

KTS mounting
instructions

Version 1.1



Applicable for all OBO cable support systems

THINK CONNECTED.

Chapter 1.	On these instructions	3
Chapter 1.1	Target group	3
Chapter 1.2	How to use these mounting instructions:	3
Chapter 1.3	Explanation of the warning information and general information	3
Chapter 2.	General safety information	4
Chapter 3.	General information	5
Chapter 3.1	Declaration of conformity	5
Chapter 3.2	Correct use	5
Chapter 3.3	Corrosion protection	6
Chapter 4.	Transport and storage	7
Chapter 4.1	Transport	7
Chapter 4.2	Unloading	7
Chapter 4.3	Storage	8
Chapter 5.	Preparing for mounting	9
Chapter 5.1	Unpacking, sorting and transportation to the mounting area	9
Chapter 5.2	Marking of the route and the fastening holes	9
Chapter 6.	Fastening the retaining structure	10
Chapter 6.1	Anchoring in the mounting substrate with heavy-duty anchors	10
Chapter 6.2	Welding to an existing retaining structure	10
Chapter 6.3	Clamp fastening to an existing building steel construction	11
Chapter 6.4	Applying cold galvanisation	11
Chapter 7.	Mounting cable routes	12
Chapter 7.1	Calculating thermal length expansion	12
Chapter 7.2	Adapting and shortening cable routes	14
Chapter 7.3	Mounting cable routes	14
Chapter 7.4	Mounting movable bearings	15
Chapter 7.5	Earthing the cable support system	16
Chapter 7.6	Labelling the cable support system	16
Chapter 7.7	Completing the report	16
Chapter 8.	Routing cables	17
Chapter 9.	Maintenance and cleaning	18
Chapter 9.1	Maintenance	18
Chapter 9.2	Cleaning	18

Chapter 1. On these instructions

Chapter 1.1 Target group

These mounting instructions are intended for specialists and/or instructed technical personnel (e.g. engineers, installation engineers and maintenance personal). It is used to assist in the mounting and maintenance of cable support systems and makes no claims as to completeness.

Chapter 1.2 How to use these mounting instructions:

- Before commencing work, read these mounting instructions through once completely. In particular, please observe the safety instructions.
- Keep all the documents supplied with the cable support system safe, so that the information is available should you need it.
- The manufacturer will not accept liability for damage caused through non-observance of these mounting instructions.
- Regional and seasonal factors cannot be taken into account.

Chapter 1.3 Explanation of the warning information and general information



Type of risk!

Shows a possibly risky situation. If the situation is not avoided, then death or serious injury will result.



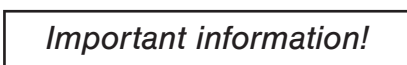
Type of risk!

Shows a possibly risky situation. If the situation is not avoided, then light or minor injury will result.



Type of risk!

Shows a possibly hazardous situation. If the situation is not avoided, then damage to the product or the surroundings may occur.



Indicates important information or assistance!

Chapter 2. General safety information

- The work may only be carried out by qualified specialists, who have been trained for the following work:
 - Creation of electrical standard structures
 - Handling electrical resources
 - Creation of safe electrical switching circuits
- When erecting function maintenance systems, take the necessary fire protection regulations into account. These instructions do not mention any fire protection standards which are to be complied with.
- Cable support systems may collapse if they are used as a footpath, ladder for people or as a bridge. Human weights are not taken into account in the manufacturer's load data and the standard. Serious injury will result from such a fall.
- Do not put your body weight on a cable support system, unless the whole construction has been approved for walking on by a structural engineer.
- Dangerous voltages when handling electrical resources can lead to serious physical injury or death. Never work on parts through which power is flowing. Wear suitable protective clothing and comply with all the required safety guidelines!
- If cable support systems are touched or carried with bare hands, then serious cutting could result. Wear suitable protective gloves!
- If the maximum load capacity is exceeded, the cable support system may collapse. Comply with the load limits!
- Additional loads from snow and wind are not taken into account in the load data for the load capacity of the cable support system. Major wind and snow loads may lead to overloading and damage of the cable support system. Carry out structural calculations and take any additional loads into account during planning.
- Seismic loads are not taken into account in the load data for the load capacity of the cable support system. Seismic loads may lead to damage of the cable support system. Take seismic forces into account during planning or obtain the appropriate advice.

Chapter 3. General information

This chapter deals with the following topics:

1. Declaration of conformity
2. Correct use
3. Corrosion protection

Chapter 3.1 Declaration of conformity

All the OBO cable support systems are CE-conformant according to the appropriate EC guidelines. This also applies to standard parts such as bolts, washers and nuts, which are component parts of the appropriate system. The appropriate EC declaration of conformity certifies compliance with the names, directives or standards, but does not provide a guarantee of characteristics. Observe the safety instructions of the supplied product information, as well as the general safety regulations during mounting and use.

The basic principles of OBO cable systems are ensured by IEC/EN 61537. It describes all the relevant parameters from the area of application, through the testing conditions, up to corrosion resistance and temperature classification.

You can read individual proofs for OBO cable support systems on the OBO website:

<http://www.obo-bettermann.com/de>

Chapter 3.2 Correct use

Observe the following:

- Cable support systems are manufactured according to the standard and may only be used for routing cables.
- Only specialists or trained technical personnel may install cable support systems.
- Improper mounting or mounting deviating from the manufacturer's specifications may cause the cable support system to collapse, causing damage to people and property.
- During mounting, the generally valid and recognised rules of technology are to be taken into account along with the standards and regulations applicable at the mounting location.
- The cable support system is designed for use at ambient temperatures of between -20 °C and $+120\text{ °C}$. At temperatures below -20 °C , the metal will become brittle and may not be processed further.

Chapter 3.3 Corrosion protection

In compliance with the KTS standard, all the supplied cable support systems and fastening systems have corrosion protection applied at the factory. This corrosion protection is guaranteed through various galvanisation methods and the use of specific rustproof materials.

Corrosion protection	Icon	Optimum area of use	Standard
Electro-galvanisation	G	Indoors	DIN EN 12329
Strip galvanisation	FS	Indoors	DIN EN 10346
Hot-dip galvanisation	FT	Outdoors	DIN EN ISO 1461
Double-dip galvanisation	DD	Outdoors	DIN EN 10346
Stainless steel	VA	<ul style="list-style-type: none"> • Tunnel construction • Food industry • Chemicals industry 	V2A, V4A or V5A
Aluminium	Alu	<ul style="list-style-type: none"> • Special applications e.g. offshore 	

Chapter 4. Transport and storage

This chapter deals with the following topics:

1. Transport
2. Unloading
3. Storage



Danger of cuts!

If cable support systems are touched with bare hands, then serious cutting could result.

Wear suitable protective gloves!

Chapter 4.1 Transport

- At the factory, the articles are packaged so that they will not be damaged during transport.
- For overseas transport, we recommend the use of suitable containers.

Chapter 4.2 Unloading

Notice

Damage to the cable routes through improper unloading!

If material is unloaded improperly, then it may become damaged. During unloading with a forklift truck, take special care, in particular if the ground is uneven. Never move a stack of cable routes out of a container by pulling at the lowest element.

Try to unload individual bundles, preferably using a crane or by hand.

Correct!



Incorrect!

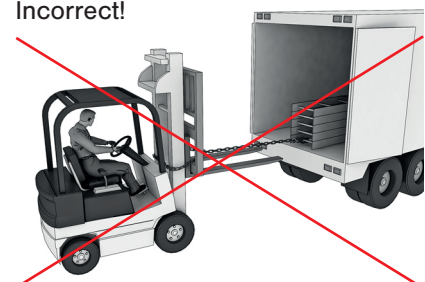


Image 1 Unloading the cable routes from a truck

Notice

Damage possible from direct contact with the forks of the forklift truck!

Material not transported on pallets may be damaged through direct contact with the forks of the forklift truck. The surface, and thus the corrosion protection, are at particular risk.

Unload material not transported on pallets by hand or crane to avoid damage!

Correct!



Incorrect!

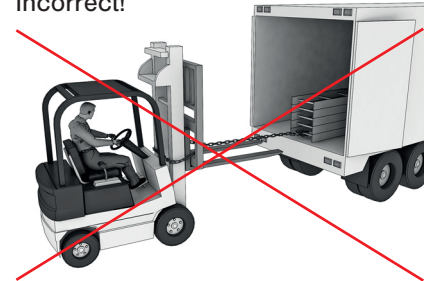


Image 2 Unloading with a forklift truck

Chapter 4.3 Storage

Important information!

Ensure all system elements are stored in a dry place. White rust may form on freshly galvanised surfaces in damp environments or outdoors.

The following measures can help you prevent white rust:

- Ensure all system components are stored in a dry place.
- Ensure sufficient ventilation of all areas.
- Use layers of wood between the stacks.
- If storing the products outside, avoid the use of plastic films or tarpaulins.

According to DIN ISO 1461, formation of white rust is not grounds for complaint. A small amount of white rust (loose, porous zinc hydroxide) is not linked to an early reduction of zinc thickness and does not affect the effectiveness and lifespan of the corrosion protection.

Chapter 5. Preparing for mounting

This chapter deals with the following topics:

1. Unpacking, sorting and transportation to the mounting area
2. Marking of the route and the fastening holes

Chapter 5.1 Unpacking, sorting and transportation to the mounting area

Important information!

After unpacking, check the supplied material for completeness and damage using the shipping note. Inform the appropriate office or construction manager of any differences or problems immediately.

Proceed as follows:

1. Divide the supply into sections according to the mounting operation.
2. Label the sections.
3. Unpack the container.
4. Check the supplied materials using the delivery note or the packing list.
5. Sort the materials according to the mounting sections and the list of material requirements.
6. Visit the mounting locations.
7. Define temporary storage locations and transport routes.
8. Transport the materials with suitable means of transport to the mounting area or the temporary storage location.

Chapter 5.2 Marking of the route and the fastening holes

To specify the course of the route and the fastening holes, use existing cable route plans and mounting drawings.

With tray heights of 60 mm, the standard spacing between the suspended supports and between the brackets is 150 cm, if no other specifications were made in the mounting drawings.

Proceed as follows:

1. Mark the course of the route.
2. Mark fastening holes for support, mounting angle and bracket mounting.

Chapter 6. Fastening the retaining structure

This chapter deals with the following topics:

1. Anchoring in the mounting substrate with heavy-duty anchors
2. Welding to an existing retaining structure
3. Clamp fastening to an existing building steel construction
4. Application of cold galvanisation

Chapter 6.1 Anchoring in the mounting substrate with heavy-duty anchors

The fastening systems must be suitable and approved to guarantee the necessary load capacity on the existing mounting substrate.

If function maintenance is required, then the fastening systems and the cable support system must have the appropriate fire protection approval.

Chapter 6.1.1 Drilling anchor holes

Notice

Destroyed anchors through incorrect drill hole size and depth!

If the anchor is placed in a drill hole which is too small, excessive hammering will make the thread unusable. If the drill hole is too big, then the anchors cannot be tightened when inserted.

Ensure the right drill hole size and depth!

Chapter 6.1.2 Mounting anchors

Notice

Unstable anchor due to incorrectly selected torque.

Tighten all the anchors with a torque wrench. Exceeding the maximum torques for the selected anchors will damage the anchor. In this case, the load capacity of the anchor is no longer guaranteed.

When mounting the anchors, use the product-specific mounting instructions of the anchor manufacturer. Comply with the specified torque data.

Chapter 6.2 Welding to an existing retaining structure

Important information!

Comply with the valid safety requirements and directives during welding.

Chapter 6.3 Clamp fastening to an existing building steel construction

The retaining structure can be fastened to an existing steel structure with standard clamping technology. Observe the mounting images for information on the different fastening options.

It is the responsibility of the planner of the cable support system to ensure that the torsion stiffness and statics of the existing steel building structure are suitable. Additional loads of other structures against and on our routes are not taken into account.

Important information!

Please observe the following basic rules:

- It is not required to use load distributing supports.
- Clamp fastenings on horizontal steel structures need not be protected against slippage, as the construction is intrinsically supportive.
- Clamp fastenings on vertical steel structures must always be protected against slippage using construction measures.
- In cases of doubt, we recommend calling in a structural engineer.

Chapter 6.4 Applying cold galvanisation

Mechanical processing (e.g. drilling, cutting, sawing, welding) will damage or remove the zinc layer, which protects the surface against corrosion.

Cutting edges and new drill holes must be protected against corrosion with a reapplication of the cold galvanisation.

Proceed as follows:

1. Clean the areas to be treated to remove dirt, grease and other impurities.
2. Apply the cold galvanisation according to the manufacturer's specifications.

Chapter 7. Mounting cable routes

This chapter deals with the following topics:

1. Calculating thermal length expansion
2. Adapting and shortening cable routes
3. Mounting cable routes
4. Mounting movable bearings
5. Earthing the cable support system
6. Labelling the cable support system
7. Completing the report

Chapter 7.1 Calculating thermal length expansion

Notice

Damage from thermal length expansion!

Cable support systems are subject to length expansion (length expansion co-efficient) and can be damaged by it.

To prevent damage to the cable support system, expansion distances must be complied with.

Important information!

If expansion joints exist in the structure of the building, then we recommend separating the cable support system at these points.

If there are major temperature variations, the thermal expansion of a cable support system may be considerable, especially if mounted outside. Therefore, expansion distances must be complied with at specific intervals, in order to avoid damage to the cable support system.

In addition, cable support systems must have sufficient conductivity to guarantee the equipotential bonding and the connection to the earth potential. Attach movable bearings and equipotential bonding conductors in such a way that they function safely, even in the case of thermal expansion.

Necessary work steps:

1. Determine the distance between movable bearings.
2. Determine expansion distances.

Chapter 7.1.1 Determine the distance between movable bearings

Proceed as follows:

1. Determine the maximum expected metal temperature difference to which the cable support system could be exposed to at the mounting location.
2. Choose the appropriate line in the “Metal temperature difference” column.
3. Select the distance given in the column “Distance between movable bearings”.

Metal temperature difference	Maximum distance between the movable bearings
°C	Metres
10	70
25	47
40	35
50	28
65	23
80	20

Table 1 Maximum permitted spacing between movable bearings

Chapter 7.1.2 Determining the expansion distance

The required expansion distance is dependent on the expected metal temperature difference and the temperature at the time of installation.

Proceed as follows:

1. Mark the highest expected metal temperature on the Y axis (Point 1).
2. Mark the lowest expected metal temperature on the Z axis (Point 2).
3. Draw a line between Points 1 and 2.
4. Enter the temperature at the time of installation on the Y axis (Point 3).
5. From Point 3, draw a horizontal line to the line which connected Points 1 and 2 (Point 4).
6. Draw a vertical line from Point 4 to the X axis (Point 5).
7. Use the value displayed by Point 5 for the necessary expansion distance.

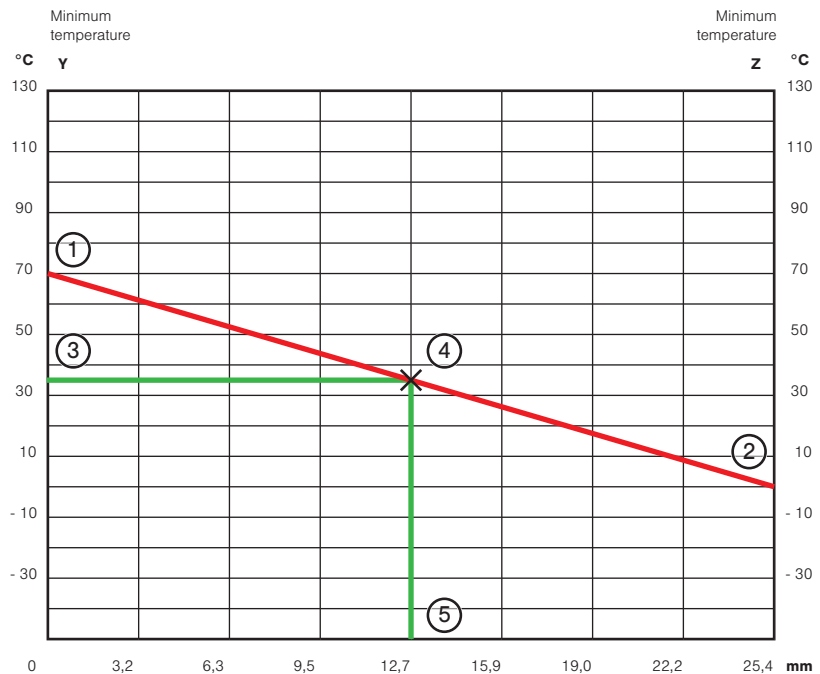


Image 3 Determining the expansion distance

Chapter 7.2 Adapting and shortening cable routes

Cable routes can be shortened with hand coping saws or electrical angle grinders.

Proceed as follows:

1. Mark the cutting area.
2. Saw the profile along the marking.
3. De-burr all the cut edges.
4. Fasten the edge protection strip or floor end plates at the cut edges.
5. If perforations are required, then draw on the appropriate perforations (e.g. for straight connectors).
6. Drill the appropriate holes in the profile.
7. De-burr all the drill holes.

Chapter 7.3 Mounting cable routes

Important information!

If expansion joints exist in the structure of the building, then separate the cable support system at these points. After separation, set up the electrical connection again using an equipotential bonding conductor. Use edge protection to prevent the cables from being damaged by the cut edges.

Proceed as follows:

1. Refer to the materials lists or the mounting drawings for details on the material required.
2. Mount the cable routes using the mounting diagrams.
3. Refer to Table_3 below for the torques to be maintained.
4. Tighten all bolts and anchors with a torque wrench.

The following tables shows the required torques for a selection of nuts and bolts. Refer to the OBO KTS catalogue for the resistance classes of the supplied bolts.

Thread	Resistance class 5.6	Resistance class 6.9	Resistance class 8.8	Resistance class 10.9	Resistance class 12.9
M6	3,9 Nm	8,5 Nm	10 Nm	14 Nm	17 Nm
M8	9,8 Nm	21 Nm	25 Nm	35 Nm	41 Nm
M10	19,6 Nm	41 Nm	49 Nm	69 Nm	83 Nm
M12	33,4 Nm	72 Nm	86 Nm	120 Nm	145 Nm
M14	54 Nm	115 Nm	135 Nm	190 Nm	230 Nm
M16	82 Nm	180 Nm	219 Nm	295 Nm	355 Nm
M18	114 Nm	245 Nm	290 Nm	400 Nm	485 Nm
M20	163 NM	345 Nm	410 Nm	580 Nm	690 Nm

Table 2 Torque table for threaded bolts in the cable support system

Thread	Resistance class 50	Resistance class 70	Resistance class 80
M6	3,8 Nm	8,2 Nm	10,9 Nm
M8	9,2 Nm	19,6 Nm	26,2 Nm
M10	19 Nm	39 Nm	53 Nm
M12	31 Nm	67 Nm	89 Nm
M14	50 Nm	106 Nm	142 Nm
M16	76 Nm	162 Nm	216 Nm
M18	105 Nm	225 Nm	299 Nm
M20	148 Nm	316 Nm	422 Nm

Table 3 Torque table for stainless steel threaded bolts (friction factor (q) 0,16))

Chapter 7.4 Mounting movable bearings

Loslager stellen im Gegensatz zu Festlagern Verbindungen zwischen Körpern her, die innerhalb eines gewissen Spielraums Bewegungen oder wärmebedingte Längenveränderungen aufnehmen können, ohne dass Beschädigungen auftreten.

Notice

Damage in the area of the movable bearing!

If movable bearings are tightened too much, then they may not be able to follow movements due to thermal expansion. As a result, damage to the cable support system and the retaining structure may occur.

Do not use a spanner! Only tighten the nuts to hand tightness and use bolt locks to permanently connect the bolts and nuts.

Proceed as follows:

1. Position the movable bearing with the expansion distance calculated in **Section 7.1.2** (see ΔL in Figure_4)
2. Fasten the connector on one side tightly to the cable support system.
3. Fasten the connector on the other side to the cable support system to hand tightness.
4. Secure the hand-tightened bolts with a screw lock to secure the bolts. Earthing the cable support system

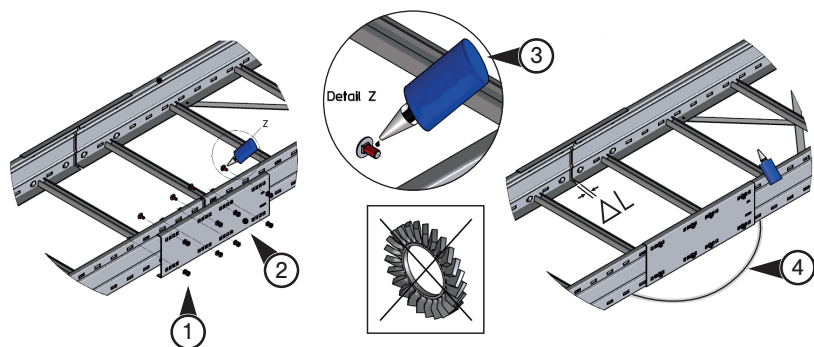


Image 4 Mounting movable bearings

Chapter 7.5 Earthing the cable support system

It might be necessary to mount additional connection cables along the joints under certain conditions, and according to the specifications of the client/system operator. The regulations and specifications, which generally apply to the mounting location, must be complied with.

Important information!

Please observe the following basic rules:

- Ensure that electrical conductivity is guaranteed by additionally fitting all the movable bearings with an equipotential bonding conductor.
- If the support system is interrupted at wall or ceiling penetrations, then you must connect the separated systems using connection cables.
- For safety and EMC reasons, the entire support system should be connected to the local equipotential bonding system multiple times.
- Position the ends of the equipotential bonding conductor at least 50 mm from the edge of the connector. The equipotential bonding conductor must be sufficiently long to function safely, even at maximum length expansion.

Chapter 7.6 Labelling the cable support system

Label the sections of the cable support system according to the cable path network plan or the cable route plan.

Proceed as follows:

5. Clean the areas to be treated to remove dirt, grease and impurities.
6. Label the cable routes with a suitable, non-washable or self-dissolving labelling system.

Chapter 7.7 Completing the report

After the mounting work has been completed, have the client accept the cable support system.

Proceed as follows:

1. Together with the client, check the cable support system.
2. Note down any problems immediately and inform the relevant people.
3. Create an appropriate report for the acceptance, in which you note down everything in writing.
4. Have the report signed by both sides.

Chapter 8. Routing cables

The chapter deals with the insertion of cables. In cases where insertion is not possible, recommendations will be given of how cables can be drawn in with the minimum of risk.

Notice

Damage to the cable support system on drawing in the cables

Cables with larger cross-sections pose a particular threat to the cable support system on drawing in.

Lay cables in the cable support system instead of drawing them in.

According to some national and international standards, cables must be laid in the cable support system and not drawn in. Therefore, we recommend laying the cables and not drawing them in.

Important information!

If it is not possible to lay the cables, then you should observe the following information to avoid damage:

- Use suitable pulling apparatus to pull the cables in in a straight direction. Use an appropriate aid at the start of the cable (e.g. stub cable, drawbar eye).
- Use suitable steering rollers to pull the cables round bends and T pieces, in order to avoid damage to the cable support system and cable insulation.
- Never pull cables over sharp edges to exclude the risk of insulation errors.
- Comply with the tensile forces and bend radii specified by the cable manufacturer.

Chapter 9. Maintenance and cleaning

This chapter deals with the maintenance and cleaning of cable support systems.

Maintenance and cleaning are in the sphere of responsibility of the future system operator, therefore we can only provide recommendations.

Chapter 9.1 Maintenance

Cable support systems do not need maintenance in the case of static loads.

Important information!

Please observe the following basic rules:

- If the cable support system is mounted directly on machine parts, conveyor systems or similar, then dynamic loads from shaking motions may loosen the mounting elements used.
- In this case, check the screw connections and the stability of the cable support system.

Chapter 9.2 Cleaning

Cable support systems must be cleaned if the weight of extreme sand or snow loads could lead to an overload of the cable support system. Depending on the load, it might be necessary to clean the trays to avoid overloads.

Important information!

Proceed as follows:

1. You can use a vacuum to remove sand or other impurities (except snow). If necessary, wipe the area with a moist cloth after this.
2. Snow, sand and other impurities can also be carefully swept away.
3. If a high-pressure cleaner is used, then the trays must be dried soon after cleaning and well ventilated.
4. We recommend that the cable support system then be lightly oiled with a saturated cleaning cloth (e.g. with drawing compound).

www.obo.de



OBO BETTERMANN GmbH & Co. KG

PO Box 1120

58694 Menden, Germany

Customer Service Germany

Tel.: +49 (0)2373 89-1500

Fax: +49 (0)2373 89-7777

E-mail: info@obo.de

© 2011 OBO Bettermann GmbH & Co. KG

Authors: F. Henneke, M. Laryea

Reprinting, even of sections, only with written approval.

Subject to changes.

THINK CONNECTED.