## Wave breakers

## FO splice boxes for future-proof high-speed data transmission

Ubiquitous computing, Internet of Things, cloud computing – three terms, one idea. All three terms also reflect the increased importance of information technology and data transmission. The new splice boxes from Phoenix Contact ensure continuously reliable data transmission in real time via fiber optics (figure 1).

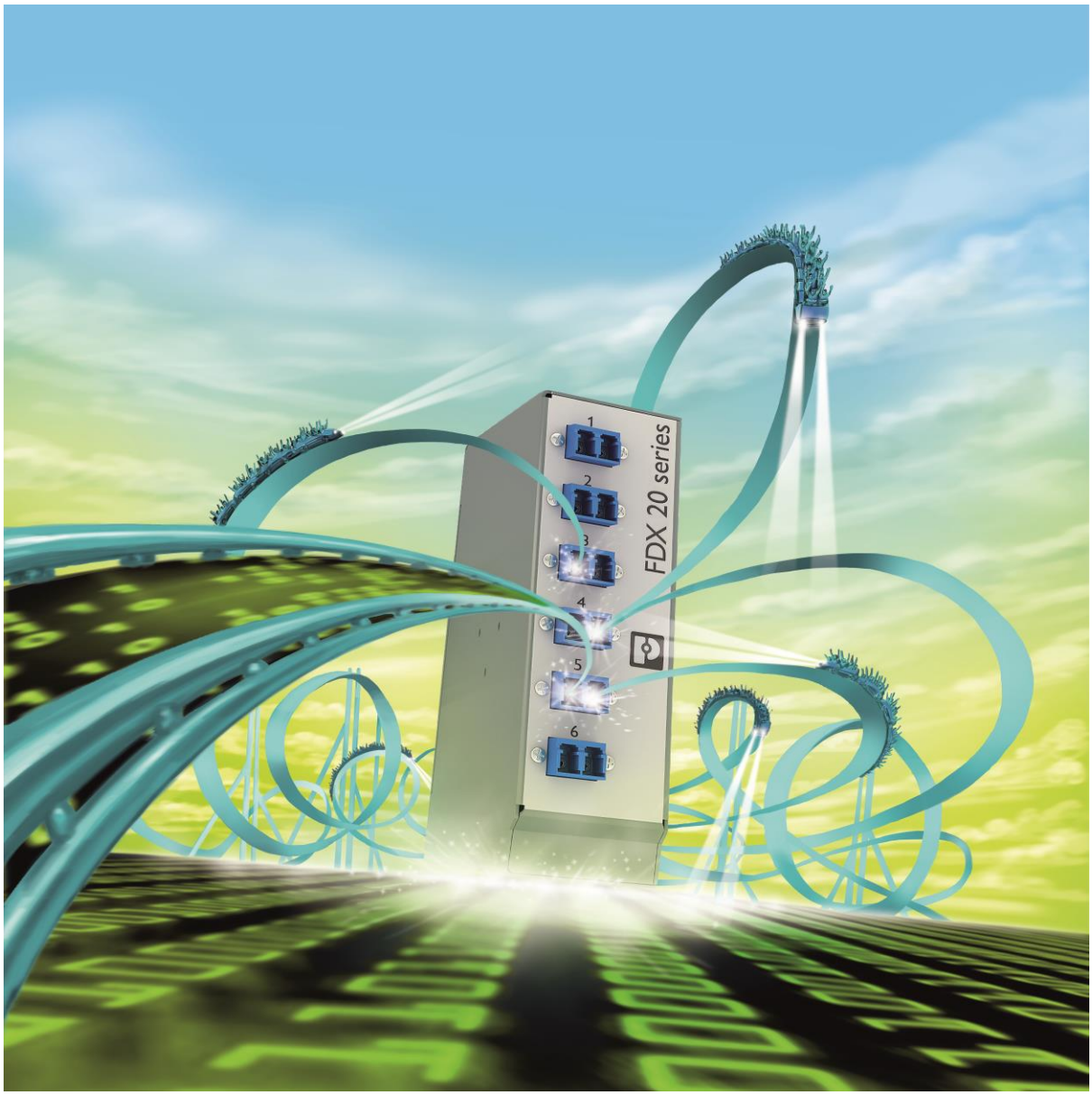


Figure 1 Splice boxes bundle connected end devices on the active side to the loose tube cables of the backbone cabling

What things will be present in the Internet of Things and why? And where is the data cloud? In principle, data does not exist on the Internet or in the cloud. Instead, it is in the physical memories of end devices such as smartphones, PCs, and industrial automation devices.

These end devices are connected to each other in local networks (LAN – local area network), broadband telecommunication networks (MAN – metropolitan area network), national networks, (WAN – wide area network) and ultimately, worldwide networks (GAN – global area network). If end devices are the brains of the Internet of Things, the transmission media are its central nervous system or backbone. The data streams of all end devices are bundled into these. Accordingly, these transmission paths must be designed for high performance, immunity to interference, and failsafe performance.

**Fiber optics has many advantages**

Optical data transmission via fiber optics (FO) enables data rates of up to 40 Gbps over paths that are many kilometers long, does not have a negative effect on adjacent cables, and at the same time is resistant to electromagnetic interference. Therefore, fiber optics has established itself as the backbone transmission medium in local networks since the beginning of the 1990s. The compact cables were simply pulled through the existing power supply ducts – or blown in with compressed air to save time and prevent damage.

With the increasing development of broadband networks and the connection of a rapidly growing number of communication devices – for example in data centers – the end of the FO path moved closer and closer to the local end user network after the turn of the millennium. Especially as trunk lines, both from and to data centers, optical multi-fiber cables with MPO or MTP male connectors have been the de facto standard since the early 2000s.

The last section of the transmission path to the end device – the so-called last mile – still consists primarily of twisted copper cables with two (twisted pair) or four (star quad) cores to this day. Therefore, on the passive infrastructure side, there are

**Series FDX 20 FO splice boxes – At a glance**

- Device type: Splice box/splice distributor
- Mounting: DIN rail
- Dimensions (W, H, D): 40 mm x 130 mm x 115 mm
- Front connections: 6 x each ST duplex, LC quad, SC duplex, LSH duplex
- Fiber categories: OM1, OM2, OM3, OM4, and OS2 (PC and APC)
- Degree of protection: IP20
- Industries: Industrial and process automation, renewable energies, mining, building automation, etc.

**Pin connector patterns and standards**

The FDX 20 FO splice box series complies with the following pin connector patterns and standards

- MPO – multiple fiber push-on (IEC 61754-7)
- SC – subscriber connector (IEC 61754-4)
- LC – lucent connector (IEC 61754-20)
- ST – straight tip (IEC 61754-2)
- E-2000® – (IEC 61754-15)

fiber optics and matching pin connector patterns, such as ST, SC, and LC. At the same time, on the active consumer or converter side, there are copper conductor and pin connector patterns such as M12 or RJ45.

**Splice boxes are transition points**

The transmission and distribution points between these are splice boxes or splice distributors. The FO cables from data centers or control centers, which are often designed as loose-tube cables, enter into these and are split into different FO connections to a media converter or directly to the recipients in the control cabinet.

The advantage of these passive junctions, or hubs, is obvious. If a device such as a media converter is replaced or added on the active side, the system operator will not have to replace all the established infrastructure cabling at the same time. The multi-fiber trunk line remains as is and continues to ensure interference-immune data transmission in the backbone. Only the significantly shorter, less expensive patch cables between the junction and the active components need to be replaced or added. This ensures that the level of investment in the backbone – such as cables, lines,and distributors – remains unchanged. The new active device can also be commissioned more quickly, because the patch cables that need to be replaced are directly accessible in the control cabinet.

**Compact DIN rail devices**

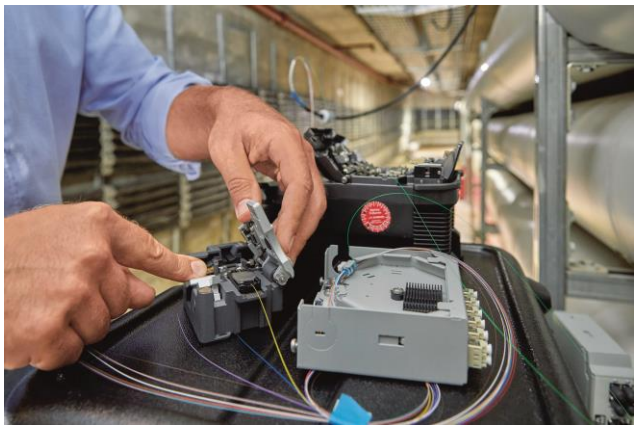

Figure 2 Ready-to-splice pigtails simplify the connection and installation of the splice box

Unlike 19" components, DIN rail splice boxes are not installed directly in extensive data centers, rather, they are installed inside compact field control cabinets, in control rooms, or in offices. Accordingly, the devices are designed to be compact in order that they can be snapped into place directly next to other devices on the DIN rail. The new type FDX 20 splice boxes from Phoenix Contact measure just 40 mm x 130 mm x 115 mm (W, H, D), but still provide a generously dimensioned pigtail tray on the inside.

The tray holds the fiber optics routed to the front connections onto which the individual fiberglass fibers of the loose tube cables are thermally spliced. Since splicing is a critical step of the process during which the fiberglass can be contaminated, broken, or inaccurately connected unless properly handled, an easily accessible tray is essential. At the same time, the minimum approved bend radii for fiberglass place tight limits on the device size. This compromise between compactness and operability means that it must be possible to connect and operate the splice boxes easily (figure 2).

In the FDX 20 series devices, the conveniently dimensioned pigtails are already prepared for thermal splicing – i.e., they are already connected to the respective front connections, meaning that only the open fiber ends must be connected to the fibers of the loose tube cables. This minimises possible sources of error and reduces commissioning time in the field.


Figure 3 The splice boxes are available with front connections for 6 ST duplex, 6 SC duplex, 6 LSH duplex (at left in the figure) and 6 LC quad (at right in the figure)

**Uniform design**

Device versions with 6 LC quad, 6 LC duplex, 6 SC duplex, 6 ST duplex, 6 LSH duplex, and 12 LSH duplex connections are available for different applications or devices connected on the active side. Thanks to the standardised pin connector patterns for fiber categories OM1 to OM4 as well as OS2, the splice boxes also provide high flexibility and investment security on the active side (figure 3).

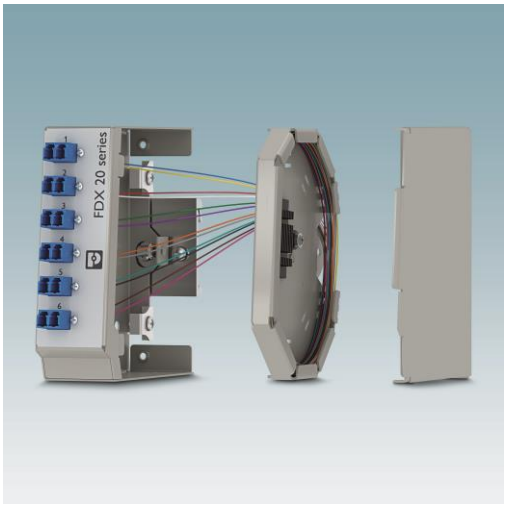


Figure 4 The FDX 20 series features a large splice tray in a compact, uniform device design

The front panels of the entire series have a uniform design, which means that in larger device configurations, the function and assignment to the active device side is clearly identifiable. Planner and users benefit from an improved overview and intuitive front operation. Providers of complete control cabinets can group functional or manufacturer-specific units, thus recognisably signalising the high quality and reliability of the components (figure 4).

**Summary**

DIN rail splice boxes are key junctions between the FO-based backbone cabling and the copper-based data cabling in control cabinets and in the field. As purely passive components, they secure the investment in existing FO cabling and simplify the replacement of active components. Splicing trays, compact bending radii, and user-friendly front connections for established pin connector patterns are important features for reliable, efficient operation in control cabinets. The new FDX 20 splice box series from Phoenix Contact combines these features and, thanks to a uniform design, can be integrated ideally into functional device configurations.

More information : https://www.phoenixcontact.com/webcode/#1834

If you are interested in publishing this article, please contact Becky Smith: marketing@phoenixcontact.co.uk or telephone 0845 881 2222.