



# ENSTO

## Ensto Novexia

Electrical equipment for  
medium and low-voltage grids

**Better life.**  
With electricity.

Ensto designs and markets smart electrical solutions to improve the safety, functionality, reliability and effectiveness of Smart Grids, buildings and transport.

[ensto.com](http://ensto.com)

# For nearly 100 years

Ensto has been offering solutions dedicated to global smart grid optimisation

Ensto Novexia is a subsidiary of the Finnish group Ensto. Its expertise lies in secure automation solutions for smart electricity distribution grids.

## Dedicated energy efficiency solutions

Since its foundation, Ensto Novexia has striven to think up the most innovative solutions in overhead and then underground grids to reduce the harmful effects of power cuts.

Over the years, Ensto Novexia has thus emerged as an undisputed expert in Medium Voltage (MV) overhead distribution and breaking equipment and fault detection and monitoring and control functions for remote control of this equipment, and in grid protection.

Ensto Novexia is now investing a substantial part of its R&D budget in energy performance and sustainable development in relation to smart grid technologies.

## A reference, both in France and Abroad

In France, Ensto is a major supplier to Enedis and to private electricity boards and associations.

Internationally, the company is also a partner with an extensive number of distribution grid managers with many contracts in Europe, Africa, and South America in particular.

## The Ensto group

Ensto Novexia belongs to the Ensto Group, an international family-run company specialising in the design, manufacture and marketing of electrical equipment and solutions for power distribution.

Ensto is established in 17 countries, with production sites in 7 of these. Its R&D departments are distributed in 5 countries. Its head office is in Porvoo in Finland.

The group's new strategy is to focus on electricity distribution with a view to reaching a higher level, increasing its innovations and growth, and, as such, becoming a leading expert in the eyes of distribution grid managers. Our ultimate aim is to:

## Live better with electricity



Ensto DSO, distribution grid managers, offer a wide range of products for:

- > overhead networks,
- > underground networks,
- > network automation (Ensto Novexia),
- > and a range of new smart technologies





**History:**

Novexia is the result of the merger of the companies Simplex in Villefranche-sur-Saône and IATS (Soulé) in Bagnères-de-Bigorre.

In October 2010, the Ensto Group acquired Novexia, which became Ensto Novexia, in order to complete its network automation product range and to develop its establishment in France.

In May 2016, Ensto Novexia extended its product range by acquiring the company Tridelta France, a surge arrester manufacturer.



Energy distribution reliability is a prerequisite for the so-called Smart Grids. Ensto Novexia's automation solutions provide global optimisation and procurement security regardless of the grid configurations.

**Our response to today's major challenges**

The population growth, along with permanent industrial development, have led to an increase in energy demand in general, and electricity in particular.

Energy suppliers are therefore required constantly to produce more, by optimising their grids to satisfy their customers, whose demands in terms of quality and continuity of service are increasingly stringent.

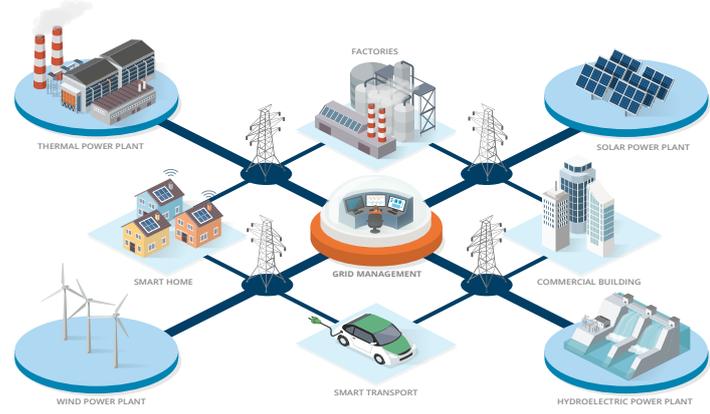
Global solutions are thus required to reduce service interruption duration and frequency.

**Distribution reliability indicators**

In a constant effort to improve their performance, energy suppliers monitor specific indicators precisely, the two most frequently used being:

- SAIDI (System Average Interruption Duration Index) which measures the average duration of power cuts affecting the end consumer in a recorded period,
- SAIFI (System Average Interruption Frequency Index) which measures the average frequency of power cuts affecting the end consumer in a recorded period.

**SMART GRID**



# Medium voltage (MV) overhead distribution solutions

## Guarantee continuity of service

### Reliability and expertise

For many years, Ensto has been developing solutions combining MV breaking and monitoring-control.

The innovative solutions proposed by Ensto are the fruit of partnerships established in close collaboration with customers. This proximity between Ensto and its customers is essential and guarantees successful evolution of its products and customer satisfaction.

This equipment therefore responds to many concerns and requirements voiced by customers:

- Offering a high-quality service
- Providing easy installation
- Operating in a safe manner
- Improving grid profitability by reducing sources of operating loss

Moreover, with a long service life (30 years), these solutions, which offer a high level of electrical endurance, are appreciated by operators for their ease of use and high level of reliability.

### Flexibility and adaptability

Ensto has found a way to design solutions to adapt equipment to every configuration of both overhead and underground electric grids.

Equipment for overhead grids can easily be fitted onto all types of pole (wood, concrete, metal, etc.).

Equipment intended for underground grids is designed to be fitted inside MV/LV stations.

These solutions are designed for the environment facing them, be it:

- extreme temperatures (-50°C / +55°C)
- dry climate (deserts) or high humidity (tropics)
- corrosive areas (polluted industrial or marine)

Lastly, plug & play systems in the electronic solutions mean easy integration into grids remotely controlled by a SCADA system.



### Customer benefits

- Adaptable to all grids
- Durable
- Reliable, operation under extreme atmospheric conditions

# Switches and circuit breakers



## MV overhead air-break disconnect switches

Manual or electric remotely controllable for 24 kV and 36 kV three-phase grids

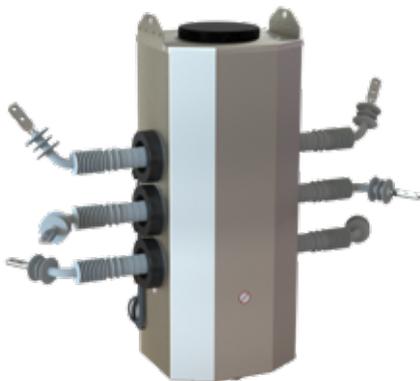
24 kV - 100 A switch	Breaking capacity: 31.5 A
36 kV - 80 A switch	Breaking capacity: 25 A
Insulator	Ceramic, synthetic or glass



## IA2T pilot-duty control

Used to operate overhead air-break switches. Associated with monitoring & control cabinet

Technical specification	ST 64-S-64
Standards	NF C 64-140



## Auguste MV overhead SF6-break disconnect switches

Manual or electric remotely controllable. Extended IP67 sealed metal housing, with integrated or external MV/LV power transformer.

Rated voltage	12/24/36 kV
Rated current	400 A - 630 A
DC current withstand strength	12,500 A

## Vacuum Smartcloser MV automatic circuit reclosers

Detect current surges, interrupt the fault currents and re-power the line by automatic reclosing. If a fault is permanent, they isolate the defective section from the rest of the grid.

Rated voltage	38 kV
Rated current	630 A
Breaking capacity	12,500 A



# Monitoring & Control range for MV overhead grids

## E-RTU 2020 Overhead Unit for MV overhead switches

Measurement	Current, voltage, power
Detection	Amperometric - Directional as per HN 50 S 51
Communication protocols	IEC104, IEC101, DNP3 IP, DNP3 serial, Modbus IP, HNZ
Communication media	Digital or analogue radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU
Cybersecurity	IEC62351



## ITI Overhead Unit for MV overhead switches

Measurement	Current, voltage, power
Detection	Amperometric - Directional as per HN 50 S 51
Communication protocols	IEC104, IEC101, DNP3 serial, Modbus, HNZ
Communication media	Digital and analogue radio, Ethernet, GSM, GPRS, external RTU, Dedicated lines, Public switched telephone networks (PSTNs)

## Smartcloser unit for MV reclosers

Measurement	Current, voltage, power
Detection	Power surge ANSI 50, 51, 67, CPL ...
Communication protocols	IEC 61850, IEC 104, IEC101, DNP3, Modbus IP, HNZ
Communication media	Digital or analogue radio, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet



## Visio II

Overhead and underground monitoring & control cabinet test and simulation case

Detection	Power surge, amperometric and directional as per HN 45-S-51, HN 45-S-50
Technical characteristics	Single-phase 230 V/50 Hz mains power 8 hour battery life, recharges in 2 hours
Measuring point	toroid sensors, PPACS and ADA function



# Overvoltage protection solutions

## Protect all types of networks thanks to Ensto surge arresters

In order to deliver high-quality power, electricity companies must constantly improve the quality of their grids. Overvoltage protection is a key element.

Appropriate overvoltage protection is key to optimising continuity of service for grids.

Furthermore, it ensures personal safety and reduces immobilisation costs.

### To each application its surge arrester

Designed and manufactured to the highest quality standards, Ensto's broad range of surge arresters ensures years of maintenance-free service in the following fields:

- Overvoltage protection for HV and MV hardware

- Overvoltage protection for direct or alternating current rail networks

- Overvoltage protection for cable sheaths

- Voltage limiter for non-earthed metal structures

Based on cutting-edge technologies (metal oxide and silicone housing), our surge arresters provide total control of residual voltage based on insulation coordination rules, thus considerably improving the level of protection.

### Surge arresters for rail applications

The availability of a secure railway power supply is critical for operators.

This search for reliability requires, amongst others, the use of specific surge arresters and voltage limiters adapted to these networks.

The protection afforded by these devices ensures the safety of persons and equipment, thus reducing operating costs.



With over five million VARISIL™ surge arresters in service worldwide, Ensto makes a significant contribution to the protection and reliability of electric grids.



# Our Ensto surge arrester range

## Optimum solutions to meet customers' needs



### HV source station surge arresters with polymer housing

VARISIL™ HI (for grids up to 170 kV)	
Standard	IEC 60099-4
10 kA	Class 2 from 5 to 144 kV
Creepage distance	25 mm/kV
SLL/SSL mechanical strength	800/1000 N.m

VARISIL™ HTS (for grids up to 245 kV)	
Standard	IEC 60099-4
10 kA	Class 3 from 5 to 198 kV
Creepage distance	25 mm/kV
SLL/SSL mechanical strength	800/1000 N.m



### MV overhead line surge arresters with polymer housing



VARISIL™ H24 / H36 (For 24 kV or 36 kV grids)	
Standard	IEC 60099-4 and EDF HN 65-S-40
10 kA	Class 1
Creepage distance	25 mm/kV
SLL/SSL mechanical strength	250/300 N.m



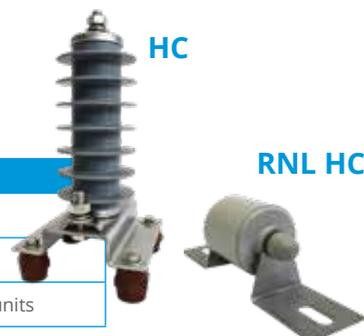
VARISIL™ HE (for grids up to 36 kV)	
Standard	IEC 60099-4
10 kA	Class 1 from 3 to 36 kV
Creepage distance	31 mm/kV
SLL/SSL mechanical strength	100/125 N.m

VARISIL™ HE-S (for grids up to 54 kV)	
Standard	IEC 60099-4
10 kA	Class 1 from 3 to 54 kV
Creepage distance	31 mm/kV
SLL/SSL mechanical strength	200/250 N.m

### Cable sheath surge arresters

VARISIL™ HC (for grids up to 18 kV)	
Standard	IEC 60099-4
10 kA	Class 1
For connection to links earthed at one point	

RNL HC (for grids up to 6 kV)	
Standard	IEC 60099-4
10 kA	Class 1
Designed to be fitted into screen permutation units	





Surge arresters for rail applications



HDC

VARISIL™ HDC	
Standard	IEC 60099-4
10 kA	Class 2
For direct current subways, trains and tramways (1 kV to 4.8 kV)	

VARISIL™ HD/T	
Standard	IEC 60099-4
10 kA	
For alternating current subways, trains and tramways (36 kV to 42 kV)	



HD/T

VARISIL™ HDP	
Standard	IEC 60099-4
10 kA	
For direct current stock	



HDP

8506	
Standard	IEC 60099-4
10 kA	Class 3
For direct current rolling stock (from 1.5 kV to 3 kV)	



8506

CLS - Low-voltage limiter
For alternating and direct current subways, trains and tramways



CLS





# LV overhead grid protection solutions

## Efficiently protecting distribution line reliability



In order to guarantee continuous electricity distribution, Ensto has been providing protection solutions for MV/LV overhead transformers in rural environments for over 40 years.

This protection is made possible by the use of pole-mounted circuit breakers or fused protection units. These specific products, adapted to significant load unbalances, guarantee total use of the installed capacity, even in unbalanced states.

These solutions protect not only the grid, but also people and goods. As protection is global and optimised, the grid can be operated in a perfectly safe manner.

### High-quality overhead range

Thanks to its extensive experience, Ensto possesses in-depth technical expertise ranging from the design to the production of equipment for electricity distribution grids. These overhead solutions are safe and long-lasting. The purpose of their reliability and resistance is to ensure efficient and fault-free power distribution.

These devices are designed to withstand the most severe conditions and are tested in accordance with international standards. The products help optimise continuity of service, reduce maintenance costs, and, most importantly contribute to customer satisfaction.

## LV Overhead Protection

For 50, 100 and 160 kVA power transformer.



### DP (Pole circuit breaker)

The DP is designed to protect type H61 pole transformers. It is effective against overloads (balanced and unbalanced) and against short-circuits.

It is installed outside and fixed to the middle or top of the pole. Its location makes it more difficult to access and less susceptible to vandalism and fraud. However, it will be easy to handle from the ground using its padlockable rod assembly protecting against fraud.

It is suitable for both overhead or overhead-underground LV lines:

Various versions are available:

- with 1 output (up to 165 A) or 2 outputs (up to 265 A)
- with digital or analogue tripping unit
- with three transformer ratings of 50 kVA, 100 kVA or 160 kVA



The **analogue tripping unit** reproduces the thermal image of the transformer through three thermistors. Each thermistor, is crossed by a current proportional to that passing through every winding on the transformer. The DP will trip to protect the transformer as soon as the thermal image received is too high.



The **digital tripping unit** protects the three pole transformer ratings (50 kVA, 100 kVA and 160 kVA) via a switch used to select the transformer protection rating. It is called "tri-rating".

A digital micro-controller assesses in real time the presumed temperature of the transformer from currents measured on the three phases and accounting for the outside ambient temperature.

**NB:** A DP fitted with an analogue unit can easily be upgraded into a DP fitted with a digital unit. The two tripping units are in fact interchangeable.

### SOP fuse box (Simplified Overhead Protection)

IP2X box used solely for SPT (Self-Protected Transformer) type transformers. It protects the LV installations positioned after the fuses. Located outside and fixed to the bottom of the pole, it is operated from the ground. It is suitable for both overhead and overhead-underground LV lines.

	1 output	2 outputs
Compliance	HN 63 S 12	HN 63 S 12
Protection principle	Fuses	Fuses
Rated operational voltage	400 V	400 V
Rated protection current	200 A max	2*200 A max
Number of protections	1	2
Mechanical resistance and safety	IP34D/IP2X	IP34D/IP2X

### BSE cabinet

Provides 400 V LV line protection behind a transformer in an SCRS (Simplified Compact Rural Station) type station.

Compliance with standards	HN 63-S-12 and HN 63-S-61
Protection principle	T2 fuses HN / IEC type
Rated voltage	400 V
Mechanical resistance	IP2X / IK07



# Underground grid solutions

## Underground grid telecontrol

### Migrating from overhead to underground

In the energy supply quality improvement programme, most electricity boards and energy suppliers are opting to replace overhead MV lines by underground grids.

These line undergrounding programmes, initially started in urban areas, followed by the commuter belt, are gradually being extended to small and medium-sized conurbations.

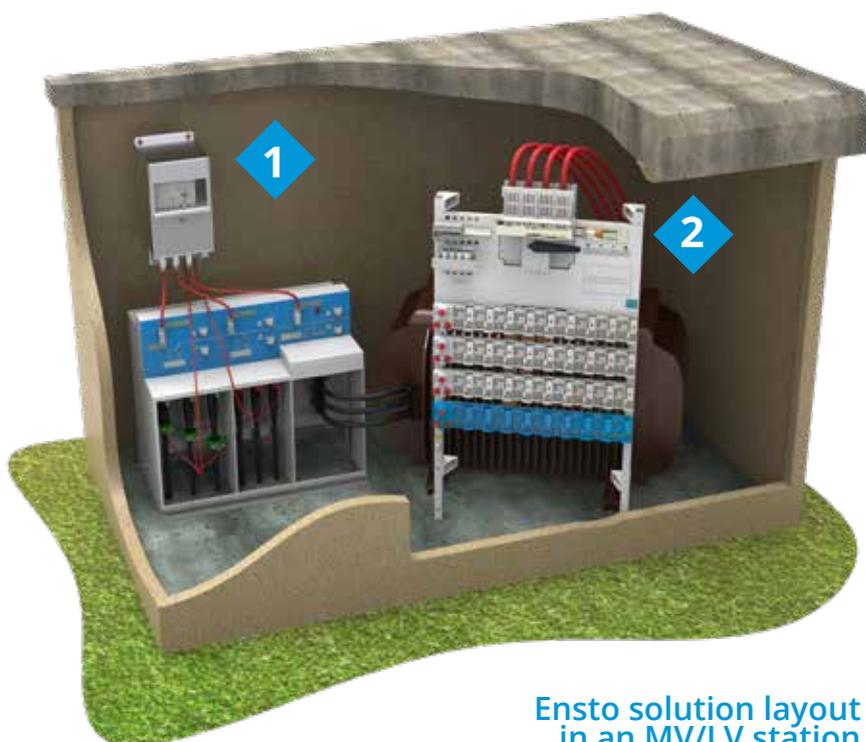
In France, underground grids are generally made up of a large number of MV/LV distribution stations, MV breaking cabinets, and “simplified” rural transformation stations.

Ensto offers a comprehensive range of equipment that can be used for fault detection, remote control of MV/LV station switches (MV disconnection cells), and LV output protection.

### Secure grid

Ensto's expertise means that it has unrivalled know-how to find the best solution for the following needs:

- Distributing power across multiple LV outputs
- Protecting LV outputs downstream from a transformer
- Safeguarding equipment operation and personal safety.



1

Monitoring and control solution for medium-voltage cells: ITI and E-RTU cabinet for remote-controlled cells, LYNX fault detector for non-remote-controlled cells.

2

TUR or TIPI type LV panelboards helping distribute power to various users and protect LV outputs downstream from the transformer.

Ensto solution layout in an MV/LV station



1

## Monitoring & control cabinet



### E-RTU 2020 Underground cabinet

Measurement	Current, voltage, power
Detection	Amperometric - Directional as per HN 50 S 51
Communication protocols	IEC104, IEC101, DNP3 IP, DNP3 serial, Modbus IP, HNZ
Communication media	Digital or analogue radio, Dedicated lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU
Cybersecurity	IEC62351
Control	Remote control of 1 to 8 switches in MV/LV stations



### ITI Overhead Unit for MV overhead switches

Measurement	Current, voltage, power
Detection	Amperometric - Directional as per HN 50 S 51
Communication protocols	IEC104, IEC101, DNP3 serial, Modbus, HNZ
Communication media	Digital and analogue radio, Ethernet, GSM, GPRS, external RTU, Dedicated lines, Public switched telephone networks (PSTNs)
Control	Remote control of 1 to 8 switches in MV/LV stations

1

### LYNX fault detector for underground MV grids

Detection	Amperometric - Directional as per HN 50 S 51
Neutral system	Directly earthed or impedance-earthed (Amperometric) - Compensated (Directional)
Rated grid voltage	from 6 to 36 kV - 50/60 Hz
Power supply	May be standalone (supercapacitor or battery) or equipped with LV power supply with battery backup



### DEIE (Operating Data Exchange Device)

Handles remote control and monitoring of decentralised production facilities (wind turbines, photovoltaic arrays, etc.). It is used to exchange data and commands between the MV grid manager and the independent producer.

Communication protocols	HNZ (Enedis-specific), IEC 104
Communication media	Digital or analogue radio, Dedicated Lines, GSM, GPRS, Public switched telephone networks (PSTNs), Ethernet, external RTU Handles remote control and monitoring of decentralised production facilities (wind turbines, photovoltaic arrays, etc.). It is used to exchange data and commands between the MV grid manager and the independent producer.



2

## LV panelboards

Designed for MV/LV stations to protect LV outputs downstream from 400, 630 and 1000 kVA transformers.



### TUR (simplified urban panelboard)

TUR — first-generation panelboards

Easy electricity distribution due to a simplified and modular configuration	
Provides mains switch breaking capability for capacities of up to 1000 kVA.	
Protects LV outputs using HRC (High Rupturing Capacity) outputs	
Configurations	4 outputs, equipped with 800 A switch 5 outputs, equipped with 1200 A switch 8 outputs, equipped with 1200 or 1800 A switch



### TIPI (power and data interface panelboard)

TIPI — latest-generation panelboards with IP2X protection. In addition to the features found in the TUR panelboard, it has the following main characteristics:

Operating safety (IP2X)	
Connectors for connecting a standby power generator to supply sockets	
Presence of voltage measuring points	
Presence of a short-circuiter	
Configurations	4 outputs + 1 temporary, fitted with a 500 A switch 8 outputs + 1 temporary, equipped with 1200 or 1800 A switch



# Services provided

## Tailored customer support

For over a century, Ensto has been devising, developing, testing and manufacturing reliable products, of high technological quality, aimed at protecting your grid and lowering your SAIDI-SAIFI index, to ensure full satisfaction for end customers.

### Gain expert knowledge

To achieve this aim, Ensto guides you through a high-quality Operational Maintenance process, and develops a wide range of services for you. Installing a product is not enough, you also need to master all of its capabilities, know how to carry out maintenance, whether preventive or corrective, and conduct pre-troubleshooting. In this regard, Ensto guides you throughout these processes: pre- and after-sales expertise, original replacement parts, commissioning support for optimised

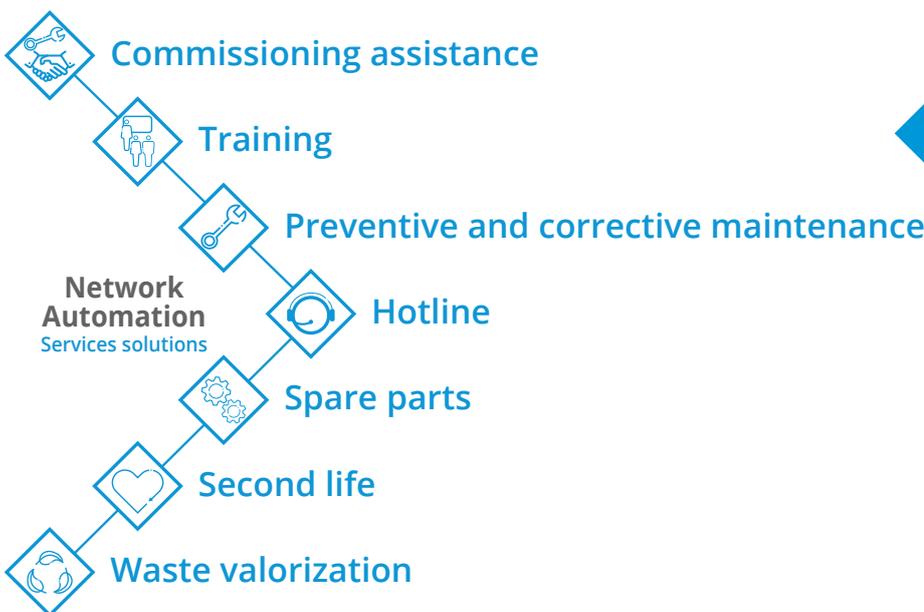
installation time, training based on your needs, dedicated hotline, Ensto is your primary contact in the after-sales phase.

### Ensto — service provider

Ensto's service offering also accounts for our aim to lower environmental costs. By helping you master the product better, we reduce your environmental impact. For this purpose, besides acquisition of expert know-how, we offer a panel of replacement parts and/or the option of recycling your products and even offering them a 2<sup>nd</sup> life.

### Helping build a more sustainable world

This sustainable development policy is in line with the Ensto group's strategy and also applies to our services.



By developing these service solutions, Ensto is seeking to supplement its business range to provide the optimal solution to your needs, by offering a comprehensive package, ranging from equipment sale to recycling.



# ENSTO

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