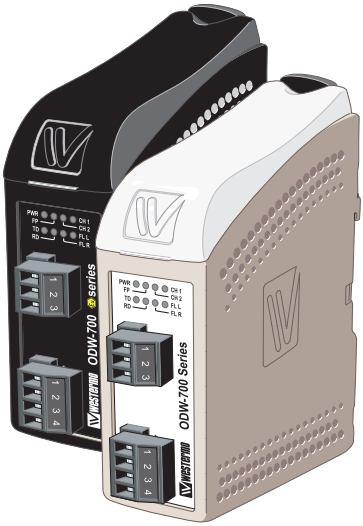
Management Guide
6651-2255

Westermo
ODW-730-F2



Industrial Converter
RS-485 to Fibre Optic Link.
Repeater, line and redundant ring

www.westermo.com

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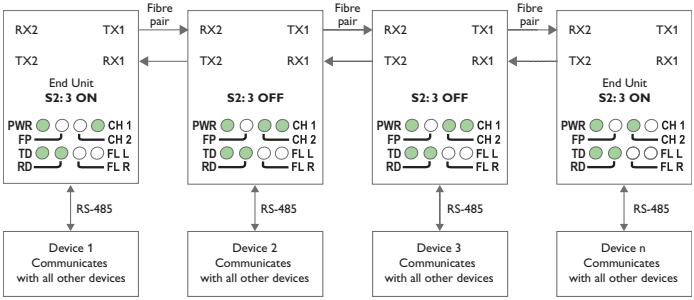
Multidrop, Y-mode configuration

In Y-mode mode an ODW-730 network will behave as a 2-wire bus. I.e. all communication devices will "hear" the data sent out by other communication devices.



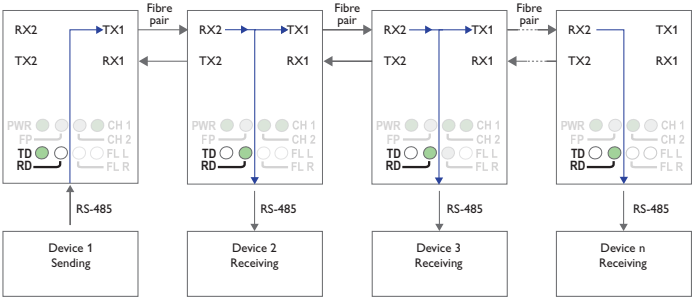
Prepare the fibre optical network

- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination).
- The first and last ODW-730 units must be configured as Multidrop end units by setting DIP-switch S2:3 to the ON position. (End units only have one fibre pair each and must know that this is a fact)
- Set DIP-switch and S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S1:8, S2:2, S2:4, S2:5 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

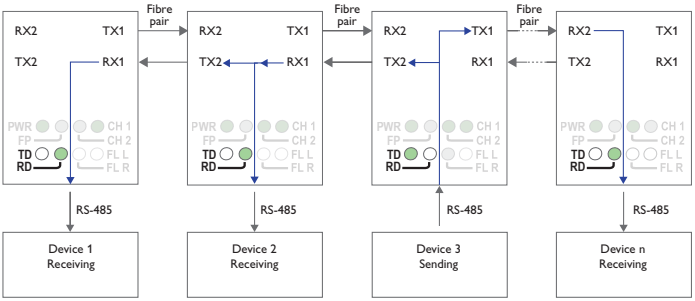
Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in multidrop, Y-mode configuration



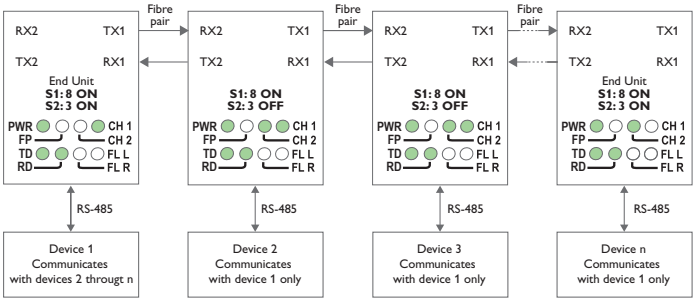
Data from comminication device 1 is received at the ODW-730 RS-485 port (as indicated by the TD LED), data bits are retimed according to the preset rate and sent out on the optical fibre TX1. The next ODW-730 unit receives data at optical fibre RX2 (as indicated by the RD LED), and data is sent out on the RS-485 port. Data is also repeated out on TX1 on to the next ODW-730 unit.



Data from some other communication device, for example device 3, is processed in the same way and sent out on both optical fibres TX1 and TX2.

Multidrop, V-mode configuration

In V-mode an ODW-730 network will behave as a 4-wire bus. Where the first ODW-730 (leftmost in the picture below) will able to communicate in full duplex with any other unit, but other units are incapable of communicating with each other.



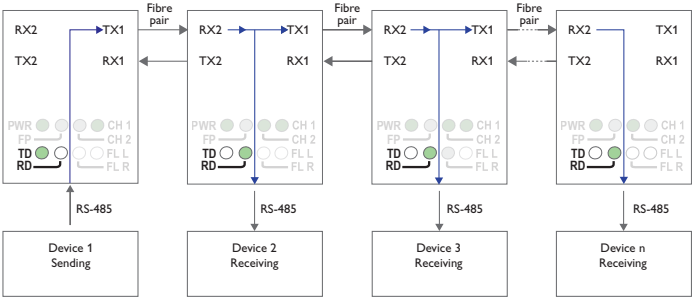
Prepare the fibre optical network

- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- Set DIP-switch S1:8 in the ON position (V-mode) on all ODW-730 units.
- The first and last ODW-730 units must be configured as Multidrop end units by setting DIP-switch S2:3 to the ON position. (End units only have one fibre pair each and must know that this is a fact)
- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S2:2, S2:4, S2:5 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

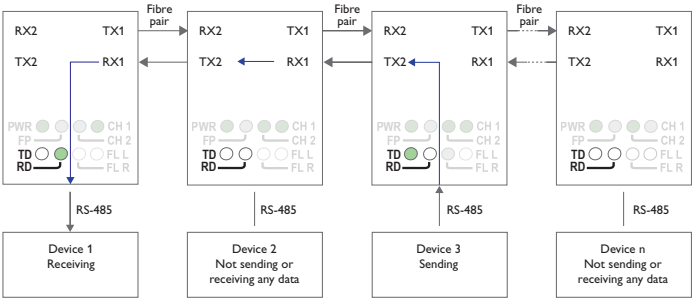
Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in multidrop, V-mode configuration



Data from comminication device 1 is received at the ODW-730 RS-485 port (as indicated by the TD LED), data bits are retimed according to the preset rate and sent out on the optical fibre TX1. The next ODW-730 unit receives data at optical fibre RX2 (as indicated by the RD LED), and data is sent out on the RS-485 port. Data is also repeated out on TX1 on to the next ODW-730 unit.



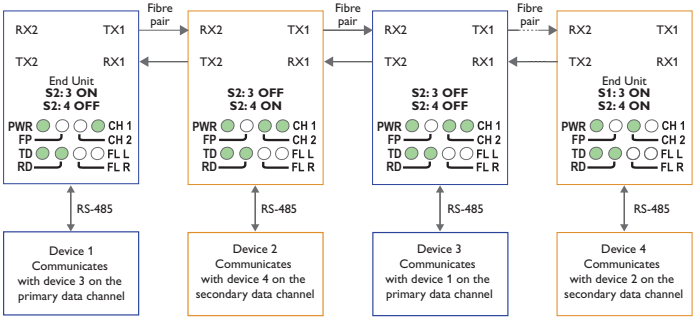
Data from some other communication device, for example device 3, is processed in the same way and sent out on optical fibre TX2. Intermediate ODW-730 units will receive this data at optical fibre RX1 and repeat it out on optical fibre TX2. But, intermediate units will not send any data received at RX1 on to the RS-485 port. Only the first ODW-730 (leftmost in the picture above) will have incomming data from optical fibre RX1 sent out on the RS-485 port.

I.e. the first ODW-730 is able to communicate in full duplex with any other unit, but other units are incapable of communicating with each other.

Multidrop dual channel, Y-mode configuration

In dual channel mode it is possible to use two separate data streams in a single ODW-730 network. However, all ODW-730's must be set to the same speed and data format. This, of course, limits the number of possible applications for a dual channel network.

In Y-mode mode an ODW-730 network will behave as a 2-wire bus. I.e. all communication devices will "hear" the data sent out by other communication devices.



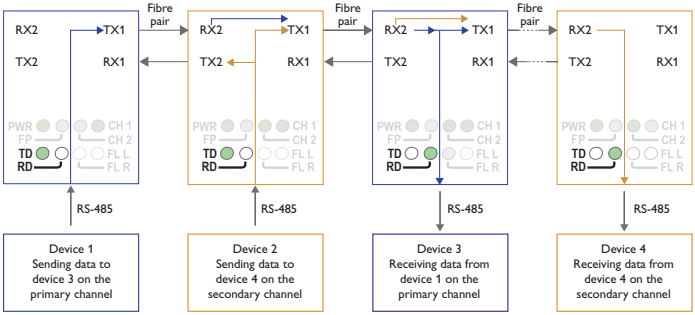
Prepare the fibre optical network

- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7. Again, notice that all ODW-730's must be set to the same speed and data format.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- The first and last ODW-730 units must be configured as Multidrop end units by setting DIP-switch S2:3 to the ON position (End units only have one fibre pair each and must know that this is a fact).
- All ODW-730 units that are to use the primary data channel ("blue" units in the picture above) must have DIP-switch S2:4 set to the OFF position. Units that are to use the secondary data channel ("orange" units in the picture above) must have DIP-switch S2:4 set to the ON position.
- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S1:8, S2:1, S2:2, S2:5 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in multidrop, dual channel, Y-mode configuration

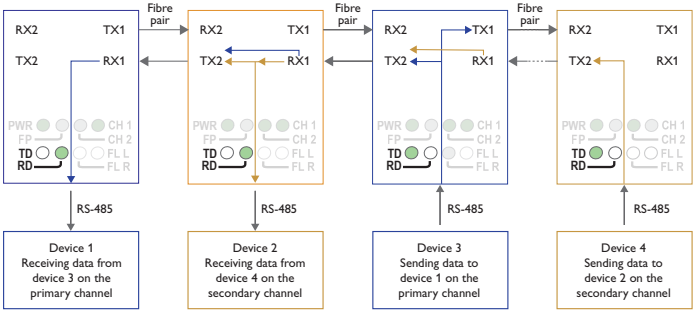


The first ODW-730 unit recieives data from communications device 1 on the RS-485 port and sends it out on optical fibre TX1 using the primary data channel.

The second ODW-730 unit receives primary channel data on optical fibre RX2. Primary channel data is repeated out on optical fibre TX1. The second ODW-730 unit also receives data from communications device 2 on the RS-485 port. The RS-485 data is sent out on both optical fibres TX1 and TX2 using the secondary data channel.

The third ODW-730 unit receives both primary and secondary channel data on optical fibre RX2. Both primary and secondary data are repeated out on optical fibre TX1, but only the primary channel data is sent out on the RS-485 port.

The fourth ODW-730 unit receives both primary and secondary channel data on optical fibre RX2, but only the secondary channel data is sent out on the RS-485 port.



The fourth ODW-730 unit recieives data from communications device 4 on the RS-485 port and sends it out on optical fibre TX2 using the secondary data channel.

The third ODW-730 unit receives secondary channel data on optical fibre RX1. Secondary channel data is repeated out on optical fibre TX2. The third ODW-730 unit also receives data from communications device 3 on the RS-485 port. The RS-485 data is sent out on both optical fibres TX1 and TX2 using the primary data channel.

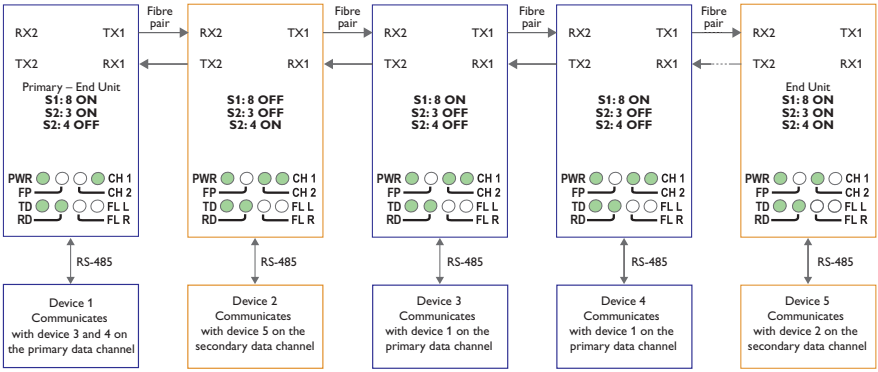
The second ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Both primary and secondary data are repeated out on optical fibre TX2, but only the secondary channel data is sent out on the RS-485 port.

The first ODW-730 unit receives both primary and secondary channel data on optical fibre RX1, but only the primary channel data is sent out on the RS-485 port.

Multidrop, dual channel, V-mode configuration

In dual channel mode it is possible to use two separate data streams in a single ODW-730 network. However, all ODW-730's must be set to the same speed and data format. This, of course, limits the number of possible applications for a dual channel network.

In V-mode an ODW-730 network will behave as a 4-wire bus. Where the first ODW-730 (leftmost in the picture below) will able to communicate in full duplex with any other unit, but other units are incapable of communicating with each other.



Prepare the fibre optical network

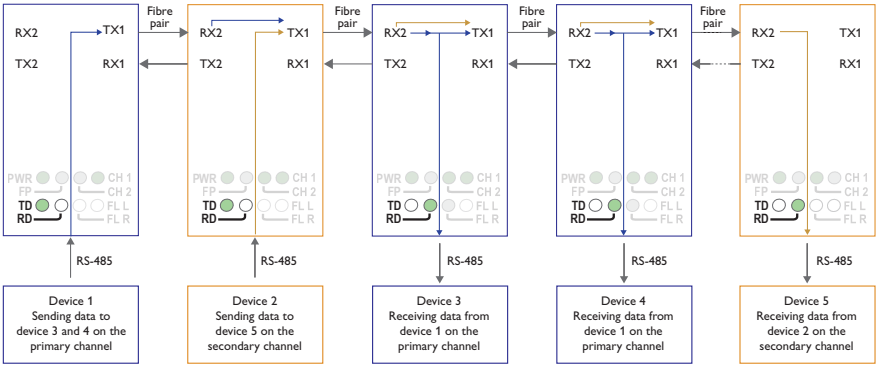
- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7. Again, notice that all ODW-730's must be set to the same speed and data format.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- The first and last ODW-730 units must be configured as Multidrop end units by setting DIP-switch S2:3 to the ON position (End units only have one fibre pair each and must know that this is a fact).
- All ODW-730 units that are to use the primary data channel ("blue" units in the picture above) must have DIP-switch S2:4 set to the OFF position. Units that are to use the secondary data channel ("orange" units in the picture above) must have DIP-switch S2:4 set to the ON position.
- The first ODW-730 unit using the secondary data channel (second from left in the picture above) must have DIP-switch S1:8 set to the OFF position (Y-mode). The reason for this is that the data will be sent in the wrong direction if this unit is also set for V-mode.
- Set DIP-switch S1:8 in the ON position (V-mode) on all other ODW-730 units.
- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S2:1, S2:2, S2:5 and S2:8 are set in the OFF position.

- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in multidrop, dual channel, V-mode configuration

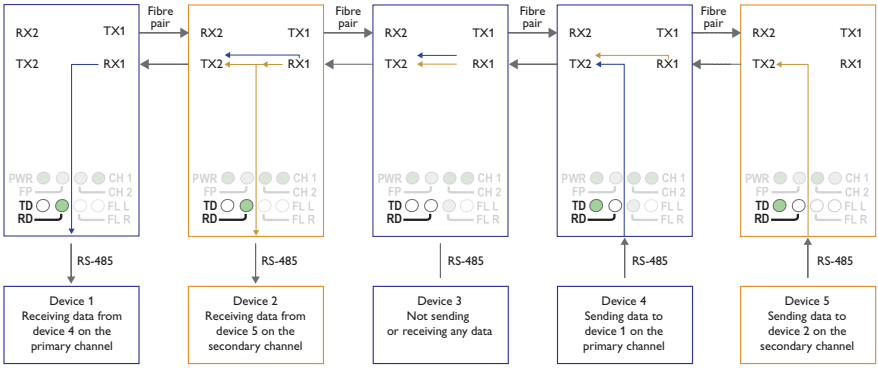


The first ODW-730 unit recieives data from communications device 1 on the RS-485 port and sends it out on optical fibre TX1 using the primary data channel.

The second ODW-730 unit receives primary channel data on optical fibre RX2. Primary channel data is repeated out on optical fibre TX1. The second ODW-730 unit also receives data from communications device 2 on the RS-485 port. The RS-485 data is sent out on optical fibre TX1 using the secondary data channel.

The third and fourth ODW-730 units receive both primary and secondary channel data on optical fibre RX2. Both primary and secondary data are repeated out on optical fibre TX1, but only the primary channel data is sent out on the RS-485 port.

The fifth ODW-730 unit receives both primary and secondary channel data on optical fibre RX2, but only the secondary channel data is sent out on the RS-485 port.



The fifth ODW-730 unit recieives data from communications device 5 on the RS-485 port and sends it out on optical fibre TX2 using the secondary data channel.

The fourth ODW-730 unit receives secondary channel data on optical fibre RX1. Secondary channel data is repeated out on optical fibre TX2. The fourth ODW-730 unit also receives data from communications device 4 on the RS-485 port. The RS-485 data is sent out on optical fibre TX2 using the primary data channel.

The third ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Both primary and secondary data are repeated out on optical fibre TX2. None of the data is sent out on the RS-485 port.

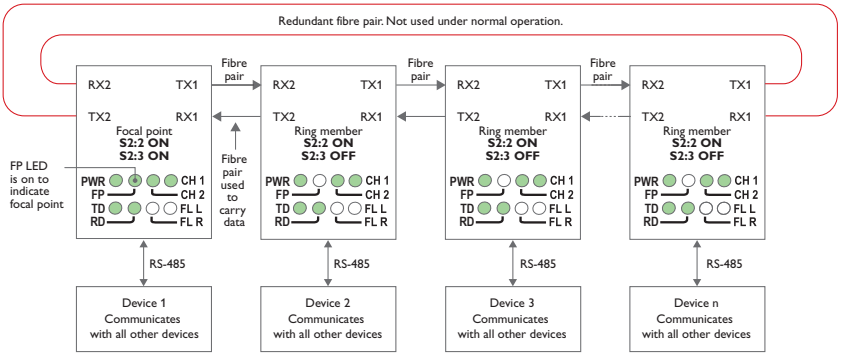
The second ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Both primary and secondary data are repeated out on optical fibre TX2, but only the secondary channel data is sent out on the RS-485 port.

The first ODW-730 unit receives both primary and secondary channel data on optical fibre RX1, but only the primary channel data is sent out on the RS-485 port.

Redundant ring, Y-mode configuration

In a redundant ring an extra fibre pair is used. This extra fibre pair is used to carry data if one of the other fibre pairs breaks. In Y-mode mode an ODW-730 network will behave as a 2-wire bus. I.e. all communication devices will "hear" the data sent out by other communication devices.

Prepare the fibre optical network

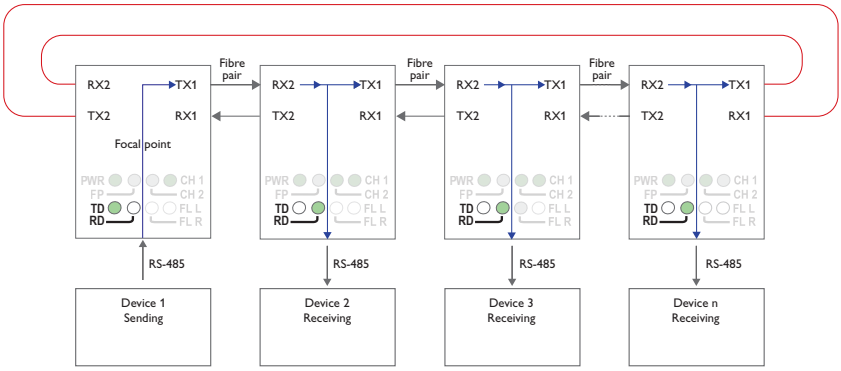


- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- Set DIP-switch S2:2 in the ON position (redundant ring) on all ODW-730 units.
- One, and only one, of the ODW-730 units must be configured as a Ring Focal Point by setting DIP-switch S2:3 to the ON position. (The Ring Focal Point acts as a logical end point in the optical fibre ring, thus forming a bus type of structure)
- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S1:8, S2:4, S2:5 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

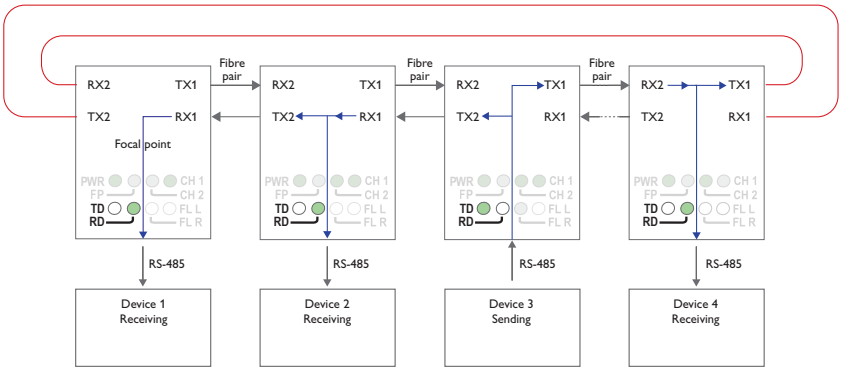
Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

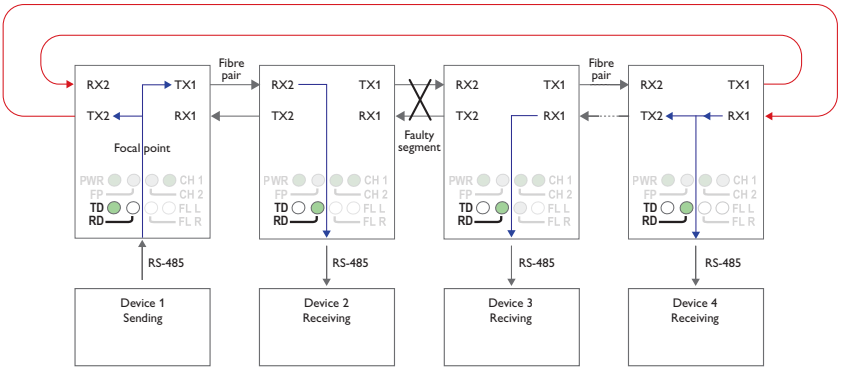
Data transport in redundant ring, Y-mode configuration



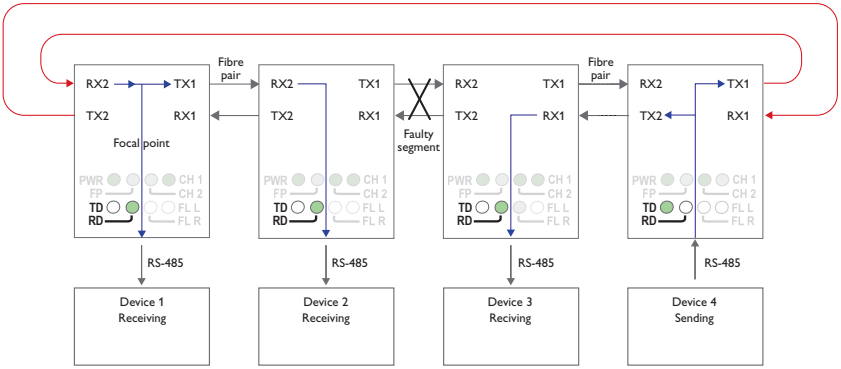
Data from comminication device 1 is received at the ODW-730 RS-485 port (as indicated by the TD LED), data bits are retimed according to the preset rate and sent out on the optical fibre TX1. The next ODW-730 unit receives data at optical fibre RX2 (as indicated by the RD LED), and data is sent out on the RS-485 port. Data is also repeated out on TX1 on to the next ODW-730 unit.



Data from some other communication device, for example device 3, is processed in the same way and sent out on both optical fibres TX1 and TX2. Notice that the Ring Focal point never repeats incoming data.



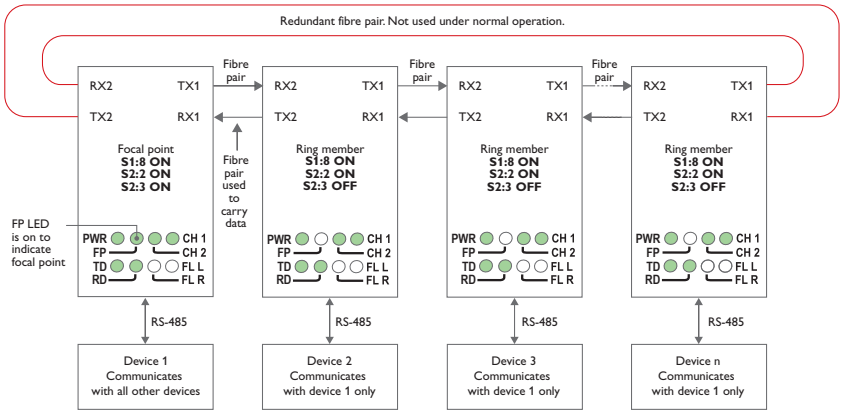
If an optical fibre segment fails, the ODW-730 Ring Focal Point will switch mode and start sending out data on both optical fibre ports, TX1 and TX2, simultaneously.



The other ODW-730 units will continue to send data out on both optical fibres TX1 and TX2. Consequently, all communication devices will still be able to communicate with each other. Notice that the Ring Focal Point is now repeating incoming data.

Redundant ring, V-mode configuration

In a redundant ring an extra fibre pair is used. This extra fibre pair is used to carry data if one of the other fibre pairs breaks. In V-mode mode an ODW-730 network will behave as a 4-wire bus. Where the first ODW-730 (leftmost in the picture below) will able to communicate in full duplex with any other unit, but other units are incapable of communicating with each other.



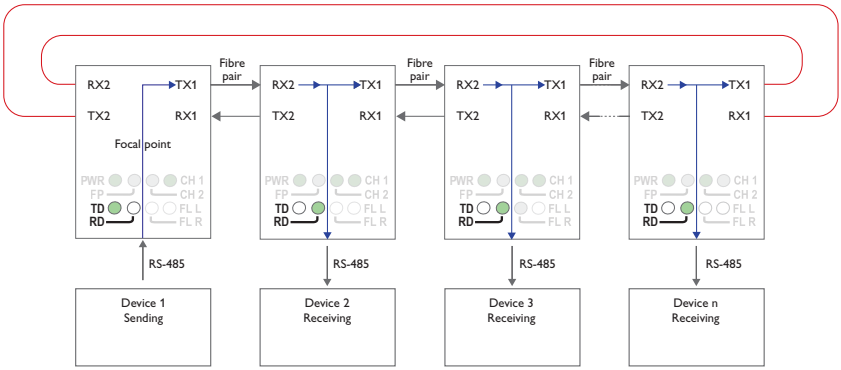
Prepare the fibre optical network

- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- Set DIP-switch S1:8 in the ON position (V-mode) on all ODW-730 units.
- Set DIP-switch S2:2 in the ON position (redundant ring) on all ODW-730 units.
- One, and only one, of the ODW-730 units must be configured as a Ring Focal Point by setting DIP-switch S2:3 to the ON position. (The Ring Focal Point acts as a logical end point in the optical fibre ring, thus forming a bus type of structure)
- Set DIP-switch S2:6 as desired. See page 34 “Status port” for more information.
- Verify that DIP-switches S2:4, S2:5 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED’s are on, FL L and FL R LED’s are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

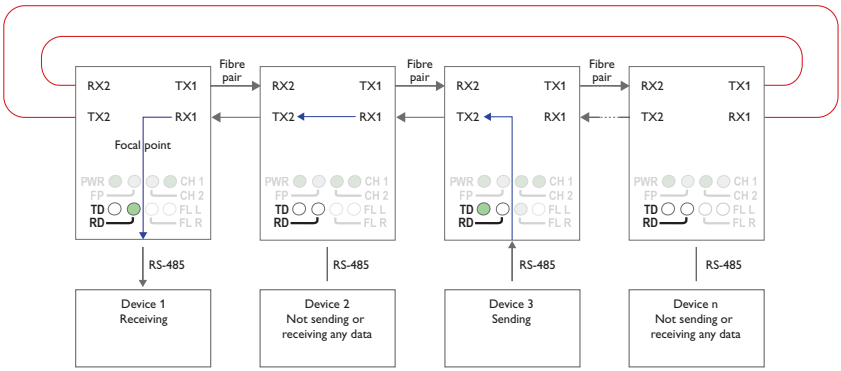
Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be

adjusted to accommodate these delays if using many ODW-730 units in a large network. See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in redundant ring, V-mode configuration



Data from comminication device 1 is received at the ODW-730 RS-485 port (as indicated by the TD LED), data bits are retimed according to the preset rate and sent out on the optical fibre TX1. The next ODW-730 unit receives data at optical fibre RX2 (as indicated by the RD LED), and data is sent out on the RS-485 port. Data is also repeated out on TX1 on to the next ODW-730 unit.

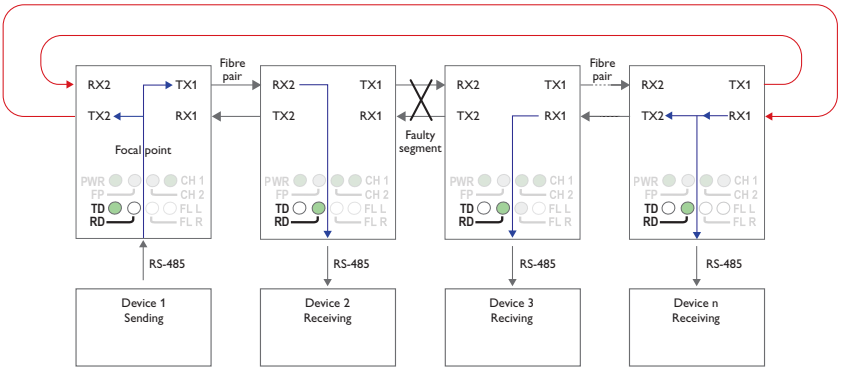


Data from some other communication device, for example device 3, is processed in the same way and sent out on optical fibre TX2. Intermediate ODW-730 units will receive this data at optical fibre RX1 and repeat it out on optical fibre TX2. But, intermediate units will not send any data received at RX1 on to the RS-485 port. **Only** the first ODW-730 (leftmost in the picture above) will have incomming data from optical fibre RX1 sent out on the RS-485 port.

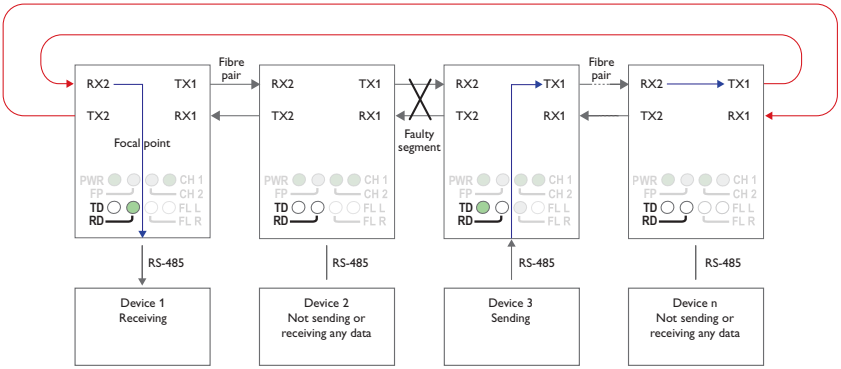
I.e. the first ODW-730 is able to communicate in full duplex with any other unit, but other units are incable of communicating with each other.

Notice that the Ring Focal Point never repeats incoming data.

If an optical fibre segment fails, the ODW-730 Ring Focal Point will switch mode and start sending out data on both optical fibre ports, TX1 and TX2, simultaneously.



ODW-730 units located to the "right" side of the failure will send data in the opposite direction as before. Notice that still, it's only the first ODW-730 that is able to communicate in full duplex with other units, and that other units are incable of communicating with each other.

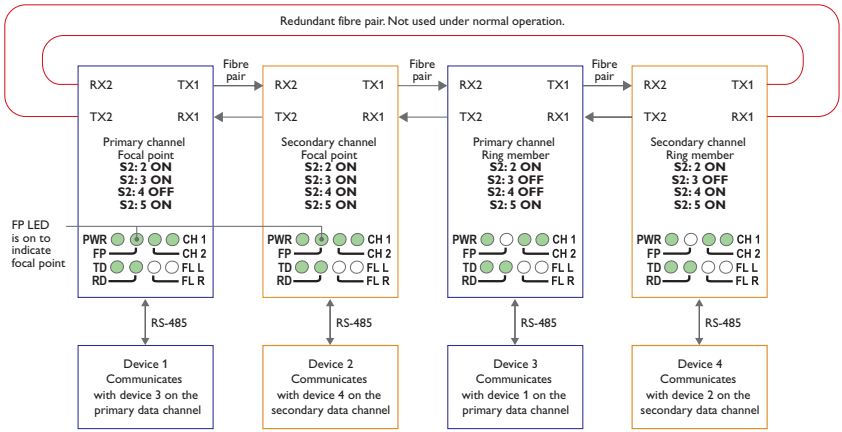


Redundant ring, dual channel, Y-mode configuration

In a redundant ring an extra fibre pair is used. This extra fibre pair is used to carry data if one of the other fibre pairs breaks.

In dual channel mode it is possible to use two separate data streams in a single ODW-730 network. However, all ODW-730's must be set to the same speed and data format. This, of course, limits the number of possible applications for a dual channel network.

In Y-mode mode an ODW-730 network will behave as a 2-wire bus. I.e. all communication devices will "hear" the data sent out by other communication devices.



Prepare the fibre optical network

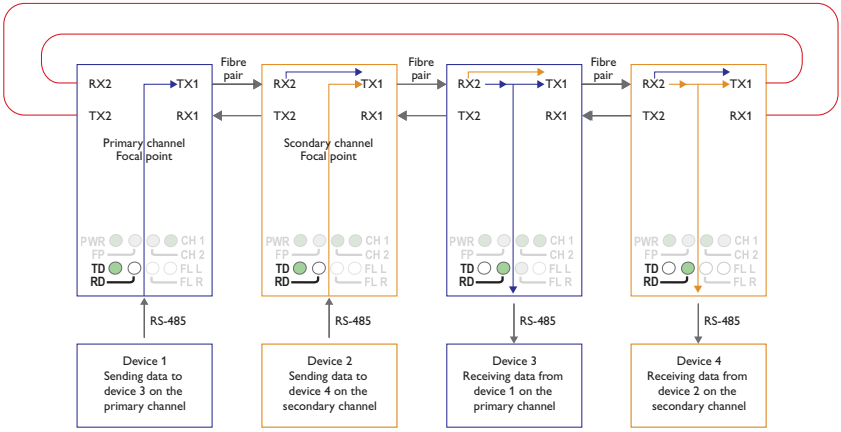
- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7. Again, notice that all ODW-730's must be set to the same speed and data format.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- Set DIP-switch S2:2 in the ON position (redundant ring) on all ODW-730 units.
- Set DIP-switch S2:5 in the ON position (dual channel system) on all ODW-730 units.
- All ODW-730 units that are to use the primary data channel ("blue" units in the picture above) must have DIP-switch S2:4 set to the OFF position. Units that are to use the secondary data channel ("orange" units in the picture above) must have DIP-switch S2:4 set to the ON position.
- One of the primary data channel and one of the secondary data channel ODW-730 units must be configured as a Ring Focal Point by setting DIP-switch S2:3 to the ON position.
- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S1:8, S2:1 and S2:8 are set in the OFF position.

- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in redundant ring, dual channel, Y-mode configuration

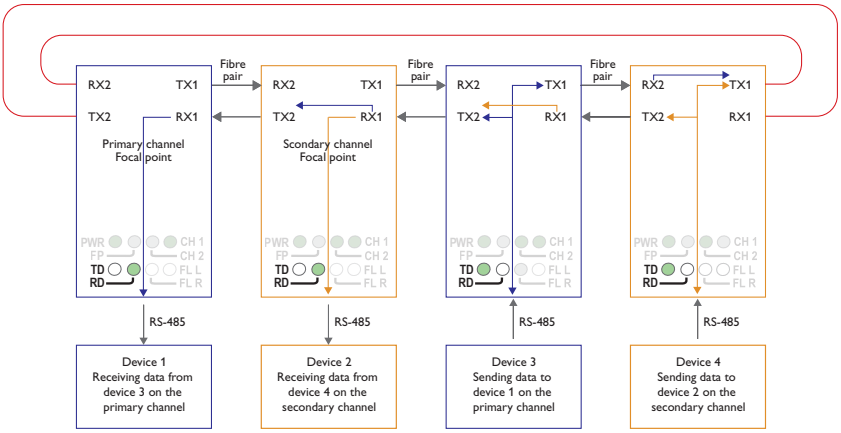


The first ODW-730 unit recieives data from communications device 1 on the RS-485 port and sends it out on optical fibre TX1 using the primary data channel.

The second ODW-730 unit receives primary channel data on optical fibre RX2. Primary channel data is repeated out on optical fibre TX1. The second ODW-730 unit also receives data from communications device 2 on the RS-485 port. The RS-485 data is sent out on optical fibre TX1 using the secondary data channel.

The third ODW-730 unit receives both primary and secondary channel data on optical fibre RX2. Both primary and secondary data are repeated out on optical fibre TX1, but only the primary channel data is sent out on the RS-485 port.

The fourth ODW-730 unit receives both primary and secondary channel data on optical fibre RX2. Both primary and secondary data are repeated out on optical fibre TX1, but only the secondary channel data is sent out on the RS-485 port.



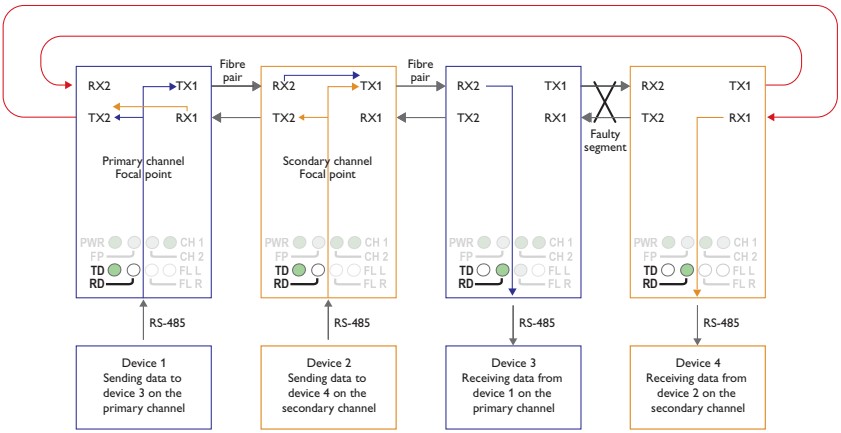
The fourth ODW-730 unit recieives data from communications device 4 on the RS-485 port and sends it out on both optical fibres TX1 and TX2 using the secondary data channel.

The third ODW-730 unit receives secondary channel data on optical fibre RX1. Secondary channel data is repeated out on optical fibre TX2. The third ODW-730 unit also receives data from communications device 3 on the RS-485 port. The RS-485 data is sent out on both optical fibres TX1 and TX2 using the primary data channel.

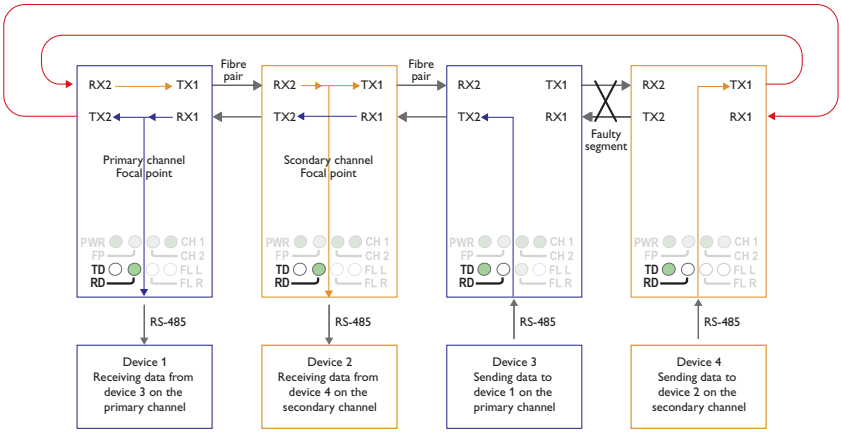
The second ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Only the primary channel data is repeated out on optical fibre TX2, and only the secondary channel data is sent out on the RS-485 port.

The first ODW-730 unit receives primary channel data on optical fibre RX1, and this data is sent out on the RS-485 port.

Notice that the Ring Focal Points never repeat data coming in from optical fibre RX2.



If an optical fibre segment fails, the ODW-730 Ring Focal Points will switch mode and start sending out data on both optical fibre ports, TX1 and TX2, simultaneously.



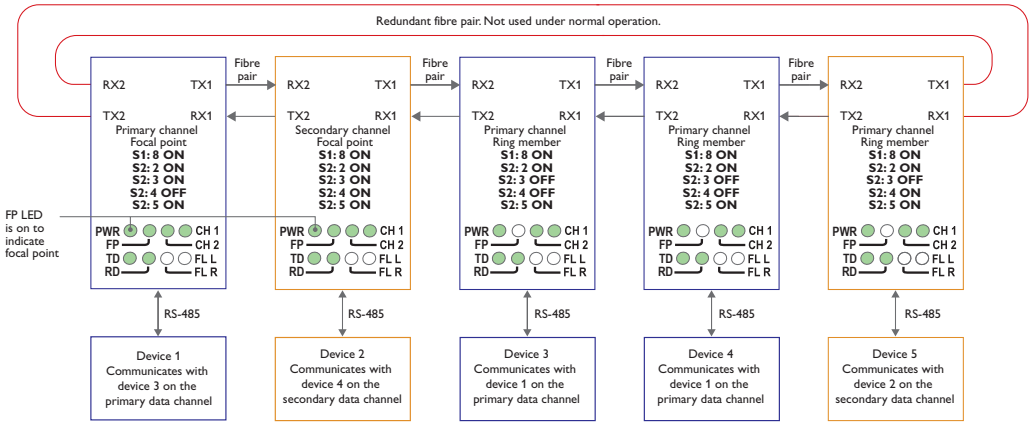
The other ODW-730 units will continue to send data out in as many directions as possible. Consequently, all communication devices will still be able to communicate with each other. Notice that the Ring Focal Points are now repeating incoming data from optical fibre RX2.

Redundant ring, dual channel, V-mode configuration

In a redundant ring an extra fibre pair is used. This extra fibre pair is used to carry data if one of the other fibre pairs breaks.

In dual channel mode it is possible to use two separate data streams in a single ODW-730 network. However, **all** ODW-730's **must** be set to the **same speed and data format**. This, of course, limits the number of possible applications for a dual channel network.

In V-mode mode an ODW-730 network will behave as a 4-wire bus. Where the first ODW-730 (leftmost in the picture below) will able to communicate in full duplex with any other unit, but other units are incapable of communicating with each other.



Prepare the fibre optical network

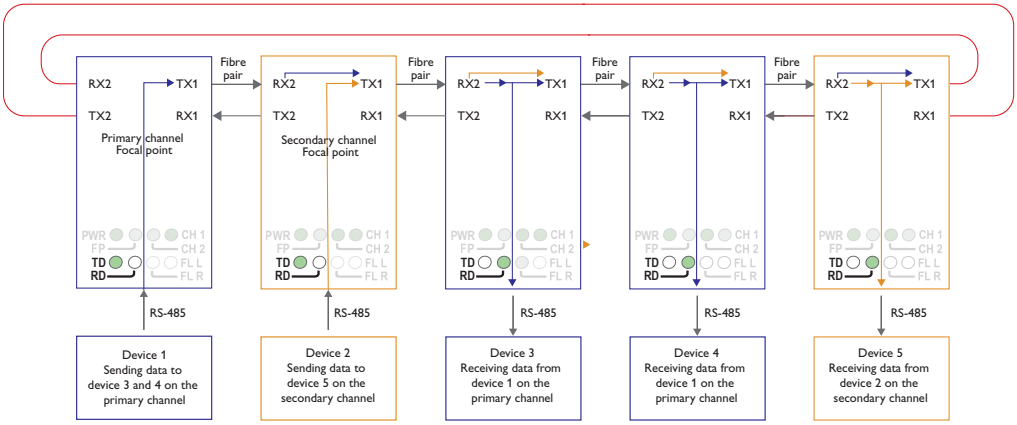
- Configure all ODW-730 units for the correct speed and data format using DIP-switches S1:1 – S1:7. Again, notice that all ODW-730's **must** be set to the same speed and data format.
- Select RS-485 2 wire and 4-wire mode using DIP-switch S2:1 (OFF = 2-wire, ON = 4-wire).
- Enable the RS-485 termination / fail-safe if required using DIP-switches S3:1 – S3:4 (S3:1 and S3:2 = 4-wire termination, S3:3 and S3:4 = 2-wire termination)
- Set DIP-switch S1:8 in the ON position (V-mode) on all ODW-730 units.
- Set DIP-switch S2:2 in the ON position (redundant ring) on all ODW-730 units.
- Set DIP-switch S2:5 in the ON position (dual channel system) on all ODW-730 units.
- All ODW-730 units that are to use the primary data channel ("blue" units in the picture above) must have DIP-switch S2:4 set to the OFF position. Units that are to use the secondary data channel ("orange" units in the picture above) must have DIP-switch S2:4 set to the ON position.
- One of the primary data channel and one of the secondary data channel ODW-730 units must be configured as a Ring Focal Point by setting DIP-switch S2:3 to the ON position.

- Set DIP-switch S2:6 as desired. See page 34 "Status port" for more information.
- Verify that DIP-switches S2:1 and S2:8 are set in the OFF position.
- Connect the fibre pairs between the units. Always connect CH 1 from one unit to CH 2 on the next unit as shown in the picture above.
- Connect the power supply to all units and verify that all fibre links become active. (CH 1 and CH 2 LED's are on, FL L and FL R LED's are off).
- Connect the communication devices to the corresponding ODW-730 unit.
- The network is now up and running.

Note: In an ODW-730 fibre optic network there will be some additional processing delays that do not exist in an electrical bus. It is possible that the application must be adjusted to accommodate these delays if using many ODW-730 units in a large network.

See page 32 "Calculating system processing delay" for more information on how to determine the overall system delay time.

Data transport in redundant ring, dual channel, V-mode configuration

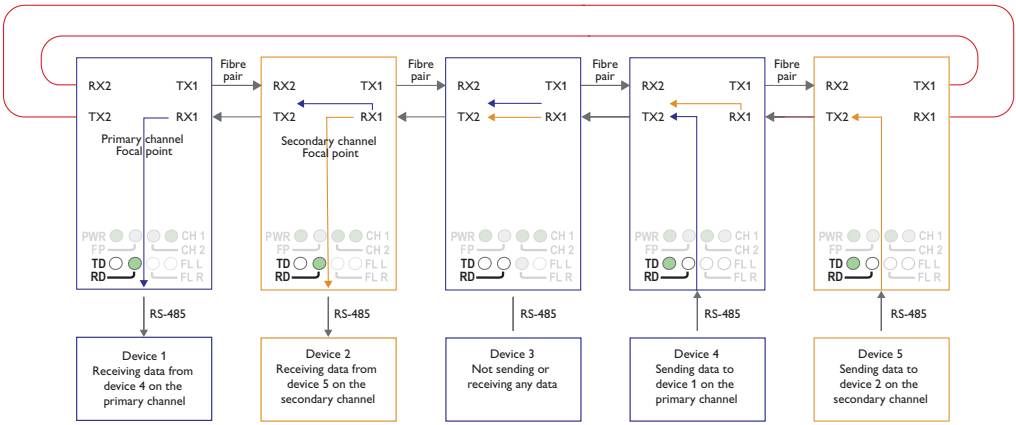


The first ODW-730 unit recieives data from communications device 1 on the RS-485 port and sends it out on optical fibre TX1 using the primary data channel.

The second ODW-730 unit receives primary channel data on optical fibre RX2. Primary channel data is repeated out on optical fibre TX1. The second ODW-730 unit also receives data from communications device 2 on the RS-485 port. The RS-485 data is sent out on optical fibre TX1 using the secondary data channel.

The third and fourth ODW-730 units receive both primary and secondary channel data on optical fibre RX2. Both primary and secondary data are repeated out on optical fibre TX1, but only the primary channel data is sent out on the RS-485 port.

The fifth ODW-730 unit receives both primary and secondary channel data on optical fibre RX2, but only the secondary channel data is sent out on the RS-485 port.



The fifth ODW-730 unit recieives data from communications device 5 on the RS-485 port and sends it out on optical fibre TX2 using the secondary data channel.

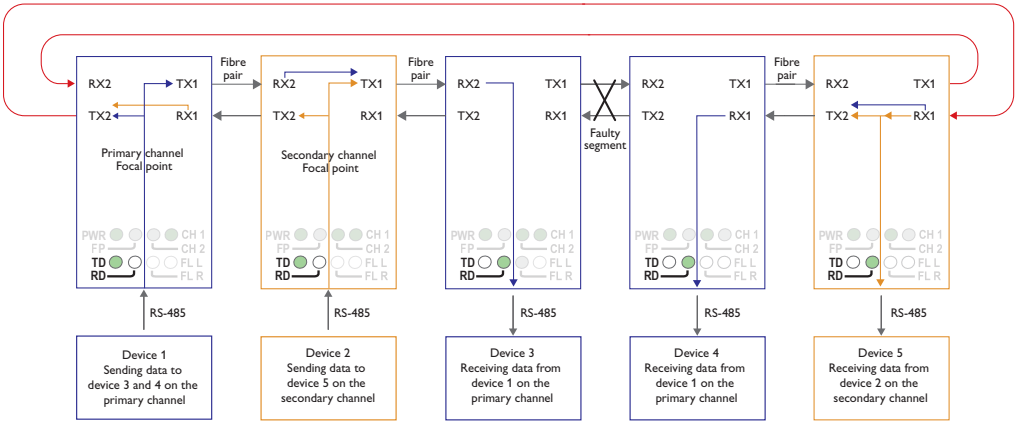
The fourth ODW-730 unit receives secondary channel data on optical fibre RX1. Secondary channel data is repeated out on optical fibre TX2. The fourth ODW-730 unit also receives data from communications device 4 on the RS-485 port. The RS-485 data is sent out on optical fibre TX2 using the primary data channel.

The third ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Both primary and secondary data are repeated out on optical fibre TX2. None of the data is sent out on the RS-485 port.

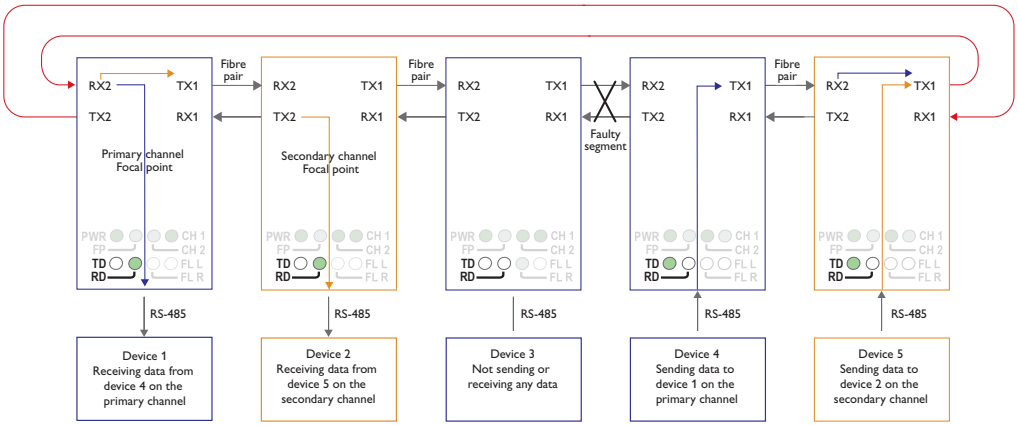
The second ODW-730 unit receives both primary and secondary channel data on optical fibre RX1. Both primary and secondary data are repeated out on optical fibre TX2, but only the secondary channel data is sent out on the RS-485 port.

The first ODW-730 unit receives both primary and secondary channel data on optical fibre RX1, but only the primary channel data is sent out on the RS-485 port.

Notice that the primary channel Ring Focal Point never repeats primary channel data coming in from optical fibre RX2 and that the secondary channel Ring Focal Point never repeats secondary channel data coming in from optical fibre RX2



If an optical fibre segment fails, the ODW-730 Ring Focal Points will switch mode and start sending out data on both optical fibre ports, TX1 and TX2, simultaneously.

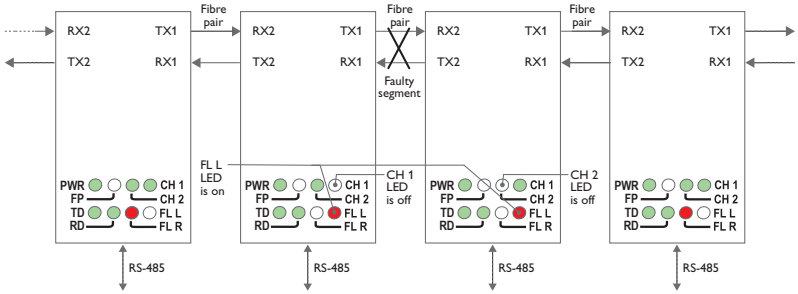


The third and fourth ODW-730 units will now switch direction so that data is sent out on optical fibre TX1 instead of TX2. (Not shown in the picture above, is that the third ODW will continue to send data out on TX2).

Consequently, communications device 1 is still able to communicate with device 3 and 4.

And communications device 2 is still able to communicate with device 5.

LED indication during optical link failure



If an optical fibre segment fails, to determine wich fibre segment has failed, look at the FL L, FL R, CH 1 and CH 2 LED's as show in the picture above.

Calculating system processing delay

Data exchange between commuinication devives via an ODW-730 fibre optic link, will be delayed due to the length of the optical fibre and the signal processing within the ODW-730. The signal processing delay is dependent on the data rate, and the fibre delay is dependent on the total length of the optical fibre. The additional time resulting from the optical fibre and ODW-730 is the Overall system delay.

	Delay @ < 1.Mbit/s
Optical fibre length delay (typical)	5 µs/km
Signal processing, electrical to fibre (max)	1 tbit + 1 µs
Signal processing, fibre to electrical (max)	0.3 µs
Signal processing, fibre to fibre (max)	1.06 µs

Note: tbit = 1 / Baud rate (Baud rate in bit/s)

Example: Calculate the maximum processing delay in a network comprising of 10 communication devices and 10 ODW-730 units, using a data rate of 115.2 kbit/s, with a total fibre length of 40 km. A data exchange between the two communication devices located at either end of the network.

1. Fibre: The total optical fibre length delay.
40 x 5 µs = 200 µs

2. Optical repeaters: The optical repeater delay x Number of optical repeaters (excluding the ODW-730 units connected to the communication devices that are exchanging data).
(10 – 2) x 1.06 µs = 8.48 µs.

3. Converter electrical to fibre: Signal processing delay inside the ODW-730 that is sending data.
1 tbit + 1 µs = 1/115200 + 1 µs = 9.68 µs

4. Converter fibre to electrical: Signal processing delay inside the ODW-730 that is receiving data.
0.3 µs

5. The system delay is calculated by summing the delays in item 1 to 4 above and multiplying the result by two:
2 x (200 µs + 8.48 µs + 9.68 µs + 0.3 µs) = 437 µs

Reconfiguration time under faulty condition

The reconfiguration time is determined by the time it takes to detect a faulty fibre segment plus the time it takes to transport an error status message through to the ODW-730 Ring Focal Point unit. The time to transport an error status message to the Ring Focal Point unit is dependent on how many units the error status message has to be repeated through and the total fibre length delay.

The time to detect a faulty fibre segment is less or equal to 3 µs.
The time to repeat an error status message through any unit is 0.8 µs

During reconfiguration data may be corrupted or lost.

Example: Calculate the maximum reconfiguration time in a network comprising of 10 ODW-730 units and a total fibre length of 40 km.

1. Error detection: The time it takes to detect a faulty fibre segment.
Always 3 µs.

2. Fibre: The total optical fibre length delay.
40 x 5 µs = 200 µs

3. Optical repeaters: The optical repeater delay x Number of optical repeaters (excluding the ODW-730 units connected to the communication devices that are exchanging data).
(10 – 2) x 0.8 µs = 6.4 µs.

4. The reconfiguration time is calculated by summing the delays in item 1 to 3 above:
3 µs + 200 µs + 6.4 µs = 209.4 µs

About the interfaces

Power terminal

The power terminal has two independent inputs, +VA and +VB, allowing redundancy should either fail. The ODW-730 power supply is galvanically isolated from all other internal electronics.

Optical fibre interfaces

ODW-730 uses Small From Factor Pluggable (SFP) transceivers that are in compliance with the Multi-Sourcing Agreement (MSA). This means that a wide range of different fibre tranceivers and connectors can be used.

RS-485 interface

A 4 position detachable screw terminal that can handle full duplex data rates up to 1.5 Mbit/s and can be set to either 2- or 4-wire RS-485 system.

When 4-wire RS-485 is selected, the terminals T/R+ and T/R– will always be set to transmit and terminals R+ and R– will always receive data.
Manchester coded protocol can be tranferred with Synchroous mode.

Status port

The status port connects to an internal relay wich may be used to trigger an external alarm if a fault condition occurs. During normal operation pins 1 and 2 are in contact with each other, and pins 2 and 3 are isolated. During an optical link failure, or power failure, pins 1 and 2 are isolated, and pins 2 and 3 are in contact with each other.

Optical link failures can be classified in to two categories, local or remote, as indicated by the FL L and FL R LED's. A local link failure is when an optical link is down at this particular unit. A remote link failure is when an optical link is down at some other unit.

From the factory, the status port is set to trigger on both types of link failures. However, by setting DIP-switch S2:6 to the ON position, the status port will only trigger when a local link failure has occured.

Westermo • SE-640 40 Stora Sundby, Sweden
Tel +46 16 42 80 00 Fax +46 16 42 80 01
E-mail: info@westermo.com
www.westermo.com

Sales Units

Sweden
Westermo Data Communications
Svalgången 1, Vallbyinstitutet, 724 81 Västerås
Tel: +46 (0) 21 548 08 00 • Fax: (0) 21 35 18 50
info.sverige@westermo.se • www.westermo.se

United Kingdom
Westermo Data Communications
Talisman Business Centre
Duncan Road, Park Gate, Southampton. SO31 7GA
Tel: +44 (0) 1489 580 585 • Fax: +44 (0) 1489 580 586
sales@westermo.co.uk • www.westermo.co.uk

Germany
Westermo Data Communications
Goethe Strasse 67
DE-68753 Waghäusel
Tel: +49 (0) 7254 95400-0 • Fax: +49 (0) 7254-95400-9
info@westermo.de • www.westermo.de

Austria
Westermo Data Communications
Tel: +43 (0) 72030 3920 • Fax: +43 (0) 2235 86131
info@westermo.at • www.westermo.at

France
Westermo Data Communications
Bat. A, 9 Chemin de Chilly
FR-91160 Champlan
Tel: +33 1 69 10 21 00 • Fax: +33 1 69 10 21 01
infos@westermo.fr • www.westermo.fr

Singapore
Westermo Data Communications
2 Soon Wing Road #08-05,
Soon Wing Industrial Building
Singapore 347893
Tel: +65 6743 9801 • Fax: +65 6745 0670
sales@westermo.com.sg • www.westermo.com.sg

North America
Westermo Data Communications
939 N. Plum Grove Road, Suite F,
IL 60173 Schaumburg, USA
Tel: +1 847 619 6068 • Fax: +1 847 619 66 74
info@westermo.com • www.westermo.com

Taiwan
Westermo Data Communications
F2, No. 188, Pao-Chiao Rd. Shing-Tien City,
Taipei 23145
Tel: +886 2 8911 1710
sales.cn@westermo.com • www.cn.westermo.com

China
Westermo Data Communications
2F Building B
No.1618 Yishan Road
Shanghai 201103
Tel: +86 21 6145 0400 • Fax: +86 21 6145 0499
sales.cn@westermo.com • www.cn.westermo.com

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