Appendix User Manual
Digital Sensor

Document Revision

Version	Date	Modification	Prepared	Checked	Released
1	2015-07-30	First release	ALB	TAB	JON
2	2015-09-17	Add “Solder Connector” Version (add link)	ALB	JON	JON
3	2016-01-18	Updated to the new sensor connectors	ALB	JON	JON
4	2016-05-13	Updated warnings and safety section	JON	TAB	JON
5	2016-10-26	Updated pigtail cable picture, wiring diagram of connectors and improved installation instruction	ALB	JON	JON
6	2019-04-30	Updated definition of recommended sensor cable 3.2 “Wiring Diagram”	VAG	ALB	VAG
7	2022-07-07	Updated Table 3, Chapter 3.2.2 Updated Figures, Chapter 1 and 3.2	ALM	ALB	KEC
8	2023-01-03	Improved connector installation section, added cable checks and updated to new webinterface	WES	BES	KEC
9	2023-03-27	Add subchapter to test cable with the DSS-CAB-TST	JLT	BES	KEC

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Warnings and Safety

The installation of the DSA should be performed only by qualified electricians. The wrong or incorrect installation may damage the system and/or puts the safety of users at risk.

STATIC ELECTRICITY
The instrument and the sensors contain CMOS devices. During installation and service, care must be taken to prevent damage due to static electricity. This is very important to ensure long-term reliability of the devices.

In this manual "Ethernet cable cat 5e" refer ONLY to the type of cable required in this installation. DO NOT CONNECT THE SENSOR CABLE TO ANY RJ45 PLUG OR CROSSOVER ADAPER THAT IS ON AN ETHERNET NETWORK. THE DSA SYSTEM WILL POTENTIALLY DAMAGE ANY SWITCH, ROUTER, HUB OR ANY OTHER NETWORK DEVICE IF CONNECTED.

NOTE: Cable colour may change depending on manufacturer. Please verify that the wiring is done according to carried signal on the cable.

WARNING!
Do not connect an analog sensor to the digital sensor port of the GMSplus. It may damage the sensor. Observe the label near the connector.

Symbols and Abbreviations

DSA	Digital Sensor Array
SPS	Samples Per Second

Caution. Refer to the instructions next to the marking, or refer to the relevant section of this user manual.

Direct current. This symbol indicates a direct current (DC) power line derived from an alternating current (AC) power source.

Earth terminal.

CE. This symbol indicates that the device conforms to all legal requirements needed to achieve free movement and sale of the product through the European Economic Area (EEA).

1. Introduction

When more external sensors are needed, it is possible to set up a configuration that allows the GMSplus to record data from up to 4 sensors using the Digital Sensors Array (DSA).

This feature is fully supported by the GMSplus by adding an optional module board (OPT4-B), which can manage up to 4 sensor nodes. A GMSplus in this configuration is called **GMSplusD**.

This appendix is part of the full user manual of the GMSplus and is applicable when the DSA configuration is available.

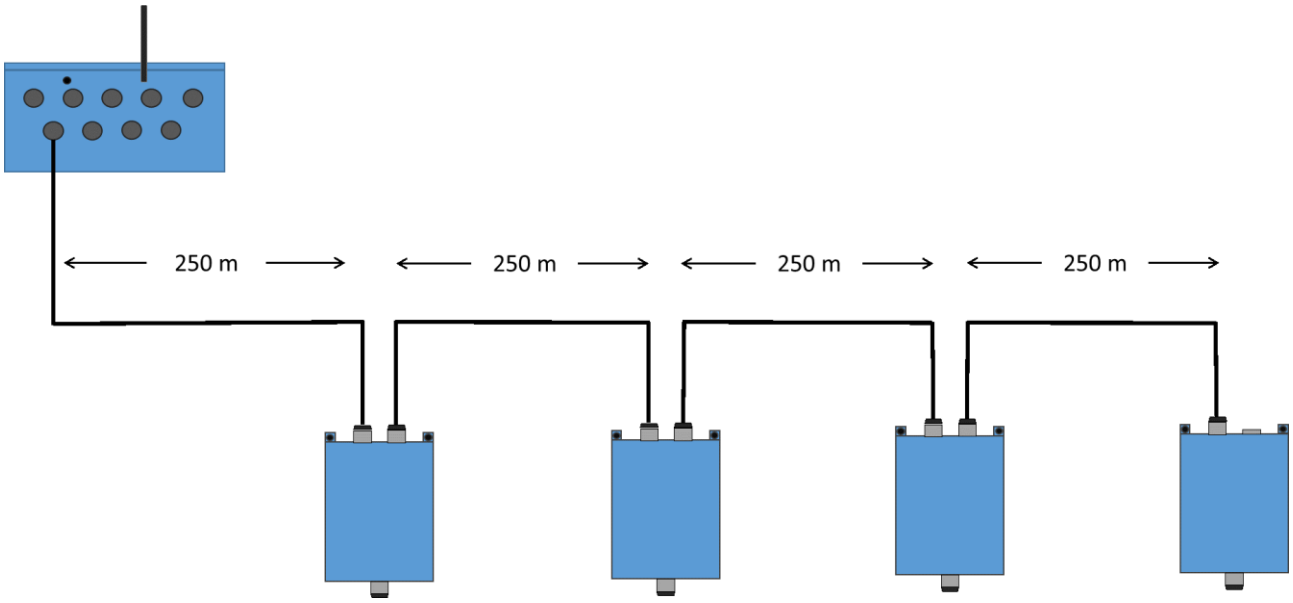


Figure 1. Digital Sensor Overview

2. Minimum requirements

The minimum hardware and software requirements to use the Digital Sensors Array are:

- GMSplus with optional module board installed
- armDAS version ≥ 21.12.00
- Linux Kernel ≥ 2.6.39.4-r9
- Web Interface ≥ 1.8-r2

3. Installation

The installation of the DSA should be performed only by qualified electricians. The wrong or incorrect installation may damage the system itself and/or put the safety of users at risk.

See GMSplus and AC-73x user manuals for the mounting of the housing and further information about required tools for installation.

3.1. Power consumption

The power consumption of the instrument differs from the standard GMSplus. At time of order, a suitable power supply can be offered. When the power adapter is not requested at order, *Table 1* lists the maximal power consumption of the instrument:

External Sensors	Max Power Consumption	Recommended power supply
2	**19.5 W**	minimum 1.3 A, 15 VDC
4	**30 W**	minimum 2 A, 15 VDC

Table 1. Maximum Power Consumption

3.2. Wiring Diagram

This section concerns only the digital sensors array. Please follow the GMSplus user manual to install any other peripherals.

The solution is designed to support long cables up to 1000 meters. However some rules must be observed:

- The recommended sensor cable is ***Ethernet cable cat. 5e*** or ***cat. 6*** (shielded, 4 twisted pairs, AWG 22/7, 24/7 or 26/7 **stranded** wires).
- The maximum total cable length, from the GMSplus to the last node in the array, is 1000 meters.

The use of unshielded cables is generally not recommended. When an unshielded cable is used the following limitation must be taken into account:

- The maximum total cables length, from the GMSplus to the last node in the array, must not exceed **100 meters**.
- To ensure the integrity of the measurement, each sensor must be electrically connected to a proper ground potential.

For further details about the cable length and specification contact GeoSIG.

- If 4 nodes are connected, the maximum allowed cable length between two adjacent nodes, or from the GMSplus to the first node, is 250 meters.

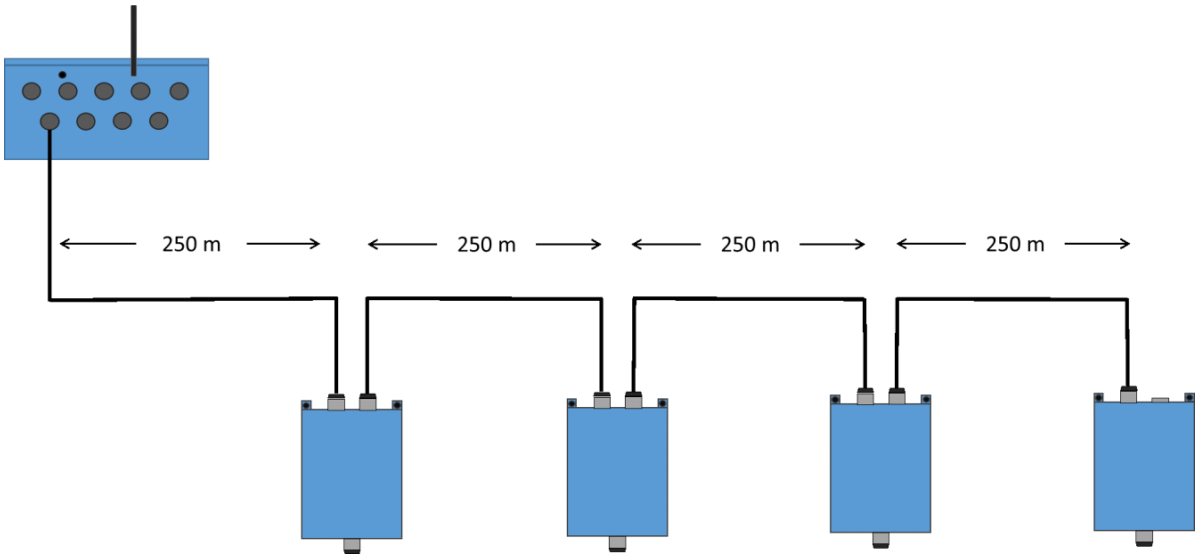


Figure 2. 4 sensors cable configuration

- If 3 sensors are connected, the maximum allowed cable length between two adjacent nodes, or from the GMSplus to the first node, is 300 meters.

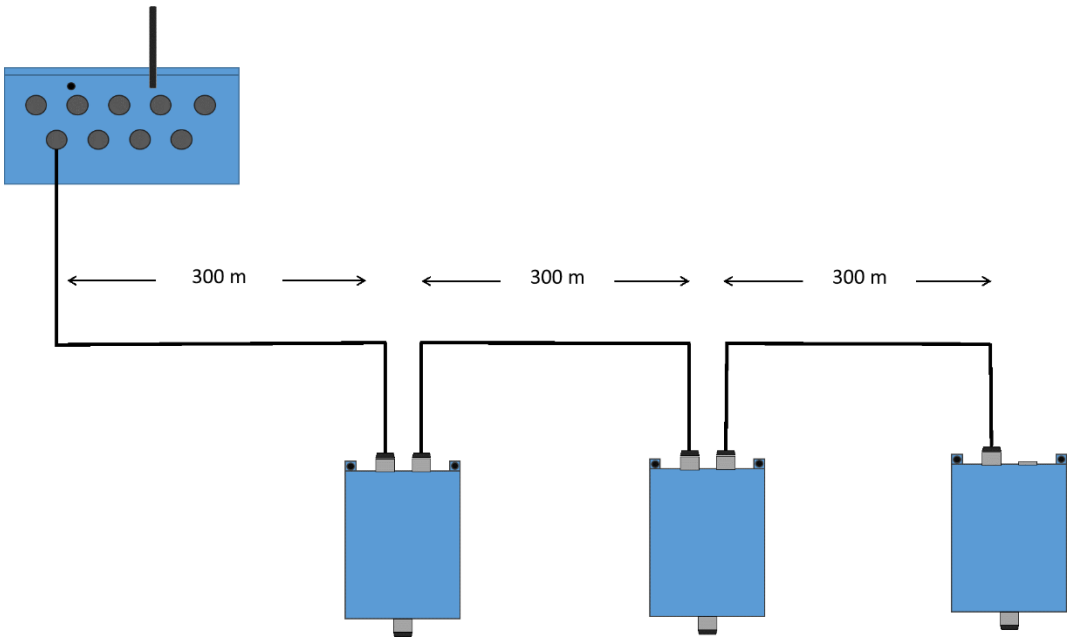


Figure 3. 3 sensors cable configuration

- If 2 sensors are connected, the maximum allowed cable length between two adjacent nodes is 500 meters

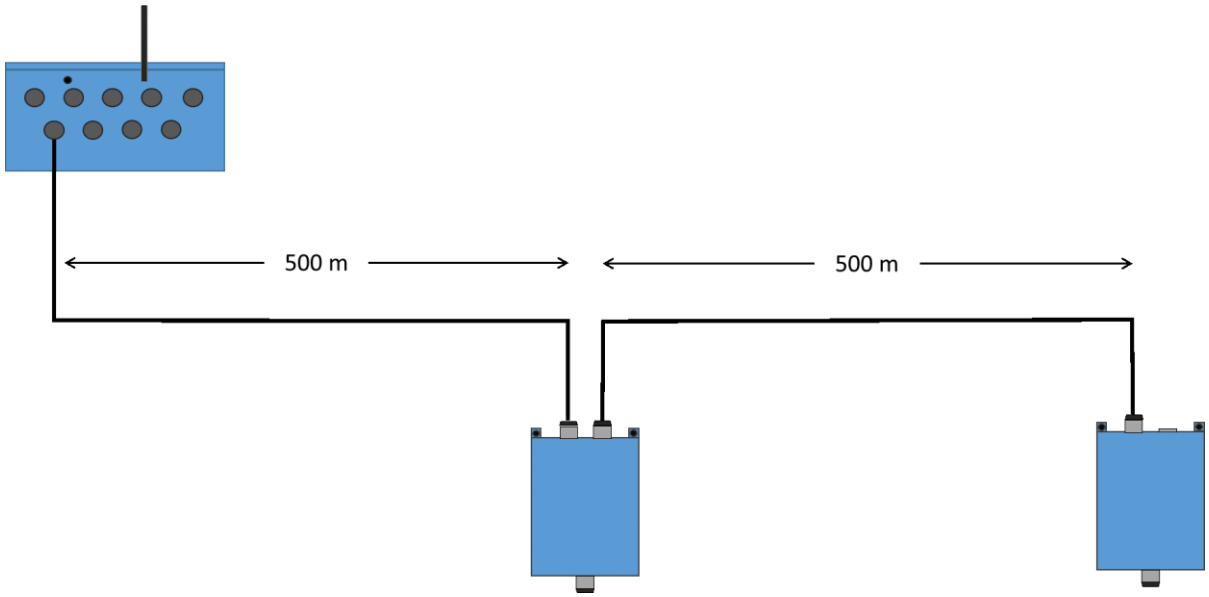


Figure 4. 2 sensors cable configuration

- If only one sensor is connected, the maximum allowed cable length from the GMSplus to the node is 1000 meters.

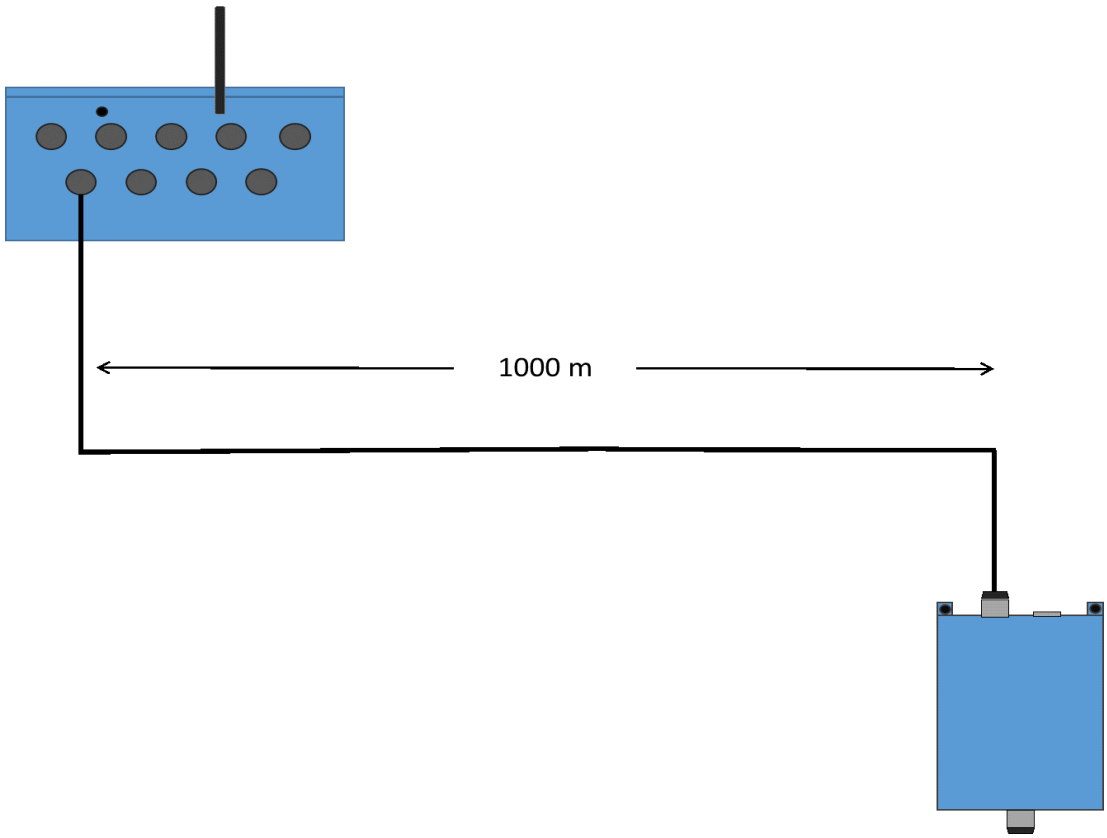


Figure 5. 1 sensor cable configuration

3.3. GMSplus to Sensor Connector

This chapter describes the installation procedure for the sensor's cabling.

Figure 6. Binder connector MALE (A)

Figure 7. Binder connector FEMALE (B)

Figure 8. Adaptor GMSplus to DSA (C)

The wiring of the sensor must be done according to Figure 9; pay attention to connect the sensors in the GMSplus **bottom-left** connector.

WARNING!
Digital sensor must be connected to the digital sensor port indicated below in green.
Do not connect an analog sensor to the digital sensor port. It will damage the sensor.

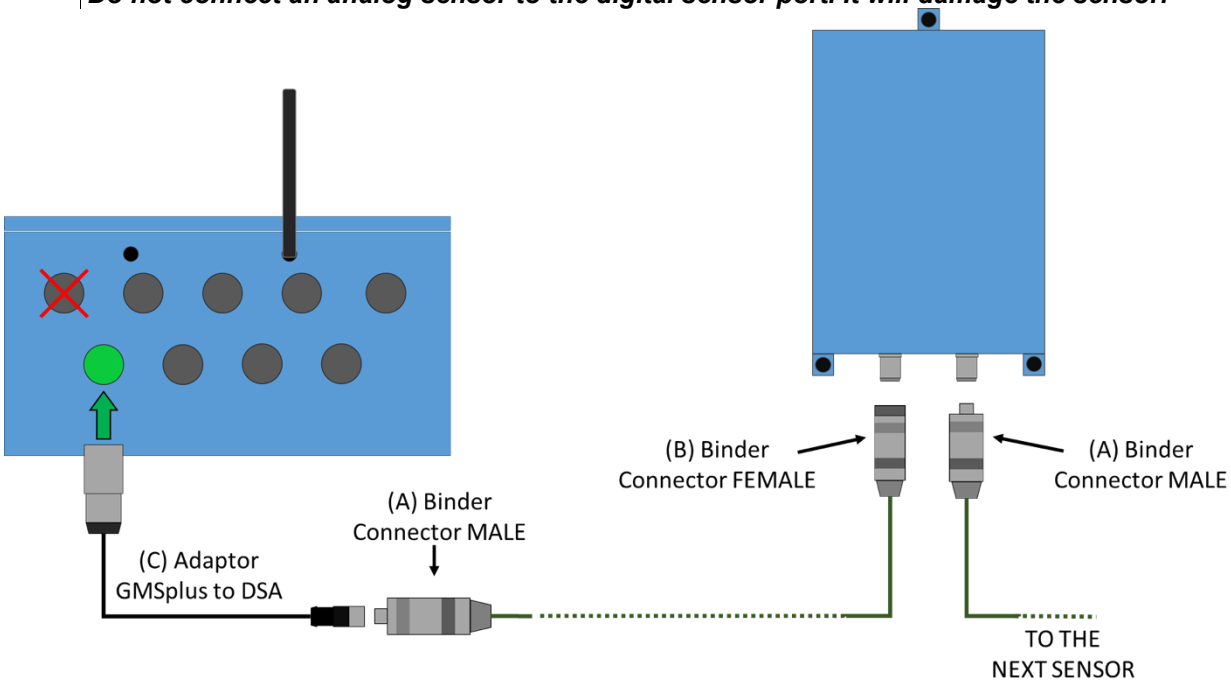


Figure 9. Sensor cable wiring diagram, general overview

Plug one end of the ***Adapter GMSplus to DSA (B)*** to the GMSplus, in the **bottom-left** connector, and the other end connect to the small ***Binder connector (A)***, (*Binder connector, series 713*).

Please follow the instructions under section 3.4 to mount the ***Binder connector (A) and (B)*** on the sensor cable.

3.4. Mounting the Binder connector on the sensor cable

3.4.1. Required Tools

Figure 10. Required Tools

(1) Tape
(2) End Sleeves (e.g. 0.14mm^2 for AWG26 wires)
(3) Slotted Screwdriver 2x0.3 mm
(4) Wrench 16mm
(5) Ruler
(6) Cable Cutter
(7) Cutter Knife
(8) Wire Stripper
(9) Crimping Tool
(10) Side Cutter

3.4.2. Step 1 – Prepare the connector

Open the Binder connector as shown in the Figure 11.

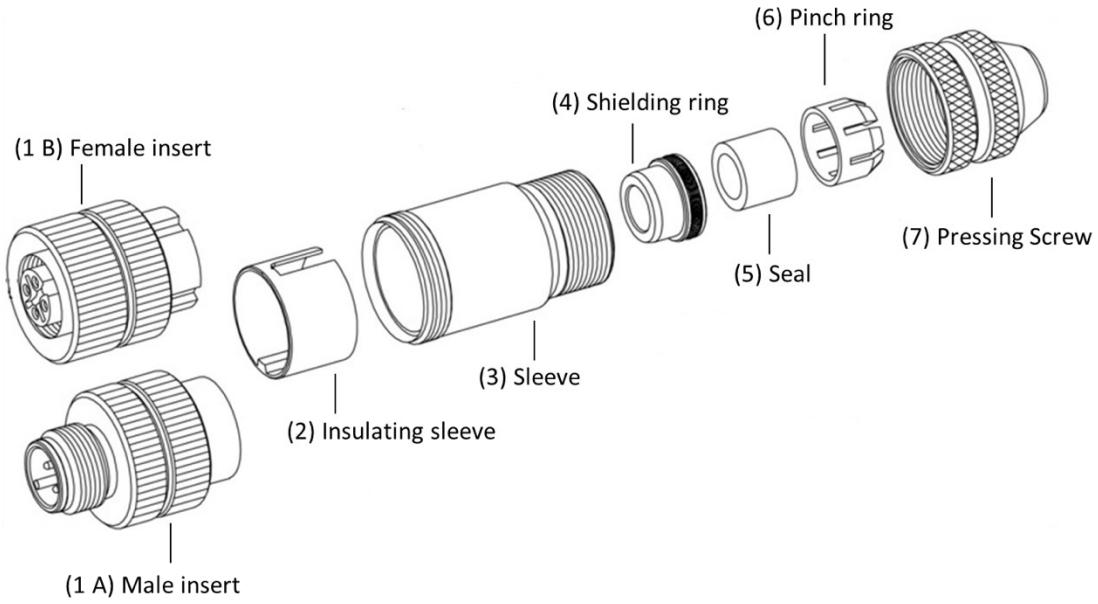


Figure 11. Internal view of Binder Connector

3.4.3. Step 2 – Insert the cable in the connector

Let the sensor cable pass through the *pressing screw* (7), the *pinch ring* (6), the *seal* (5), the *shielding ring* (4) and the *sleeve* (3).

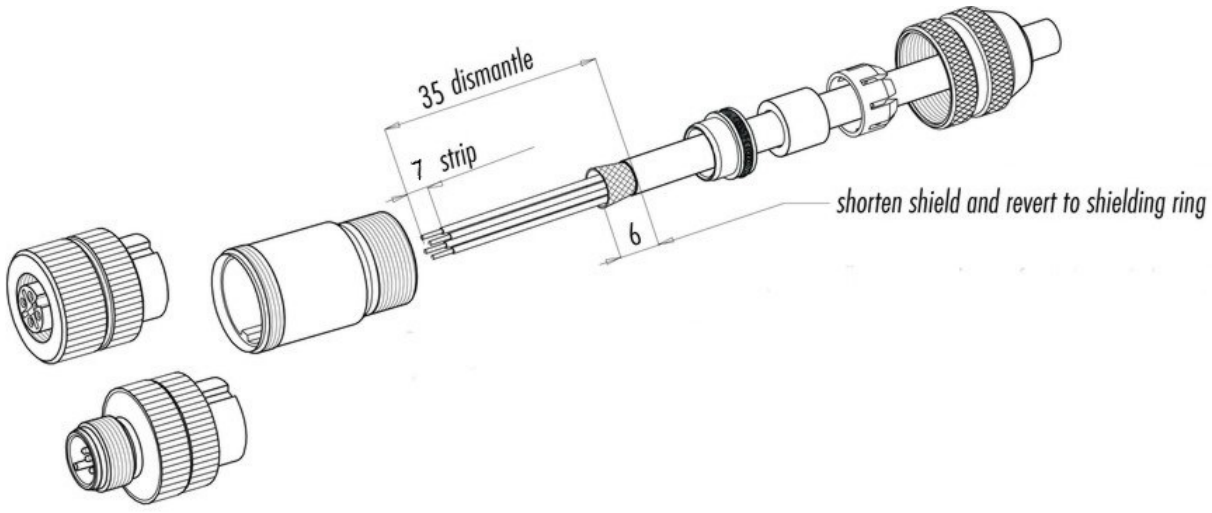


Figure 12. Preparation of the connector, insert cable

3.4.4. Step 3 – Prepare the cable

Prepare the cable as shown in Figure 12; measure 35mm and carefully cut the jacket without cutting into the braided metal shield (Figure 13), remove 35mm of the cable jacket (Figure 14), unravel the metal shield (Figure 15) and shorten the shield with a side cutter, leaving 6 mm (Figure 16).

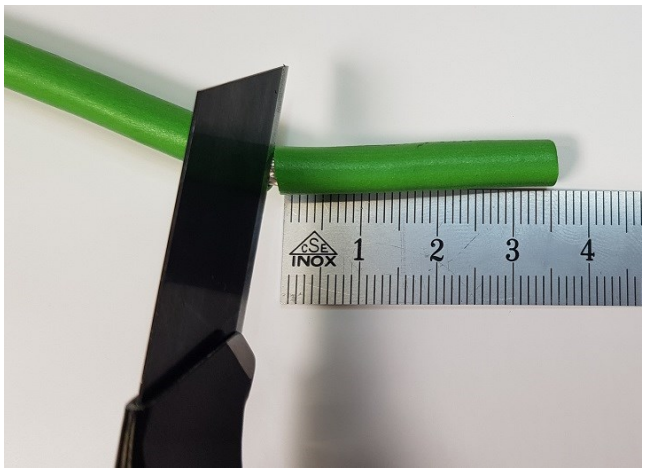


Figure 13. Cut 35mm of the cable jacket

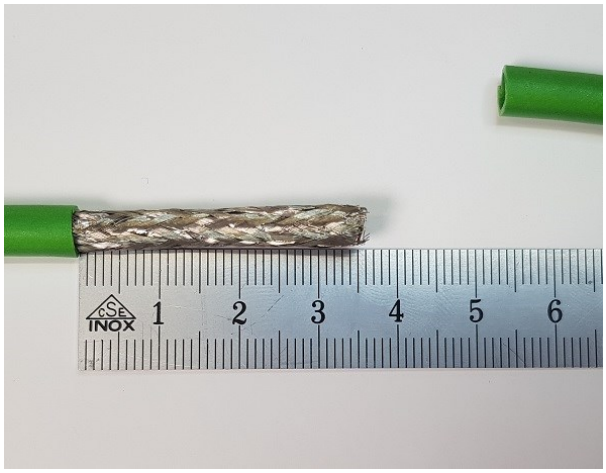


Figure 14. Remove 35mm of the cable jacket

Figure 15. Unravel the cable shield

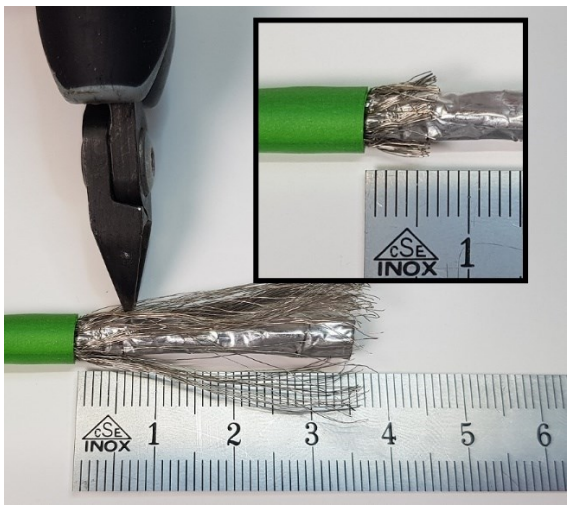


Figure 16. Shortening the shield to 6mm

3.4.5. Step 4 – Fold back the shield and fix it with tape

Fold back the cable shield (Figure 17). Apply tape to hold the shield in place (Figure 18).

Figure 17. Fold back the cable shield

Figure 18. Apply tape on the shield

3.4.6. Step 5 – Cut off foil

Cut the aluminium foil (Figure 19), take care not to damage the insulation of the wires inside and remove the aluminium foil. Carefully cut and remove the plastic foil (Figure 20).

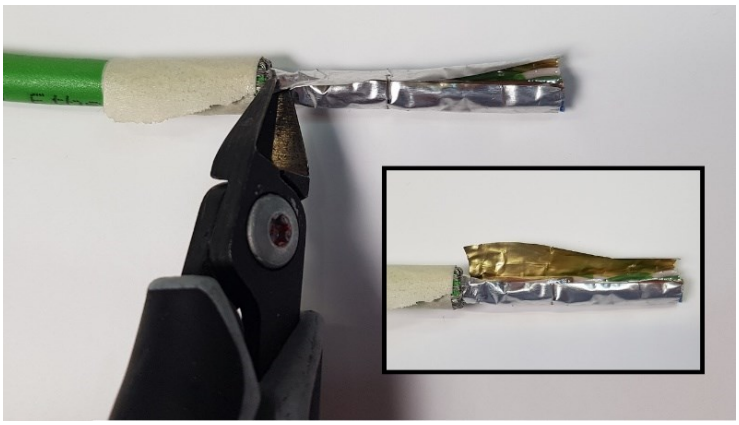


Figure 19. Cut off aluminium foil

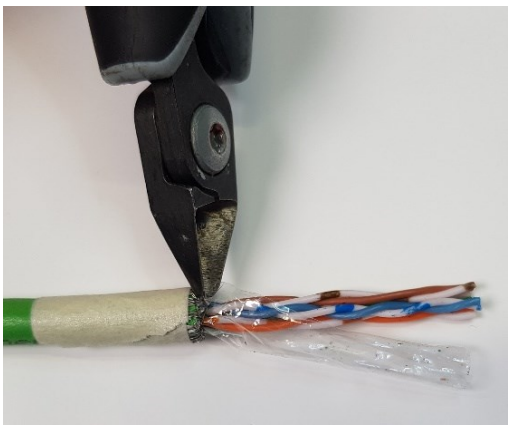


Figure 20. Cut off plastic foil

3.4.7. Step 6 – Strip wires

NOTE: It is important to use a wire stripper fitting the cross section of the conductors (e.g. 0.14mm2/AWG26), this ensures that the single strands are not damaged!

Use a wire stripper to strip 7mm from the end of each wire (Figure 21). Check that all strands are intact (Figure 22).

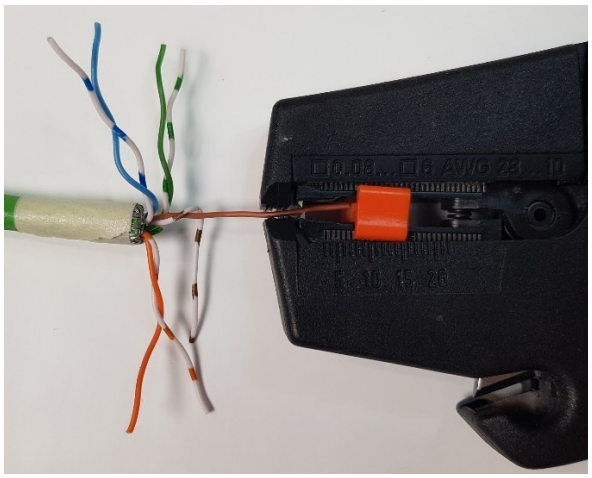


Figure 21. Strip 7mm

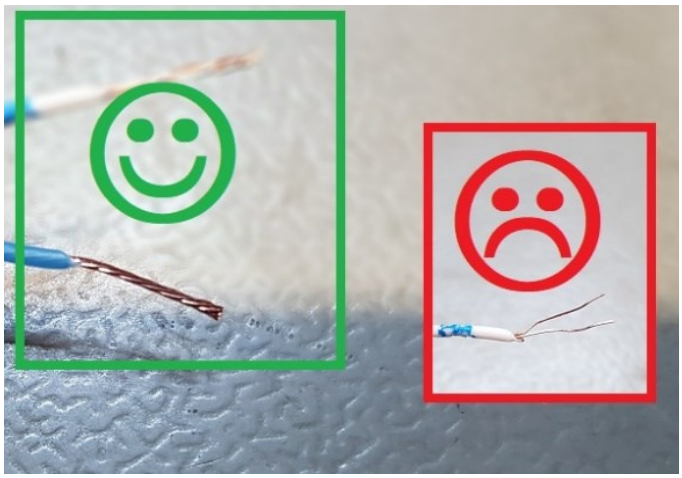


Figure 22. All strands intact

3.4.8. Step 7 – Apply the conductor end sleeves

NOTE: To ensure good electrical contact, care should be taken in choosing the appropriate sized end sleeves (e.g. 0.14mm2 for AWG26 wires). Cable purchased through GeoSIG will be shipped with matching end sleeves.

Put on the end sleeves, the copper conductor should be visible but not standing out (Figure 23). Squeeze the end sleeves onto the conductors using a crimping tool (Figure 24).

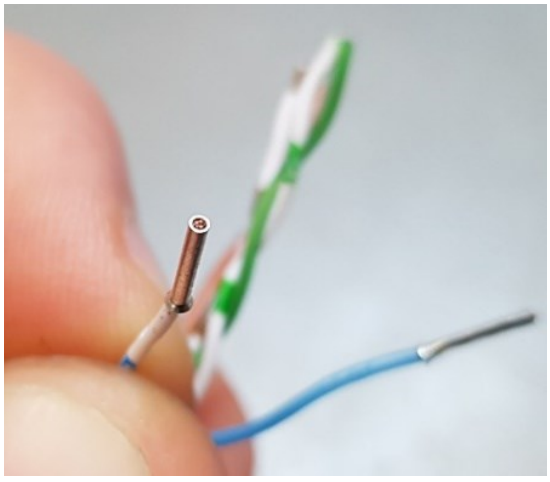


Figure 23. End sleeve with copper visible

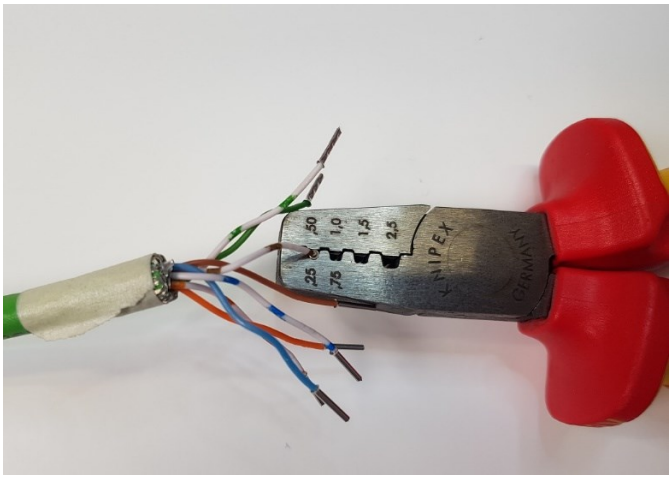


Figure 24. Crimping end sleeves

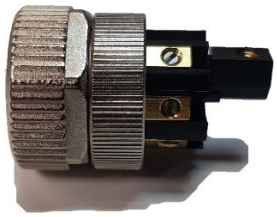
3.4.9. Step 8 – Pin order of the connector terminals

PAY ATTENTION TO THE PIN ORDER. The wrong or incorrect installation may permanently damage the system and/or puts the safety of users at risk.

PAY ATTENTION TO THE ORIENTATION OF THE CONNECTOR. When installing the wires, the diagram must be observed from the screw terminal view.

Screw the wires to the corresponding connector terminals, see Table 2 for the pin order.

MALE CONNECTOR **FEMALE CONNECTOR**



SCREW TERMINAL VIEW

SCREW TERMINAL VIEW

PIN	WIRE COLOR	PIN
1	White/Blue GND	1
2	Blue GND	2
3	White/Orange RX - A	3
4	Orange RX - B	4
5	White/Green TX - Z	5
6	Green TX - Y	6
7	White/Brown +48V	7
8	Brown +48V	8

PAY ATTENTION TO THE PIN ORDER IN THE CONNECTOR

Table 2. Wiring diagram of digital sensor connector

NOTE: Cable colour may change depending on manufacturer. Please verify that the wiring is done according to carried signal on the cable.

3.4.10. Step 9 – Screw the wires to the corresponding connector terminal

Screw the wires with the end sleeves to the corresponding connector terminal according to Table 2. Pay attention to the different pin order of the male connector (Figure 25) and female connector (Figure 26).

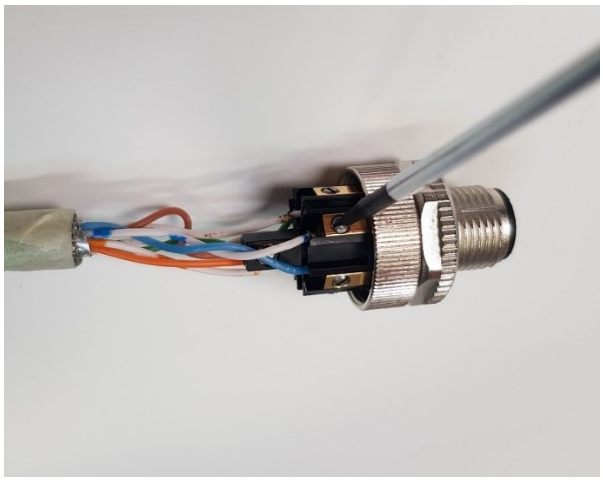


Figure 25. Screwdriver applied on pin1 of the male connector

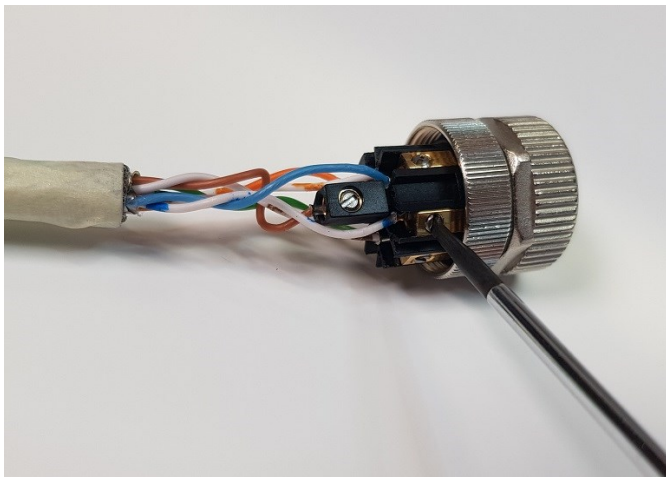


Figure 26. Screwdriver applied on pin1 of the female connector

3.4.11. Step 10 – Apply the shielding ring

Push the protective sleeve towards the insert, but don't screw it on yet (Figure 27). Remove the tape from the shield (Figure 28) and push the wire strands out (Figure 29). Bend the wire strands over the shielding ring (Figure 30) and push it into the sleeve (Figure 31).

Pay attention that the shield makes good contact on the metal part of the shielding ring, no strands should be squeezed with the rubber of the shielding ring.

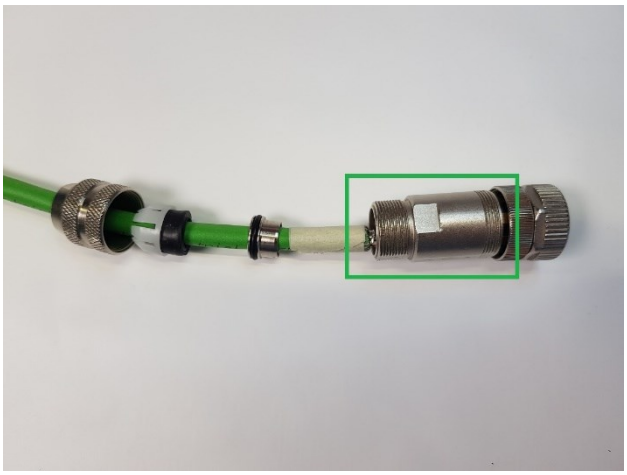


Figure 27. Protective sleeve towards insert

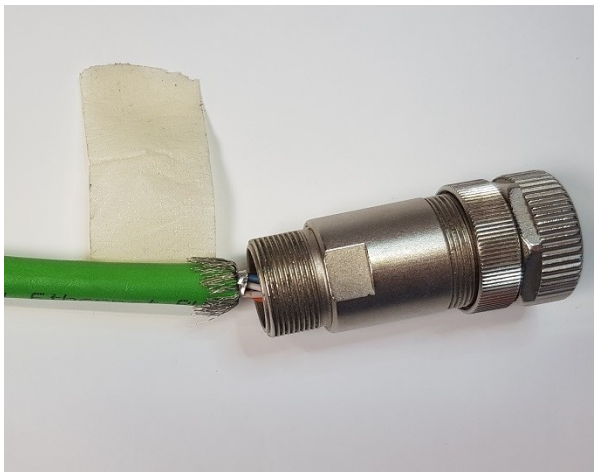


Figure 28. Removing the tape

Figure 29. Pushing out the wire strands

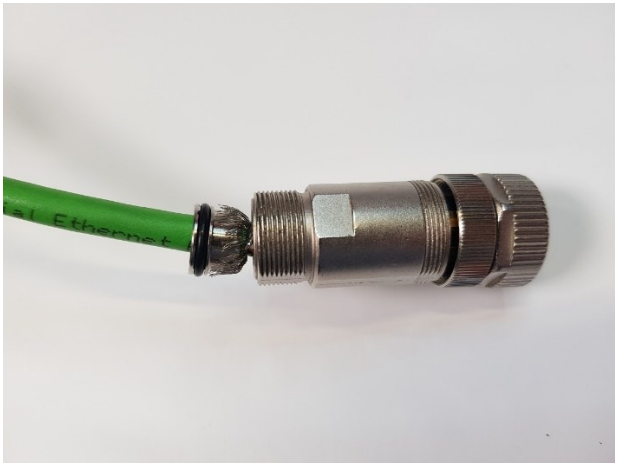


Figure 30. Bending the shield onto the ring

Figure 31. Pushing the shielding ring into the sleeve

3.4.12. Step 11 – Close the connector

Push the seal and the pinch ring together (Figure 32) and firmly screw the pressing screw in place (Figure 33). Push the insert carefully into the protection sleeve, pay attention to the guiding groove (Figure 34) and make sure no wire is squeezed with the groove or the thread. Hold the protection sleeve with a 16mm wrench and firmly tighten the pressing screw and insert (Figure 35).

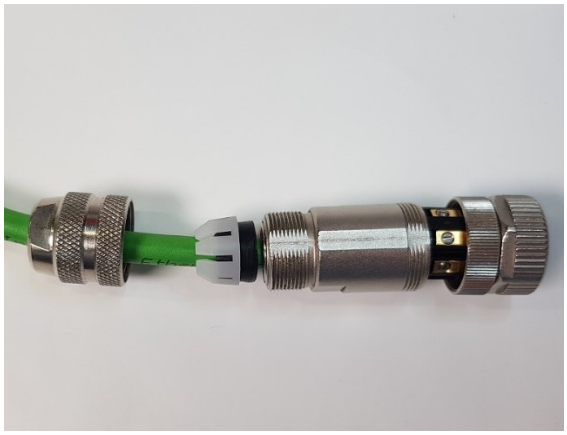


Figure 32. Pushing together pinch ring and seal

Figure 33. Apply pressing screw

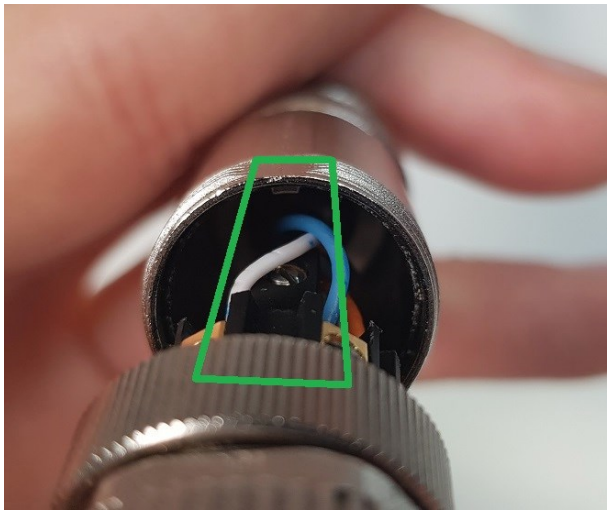


Figure 34. Alignment of guiding groove

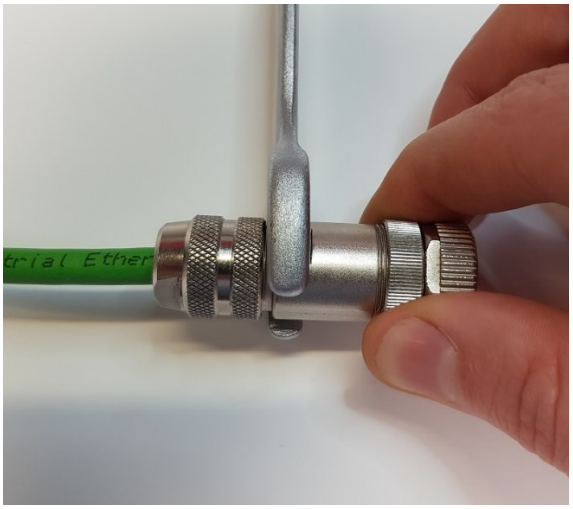


Figure 35. Tightening with wrench

3.5. Cable test before first startup with DSS-CAB-TST

It is strongly recommended to double-check the correctness of wiring BEFORE the first startup of the system.

3.5.1. Required Material

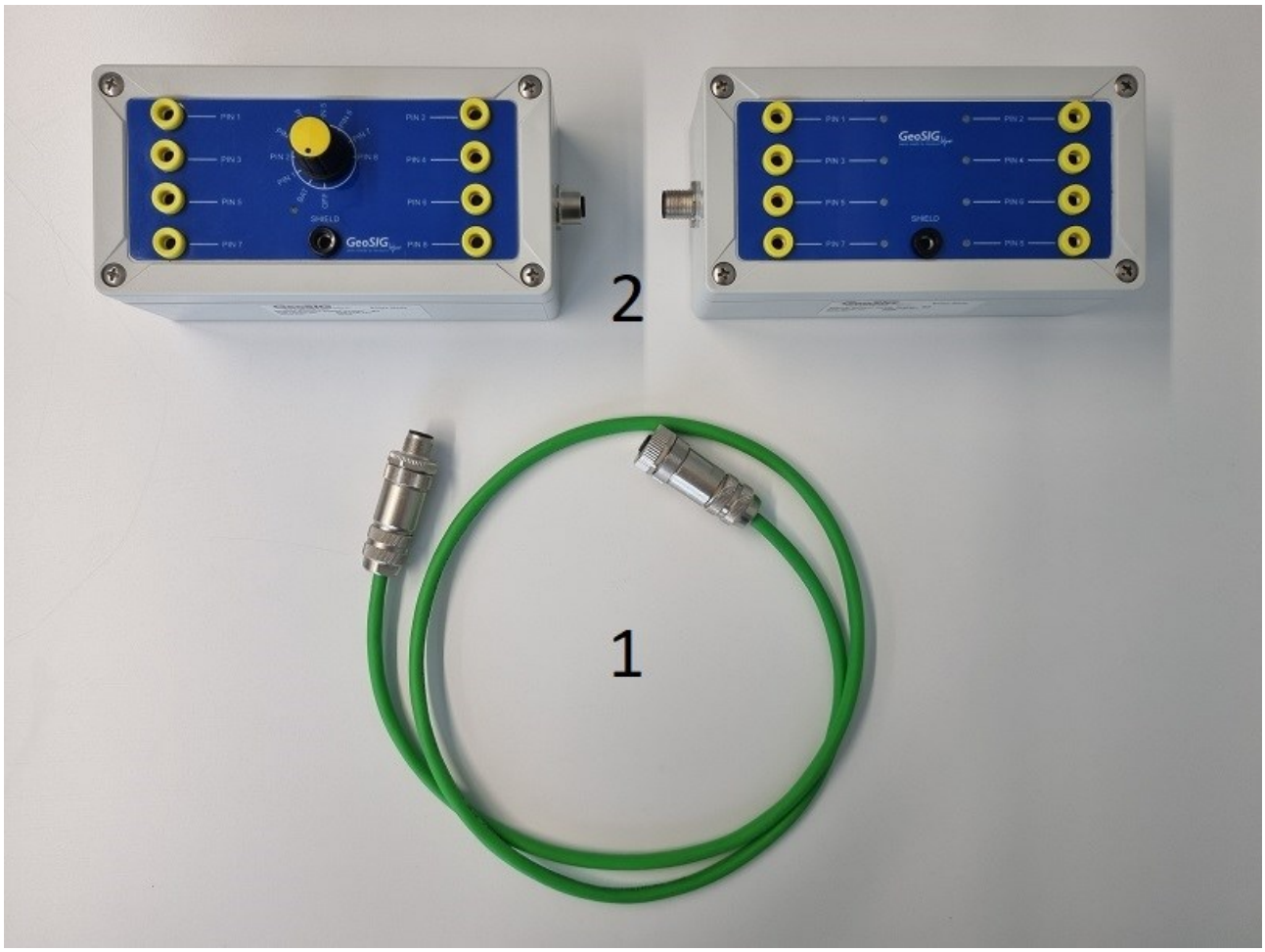


Figure 36. Required Material

(1) Cables installed, connectors mounted

(2) DSS-CAB-TST

3.5.2. Overview of test with DSS-CAB-TST

The DSS-CAB-TST is a test tool consisting of two boxes. BOX 1 is with a rotary switch and BOX 2 is with a LED for each pin.

Figure 37. DSS-CAB-TST BOX 1

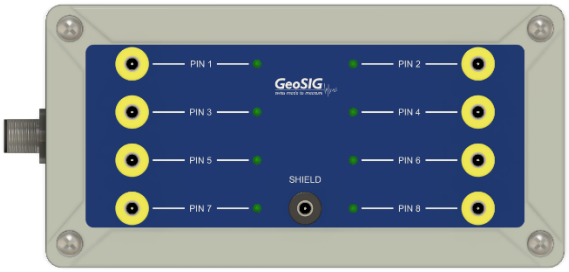


Figure 38. DSS-CAB-TST BOX 2

Test each cable section. Possible cable sections to test are marked below in red.

Make sure all sensors and GMSplusD are disconnected for the test!

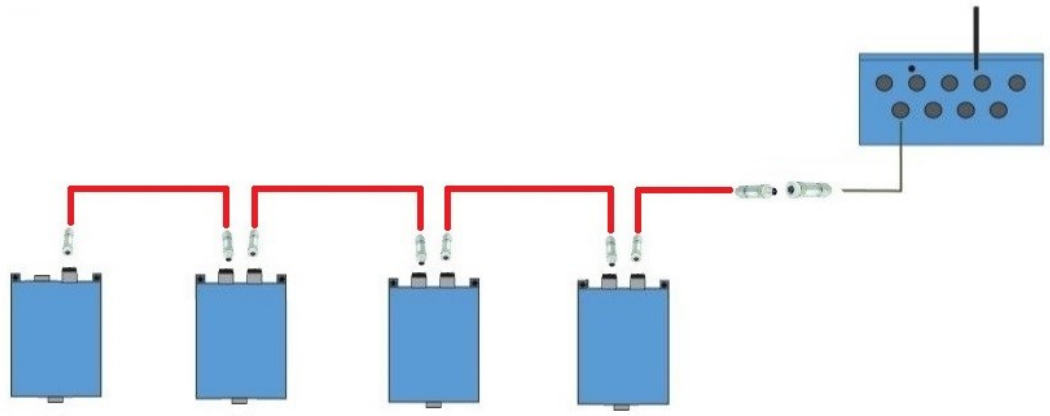


Figure 39. Cable Sections for Test

Connect the male connector of your cable section to test to BOX 1 and the female connector to BOX 2.
For each section, follow the steps under 3.5.3 and 3.5.4.

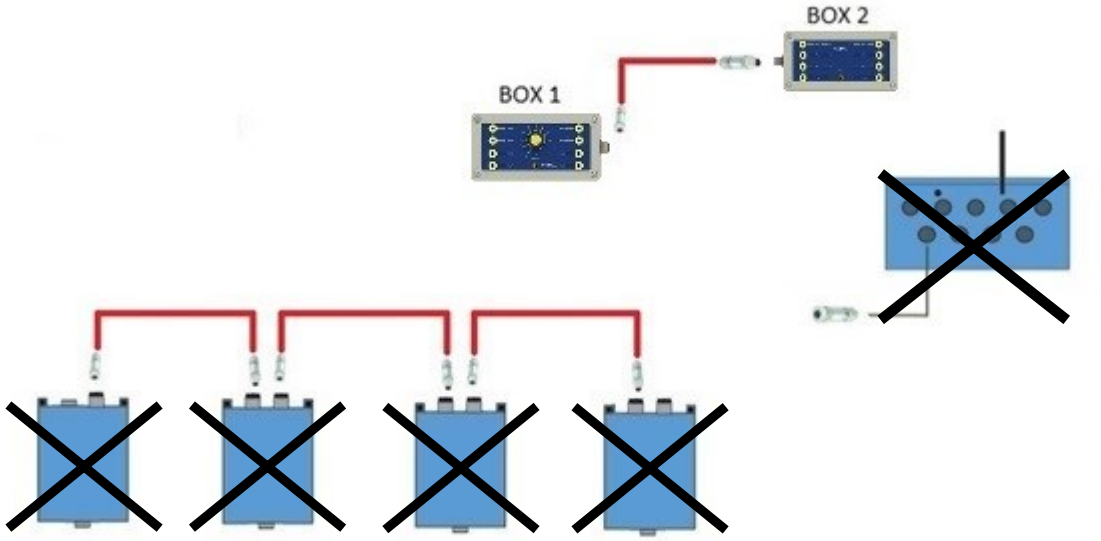


Figure 40. Box Connection on Cable Section 1

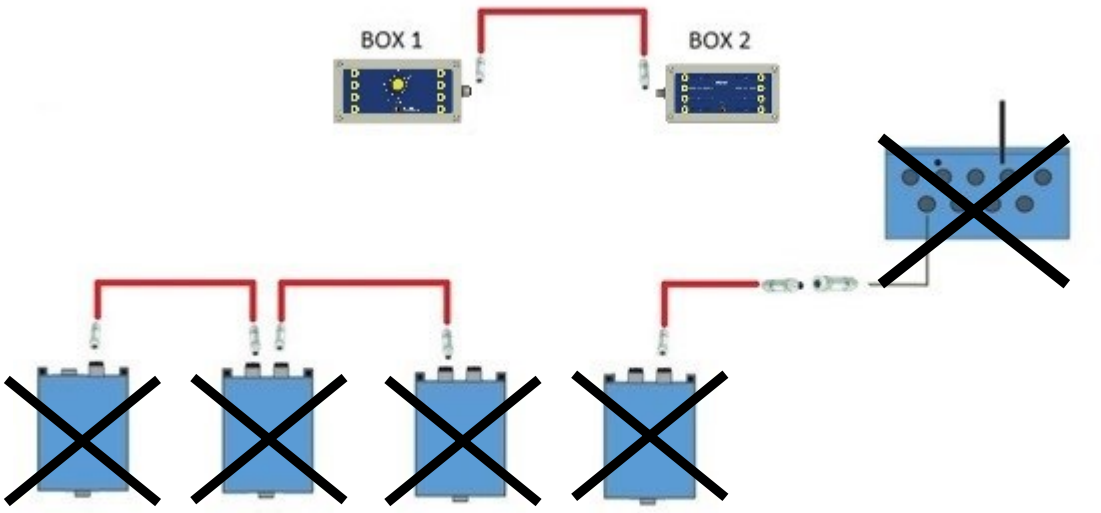


Figure 41. Box Connection on Cable Section 2

3.5.3. Preliminary test of DSS-CAB-TST

As a first step check that the state of the battery is adequate. Turn the rotary switch on BOX 1 to position **BAT**.

If the LED under the position BAT is *ON*, this means that the Battery is in good condition.

If the LED is OFF or its brightness is very low, it means that either the battery is not installed or that the battery is discharged. In this case, follow the steps under 3.5.5 to add/change the battery.

Figure 42. BOX 1 with LED BAT OFF

Figure 43. BOX 1 with LED BAT ON

3.5.4. Testing cabling with DSS-CAB-TST

BOX 1 and BOX 2 are connected to the cable section.

On BOX 1, turn the rotary switch to position **PIN 1** and check on BOX 2 if the LED PIN1 is ON.

- **If only LED PIN1 is ON, it means that the connection is OK**
- If another LED is ON, it means there is a misconnection to that pin

  If several LEDs are ON, it means a shortcut between two or more lines, see example in Figure 44.

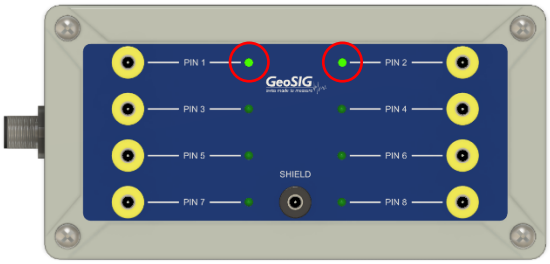


Figure 44. Shortcut between PIN 1 and PIN 2.

- If no LED is ON, it means the pin is not connected

Repeat the previous step and check the other lines (turn the rotary switch to **PIN 2**, **PIN 3**, etc.)

- If none of the LEDs turns ON, most likely the shield is not connected

If every LED turns on at the expected pin, connect the boxes to the next cable section and repeat the steps.

If the test results on all cable sections are good, the array can be connected to the GMSplusD and the system can be turned on (section 3.6).

3.5.5. Changing the battery of BOX 1

Required materials and tools:

- Phillips screwdriver N°2
- New battery 9V (6LR61)

Steps:

- To open the lid by turning the four screws 90° on BOX 1
- Replace the battery
- Close the lid by pushing the screws downwards and turning them 90°

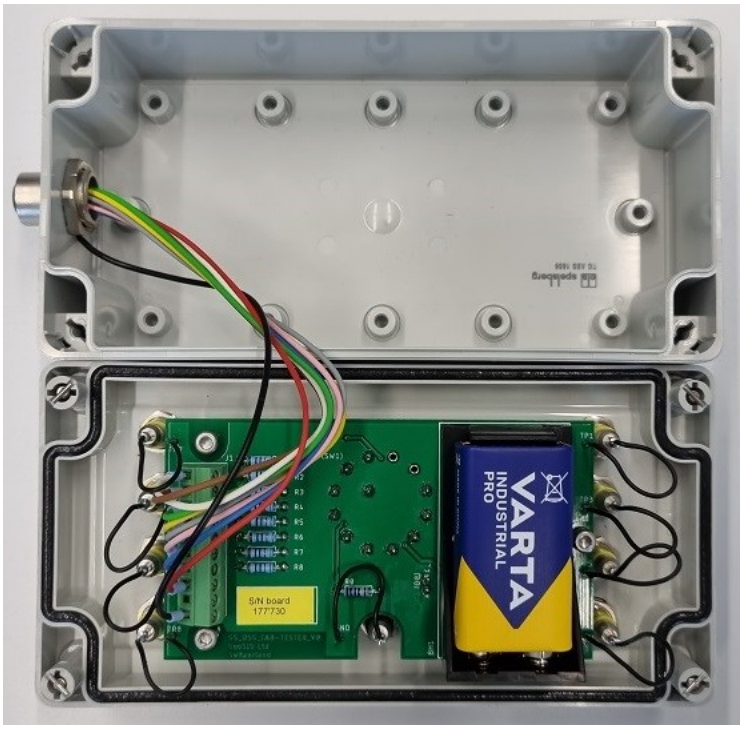


Figure 45. BOX 1 with Open Lid

3.6. First startup and status check

1. Open the instrument removing the 4 screws of the cover plate.
2. If the battery is not plugged, connect the battery with its connector.
3. Connect the internal serial port (CONSOLE) to your computer using an RS-232 cable; open a terminal with baud rate 115200 and 8n1.
4. Push the POWER button of the GMSplus for 2 seconds; the RUN LED will start blinking
5. Sensors will be started in sequence, the process can take up to two minutes.
6. Once all sensors are initialized, you can press ***'ENTER'*** and the main menu will appear

```
GMSplus s/n 123456 version 21.12.29
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
N - List network tunnels
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
D - View DSA status
P - View GPS information
H - Set RTC time
U - User request
R - Restart
Q - Quit
```

7. Press ***'D'*** to view DSA status

8. The top part of the information screen shows information about the optional module board (OPT4-B). The voltage should show at least 48000mV

```
DSA Information:
 Status="Enabled"
 Firmware="140.2.4"
 FSM="3"
 LastTransaction="3"
 Voltage_mV="48246"
```

9. The bottom part of the information screen shows information about the connected sensors. The prefix **Node_1_1_** indicates the first sensor, **Node_1_2_** indicates the second sensor in the chain. Check that all installed sensors appear in the list.

```
Array_1_nodes="4"
 Node_1_1_firmware="43.06.14"
 Node_1_1_demux_fw="141.2.1-0"
 Node_1_1_voltage_1_mV="42054"
 Node_1_1_voltage_2_mV="15360"
 Node_1_1_voltage_3_mV="15360"
 Node_1_2_firmware="43.06.14"
 Node_1_2_demux_fw="141.2.1-0"
 Node_1_2_voltage_1_mV="40506"
 Node_1_2_voltage_2_mV="15232"
 Node_1_2_voltage_3_mV="15296"
 Node_1_3_firmware="43.06.14"
 Node_1_3_demux_fw="141.2.1-0"
 Node_1_3_voltage_1_mV="40764"
 Node_1_3_voltage_2_mV="15104"
 Node_1_3_voltage_3_mV="15104"
 Node_1_4_firmware="43.06.14"
 Node_1_4_demux_fw="141.2.1-0"
 Node_1_4_voltage_1_mV="39732"
 Node_1_4_voltage_2_mV="15232"
 Node_1_4_voltage_3_mV="15232"
 Array_2_nodes="0"
```

For the full configuration such as network and threshold settings, please refer to the GMSplus user manual.

4. Configuration

Steps in this section are only required to add or remove external digital sensors. If you ordered a full system, it comes already set for the ordered number of sensors. For the full configuration of the GMSplus and the accessories please refer to the GMSplus user manual.

4.1. First run hardware setup

1. Open the instrument removing the 4 screws of the cover plate.
2. If the battery is not plugged, connect the battery with its connector.
3. Connect the internal serial port (CONSOLE) to your computer using an RS-232 cable; open a terminal with baud rate 115200 and 8n1.
4. Push the POWER button of the GMSplus for 2 seconds; the RUN LED will start blinking
5. As soon as the following message appears on the serial console, press '***CTRL + Z***' in your keyboard

```
GMSplus s/n 123456. Firmware in the Linux image: 21.12.00-a10
################################################
###### Test and Initial Configuration Mode ######
################################################
Press Ctrl+Z to enter the test mode....
```

1. Access to the *Powerful User* menu pressing '***W***'. The following menu appears.

2. Press '***K***' to setup the hardware parameters.

```
Bootloader Menu of the GMSplus s/n 123456
Access level: Powerful User

 --- Flash Images and Boot Options ---
L - List flash images
Q - Reset instrument configuration to the user default
V - Reset instrument configuration to the factory default
5 - Boot now
X - Reboot the instrument
Y - Power off

 --- Hardware Setup and Monitor ---
K - Instrument hardware parameters
N - Network settings
T - Battery installation dates

 --- Security ---
O - Set password
J - Reset all passwords

-->
```

3. Press '***A***' and enter the total number of sensors present in your installation, including internal and external nodes.

```
Loading hardware configuration...
Querying devices...
Detecting cell modems, press <Esc> to skip.....
Hardware Configuration Menu
A) Number of sensors ..... 5
B) Sensor parameters ..... ->
  C) Standard Wi-Fi module .......No
     Lantronix Wi-Fi module ...... No
     Rack mounted slave board .... No
     Wireless time sync module ... No
     Internal analogmodem ....... No
  H) Cellular modem .............. None
     Alarm interface ............. No
     Seismometer control ......... No
  K) Interconnection interface ... Disabled

Select <A>...<M>. <Esc> to exit
```

4. Select '***B***' and setup each node.
   a. Press '***B***' and select the number of channels of the sensor (standard 3 channel for *x*, *y* and *z* axis)
   b. Press '***D***' and select "*external*" for the digital sensors, "*internal*" for the internal sensor (if available).
   c. If the node is external, press '***E***' until "*DSA interface*" is selected.

```
Hardware Configuration Menu | Sensors Menu 1 of 5
  A) Sensor S/N ............. 0000A
  B) Number of channels ..... 3
  C) Sensor channels ........ ->
  D) Internal or external ... External
  E) Sensor interface ....... DSA interface
  F) Sensor identifier ...... 1 (0x01)
  I) Digital sensor array ... DSA1

Select <A>...<I>, <+> Next, <Esc> back to Hardware Configuration Menu
```

   d. Press '***F***' and enter the sensor identifier number

*All the identifiers of the external node **must be different**.*
Example:
1st Node, ID=1
2nd Node, ID=2
…

   e. Press '**+**' to configure the next sensor node.
   f. Optionally for each sensor you can enter the sensor S/N pressing '***A***'.

5. Press '***ESC***' to return to the main menu, and press '***S***' to save the configuration when the following message appears.

```
Configuration is complete. (S)ave, (D)iscard or continue (E)diting?
```

6. Press '**5**' to start the instrument.

4.2. armDAS Settings through the local Console

In this section is described how to setup the instrument to record data from the digital sensors. The same procedure can be done from the Web Interface ad describe in section 4.3 of this manual.

1. Connect the internal serial port (CONSOLE) to your computer using an RS-232 cable; open a terminal with baud rate 115200 and 8n1 and start the instrument if is not running. Wait until the main user menu is available on the console.

```
GMSplus s/n 123456 version 21.12.00-a10
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
D - View DSA status
P - View GPS information
H - Set RTC time
U - User request
R - Restart
Q - Quit
```

2. Press '***C***' to enter in the configuration menu, and select '***C***' to modify the current configuration. The following menu will appears.

```
Main Menu
  A) Station description ............... GeoSIG Station
  B) Station code ...................... GSGMS
  C) Location description .............. Default location
  D) Seismic network code .............. GS
  E) Number of Channels ................ 15
  F) Number of Output Streams .......... 4
  G) Number of Trigger Sets ............ 1
  H) Number of PresetTriggers  ........ 0
  I) Channel Parameters ................ ->
  J) Stream Parameters ................. ->
  K) Trigger Parameters ................ ->
  M) File Storage and Policy ........... ->
  N) Communication Parameters .......... ->
  O) Miscellaneous Parameters .......... ->

Select <A>...<O>. <Esc> to exit
```

3. Press '***E***' and enter the total number of channels available in your installation.
4. Press '***I***' to configure each channel.

```
Select <A>...<W>, <+> Next, <->Prev, <Esc> back to Main Menu +
Main Menu | Channel 4 of 15
  A) Data source ..................... EXT-DSA-S02-C01
  E) Channel name .................... X
  F) Location code ................... E1
  G) Source data unit ................ g
  H) LSB factor ...................... 2.6491e-07
  I) Sampling rate, sps .............. 200 (0xC8)
  K) Negative axis ................... No
  L) Offset compensation ............. Yes
  N) Maintain the ringbuffer ......... Yes
  O) Online preprocessing ............ None
  S) Decimation and peaks ............ None

Select <A>...<W>, <+> Next, <->Prev, <Esc> back to Main Menu
```

Refer to the GMSplus user manual to configure internal sensors, here only how to configure the external digital channels is explained.

5. To configure the external digital channels:

   a. Press '***A***' to select the data source of the channel. The external digital sensors are recognised as **EXT-DSA-S*xx*-C*yy*** where ***xx*** is the sensor number as defined in the hardware configuration, and ***yy*** is the channel identifier. Normally the channel identifier 01 corresponds to x axis, 02 to y axis and 03 to z axis.

   b. It is possible to change the *channel name* pressing '***E***' and the *location code* pressing '***F***'.

   c. Enter the data unit and the LSB factor according to the sensor type. The formula for calculation of LSB can be found in the GMSplus user manual in section "***Calculation of the LSB factor***" (9.3.3).

d. Press '***I***' to specify the sampling rate according to the following table of supported rates:

Number of external sensors	Maximum SPS
1	1000
2	500
3 or 4	200

When you enter the SPS in the first channel of the sensor, it will automatically set for the remaining channels. It is not possible to set different sampling rates for each channel of a sensor. But it is possible to set different sampling rates for different sensors.

6. Press '***ESC***' to back to the main menu, press '***C***' to save the configuration when asked.

```
Save as (C)urrent, save to a (F)ile or just (E)xit without saving....>
```

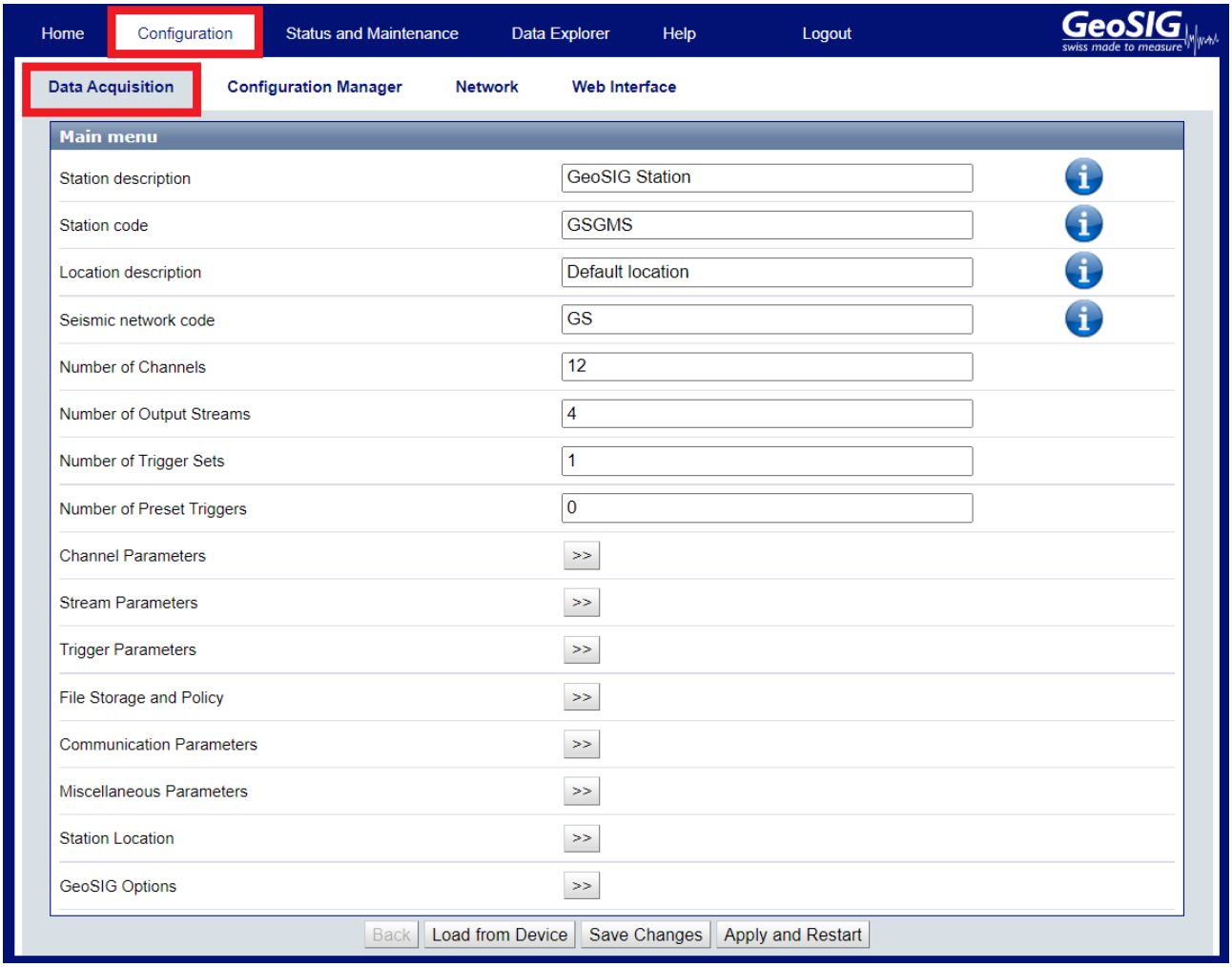
7. Restart the instrument pressing '***R***' to apply the new configuration.

```
GMSplus s/n 123456 version 21.12.00-a10
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
D - View DSA status
P - View GPS information
H - Set RTC time
U - User request
R - Restart
Q - Quit
```

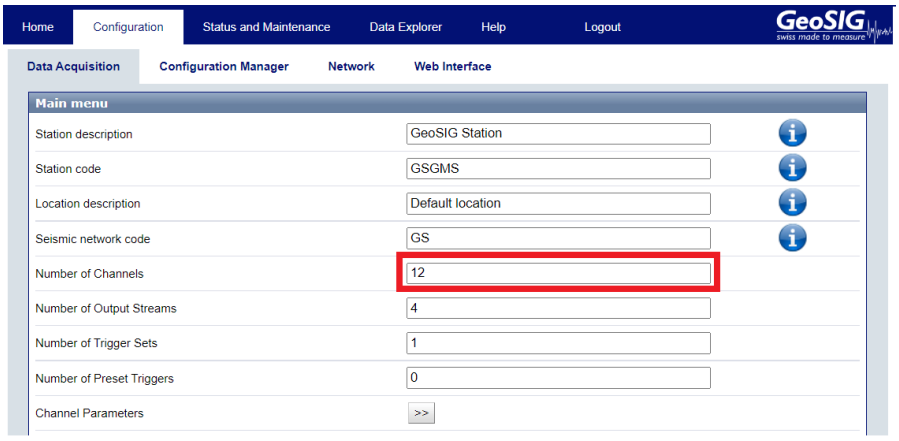
4.3. armDAS setting from Web Interface

The same settings described in section 4.2 can be done from the Web Interface. Log in to the web interface as described in the GMSplus user manual (see sections "***The Web Interface***" and "***Detailed Configuration of the Instrument***").

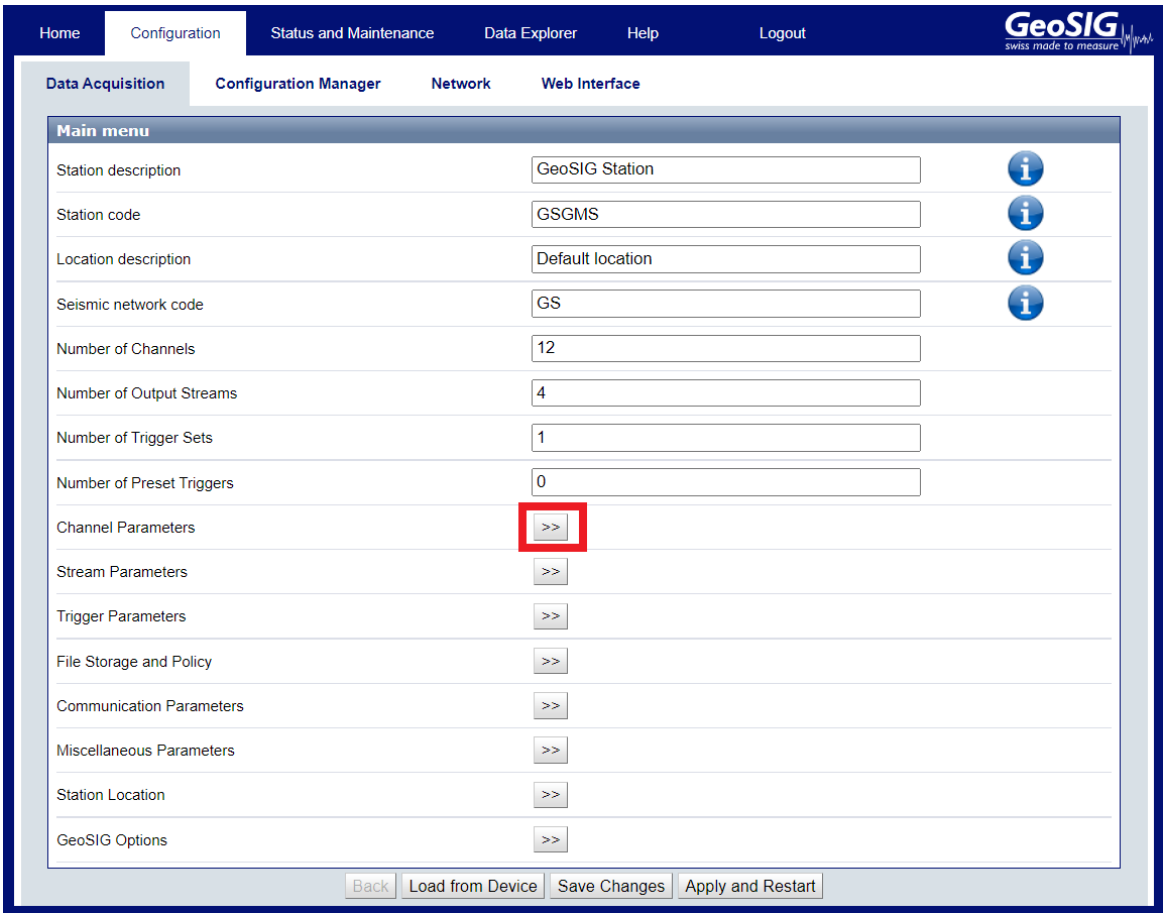
1. Go to **Configuration → Data Acquisition**



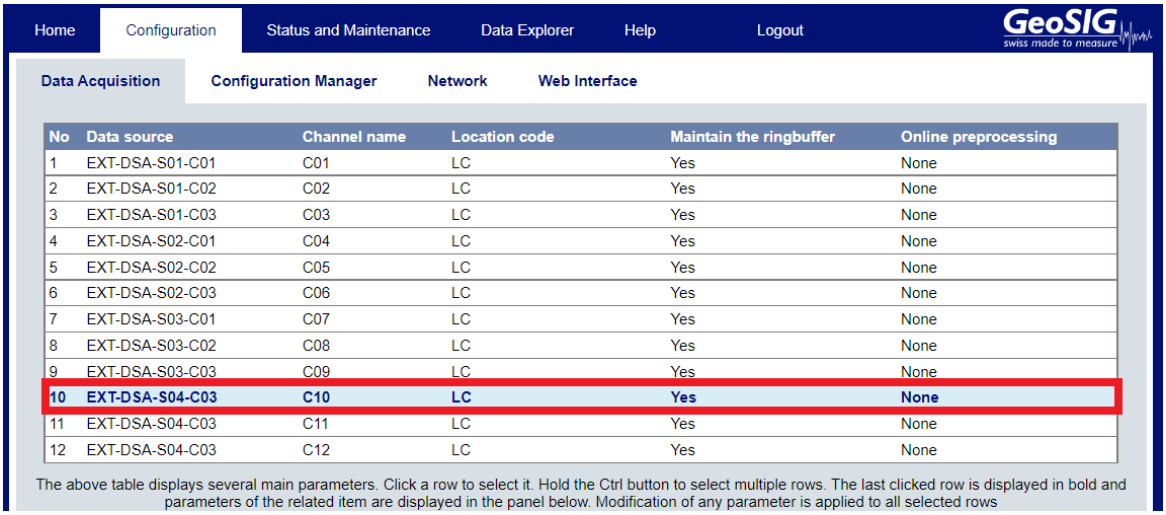
2. Select ***"Number of Channels"*** and enter the number of channels available in your installation.



3. Select ***"Channel Parameters"***

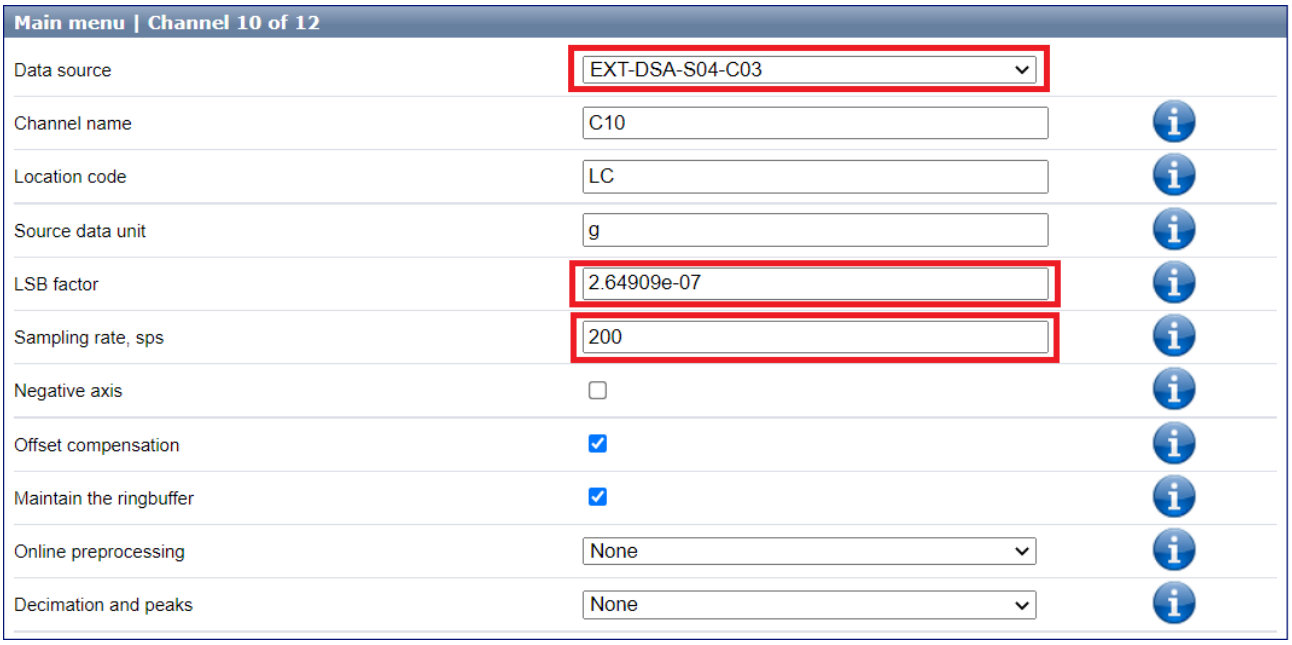


4. Select the channel from the list you want to edit. The channels of external digital sensors are recognized (parameter *Data Source*) as ***EXT-DSA-Sxx-Cyy*** where ***xx*** is the sensor number as defined in the hardware configuration, and ***yy*** is the channel identifier. Normally the channel identifier 01 corresponds to x axis, 02 to y axis and 03 to z axis.



You can apply settings such as LSB or Sampling rate to multiple channels by selecting channels holding CTRL button. To apply individual settings, follow steps 4-7 for each channel.

5. In the window below it is possible to set up the channel parameters for the selected channel. Enter the data unit and the LSB factor according to the sensor type. Formula for calculation of LSB can be found in the GMSplus user manual in section "*Calculation of the LSB factor*" (9.3.3).



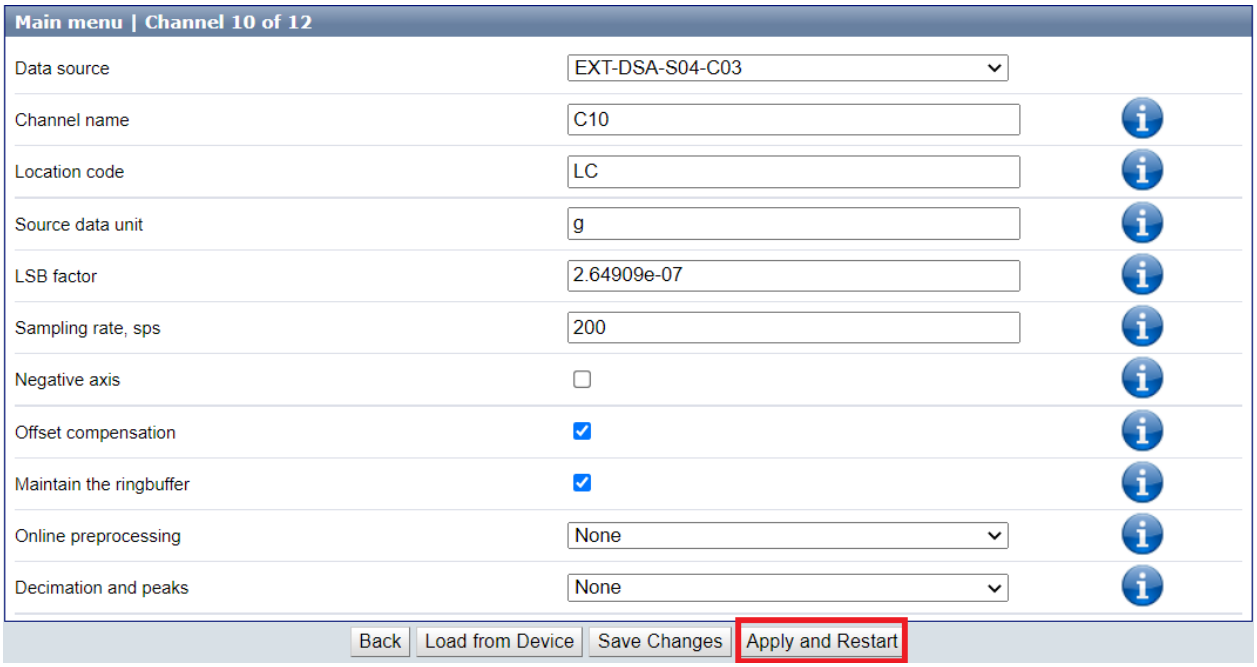
6. Specify the sampling rate according to the following table of supported rates:

Number of external sensors	Maximum SPS
1	1000
2	500
3 or 4	200

When you enter the SPS in the first channel of the sensor, it will automatically set for the remaining channels. It is not possible to set different sampling rates for each channel of a sensor. But it is possible to set different sampling rates for different sensors.

7. To easily identify the sensors in the array it is possible to rename the nodes using the fields *channel name* and *location code*.

8. Click on ***"Apply and Restart"***, and restart the instrument.



After rebooting, the system is configured and ready to start processing data from the DSA.