



**HYBRID is the new SERVO**





Technology is not  
something you think for  
the future: is something  
you desing in your  
present.

# MOTION CABLES H<sub>2</sub>BRID

Hybrid technology is an ever evolving matter.  
In the latest years the numbers of hybrid servo cables solutions  
have increased sensibly and still grown.  
Same is for our experience in this new technology.

**WHEN**, back in 2015, we started collaborating with SICK® for developing our first release of the DSL HIPERFACE hybrid digital servo cable family, we were already aware that this kind of technology would become the “usual one” in a short time.

For this reason, and due to our technical background, we strive not only to develop an high quality solution, but to achieve a deep knowledge about these cables solutions.

We come from a previous history of cables' manufacturing where the custom solutions where more common than standard cables.

So it has been not an issue to overcome the “customisation” that this cables request, and also we bring in our deep knowledge of raw material and special cables manufacturing.

With this ideas in mind we endeavour in being able to follow this new path the best way possible: we open a new production site totally devoted to these cables in order to be more effective and more proactive, keeping our quality level the best as it is and being able to be a step ahead the evolution.

Hybrid is the new servo.

**Filippo Porto**

CEO MotionCables Srl



MOTIONCABLES  
H<sub>2</sub>BRID SERVO

# CONTENT

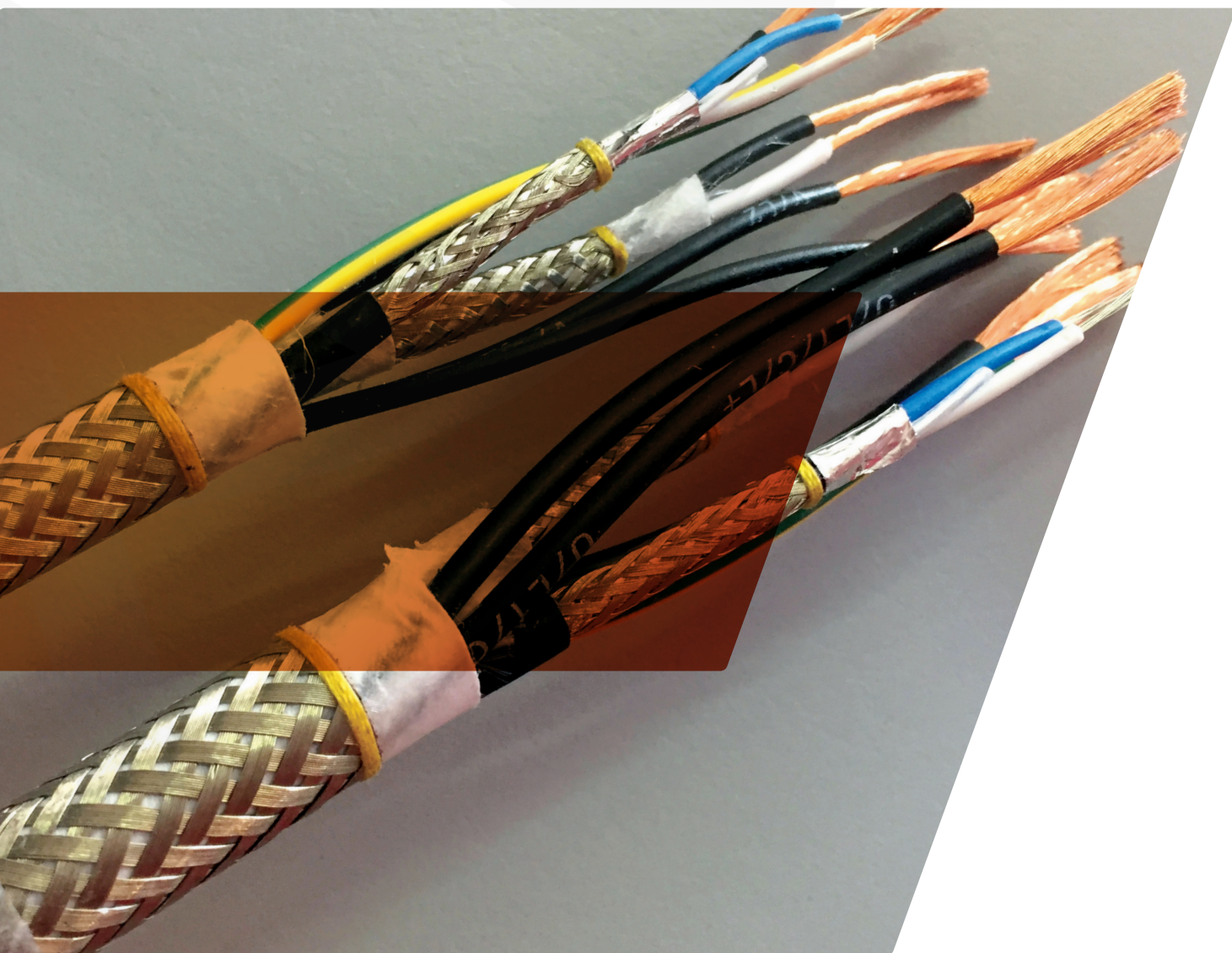
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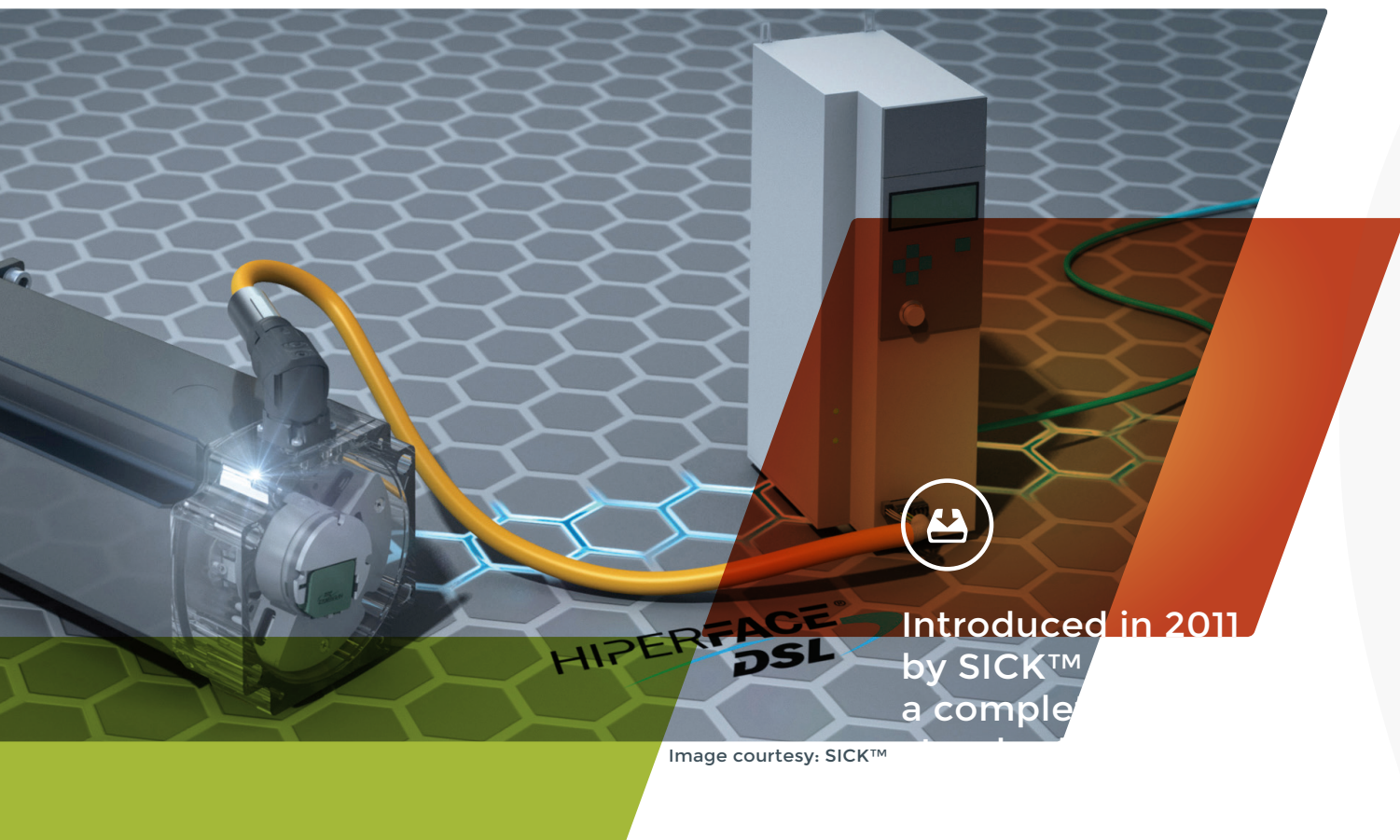


See the detail of our range of Hybrid Servo Cables at page 14









# What is **OCT Hybrid**

**INTRODUCED** by SICK™ almost seven years ago, the OCT - One-Cable Technology - associated with Hiperface DSL communication revolutionized the market. In fact, the integration of the encoder cable into the motor power cable simplifies wiring and allows the construction of lighter systems. In addition, the fully digital interface records, analyzes and transmits position data and ancillary information, such as temperature, speed and operating status for a real-time condition monitoring that allows you to intervene at any time on the motor feedback and to implement maintenance interventions only when it is really necessary.

HIPERFACE DSL® opens a complete new standard that is everyday evolving.

By opening **HIPERFACE DSL®**, SICK is supporting open system architectures which are the **foundation for Industry 4.0**, and is creating the prerequisites for smart drive technology.

HIPERFACE DSL® makes it possible to slim down the system, increase integration density of data and functions and continuously monitor conditions.



# Advantages

1

## MACHINE END-USER

- Machine costs are reduced.
- Reduced number of cables and connectors improves machine reliability.
- Trouble-shooting and maintenance times reduced.
- Spare parts inventory reduced.

2

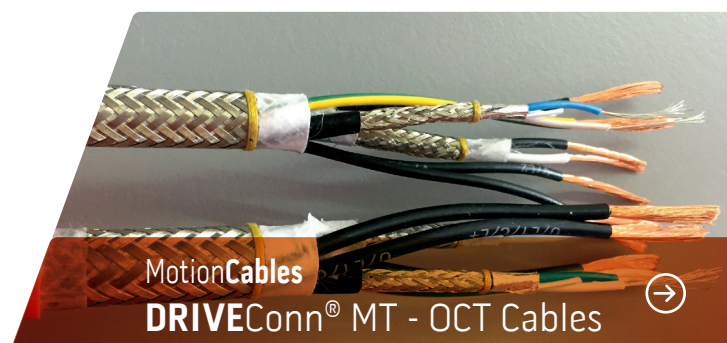
## OEM MACHINE BUILDER

- Overall drive system cost reduced because of fewer cables and less time installing in machine
- Reduced number of cables and connections improves drive system reliability
- Spare part inventory reduced
- Start-up trouble shooting time reduced

3

## DRIVE SYSTEM MANUFACTURER

- Reduced drive construction cost (fewer connection ports)
- Reduced motor construction cost (feedback connector eliminated)
- Lowers parts in inventory
- Reliability increases with fewer encoder interface connections









# Our new plant

Fully devoted to the new hybrid technology, it will be your point of reference for this up-to-date standard.

**WE** decided, back in 2017, to start developing a new production site that had the goal to become a point of reference for the production of the hybrid servo cables.

The new facility will have an inner testing lab that will qualify materials and products and also conducted endurance and qualification test for the finished cables.

Production capability and shorter delivery time will be at their best in order to provide an extreme dedicated service about these new technology cables and be your proactive partner in supplying high qualified and reliable hybrid servo cables.



Manufacturing is more than just putting parts together. It's coming up with ideas, testing principles and perfecting the engineering, as well as final assembly.

## A day of testing in **MotionLAB**

It is one of our pride: an area where all that pertains cables - from raw materials to finished products - is tested, tested and tested again.

**SINCE** the beginning, and due to our past experiences, we have always prided to have - even small when we started - a testing area where to qualify raw materials and finished products.

This area, when we moved to our actual premises, has been enlarged and it will be bigger into our new production plant.

What we do there? Several types of tests are made in our MotionLAB

everyday. We pass from standard qualification test of material to specific electrical and lifetime test on products.

The lifetime testing is the most valuable type of analysis we undergo on a regular basis. It consist on a series of different evaluation test that - with the support of specific machines - will reproduce some specific aspects of a cable's lifetime requirements.



**Endurance test** on drag chain with different speed, bending and accelerations that would simulate - in a short time - a longer operational usage. These tests are mainly done to evaluate how outer sheath, inner layout and shields will perform according to the test's requirements. On doing these tests we can also reproduce real situation - like chain complete setup, speed and such - in order to provide our customer a complete survey on how our cables perform under stress. Furthermore, these kind of tests are also fundamental to guarantee the highest possible reliability and quality for our products. Endurance test can vary in time and number of cycles: everything is dictated by how deep we have to push our evaluation.

Beside these we have the **Bending/Torsion test**, a specific control that is made to qualify cables that would have to work on robot or continuously torqued application. The sample in test travels at different speeds with different acceleration (progressive or sudden) for simulating an operation of traction, torsion and bending. A portion of the cable is secured to a weight and the rest passes through two pulleys of different diameter that move longitudinally. We let the cable work for a series of cycles (a complete movement from one side to the other) according to how long we would like to simulate a real time operation. The diameter of the two pulleys can be adjusted accordingly.

Similar to this test, and normally done in the same time, is the **Single/Bunch torsion test**. Here the cable (or a bundle of cables) is connected to a rotating system which angle excursion could be modified accordingly. One end of the cable is weighted the other secured to the torque. The complete right/left rotating movement

is considered a complete cycle. As for all the test, we plan a number of cycles according to the lifetime evaluation we would like to reproduce.

**During 2018 we have performed more than 640 tests, cycles for 26 million and qualified more than 200 new cables.**

Between the other dynamic tests we perform in the Motion**LAB** there is the so-called **Tick/Tock test** (because the movement recalls the coming and going of a pendulum). The technical name is **Alternate Bending test**.

During this test the cable is subjected to a regime of push ups (each one considered as a single cycle) that are performed with different angles and loading.

This test simulates the continuous friction of cable during operation in drag-chain. It is a destructive test done for qualifying the outer sheath performances.

Apart from these dynamic tests we perform **environmental tests**:

- Air oven ageing in cold or hot temperatures;
- Cold impact on cable's surface;
- Cable's bending at low temperatures;
- Different fluids test (oils, chemicals, water, polluted water, etc.).

Last, but not the least, there are tests done on the materials like tensile and elongation, video microscope analysis, and all the main electrical tests.

Another type of tests, still important and mandatory, are those for security: **flame resistance test** from FT1 to FT4.

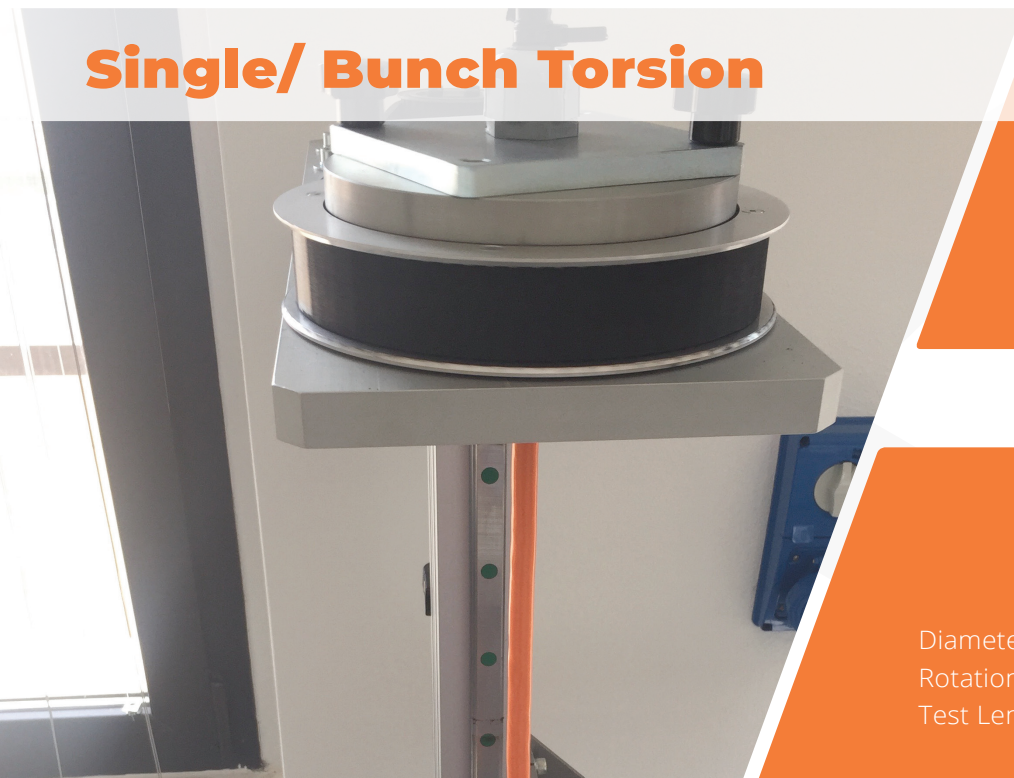
So, as you can see, there is a lot to do on a normal day at our Motion**LAB**. If you want to come and visit it, please we will be glad!

## Endurance Test



Run length	from 2 to 110 meters
Acceleration:	from 0.5 to 6 G
Speed:	from 100 to 600 m/min

## Single/ Bunch Torsion



Diameter Range:	from 5 to 50 mm
Rotation Angle:	from $\pm 360$ to $540^\circ$
Test Length:	from 300 to 1000 m



## Alternate Bending

Run length: 5 meters  
Acceleration: 4 G  
Speed: 400 m/min



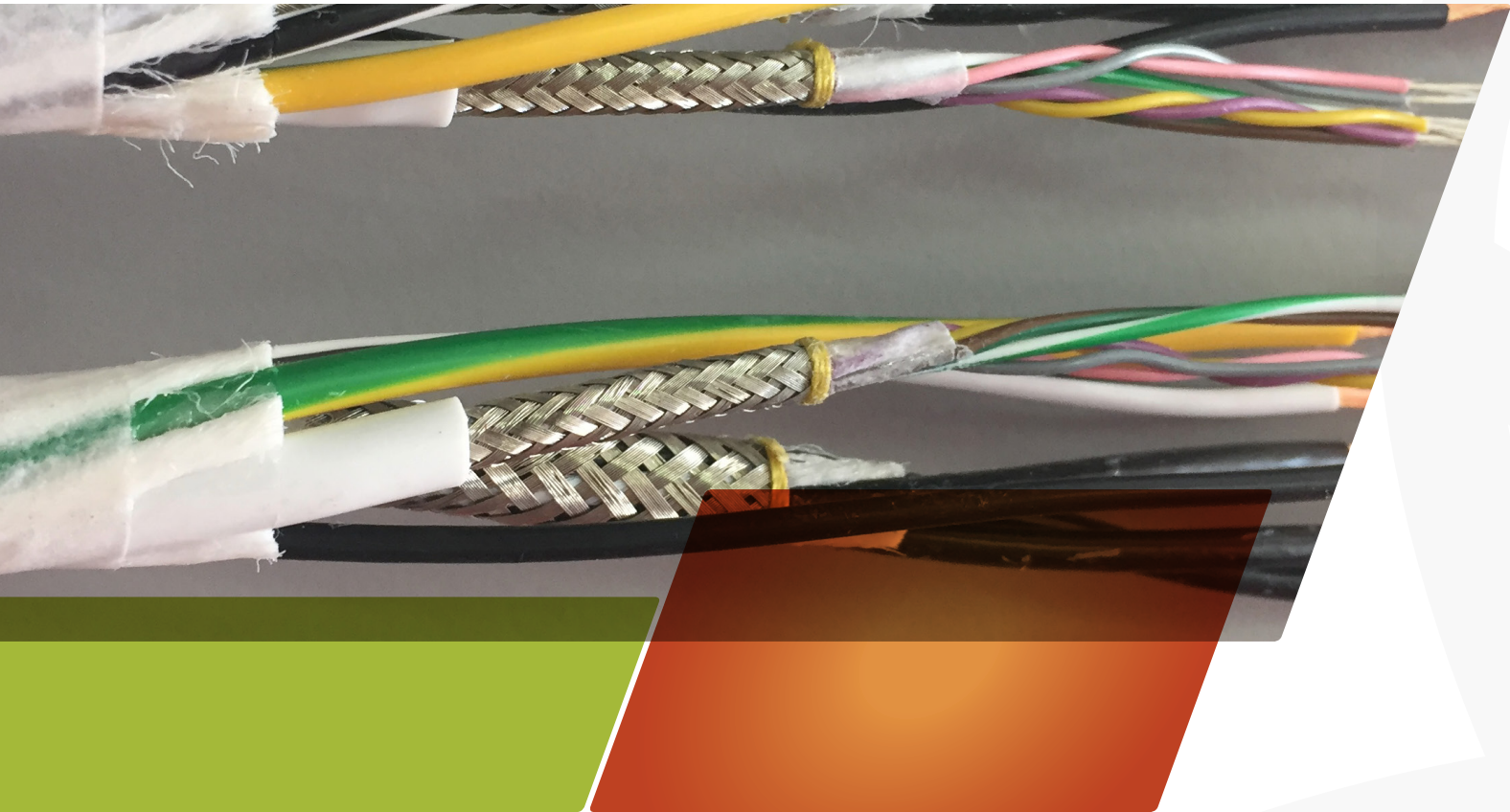
## Tick/Tock Test

Diameter Range: from 5 to 50 mm  
Rotation Angle:  $\pm 135^\circ$   
Test Length: from 20 to 100 m



DRIVEConn® MT OCT cables

# HYBRID **SERVO**



**DRIVECONN MT OCT** is the family we develop back in 2015 that comprises all the One Cable Technology solutions. At the beginning we treated them as Custom solution, then when we saw their increase we decided to create a specific series of products. Since there this family has grown up sensibly. We have now not only the DSL HIPERFACE solution, but also the HMC6 EnDat 2.2 and the SIEMENS and Indra Dyn hybrid servo plus a wealth of custom solutions that share the same technology background.

**HYBRID SERVO - DSL**

**HYBRID SERVO - HMC6**

**HYBRID SERVO - EnDAT 2.2**

**HYBRID SERVO - S210**

**HYBRID SERVO - INDRADYN-S**

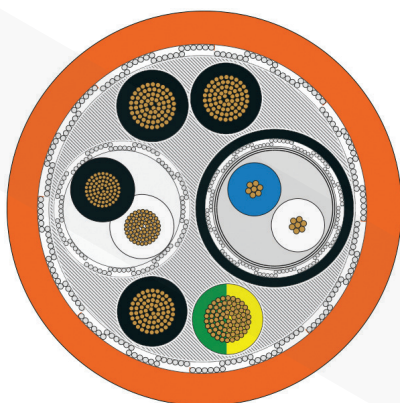
**Hybrid is the new Servo**

*The data and the drawing in the section shown here are not binding and may be varied on the basis of technical choices, modifications and / or improvements that the manufacturer deems necessary.  
The reference to trademarks and standards is made for reference or information purposes only. These trademarks and standards are the exclusive property of their respective owners.*



Acc.to DSL HIPERFACE® standard

# HYBRID SERVO DSL®



## DATA

Conductor: Extra Flexible Tinned Copper  
 Insulation: Special PP - Green, Pink, Yellow, Blue  
 1st Shield: AL/PET tape  
 2nd Shield: Tinned Copper braid O.C. ≥ 85%  
 Insulation: Thermoplastic Compound - White

## Control

Conductor: Extra Flexible Bare Copper  
 Insulation: Special PP - White, Black  
 Shield: Tinned Copper Braid O.C. ≥ 85%

## Power

Conductor: Extra Flexible Bare Copper  
 Insulation: Special PP - Grey, Black, Brown, Y/G

## Shield

Tinned Copper Braid O.C. ≥ 85%

## Separator

Easy Strip-Away Tape

## Outer Sheath

PVC (BP) - PUR (HP)

## Colour

ORANGE RAL 2003

BP

DP

HF HP

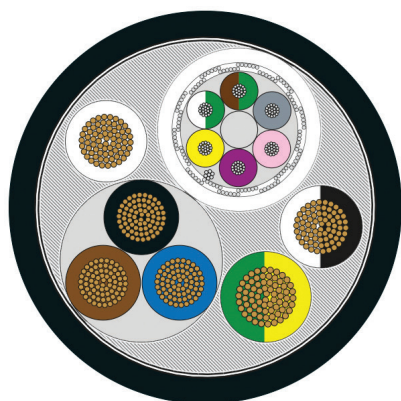
	MotionCables Code	Cable formation	Ø mm	Cu kg/km
Max Connection Length ≤ 50 m	HFSS21G08UR-A	[4 G 0.50 + (2 x 0.35) + (2 x 26 AWG)]	9,80	86
	HFSS17G08UR-A	[4 G 1.0 + (2 x 0.75) + (2 x 26 AWG)]	11.50	113
	HFSS15G08UR-A	[4 G 1.5 + (2 x 0.75) + (2 x 26 AWG)]	12.50	150
	HFSS13G08UR-A	[4 G 2.5 + (2 x 1.0) + (2 x 26 AWG)]	13,80	195
	HFSI17G08UR-A	[4 G 1.0 + (2 x 0.75) + (2 x 22 AWG)]	12.50	125
	HFSI15G08UR-A	[4 G 1.5 + (2 x 1.0) + (2 x 22 AWG)]	13,20	160
	HFSI13G08UR-A	[4 G 2.5 + (2 x 1.0) + (2 x 22 AWG)]	14,50	200
	HFSI11G08UR-A	[4 G 4 + (2 x 1.5) + (2 x 22 AWG)]	16,30	285
Max Connection Length ≤ 100m	HDSS21G08UR-A	[4 G 0.50 + (2 x 0.35) + (2 x 26 AWG)]	9,80	86
	HDSS17G08UR-A	[4 G 1.0 + (2 x 0.75) + (2 x 26 AWG)]	11.50	113
	HDSS15G08UR-A	[4 G 1.5 + (2 x 0.75) + (2 x 26 AWG)]	12.50	150
	HDSS13G08UR-A	[4 G 2.5 + (2 x 1.0) + (2 x 26 AWG)]	13,80	195
	HDSI17G08UR-A	[4 G 1.0 + (2 x 0.75) + (2 x 22 AWG)]	12.50	125
	HDSI15G08UR-A	[4 G 1.5 + (2 x 1.0) + (2 x 22 AWG)]	13,20	160
	HDSI13G08UR-A	[4 G 2.5 + (2 x 1.0) + (2 x 22 AWG)]	14,50	200
	HDSI11G08UR-A	[4 G 4 + (2 x 1.5) + (2 x 22 AWG)]	16,30	285
Max Connection Length ≤ 50 m	HDSS21G08UP-A	[4 G 0.50 + (2 x 0.35) + (2 x 26 AWG)]	9,80	86
	HDSS17G08UP-A	[4 G 1.0 + (2 x 0.75) + (2 x 26 AWG)]	11.50	113
	HDSS15G08UP-A	[4 G 1.5 + (2 x 0.75) + (2 x 24 AWG)]	12.50	150
	HDSS13G08UP-A	[4 G 2.5 + (2 x 1.0) + (2 x 24 AWG)]	13,80	205
	HDSI17G08UP-A	[4 G 1.0 + (2 x 0.75) + (2 x 22 AWG)]	12,50	125
	HDSI15G08UP-A	[4 G 1.5 + (2 x 1.0) + (2 x 22 AWG)]	13,20	160
	HDSI13G08UP-A	[4 G 2.5 + (2 x 1.0) + (2 x 22 AWG)]	14,50	200
	HDSI11G08UP-A	[4 G 4 + (2 x 1.5) + (2 x 22 AWG)]	16,30	285
Max Connection Length ≤ 100m	HDSI09G08UP-A	[4 G 6 + (2 x 1.5) + (2 x 22 AWG)]	18,00	380



MOTIONCABLES  
HYBRID SERVO

Acc.to HEIDENHAIN® standard

# HYBRID SERVO HMC6®



<b>HMC6</b>	Conductor	Flexible Tinned copper
	Insulation	Polyolefin - Grey, Pink, Violet, Yellow, White/Green, Brown/Green
	1st Shield	AL/PET Tape
	2nd Shield	Tinned Copper Wire Braid O.C. ≥ 85% + Drain Wire
	Insulation	Thermoplastic Compound - White
<b>Control</b>	Conductor	Extra Flexible Bare Copper Class 6 as IEC 60228
	Insulation	Special PP - Black, Blue, Brown
	Shield	AL/PET Tape
<b>Power</b>	Conductor	Flexible Bare Copper Class 6 as IEC 60228
	Insulation	Special PP - White, Black/White + Y/G
<b>Overall Shield</b>	Tinned Copper Wire Braid O.C. ≥ 85%	
<b>Separator</b>	Easy Strip-Away Band	
<b>Outer Sheath</b>	PVC (DP) - PUR (HP) - BLACK RAL 9005	

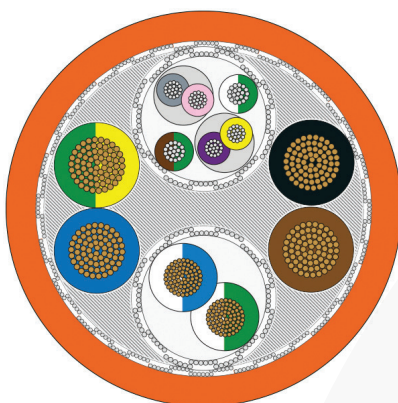
DP

HF HP

MotionCables Code	Cable Formation	Ø mm	Cu kg/km
<b>HDS15G12UR-N</b>	(3x1.5) + 1x1.5 + 2x1 + (2x0.24 + 4x0.09)	12,50	86
<b>HDS13G12UR-N</b>	(3x2.5) + 1x2.5 + 2x1 + (2x0.24 + 4x0.09)	14,20	113
<b>HDS11G12UR-N</b>	(3x4) + 1x4 + 2x1 + (2x0.24 + 4x0.09)	16,50	150
<b>HDS15G12UP-N</b>	(3x1.5) + 1x1.5 + 2x1 + (2x0.24 + 4x0.09)	12,50	86
<b>HDS13G12UP-N</b>	(3x2.5) + 1x2.5 + 2x1 + (2x0.24 + 4x0.09)	14,20	113
<b>HDS11G12UP-N</b>	(3x4) + 1x4 + 2x1 + (2x0.24 + 4x0.09)	16,50	150

Acc.to B&R® standard

# HYBRID SERVO EnDAT® 2.2



<b>EnDAT 2.2</b>	Conductor	Flexible Tinned copper
	Insulation	Polyolefin - Gray, Pink, Violet, Yellow, Green /White, Green / Brown
	Shield	Tinned Copper Wire Braid O.C. ≥ 85%
<b>Control Pair</b>	Conductor	Extra Flexible Bare Copper Class 6 as IEC 60228
	Insulation	Special PP - White, Black / White
	Shield	Tinned Copper Wire Braid O.C. ≥ 85%
<b>Power</b>	Conductor	Extra Flexible Bare Copper Class 6 as IEC 60228
	Insulation	Special PP - Black, Blue, Brown + Y/G
<b>Overall Shield</b>	Tinned Copper Wire Braid O.C. ≥ 85%	
<b>Separator</b>	Easy Strip-Away Band	
<b>Outer Sheath</b>	PVC (DP) - PUR (HP)	
<b>Colour</b>	ORANGE RAL 2003	

DP

HF HP

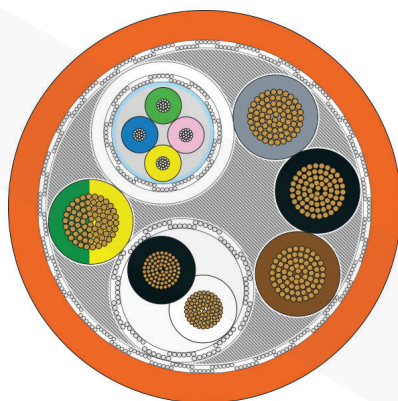
MotionCables Code	Cable Formation	Ø mm	Cu kg/km
<b>HDSH15G12UR-A</b>	[4G1.5 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	13	165
<b>HDSH13G12UR-A</b>	[4G2.5 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	14,2	210
<b>HDSH11G12UR-A</b>	[4G4 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	16,5	285
<b>HDSH15G12UP-A</b>	[4G1.5 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	13	165
<b>HDSH13G12UP-A</b>	[4G2.5 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	14,2	210
<b>HDSH11G12UP-A</b>	[4G4 + 1x(2x0.75) + 1x(2x0.24 + 2x2x0.15)]	16,5	285





Acc.to SIEMENS® SINAMICS S210® standard

# HYBRID SERVO S210®



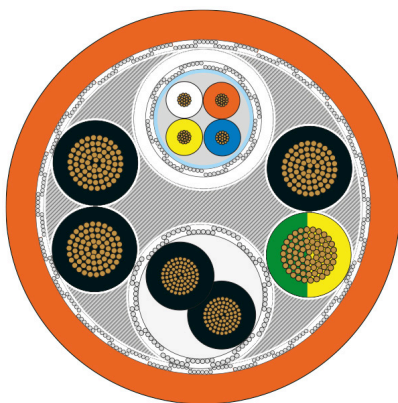
<b>DATA</b>	Conductor	Flexible Tinned copper
	Insulation	Special PP - Green, Pink, Yellow, Blue
	1st Shield	AL/PET-Band
	2nd Shield	Tinned Copper braid O.C. ≥ 85%
	Insulation	Thermoplastic Compound - White
<b>Control</b>	Conductor	Extra Flexible Bare Copper Class 6
	Insulation	Special PP - White, Black
	Shield	Tinned Copper braid O.C. ≥ 85%
<b>Power</b>	Conductor	Extra Flexible Bare Copper Class 6
	Insulation	Special PP - Gray, Black, Brown, Y/G
<b>Shield</b>	Tinned Copper braid O.C. ≥ 85%	
<b>Separator</b>	Easy Strip-Away Band	
<b>Overall Sheath</b>	PVC (DP) - PUR (HP)	
<b>Colour</b>	ORANGE RAL 2003	

DP  
HF HP

MotionCables Code	Cable Formation	Ø mm	Cu kg/km
<b>HFSSI22Z10UR-A</b>	[4G0.38 + (2x0.38) + (4x0,20)]	9,5	79
<b>HFSSI19Z12UR-A</b>	[4G0.75 + (2x0.50) + (4x0,20)]	10,4	105
<b>HDSSI22G10UP-A</b>	[4G0.38 + (2x0.38) + (4x0,20)]	9,5	79
<b>HDSSI19G10UP-A</b>	[4G0.75 + (2x0.50) + (4x0,20)]	10,4	105

Acc.to BOSH REXROTH INDRAMAT® standard

# HYBRID SERVO IndraDyn® S



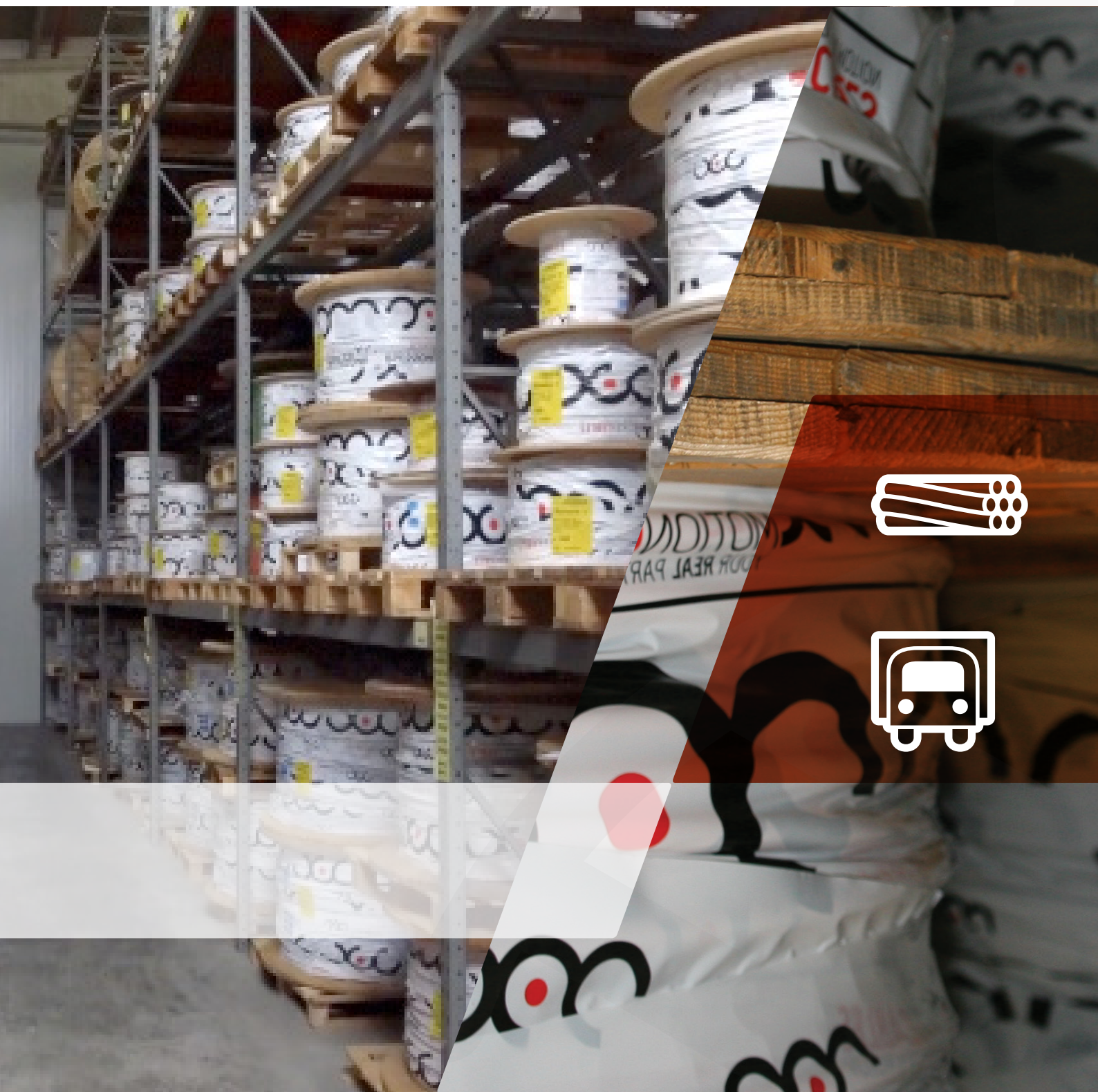
<b>DATA</b>	Conductor	Extra Flexible Bare Copper
	Insulation	Polyolefin - Blue, Yellow, White, Orange
	1st Shield	AL/PET tape
	2nd Shield	Tinned Copper braid O.C. ≥ 85%
	Insulation	Thermoplastic Compound - White
<b>Control</b>	Conductor	Extra Flexible Bare Copper Class 6
	Insulation	Special PP - Black numb. 5, 6
	Shield	Tinned Copper Braid O.C. ≥ 85%
<b>Power</b>	Conductor	Extra Flexible Bare Copper Class 6
	Insulation	Special PP - Black num 1, 2, 3, Y/G
<b>Shield</b>	Tinned Copper Braid O.C. ≥ 85%	
<b>Separator</b>	Easy Strip-Away Tape	
<b>Outer Sheath</b>	PUR (HP)	
<b>Colour</b>	ORANGE RAL 2003	

HF HP

MotionCables Code	Cable formation	Ø mm	Cu kg/km
<b>HDSBR15Z10UP-A</b>	[4G1,5 + (2x0.75) + (4x24AWG)]	13,0	148



MOTIONCABLES  
HYBRID SERVO





# Our stock

Daily monitored, searchable and visible from the web (on a users' area) it is the backbone of our service.

**THE** winning situation? Having the cable in stock for a quick react on customers' request and for a proper quality service.

This is the reason because we regularly plan to have the proper amount of stock for those cables that shown to be the most demanded and - besides - we struggle to keep also a good amount of the other ones.

Our customers can search our stock form their user's area on our website where they can see the whole quantity available, the single drums and if those are ready or already settled for other customers.

We are going to improve also in this side having the new plant ready.



**30.000 sqm**

**1.500 cables**

**24/48h  
delivery time**



MOTIONCABLES  
HYBRID SERVO







# The future

The One Cable  
Technology continuous  
condition monitoring  
results in an enormous  
potential for  
improvements.


**THE** market is now accustomed to be provided with more extensive solutions in hybrid. Manufacturers of servo drive technology will gain advantages of the enhanced products and of the security of working with an already open, trusted and established interface.

This also brings together all the advantages of a digital real-time interface: the OCT provides a continuous condition monitoring resulting in an enormous potential of improvement in new technical solutions and economic efficiency.

Opening up this new interface to the expert in motor feedback systems we will see in a near future even more new solutions for motor and drive suppliers, especially in the context of Industry 4.0, and **MotionCables** will be there.

**Hybrid is the new Servo.**





Technology is not something you think  
for the future: is something you design  
in your present.



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