AGRICULTURAL SOLUTIONS

ISO-11783-2 Connectors for Modern Agriculture Technology

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Powell Electronics is dedicated to providing the most advanced ISO-11783-2 connector system for the most demanding applications. Today, your system and design needs require high reliability, faster speeds, and world-class quality. Modern farming demands cutting edge technology and advanced performance that provides higher yield efficiencies. From prototype to production, Powell has the solutions.

Powell Electronics provides components for ISO 11783-2 and SAE J1939 applications, along with a vast array of related products such as ground radar, switches, connectors, lighting, circuit breakers, solenoids and value-added assemblies. Thank you for your interest in Powell Electronics, and we look forward to engineering a solution for you.
ISO 11783-2 COMPONENTS

IBBC • ISOBUS Breakaway Connector 2.0
The next generation model offers a new three latch retention for better contact alignment. The extended contact mating length reduces voltage drop and heat build-up. The improved thumb latch construction and lightened spring force optimizes the closing of the lid and improves the water resistance. Overall it provides a much more reinforced CAN interface connection.

IBRC-3L • Three Latch Rear Connector
The new generation model offers an improved alignment of contacts to ensure maximum power transfer with minimum heat build-up or voltage drop. The interfacial seal offers visibility of correct mating in production or in the field, preventing power interruptions. The population principle is designed for ease of wiring, reducing cost and improved quality.

IBIC™ • ISOBUS Implement Connector
The IBIC™ Implement Connector is by far the most accepted implement connector on the market due to its ease of wiring with standard tooling in less than 3 minutes. It is field repairable in case of a mishap occurring, requiring no special techniques or tooling. It is produced out of high-grade polymers, making it resistant to all aggressive substances used in the industry. The combination of this connector with the IBBC offers you the safest and most reliable interconnection for this essential application.

IBIC™ • ISOBUS Implement Connector Cap
The mating cap to the IBIC™ is specially produced for two applications. One is to provide an environmental sealing to the IBIC™ in case it is not mated. The second is to provide a storage space for the IBIC™ when not in use. The cap is therefore equipped with a lanyard that can be attached to the cable or fitted to a bracket at the implement
IBIC-R™ • Agricultural Inline Receptacle

The IBIC-R™ is a receptacle that is designed after the requirements of the AEF to provide a cost effective solution for low power tractors that are still considered to be equipped with a BUS system. It is designed with the ISO 11783 interface, making it immediately compatible with ISOBUS applications.

Diagnostic Receptacles

Powell provides two different versions of this SAE J1939 diagnostic connector, also adopted by ISO 11783-2. The connector is available in a standard flanged variant that is a drop-in replacement for existing connectors, and also a jam nut style that provides for far easier installation during manufacturing. These thermoplastic receptacles feature a positive contact retention system, are sealed via redundant grommet wire seals, and use proven Powell AT contact technology.

TBC • Terminating Bias Circuit

Powell’s TBC allows for simple, stand-alone termination of CAN BUS systems. The TBC can be used for active or passive systems and is the ideal cost-effective solution for termination on every location of the BUS.

ISOBUS Jacket Cable

Powell’s ISOBUS Jacket Cable is a premium addition for connecting our agricultural components. The layered cable elements consist of stranded plain copper wires, according to IEC 60228 Class 5 specifications. Combined with a TPR and PVC insulation and a black PVC jacket, this cable allows for accelerated, reliable communication and sustained connection even in harsh temperatures. The four CAN wires are twisted as per the ISO document, 50 til 55 mm/turn - an important feature for reducing EMI. Also mention The power lines are available in ø6 mm² and in ø10 mm² in case of longer implement cables to reduce voltage drop over the cable.
ISOBUS Breakaway Connector for CAN Based Implement Systems

Powell’s ISOBUS Breakaway Connector is a cost effective connector solution for CAN based implement systems. The IBBC connector maintains full compatibility with ISO 11783-2 standards, ensuring reliable communications between the implement and tractor or construction equipment.

ISO 11783 DEFINES A STANDARD FORMAT FOR COMMUNICATIONS TRAVELING BETWEEN ELECTRONIC DEVICES

Why is ISO 11783 so important?

Electronics have become a major aspect of construction and agricultural equipment. In an effort to create standards for communications and electronics in mechanized equipment, the ISO 11783, or ISOBUS, specifications were developed.

The ISO 11783 protocol describes a control area network, or CAN, protocol – a proven technology that has been used to standardize components in agricultural equipment for many years. ISO 11783 defines a standard format for communications traveling between electronic devices. Through compliance with ISO 11783, you are ensuring that connectors and wire harnesses are compatible and that the systems will communicate with each other.

Why Powell’s IBBC is a Better Choice

The IBBC uses an improved design, which consists of a die-cast aluminum handle and locking latch/release mechanism that holds the mating connector securely in place. This HSI-ready design offers many benefits over the typical bayonet locking pin and ring design:

- Simple to line up and push the implement harness connector into place.
- Powder-coated aluminum handle will not corrode due to exposure to farm chemicals and the environment.
- The handle holds the mated connector firmly in place during operation, while the latch/release will allow the connectors to breakaway in the event of a mishap.
- Easy to install and the most accepted in the industry.

* For overall dimension specifications and pin arrangements, see Appendix A.
IBRC-3L Sustainability Improvements

Powell Electronics’s new and improved IBRC Connector (for mating with the IBBC) comes with an optimized mating tolerance, longer mating interface, three latch locking mechanism, brightly-colored 2D visual inspection interfacial seal, and the option of adding a backshell or cable router to it.

These improvements feature less stress on the contacts, which optimizes the power transfer and results in less heat build-up under full load. The three latches provide an increased mating stability, again adding to a stress-free contact alignment. A brightly colored interfacial seal will provide an easy visual inspection on correct and tight mating while sealing off in two dimensions – performing to IP6K9K standards. Populating this improved version is extremely easy by simply pushing the contacts in until a click is heard, locking the contacts safely in place. This will reduce the population time to an absolute minimum and therefore can be seen as a huge cost savings.

Although this new IBRC is 100% backwards compatible, it will be launched under part number IBRC-3L and comes with all four contacts. The pricing will not be affected by this improved design. The previous version will be phased out as the new design is backwards compatible.
ISOBUS Implement Connector for CAN Based Implement Systems

Powell’s ISOBUS Implement Connector is a new design for the implement connector specified in the ISO 11783 protocol. The IBIC™ creates the electrical connection of implements to the tractor or other agricultural vehicles in order to transfer power, signals, and CAN BUS communication to and from the tractor and implement. This IBIC™ connector provides a cost-effective solution for implement manufacturers.

The IBIC™ Implement Connector is by far the most accepted implement connector in the market. This is due to its ease of wiring with standard tools in less than 3 minutes. It is field repairable in case of a mishap occurring, requiring no special techniques or tooling.

Features and Benefits

- High-grade, non-corrosive polymers used in construction
- Rapid population and simple assembly
- Ergonomic design with no sharp edges or parts
- No special tooling required
- Mates with all existing ISO 11783-2 Tractor Connectors
- Strong high-grade plastic construction will not deform if dropped
- Bayonet rings are easily field replaceable to keep equipment working in the field and reduce downtime
- Environmentally sealed; IP67 rated against moisture and dust in both mated and unmated states.

Dimensions and Specifications

- **Overall Dimensions**: 96 x 51mm
- **Operating Temperature**: -30°C to +85°C
- **Storage Temperature**: Room temperature
- **Mounting Time**: 3 minutes
- **Weight**: Approximately 100 grams ex contacts
- **Cable OD**: <18mm / >14mm
- **Contacts**: 2x #8 AWG | 2x #12 AWG | 5x #16 AWG - 1x bridged
- **Max Power Capacity**: 2x 60 amp | 2x 25 amp | 4x 13 amp - 1x 13 amp bridged
- **Construction Material**: High grade plastics, non-corrosive
- **Environmental Protection**: IP67 mated and unmated
**Waterproof Cap**
Made from the same durable polymers as the IBIC™, the Waterproof Cap can be applied by direct connection to the IBIC™ with a strong lanyard or in a panel bracket.

**Convolute Adapter**
This adapter is extremely easy to mount and offers an IP 67 water resistance like the complete connector does. It’s available in size 17 and 22, and offers UV and weathering resistance.

**Grommet Seals**
Protect the IBIC™ wire and cable with flexible grommet seals. These seals are designed to handle UL Spec Wires (orange) or SAE Spec Wires (blue).

<table>
<thead>
<tr>
<th>Cavity #</th>
<th>Conductor Diameter</th>
<th>Minimal Insulator Outer Diameter</th>
<th>Maximal Insulation Outer Diameter</th>
<th>Minimal Insulator Outer Diameter</th>
<th>Maximal Insulation Outer Diameter</th>
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<td>6.10 (0.240)</td>
<td>3.43 (0.135)</td>
<td>5.59 (0.220)</td>
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<td>3.40 (0.134)</td>
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The IBIC-R™ Connector is an ISOBUS receptacle that is designed after the requirements of the AEF to provide a cost effective solution for low power tractors that are still considered to be equipped with a BUS system. The TPPL is designed with the ISO 11783-2 interface, making it immediately compatible with ISOBUS machinery.

**IBIC-R™ Agricultural Inline Receptacle for TPPL:**
- Meets the increasing need of ISOBUS and precision farming technology on smaller and cheaper machines
- AEF agreed to work out a solution to make ISOBUS suitable and affordable for smaller machines
- A twisted pair CAN cable costs about a half of a twisted pair. Moreover, the tolerance in twisting allows manufacturers to twist cables internally (which is quite a saving)
- Longer stubs allows to reach farther points of the machines with a single wire: no more buses running left, right, up and down in the machine
- Less wirings, less costs (depending on the machine dimension and bus topology).
- Cheaper connectors and terminations
- Complete backward compatibility and Current production ISOBUS ECUs can be used
- TPPL and TOPL is suitable for all machines and not only for the small ones

This connector is modularly built to the version preferred for these applications. The **IBIC-R™** is a standard receptacle with a hex nut to be mounted in a box or on a bracket on the tractor. This modular design enables it to be the most cost effective ISO BUS connector on the market.

The **IBIC-RBS™** is the same housing with a convoluted tubing adapter or a backshell with cable clamp to adopt a jacket cable used in all ISO BUS 11783 applications throughout the world. It is meant to be mounted on a bracket and can be used to create an extension cable in ISO BUS applications or to equip TPPL tractors.

The **IBIC-RBSL™** includes an IP6K9K lid to protect the interface when the implement is not connected. This can be used in all above applications and is constructed with the same high quality as all Powell Ag products.
Terminating Bias Circuit - ISO Compatibility for CAN Based Vehicle Networks

A cost-effective solution for providing active termination for CAN Bus vehicle networks. The TBC maintains a full compatibility with ISO 11783-2 and SAE J1939 specs. The TBC offers robust construction in a very compact size. It is constructed of an electronic PCB over-molded in a tough polypropylene to protect the electronics. It also plugs directly into the harness on a vehicle without additional mounting hardware.

In some of today’s systems, termination of the CAN BUS is made inside the controller. The Powell TBC is an inexpensive alternative that provides the correct electrical bias and termination at each end of a CAN BUS segment, and offers a flexible BUS architecture for front end IBBC’s. The Powell TBC is fully compatible with ISO 11783-2 and SAE J1939 specifications.

* For overall dimension specifications and pin arrangements, see Appendix B.
PAPIL4C - R and PAPIL4C - P Power Connectors

The PAPIL Series are developed for ISO 11782 applications where the power needs to be split. It is developed to the same specifications as all ISOBUS connectors in the Powell Ag range. It comes in a 4-pole version with 2x AWG12 and 2x AWG 8.

Features and Benefits

- High-grade, non-corrosive materials
- Easy to operate
- Fast and simple population process
- No special tooling required
- Will not damage when dropped
- Ease of mating due to clip marker
- IP 67 rated in mated condition.
ISO 11783-2 and J1939 Circular Diagnostic Connectors

Powell’s Circular Diagnostic Connectors are available in two different versions. The first is a flange mounting version that is a drop-in, cost-effective replacement for products currently on the market. The second is a hex nut version that dramatically simplifies installation of the connector during assembly. The hex nut version is currently the standard version due to its ease of installation.

These 9 pin connectors are designed to perform in the demanding environments found on construction equipment, agricultural equipment, and heavy duty vehicles.

These circular connectors feature robust thermoplastic construction with a positive contact retention system and are protected via grommet wire seals.
CABLES & CONDUITS

ISOBUS Jacketed Cable
A premium addition for connecting all of our Powell Ag components. The layered cable elements consist of stranded plain copper wires; a TPR and PVC insulation; and a black PUR or PVC sheath. This allows for accelerated, reliable communication and sustained connection even in harsh temperatures. The four CAN wires are twisted 50 til 52 mm/turn - an important feature for reducing EMI.

KST T Splice and KSY Y Splice Connectors
These splice connectors offer quick and secure push-in connection of corrugated conduits. Created from high-grade formulated polyamide, they are excellent impact strength, are self-extinguishing, and free from halogens and cadmium. With a reinforced sealing cap at conduit side, they can rate up to IP 68 / NEMA 6P protection.

PME Medium Duty & LHT Heavy Duty Conduit
Both of these conduit options are created from high-grade, specially formulated polyamide. Both are self-extinguishing, and free from halogens and cadmium. The PME Conduit has excellent mechanical and flexibility characteristics and is designed for any installation with medium to high flex requirements. The LHT’s main characteristic is the high fatigue strength it possesses while undergoing reverse bending stress.
APPENDIX A - IBBC DIMENSIONS, SPECIFICATIONS & PIN CONNECTIONS

IMPLEMENT SIDE CONNECTION FOR IBIC™

**Specifications**

- **Enclosure**: Over molded polypropylene
- **Handle**: Die cast aluminum
- **Connectors**: One 9 pin (implement side) Two 4 pins (tractor side)
- **Latch / Release**: Spring loaded, holds securely onto locking tower
- **Connector Lid**: Spring loaded to remain closed when mating connector is not in use, and automatically closes when the connector breaks away.

**Mating Connector IBIC™ (XIJI) for Implement Side Connections**

1. Pass through ground
2. Electronic control unit (ECU) ground
3. Pass through power
4. ECU power (6-16 Vdc)
5. Return power to integrated relay
6. TBC power (6-26 Vdc)
7. TBC return
8. CAN high (2500 V, 75 ohm, +/- 5 ohm termination resistance)
9. CAN low (2500 V, 75 ohm, +/- 5 ohm termination resistance)

**Connector IBRC for Tractor Side Connections**

1. Pass through ground
2. Electronic control unit (ECU) ground
3. Pass through power
4. ECU power (6-16 Vdc)

**Connector X1J3 for Tractor Side Connections**

1. TBC power (6-16 Vdc)
2. CAN high (2500V, 75 ohm, +/- 5 ohm termination resistance)
3. TBC return
4. CAN low (2500V, 75 ohm, +/- 5 ohm termination resistance)
APPENDIX B - TBC DIMENSIONS, SPECIFICATIONS & PIN CONNECTIONS

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
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<tr>
<td>Rated Voltage</td>
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<td>Max Current</td>
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<tr>
<td>Storage Temperature</td>
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Pin Connections

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<th>Pin</th>
<th>Description</th>
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<td>A</td>
<td>Electronic control unit power</td>
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<tr>
<td>B</td>
<td>Terminator power line (6 to 16 Vdc)</td>
</tr>
<tr>
<td>C</td>
<td>Electronic control unit ground</td>
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<tr>
<td>D</td>
<td>Terminator return line</td>
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<tr>
<td>E</td>
<td>CAN high (2500V +/- 0</td>
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<tr>
<td>F</td>
<td>CAN high (2500V +/- 0</td>
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Mating Connector - Delphi Part Numbers

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<td>Terminal</td>
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<tr>
<td>Wire Seal</td>
<td>12048086</td>
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<tr>
<td>Cavity Plug</td>
<td>12059168</td>
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The number of terminals, wire seals, and cavity plugs necessary will depend on the use in an ISO 11783 or SAE J1939 application.
Powell Electronics, Technical Partner & Tier

GPS Antennae

GPS Connectors
Amphenol
ECTA SERIES

TARS IMU Sensor
Honeywell MICRO SWITCH™

ElectroMechanical Relays
One Supplier to the Agricultural Industry

Wire Protection
- Federal Mogul
- Bentley Harris

ISO 11783 CAN BUS Connectors
- Powell
- IBBC, IBIC™ ISO 11783-2 Connectors

IMU, Position Sensors
- Honeywell MICRO SWITCH™

J1939 Connectors
- TE Connectivity
Powell Electronics works with only the most trusted brands and industry leaders in reliability and quality service for every environment. Powell Agricultural parts are subject to an ongoing improvement process, resulting in constant new and improved versions but always backwards compatible. For more information on all of our parts, as well as the many other industries we service, visit our website or contact our sales team.

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