

HEAT EXCHANGER SOLUTIONS FOR THE OIL AND GAS INDUSTRY



Plate & Frame
Heat Exchanger

Shell & Plate
Heat Exchanger

Welded Plate
Heat Exchanger

Prime Surface
Heat Exchanger

Spiral
Heat Exchanger



Tranter gasketed/all-welded plate heat exchangers installed on a gas dehydration skid.



Tranter all-welded heat exchangers onboard an offshore platform.



Tranter gasketed plate heat exchangers onboard an FPSO offshore Nigeria.

Performance Tuned Heat Exchanger Products for Oil & Gas

Oil & gas upstream and downstream processing places special demands on heat exchangers. Such equipment must not only withstand corrosive media, two-phase mixtures, extreme pressures and temperatures, but also be extremely compact.

Outstanding Performance

The Tranter group has established itself as a world leader in the design, development and manufacturing of heat transfer equipment for the oil & gas industry.

Tranter offers a wide range of gasketed, all-welded and spiral heat exchangers, proven to meet the toughest customer requirements. Our patented plate technology enables us to tailor thermal and hydraulic design to optimise performance, reduce investment costs and minimise footprint and weight.

Tranter's goal is to build relationships with value by helping our customers build their business and giving them ideas they can use for their profit. We do this by working closely with EPC contractors worldwide from FEED stage up to delivery of equipment.

The Tranter Group has worked with many major EPC contractors on global oil & gas projects. Our references cover a wide variety of applications from downstream to upstream facilities.

Manufacturing & Service

Tranter is represented all over the world by a network of our own sales companies, licensees and agents. Our ISO9001 approved factories are located in Sweden, Germany, USA, India and China.

Tranter also has a service network covering Europe, North America, South America, Middle East, Asia and Australia. Our representatives and engineers can provide service and support and also train customer staff in handling day-to-day maintenance.



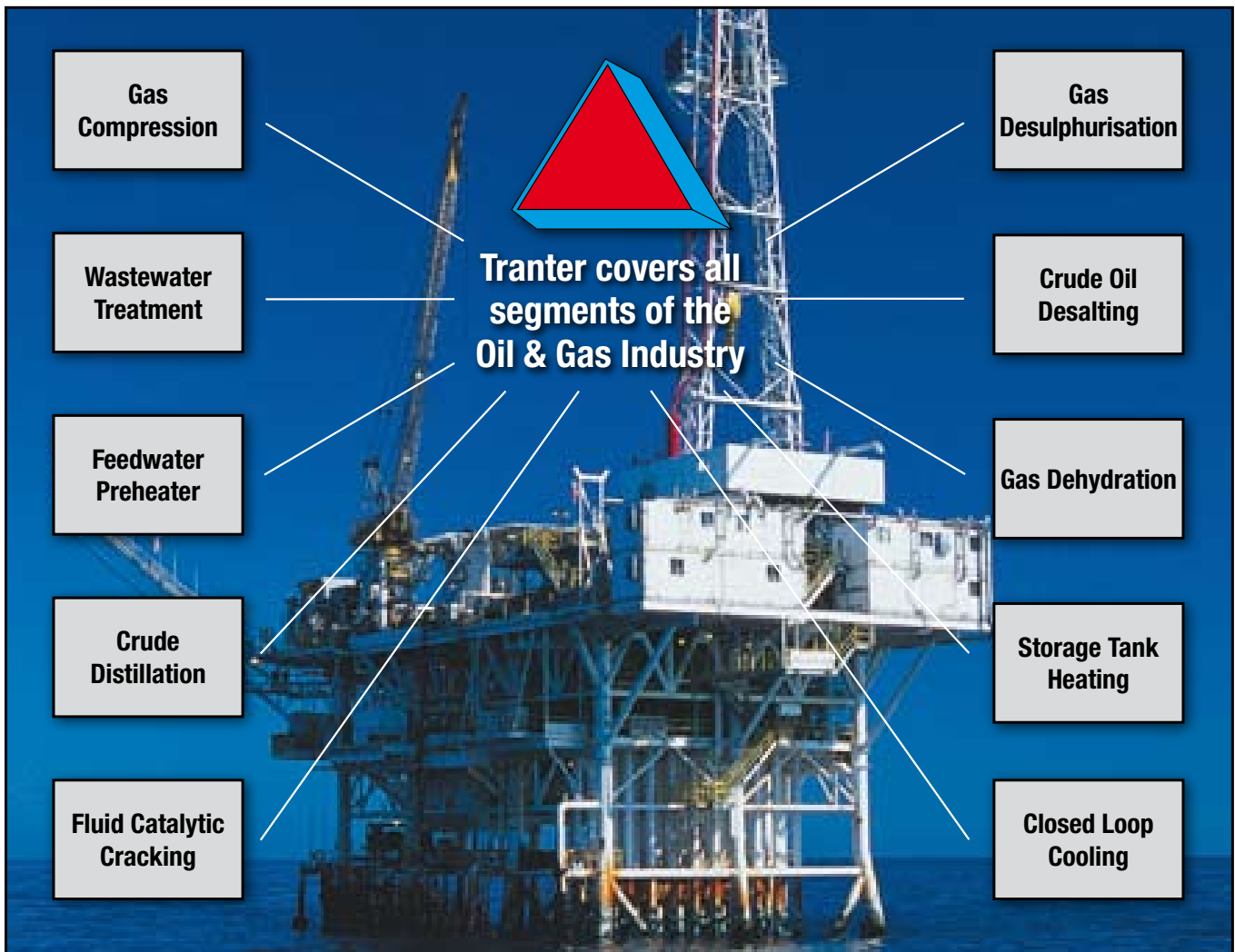
Applications for the Oil & Gas Industry

Tranter's products can solve almost any heat transfer problem in a variety of applications, which is why our customers include major oil companies and EPC contractors worldwide.

Customers in the oil & gas industry trust us because of our flexibility and high level of expertise in material selection, thermal design and process knowledge.

Tranter has its own R&D facilities and the tests conducted are designed to simulate real operation as would be experienced in the field. These include thermal fatigue testing of welds and two-phase heat transfer performance.

The figure below shows the main applications where our heat exchangers can solve heat transfer problems. The most important of these applications are described in the next pages.



Codes & Standards

Tranter fabricates in accordance with all major design codes, specifically ASME Section VIII Division 1 with U stamp, EN 13445, PED 97/23/EC with CE stamp and API 662 / ISO 15547. Our Document Control Department produces documents in accordance with requirements of the most demanding clients. For equipment in critical service, Tranter can provide all major types

of calculations and stability analysis, i.e. motion load, wind load, seismic load, nozzle load and even detailed FEA calculations if required. Welding is generally done according to ASME IX with standard available NDE methods consisting of RT, UT, MPI, DPI and PMI. Tranter also adopts customer specific engineering standards of major oil companies worldwide.



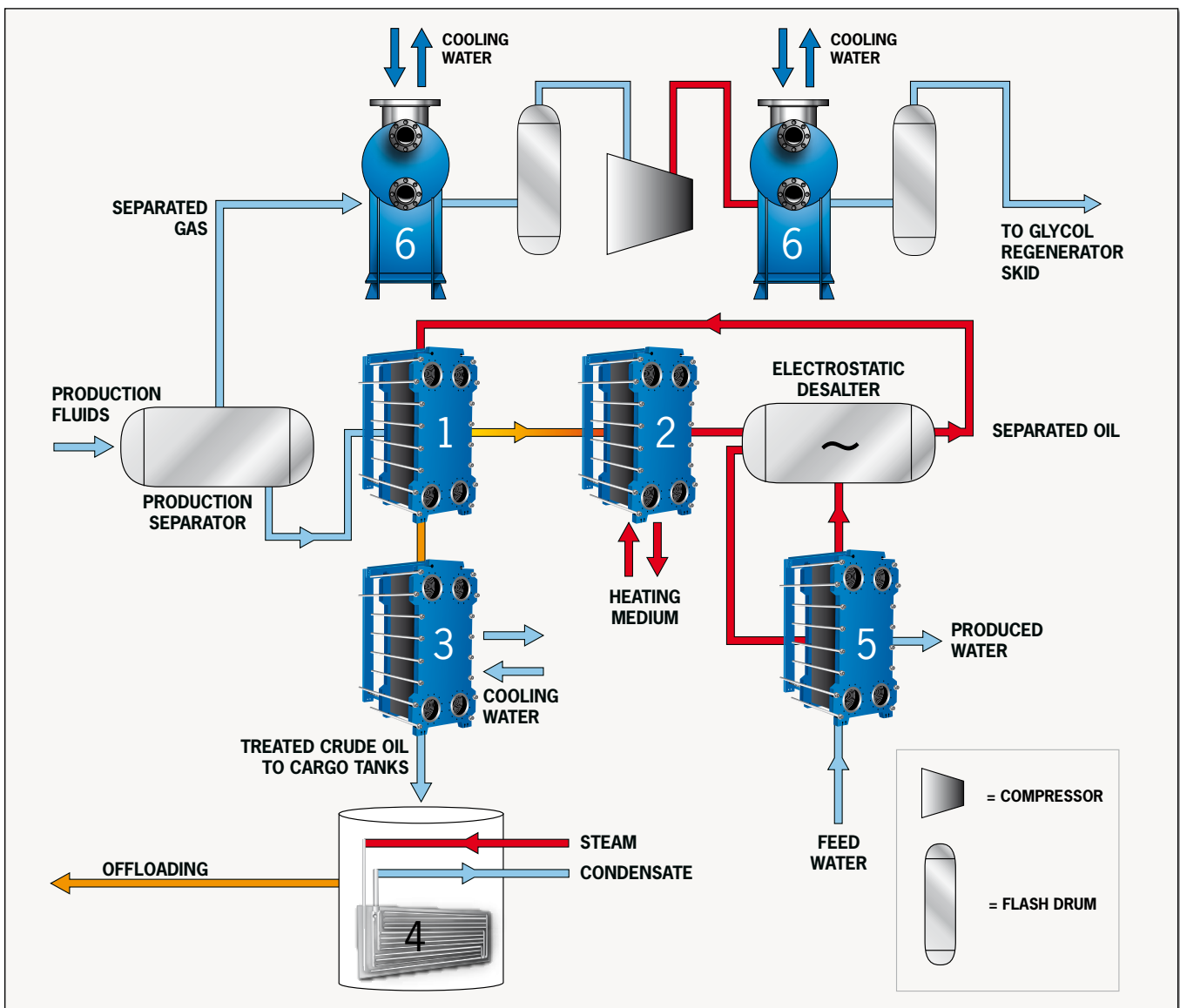
Crude Oil Stabilisation

Raw crude oil contains many contaminants that have to be removed before it can be further processed, particularly water and salts. Depending on the process used for dehydration / desalting, plate heat exchangers can be utilised for many different services, such as:

- HE-1 – Crude oil interchanger - Desalted / dry crude oil coming from the desalter is interchanged with untreated crude oil from the multiphase separator, thus reducing the heat input to the crude oil inlet heater.
- HE-2 – Crude oil heater - Heating of the wet crude oil to the final desalting temperature by using hot water or steam. If high pressure steam is used as heating medium an all-welded shell & plate heat exchanger can be a complement to conventional gasketed units.
- HE-3 – Crude oil cooler - The dry crude oil is further cooled by seawater or freshwater to obtain a suitable storage vapour pressure. To avoid the risk of waxing problems when the crude oil

is cooled to storage temperature, an easily maintained gasketed unit is beneficial to use.

- HE-4 – Storage tank heater – Before offloading the crude oil, it needs to be heated to allow pumps to work efficiently and optimise discharge rate. Reducing the crude viscosity prior to offloading is easily done with a prime surface plate heat exchanger using conventional heating mediums.
- HE-5 – Produced water cooler - The feedwater to the desalter is heated by interchanging it with produced water from the desalter. The risk of fouling problems on the seawater / produced water side can be avoided by using a gasketed unit, since it provides high shear stress.
- HE-6 – Interstage cooler - The hot hydrocarbon gas leaving the compressor is cooled in the interstage coolers and condensed liquids are separated from the gas stream in the flash drums. Using a shell & plate unit over a tubular unit, saves space and minimises the utility flow.

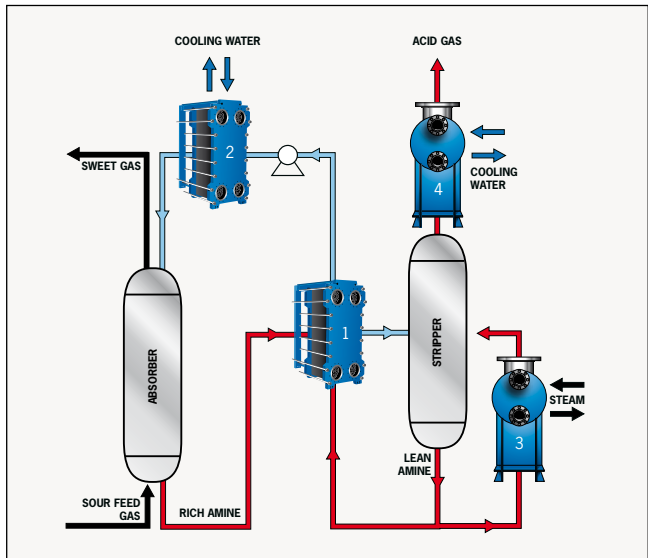




Gas Desulphurisation

The gas desulphurisation or sweetening process is the removal of acidic components from a gas stream, i.e. CO₂, H₂S, CO and CS₂, and is carried out by absorption in a continuous process with re-generable solvents.

- HE-1 – Lean / Rich amine interchanger – The rich amine containing acidic components is heated by lean amine coming from the absorber. Tranter’s gasketed Ultraflex plate provides high shear stress on each side, thus minimises plate fouling.
- HE-2 – Lean amine trim cooler – Before entering the absorber, the lean amine needs to be cooled to the appropriate absorption temperature. A gasketed trim cooler is easily maintained and provides precise temperature control.
- HE-3 – Stripper reboiler – Acidic components are evaporated in the reboiler. The short flow path and highly efficient plate makes the shell & plate heat exchanger an excellent choice for reboiler duties.
- HE-4 – Acid gas condenser - Condensable gases are partially condensed at the top of the stripper column, using a shell & plate heat exchanger. The non condensable acid gases (i.e. H₂S and CO₂) leave at the top and is transported to further treating.



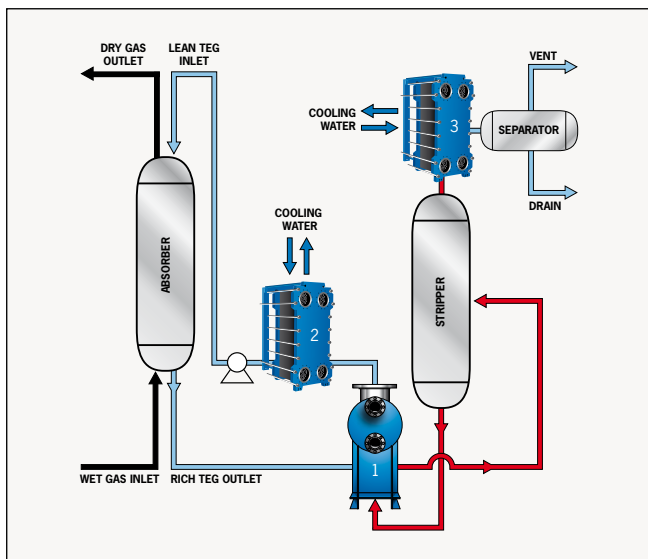
Did you know...

that thermal and pressure fatigue is the single largest cause of failure in metals, estimated to comprise approximately 90 % of all failures. That is why Tranter’s shell & plate heat exchanger, with its excellent resistance to fatigue, is the preferred solution in challenging processes.

Gas Dehydration

Dehydration of wet gas removes water vapour from the gas stream, and prevents hydrate formation and pipeline corrosion, which enables pipeline requirements to be met. Dehydration is normally carried out by a TEG absorption process.

- HE-1 – Lean / Rich TEG interchanger – The rich triethylene glycol (TEG) is preheated prior to entering the stripper by using a shell & plate heat exchanger. The heat exchanger minimises the required reboiler duty and also respects the low pressure drop constraint on the lean side.
- HE-2 – Lean TEG cooler – A semi-welded or gasketed plate heat exchanger is used to cool the lean TEG to an optimum temperature before entering the absorber, thus enabling precise temperature control.
- HE-3 – Vent condenser – A semi-welded heat exchanger can be used on top of the stripping column to condense the water / hydrocarbon mixture using seawater / freshwater as cooling medium.

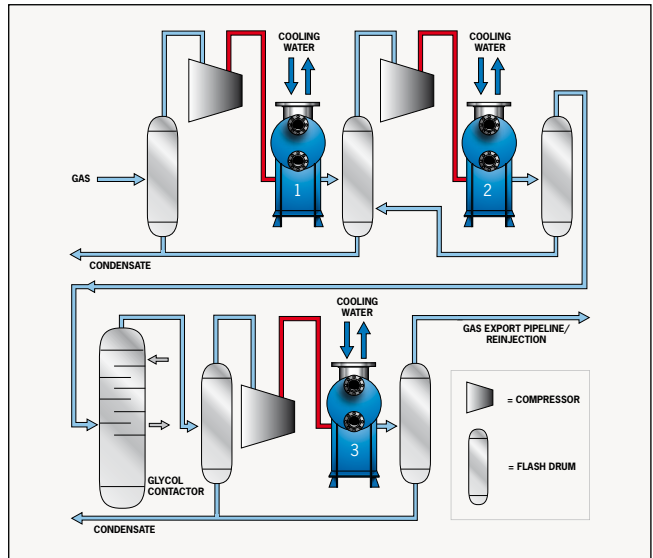




Gas Compression

Gas is compressed in several stages and cooled in interstage coolers. Condensed liquids are separated from the gas stream in flash drums after interstage cooling, thus liquid is constantly removed from the gas prior to each compression stage. Depending on the dryness requirements of the gas it may have to be dehydrated prior to the final discharge compression stage.

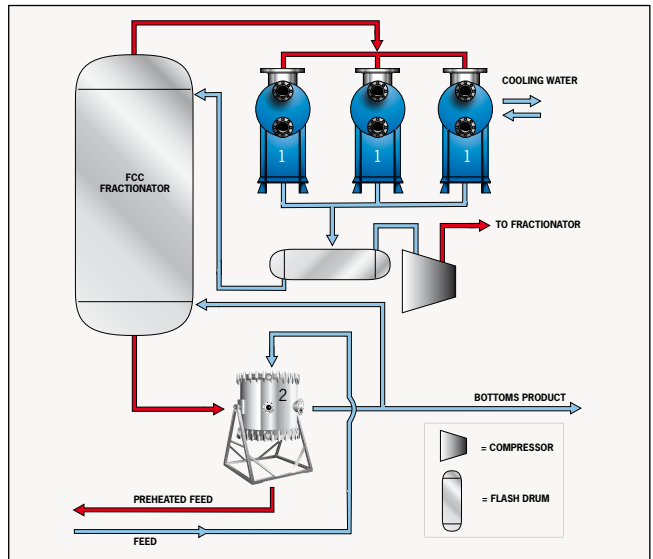
- HE 1,2,3 – Interstage coolers - Shell & plate heat exchangers used as interstage coolers provide excellent reliability due to the high resistance to pressure / thermal fatigue. The short flow path and the large cross section also make them particularly suited for two-phase flows with a high LMTD between the hot and cold side of the heat exchanger.



Fluid Catalytic Cracking (FCC)

FCC is the conversion of a hydrocarbon mixture into high value products such as light olefins and high octane gasoline. FCC overhead vapours flow to the fractionator where they are separated into an overhead stream containing the wet vapours and a heavier stream containing the hydrocarbon liquids. The heavy liquids or the bottoms product often contains fouling products that makes fouling / clogging prevention an important factor.

- HE-1 – Overhead condenser – The shell & plate heat exchanger is well suited for condensation of light hydrocarbons leaving the top of the fractionator. The heat exchanger enables a close temperature approach and is well suited for preheating the boiler feedwater, thus, saving energy consumption in the plant. The small hold up volume also provides fast responses to capacity changes.
- HE-2 – Bottoms cooler – The liquid hydrocarbons collected at the bottom of the fractionator can be either reboiled and reintroduced into the column or be used for preheating a feed stock. In some refineries the bottoms product is cooled by a freshwater loop. In both cases, the spiral heat exchanger contributes to improved process reliability as clogging on the product side is prevented by its unique features.



Did you know...

that the spiral heat exchanger was originally developed in the twenties for use in the paper-industry by the Swedish engineer C. Rosenblad. The design makes it particularly suited for fluids containing solids and fibres.



Heat Exchangers for Demanding Tasks

Tranter heat exchangers are not only tailor-made in terms of thermal performance, but also in terms of mechanical design. A wide range of possible connections are available and vary from standard studded connections to

special weld neck connections manufactured according to the most challenging specifications. The tables below show the pressure/temperature ratings and possible connection sizes for our wide range of products.



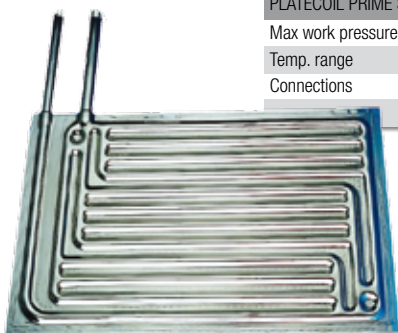
GASKETED PLATE HEAT EXCHANGERS	
Max work pressure	25 bar
Temp. range	-40°C to +180°C
Connections	DN25-DN500 Up to ANSI 20"

SPIRAL HEAT EXCHANGERS	
Max work pressure	60 bar
Temp. range	-100°C to +450°C
Connections	DN25-DN500 Up to ANSI 20"



SUPERMAX SHELL & PLATE HEAT EXCHANGERS	
Max work pressure	100 bar
Temp. range	-195°C to +900°C
Connections	DN25-DN700 Up to ANSI 28"

MAXCHANGER WELDED HEAT EXCHANGERS	
Max work pressure	115 bar
Temp. range	-195°C to +540°C
Connections	DN25-DN50 Up to ANSI 2"



PLATECOIL PRIME SURFACE HEAT EXCHANGERS	
Max work pressure	28 bar
Temp. range	-195°C to +260°C
Connections	DN25-DN200 Up to ANSI 8"



ECONOCOIL PRIME SURFACE HEAT EXCHANGERS	
Max work pressure	18 bar
Temp. range	-140°C to +185°C
Connections	DN25-DN200 Up to ANSI 8"



At the forefront of heat exchanger technology for more than 70 years

Tranter top quality, high-performance, proprietary products are on the job in demanding industrial and commercial installations around the world. Backed by our comprehensive experience and worldwide presence, Tranter offers you exceptional system performance, applications assistance and local service. Tranter is close to its customers, with subsidiary companies, agents, distributors and representatives located worldwide. Contact us for a qualified discussion of your needs.



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