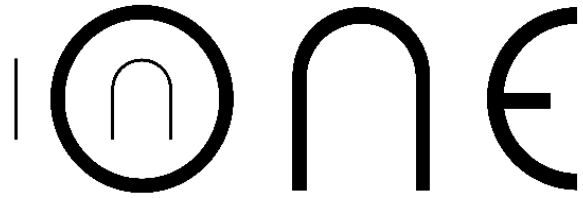


POWER & FIBER



Air Blown Power and Fiber system

Application Note



This document is intended to describe the purpose and function of Hexatronic InOne Air Blown Power and Fiber system. It will provide an overview of what options are available and highlight issues to consider for deployment.

## AIR BLOWN POWER AND FIBER SYSTEM

Forget complicated installations and multiple cables for power and fiber connections. With Hexatronic InOne, devices may be connected to power and fiber networks with a single micro hybrid cable – which can be blown into an existing infrastructure of ducts.

### READY TO USE IN EXISTING INFRASTRUCTURE

Blowing InOne slim micro hybrid cables into microducts can reduce installation costs by 50-70%. Unoccupied microducts in existing network infrastructure can be used to get maximum output of the network investment already made.

### SECURES POWER AND FIBER SUPPLY

The InOne system can feed multiple devices with power and fiber using a source located at a single point. This simplifies network and installation planning and gives you total control over power and fiber supply. With distances of 500-1000 m and power transmission of up to 400W, the distance and power limitations of existing Power and Fiber transmission systems such as PoE are overridden.

### HIGH SAFETY LEVEL

The InOne system use a unique low voltage transmission system to safely transmit high power over long distances through extremely slim air blown cables. The InOne system is tested and approved in accordance to EN 50288-7.

### Application

InOne can be used for a diversity of applications such as 5G and WLAN access points, Smart Cities, IoT, Surveillance Systems etc. Some examples are:

#### Fixed Wireless Access, FWA

5G FWA deployment involves the complexity of planning and optimization of Radio Access Network coverage, Fiber Access

Network connections and Power Network connections. InOne combines two networks into one which reduces the complexity and total cost substantially.

### WLAN Coverage

Public WLAN access points benefit from the extended reach of PoE by using the InOne systems PoE extender. A single cable in the InOne system can transmit enough power for several daisy chained WLAN access points over distances of 1000 m or more.

### Security Systems and Surveillance Cameras

Owning your own power gives another dimension to the term security and reliability for critical applications. No need to worry about local power interruptions, UPS battery maintenance etc.

## HEXATRONIC InOne A COMPLETE SYSTEM

The Hexatronic InOne system consists of all components needed for safe end-to-end transmission of power and fiber. Some examples are shown below:

#### 1. Access Node Power Rectifiers

Converts 230VAC to high power, but safe 100VDC transmission. Hexatronic Fiber trays and Power trays are used to splice towards the hybrid cable.

#### 2. Hybrid Fiber/Power Termination Panels

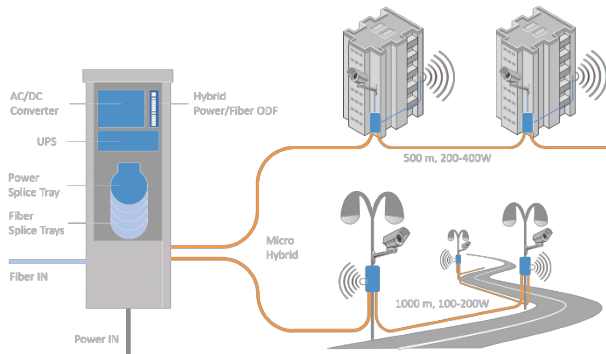
Miniature panels that combine power and fiber termination onto one single unit for easy connection. Available for DIN-rail or 19" rack mount.

#### 3. Air-blown ultra slim Hybrid Power/Fiber Cables

A complete range of cables for air-blown microduct installation or indoor installation. For distances up to 2000m. Indoor cables are halogen free and flame retardant according to CE Dca

#### 4. Power Receiver Unit with Fiber Management

This end user connection point can also be supplied with a manageable PoE switch for easy connection of 1-4 WLAN access points, security cameras etc.



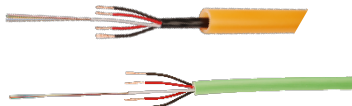
### System overview

InOne is a logical extension of our durable and cost-effective Matrix system for deployments of fiber networks in direct burial, duct, indoor and aerial installations with microducts, microduct connectors, duct branches, joint closures and street cabinets.

InOne extend the matrix system with:

- Hybrid Cables
- Hybrid ODF
- Power supply
- Power splice tray
- Termination Boxes
- Media Converters/Switches

### Hybrid Cables



- Duct and Indoor version
- Up to 24 fibers and 4 copper wires 0.75 mm2
- Super slim design for microducts down to 8 mm
- Excellent installation performance up to 1000m
- Unique design with robust inner tubes
- Temperature range from -45 to +70 °C
- Easy to prepare and identify fibers
- Halogen-free flame retardant EN 50575 Dca-s2,d2
- Rated to 120 Vdc

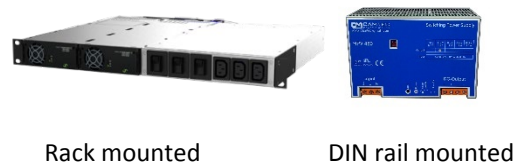
Detailed product info see data sheet TOL40790+

### Hybrid ODF



The Hybrid ODF exist in two version Rack mounted or for DIN rail mounting. Equipped with splice holders and LC adapters for 12 fibers. Power wires is terminated in spring loaded terminals with Min-Fit connector on front for power cords to power supply.

### Power Supply



Power supply of 110 Vdc rack or DIN rail mounted depending on installations.

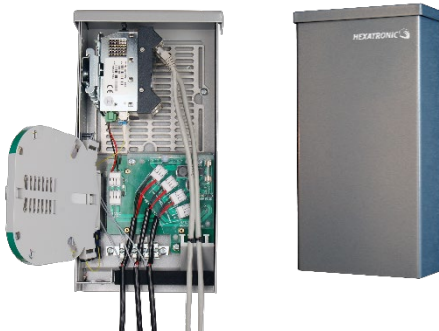
- Soft start & auto-recovery
- Precise dynamic response to load change
- Designed for long life under full stress
- Strong input filters
- High reliability, shock & vibration proof
- EMC meets CE norm class B
- Overload and short circuit protection

### Power Splice Tray



Power splice tray designed to fit in Matrix standard fiber tray cabinets. Splitting the included power wires to power tray and fibers in a standard fiber tray within the same cabinet. Enables a smooth integration of InOne hybrid cable into Matrix standard product line. The Power tray is equipped with spring loaded terminals for power wire for easy termination and overvoltage protection, LED indication for proper power supply.

## Termination Box



The termination box is designed to be mounted on walls, in street cabinets or other weather protected areas.

- Remote Powered by Hexatronic InOne System
- Stabilized and protected power 150 W, 48 Vdc
- Easy power termination and fiber splicing off several hybrid cables, enables a central powered fiber network by daisy chain and branch out 1-3. Splice tray for robust fiber termination.
- Power inlet is designed with blocking functionality with faulty polarity connection detection. LED at power inlet indicate correct polarity and powering.
- Dedicated area with several options for mounting of PoE media switches.
- Optional pre-mounted media switch with 4xPoE+
- Compact design, WxHxD 150x285x60 mm
- Ambient Operating Temp.- 40°C - +60°C
- Wall mounting

## Media Converter/Switch

Several types of media converters exist depending on requirements as number of PoE ports, managed or unmanaged, Wall, DIN or rack mount and so on.



## Matrix portfolio

Matrix product line is a complete system of products for fiber from central office to access terminals in access network. The system includes products for aerial, ground, underwater and indoor installation.



Microducts and Microduct Assemblies



Fiber Optic Cables



Microduct Accessories



Installation Tools and Accessories



Fiber Optic Interconnect Products



Network Products

For more info on matrix products visit our webpage [hexatronic.com](http://hexatronic.com).

Enclosures



Street cabinet from Matrix extended with InOne power supply, ODF and power tray.

InOne power system

InOne power system is based upon the use of 110 Vdc power supply defined as Extra-low voltage. **To be installed by a person whose qualifications meet the requirements of the national electrical regulations for 120 Vdc**

Termination boxes includes a DC-DC converter to handle the variation of voltage due to cable length and power load. Output voltage from the DC-DC converter is stabilized to 48 Vdc as standard and is adjustable to 57 Vdc for PoE+ output

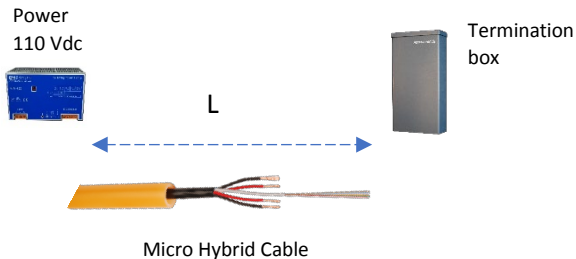
Power calculation

There are some limitations to be aware of:

- Max power from Power supply unit
- Voltage drop from Hybrid cables
- Max power from DC-DC converter in termination box
- PoE limitations in media Switch

Some examples of power budgets with different hybrid cables and applications.

Single access point load

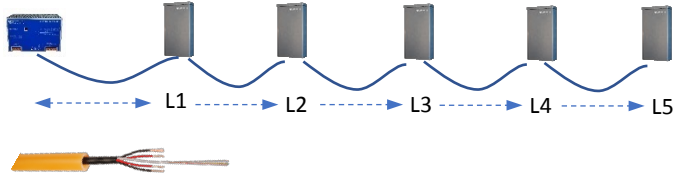


Depending on hybrid cable type the maximum power load with various cable length is as below.

|        | 200m  | 400m | 1000m | 2000m |
|--------|-------|------|-------|-------|
| 4x0.75 | 500W  | 250W | 100W  | 50W   |
| 4x1.5  | 1000W | 500W | 200W  | 100W  |

Daisy chain load

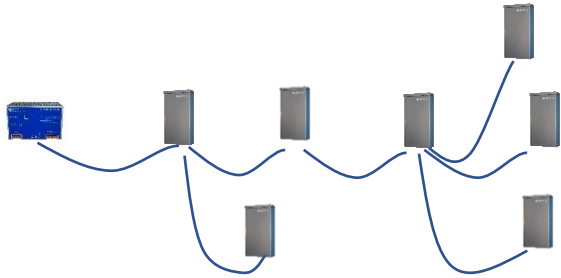
With daisy chained application the distributed power load needs to be calculated more carefully with our design tool. Below an example of loads and distances.



|        | L1   | L2   | L3   | L4    | L5    |
|--------|------|------|------|-------|-------|
|        | 100m | 400m | 700m | 1000m | 1300m |
| 4x0.75 | 30W  | 30W  | 30W  | 30W   | 30W   |
| 4x1.5  | 60W  | 60W  | 60W  | 60W   | 60W   |

Diverse network

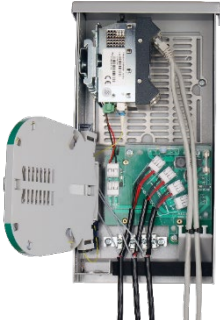



Since the termination box supports splitting the hybrid cable 1->3, diverse structured network is possible to fit many network applications. Example as illustrated below



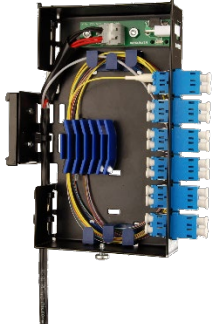

For detailed calculation of maximum power load a design tool is available for download.

| Cable | Cable type            | Resistance | Powerload |
|-------|-----------------------|------------|-----------|
| 1-3   | 4x1.5 mm <sup>2</sup> | 4.38       | 4.38      |
| 3-4   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 4-5   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 5-6   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 2-3   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 2-4   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 2-5   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 2-6   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 3-7   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 4-7   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 5-7   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 6-7   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 8-9   | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 9-10  | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 10-11 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 11-12 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 12-13 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 13-14 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 14-15 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 15-16 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 16-17 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 17-18 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 18-19 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |
| 19-20 | 4x1.5 mm <sup>2</sup> | 25.28      | 25.28     |


## Terminal box

| Picture   | Description   | Status  |
|---|---|---|
|    | <p>Hybrid termination box<br/>           Including DC-DC converter -&gt; 48 Vdc<br/>           Splice tray to handle 16 fiber splices<br/>           Space for Media switch<br/>           Wall mounted IP 52 (weather protected)</p>   | <p>HNCD520232/1 (<i>No Media Sw</i>)<br/>           HNCD520232/2 (<i>4xPoE</i>)<br/>           Released</p> |
|   | <p>Hybrid termination box<br/>           Including DC-DC converter -&gt; 48 Vdc<br/>           Splice tray to handle 16 fiber splices<br/>           Space for Media switch<br/>           Wall mounted IP 65 (weather protected)</p>   | <p>Ongoing design for<br/>           Outdoor weather proof<br/>           termination box.</p>              |
|  | <p>XS Hybrid termination box for hidden pole<br/>           mounting (Pole diam 100 mm)<br/>           Including DC-DC converter -&gt; 48 Vdc<br/>           Splice tray to handle 2 fiber splices<br/>           Possible to daisy chain Hybrid<br/>           Interface - LC duplex, Power terminal</p> | <p>On going concept design</p>  |
|  | <p>"iPhone" box<br/>           Passive termination of Micro hybrid for<br/>           split to fiber and power cable</p>  | <p>Prel design</p>  |

## Hybrid ODF

| Picture   | Description   | Status                    |
|---|---|---------------------------|
|  | Hybrid ODF DIN mounted<br>Adapters for 12 LC<br>Power inlet Mini-fit  | HNCD520225/11<br>Released |
|  | Hybrid ODF Rack mounted<br>Adapters for 12 LC<br>Power inlet Mini-fit | Prel concept design       |

## Power tray





| Picture   | Description                              | Status              |
|---|--|---------------------|
|  | Power tray based upon fiber tray concept | Prel concept design |

## Power unit

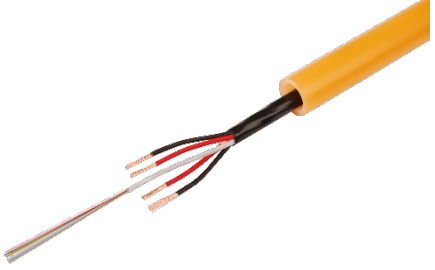
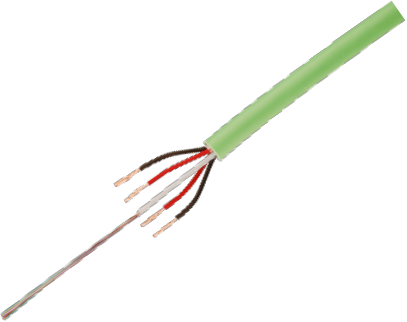
| Picture   | Description   | Status  |
|---|---|---|
|    | 110 Vdc 480 W rectifier (switched)<br>110 Vdc 1000 W rectifier (switched) | HBMR136200/51<br>HBMR136200/6<br>Released   |
|    | 110 Vdc 120 W rectifier (switched)  | HBMR136200/31<br>Released   |
|   | 110 Vdc 200W Rectifier  | HBMR136200/2<br><b>(Released)</b><br><i>(not fully complied to ES2 band ripple)</i> |
|  | 110 Vdc Rectifier rack mount  |   |
|  | 110 VDC rectifier 1200W   |   |





Media Converter/Switch

| Picture   | Description   | Status                   |
|---|---|--------------------------|
|    | Media converter 1G SFP 1xPoE+<br>DIN mounted          | HKDU136100/1<br>Released |
|   | Media switch 1G SFP 4xPoE+<br>DIN Mounted<br>Managed  | HKDU136100/2<br>Released |
|  | Media Converter Rack mounted<br>(Transition Networks) |                          |
|  | Rack shelf for media converters..                     |                          |

## Micro Hybrid Cables

| Picture  | Description  | Status                                     |
|--|--|--|
|   | Duct type<br>12 SM 4x0.75mm <sup>2</sup><br>24 SM 4x1.5mm <sup>2</sup>                   | TOL4079028/12<br>TOL4079029/24<br>Released |
|  | In/Outdoor type CPR Class D<br>12 SM 4x0.75mm <sup>2</sup><br>24 SM 4x1.5mm <sup>2</sup> | TOL4079030/12<br>TOL4079031/24<br>Released |

## SFP

| Picture   | Description  | Status                                   |
|---|--|--|
|  | SFP 1G WDM (BiDi)<br>TX1550/RX1310<br>SFP 1G WDM (BiDi)<br>TX1310/RX1550 | HRDH102001/1<br>HRDH102001/2<br>Released |
|  | SFP 1G 10km 1310 dual strand   | HRDH102001/3<br>Released                 |