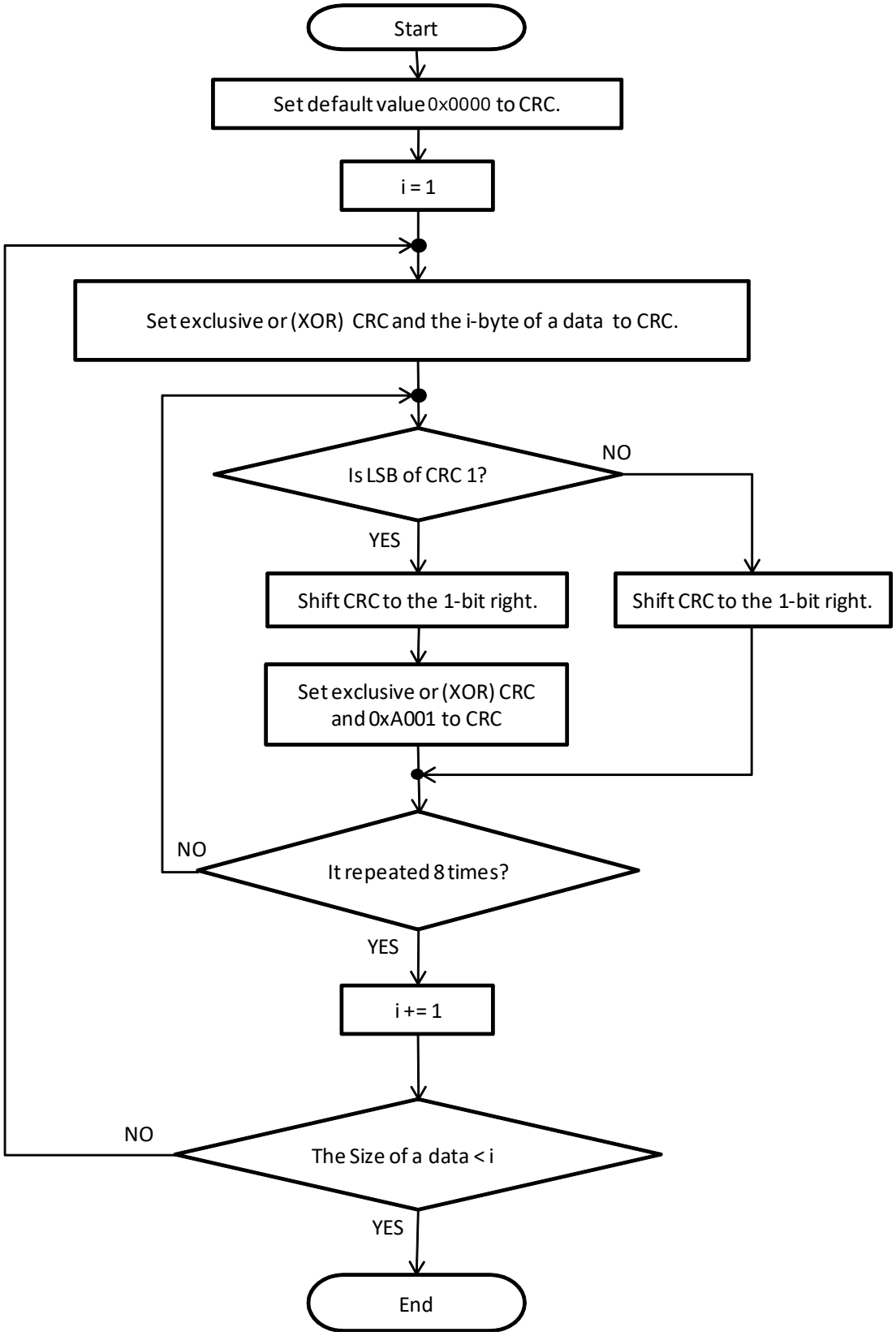
items	symbol	Typ	unit
VDD fall time	t1	150	ms
VDD "fall start" ～FW "stop" time	t2	100	ms

Measurement Time



items	symbol	MAX	unit
measurement time	t1	5	s

CRC-16

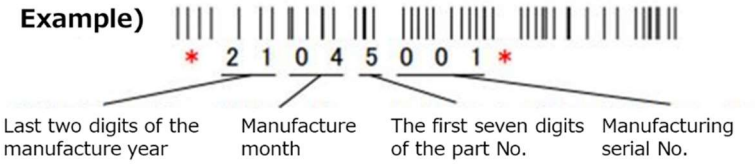

Start
Set default value 0x0000 to CRC.
i = 1
Set exclusive or (XOR) CRC and the i-byte of a data to CRC.
Is LSB of CRC 1?
NO
YES
Shift CRC to the 1-bit right.
Shift CRC to the 1-bit right.
Set exclusive or (XOR) CRC and 0xA001 to CRC
It repeated 8 times?
NO
YES
i += 1
The Size of a data < i
NO
YES
End

CRC-16 (Program)

```
USHORT  CRC16(int size, BYTE* data)
{
    USHORT cr = 0x0000;

    for(int i = 0; i < size; i++)
    {
        cr = cr ^ data[i];

        for(int j = 0; j < 8; j++)
        {
            if((cr & 0x0001) == 0x0001)
            {
                cr >>= 1;
                cr ^= 0xA001;
            }
            else
            {
                cr >>= 1;
            }
        }
    }

    return cr;

}
```

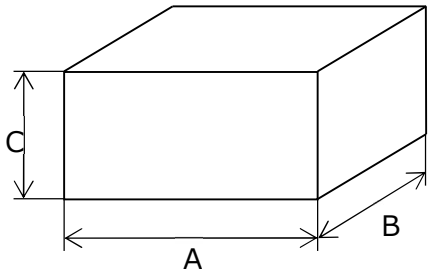
[10] Product label

The serial number is printed on the surface of the product body.



[11] Packing

After packing the products one by one with package cushioning, put them in a bag.
Furthermore, it is packed in one of three types of boxes according to the quantity as follows.



Box type	Size(Typical mm)			Maximum quantity
	A	B	C	
40 号	336	263	227	15 pcs.
10 号	267	170	120	5 pcs.

[12] Warranty

12-1. Warranty period

The warranty period is one year after delivery.

12-2. Warranty details

The sensor will be exchanged free of charge in case of a malfunction occurred under the normal use that has followed the specifications and cautions of this document.

※The warranty is only covered by the contents in the specification that meet our measurement standard.

12-3. Disclaimer

Murata shall be under no liability in respect of any fault and damage as follows.

(1) Misuse, improper handling, improper repair, and improper alteration.
(Including failure to use normally in accordance with handling method and caution described in this document.)
(2) Improper handling such as dropping or impact on transportation or moving.
(3) Fire, earthquake, lightning surge, or other natural disaster.
(4) Gas damage (hydrogen sulfide gas, etc.).
(5) Non-specified power connection and erroneous connection.
(6) Cause from any other devices which is connected to the system.
(7) Excessive stress, dent, scratch
(8) Chemicals, organic solvents
(9) Biological factors

[13] ⚠Caution

13-1. Limitation of Applications

The products listed in the document (hereinafter the product(s) is called as the “Product(s)”) are designed and manufactured for applications specified in the document. (hereinafter called as the “Specific Application”).

We shall not warrant anything in connection with the Products including fitness, performance, adequateness, safety, or quality, in the case of applications listed in from (1) to (11) written at the end of this precautions, which may generally require high performance, function, quality, management of production or safety. Therefore, the Product shall be applied in compliance with the specific application. WE DISCLAIM ANY LOSS AND DAMAGES ARISING FROM OR IN CONNECTION WITH THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE CASE SUCH LOSS AND DAMAGES CAUSED BY THE UNEXPECTED ACCIDENT, IN EVENT THAT (i) THE PRODUCT IS APPLIED FOR THE PURPOSE WHICH IS NOT SPECIFIED AS THE SPECIFIC APPLICATION FOR THE PRODUCT, AND/OR (ii) THE PRODUCT IS APPLIED FOR ANY FOLLOWING APPLICATION PURPOSES FROM (1) TO (11) (EXCEPT THAT SUCH APPLICATION PURPOSE IS UNAMBIGUOUSLY SPECIFIED AS SPECIFIC APPLICATION FOR THE PRODUCT IN OUR CATALOG SPECIFICATION FORMS, DATASHEETS, OR OTHER DOCUMENTS OFFICIALLY ISSUED BY US*).

(1) Aircraft equipment
(2) Aerospace equipment
(3) Undersea equipment
(4) Power plant control equipment
(5) Medical equipment
(6) Transportation equipment
(7) Traffic control equipment
(8) Disaster prevention/security equipment
(9) Industrial data-processing equipment
(10) Combustion/explosion control equipment
(11) Equipment with complexity and/or required reliability equivalent to the applications listed in the above.

For exploring information of the Products which will be compatible with the particular purpose other than those specified in the document, please contact our sales offices, distribution agents, or trading companies with which you make a deal, or via our web contact form.

Contact form: https://www.murata.com/contactform

*We may design and manufacture particular Products for applications listed in (1) to (11). Provided that, in such case we shall unambiguously specify such Specific Application in the document without any exception. Therefore, any other documents and/or performances, whether exist or non-exist, shall not be deemed as the evidence to imply that we accept the applications listed in (1) to (11).

13-2. Addition of fail-safe function

To avoid of unprecedented failure caused by this product, please include appropriate fail-safe protection function to the overall system.

[14] Caution of storage

14-1. Temperature -20～+60℃.
Please store it in the room without the sudden temperature change.
14-2. A deterioration in the quality of product is caused
when kept of chemical atmospheres such as acid, alkali, salt, organic gas, sulfur.
Please store it avoiding the chemical atmosphere.
14-3. Please store it avoiding direct sunlight, heat, vibration.
14-4. A failure is caused by the dropping of product.
Please handle and store it with the state not to drop easily.

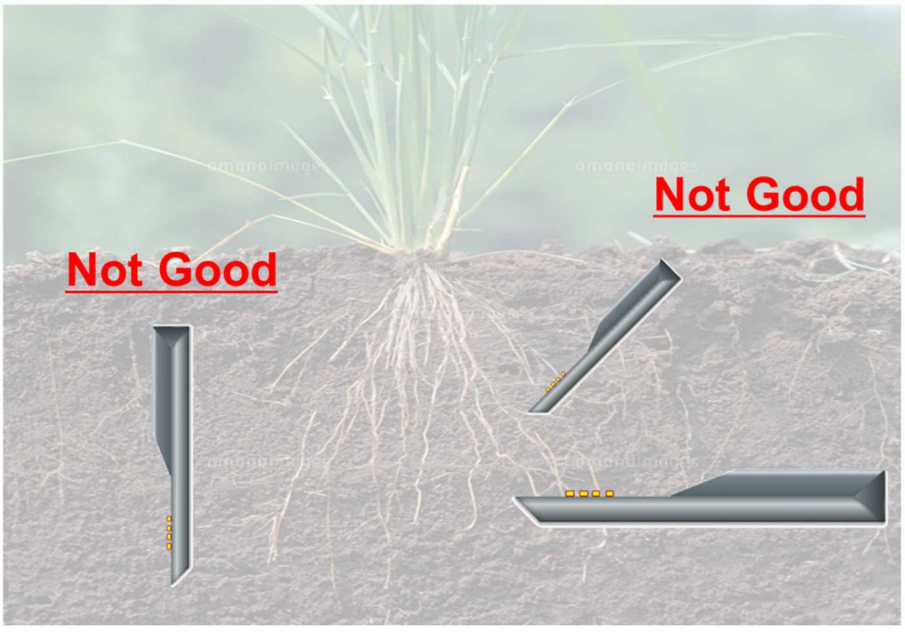
[15] Request

1. When using the product, please be sure to evaluate it in the condition of being mounted on your product.
2. Please do not use this product deviating from the description in this delivery specification.

(Appendix)

Handling method

Recommended way of setting up



Sensing/detecting area

The effective sensing area is 7cm from the bottom, left and right of the sensor for VWC and EC_pore measurement.

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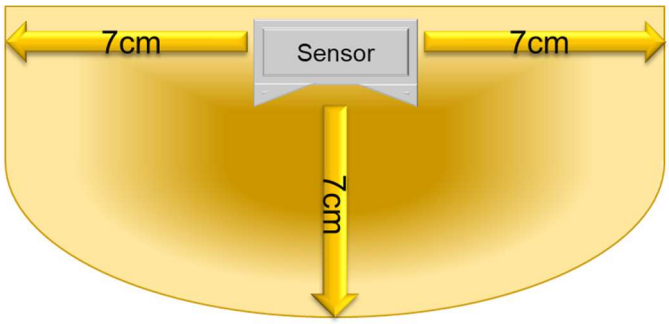


Recommended way of setting up ①

- ✓ Set EC sensor side (the side you can see 9 electrodes) upward.
- ✓ Put the sensor in the target ground depth (from the ground level to EC sensor surface)

①Dig a hole in the ground

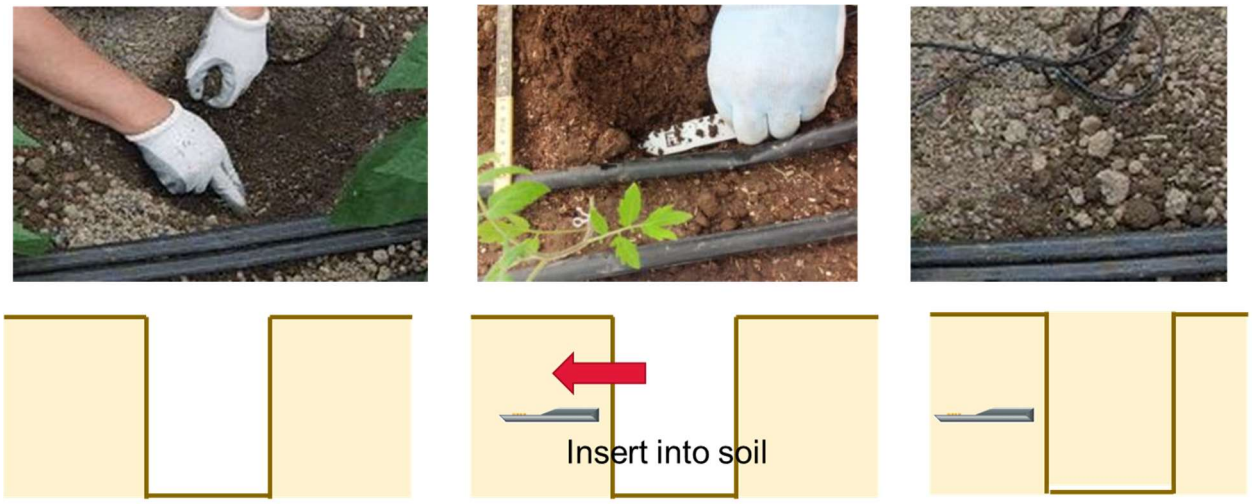
②put fine soil through a sieve

③Put sensor with sticking to soil, then move right/left for more close sticking

④By fixing sensor, put more fine soil

⑤After soil covering the whole sensor, add more soil with surroundings

Recommended way of setting up ②



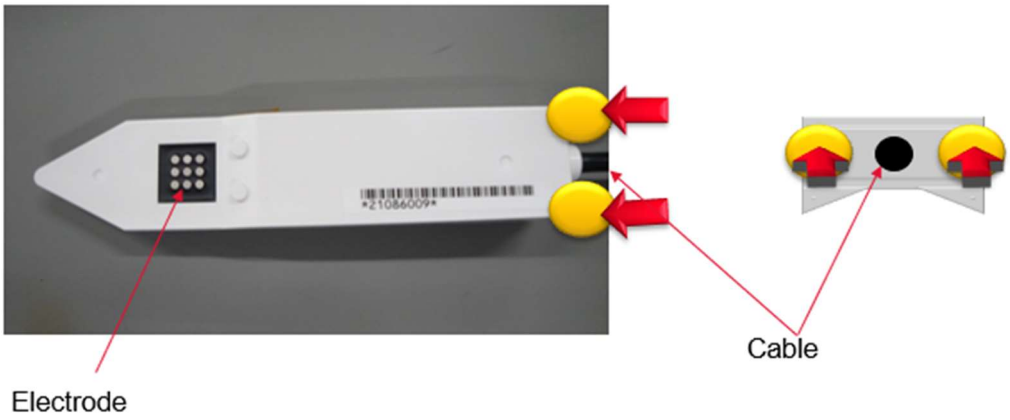
①Dig a hole in the ground

②Insert into soil from hole section
Please insert the whole sensor in the soil

③Bury the hole

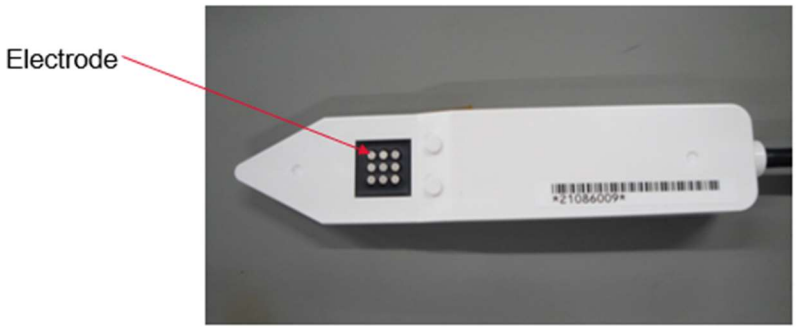
Handling of setting and removal

When you set it up in the soil, please push it from the two yellow mark positions. Please do not apply force to the electrical cable, and please do not touch the electrode directly. When you remove it from the soil, please do not pull the electrical cable.



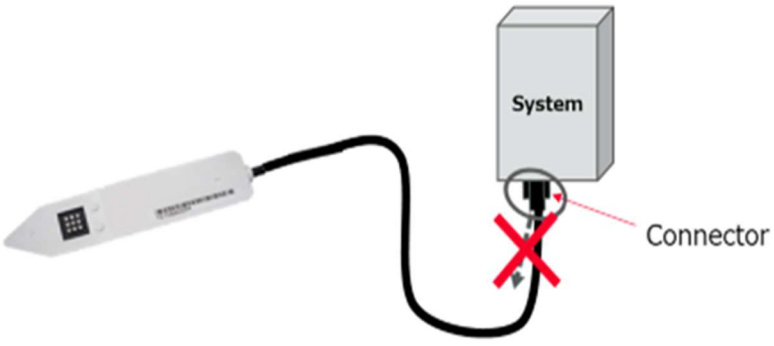
Storage method after removal

Please store it after washing with water.
If needed, please use a neutral detergent for tableware.
Please wash it with soft cloth, do not use any hard metal on electrodes.
After that, please dry the sensor completely before storage, and store it avoiding direct sunlight.



Precaution for use

Please do not pull out the connector with the sensor power on.



Revision history

Product number	Item	Page
SLT5008	**Revision history**	1

date	revision	Change items	Contents	Person in charge	approve
2022.04.07	1.0.0		Creating a new	Kubo	Dan
2022.12.29	1.0.1	[1]Scope 1-1 Specific applications [1]Scope 1-2 Unsuitable Application [2] Part number [13] Caution [15] Request	To revise company-wide regulations. * There is no change in technical content. To unify the notation with our other products.	Oba	Dan
		Murata Manufacturing Co., Ltd.			