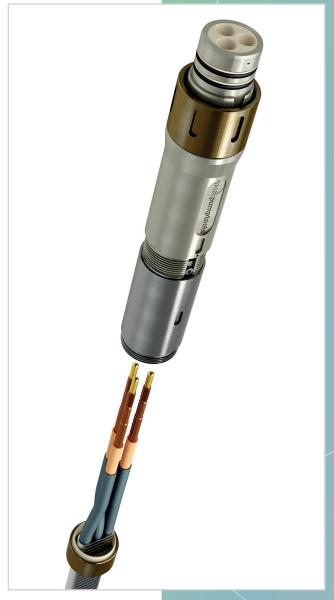


# Electrical Penetrators & Connector Systems







# **SPEEDFIT**Single Mandrel Field Attachable

RMSpumptools SPEEDFiT is the new benchmark for high-speed, consistently reliable field installations of downhole cable to wellhead and packer penetrators - saving you even more rig time. Requiring minimal parts and training, just a cable prep is required - SPEEDFiT requires no epoxy, no gel and no assembly of parts.

SPEEDFiT is easily adaptable for use with different size cables, resulting in simple redress for re-use with only a minimum of spares required. The Vertical Penetrator can be installed top or bottom fed into the Tubing Hanger, allowing simple retrofit to existing wellhead equipment designs.

## Less than 10 Minutes Assembly Time in the Field after the Cable is Stripped

#### Electrical Specification - (values may differ depending on model and materials)

#### **Key Performance Features**

Simple, Reliable, Efficient
No Epoxy and No Gel
Minimal Assembly of Parts
Saves Significant Rig Time
Full Range to fit all Cable Sizes
ATEX/IECEx Certified
Min ID Wellhead Profile: Ø2"
Max OD Coupling Nut: Ø2.25"
Plug and Play Style Assembly

Dual Sealing - retains the exclusive Field Proven RMSpumptools Pressure Barrier Back-up O-Ring Seals between Field Attachable Connector and Penetrators. Fully testable after being installed on the Cable

#### Experience





## Single Mandrel Field Attachable Configurations





## Simple 3 Stage Installation

#### **STAGE 1**

Strip the cable and crimp the contacts.



#### **STAGE 2**

Insert the cable into the housing and secure the nuts from the front.



#### STAGE 3

Tighten the threads on the body to energise the seals.



#### Various Redress Options available including:

- Boot Sizes
- Contact Sizes
- Cable Gland Sizes (to suit both flat and round cable options)

All that is needed for redress kits are two seals and new pins.



## Single Mandrel Mechanical SPLiCE

The RMSpumptools SPEEDFiT SPLiCE, consisting of two Field Attachable Connectors and a Connector Union, is the new benchmark for high-speed, consistently reliable field installations to replace the traditional taped splice method - saving you a significant amount of rig time. The success of the product is down to the consistency of quality design and manufacture, rather than reliance on installation.

Now installed in the UK North Sea and Gulf of Mexico, the SpeedFit SPLiCE is proven in harsh environments where the highest standards of reliability and performance are required. Requiring minimal parts and training, just a cable prep is required - SPEEDFiT SPLiCE requires no epoxy, no gel and no assembly of parts.

Reduce make-up time from around 5hrs (expected time for traditional splicing) to less than 30 mins...

#### Electrical Specification - (values may differ depending on model and materials)

Maximum Voltage: 5 kVAC

Maximum Working Current: 180 A

Maximum Working Temperature: 150°C (302°F)

Maximum Working Pressure: 5,000 psi

Maximum H<sub>2</sub>S: 40%

Maximum CO<sub>2</sub>: 90%

#### Key Performance Features

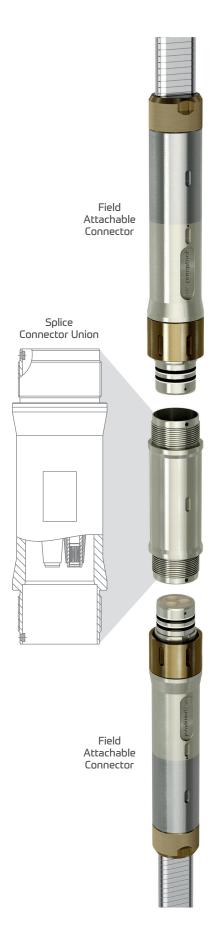
Simple, Reliable, Efficient
No Epoxy and No Gel
Minimal Assembly of Parts
Saves Significant Rig Time
Full Range to fit all Cable Sizes
Max OD Coupling Nut: Ø2.25"
Plug and Play Style Assembly

Dual Sealing - retains the exclusive Field Proven RMSpumptools Pressure Barrier Back-up O-Ring Seals between Field Attachable Connector and Union.

Fully testable after being installed on the Cable

Suits a range of Cable Sizes

#### Experience





# **SPEEDFIT**Split Phase Field Attachable

RMSpumptools SPEEDFiT is the new benchmark for high-speed, consistently reliable field installations of downhole cable to wellhead and packer penetrators - saving you even more rig time. Requiring minimal parts and training, just a cable prep is required - SPEEDFiT requires no epoxy, no gel and no assembly of parts.

SPEEDFiT is easily adaptable for use with different size cables, resulting in simple redress for re-use with only a minimum of spares required. The system variations suit different tubing sizes and can be adapted to different hanger profiles and existing equipment.

## Minimal Space required to suit Tight Bores and Ultra Fast Assembly Time in the Field

#### Electrical Specification - (values may differ depending on model and materials)

#### Key Performance Features

Simple, Reliable, Efficient No Epoxy and No Gel Minimal Assembly of Parts Saves Significant Rig Time Full Range to fit all Cable Sizes ATEX/IECEx Certified

Max OD of FA Connectors: 31mm Plug and Play Style Assembly

Dual Sealing - retains the exclusive Field Proven RMSpumptools Pressure Barrier Incorporates a combination of metal and elastomeric seals

Fully testable after being installed on the Cable

#### Experience





## Simple 3 Stage Installation







**STAGE 1**Insert the Cable Jumpers into the Tubing Hanger and swage in the correct position.

**STAGE 2**Attach the Split-Phase Field
Attachable Connectors to the
Cable Jumpers.

STAGE 3
Prepare the downhole cable and store the Breakout Box on the cable, then insert the cable into the Field Attachable Connectors.



## Frontier Series

## Packer Penetrator - Single Mandrel

The RMSpumptools Single Mandrel Packer Penetrator for ESP Wells delivers pressure-tight, 3-Phase power through Downhole ESP Packers and encapsulated ESP Systems (PODS/CANS). This single-piece product transmits power through a single bore - it can accommodate a vast array of cable types and sizes and is supplied factory-moulded to downhole cable (including the MLE if required). To accommodate for an excess or shortfall in MLE length, adapters can be supplied to allow from 3.5" to 24" of adjustment to penetrator positioning.

#### Electrical Specification - (values may differ depending on model and materials)

 $\begin{array}{lll} \mbox{Maximum Voltage:} & 8 \mbox{ kVAC} \\ \mbox{Maximum Working Current:} & 250 \mbox{ A} \\ \mbox{Maximum Working Temperature:} & 180 \mbox{°C (356 \mbox{°F})} \\ \mbox{Maximum Working Pressure:} & 15,000 \mbox{ psi} \\ \mbox{Maximum H}_2 \mbox{S:} & 40 \mbox{\%} \\ \mbox{Maximum CO}_2 \mbox{:} & 90 \mbox{\%} \\ \end{array}$ 

#### **Key Performance Features**

#### Single Mandrel Configuration

Industry standard with one single assembly. No field assembly required.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security.

#### Double Seal Technology

Enables pressure testing via test ports in adapter and built-in redundancy giving total confidence of seal integrity during and post installation.

#### No Connectors

Elimination of possibility of connector contamination giving improved reliability.

#### Permanently Activated Internal Seals, tested during assembly

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### All Mating Materials Dissimilar

Avoids galling during installation.

#### MLE can be moulded directly into Penetrator

Eliminates the need for a splice below the packer/inside the POD, giving improved reliability and reduced rig time during installation.

#### Range of Adapters available

Available with a range of adapters to secure to the Packer, offering maximum completion design flexibility for different applications.

#### Other Key Features

Protective Caps provided Qualified to IEC60502 Only NACE MR01-75 Materials used

#### Experience





## Packer Penetrator - Single Mandrel

The RMSpumptools Single Mandrel Packer Penetrator for ESP Wells delivers pressure-tight, 3-Phase power through Downhole ESP Packers and encapsulated ESP Systems (PODS/CANS). This single-piece product transmits power through a single bore - it can accommodate a vast array of cable types and sizes and is supplied factory-moulded to downhole cable (including the MLE if required). To accommodate for an excess or shortfall in MLE length, adapters can be supplied to allow from 3.5" to 24" of adjustment to penetrator positioning.

#### Electrical Specification - (values may differ depending on model and materials)

 $\begin{array}{lll} \mbox{Maximum Voltage:} & 5 \mbox{ kVAC} \\ \mbox{Maximum Working Current:} & 200 \mbox{ A} \\ \mbox{Maximum Working Temperature:} & 180 \mbox{ }^{\circ}\mbox{C (356 \mbox{°F})} \\ \mbox{Maximum Working Pressure:} & 10,000 \mbox{ psi} \\ \mbox{Maximum H}_{2}\mbox{S:} & 40 \mbox{\%} \\ \mbox{Maximum CO}_{2}\mbox{:} & 90 \mbox{\%} \\ \end{array}$ 

#### **Key Performance Features**

#### Single Mandrel Configuration

Industry standard with one single assembly. No field assembly required.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security.

#### Double Seal Technology

Enables pressure testing via test ports in adapter and built-in redundancy giving total confidence of seal integrity during and post installation.

#### No Connectors

Elimination of possibility of connector contamination giving improved reliability.

#### Permanently Activated Internal Seals, tested during assembly

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### All Mating Materials Dissimilar

Avoids galling during installation.

#### MLE can be moulded directly into Penetrator

Eliminates the need for a splice below the packer/inside the POD, giving improved reliability and reduced rig time during installation.

#### Range of Adapters available

Available with a range of adapters to secure to the Packer, offering maximum completion design flexibility for different applications.

#### Other Key Features

Protective Caps provided Qualified to IEC60502 Only NACE MR01-75 Materials used

#### Experience





## **Stealth** Series

## Packer Penetrator - Single Mandrel

The Stealth Series Single Mandrel Packer Penetrator for ESP Wells delivers pressure-tight, 3-Phase power through Downhole ESP Packers and encapsulated ESP Systems (PODS/CANS). It has been developed in response to growing demand for high-specification, compact penetrator applications which are small enough for Ø1.5" bores.

#### Electrical Specification - (values may differ depending on model and materials)

#### Key Performance Features

#### Single Mandrel Configuration

Industry standard with one single assembly. No field assembly required.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security.

#### Double Seal Technology

Enables pressure testing via test ports in adapter and built-in redundancy giving total confidence of seal integrity during and post installation.

#### No Connectors

Elimination of possibility of connector contamination giving improved reliability.

#### Permanently Activated Internal Seals, tested during assembly

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### MLE can be moulded directly into Penetrator

Eliminates the need for a splice below the packer/inside the POD, giving improved reliability and reduced rig time during installation.

#### Range of Adapters available

Available with a range of adapters to secure to the Packer, offering maximum completion design flexibility for different applications.

#### Other Key Features

Small enough for Ø1.5" Bores 8" Adjustable Adapter Ø2.24" Non-adjustable Adapter Ø2.00" Accommodates up to #4 AWG Flat Cable Factory Moulded MLE Option NACE Approved Materials V3 Rated

#### Experience



## Frontier Series

## Packer Penetrator - Split Phase

The RMSpumptools Split Phase (3 -Leg) Packer Penetrator for ESP Wells is a universal application, delivering pressure-tight 3-Phase power through Downhole ESP Packers and encapsulated ESP Systems (PODS/CANS). Three phases are branched out into individual legs that are fed through narrow bores in the POD or Packer - this product is particularly suited to concentric applications where space is premium. They can be supplied factory moulded to many types of downhole cable, including the MLE and no adapter is required to secure the penetrator into the packer.

#### Electrical Specification - (values may differ depending on model and materials)

#### **Key Performance Features**

#### Split PhaseConfiguration

Each phase is split to penetrate the packer (or Pod) through three separate bores. Interchangeable with other 3-leg packer penetrator systems, completely gas tight using industry standard compression fittings.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of gas migration.

#### Unique Stack-up Tolerant Design

Providing variable space-out when installing. Eliminates risky cutting of 3/8" SS tubes, eliminates terminating connections on site, preventing potential damage to insulation, improving reliability and speed of installation.

#### 'Plug and Play' Upper Connector and 3-into-1 Breakout Module

With factory moulded power cable pigtail. No onsite cable separation or preparation required. 3-Leg breakout module pigtails can be pre spliced to main power cable. Removes all critical process from rig floor, no on site specialist required, saves rig time and improves reliability.

## Seal Integrity Test included as part of Installation Procedure for absolute peace of mind

No pressure-activated seals, no possibility of gas migration through the penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Protective Caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Kidney shaped Breakout to minimise
space requirement.

#### Experience





## Packer Penetrator - Split Phase

The RMSpumptools Split Phase (3 -Leg) Packer Penetrator for ESP Wells is a universal application, delivering pressure-tight 3-Phase power through Downhole ESP Packers and encapsulated ESP Systems (PODS/CANS). Three phases are branched out into individual legs that are fed through narrow bores in the POD or Packer - this product is particularly suited to concentric applications where space is premium. They can be supplied factory moulded to many types of downhole cable, including the MLE and no adapter is required to secure the penetrator into the packer.

#### Electrical Specification - (values may differ depending on model and materials)

#### **Key Performance Features**

#### Split PhaseConfiguration

Each phase is split to penetrate the packer (or Pod) through three separate bores. Interchangeable with other 3-leg packer penetrator systems, completely gas tight using industry standard compression fittings.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of gas migration.

#### Unique Stack-up Tolerant Design

Providing variable space-out when installing. Eliminates risky cutting of 3/8" SS tubes, eliminates terminating connections on site, preventing potential damage to insulation, improving reliability and speed of installation.

#### 'Plug and Play' Upper Connector and 3-into-1 Breakout Module

With factory moulded power cable pigtail. No onsite cable separation or preparation required. 3-Leg breakout module pigtails can be pre spliced to main power cable. Removes all critical process from rig floor, no on site specialist required, saves rig time and improves reliability.

## Seal Integrity Test included as part of Installation Procedure for absolute peace of mind

No pressure-activated seals, no possibility of gas migration through the penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Protective Caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Kidney shaped Breakout to minimise
space requirement.

#### Experience





## Frontier Series

## Side-Entry Wellhead Connector

When the lower wellhead penetrator is unable to exit the wellhead vertically, the RMSpumptools Side-Entry Feedthru System is the perfect solution, exiting sideways through the wellhead body. The Single Mandrel 3-Phase Penetrator for ESP Wells is for use in 3.25" Bore Sizes and complex applications. It is suitable for High H2S and/or High CO2 wells, and for the highest power ESPs.

### Electrical Specification - (values may differ depending on model and materials)

Maximum Voltage: 8 kVAC

Maximum Working Current: 250 A

Maximum Working Temperature: 180°C (356°F)

Maximum Working Pressure: 7,500 psi

Maximum H<sub>2</sub>S: 40%

Maximum CO<sub>2</sub>: 90%

#### Key Performance Features

#### Unique Protection System

Internals have total isolation from well fluid environment for exceptional reliability.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions.

#### Factory Moulded Lower Pigtail or Field Attachable

Only a horizontal splice is needed when factory moulded; no lower connector; removes wellbore mating interference. Eliminates weak spot and removes critical process from rig floor. No on-site specialist required.

#### 'Plug & Play' Design

Single, factory assembled and tested product, prevents damage during installation. No special training, or specialist required. Saves rig time and eliminates human error.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Compact Design

Entire penetrator is enclosed and protected by the wellhead, avoids penetrator damage when landing hanger.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Bottom Fed for easy installation
Available with 45° or 90° Surface Connectors

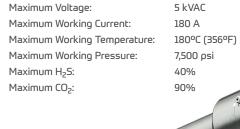
#### Experience



## Side-Entry Wellhead Connector

When the lower wellhead penetrator is unable to exit the wellhead vertically, the RMSpumptools Side-Entry Feedthru System is the perfect solution, exiting sideways through the wellhead body. The Single Mandrel 3-Phase Penetrator for ESP Wells is for use in 2.00" Bore Sizes and complex applications. It is suitable for High H2S and/or High CO2 wells, and for the highest power ESPs

### Electrical Specification - (values may differ depending on model and materials)



#### Key Performance Features

#### Unique Protection System

Internals have total isolation from well fluid environment for exceptional reliability.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions.

#### Factory Moulded Lower Pigtail or Field Attachable

Only a horizontal splice is needed when factory moulded; no lower connector; removes wellbore mating interference. Eliminates weak spot and removes critical process from rig floor. No on-site specialist required.

#### 'Plug & Play' Design

Single, factory assembled and tested product, prevents damage during installation. No special training, or specialist required. Saves rig time and eliminates human error.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Compact Design

Entire penetrator is enclosed and protected by the wellhead, avoids penetrator damage when landing hanger.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Bottom Fed for easy installation
Available with 45° or 90° Surface Connectors

#### Experience



# Frontier Series

### Vertical Wellhead Connector

The Vertical Wellhead Penetrator System is one of our most popular products and comprises of a Lower Hanger Penetrator and a Surface Connector (which can be either 45 or 90 degrees). The Single Mandrel 3-Phase Vertical Penetrator for ESP Wells is for use in 3.25" Bore Sizes and complex applications. It is suitable for High H2S and/or High CO2 wells and for the highest power ESPs.

#### Electrical Specification - (values may differ depending on model and materials)

#### Key Performance Features

#### Unique Protection System

Internals have total isolation from well fluid environment for exceptional reliability.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions.

#### Factory Moulded Lower Pigtail or Field Attachable

Only a horizontal splice is needed when factory moulded; no lower connector; removes wellbore mating interference. Eliminates weak spot and removes critical process from rig floor. No on-site specialist required.

#### 'Plug & Play' Design

Single, factory assembled and tested product, prevents damage during installation. No special training, or specialist required. Saves rig time and eliminates human error.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Compact Design

Entire penetrator is enclosed and protected by the wellhead, avoids penetrator damage when landing hanger.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Bottom Fed for easy installation

Available with 45° or 90° Surface Connectors

#### Experience



#### Vertical Wellhead Connector

The Vertical Wellhead Penetrator System is one of our most popular products and comprises of a Lower Hanger Penetrator and a Surface Connector (which can be either 45 or 90 degrees). The Single Mandrel 3-Phase Penetrator for ESP Wells is for use in 2.00" Bore Sizes and complex applications. It is suitable for High H2S and/or High CO2 wells, and for the highest power ESPs.

#### Electrical Specification - (values may differ depending on model and materials)



#### Unique Protection System

Internals have total isolation from well fluid environment for exceptional reliability.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions.

#### Factory Moulded Lower Pigtail or Field Attachable

Only a horizontal splice is needed when factory moulded; no lower connector; removes wellbore mating interference. Eliminates weak spot and removes critical process from rig floor. No on-site specialist required.

#### 'Plug & Play' Design

Single, factory assembled and tested product, prevents damage during installation. No special training, or specialist required. Saves rig time and eliminates human error.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Compact Design

Entire penetrator is enclosed and protected by the wellhead, avoids penetrator damage when landing hanger.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Bottom Fed for easy installation
Available with 45° or 90° Surface Connectors

#### Experience



## **Stealth** Series

#### Vertical Wellhead Connector

The Vertical Wellhead Penetrator System is one of our most popular products and comprises of a Lower Hanger Penetrator and a Surface Connector (which can be either 45 or 90 degrees). The Single Mandrel 3-Phase Vertical Penetrator for ESP Wells is for use in slimline 1.5" Bore Sizes and complex applications. It is suitable for High H2S and/or High CO2 wells and for the highest power ESPs.

#### Electrical Specification - (values may differ depending on model and materials)



#### Unique Protection System

Internals have total isolation from well fluid environment for exceptional reliability.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions.

#### Factory Moulded Lower Pigtail or Field Attachable

Only a horizontal splice is needed when factory moulded; no lower connector; removes wellbore mating interference. Eliminates weak spot and removes critical process from rig floor. No on-site specialist required.

#### 'Plug & Play' Design

Single, factory assembled and tested product, prevents damage during installation. No special training, or specialist required. Saves rig time and eliminates human error.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Compact Design

Entire penetrator is enclosed and protected by the wellhead, avoids penetrator damage when landing hanger.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
Only NACE MR01-75 Materials used
Bottom Fed for easy installation
Available with 45° or 90° Surface Connectors

#### Experience



# **Frontier Series**Split Phase Wellhead Connector

The Split Phase (3-Leg) Connector for ESP Wells is a universal application for concentric and/or limited space wellhead configurations, providing reliable gas-tight 3-phase power to conventional ESP systems. The Connector enables equivalent power transmission equivalent to our Single Mandrel range, but by passing through the wellhead as individual phases before converging downhole into a single ESP cable.

#### Electrical Specification - (values may differ depending on model and materials)

#### Key Performance Features

#### 3 Leg Configuration

Each phase is split to penetrate wellhead through three separate bores; completely gas tight using industry standard compression fittings.

#### Dual Pressure Barrier Technology

Provides double isolation between wellhead and bonnet cavity as well as bonnet cavity and surface, giving total protection against gas leaks to surface.

#### 'Plug & Play' Surface Connector

Reusable, factory assembled and tested product, No special training, or specialist required. Saves rig time and improves reliability performance.

#### Single Assembly Downhole Penetrator and 3-into-1 Breakout Module

With moulded pigtail to downhole cable. No on-site cable phase separation and termination preparation required; only standard horizontal splice. Removes critical process from rig floor. No on-site specialist required. Saves rig time and improves reliability performance.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Available with Optional Deck Connector System

Enables surface connector and cable to be removed during workovers - prevents damage during workover.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris Caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
API 6A PR2 Certified
Metal to Metal Sealing
Only NACE MR01-75 Materials used

#### Experience





# **Frontier Series**Split Phase Wellhead Connector

The Split Phase (3-Leg) Connector for ESP Wells is a universal application for concentric and/or limited space wellhead configurations, providing reliable gas-tight 3-phase power to conventional ESP systems. The Connector enables equivalent power transmission equivalent to our Single Mandrel range, but by passing through the wellhead as individual phases before converging downhole into a single ESP cable.

#### Electrical Specification - (values may differ depending on model and materials)

Maximum Voltage: 8 kVAC

12 kVDC

Maximum Working Current: 250 A

Maximum Working Temperature: 135°C (275°F)
Maximum Working Pressure: 5,525 psi
Maximum  $H_2S$ : 40%
Maximum  $CO_2$ : 90%

#### Key Performance Features

#### 3 Leg Configuration

Each phase is split to penetrate wellhead through three separate bores; completely gas tight using industry standard compression fittings.

#### Dual Pressure Barrier Technology

Provides double isolation between wellhead and bonnet cavity as well as bonnet cavity and surface, giving total protection against gas leaks to surface.

#### 'Plug & Play' Surface Connector

Reusable, factory assembled and tested product, No special training, or specialist required. Saves rig time and improves reliability performance.

#### Single Assembly Downhole Penetrator and 3-into-1 Breakout Module

With moulded pigtail to downhole cable. No on-site cable phase separation and termination preparation required; only standard horizontal splice. Removes critical process from rig floor. No on-site specialist required. Saves rig time and improves reliability performance.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### Available with Optional Deck Connector System

Enables surface connector and cable to be removed during workovers - prevents damage during workover.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Debris Caps provided
Gold Plated Pins and Sockets
Qualified to IEC60502
API 6A PR2 Certified
Metal to Metal Sealing
Only NACE MR01-75 Materials used

#### Experience





## Split Phase Wellhead Connector

The Split Phase (3-Leg) Connector for ESP Wells is a universal application for concentric and/or limited space wellhead configurations, providing reliable gas-tight 3-phase power to conventional ESP systems. The Connector enables equivalent power transmission equivalent to our Single Mandrel range, but by passing through the wellhead as individual phases before converging downhole into a single ESP cable.

#### Electrical Specification - (values may differ depending on model and materials)

Maximum Voltage: 5 kVAC Maximum Working Current: 180 A Maximum Working Temperature: 125°C (257°F) Maximum Working Pressure: 5,000 psi Maximum H<sub>2</sub>S: Iow 40% Maximum CO<sub>2</sub>:

#### **Key Performance Features**

#### 3 Leg Configuration

Each phase is split to penetrate wellhead through three separate bores. Interchangeable with any 3-leg wellhead system; completely gas tight using industry standard compression fittings.

#### Unique Pressure Barrier Technology

Zero Gas Leakage, total safety security with zero possibility of surface explosions - no need for surface 'breathers'.

#### Unique Stack-up Tolerant Design

Providing variable space-out when installing. Eliminates risky cutting of 3/8" SS tubes, obsoletes terminating connections on site, preventing potential damage to insulation, improving reliability and speed of installation.

#### 'Plug & Play' Surface Connector

Reusable, factory assembled and tested product, No special training, or specialist required. Saves rig time and improves reliability performance.

#### Single Assembly Downhole Penetrator and 3-into-1 Breakout Module

With moulded pigtail to downhole cable. No on-site cable phase separation and termination preparation required; only standard horizontal splice. Removes critical process from rig floor. No on-site specialist required. Saves rig time and improves reliability performance.

#### Permanently Activated Internal Seals (tested during assembly)

No pressure-activated seals, no possibility of gas migration through penetrator, even at low pressures.

#### No Specialist Tooling Required

Reduced risk of delays due to missing or broken specialist tooling.

#### Unrivalled Reliability Track Record

Total confidence of reliability.

#### Other Key Features

Protective Caps provided Gold Plated Pins and Sockets Qualified to IEC60502 Metal to Metal Sealing Only NACE MR01-75 Materials used

Kidney Shaped Breakout Penetrator Assembly

#### Experience





## **Nexus/Frontier** Series

### 90° Surface Connector

The new RMSpumptools surface connector maintains the same user-friendly characteristics as the existing surface connectors in the range and can be used as a direct replacement for the following RMSpumptools single mandrel surface connectors: 016/12/213, 016/12/300 & 016/12/602. Using evolutionary technology the new surface connector design provides a host of benefits over the previous design.

#### More Compact Profile

Up to 27% shorter than previous 90° version (016/12/602) (depending on cable type)

#### Increased Power Ratino

From 160 Amps to 180 Amps

#### Simpler Design

Increased Wellhead Compatibility Faster Delivery Easier Installation Increased Cable Compatibility

#### Options for Ordering

Factory Moulded Surface Cable up to #2/0 AWG in size.

Internal earthing cable ground wires and braiding hard wired inside bodywork.

High power variant available up to 215 Amps, with no impact to the connector size or shape.

#### Qualification and Certificates

ATEX/IECEx Certified

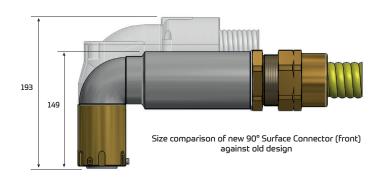
FM and CSA (certification pending)

IP68 as standard

28kV FAT as standard

Rigorous Internal Qualification:

- Power frequency testing
- Mechanical load and impact testing
- Temperature cycling
- Heat rise testing
- Electrical endurance testing







## The **SWITCH®**

### Power Transfer between ESPs

The SWITCH® is a world first in artificial lift innovation and is designed to allow the operation of two ESPs from a single power cable from surface, expanding the options for multiple ESP configuration. This patented product is fully qualified and delivers significant reductions in operating and capital costs, planning and lost production time. Avoid unexpected workovers when your pump fails - simply transfer the power to the secondary pump and production continues with minimum delay.

#### **Operational Requirements**

Rated Pressure: 5,000 psi

Working Temperature: 0°C to 121°C (250°F)

Qualified Voltage (U): 5kVAC Qualified Current: 160A

Design Life (below packer): 10 years minimum Production Tubing: 4.5" maximum

(secures to production tubing)

Running OD: 8.25" (9-5/8" 53.5lb or larger)

#### **Key Performance Features**

Single ESP feed-through to surface

Switch between two 3-phase ESP units

Low Profile (suitable for an 8.25" drift diameter with a production tubing up to 4.5")

Pressure Compensated for long term Seal Performance

NACE and NORSOK Compliant Materials

Suitable for use below ESP Packer

Resistant to Gas Decompression

Maintains Standard Packer, Clamps and Wellhead

Up to  $8\ensuremath{^{\prime\prime}}$  Adjustability on the MLE Terminations

Cable Terminations based on field proven Penetrator Technology

Factory Prepared Connectors (no field servicing during installation)

#### **Product Applications**

Dual, Triple and Quad ESP Configurations Retrofit Single ESP Well to Dual ESP Dual ESP + Induction Heater Intelligent Well Completions (SmartWells)

#### **Qualification Testing**

Hydrostatic Pressure Test and Temperature Cycling
Gas Test and Rapid Gas Decompression Test
Vibration and Shock Test
High Current Temperature Rise
Downhole Simulation
Power Frequency





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#### **Key Benefits**

Retrofit Single ESP Well to Dual ESP
Triple and Multiple ESP Applications
Intelligent Well Completions (SmartWells)
No Specialist Equipment Required
Eliminates Unexpected Workovers
Increased Production and Substantial Cost Savings

## Continual Production with SWITCH v Workover and Deferred Production due to Pump Failure

