

YAMAICHI



Y-Sol® Photovoltaics

- Cable Assemblies
- Connectors
- Junction Boxes

Y-Sol for your Photovoltaics System

1. Junction Boxes



Eco-Si J-Box

For Silicon Wafer Modules
(see Page 10)



Universal J-Box

For Silicon Wafer Modules
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TF J-Box

For Thin Film Modules
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2. Cable Assemblies



Y-Sol4

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Y-Sol3

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3. T-Junctions



Y-Sol4

(see Page 5)



Y-Sol3

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4. Field Assembly Connectors



Y-Sol4 F.A.T. / C.A.T. (male)

(see Page 8/9)



Y-Sol4 F.A.T. / C.A.T. (female)

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5. Receptacles



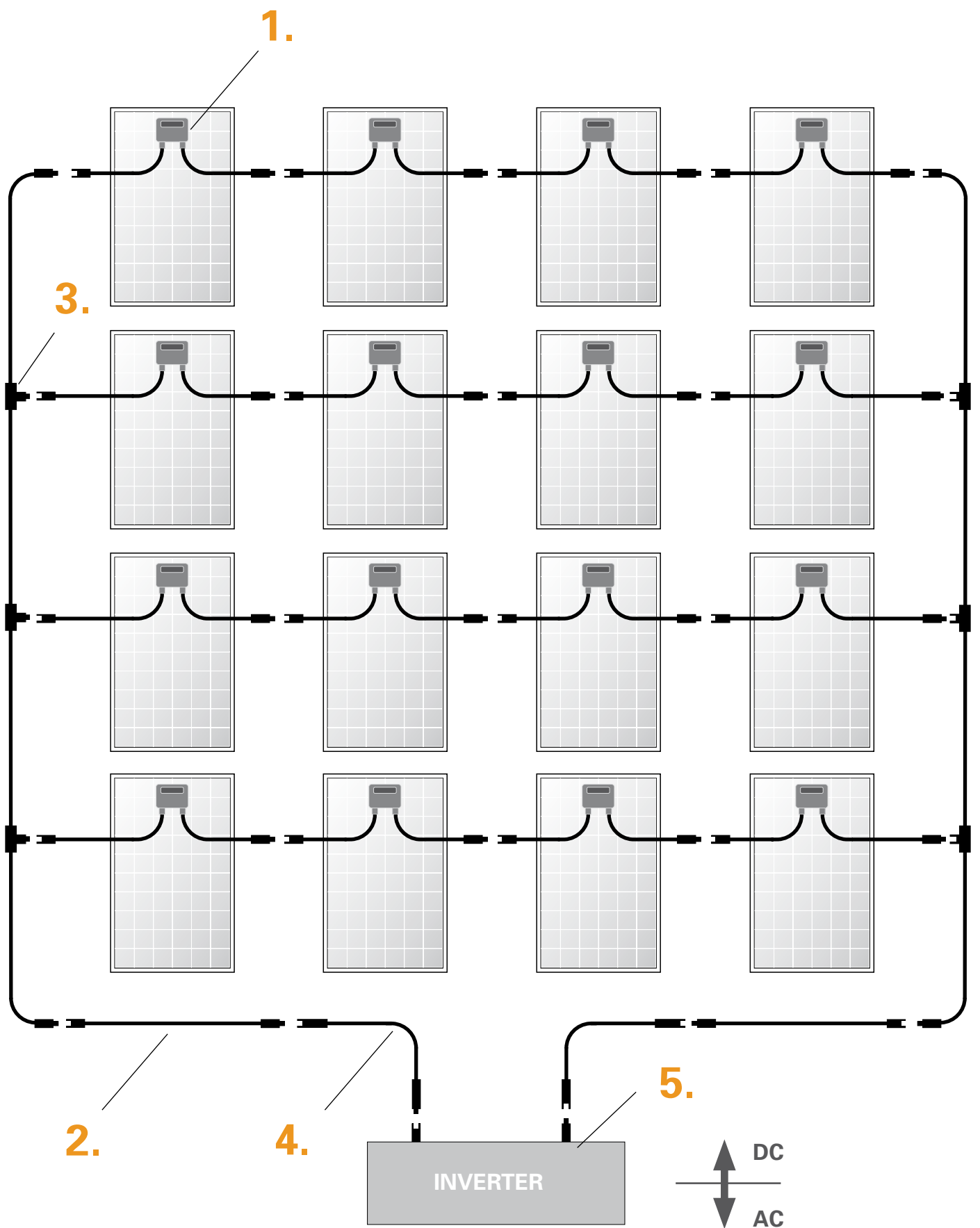
Y-Sol4 (male)

(see back cover)



Y-Sol4 (female)

(see back cover)



Why Hermetic Sealed?



One Step Process

What is the meaning of Hermetic Sealed?

Hermetic Sealed is a one step overmolding process.

In a one step process the connector or junction box is molded into its final shape. No screws or extra parts are needed. The overmolding forms a permanent hermetic sealing around the enclosed parts. A maximum of protection against dust or water is achieved. (fig 1)

Yamaichi has developed this technology for connectors like Y-Sol3 and Y-Sol4 but also extended the technology to be used for junction boxes like TF and Eco-Si. These products come ready-to-plug to the customer and do not require additional assembly on customer side. 100% tested for easy and safe assembly.

For worldwide usage, the products are tested and certified by TÜV and UL.

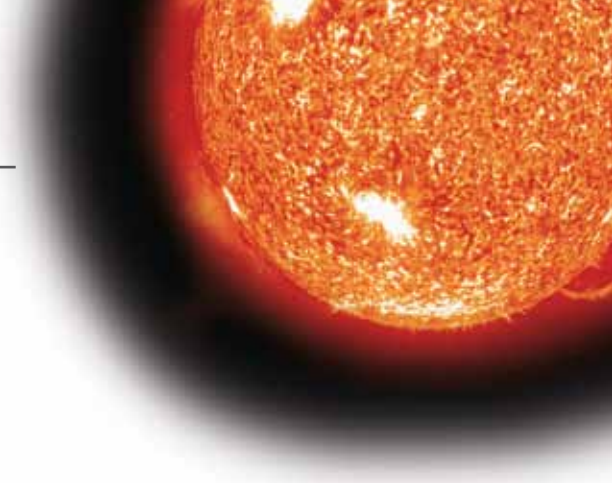
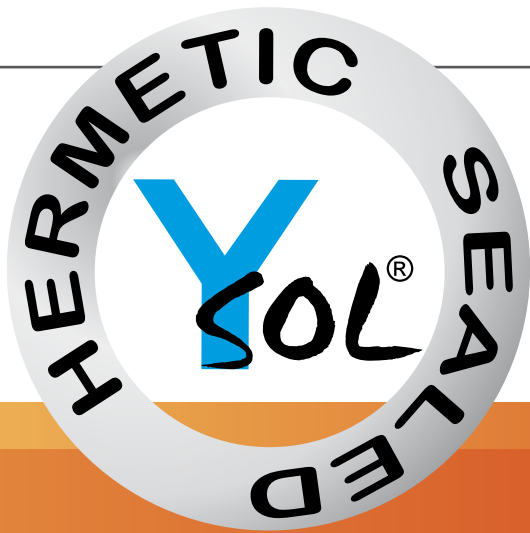


fig 1. Shows a 3D drawing of the Hermetic Sealed Y-Sol4 T-Junction

Customer advantages with Y-Sol cable assemblies

The Hermetic Sealed technology combines the advantages of cost and quality

- Less installation time required because of overmolded cable assemblies which are pre-assembled and "ready-to-plug".
- Permanent and safe operation of the PV plant. Y-Sol connectors fulfill the IP68 protection class. Inner parts such as contacts are hermetic sealed against dust or water.
- Safe power transmission of up to 40A.
- Cable assemblies can be made according to the customer specification (e.g. length, cable diameter).
- Long life time of the complete assembly even under harsh environmental conditions.
- Cross-linked PV cables are used as standard for maximum durability.



Customer advantages with Y-Sol Junction Boxes

All Junction Boxes from Yamaichi are delivered with cables and overmolded connectors. In addition to the advantages of our cable assemblies, the Hermetic Sealing of the TF and Eco-Si J-Box has the following features:

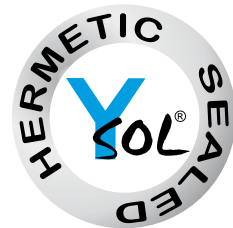
- Higher reliability because the junction boxes are delivered as a pre-assembled Hermetic Sealed system, complete with cables and connectors. No assembly at customer side needed.
- High IP ratings allow long-life performance even under extreme conditions. The Eco-Si Junction Box reaches IP68 rating.
- Configuration according to customer requirements.
- Optionally integrated and overmolded bypass diodes guarantee safe and reliable operation under different lighting conditions or shadowing.



*Eco-Si Hermetic Sealed
Junction Box*

Y-Sol4 Cable Assemblies

Y-Sol4 is a ready to use solar cable assembly. It is made according to customer requirements. The Y-Sol4 connector has a security locking function. Once closed a release tool is necessary to re-open the connection.



Ready-to-Plug

Y-Sol4

Ø 4mm contacts with locking



Y-SOL4 release tool

Part Number
Y-SOL4-RELEASE-TOOL-SR



Certified: acc. to EN50521 (TÜV)
acc. to UL 1703



Part Number (example) and various combinations

Y-SOL4AOV - M1 - 4T - 1000 - GM*

Series No.
for Overmolded
(Hermetic Sealed)

M1 = Male
(with Partial Strip off)
F1 = Female
(with Partial Strip off)
M2 = Male (with Blank Cut)
F2 = Female (with Blank Cut)

Cable Cross Section / Cable Listing
2U = 2.5mm², with TÜV and UL
4T = 4.0mm², with TÜV

Overall Length in mm (e.g. 1000 = 1 meter)

GM* = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

Specifications

Description	Y-SOL4
Height	12mm
Degree of protection	IP68 (plugged) and IP20 (unplugged)
Protection class	II
Cable cross section	2.5mm ² and 4.0mm ²
Ambient temperature	-40°C to +85°C
Contact resistance	< 5mΩ (typ. value 1mΩ up to 3mΩ)
Voltage rating	1,000 V DC acc. to TÜV EN50521 600 V DC acc. to UL 1703
Current rating	30A (based on 4mm ² cross section)
Extraction force	≥ 89 Newton
Cable pull-out force	≥ 350 Newton

Y-Sol4 T-Junction Assemblies

Y-Sol4 T-Junction is a ready to use solar cable assembly. It is made according to customer requirements for fast and safe installation in the PV Field. The number of T-Junctions and adapter cables can be freely specified. The Y-Sol4 T-Junction has a security locking functionality. Once closed a release tool is necessary to re-open the connection.



Y-Sol4 T-Junction

Ø 4mm overmolded cable harness for connection of PV panels in parallel configuration.



Y-SOL4 release tool

Part Number
Y-SOL4-RELEASE-TOOL-SR

Part Number (example) and various combinations

Y-SOL4T - F 4 3 - 6T - 3200 - GM*

Series No.
for Overmolded
(Hermetic Sealed)

M = Male F = Female

Number of T-Junctions (e.g. 4)

Number of Adapter Cables (e.g. 3)

Cable Cross Section / Cable Listing
4U = 4.0mm², with TÜV/UL
6T = 6.0mm², with TÜV

Overall Length in mm (e.g. 3200 = 3.2 meter)

GM* = Internal Style No. (determined by Yamaichi)

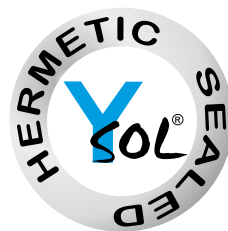
For final part numbers please contact Yamaichi before ordering

Specifications

Description	Y-SOL4 T-Junction
Height	Ø12mm
Degree of protection	IP68 (plugged) and IP20 (unplugged)
Protection class	II
Cable cross section	6.0mm ²
Ambient temperature	-40°C to +85°C
Contact resistance	< 5mΩ (typ. value 1mΩ up to 3mΩ)
Voltage rating	1,000 V DC acc. to TÜV EN50521 600 V DC acc. to UL 1703
Current rating	40A (based on 6mm ²)
Extraction force	≥ 89 Newton
Cable pull-out force	≥ 350 Newton

Y-Sol3 Cable Assemblies

Y-Sol3 is a ready to use solar cable assembly. It is made according to customer requirements.



Ready-to-Plug

Y-Sol3

Ø 3mm contacts without locking



Certified: acc. to EN50521 (TÜV)
acc. to UL 1703



Part Number (example) and various combinations

Y-SOL3AOV - F1 - 4U - 1000 - GM*

Series No.
for Overmolded
(Hermetic Sealed)

M1 = Male
(with Partial Strip off)
F1 = Female
(with Partial Strip off)
M2 = Male (with Blank Cut)
F2 = Female (with Blank Cut)

Cable Cross Section / Cable Listing
2T = 2.5mm², with TÜV
4U = 4.0mm², with TÜV and UL
4T = 4.0mm², with TÜV
6T = 6.0mm², with TÜV

Overall Length in mm (e.g. 1000 = 1 meter)

GM* = Internal Style No. (determined by Yamaichi)

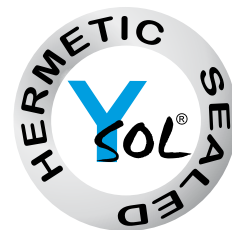
For final part numbers please contact Yamaichi before ordering

Specifications

Description	Y-SOL3
Diameter	Ø13.5mm
Degree of protection	IP68 (plugged) and IP20 (unplugged)
Protection class	II
Cable cross section	2.5mm ² , 4.0mm ² and 6.0mm ²
Ambient temperature	-40°C to +85C
Contact resistance	< 5mΩ (typ. value 1mΩ up to 3mΩ)
Voltage rating	1,000 V DC acc. to TÜV EN50521 600 V DC acc. to UL 1703
Current rating	40A (based on 4mm ² cross section)
Extraction force	≥ 89 Newton
Cable pull-out force	≥ 350 Newton

Y-Sol3 T-Junction Assemblies

Y-Sol3 T-Junction is a ready to use solar cable assembly. It is made according to customer requirements for fast and safe installation in the PV field. The number of T-Junctions and adapter cables can be freely specified.



Y-Sol3 T-Junction

Ø 3mm overmolded cable harness for connection of PV panels in parallel configuration.



Certified: acc. to EN50521 (TÜV)
acc. to UL 1703

Part Number (example) and various combinations

Y-SOL3T - F 4 3 - 6T - 3200 - GM*

Series No.
for Overmolded
(Hermetic Sealed)

M = Male F = Female

Number of T-Junctions (e.g. 4)

Number of Adapter Cables (e.g. 3)

Cable Cross Section / Cable Listing
6T = 6.0mm², with TÜV
6U = 6.0mm², with TÜV and UL

Overall Length in mm (e.g. 3200 = 3.2 meter)

GM* = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

Specifications

Description	Y-SOL3 T-Junction
Diameter	Ø17mm
Degree of protection	IP68 (plugged) and IP20 (unplugged)
Protection class	II
Cable cross section	6.0mm ²
Ambient temperature	-40°C to +85C
Contact resistance	< 5mΩ (typ. value 1mΩ up to 3mΩ)
Voltage rating	1,000 V DC acc. to TÜV EN50521 600 V DC acc. to UL 1703
Current rating	40A (based on 6mm ²)
Extraction force	≥ 89 Newton
Cable pull-out force	≥ 350 Newton

Y-Sol4 Free and Crimp Assembly Connector

The Y-Sol4 F.A.T. (Free Assembly Type) is a connector for fast and safe field installation. The connector comes in male and female types and has only two parts to connect with the cable. There is no crimp tool required for this operation. The assembly is closed by simply screwing the two parts together.



Tool Free

Y-Sol4 F.A.T.

Ø 4mm contacts - spring type assembly

Customer Advantages

- ✓ No crimp tool required
- ✓ Two piece design
- ✓ Installation in just three steps



Male Connector

Female Connector



Assembly Process Spring Contact

Step 1

Insert cable to contact.
Close spring to hold cable



Step 2

Insert contact to housing
in the direction of the arrow



Step 3

Tighten screw cap



Recommended Tools

Gauge to test
the contact
position

Part No.
PVP0402-TEST GAUGE



Spanner to tighten
the screw
connection of
Y-Sol F.A.T. / C.A.T.

Part No.
PVP0402-SPANNER



For correct usage of these tools
please contact Yamaichi for the
installation manual

The Y-Sol4 C.A.T. (Crimp Assembly Type) is a connector for field installation by crimp connection. The connector comes in male and female types and has only two parts to connect with the cable. The cable is assembled by using a standard crimp tool. This crimping can be done manually or automatically.

Crimp Type



Part Number (example) and various combinations for connectors F.A.T. and C.A.T.

PVP0402 - 202 - 02 02 - 00*

Series No. for
PVP0402 = Plug
PVS0402 = Socket

102 = Crimp Type Unit Packaging (C.A.T.)
202 = Spring Type Unit Packaging (F.A.T.)

Cable Cross Section
02 = 2.5mm² to 6.0mm²

Cable Outer Dimension
02 = 5.8mm up to 7.0mm
(other diameters are being planned)

00* = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

Y-Sol4 C.A.T.

Ø 4mm contacts - crimp type assembly

Customer Advantages

- ✓ For manual or automatic assembly
- ✓ Two piece design



Specifications

Description	Y-SOL4 F.A.T. / Y-SOL4 C.A.T.
Diameter	Ø 18.8mm
Degree of protection	IP67
Protection class	II
Cable cross section	2.5mm ² , 4.0mm ² and 6.0mm ²
Cable outer diameter	5.8mm to 7.1mm (other dimensions are planned)
Ambient temperature	-40°C to +85°C
Contact resistance	< 5mΩ (typ. value 1mΩ up to 3mΩ)
Voltage rating	1,000 V DC acc. to TÜV EN50521 600 V DC acc. to UL 1703
Current rating	30A (based on 4mm ² cross section)
Extraction force	≥ 89 Newton

Eco-Si J-Box for Silicon Wafer Modules

The new Eco-Si J-Box offers an IP68 protection at an attractive price level which is unique in the market. Yamaichi's Hermetic Sealed technology ensures high reliability even under extreme conditions. In addition the Eco-Si box comes at very low height (22mm) and is already prepared for coming 1,500V system voltages.



Junction Boxes

Eco-Si J-Box

Technical Highlights

- ✓ IP68 protection
- ✓ High voltage rating
- ✓ Low height

Customer Advantages

- ✓ High reliability even under extreme conditions
- ✓ Additional features for fully automated production process
- ✓ Prepared already for future requirements of 1,500V solar modules



Certified: acc. to DIN V VDE V 0126-5/2008-05 (TÜV)
acc. to UL 1703



Part Number (example) and various combinations

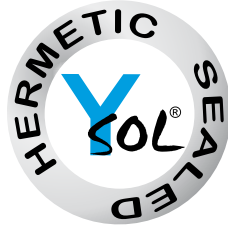
Y-SOL4BE	SI	3	4	S	1	6T	M11	F11	GM*
Series No. Eco-Si with Y-sol4									
SI = Standard J-Box SC = With Flash Test Clip									
Number of Bypass Diodes									
Number of Contacts & Rails									
S = Soldered Contacts									
1 = PCB (Standard Type)									
Cable Cross Section / Cable Listing 4U = 4.0mm ² , with TÜV and UL 6T = 6.0mm ² , with TÜV									
M11 = Male Cable Overall Length (e.g. 11 = 1.1 meter)									
F11 = Female Cable Overall Length (e.g. 11 = 1.1 meter)									
GM* = Internal Style No. (determined by Yamaichi)									

For final part numbers please contact Yamaichi before ordering

Specifications

Description	Eco-Si J-Box
Dimensions (L x W x H) in mm	Short Type: 153 x 116 x 22
Degree of protection	IP68
Protection class	II
Number of diodes	3
Number of ribbons	4
Conductor cross section	4.0mm ² and 6.0mm ²
Voltage rating	1,000 V DC acc.to DIN V VDE V 0126-5/2008-05 (TÜV) 600 V DC acc. to TÜV V 0126-5
Current rating	12A
Reversed current rating	30A

Eco-Si J-Box Accessories



Eco-Si J-Box



Eco-Si J-Box with Flash Test Clip



Accessory: Flash Test Clip

Technical Highlights

- ✓ Available as an option
- ✓ Cable holder and contact plates for direct flash test

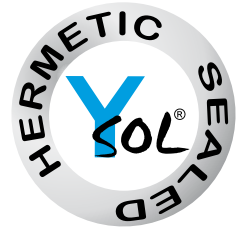
Customer Advantages

- ✓ For automated production lines
- ✓ Transport clip for cables from Yamaichi to the panel installer in the field



TF J-Box for Thin Film Modules

The Y-Sol Thin Film J-Box can be easily assembled either manually or in an automatic process. Contacting to the PV module is realized by spring loaded contacts in the J-Box lid. One bypass diode can be integrated optionally as per customer requirements.



Junction Boxes

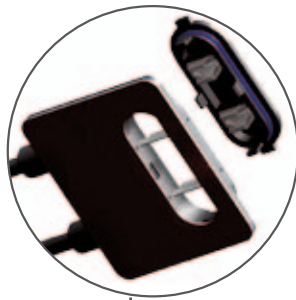
TF J-Box

Technical Highlights

- ✓ Spring loaded contacts
- ✓ Double sided adhesive
- ✓ Extremely flat

Customer Advantages

- ✓ No tools required
- ✓ Easy and safe contact assembly
- ✓ Simple mounting to module



Certified: acc. to DIN V VDE V 0126-5/2008-05 (TÜV)
acc. to UL 1703

Part Number (example) and various combinations

Y-SOL4B TFL 1 2 1U M06 F08 GM*

Series No.
for Overmolded
(Hermetic Sealed)

TFS = Short Type
TFL = Long Type

0 = No Bypass Diode
1 = With Bypass Diode

Two Spring Contacts

Cable Cross Section / Cable Listing
2U = 2.5mm², with TÜV and UL

M06 = Male Cable (e.g. 06 = 0.6 meter)

F08 = Female Cable (e.g. 08 = 0.8 meter)

GM* = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

Specifications

Description	TF J-Box
Dimensions (L x W x H) in mm	Short Type: 60 x 70 x 14 Long Type: 68 x 70 x 14
Degree of protection	IP65
Protection class	II
Number of diodes	Optional with one bypass diode
Number of ribbons	2
Ribbon width	max. 10mm
Conductor cross section	2.5mm ²
Voltage rating	1,000 V DC acc.to DIN V VDE V 0126-5/2008-05 (TÜV) 600 V DC acc. to UL 1703
Current rating	up to 7A depending on J-Box configuration

TF J-Box Accessories

Accessories to the existing TF boxes complete the product series with additional benefits. This brings module producers easier and faster to their running production process.



Flash Test Clip

Part Number Y-SOL4BTF-FLASHCLIP-MP

Customer Advantages

- ✓ This optional clip holds the cables in a fixed position and can be used as fixation during transport and tooling in production.
- ✓ Automated flash test by contacting the cables directly without any manual interaction is possible



Universal Mounting Tool

Part Number YED950-0-SOL4-ADJ-TF

Customer Advantages

- ✓ Universal mounting tool with clamp mechanism. This mounting tool has a clamp mechanism which holds the box during the mounting process.
- ✓ After successful box mounting on the panel the buttons can be pressed automatically or manually to release the tool from the box. This allows a reliable positioning of the TF-Box on the panel.

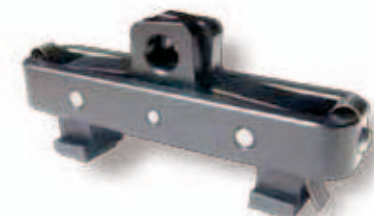


Clamp for Adhesion Tests

Part Number Y-SOL4BTFX-BOX CLAMP

Customer Advantages

- ✓ This clamp is needed for testing of adhesion force, mainly needed for UL testing.
- ✓ The clamp allows comfortable pull force testing.



Universal J-Box for Silicon Wafer Modules

The Universal J-Box is Yamaichi's most flexible product which supports different quantities of diodes, ribbons, PCB designs and contact possibilities.

This flat Silicon Wafer J-Box (<27 mm height) features integrated cable holders for automated assembly. SMD diodes used in this J-Box generate approximately 40% less heat than conventional radial diodes.



Junction Boxes

Universal J-Box

Technical Highlights

- ✓ Flexible quantity of diodes and ribbons
- ✓ PCB as crossed and standard version
- ✓ SMD diodes and Gore-Tex® membrane

Customer Advantages

- ✓ Flexible design allows customization
- ✓ Minimized heat development in bypass mode (shadowing)



Certified:
acc. to DIN V VDE V 0126-5/2008-05



Part Number (example) and various combinations

Y-SOL4B SI 3 4 C 1 4T M10 F8 GM*

Series No.
Y-SOL3B with Y-Sol3
Y-SOL4B with Y-Sol4

Si Wafer J-Box

Number of Bypass Diodes
(3 is standard)

Number of Contacts/Rails

C = Clamped Contacts
S = Solder Contacts

1 = PCB Standard Type
2 = Non Ribbon Crossing Type

Cable Cross Section / Cable Listing
4T = 4.0mm², with TÜV 6T = 6.0mm², with TÜV

M10 = Male Cable overall Length (e.g. 10 = 1 meter)

F8 = Female Cable overall Length (e.g. 8 = 0.8 meter)

GM* = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

Specifications

Description	Universal J-Box
Dimensions (LxWxH)	111 x 140 x 26.5
Degree of protection	IP67
Protection class	II
Number of diodes	Optional with up to 6 bypass diodes
Number of ribbons	2 - 8
Ribbon width	max. 7.5mm
Conductor cross section	4.0mm ² and 6.0mm ²
Voltage rating	1,000 V DC acc. DIN V VDE V 0126-5/2008-05 (TÜV)
Current rating	up to 20A depending on J-Box configuration

SMARTview J-Box for Silicon Wafer Modules

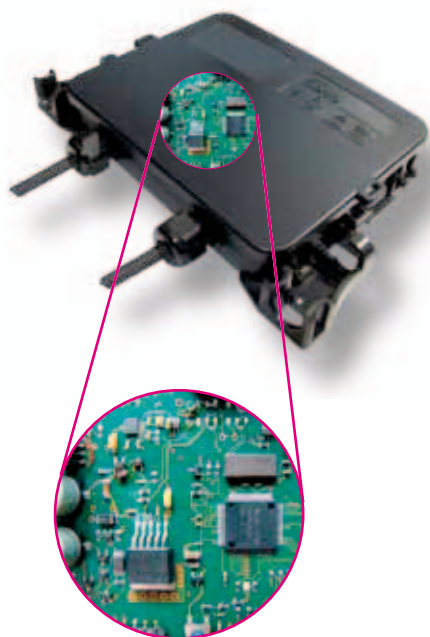
The Y-Sol SMARTview J-Box is based on the Yamaichi Y-Sol Universal J-Box design. It has the complete functionality of the Universal J-Box. Additionally it enables an active and intelligent monitoring (smart view) of the PV field system during operation.



SMARTview J-Box

Technical Highlights

- ✓ Temperature measurement (°C) of each module
- ✓ Voltage measurement (V) of each module in bypass mode (shadowing)
- ✓ Performance measurement of each module (W)



Part Number (example) and various combinations

Y-SOL4B SMS 3 4 C 1 4T M10 F10 GMA

Series No.
Y-SOL3B with Y-Sol3
Y-SOL4B with Y-Sol4

SMARTview Wafer J-Box

Number of Bypass Diodes
(3 is standard)

Number of Contacts/Rails

C = Clamped Contacts
S = Solder Contacts

1 = PCB Standard Type
2 = Non Ribbon Crossing Type

Cable Cross Section / Cable Listing
4T = 4.0mm², with TÜV 6T = 6.0mm², with TÜV

M10 = Male Cable overall Length (e.g. 10 = 1 meter)

F8 = Female Cable overall Length (e.g. 8 = 0.8 meter)

GMA = Internal Style No. (determined by Yamaichi)

For final part numbers please contact Yamaichi before ordering

The measured data is transferred to an internet based server. It can be accessed via software from a PC, laptop or smart phone.

The customer benefits are:

- Accurate and prompt PV field status and information about the performance of each PV module
- Warning alert function in case of a failure or power loss in the PV field
- Root cause analysis of the failure down to module level allowing target oriented and prompt counter measures.

Malfunctions are detected earlier. The root cause of the failure can be addressed directly. System downtime is reduced. The PV field power output will be increased.

Y-Sol4 Receptacles

The Y-Sol4 Receptacle is a panel mount connector. It will be available in a male and female version.

- ✓ Y-Sol4 contact technology
(compatible connection to Y-Sol4, Y-Sol4 F.A.T. and C.A.T.)
- ✓ Easy and safe assembly



J-Box for Building Integration

The need for photovoltaic installations integrated in parts of buildings is increasing. Therefore Yamaichi is working on a design for a tailored product series

- ✓ Small footprint and compact design
- ✓ Fulfills building integration requirements



Cable Harness and X / Y Couplers

- ✓ Customised cable harnesses and X / Y couplers reduce the manual work in a PV installation
- ✓ The installation is now very simple and safer for the PV field operations
- ✓ Customized cable assemblies



For further information please contact Yamaichi

YAMAICHI ELECTRONICS
Deutschland GmbH
Karl-Schmid-Str. 9
81829 Munich
Germany

Tel.: +49 (0) 89 45 10 9 - 0
Fax: +49 (0) 89 45 10 9 - 110
e-mail: sales@yamaichi.de
Internet: www.yamaichi.de

YAMAICHI ELECTRONICS Italia s.r.l.
Centro Direzionale Colleoni
Via Colleoni, 1 - Pal. Taurus Ing. 1
20041 Agrate Brianza (MI)
Italy

Tel.: +39 039 6881185
Fax: +39 039 689 2150
e-mail: sales@yamaichi.it
Internet: www.yamaichi.de

YAMAICHI ELECTRONICS GB Ltd.
Unit 4, Woodlands Business Village,
Coronation Road, Basingstoke
Hampshire RG21 4JX
England

Tel.: +44 (0)1256 463131
Fax: +44 (0)1256 463132
e-mail: sales@yamaichi.co.uk
Internet: www.yamaichi.de

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