


	<p style="text-align: center;"><b>Redundancy Concept of Softing Linking Device</b></p> <p style="text-align: center;"><b>FG-110 FF</b></p>	
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# Redundancy Concept of Softing Linking Device

## FG-110 FF

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## 1 Purpose of this document

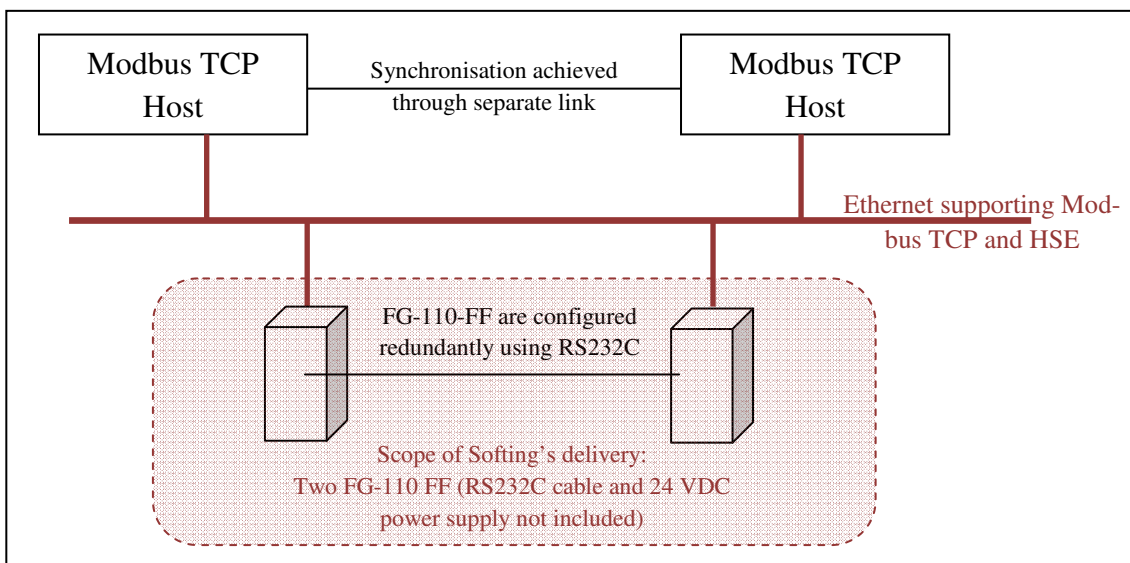
This document proposes a system configuration architecture and redundancy strategy.

## 2 Notes on Ethernet redundancy

The FG-110 FF does not support media Ethernet redundancy. For a note on Ethernet redundancy and a possible workaround, please see the appendix “Media Ethernet Redundancy” at the end of this document.

## 3 Environment

The topology picture below (Figure 1) describes a typical setup and the scope of delivery and responsibility of Softing.



*Figure 1: Typical Topology*

## 4 Rules for a redundant MODBUS TCP host

The rules described in this section correspond to the minimal set of functions that the Modbus TCP host and the redundancy application must support, which is out of Softing's scope of supply. The suggestions below are not a statement of warranty on the validity of this proposal, which depends on how the redundancy application is implemented.

### 4.1 **Rule 1: Access of more than one MODBUS host's**

The Modbus TCP host can only communicate with **one** FG-110 FF (see Figure 2). If the Modbus TCP host attempts to communicate with an FG-110 FF which is already communicating with another Modbus TCP host, the Modbus TCP host will get back an error.

So, before a second client gets access to the FG-110 FF the first connection has to be closed.

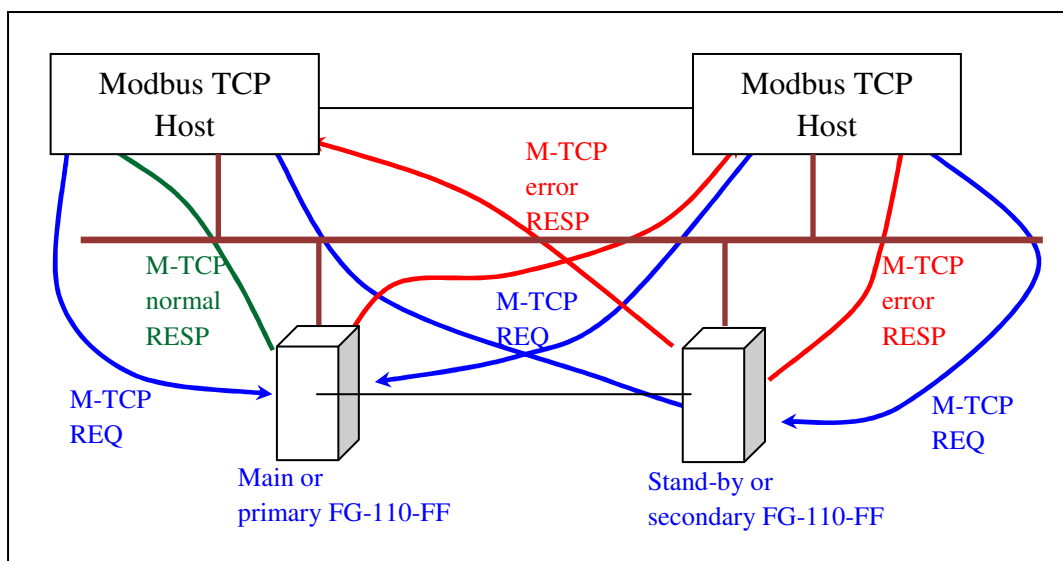


Figure 2: Modbus TCP host access

### 4.2 **Rule 2: Status of process value**

The Modbus TCP host monitors registers and their corresponding register's status in the FG-110 FF Modbus TCP database. The Modbus TCP host can trust the process data mapped into the FG-110 FF Modbus TCP when the FF status of the mapped FF value is normal.

For example if the FF-H1 cable is disconnected from one field device or the field device works not properly the process value mapped onto the Modbus TCP server will go to abnormal FF-status (see figure 3).

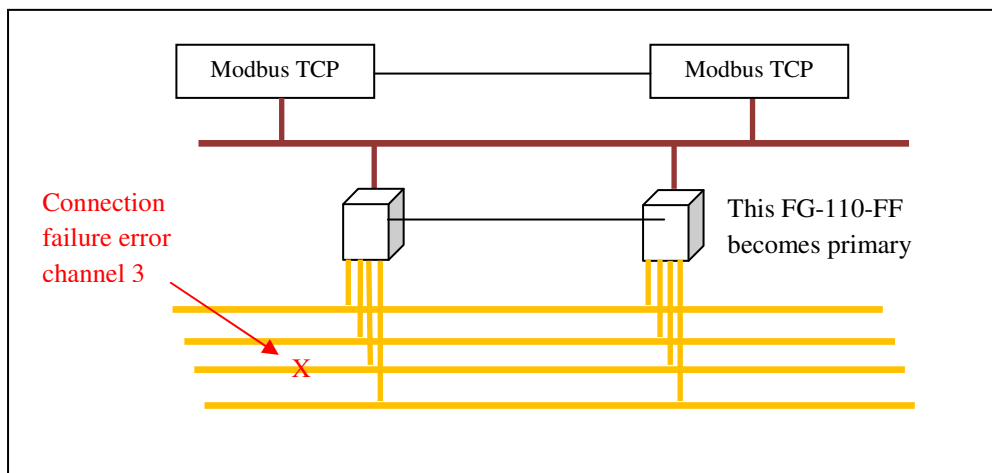


Figure 3: Detection of failure

#### 4.3 Rule 3: Write request

The DCS **must ensure** that both Modbus TCP hosts send the same output data through Modbus TCP write commands to their respective FG-110 FF at roughly the same time (see figure 4). Only the primary FG-110 FF will write onto FF-H1 bus. The hosts must ensure that their memories are synchronised.

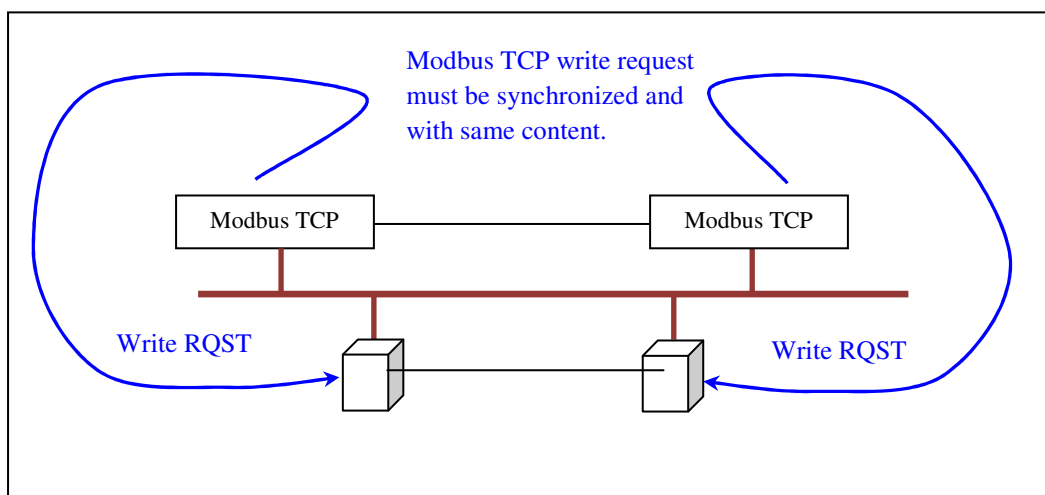


Figure 4: Synchronization of write requests

#### 4.4 **Rule 4: Primary and secondary Linking Device**

Only the FG-110 FF acting as primary Linking Device will return valid data to the Modbus TCP host. The information which Linking Device is acting as primary or secondary can be seen in the Modbus register 49001. This is how the Modbus TCP client determines which FG-110 FF is the primary and which is the secondary.

#### 4.5 **Rule 5: HSE device redundancy**

The detail behaviour of the HSE redundancy operation conforms to Foundation Fieldbus specification FF-593 for Type D-3 device.

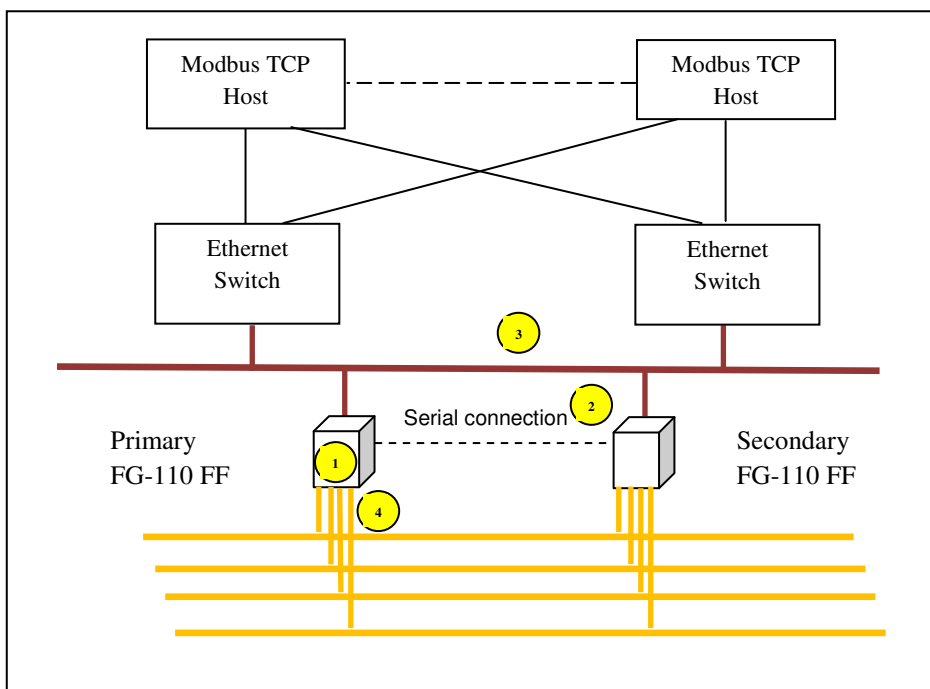



Figure 5: HSE Redundancy

The FG-110 FF supports the HSE device redundancy D3. The following fault will be detected and covered by the redundancy feature (see figure 5).

- permanent faults within the Linking Device 1
- transient faults within a Linking Device that lead to loss of functions 1
- a loss of the serial connection between the two Linking Devices 2
- a failure in the Ethernet communication between the two Linking Devices 3

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- a loss of an H1 connection between the Primary Device and the entire H1 link; this may be caused by disconnecting an H1 cable from the Primary Device (4)

Detecting a loss of an H1 connection between the Primary Device and the entire H1 link requires that at least two H1 devices have been connected to that H1 channel of the Linking Device and have appeared in the H1 Live List before the loss of the connection occurs.

## 5 Appendix: Ethernet Media Redundancy

Since there is only one Ethernet port in FG-110 FF, strictly speaking Ethernet media redundancy cannot be supported. However, by choosing suitable managed switches, it may be possible to achieve some degree of media redundancy, for example with an arrangement like the one shown below:

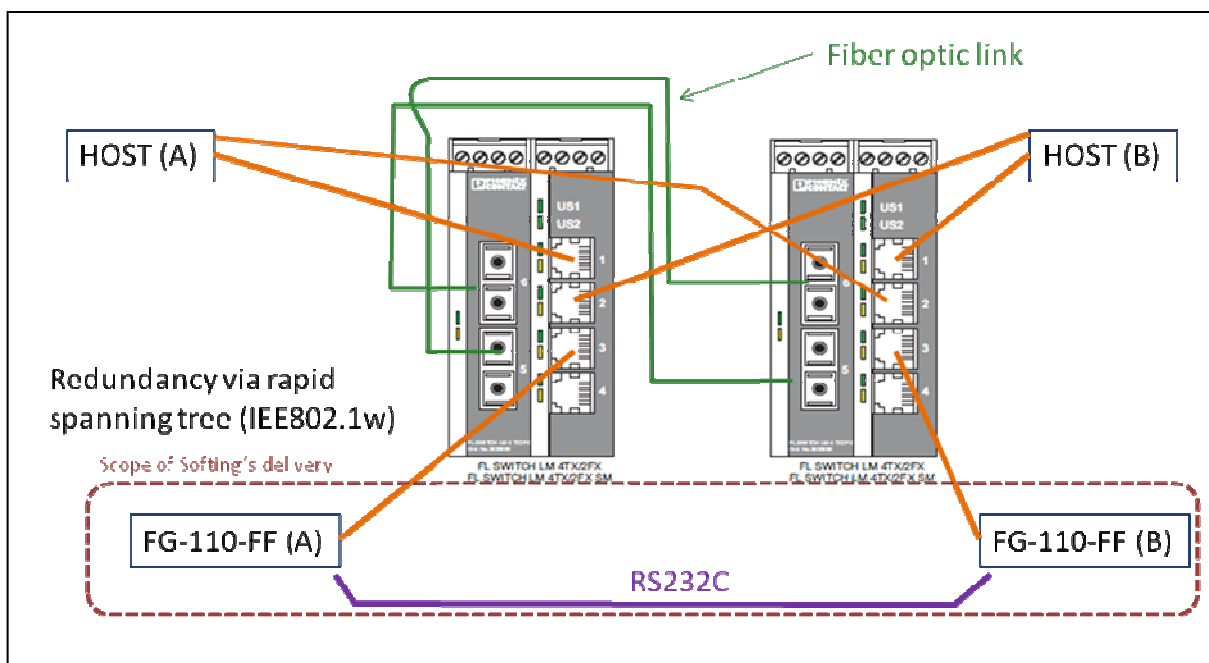



Figure 6: Possible solution for media Ethernet redundancy

Please note that this solution is not scope of Softing's standard offer for a FG-110 FF.

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