Aquilar Ltd, Unit 30 Lawson Hunt Industrial Park, Broadbridge Heath, Horsham, West Sussex. RH12 3JR
Tel:01403 216100 - **Fax:**01403 216109 - **Email:**info@aquilar.co.uk - www.aquilar.co.uk

TraceTek - RS485 Multiple Module Network Guidelines

Careful design and installation, that considers the effect of interference and unbalanced impedance, can avoid the common issues of many large RS485 networks that can lead to communication errors and dropouts.

It is important to consider RS585 is a master-slave protocol. There can only be one master, and the master always initiates communication. Slaves cannot initiate communication, they can only respond to requests from the master.

e.g. *In simple terms, a TT-SIM will not send a message to the TTDM to say it is in leak alarm. The TTDM must ask what alarm state the SIM is in, and when it is polled the SIM status (response) will be 'in alarm' or 'not in alarm'.*

The master can be anywhere along the network however special attention needs to be paid to the 'balance' and EOL situation (section E).

Please find below some guidelines to follow to help ensure a reliable TraceTek communications network.

A. Design:

a. RS485 network cable runs should be placed as far away from sources of interference as possible.
b. Avoid long runs adjacent to high voltage cables if possible.
c. RS485 networks are limited to 1200m maximum cable run between host and final device.
d. Stubs (legs, t-off's) are not recommended and if absolutely necessary, must be as short as possible.

B. Cable:

a. While it is certainly possible for networks to function with only the '+' and '-' connected. Correct RS485 is a 3 wire system, not 2 wire. The '+' and '-' are signal wires. The network also requires a return path. This would be the drain wire, or the shield itself if no drain wire is available.
b. If the same cable is being used for LV power and network the RS485 and power must be separately shielded twisted pairs, such as our TT-SIM-CC.
c. For longer network runs we recommend separate shielded cables are used (the RS485 cable must still be a shielded twisted pair) (Fig.1).

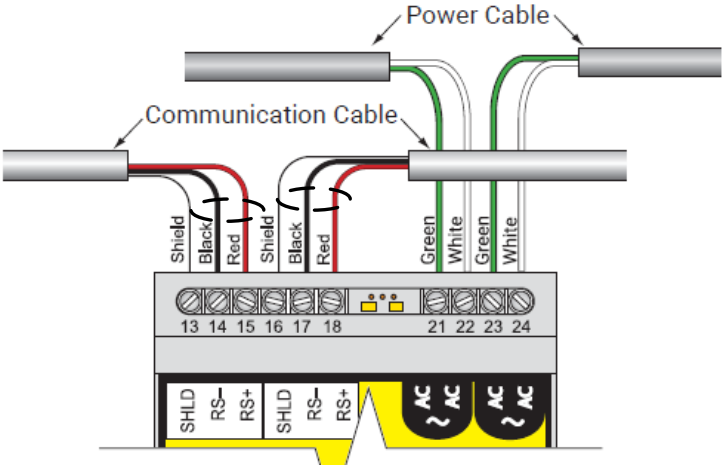

Fig.1

C. Termination:

a. Cables must be correctly terminated. The same colour combinations should be used throughout the installation to enable fast identification of correct cabling. It is strongly recommended the cables are terminated in the colour ways shown (Fig.2).
b. They must be securely fastened in their terminals.
c. If ferrules are used, they must be the correct size and fitted properly. Any loose connection will weaken signal.

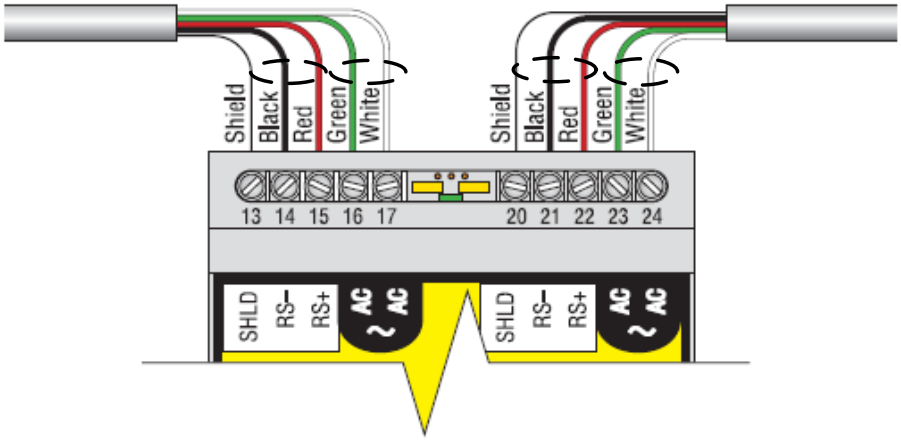

Fig.2

D. Shielding:

a. The shield must be connected to earth (ground) **at the master panel only**. Connecting at multiple point can create signal on the drain wire if there are differences in potential at the multiple earth points.
b. The shield should be continuous along the length of the circuit. TTSIM's are opto-isolated, so it is safe to connect the drain wire to the in and out 'shield' terminations to create a complete shield.

E. End Of Line (EOL):

a. To aid in preventing signal reflections the circuit should be balanced at **both** ends using a 120ohm resistor.
b. Generally, the master panel is at the end of the network so the starting resistor would be within it. However, if the master is not at one end, it should not have an EOL resistor enabled/fitted. (Fig.5)

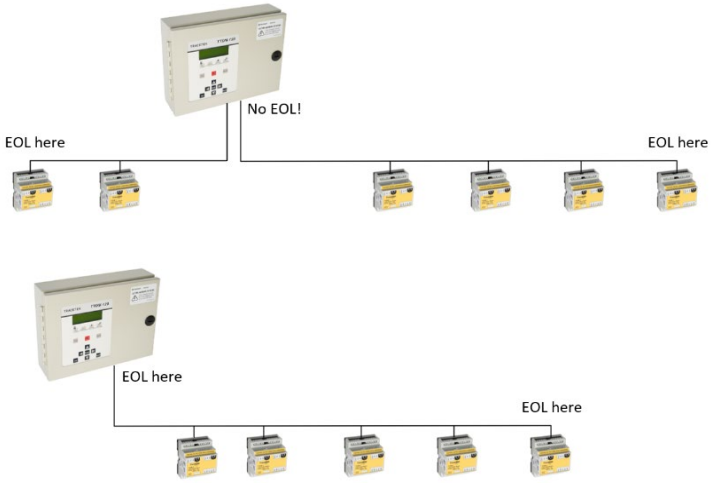

Fig.5

c. TraceTek panels have the resistors built into them and just require ensuring they are enabled if the master is at the end of the circuit.
    i. On the TTDM-128 the panel EOL is enabled by default (J12 on the UI board).
    ii. On the TS-12 touchscreen it is not engaged as the default factory default configuration) It is enabled with the dip switch SW3 on the motherboard above the port that needs to be switched to 'On'. (The back cover of the touchscreen must be removed for access).
    iii. TT-SIM's have an EOL jumper that must be enabled on the **final SIM on the circuit only**. (Fig.3)

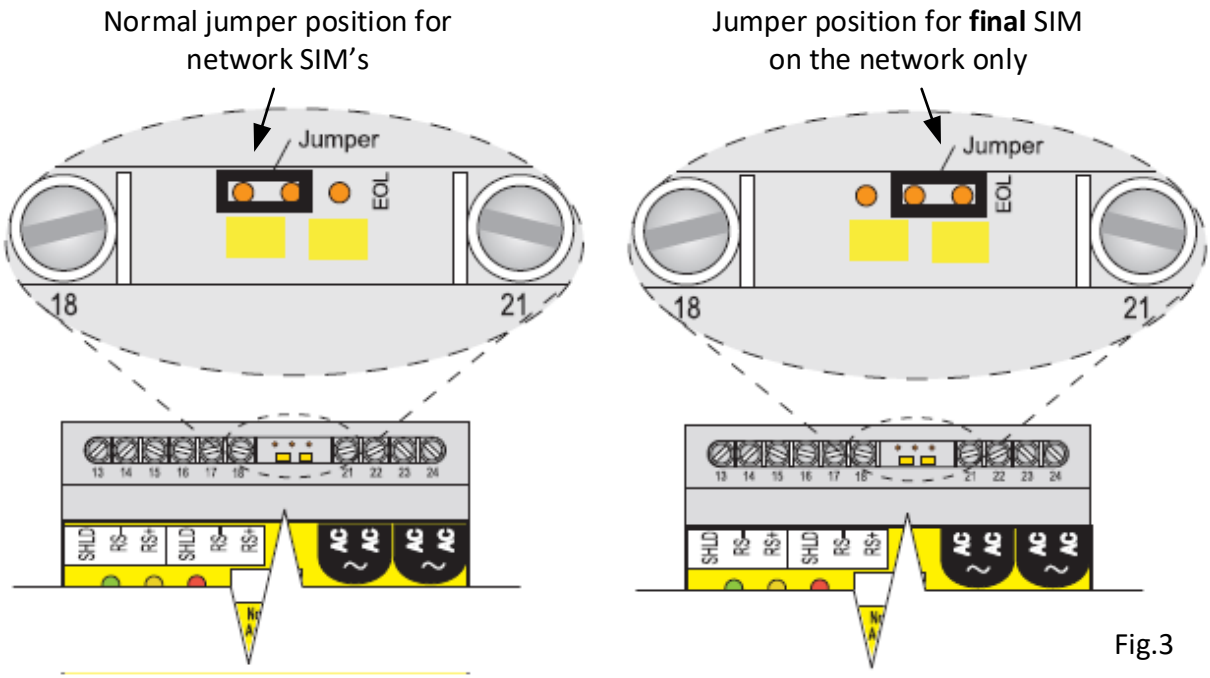

Fig.3

F. Ferrite clamp:

a. A ferrite clamp (or bead) should be used on large networks as it will help to further absorb any interference. But it is important that it be positioned correctly at the panel end of the circuit, close to the termination but not over the shield. Fig.4

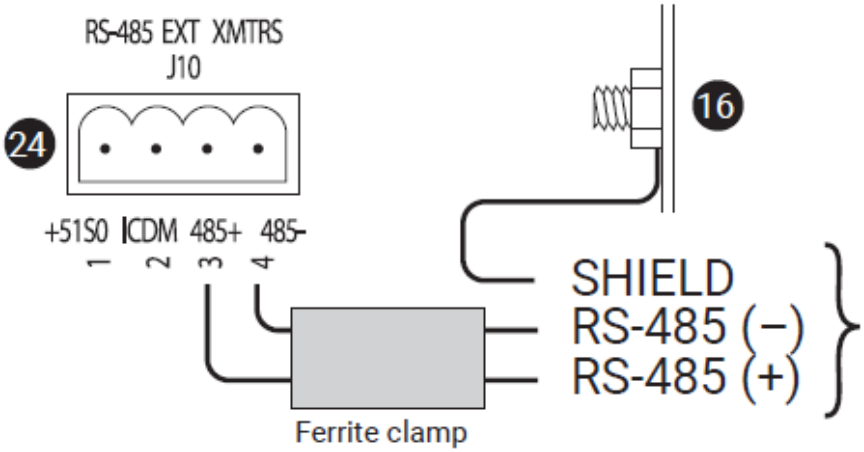

Fig.4