

WHITEPAPER | CABLE ASSEMBLY FOR MARKET APPLICATIONS

# ÖLFLEX® CONNECT SERVO Assemblies from LAPP – Get the most out of your servo assemblies



## INTRODUCTION

Ever used one of those “complete market solutions” offered by servo systems manufacturers? These solutions consist of servo controller, motors and cable assemblies, and often include glossy marketing jargon such as “comes with system warranties” or “designed or optimised to work together.”

If you answered ‘yes’, take a pause and read on! Unlike cable manufacturers, Servo system solution providers often provide just a limited product range and also fewer cabling possibilities – a solution for static use and another for dynamic applications. This one-size-fits-all approach means that the solution meant for dynamic use is often recommended for any application requiring movements, no matter how slow or low the acceleration required. And this includes the entire spectrum of moving applications from movements of 0.1m/s (wood working or material handlers) to 10 m/s (pick & place machines or wire bonders).

Hardly the cable experts, equipment designers may incorrectly assume that there are no alternatives – anything but! Here are some must-know tips and suggestions if you are keen on a quick, straightforward and cost-saving implementation using servo system designs.

## APPLICATION AND SELECTION CRITERIA

### 1 Mechanical Performance

Simply put, two factors determine the performance quality of your cable assembly - its ability to withstand movement and acceleration, as well as the cable’s outer sheath material and conductor design.

#### • Outer Sheath Material

In static applications, PVC is the go-to material for cable outer sheath or jacket as it is not only widely used, but also cost-effective and characteristically suited to the insulation of conductors.

Highly dynamic applications on the other hand, demand high speeds and acceleration rates. Due to its hardness and superior abrasion resistance, PUR is the material of choice in such applications as it better withstands constant contact and abrasion against tougher materials such as PUR, TPE or Polyamide, often used in drag chains.

For businesses with cost concerns, it is worth noting that a single PUR cable can cost up to 2-3 times more compared to a PVC cable, depending on size and number of cores. Why fork out more for your slower-moving applications if you can have an alternative that works just as well for less?

## • Conductor Design

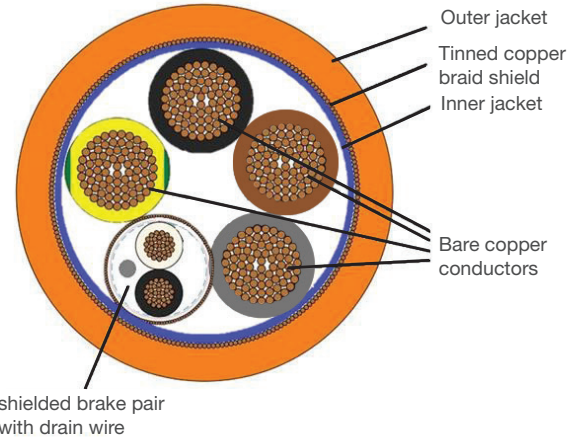
Conductor design plays a huge role on the cable's ability to withstand continuous bending. Depending on the type of movement (bending or torsion), the design of the conductor, its fineness and the way it is stranded and twisted, the number of bending cycles that the cable can withstand will vary.

## 2 Electrical Performance

One key concern for recently developed servo systems is how well the cable assembly can withstand increasingly frequent and heavy electromagnetic interference, due to ever rising motor speeds.

A quick recap of the influencing factors would inevitably throw up the quality of the screen braiding - the tighter the braid, the better the screening and hence the stronger the assembly. In addition, the braid also needs to be properly grounded - preferably connected 360 degrees all round, on both ends of the assembly.

This of course, means that both your chosen cable and connector have a crucial role to play in ensuring proper, high-quality EMC protection!



**Eliminate unnecessary costs with our evolution of cable assembly solutions!**

## ÖLFLEX® CONNECT SERVO: SERVO SYSTEMS MADE BY LAPP

LAPP offers the following 3 categories of powerline cables:

### • Basic Line

The ÖLFLEX® SERVO PVC basic line is ideal for static requirements. Designed according to Siemens® PVC 6FX-5002 standard, product features include:

- Cables with application-specific performance categories
- PVC outer sheath
- Connector with safe screen connection
- Brake wire with 1.5mm<sup>2</sup> wire gauge

### • Core Line

Suitable for semi-automated production lines, the ÖLFLEX® SERVO PVC core line comes with a PVC sheath with inner jacket, and supports applications with up to 10m travel distances. With a brake core of 1.5mm<sup>2</sup> cross section, the Core Line should not be used for cable lengths greater than 100m, as in such instances it may result in a very high voltage drop at the brake end during operation.

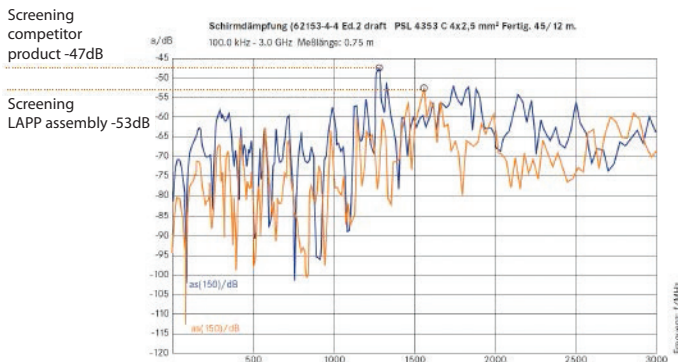
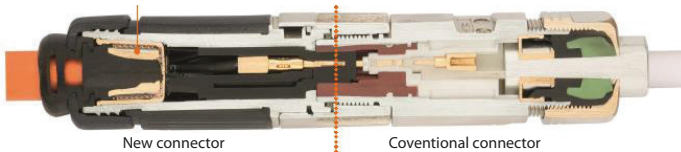
The core line products offered by LAPP include:

### • ÖLFLEX® SERVO Core Line for Siemens® PVC 6FX-5002

Ideal for light duty power chain (or slower moving) applications such as timber processing, slow-moving assembly chains, and equipment packaging. This product comes with a high number of chain cycles and higher acceleration, offering better performance for moving chains. Main features include:

- Connector with safe screen connection
- New and shielded PVC servo cable
- Shielded brake pair with drain wire that enables faster shielding assemblies
- Brake wire with 1.5mm<sup>2</sup> wire gauge

The cable shielding is compressed between two metallic sleeves. The sleeves cover a large area of the housing, providing a 360° EMC shielding



## TESTING AND ASSEMBLY

Besides the quality of individual components, the assembly process and testing of the complete servo assembly also make a huge difference to system performance. LAPP's innovative generation of ÖLFLEX® SERVO offers a semi-automated assembly and test process to enable a more consistent, high-quality end product.

- **ÖLFLEX® SERVO Core Line for Siemens® PUR 6FX-8002**

Suitable for faster-moving applications such as moving production chains. Available at highly competitive prices, the PUR core line product is suitable for 80% of production line applications. Main features include:

- Connector with safe screen connection
- New shielded and halogen-free PUR servo cable
- Shielded brake pair with drain wire that enables faster shielding assemblies
- Brake wire with 1.5mm<sup>2</sup> wire gauge

- **Extended Line**

The ÖLFLEX® SERVO extended line is ideal for highly dynamic applications with very high dynamic motion sequences or for power chain use with horizontal travel distances of up to 100m. Designed according to the Siemens® PUR 6FX-8002 standard, key product features include:

- Classical cable production and assembly
- Connector with safe screen connection
- Brake wire with 1.5mm<sup>2</sup> wire gauge

### Product Selection Tables

The following table shows a comparison of the ÖLFLEX® SERVO Core Line for Siemens® 6FX-5002 (PVC) line with other products.

Table 1: ÖLFLEX® SERVO Core Line PVC 6FX-5002

PVC 6FX-5002	Core Line	Basic Line	SIEMENS® offering
<b>Performance</b>			
Number of cycles	5 mio cycles	2 mio cycles	100,000 bendings
Travelling speed	Up to 3m/s	Up to 5m/s	Up to 0.5m/s
Travelling distance	Up to 10m	Up to 10m	Up to 5m
Acceleration	Up to 3m/s <sup>2</sup>	Up to 2m/s <sup>2</sup>	Up to 2m/s <sup>2</sup>
Fixed Bending radius (min)	4 x Outer diameter	6 x Outer diameter	5 x Outer diameter
<b>Assembly</b>			
Tamper-proof connector	Yes	Yes	Not applicable
Improved EMC shielding	Yes	Yes	Not applicable
Improved quality through semi-automated assembly	Yes	Not applicable	Not applicable
IP67	Yes	Yes	Yes
Temperature range	-40 to 80°C (Fixed)	-20 to 80°C (Fixed)	-20 to 80°C (Fixed)
Complete components (controller & drive connector, cable)	Yes	Yes	Yes

## Product Selection Tables

The following table shows a comparison of the ÖLFLEX® SERVO Core Line for Siemens® 6FX-8002 (PUR) line with other products.

Table 2: ÖLFLEX® SERVO Core Line PUR 6FX-8002

PUR 6FX-8002	Core Line	Extended Line	SIEMENS® offering
<b>Performance</b>			
Number of cycles	10 mio cycles	10 mio cycles	10 mio cycles
Travelling speed	Up to 3m/s	Up to 5m/s	Up to 5m/s
Travelling distance	Up to 10m	Up to 100m	Up to 50m
Acceleration	Up to 3m/s <sup>2</sup>	Up to 50m/s <sup>2</sup>	Up to 50m/s <sup>2</sup>
Flexible Bending radius (min)	7.5 x Outer diameter	7.5 x Outer diameter	7.5 x Outer diameter
<b>Assembly</b>			
Tamper-proof connector	Yes	Yes	Not applicable
Improved EMC shielding	Yes	Yes	Not applicable
Improved quality through semi-automated assembly	Yes	Not applicable	Not applicable
IP67	Yes	Yes	Yes
Temperature range	-20 to 90°C (Continuous flex)	-20 to 90°C (Continuous flex)	-20 to 60°C (Continuous flex)
Complete components (controller & drive connector, cable)	Yes	Yes	Yes

Unless specified otherwise, the shown product values are nominal values at room temperature. Detailed values e.g. tolerances) are available upon request. Siemens® part designations (6FX5002/8002) are registered trademarks of Siemens® AG, and are listed for comparison purposes only. Photographs and graphics are not to scale and do not represent detailed images of the respective products.

All ÖLFLEX® SERVO powerline cable products (including Core Line) are provided with the Intercontec version 4.0 connector (with size 1), which offers the following operational benefits:

- Tamper-resistant as the circular connector cannot be opened by unauthorized personnel
- Plastic coating to prevent voltage shifting
- IP67 compatible
- Temperature range from -20 to 90°C
- Manufactured through semi-automated manufacturing assembly resulting in better quality

- Improved EMC shielding due to 360-degree shield connection that provides 4x better EMC as compared to competitive products. This is technically possible due to the inhouse automated manufacturing process which removes the sheathing from the cable and spreads the shielding, thus creating the all-round contact with the connection system. This improves the overall quality of the electromagnetic shielding and reduces the risk of encoder failures due to electromagnetic interference.
- Overall improvement of 400% (or 6dB) in screening performance

You can trust our team of engineering experts to design and deliver assemblies based on your specifications and using the most suitable and reliable cable configuration. If you have a need for custom cable assembly, LAPP can help! Simply email or call us today.

**Disclaimer**  
This whitepaper has been prepared for distribution solely for information purposes. LAPP has attempted to incorporate as much information as developed by the industry and its only obligations are those in standard terms and conditions of sale for this product. Information are subjected to change.

The above listed values, factors and bending cycles are guide values and serve only as non-binding benchmark for assessment of expectable service life. Stated values for travel lengths, acceleration and speed are always meant as maximum values which must not be exhausted in the very same application. We reserve the right for adjustments and modifications of above mentioned values.