

## Brochure

Sales expertise for your applications requirements



■ Standard products



■ Customised products



■ Application-specific solutions



[www.crouzet.com](http://www.crouzet.com)



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Recognised for over 50 years for the quality of its standard and customised products, Crouzet invites you to discover its **expertise in Micro-control**.

Always one step ahead of customer requirements, Crouzet, the customisation specialist, is continually developing new automation components and solutions for all the latest commercial and industrial applications and to meet the needs of manufacturers of automated equipment and machinery.



**CST (Custom Sensors & Technologies)**, incorporating BEI, Crouzet, Crydom & Kavlico, also has a full range of detection, control and motorisation products in addition to the micro-control products presented in this brochure. This new organisation means even better service and technical choices for our customers.

Crouzet's Quality Control System has integrated environmental management into its processes. The production sites are **ISO 9001 and ISO 14001** certified.



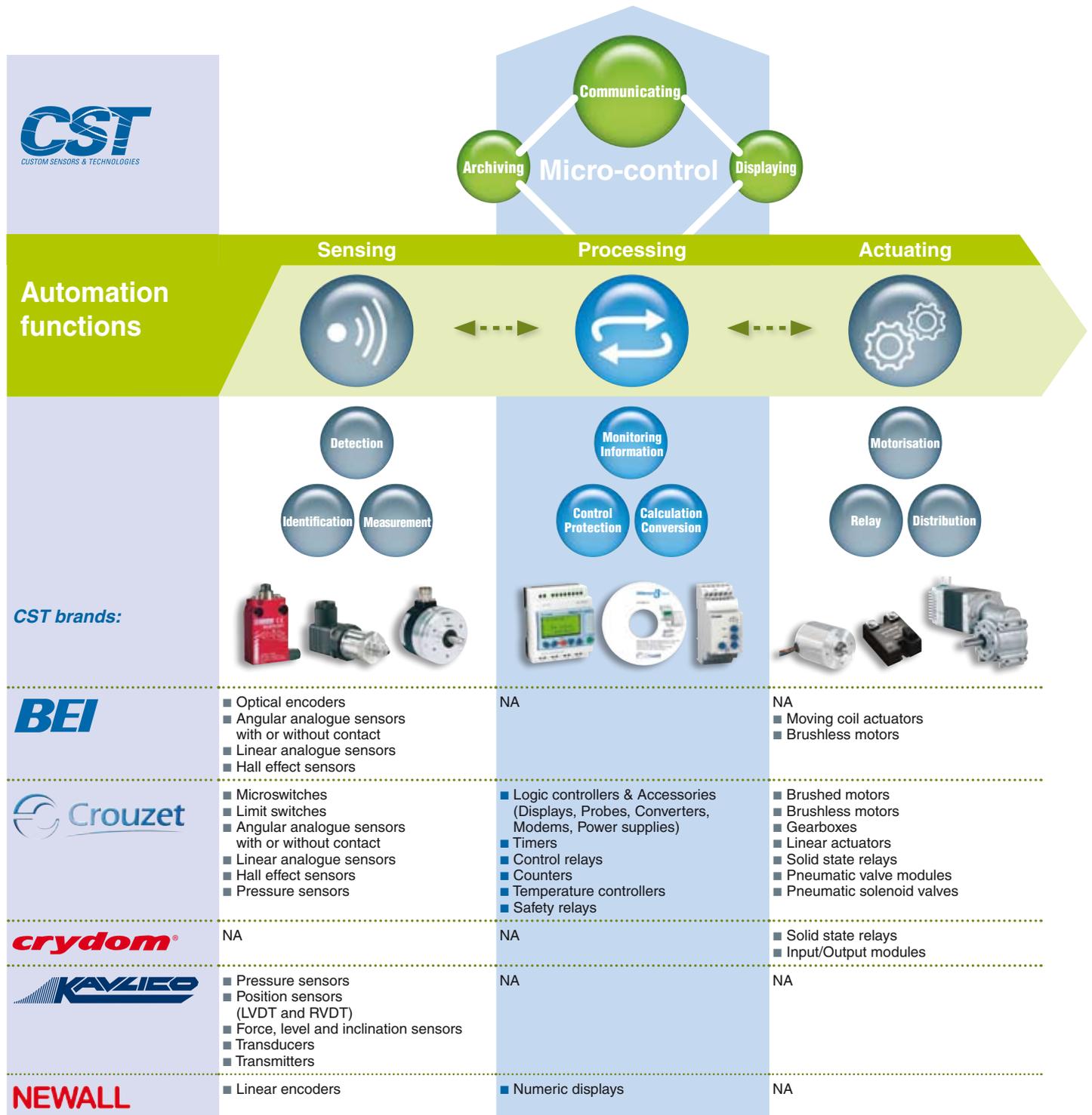
Eco-design is central to the company's "Offer Creation Process", the aim of which is to design products and services that correspond as closely as possible to customer requirements and reduce their environmental impact throughout their life cycle.

All Crouzet products are fully compliant with the RoHS directive.



# Automation functions

► CST solutions at the heart of your automation systems



► **Specialist automation for all your applications**

► **Applications**

■ Taking a **specialist approach** to offer complete solutions, Crouzet harnesses **electronic** and **electromechanical technologies** to meet all your requirements for time management and management of physical and electrical values.

■ These automation solutions are used in all types of **commercial installation** and on every **industrial machine**. For example, they can control agricultural and water treatment equipment and manage renewable energy installations.



■ **Timers**



■ **Control relays**



■ **Counters**



■ **Logic controllers**



■ **Temperature controllers**



■ **Safety relays**

## Timers

■ Crouzet offers a range of electromechanical or electronic (digital or analogue) timers. These products are available in **modular or industrial formats** for integration into all types of industrial or domestic cabinets. They are also available in a **"panel-mounted" version** for direct access to information.

■ These mono- and multi-function products (delay on energisation, time delay on opening, off-delay, flip-flop, cyclic timing, etc.) cover different applications: delayed fan start-up, lighting management, control of electric door catch, etc.

## Control relays

■ Control relays inform the user of abnormal operating conditions and make it possible to anticipate major faults to prevent production stoppages and increase your productivity.

■ C-Lynx control relays are designed to **monitor electrical values** (voltage, intensity, phase, frequency), or **physical values** (level, temperature, speed, etc.).

■ To meet the specific needs of your applications, Crouzet has developed **dedicated "application-specific" control relays**: Pump control, Temperature control in lift machine rooms (according to standard EN81), Defrost relays for air conditioning and industrial refrigeration, etc.

## Counters

■ Counters measure and supply the data required for **management of maintenance operations**. In combination with different detectors, a counter can stop a machine, trigger an alarm or control all types of actuator.

■ They meet your requirements for:

- counting of parts, batches, events, etc.
- measuring time, speed, flow, cut length, etc.
- control (production management, operating time), etc.

These counters carry out the following functions: batch counter, down counter, tachometer, chronometer, totaliser, elapsed time counter, impulse counters.





# The Micro-control offer

## ► Strong points

- Unlike dedicated printed circuit boards, Crouzet micro-control products provide greater flexibility to **enable your processes to evolve** (customisation of the electronics and/or software).
- These compact, easy-to-use micro-control products **still comply with international standards** (UL, CSA, EC) and are suitable for all types of power supply.

## Logic controllers

- The Millennium 3 logic controller can be used to automate devices requiring **10 to 50 inputs/outputs**. An appropriate solution for all **control and regulation applications**, the new Millennium 3 is suitable for highly complex projects containing **up to 700 function blocks**.
  - The Millennium 3 "**Standard**" range is available in the following versions:
    - "**Compact**" for simple automation,
    - "**Expandable**" for higher performance (larger number of digital or analogue I/O) or for access to networks (Ethernet or Modbus).
  - With **modem communication** (GSM or STN), it is also possible to monitor and control your equipment remotely to reduce your maintenance costs.
  - In addition to its Millennium 3 "Standard" range, Crouzet offers a dedicated range of logic controllers, the **Millennium 3 "Custom" range** to meet the needs of **specific applications** (geothermal systems, solar panels, water treatment, etc.) or harsh **environments**.

## Temperature controllers

- If your control application requires precision, optimisation of temperature rises or anticipation of changes, Crouzet offers a range of temperature controllers.
- These panel-mounted products can manage **all types of heating systems** (injection moulds, industrial furnaces, etc.). Temperature is measured by resistance temperature detectors (Pt100) or thermocouple probes (J, K).

## Safety relays

- The Crouzet range of safety components provides an appropriate response to **risk analyses in machinery control systems**.
- Based on redundancy, self-checking and positive break operation, these components ensure that machines are available and safe with minimum installation costs.
- This range is suitable for **general safety applications** (supervision of emergency stop systems, moving guards, conveyors and pressure-sensitive strips, control panel management) and for **specific applications** (zero speed detection, releveling control for lifts, etc.).



► **4 customisation levels**

► The **Customer Adaptation Technical Service (STAC)**, a dedicated team with expertise to meet every specific automation requirement.

■ **STAC expertise**

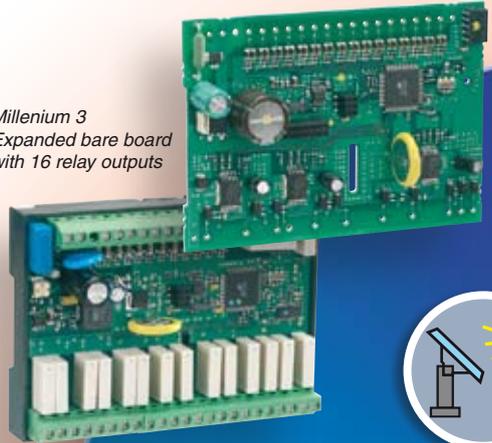
- Application-based marketing
- Electronics & software design
- Prototyping
- Mechanical and connector technology
- Production of adapted products
- EMC\* tests & approvals
- Sales & logistics follow-up

**Specific products**

■ All our design and industrialisation expertise in control and automation systems at your service, to define and create specific products dedicated to your application.

*Millenium 3  
Bare board without connector  
for integration into a motherboard*

*Millenium 3  
Expanded bare board  
with 16 relay outputs*



**T4  
Specific products**

**Adapted products**

■ Defined jointly with our technical sales teams, these adapted products have all the performance and functionality you need for your application.

*Sealed S series  
timers for  
compressors or  
heat pumps*



**Adapted products  
T3**



■ Adaptation of printed circuit boards



■ Software adaptations

*Millenium 3  
Resin boards  
for harsh environments*



\*EMC: electromagnetic compatibility

# Adaptation wheel

▷ **Crouzet**, standard or adapted components perfectly integrated into your equipment.

## Standard components

■ A complete range of standard stocked control products available to create your automation applications.



■ Firmware adaptations



**T1**  
Standard components

**Components with added value**  
**T2**

## Components with added value

■ Standard products with accessories (connectors, cables, lead outputs, etc.) installed in the factory or supplied as specific kits to assist integration into your equipment, simplify your logistics and maximize the reliability of your installations.



■ Prototype tests



■ Enhanced EMC tests



■ Approval test reports



Millenium 3



C-Lynx control relays



Timer TMR48



Millenium 3 kit, application-specific adaptation with integral temperature transmitter

## Fluid management

Functions	Product	Extensions	Accessories	
 <b>Level control (digital or analogue)</b>	 <b>Control relays</b> <b>E, F, L and C-Lynx range</b>			
	Digital float type volt-free contact	NA	Not supplied	
	Conductivity probes	NA	Electrodes	
	 <b>Logic controller</b> <b>Millenium 3 range</b>			
	Digital float type volt-free contact	NA	Not supplied	
	Pressure measurement	NA	Pressure sensor	
	 <b>Temperature monitoring</b>	 <b>Control relays</b> <b>NFR defrost relay</b>	NA	Probe supplied
		<b>C-Lynx range</b> Motor: internal motor winding temperature by PTC probe	NA	NA
		Lift machine rooms (according to EN81-2)	NA	NA
		 <b>Temperature controller</b> <b>Digital output heating and/or cooling controller</b>		
Pt100 probe		NA	Pt100 probe	
Thermocouple probe		NA	Thermocouple J, K	
 <b>Logic controller</b> <b>Millenium 3 range</b>				
Pt100 probe		Pt100 extension	Pt100 probe	
Thermocouple probe		Analogue extension (or direct connection on Millenium)	Thermocouple probe J, K + temperature converter	
By ambient or outdoor temperature transmitter		Analogue extension (or direct connection on Millenium)	Temperature transmitter 0-10 V output	
NTC probe	NA	Dedicated NTC probe		
 <b>Neutrality (pH) monitoring</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> pH probe		 pH probe	
 <b>Monitoring of liquid disinfection (ORP)</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> ORP probe		 ORP probe	
 <b>Monitoring the conductivity of a liquid</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> 4-20 mA input		Analogue extension and/or application-specific analogue extension (direct connection on 4-20 mA input) Not supplied	
 <b>Pressure measurement</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> Pressure sensor		 Pressure sensor	
 <b>Flow rate measurement</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> Pressure sensor		 Pressure sensor	

# Micro-control functions

## Strong points

- Low-cost, dedicated solution
- Compatible with all liquids
- Ideal for "small" process (flow or volume calculation)
- Ideal for "small" process (flow or volume calculation) - Level function block
- Dedicated "application" solution
- Up to 6 probes in series
- Prevents temperature rises in the motor, broken windings or short-circuits between wires
- Version available with built-in phase control
- Version available with built-in phase control - Application-specific and standard products
- Accurate measurement by Pt100 input
- Precision - Integral algorithms - PID with auto-tune and adaptive tune - Alarms
- Long wires - Large temperature range
- Very large temperature range - High temperatures available
- Low-cost solution
- Alarms - Ideal for "small" process - Digital and/or analogue control
- Dynamic control management - Control function blocks (analogue PID, PID PWM)
- Long wires - Large temperature range
- Very large temperature range
- Low-cost solution
- Tailor-made solution for building management systems
- Very long wires
- Low-cost solution - NTC function block
- Complete water treatment solution: chemical filtration, physical filtration (filter)
- Option of temperature-controlled measurement
- Direct probe connection
- Ideal for "small" process
- Complete water treatment solution: chemical filtration, physical filtration (filter)
- Option of temperature-controlled measurement
- Direct probe connection
- Ideal for "small" process - Calibration function
- Compatible with pH/ORP/Temperature monitoring
- Ideal for "small" process
- Calibration function
- Ideal for "small" process (flow or volume calculation)
- Preconfigured pressure sensors
- Analogue Pressure Gain and Conversion function blocks with 5 thresholds
- Ideal for "small" process (flow or volume calculation)
- Pre-configured pressure sensors - Flow function block

## Examples of applications

- Level management for tanks, reservoirs or containers
- Level management for tanks, reservoirs or containers
- Proportional pump control
- Level control in tanks
- Density monitoring in treatment tanks
- Controls ice formation
- All motors with integral probes
- Monitoring of motor overheating: compressors, refrigerated units, grinders, etc.
- Electric lift machine rooms
- Maintain temperature in an incubator, etc.
- Maintain temperature in pottery kilns, baker's ovens, etc.
- Maintain and adjust oven temperature
- Maintain and adjust temperature in pottery kilns, baker's ovens, etc.
- Heating management in commercial buildings
- Heat pump control
- Water quality control for swimming pools, ponds and fountains
- Waste water treatment
- Water quality control for swimming pools, ponds and fountains
- Reverse osmosis unit
- Vacuum control on packing and packaging machinery
- Pressure control on air compressors
- Differential pressure display
- Calculation of the volume consumed by a watering system
- Measurement of flow in a pipe



## Electrical measurements

Functions	Product	Strong points
 <b>Phase control (3-phase)</b>	 <b>Control relays</b> <b>E, F, L and C-Lynx range</b> Phase failure, phase sequence, asymmetry	<ul style="list-style-type: none"> <li>- Changeover outputs to manage 2 relay positions</li> <li>- Protection for all types of motor</li> </ul>
 <b>Voltage control</b>	 <b>Control relays</b> <b>E, F, L and C-Lynx range</b> Overvoltage/Undervoltage	<ul style="list-style-type: none"> <li>- Configurable thresholds</li> <li>- Changeover outputs to manage 2 relay positions</li> </ul>
 <b>A</b> <b>Current control</b>	 <b>Control relays</b> <b>E, F, L and C-Lynx range</b> Undercurrent/Overcurrent	<ul style="list-style-type: none"> <li>- C-Lynx version with integral current transformer (2 A → 20 A)</li> <li>- Configurable thresholds</li> <li>- Precise current measurement</li> <li>- External current transformer (10 A → 100 A)</li> </ul>
 <b>Hz</b> <b>Frequency control</b>	 <b>Control relays</b> <b>C-Lynx range</b> Underfrequency/Overfrequency	<ul style="list-style-type: none"> <li>- Prevents overconsumption of current and temperature rises</li> <li>- Fixed thresholds</li> </ul>

## Time management

Functions	Product	Strong points
 <b>Event management (Delaying or prolonging actions for a predefined time)</b>	 <b>Logic controller</b> <b>Millenium 3 range</b> By volt-free contact or analogue inputs	<ul style="list-style-type: none"> <li>- Integration into a Process</li> <li>- Management of a large number of events</li> <li>- Larger time range</li> <li>- Alarms</li> </ul>
 <b>Operating time</b>	 <b>Timer</b> <b>DIN rail mounted (Chronos, S series) or panel mounted (TMR48, Timer 81x)</b> Volt-free contact	<ul style="list-style-type: none"> <li>- Easy to install and use (direct access to settings)</li> </ul>
	 <b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact or analogue inputs	<ul style="list-style-type: none"> <li>- Integration into a Process</li> <li>- Management of a large number of events</li> <li>- Larger time range - Backup on power failure</li> </ul>
	 <b>Timers</b> <b>Range (Chronos, S series) or panel-mounted (TMR48, Timer 81x)</b> By volt-free contact	<ul style="list-style-type: none"> <li>- Easy to install and use (direct access to settings)</li> </ul>
 <b>RPM</b> <b>Speed/tachometer systems (km/h, m/s, rpm)</b>	 <b>Counter</b> <b>Hour counter range (CH48G/CP2)</b> Volt-free contact	<ul style="list-style-type: none"> <li>- Easy to install and use (direct access to settings)</li> <li>- Low-cost, dedicated solution</li> </ul>
	 <b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact/PNP input	<ul style="list-style-type: none"> <li>- Integration into a Process</li> <li>- Backup on power failure</li> </ul>
	 <b>Counter</b> <b>Electronic counter range CP2/CPT4</b> Volt-free contact/PNP/NPN	<ul style="list-style-type: none"> <li>- Readability (value display)</li> <li>- Easy to install and use (direct access to settings)</li> </ul>
 <b>Clock (format-date-time)</b>	 <b>Control relays</b> <b>C-Lynx range</b> Volt-free contact/PNP/NPN/Namur/0-30 V	<ul style="list-style-type: none"> <li>- Easy to install and use</li> <li>- Low-cost solution</li> </ul>
	 <b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact	<ul style="list-style-type: none"> <li>- Integration into a Process - Management of a large number of events</li> <li>- Larger time range</li> </ul>

# Micro-control functions

## Examples of applications

- Prevent overheating and destruction of insulation in 3-phase motors
- Monitor phase loss and failure on hoists, etc.

- Control of supply voltage in backup units
- Undervoltage alarm in assembly line robots, etc.

- Breakdown detection by measuring undercurrent in advertising hoardings
- Detection of clogged filters by overcurrent monitoring, etc.

- Frequency control in generating sets and backup units

## Examples of applications

- Managing the anti-short cycle on refrigeration unit
- Lighting management
- Management of filling/emptying thresholds for tanks, containers, bottles
- Management of compressors in pumping stations, etc.

- Flashing illuminated displays
- Delayed fan start-up
- Timed management of dosing in automatic drink vending machines

- Wear management
- Maintenance period management
- Management of industrial washing machine programmers

- Operating time management
- Maintenance period management

- Wear management
- Maintenance period management
- Operating time monitoring

- Speed control on shrink wrapping machine
- Rotational speed control by analogue output

- Speed control on shrink wrapping machine
- Control of conveyor movement speed

- Blockage control
- Monitoring of conveyor motor rotation

- Trajectory tracking for solar panels
- Control of switch-on/switch-off of public lighting

- Timer function blocks (totaliser, delay on/off, flashing)
- Pump switching function blocks
- Backup on power failure

- Low-cost, dedicated solution
- Plug-in (8 or 11 pins)

- Timer function blocks (totaliser, delay on/off, flashing)
- Pump switching function blocks
- Counting function blocks (elapsed time counter, time programmer)

- Low-cost, dedicated solution
- Plug-in (8 or 11 pins)

- Backup on power failure
- Readability (value display)

- Tachometer function block

- High counting frequency
- Backup on power failure

- Threshold management

- Backup on power failure
- Clock function block (time programming, sunrise/sunset)



## Quantity management

Functions	Product	Strong points
1.2.3... Quantity counting (batches, units, impulses, etc.)	<b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact or analogue inputs	- Integration into a Process - Greater precision - Management of a large number of events
	<b>Counter</b> <b>Electronic (CP2/CPT4) and electromechanical counter range</b> Volt-free contact	- Low-cost, dedicated solution - Counting speed
m Metric counting	<b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact	- Integration into a Process - Counting function blocks
	<b>Counter</b> <b>Electronic (CP2/CPT4) and electromechanical counter range</b> Volt-free contact	- Greater precision - Low-cost, dedicated solution
<b>Position control</b>	<b>Logic controller</b> <b>Millenium 3 range</b> Volt-free contact	- Integration into a Process - Several setpoint memories
	<b>Counter</b> <b>Electronic (CP2/CPT4) and electromechanical counter range</b> Volt-free contact	- Low-cost, dedicated solution - Counting speed

## Data communication

Functions	Product	Extensions	Strong points
<b>Remote management on the same site</b>	<b>Temperature controllers</b> <b>MIC48</b> Modbus networks		- Option of changing the regulation setpoint
	<b>Logic controller</b> <b>Millenium 3 range</b> Modbus networks (RJ45) Ethernet network (RJ45)	Extension of Modbus communication Extension of Ethernet communication	- Integration into a Process - Integration into a Process
<b>Remote management</b>	<b>Logic controller</b> <b>Millenium 3 range</b> GSM/STN modem	M3MOD communication interface	- Optimised system for setpoint adjustment and alarm management
www. <b>Supervision</b>	<b>Web server</b> <b>Millenium Web Server</b> Modbus networks	Millenium 3 + Modbus communication extension or any other Modbus slave	- Modbus data exchange (fully automated) - Standalone system without ownership licence - Monitoring/control via any web browser
	<b>Archive management</b>	<b>Web server</b> <b>Millenium Web Server</b> Modbus networks	Millenium 3 + Modbus communication extension or any other Modbus slave
<b>Data display</b>	<b>Logic controller</b> <b>Millenium 3 range</b> Direct link to Millenium 3 Modbus link (RJ45)	Remote LCD display/keyboard Remote LCD display	- Dedicated access to Millenium 3 - Access to any Modbus PLC

## Safety management

Functions	Product	Strong points	Examples of applications
<b>Two-hand control</b> <b>Zero speed monitoring</b> <b>Relevelling zone control for lifts</b>	<b>Safety relays</b> <b>KZH range</b> <b>KSW range</b> <b>KZHN range</b>	- Prevention of mechanical risks - Machine safety - Safety level 4: safety function guaranteed at all times	- Control of two-hand control console - Zero speed detection on industrial conveyors - Relevelling of hydraulic lift cars

# Micro-control functions

- Backup on power failure - Flow and pressure gain function blocks
- Counter function blocks (impulse counter)

- Panel mounting and user-friendly display

- Other counting functions available
- Counting speed

- Up/down counting function blocks

- Other counting functions available

## Examples of applications

- Packaging by unit, batch or series of batches
- Calculation of volume of liquid in a tank, etc.

- Packaging by unit, batch or series of batches

- Calculation of cut length on wood and paper machines, etc.

- Calculation of cut length on wood and paper machines, etc.

- Calculation of distance of travel for door closing
- Positioning of solar panels on 2 axes

- Calculation of distance of travel for door closing, etc.

- Tracking changes in actual temperature

- Less wiring
- Higher flow rates available - Less wiring

- Alarm management software (M3 ALARM)
- Easy to use
- Preconfigured GSM/STN modems

- No knowledge of IT languages necessary (Etice Soft software)
- Remote control of actuator and sensor status managed by the logic controller

- Monitoring/control via any web browser
- No knowledge of programming languages necessary (Etice Soft software)
- Create an event history as you go

- No programming
- Display quality

## Examples of applications

- Temperature monitoring via a Modbus master
- Remote monitoring/control

- Data transmission/exchange between machines, etc.

- Remote fill level management for compactors/containers
- Management of waste collection runs
- Default information (alarms)

- Information reporting and remote monitoring/control for locks, buildings, car parks, etc.

- Data archiving as you go (temperatures, etc.)
- Maintaining the refrigeration chain, etc.

- Any application requiring remote display (distance from the measuring point or making parameters accessible to users)

## Functions

Emergency stop and/or mobile guards

Stop control by time delay

## Product

 Safety relays

**KNA/KZP range**

**KSW range**

## Strong points

- Prevention of mechanical risks
- Machine safety
- Safety level 4: safety function guaranteed at all times

## Examples of applications

- Monitoring of moving guards
- Conveyors and pressure-sensitive strips
- Inertia management in moving parts



► **Crouzet - your partner for all your applications**

Solar dual axis tracking    Solar altitude    Angular encoders    Solar dual axis tracking  
 Solar altitude    Solar collector    Solar azimuth    Longitude/Latitude    Longitude/Latitude  
**Solar altitude**    Longitude/Latitude    Solar dual axis tracking    Solar altitude    Solar collector    Solar dual axis tracking  
 Solar azimuth    Longitude/Latitude    Solar azimuth

**Renewable energies**

Better photovoltaic cell performance requires optimisation of solar panel position relative to the path of the sun.



► **Mobile photovoltaic solar panels**

**Your requirements**

- Install single or dual axis tracking on each of your solar panels to allow horizontal (azimuth) and vertical (solar altitude) movement of the panel from sunrise to sunset.
- Centralise or coordinate information from or to each panel (performance, synchronisation, safety limit, etc.) at a principal station.

**The Crouzet solution**

- **Millenium 3 logic controller** with a dedicated software function block for mobile solar panels in order to track the sun's position all year round. After recording the latitude and longitude of the installation, the **Millenium 3 logic controller** analyses and controls panel position in relation to the sun (altitude and azimuth). Crouzet offers an application-specific function which works on a single axis when there is only one motor (azimuth) and two axes when there are two motors (altitude and azimuth).
- **Extension to Modbus or Ethernet network** to enable communication between panels.
- Crouzet also has a dedicated technical team to help you to carry out your project.

**Advantages**

- Whatever type of actuator is being controlled (hydraulic cylinder or electric motor), the **Millenium 3 "solar panel" solution** is easy to use (drag/drop in the programming software), low-cost and dedicated to the constraints of your application. Your expertise is protected by a password and/or a customised access key.

**Your further requirements**

- Option of adding:
  - **24 V DC power supplies,**
  - **angular position sensors** mounted on the framework of the structure,
  - **sealed limit switches,**
  - **brushless motors,**
  - a **web server** to supervise the installation and manage several **Millenium 3 logic controllers** in a network for small solar power plants.

► *In addition to optimisation of energy production, Crouzet offers solutions for management of heating sanitation using solar thermal technology: control of exchange circuits, etc.*

Filtration Water temperature Swimming pools UV treatment Redox Ultrafiltration pH Ponds  
 Reverse osmosis Redox Ultrafiltration UV treatment Ultrafiltration Swimming pools Fountains  
 ORP UV treatment Fountains Ponds Filtration Water temperature ORP Reverse osmosis

## Water treatment

Water quality is affected by pollution and chemical treatment so it must be treated in order to make it fit for consumption and to protect our environment.

Reverse osmosis is a method of purifying water by filtration using a very fine membrane which only allows water molecules to pass through. This system is frequently used in medical and food environments to obtain water which is over 99% pure.



## ► Purification

### Your requirements

- Purification of polluted water (dissolved salts, sludge, bacteria, viruses, etc.) using a reverse osmosis system. The filtration process is complex: it requires monitoring of temperature, pressure and conductivity upstream/downstream of the treated water in order to guarantee optimum filtration.
- Automatic management of the reverse osmosis unit requires:
  - calendar-based, automatic and manual operating mode,
  - management of alarms, etc.
- Preventive management of filter maintenance in your installation.

### The Crouzet solution

- **Millenium 3 logic controller** to manage the circulation pumps, monitor levels, pressure and temperature of treated water (up to  $-40^{\circ}\text{C}$ ) and monitor outlet water conductivity via an analogue conductivity probe.
- **pH analogue extension** to eliminate dissolved carbon from polluted water.

### Advantages

- The same PLC controls physical filtration and chemical treatment.
- Simple, straightforward programming.
- Other automation requirements controlled by additional functions of the **Millenium 3 logic controller**.

### Your further requirements

- Option of SMS alarm via a **Millenium 3 Modem**.
- pH monitoring during treatment with caustic soda which is carried out in order to remove from the water the  $\text{CO}_2$  that might damage the membrane.
- To adapt to these humid environments, the electrical panel requires a separate interface: **backlit remote /display keypad**.
- Tank level monitoring with **C-Lynx control relays**.
- Measure the micro-filtration flow rate with the pre-calibrated range of **dedicated Millenium 3 Pressure sensors**.

### ► For your swimming pools, ponds and fountains

Control the disinfection level (Redox/ORP) and pH neutrality of the water in ponds, swimming pools and fountains with a true industrial standard: **Millenium 3**.



Cranes Lifting Voltage range Lifting Start-up time Overload Overload Cranes Lifting  
 Crane booms Voltage range Crane booms Overload Start-up time Sensors Crane booms Sensors  
 Overload Sensors Overload Start-up time Voltage range Cranes Voltage range

## Lifting

Parameter management of crane automation systems and control of mobile cranes.



### ▷ Cranes

#### Your requirements

- Protect the position drive motors and the trolley motors.
- Ensure the safety of machines and operators.
- Eliminate the variations in input voltage which are very common on construction sites where the electricity supply comes from a temporary station or an emergency supply (generating set).

#### The Crouzet solution

- **C-Lynx phase control relays** to monitor phase sequence, failure and imbalance.
- **C-Lynx voltage control relays** to monitor undervoltage and overvoltage.
- **C-Lynx current control relays** to monitor overcurrent in case of motor overload.
- **C-Lynx phase and temperature control relays** to monitor the phase and internal temperature of the motor.

#### Advantages

- Energisation of the crane under all power supply conditions.
- Optimum operation of 3-phase motors and preventive maintenance.

#### Your further requirements

- Control of solenoid valves and manoeuvring of truck-mounted cranes with a "resin board" **Millenium 3 logic controller**.

### ▷ On-board system

The "resin board" **Millenium 3 Custom version** enables control of your equipment in harsh environments. It is particularly suitable for all "on-board" applications where the mechanical and environmental constraints are the dominating factor: shocks, vibrations, knocks, moisture, moulds and noxious environments.

Walkways EN81 Conveyor belts Walkways Elevators Conveyor belts Walkways Lifts Walkways  
 Lifts Escalators Machine rooms Hoists Lifts Lift cages Conveyor belts Hoists  
 Lift cages Conveyor belts Machine rooms Escalators Machine rooms Conveyor belts EN81

## Electric lifts/escalators

Correct operation of electric lifts requires optimum control of the 3-phase motor. The new standard EN81 also requires electric lift manufacturers to monitor the temperature of machine rooms.



## ▷ Electric lifts/Escalators

### Your requirements

- Protect the lift's electrical system against power failures (3-phase network control) which may affect the direction of rotation/movement of the equipment and prevent correct operation. For example, if there is an electrical fault (phase failure, etc.), your lift motor may be strained, overheat and suffer damage.
- Maintain an ambient temperature of between + 5°C and + 40°C in these areas: paragraph 0.3.15 of standard EN81-2 imposes this constraint in order to ensure the correct operation of machine room equipment for lifts.
- Greasing of mechanical parts (gears, chains, joints and guides) in escalators and moving walkways.

### The Crouzet solution

- **C-Lynx phase control relays** to monitor phase sequence, failure and imbalance.
- **C-Lynx thermocontrol relays for lifts** to comply with standard EN81-2 by monitoring the temperature of the machinery (or the pulley room), measured using a simple Pt100 probe (2 or 3 wires). To comply with any changes to the regulations, the 5°C and 40°C thresholds can be adjusted separately.
- **C-Lynx phase and temperature control relays** to monitor the phase and monitor the internal temperature of the motor using a PTC probe (1 to 6 probes in series).
- **C-Lynx level control relays** to monitor lubrication of mechanical parts: optimum lubrication level.

### Advantages

- Optimum functioning of the equipment.
- Prevents destruction of the motor.

### Your further requirements

- Hydraulic lifts are most likely to be low-rise lifts of the type used in shopping centres. They use a hydraulic system (motor + pump) which produces pressurised oil which activates the cylinder. If they are stationary for a long time or if there is a weight difference between loading/unloading, these lifts require adjustment of the level to be reached in order to prevent the step effect (car level different from landing level). For this application, Crouzet suggests a "**relevelling**" safety relay which ensures that the landing and the car are at the same level.



Refrigerant fluid    Reversible systems    External temperature    Heating return temperature    Heat pumps  
 Exchangers    POT    Ambient temperature    Evaporators    Exchangers    Evaporators    Membrane compressors  
 Ambient temperature    Membrane compressors    Reversible systems    Ambient temperature    External temperature    POT  
 Evaporators    Geothermal systems    Heating return temperature    Refrigerant fluid    Exchangers    Exchangers

## HVAC

Heating management via heat pumps makes the best use of natural energy (air, water, earth) to heat or cool a heating circuit or hot water system.

This type of system may be chosen for financial reasons (energy costs) or on environmental grounds.



### ▷ Heat pumps

#### Your requirements

- The principle of a heat pump is that the heat from a warm fluid (external air, water from a heat-exchanging source or coolant) is captured by a refrigerating liquid which is compressed to give it a pressure of 40 bar and a temperature 140°C. This refrigerating liquid then transfers its heat to water (cold source) for a hot water system (underfloor heating) or a hot water tank (water for a hot water system or swimming pool).

Once this thermal exchange has taken place, the fluid which has lost both temperature and pressure has its pressure further reduced by a solenoid valve which drastically reduces its temperature even more. This fluid is then able to receive the heat from the hot source, and the cycle is ready to begin again.

#### ■ Managing the needs of a heat pump:

- heating/cooling (reversible system),
- fluid temperature (refrigerant, hot source, cold source, etc.),
- external/internal temperatures,
- calendar-based, frost protection, automatic and manual operating modes,
- management of alarms, etc.
- regulation (PID, water ratio/temperature curve, etc.).

#### The Crouzet solution

- **Millenium 3 logic controller** with a "water ratio" software function block or an application-specific "PID" function block.

#### ■ Millenium 3 accessories:

- **CTN:** probe providing resistance as a function of temperature which is directly connected to the analogue inputs (0-10 V). A dedicated function block to convert resistance into temperature.
- **Pt100** (distance between probe and Millenium 3 greater than 3 metres): temperature probe with a converter on the analogue inputs or directly linked to extensions XA03, XA04W.
- **Remote display/keypad** to provide access to configuration parameters (day/night setpoints, etc.) for users.
- **S series timers** to control compressor start-up (anti-short cycle).

#### Advantages

- Control of the entire heat pump operating process.

#### Your further requirements

- Motor protection for screw-type compressors by **C-Lynx phase control relays**.
- Where more than one compressor is present, protection and optimisation by pump switching using a dedicated function block.
- Alarms by **GSM modem** for remote heat pump maintenance.

### ▷ Manufacturers of pellet-burning stoves

Discover **Millenium 3** for optimum minute-by-minute control of heat supply, combustion and ash removal!

Switching Exchangers Boilers Coolers Energy optimisation Roof tops Air conditioning  
 Heat optimisation Evaporators Chillers Control Dehumidifiers Dew point  
 Thermostats Humidifiers Compressors Compressors Thermostats Dual energy  
 Evaporators Heat optimisation

## HVAC

To provide a comfortable environment in commercial buildings, it is essential to use reversible conditioning systems (heating and cooling) in which the operating period and duration can be controlled according to heating algorithms and for energy optimisation.



### ▷ Reversible air conditioning

#### Your requirements

- Manage room temperature in residential buildings, halls and offices in the commercial sector, etc.
- Control return temperature in refrigeration or heating circuits (regulation).
- Monitor humidity levels.
- Monitor the operating time, switching and power increase in compressors to optimise their energy consumption and wear.

#### The Crouzet solution

- **Millenium 3 logic controller** with a dedicated software function block to manage and switch between two and four compressors.
- **C-Lynx control relay** to control the phase sequence on energisation and ensure that compressors start up in the right direction.
- **S series timer** (anti-short cycle) to limit the number of starts/hour.

#### Advantages

- Simultaneous control of compressors, fans and pumps.
- An integral panel-mounted **remote display/keyboard** provides an interface to display the failure modes and configure the air conditioning system.
- Lower after-sales service costs with compressor monitoring.
- Optimisation of compressor service life through circular switching, etc.

#### Your further requirements

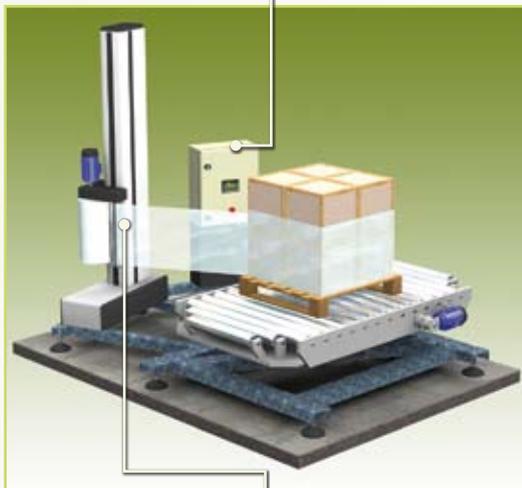
- Option of remote management (temperature, operating mode) and traceability/log (energy calculation) with the **Millenium Webservice solution**.
- Optimise the energy bill for dual energy systems (conventional and renewable energy) by choosing the most suitable fuel for the climatic conditions.
- Option of defrosting the condensation circuit with control of the defrost fan by the **Millenium 3 logic controller** (reduction of refrigerant pressure by multiple short-term pressure reductions) in order to prevent icing of the evaporator.
- **In heating mode with the probe supplied, the NFR defrost relay**, which is dedicated to air conditioning and industrial refrigeration, prevents icing of the evaporator by controlling a defrost fan or heating resistors. In refrigeration mode, the process is reversed and takes place on the exchanger. It is therefore possible to guarantee evaporator and exchanger performance.



Unwinding End of roll High speed counting Zero speed Unwinding Counting Packaging  
 End of roll Packaging High speed counting Packaging End of roll Conveyors  
 Unwinding Zero speed Counting Packaging Conveyors End of roll Counting Packaging

## Small industrial machines

Packaging machines may use paper, inflatable cushions (sachets) and rolls of plastic film. They all have different automation requirements.



### ► Packaging

#### Your requirements

- Checking that paper or plastic film is unwinding correctly (breakage, damage, end of roll) and that the correct length of film is taken up by controlling the appropriate motor.
- Cut the film or paper at the end of a cycle: control cutting by motor or cylinder.
- Ensure that plastic bags (various sizes) are perfectly sealed before filling with air or other gases by controlling the temperature and duration of sealing.
- Achieve ideal operating conditions: unwinding speed, rotational speed, etc.

#### The Crouzet solution

##### ■ Millenium 3 logic controller:

- rapid input to detect zero speed, indicating the end of a roll or broken film.
- to manage operating cycles (winding time, unwinding time, packaging height reached for stretch wrapping machine).
- **Remote display/keypad** to display parameters, faults and alarms on the control panel.
- **Temperature controller** to monitor heating temperature, together with a timer to control the sealing cycle times.

#### Advantages

- Full automation of machine cycles.
- Alarms in case of faults or lack of paper.
- Counting of the number of operations for the purposes of preventive maintenance.

#### Your further requirements

- A wide range of external power supplies for **Millenium 3**, **analogue sensors and actuators**.
- A range of **C-Lynx control relays** to monitor essential motor parameters: (phase loss/failure, asymmetry, imbalance) to optimise the service life of the motor.

## Coffee machines

Commercial baking ovens  
Commercial baking ovens

Commercial baking ovens

Commercial baking ovens

Coffee machines

Coffee machines

## Ice makers

Ice makers

Ice makers

Commercial baking ovens

## Commercial baking ovens

Coffee machines

Ice makers

Coffee machines

### Small machines for food industry

Machines for manufacturing ice flakes (flake ice machines or ice cube makers) for the catering industry (hotels, restaurants, company restaurants) or large areas (fishmongers, butchers, etc.) can produce large volumes of ice on a regular basis.



### Ice makers

#### Your requirements

- Obtain a "hard" ice by monitoring the ice density.
- Determine the type of ice formed (flake thickness).
- Obtain a constant, continuous ice flow.
- Manage the refrigeration parameters of the machine: control of refrigeration chamber temperature.
- Manage the ice formation time.

#### The Crouzet solution

- **Millenium 3 logic controller** with or without display unit to manage the different automation parameters of the machine (ice thickness, refrigeration chamber temperature, etc.). Our range of **remote displays/keypads** means that the control screen can be moved to a more user-friendly part of the machine (drier and visible to the user).
- **Chronos 2 timer** to control the refrigeration time.
- **C-Lynx current control relay** via 2 electrodes to enable the customer to monitor the density of the ice formed.
- Measurement of ice (or edible liquid) temperature using **Pt100, Pt1000** or **CTN probes**.

#### Advantages

- Continuous production.
- Alarm/fault management and display of all types of fault.
- Logic controller **adapted to "tropical bare board" version** to cope with humidity constraints.

#### Your further requirements

- A range of **C-Lynx control relays** to monitor essential motor parameters (phase loss/failure, asymmetry, imbalance) to optimise the service life of the motor.

### ► Coffee machine manufacturers

**Crouzet timers** are used to control coffee grinding, water and coffee dosing and heating time.



Doors Alerts Overtravel detection Air-locks Barriers Overtravel detection  
 Counting people Motorisation Access Movement Person present Doors Person present  
 Barriers Pre-opening Ramps Alerts Air-locks Authorisation Overtravel detection Ramps Access Doors  
 Movement Person present

## Access control

Safety and our constant quest for energy savings for businesses demand optimum access management: internal doors, fire doors, air locks, automatic barriers, sectional flexible doors, car park access ramps, loading ramps, dock levellers, heat-insulated industrial loading chambers, etc.

### ▷ Access control

#### Your requirements

- Detect the presence of personnel or vehicles.
- Control opening and closing of doors after a delay or on presence detection.
- Count the number of operations for the purpose of preventive maintenance.
- Control the different opening modes (automatic/manual/semi-automatic) depending on the company's needs.
- Configure the cycle times depending on door models.
- Control the opening height.

#### The Crouzet solution

- **Millenium 3 logic controller** to:
  - define the different opening modes (time-based, calendar-based, etc.),
  - modify the detection parameters (distance, etc.),
  - control the door opening/closing times and position,
  - count the cycles,
  - fault alerts via alarms,
  - manage several traffic directions (directional/bi-directional control),
  - check that the cells and "descent" contactor are operating correctly via an auxiliary contact in order to authorise lowering of the door.

#### Advantages

- Easy to install in the **Millenium 3 electrical panel** in the "compact", "extendable" or "bare board" versions.
- Checks that the sensors (photo-electric or magnetic cells) are operating correctly before each lift/lower operation.
- Cycle counting enables management of preventive maintenance of the doors.
- Flexibility in use compared with the printed circuit board solution.
- Full autonomy for the user.

#### Your further requirements

- Tram/train/bus doors: the "**Resin board**" version of the **Millenium 3**, which is particularly resistant to harsh environments (vibration, operating temperature, etc.), is used to control opening/closing of doors.



Industrial vehicles   Railways   Trains   Industrial trailers   Trams   Public transport   Trains   Alarms  
 Operating cycles   Grass-cutting equipment   Trams   Industrial vehicles   Fluid pressures  
 Farm machinery   Alarms   Public transport   Buses/coaches   Railways  
 Trams   Technical vehicles   Industrial trailers   Grass-cutting equipment   Buses/coaches   Fluid pressures

## Vehicles

Crouzet automation components are designed to be used in all types of vehicle: industrial, agricultural and technical (high pressure washers, rendering machines, cradles). In these applications the electronics systems must be resistant to vibration, shock, knocks and falls, temperature, humidity and harsh environments. These constraints are due to the environment in which the machine is used.



### ▷ On-board

#### Your requirements

- Make the **Millenium 3 logic controller** resistant to mechanical stress.
- Withstand climatic and environmental constraints: temperature (-30°C to +70°C), humidity and mould.

#### The Crouzet solution

- Protect the electrical components in the **Millenium 3 logic controller** by coating them with an industrial resin. This "resin board" version has the following features:
  - NPN input version suitable for on-board applications,
  - digital and analogue inputs,
  - high power "automobile" type relay outputs from 8 to 20 A,
  - **vibration**: amplitudes of 12 mm up to 10 Hz (low frequency), 5 g from 11 to 500 Hz according to standard IEC 60068-2-6 (vibration standard),
  - **shock**: up to 30 g on each axis for a duration of 11 ms according to the specific standard for the application, e.g. railway or military (GAM EG13),
  - **knocks**: up to 25 g on each axis, duration up to 6 ms,
  - **falls**: from 1 to 3 metres.

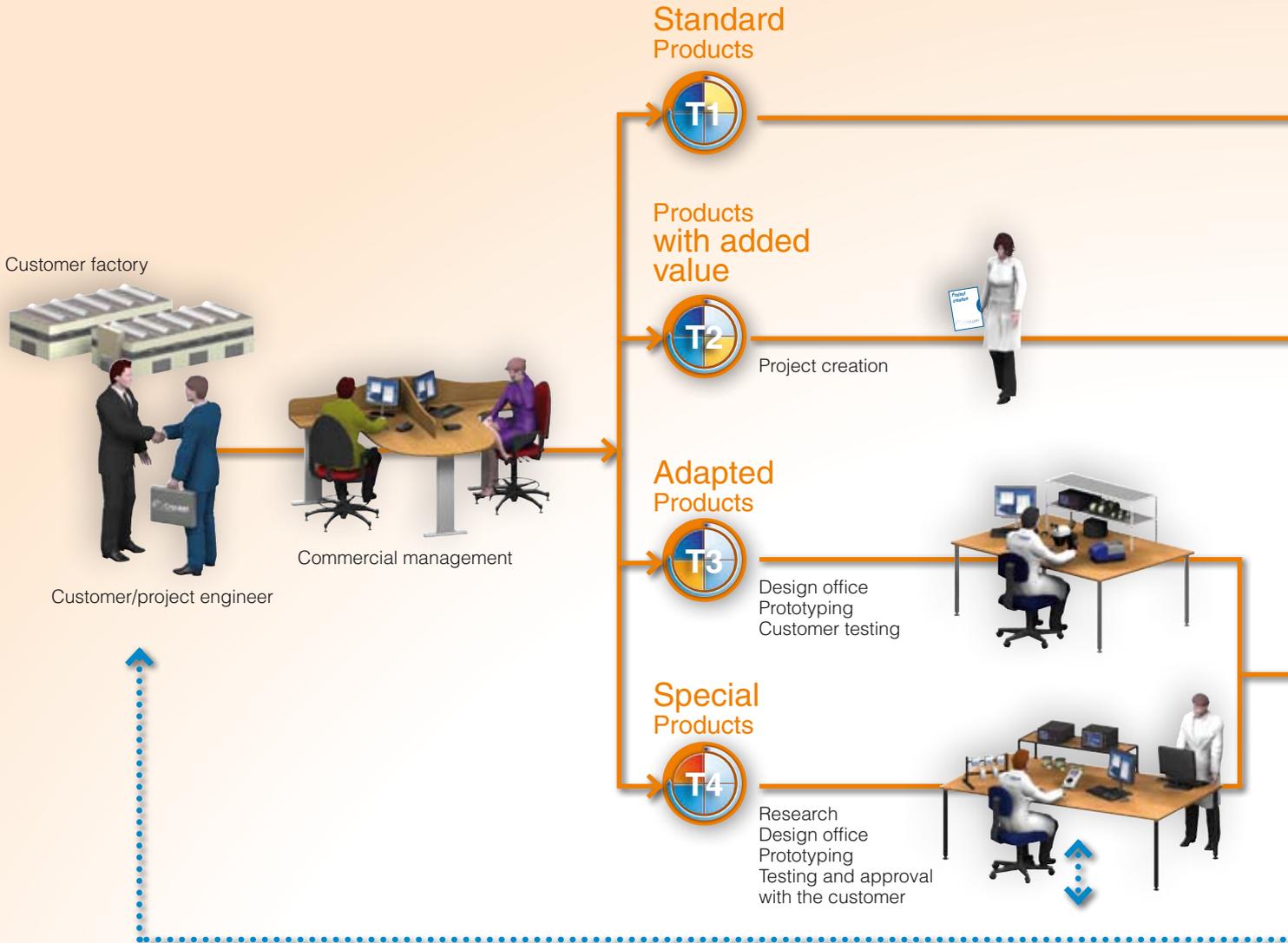
#### Advantages

- Fully resistant to permanent mechanical stress (vibration).
- Fully resistant to sudden mechanical stress (shock).
- Installed directly on the machine structure.
- Simplified connections through the use of wire outputs or plug-in connectors.
- Rapid replacement of parts by means of plug-in connectors (standard replacement).
- Prevent dew point on the electronics (condensation).

#### Your further requirements

- The **Millenium 3 logic controller** can also monitor battery charge in lift trucks and air conditioning in trains and buses by controlling the internal temperature according to exposure (sunny side/shady side) and forward/reverse gear synchronisation in the gearbox.

► **The Crouzet process**



## Sales



### ■ Analysis of customer requirements

The principal aim of our project engineers is to understand how your **application works** and to help to **improve its overall performance**. Our sales staff will propose technical solutions which fully meet the needs of your applications and are appropriate to the environmental constraints of the function required.

## Design

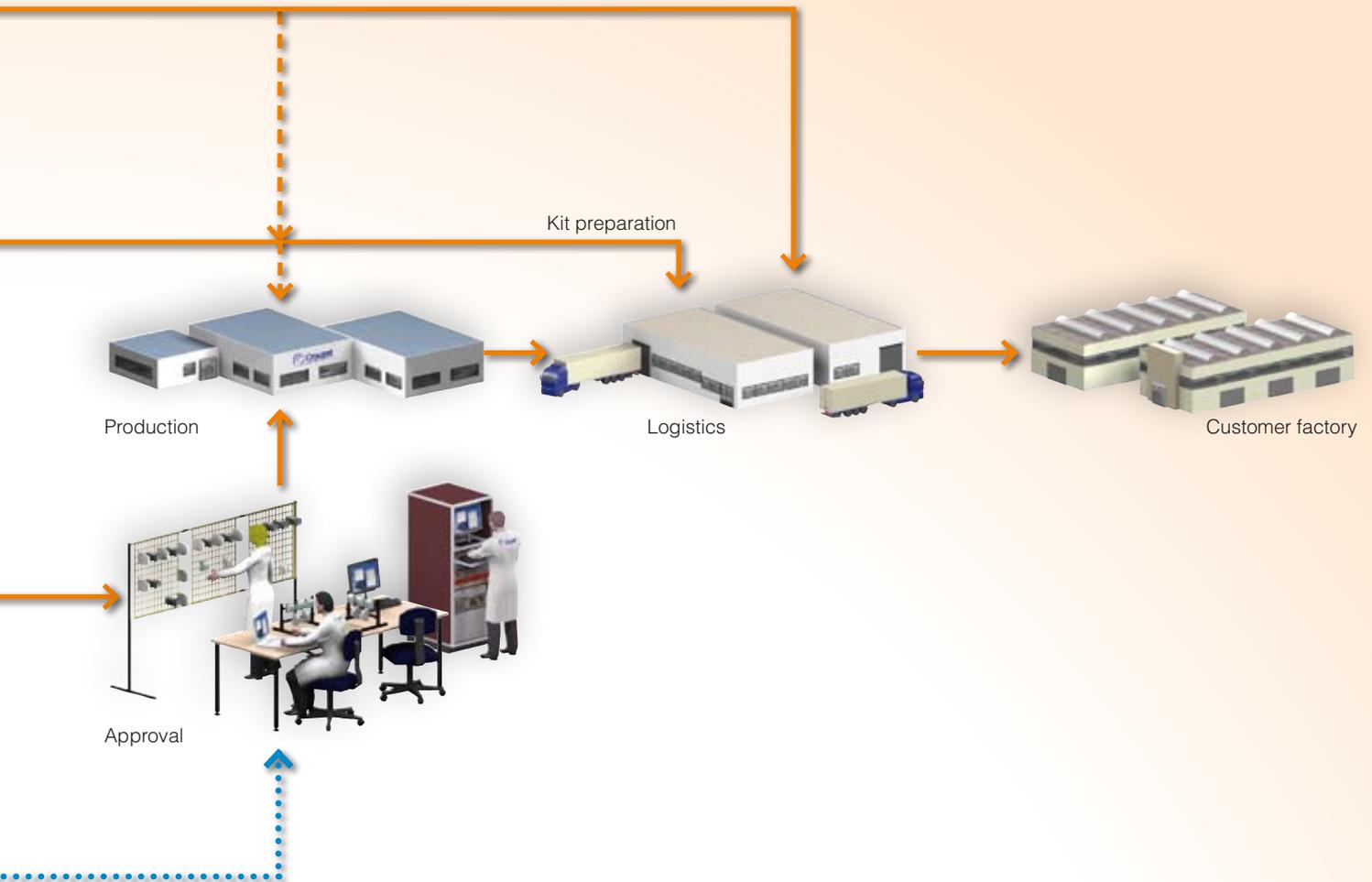


### ■ Design

Crouzet has considerable expertise in all the technologies needed to develop and industrialise a complete range of standard and customised micro-control products: **mechanical, connector technology, electrical engineering, electronics, software and networks**. Crouzet is continually adapting to enable you to stand out and bring **innovation to your customers**.

# Expertise in Micro-control

- ▷ **Crouzet puts in place a Project team** which provides you with experts who will work in partnership with you throughout all the phases of your project: drawing up the specification, feasibility, development, approval, prototyping, optimisation of the logistics parameters, durability of the offer over time, and monitoring of products.



## Technical development



### ■ Production

From standard to specialised products, the **flexibility** of our factories meets all your equipment needs. In order to guarantee product reliability and make quality central to our approach, all Crouzet production units have **ISO 9001** and **ISO 14001 certification**. Crouzet has also incorporated **eco-design** into its processes in order to design products which meet the customer needs by minimising their environmental impact throughout the life cycle.

## Logistics



### ■ Logistics and After-Sales Service

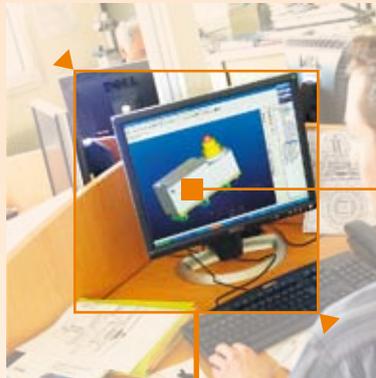
Our logistics team is involved in all new projects from the outset and shares our common objectives: **just-in time processes**, **partnerships** with our suppliers, traceability **systems** (products assigned a number by week of manufacture).

You will receive the same level of after-sales service whether you order a standard or an adapted product.

## ► Technical expertise at your service

### Optimisation of technology selection

We have **multidisciplinary expertise** (engines, sensors, etc.). This means that we can provide the best solution for your needs and optimise technology selection through our expertise in related technologies.



### Advanced prototyping and on-site testing

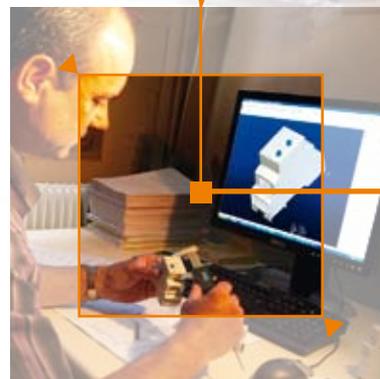
We can install test **products on site** in your applications and adapt the specifications (hardware and software) accordingly.



### Expertise: Electronics/Electrical/Mechanical/Connector technology

We coordinate our technical and technological expertise to create innovative concepts that bring **you real added value** and a quality service at a competitive price.

- **Electronics:** design of printed circuits that comply with EMC
- **Electrical:** design of wiring diagrams, simulation on a virtual oscillator, compliance with standard voltages and adaptation to specific voltages, etc.
- **Mechanical:** ULV0 self-extinguishing thermoformed plastic casing even for the smallest batches, expertise in polymethane resin, etc.
- **Connections:** dedicated connections and fixings to provide you with a complete electrical function that is easy to install in your environment.
- **Customised product marking and labelling:** if you wish to customise your product to assist in after-sales service and maintenance, we are skilled in non-polluting laser marking technologies.





# Expertise in Micro-control



## Standardisation and approval of components

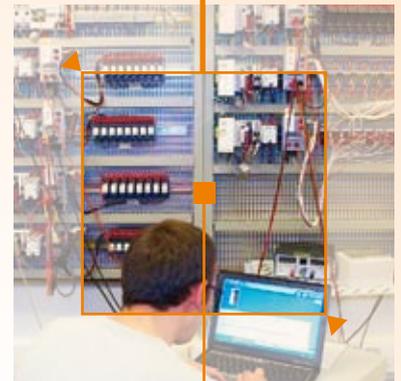
With our in-depth knowledge of the electrical standards and our **experience in many sectors**, we are able to start the **standardisation process for your specific sectors**.

For example, we will take account of the standards relating to certain fields of application (e.g.: medical, agriculture).

## Electrical, mechanical and climatic endurance tests

Our laboratories have facilities for testing all our products from design through to production.

Whether this is done using simulation or in real tests (electrical, mechanical and environmental endurance), our products are **validated, approved and monitored** throughout the project development process: climatic/environment tests; vibration table/climate chambers; humidity/temperature/EMC tests, etc.



## Software engineering

We are expert at **developing programming and configuration software environments** that are suitable in the long term for integration of **new functionalities and application-specific functions** without involving external expertise and without changes to the hardware.

We can exchange functions by e-mail, bringing you flexibility and a faster response time.

We can also update the **internal firmware** in each product and reprogram the processor.



4eme de couverture à intégrer