

MOTOR DRIVEN REEL TECHNOLOGY

# *MAG DRIVE*



***CONDUCTIX***

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CANADA

Manchester



Belley



The manufacturing plants in Belley, Omaha, and Milan are ISO 9001:2000 certified



Victoria



Omaha, NE

AUSTRALIA



Harlan, IA



USA

UK



Milan



CANADA

ITALY



Frankfurt



BENELUX



CHINA



MEXICO



FRANCE

GERMANY

# HISTORY

In 1974, the Conductic Division of the DELACHAUX group revolutionized cable / hose motor driven reel technology by registering the original patents for :

- **A Modular Assembly System** enabling the construction of a wide variety of motor driven reels using limited number of components;
- **A Magnetic Coupler Drive** composed of permanent magnets.

This technology is being continuously improved to meet the requirements of users.



Relying on more than a century of experience in the field of electrification systems for all kinds of mobile equipment, the DELACHAUX Group has become, under the **CONDUCTIX**<sup>®</sup> trademark, an essential supplier to the global material handling industrial.



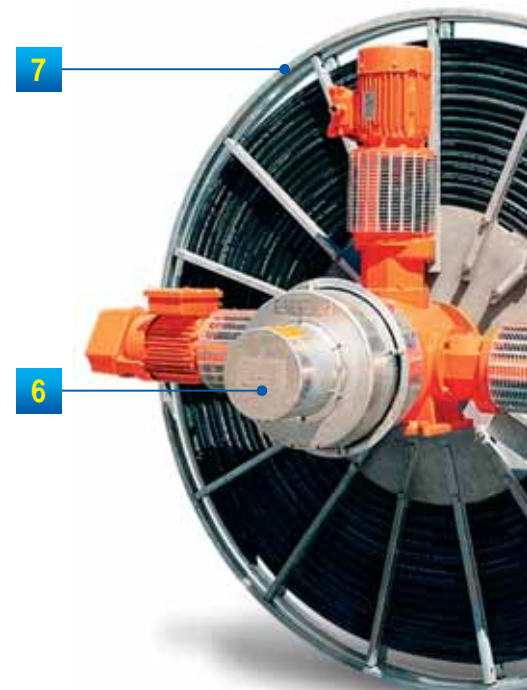
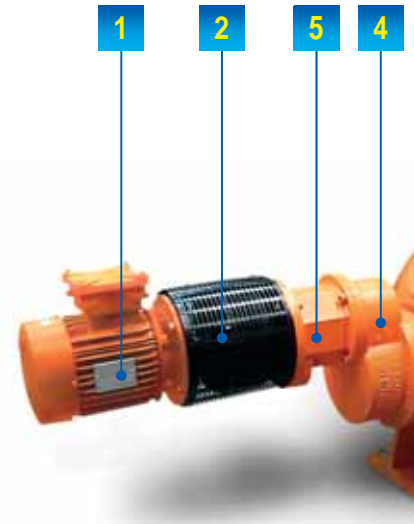
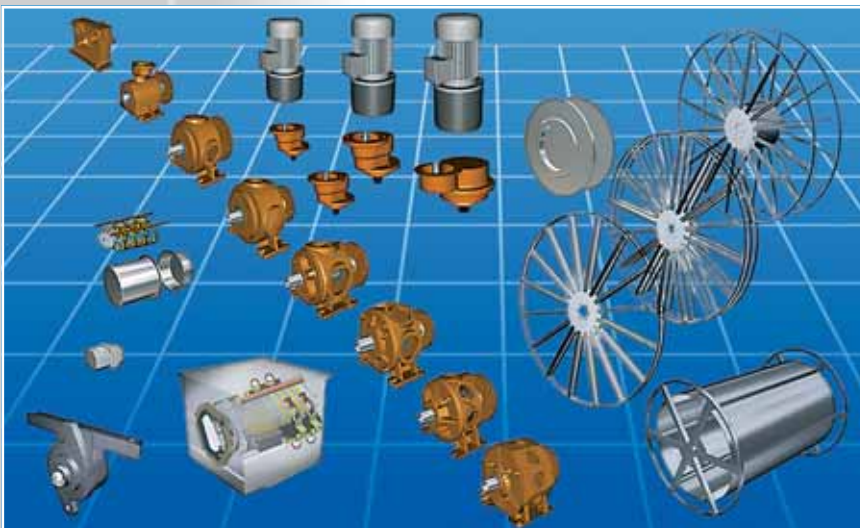
# MODULAR ASSEMBLY

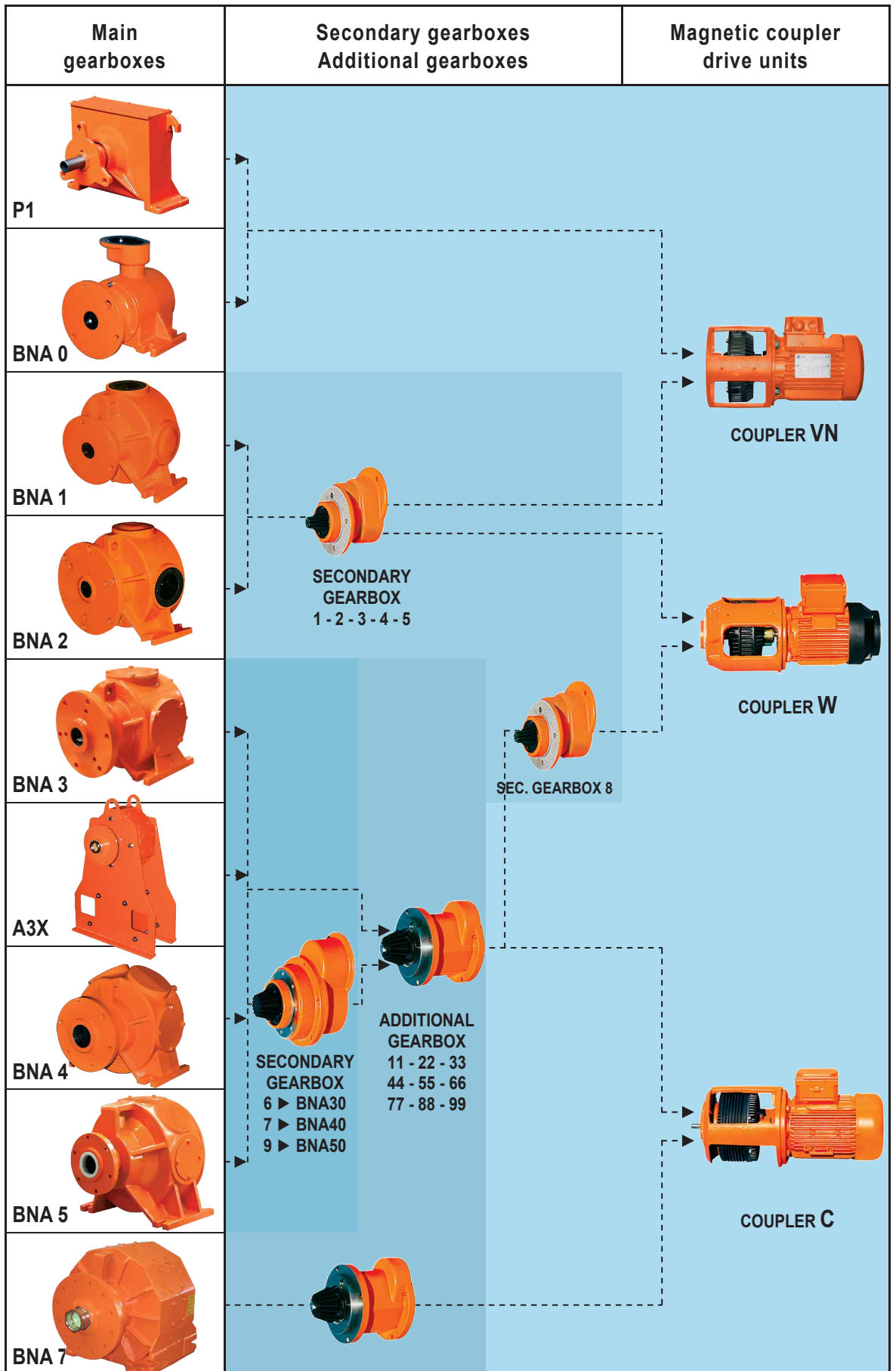
## The MAG DRIVE motor driven reel range

- Modular and compact design : limited number of spare parts and reduced maintenance procedures.
- Reliable magnetic couplers : simple component without contact (no wear, no lubrication required).
- Highly efficient components and low starting inertia.
- Magnetic coupler acts as a torque limiter that protects the cable and the related equipment, and increases safety for nearby personnel.
- Uses standard off-the-shelf electrical motors.

The motor driven reels of the MAG DRIVE range are assembled from the following modular components :

- 1: Electrical motors
- 2: Magnetic couplers (three sizes)
- 3: Main gearboxes (nine sizes)
- 4: Secondary gearboxes (nine sizes)
- 5: Additional gearboxes (nine sizes)
- 6: Slip rings (power, control, mixed power/control, fiber optic transmitter) and rotary joints (for water, air or other fluids)
- 7: The spools (five types, extended range of dimensions and options)

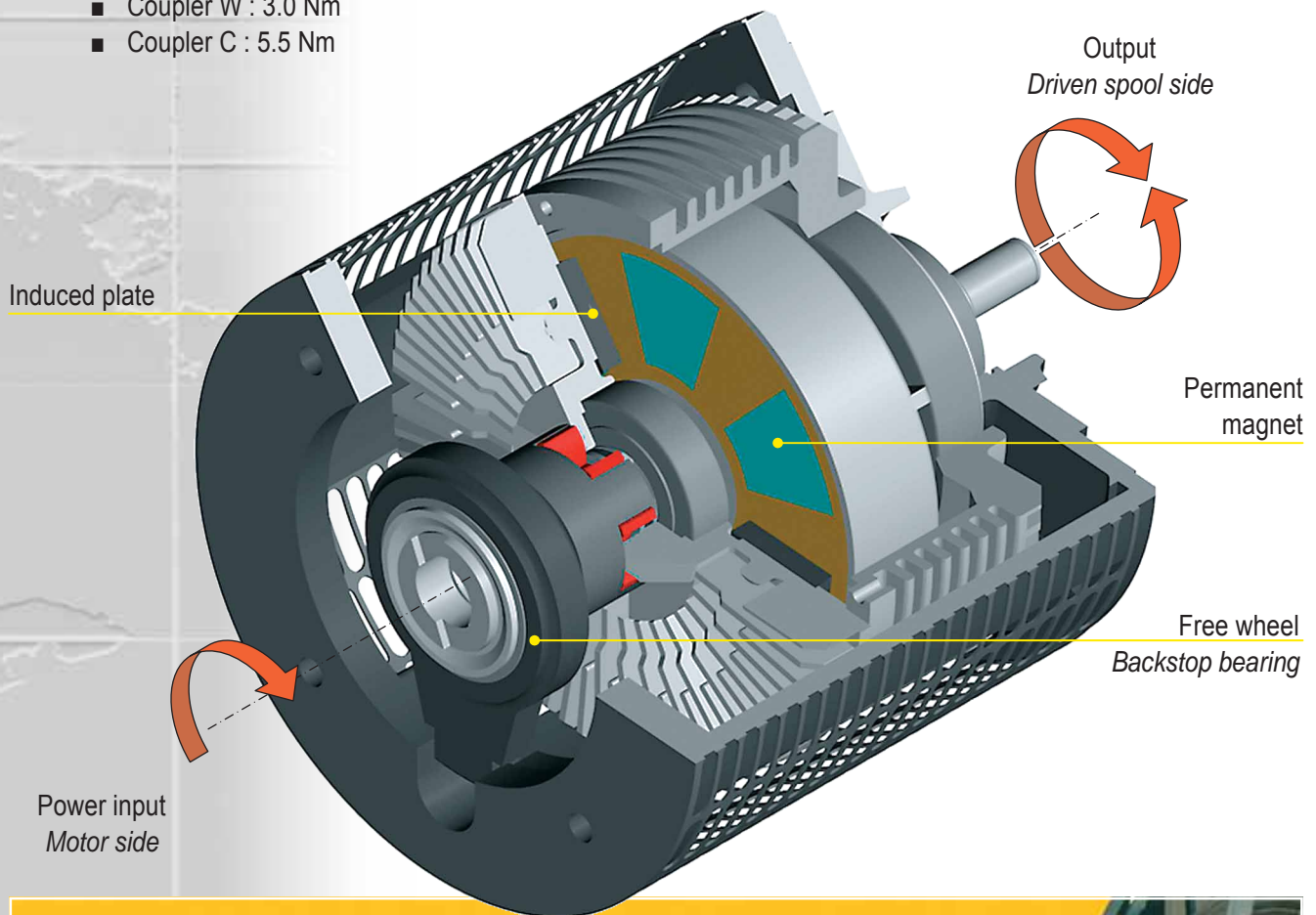




# MAGNETIC COUPLER

CONDUCTIX<sup>®</sup> offers 3 types of magnetic coupler with 3 different maximum torque rates :

- Coupler VN : 1.8 Nm
- Coupler W : 3.0 Nm
- Coupler C : 5.5 Nm



## ADVANTAGES OF THE MAGNETIC COUPLER DRIVE

- **High efficiency** and low energy consumption
- **Smooth constant torque** to ensure maximum cable life
- **No contact** : no friction, no wear, no lubrication required
- **No loss of cable tension** during power failures
- **Low inertia** even when acceleration is high



### Environmental and Operating Considerations

- The magnetic coupler is a completely sealed component (IP 66).
- Suitable for sea coast conditions and exposure to sea waves.
- Suitable for hazardous environments (spark free).
- Will handle ambient temperatures from -40°C up to +70°C according to the configuration ordered.
- Operates in any position.

### Assembly

Each magnetic coupler is assembled from the following parts :

- The induced plate (on the left) consists of a hardened magnetic ring attached to a support housing with cooling fins. The magnet has a flat torque curve.
- The permanent magnet (on the right) contains eight blocks of Ticonal magnets of alternate polarity.



The permanent magnet magnetizes the induced plate, thus generating a ring of alternating polarity and the magnetic forces required to transmit the torque.

### Operating Principle

#### ■ Winding of cable

As the cable (or hose) is being wound, the induced plate rotates at the speed of the electric motor. The permanent magnet is then driven by the magnetic forces and the spool will wind the cable at a rate that matches the speed of the mobile machine.

#### ■ Unwinding of cable

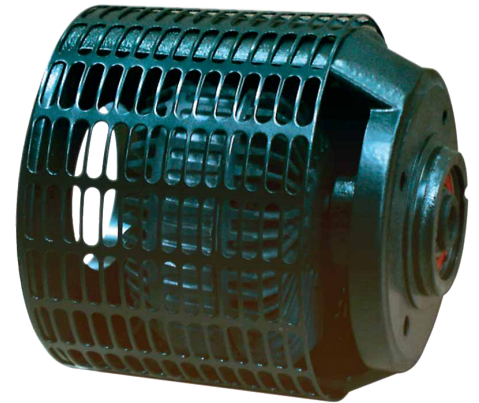
The induced plate always turns in the winding direction at the output speed of the electric motor. The permanent magnet which is connected to the spool shaft rotates in the opposite direction.

**The electric motor always turns in the same direction irrespective of the spool rotation.**

#### ■ Power off

When the equipment is switched off, the rotation of the induced plate is stopped using a backstop bearing. The magnetic field of the permanent magnet generates torque, which prevents the cable from unwinding. However, it is always possible to unwind the cable by applying a pull action stronger than the magnetic coupler torque.

**Therefore, the cable (or hose) is protected even if the mobile machinery moves unintentionally (e.g.: a quay side crane pushed by the wind).**

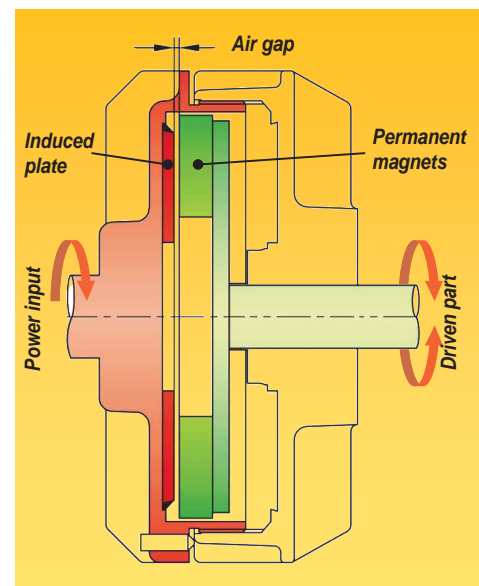


### Settings

The amount of output torque generated by the coupler depends on the air gap between the induced plate and the permanent magnet. A smaller gap generates more torque, a larger gap generates less torque.

The air gap is factory pre-set for the application.

However, adjustments can be easily made on site in case the application changes (travel speed, change of cable or hose, and so forth).



# KINEMATIC CHAIN



## Main Gearbox

As the primary part of the reeling drum, the main gearbox carries the dynamic and static loads generated by the spool, the drive units and the slip ring assembly. Its specification is directly related to the size of the reel.

The drive units are all mounted radial to the rotational axis of the spool. The main gearbox can accommodate from one up to seven magnetic couplers, depending on the model chosen.

The slip ring assembly is normally located on the opposite side of the spool. It is easily accessible for connections and maintenance.



## Secondary Gearbox - Additional Gearbox

The function of the secondary and additional gearbox is to match the output speed of the main gearbox to the speed of the mobile machinery and match the torque to what is required to wind the cable.

**CONDUCTIX®** gearboxes are lubricated for 5-year life or 15,000 operating hours.

## Magnetic Coupler Drive Unit

This sub-assembly is composed of a magnetic coupler, an electric motor, and a free wheel (also called the "backstop bearing").

- The motor turns at nameplate speed irrespective of the mobile travel speed.
- The coupler is driven at a constant speed.
- Three motor sizes are available depending on the type of coupler:  
0.37 kW - 0.75 kW - 1.5 kW (@ 1,500 rpm)
- The most commonly used motor is the AC - 3 phase, IP 55, insulation class F, complying with the international standards such as IEC or NEMA.
- Other types of motors are available on request : voltage, cycles, protection degree, pneumatic or hydraulic motor ...

## Free Wheel

The free wheel ("backstop bearing"), prevents the cable/hose from unwinding due to its own weight when the drive motor is switched off. However, it is possible to intentionally unwind the cable/hose by applying a pull stronger than the magnetic coupler torque.

This component acts as a safety brake.



**Semi Wide (“Bulk Wrap”) Spools**

This type of spool is particularly suited to short or medium lengths of cable (or hose).

During winding, the cable naturally spreads around the drum without any guiding assistance system.



**Monospiral Spools**

The largest sizes of this spool range can accommodate up to 700 meter long cable.

The cable is wound neatly as a spiral, with or without assistance of a guiding device, at a speed over 200 m/min.

This type of spool wraps the cable in a consistent plane, which avoids twisting and increases maximum cable life. The cable is exposed to the air, which cools the cable and reduces the need to de-rate current carrying capacity.



**3-2-3 Spools**

This is a combination of monospiral and semi wide spools, where the cable is stacked in layers, each three cable diameters wide.

The 3-2-3 spool is generally used when space available for the spool is limited.



**Level Wind Spool**

This range of spool has been designed to accommodate very long cable (in excess of 500 meters).

The cable is wound in 2 or 3 layers on a cylindrical drum.

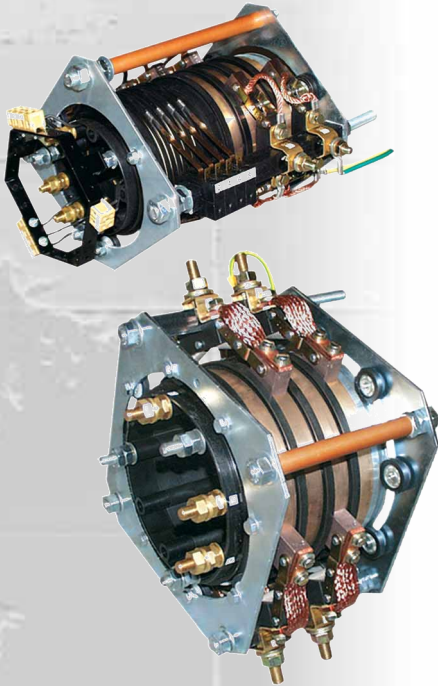
The layering of cable is accomplished with a guide system driven by the reel drum.



**Special Spools**

By request, **CONDUCTIX**® can build double monospiral spools, plain monospiral spools, spools with different materials such as stainless steel, special protection and/or dimensions, reinforced construction for harsh applications ...

# ROTARY JUNCTIONS



## Slip Ring Assemblies

**CONDUCTIX**<sup>®</sup> has several decades of experience designing and manufacturing of slip ring assemblies. Complying with the IEC, UL, NEMA and VDE international standard among others, **CONDUCTIX**<sup>®</sup> slip ring assemblies are designed for the following applications:

- Power
  - Low Voltage up to 690 V and 1 250 A
  - High Voltage up to 24 kV and 500 A
  - 100% duty
- Control
  - Low Voltage up to 500 V and 24 A
  - Suitable for data transmission (control, measurement), computer, audio-video and telecom equipment.
  - 100% duty
- Mixed
  - Mixed power / control slip ring assemblies
  - Rings of same or different diameters.

## Rotary joint

For fluid transfer (such as water, air ...), the motorized reel can be equipped with a single or multiple rotary joint.

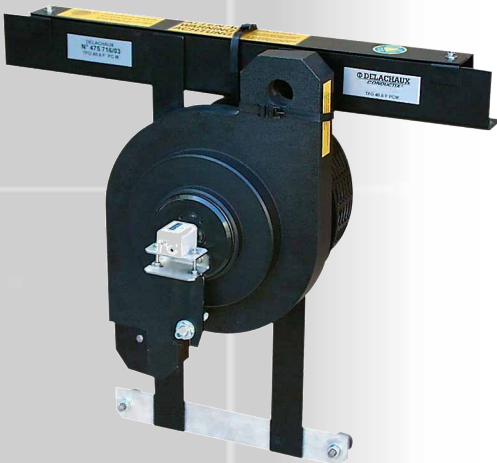
- Available diameters :  $\frac{3}{8}$ " -  $\frac{1}{2}$ " -  $\frac{3}{4}$ " - 1" - 1"  $\frac{1}{4}$  - 1"  $\frac{1}{2}$  - 2" - 2"  $\frac{1}{2}$  - 3"
- The rotary joints have a standard kanigen treatment.

## Fiber optic transmitter

**CONDUCTIX**<sup>®</sup> was one of the first cable reel manufacturers to develop a continuous fiber optic transmitter to meet the requirements of industry. Fiber optic cables are ideal for transmitting large amounts of information over long distances.

The transmitter is used when the reeling cable contains fiber optic conductors. This method is superior to fiber optic swivels that can degrade the signal.

- Attenuation: less than 1 dB.
- Available in 50 or 120 turns with 6, 12, 18 or 24 fibers.
- Single or multimodal fibers.



# ACCESSORIES

**CONDUCTIX® offers a complete range of reel accessories.**

The list below is not exhaustive, please contact **CONDUCTIX®** for details.

- One-way or two-way cable guides with optional slack cable, over pull, and position detection.
- Cable entries and anchor drums.
- Connection boxes for power, control, and optic fiber - Connection accessories.
- End limit switches.
- Heat ropes for slip ring housing.
- Guiding and diverting devices.
- Cable sleeves with shock absorber springs.



Two-way cable guides



Cable entries



End limit switches



Cable sleeves with shock absorber springs



Roller boxes



Connection boxes



Anchor drums

## TrenchGuard® Cable Protection System

The system includes:

- Galvanized steel or stainless steel pre-manufacturing trench channel;
- Reinforced flexible rubber belt;
- Stainless steel mounting hardware;
- Belt lifting rollers mounted on the cable guide.



# PORTS & MARINE

1 - Quayside container cranes made by HYUNDAI - SAMHO equipped with a MAG DRIVE motor driven reel.

2 - Cable reel BNA59.3C55.M2763X-VS used to retrieve 470 meters of  $3 \times 70 + 2 \times 35 \text{mm}^2$  plus 6 optic fibers combination cable.

3 - Power supply of a quayside container crane made by SAMSUNG.  
Cable:  $3 \times 70 + 2 \times 35 \text{mm}^2$  plus 6 optic fibers - 6.6 kV.  
Reel: BNA59.3C55.M2560VS.  
Speed: 46 m/min.



▲1



▲2



▲3

## Port of Singapore

Motor driven cable reel BNA36.1C55 installed on a DOOSAN container crane and equipped with a **pre assembled 3-parted** monospiral spool M1642.



To retrieve a **CONDUCTIX®** polyurethane outer sheath high voltage cable HTP  $3 \times 50 + 3 \times 10 \text{mm}^2$  - 3.6/6 kV.

Close shot of a motor driven reel **CONDUCTIX**® used to feed a quayside container crane at a speed of 45 m/min.



100% automated container cranes energized through cable reels **CONDUCTIX**® with magnetic couplers at a speed of 150 m/min.

*Port of Pusan  
(South Korea)*



General view of quayside cranes equipped with MAG DRIVE reels. (O.O.C.L. Terminal)



*Port of Kaohsiung  
(Taiwan)*



South Carolina State Ports Authority,  
Charleston (U.S.A.)  
Reel BNA59.3C33.M2055VS.3TH7

R.M.G.C.  
application view



# PORTS & MARINE



Motor driven reel with a monospiral spool and a two-way cable guide in action.



*Port of Marseille  
(France)*

*Port of Hai Phong  
(Vietnam)*

Power cable reel on a mobile swiveling ship unloader.



1 ▶



▼ 2

*Port of Ho Chi Minh  
(Vietnam)*

Mobile swiveling multi purpose crane power supplied with equipments of the MAG DRIVE reel range.

- 1 - Cable reel A3X installed at the end of the beam (lift application).
- 2 - Cable reel BNA50 to retrieve a pair of low voltage cables in parallel (**dual spool**).



**Ore Stacker Reclaimer.**

Power: BNA36.1C55.M1644X to retrieve 280 meters of 3x25 + 25mm<sup>2</sup> + 1 shielded pair cable - 3.6/6 kV.

Control: BNA40.1C55.M1642 to retrieve 280 meters of 16x2.5mm<sup>2</sup> + 3 pairs 2.5mm<sup>2</sup> + 6 optic fibers **combination cable**.



*Port of Sines  
(Portugal)*



**Iron Ore Stacker Reclaimer.**

Cable reel with a level wind spool and 3 magnetic couplers suitable for use **with low temperature down to -40°C.**

*Port of  
Sept-îles  
(Canada)*

*Kentucky  
(U.S.A.)*



**Ore Barge Unloader.**

Reel BNA50 with a **3-parted monospiral spool.**



# METALS & METALLURGY



*Taiwan*



Iron Stacker Reclaimer equipped with a **CONDUCTIX**<sup>®</sup> monospiral spool reel of the MAG DRIVE range.



*Chicago, II  
(U.S.A.)*



Scale Pits.

A couple of MAG DRIVE monospiral reels working under harsh conditions.

The **CONDUCTIX**<sup>®</sup> experience in the field of level wind reels and heavy mining machines began in the early 50's in French mines and steel plants.

Due to heavy duty, vibrations, and hard environment, our reels are made according to a strong and reliable design.



A pair of level wind cable reels installed on an ore bucket wheel.

## *Dunkerque (France)*



Iron Ore Scrapper.  
Power and control level wind reels driven by permanent magnet couplers.



# METALS & METALLURGY

*U.S.A.*

**Wheatland Tube Corp.**  
Coil handler equipped with a 'bulk wrap'  
spool cable reel.



**Compañía Siderúrgica Huachipato**  
Dual spool cable reel MAG DRIVE to  
supply power to a transfer car in a hot and  
dusty environment.

*Chile*

The **Modular Design** of the MAG DRIVE range allows **CONDUCTIX®** to offer solutions matching **any kind of industry specifications** in terms of dimension, atmosphere, duty ...



**Aciéries et Laminoirs de Rives**

Stationary mounted reels type P1 with 'bulk wrap' spool in action in a steel plant. Both systems supply power to a conveyor car.

- 1 - The cable is pulled out by the machine and is laid on the ground .
- 2 - The cable is **unsupported** and is stretched horizontally.

*France*



▲ 1



▲ 2

*U.S.A.*



**U.S. Steel Corp.**

To supply power to a transfer car under **high temperature and dusty atmosphere.**



# MINES & TUNNELING

*New  
Caledonia*



Bucket wheel in a nickel opencast mine.  
Cable retrieve by a level wind reel through a two-way cable guide.



Several **CONDUCTIX**® monospiral cable reels of the MAG DRIVE range that supply power and control to coal handling equipments in Europe.



*Chile*



Mantos de Oro Gold Mine  
Dual spool reel **CONDUCTIX**®  
working under a large amount of dust.



Level wind cable reel BNA59.3C33.TR3140 equipped with a **swiveling cable guide** to supply power to an excavator for quarries that moves in all directions.

Cable: 1,000 meters of 3x185+3x95 /3E - 6 kV.  
Speed: 10 m/min.



**Kazakhstan**



**France**

Since many years **CONDUCTIX®** is experienced with tunneling machine applications that can use either cable reels or **hose reels**.



Borate Stack Rake in California.  
Monospiral spool reel MAG DRIVE  
working in dusty atmosphere.

**U.S.A.**



# ENVIRONMENT & SERVICES



**Refuse Crane**

**CONDUCTIX**® 'bulk wrap' reel used to lift the power cable of a grabber.

*Grenoble  
(France)*

**Waste Water Treatment Facility**

Reels BNA13.1VN0.SL5 to retrieve **CONDUCTIX**® cables  
TSP - 20 G 2.5mm<sup>2</sup>



*Milan  
(Italy)*

*Germany*



**Water Treatment in a Power Station**

Motor driven reel BNA25.1W0.2M922.4TP080 (dual spool) installed on a grabber crane.  
Cables : 4x16mm<sup>2</sup> + 2x(4x1,5mm<sup>2</sup>) shielded - 0,6/1 kV

# INDUSTRIES & AUTOMATION

## Chile

A pair of monospiral reels to energize and control a Reclaimer in a cement plant



Motor driven reel MAG DRIVE to feed a transfer car that takes lumber in and out of a drying kiln.

## U.S.A

## Germany

Monospiral reel to supply power to a surfacing machine in a pre manufactured concrete block plant.



## France



Aggregate rail mounted unloader.



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