NSFT Soft Starters,
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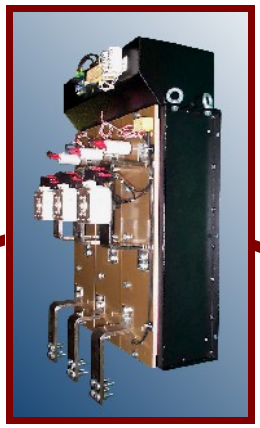

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MOTOR SOFT STARTING TECHNOLOGIES

Overview and General Specifications

BSFT and BSTT Basic
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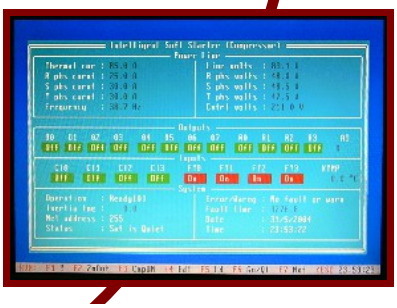

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March 2011

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1. NSFTxx Line of Soft-starters

NSFTxx soft starters accelerate and decelerate AC induction motor loads smoothly, save energy and reduce system wear and tear.

NSFT25 25HP (37 A/phase) soft-starter

They interface with most (if not all) automation equipment in the market and are an effective mechanical interface in many applications.

They are all fully protected, digitally-controlled and programmable units. They are simple to install and are effectively employed in applications driving:

- Transport systems (conveyors, escalators, roller tables etc.) for low inertia loads,
- Pumps and compressors,
- Inelastic transmissions (gear trains, high-ratio belt systems etc.), and
- Fans and ventilators.

NSFTxx Features	
Power circuit	Generous x4 starting current and cooling circuit design provides for 60-555 A (starting, per phase), 10-90 HP/7.5-66 kW (at 3x400 VAC) loads. The employed 1600 VDC power circuit allows use in up to 3x480 VAC systems.
Torque control	User selectable cycle-by-cycle starting current limitation.
Complete, electronic protection	Overcurrent, undercurrent, overvoltage, undervoltage, against noise, faults and disturbances in the supply, phase sequence and integrity, internal temperature.
Control interface	Galvanically isolated, versatile two input user/control interface.
Analog interface	One load current output and one overcurrent limit input.
DIP switch selectable parameters	Operation timer, fault handling, trigger/control type, profile, starting control, protection type, deceleration, starting value and duration options.
Isolated control outputs	Galvanically isolated “Idle”, “Run”, “By-pass”, “Fault” outputs.
Power supply	Small 24 VDC power supply available to power a local sensor or other automation device.
“Bookcase” enclosure	Installation-friendly, space-saving “bookcase”, robust enclosure.
Separate control circuit supply	Enables separate/isolated power circuit functions and prevents any power disruptions from affecting the unit’s control and monitoring functions.

The individual NSFTxx line member specifications and capabilities are presented on page 6 and ordering information is given on page 11.

2. BSFT and BSTT Basic AC Induction Motor Soft starters

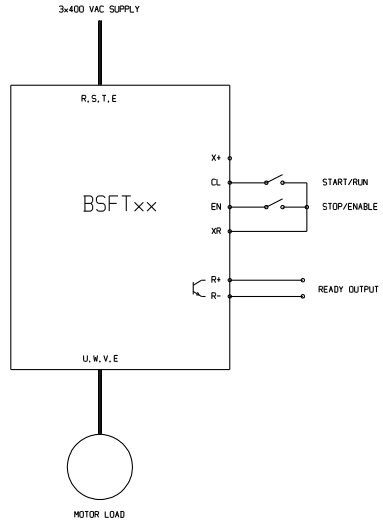
The BSxT soft starters accelerate and decelerate (BSFT only) simple AC induction motor loads smoothly, save energy and reduce system wear and tear.

BSTT 11KW soft starter.

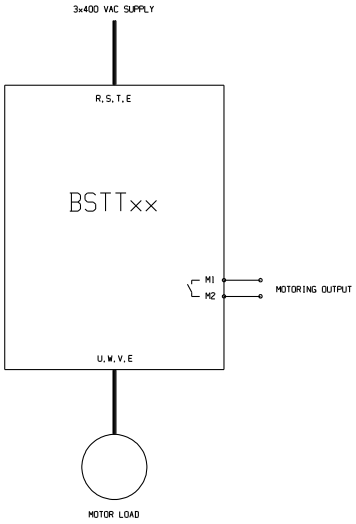
They are all partly protected, digitally-controlled and programmable units. They are simple to install and are effectively employed in low cost applications driving:

- Transport systems (conveyors, escalators, roller tables etc.) for low inertia loads,
- Pumps and compressors,
- Hydraulic lift pumps,
- Inelastic transmissions (gear trains, high-ratio belt systems etc.), and
- Fans and ventilators.

BSxT Features	
Power circuit	Starting current and cooling circuit design provides for 55-75 A (starting, per phase), 13-16 HP/10-12 kW loads. The employed 1200 VDC power circuit allows use in up to 3x430 VAC systems.
Integrated bypass relay	Internal relay bypasses the solid state switches to minimize losses.
Electronic protection	Overvoltage, undervoltage, against noise, faults and disturbances in the supply, phase sequence and integrity, internal temperature.
Control method	BSFT is controlled via two, “Run” and “Enable”, galvanically isolated inputs, BSTT is activated after power-up.
Ramp profiles	Linear torque, boosted torque, linear voltage (BSTT only), sine voltage (BSTT only).
DIP switch selectable parameters	Ramp profile, deceleration (BSFT only), starting value (30-65%), ramp duration (1-4 s) and activation delay.
Isolated control output	Galvanically isolated “Ready” (BSFT) or “Motoring” (BSTT).
Power supply	Small 24 VDC power supply available to power a local sensor or other automation device.
“Bookcase” enclosure	Installation-friendly, space-saving “bookcase”, robust enclosure.
Self-powered from the 3x400 VAC line	Control circuit is powered from the 3x400 VAC line.



Typical BSFTxx connection



Typical BSTTxx connection

Characterizing Features of the BSFT and BSTT Models at 3x400 VAC					
Model	**Motor power, Delta connected, HP/kW**	**Motor power, Inside Delta connected, HP/kW**	**Maximum starting current, A**	**Motoring phase current, A**	**Maximum number of starts/hour**
BSFT10	14/10	24/17	55	19	Unlimited
BSTT11	15/11	26/19	55	22	60
BSFT12	16/12	27/20	75	25	Unlimited

Ordering information is given on page 11.

3. NSFT/ICCD and BAO-1 Panel Controllers

The NSFT/ICCD panel controller gives local and distributed control capabilities to the NSFTxx soft starter.

NSFT/ICCD panel controller

The NSFT/ICCD controller features:

- Standard panel mounting enclosure (DIN 43700) with an IP54 polyester membrane face,
- Two user tactile switches on the front panel,
- Three status indicating LEDs,
- A solid state switch to drive a bypass contactor,
- Comprehensive signal and power connections with the NSFTxx hardware, and
- Quamatic and Modbus network connectivity.

The network capability is offered as an option and turns the controller into a Quamatic or Modbus satellite with the following functions:

NSFT/ICCD Panel Controller Quamatic/Modbus Functions	
Record exchange	Identity, Status, Progress and Configuration
Time-stamping	Record time-stamping
Commands	Go and Quiet (Start/Stop)

The four NSFTxx/ICCDxx hardware bit state outputs (“Idle-Run-Bypass-Fault”) are repeated, galvanically isolated, for further processing by any local automation devices.

The BAO-1 panel controller and logger can control and manage a number of NSFT/ICCD controllers connected in a Quamatic or Modbus multidrop network. In such a case, the BAO-1 manages and controls the distributed resources (soft starters and all other types) in typical applications such as plant ventilation and pump station control and monitoring.

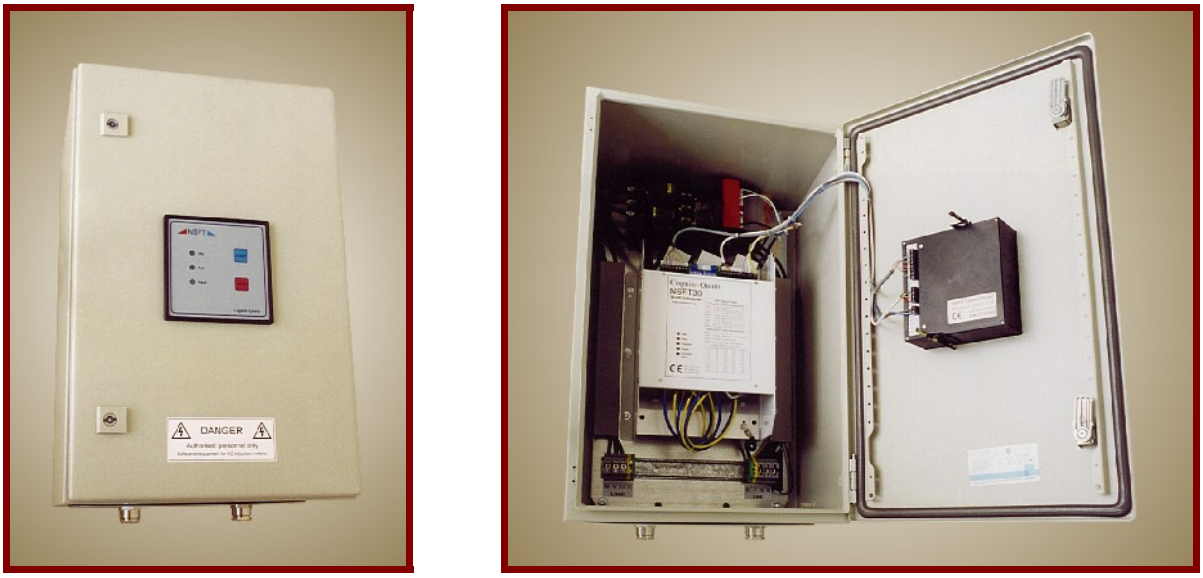
A detailed description of the BAO-1 controller and its applications is available at the company’s site <www.cognitoquam.gr> .

BAO-1 panel controller and logger

Ordering information is given on page 11.

4. Ready to Install Soft Starting System

The NSFTxx line is also available in ready-to-install, completely assembled systems. Units over 10 HP include a bypass contactor to minimize heat dissipation.



Ready-to-install soft-starter system.

Features are:

Ready-to-Install System Features	
Wall-mounted cabinet	The IP54 electrical wall-mounted cabinet for use in an environment of <50°C.
NSFT/ICCD panel controller	The front NSFT/ICCD panel controller integrates all the required automation and is a practical and robust user interface. Quamatic or Modbus connectivity is offered as an option.
Bypass contactor	The bypass contactor is driven by the panel controller solid-state switch.
400/230 V transformer	A 400/230 V transformer sources the required 230 V control voltage thus eliminating the need to connect to the line neutral.
DIN rail terminal blocks	Line and load connections are made to DIN rail terminal blocks.

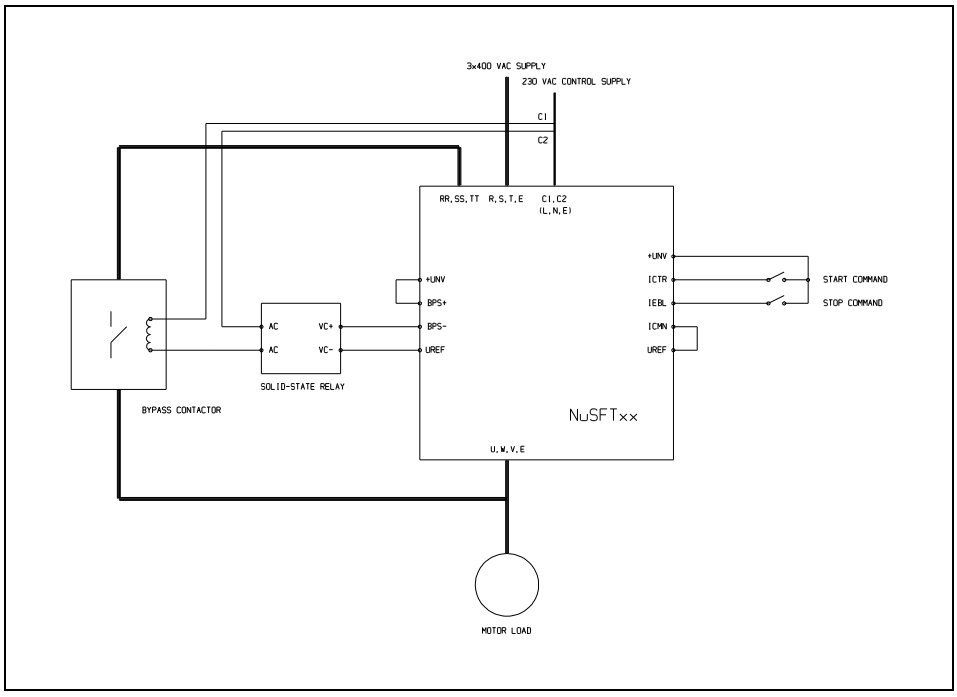
The individual NSFTxx line member specifications and capabilities are presented on the next page.

Ordering information is given on page 11.

5. NSFTxx Line Member Specifications

Characterizing Features of the NSFTxx Line at 3x400 VAC					
Model	**Motor power, Delta connected, HP/kW**	**Motor power, Inside Delta connected, HP/kW**	**Maximum starting current, A**	**Motoring phase current, A**	**Worst case motoring heat dissipation (no bypass), W**
NSFT10	10/7.5	17/12.5	60	15	61
NSFT15	15/11	26/19	100	23	95
NSFT20	20/15	35/25	135	30	109
NSFT25	25/18.5	43/32	165	37	138
NSFT30	30/22	52/38	190	45	150
NSFT35	35/26	60/44	210	52	174
NSFT40	40/30	69/51	235	60	202
NSFT45	45/33	78/57	300	67	218
NSFT50	50/37	86/63	330	75	252
NSFT55	55/40	95/70	360	82	275
NSFT60	60/44	103/76	377	91	306
NSFT75	75/55	129/95	470	114	345
NSFT90	90/66	155/114	555	137	414

Units above 90 HP and for non-standard/medium voltage applications are produced on a per order, custom base.



Typical NSFTxx connection

6. ISFT Intelligent Motor Starting Panel Controller

ISFT intelligent motor starting panel controller

The fully programmable ISFT intelligent motoring starting controller has been designed for demanding motor starting applications with the following features:

ISFT Controller Features	
Power circuit interface	Complete and versatile control interface to a three leg, six thyristor reduced voltage soft starter power assembly and its protection circuits.
Four isolated control inputs	Four universal connection 24 VDC, galvanically isolated control inputs.
Eight isolated bit outputs	Eight galvanically isolated transistor bit outputs.
Four relay outputs	Four 5A contact relay outputs.
Input and output parameters	Fully programmable parameters and function for each input and output.
Voltage and current analog output	Fully programmable galvanically isolated analog voltage and current output.
Pt100 probe interface	External Pt100 temperature interface.
Fault and warning parameters	Fully programmable and versatile fault and warning parameters.
True RMS measurement	True RMS measurement of each phase voltage and current.
Thermal current calculation	Thermal current calculation is in real time .
Line frequency and phase monitor	The line is measured and monitored for frequency, phase sequence and integrity.
Network integration	Complete integration within a Quamatic, Modbus or other supervisory network systems.
Standard panel dimensions	Standard front panel cut-out dimensions (per DIN 43700).
Operation	Simple, self-contained, unattended operation by non-specialist personnel.

ISFT front panel

Typical applications for the ISFT are:

- Control of high inertia loads such as large fans and crushers,
- Control of high static friction loads such as material transport mechanisms, and
- High availability, fully protected loads such as in waterworks pumping stations.

All ISFT parameters are programmable and user-configurable.

The ISFT controls the voltage supply to the motor load under the following variables:

ISFT Control of Voltage Supply to the Load	
Acceleration profile	Current limited linear or boosted torque acceleration profile.
Acceleration start	Voltage value at acceleration start.
Acceleration duration	Specifies the duration of the acceleration ramp.
"Kick" profile	“Kick” pulse is specified in voltage value and timing.
Deceleration duration	Specifies the duration of the decelerating ramp.
Deceleration timing	Voltage value at deceleration start and stop.
Operation times	Minimum on/off, fault recovery and operation times.

The controller features a versatile two tier error handling system. Warning/alarm and fault conditions are configured individually for each controller variable and external event. Each warning/alarm and fault flag can be individually enabled and configurable in terms of trigger limit and delay.

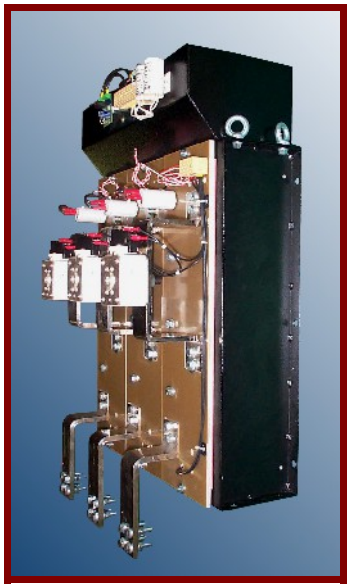
The ISFT interfaces to local and remote devices via its individually configurable input, output, relay and network ports in an extremely flexible and versatile manner:

ISFT Interface to Local and Remote Devices	
Inputs	Each input is of universal connection 24 VDC type and enables, disables, starts or stops motor operation.
Pt100 probe interface	The Pt100 probe interface allows for monitoring overheating or freezing conditions further expanding the available control facilities and options.
Bit and relay outputs	Each bit and relay output can be configured to represent a function of a controller variable or logical flag. Such a flag can be an operational state (e.g. acceleration), a warning/alarm, a fault or a combination of these.
Analog output	The analog output is a voltage and current signal. The magnitude is configurable in terms of offset, scale and signal source. In this way the chosen internal variable is replicated at the analog output.
Serial port	The network port is a dual standard serial type: EIA(RS)232 for local communications and/or EIA(RS)485 for connection to Quamatic, Modbus and similar networks and/or remote sensors.

The interface to the thyristor assembly is efficient and effective:

- The six thyristor gates are driven individually and directly (no other device is needed), and
- The four configurable bit inputs interface to the assembly's fault, event and other signals.

(Low - and medium - voltage thyristor assemblies are offered separately on a custom, per order basis).



Typical thyristor assembly (offered separately)

The front operator panel consists of a large five digit LED display and four operator switches. It is protected to IP54 and is covered by a polyester membrane. The display is visible through a suitably transparent window and the switches are of the tactile type. The controller is designed to be fixed on the inside of an electrical cabinet door/panel with the operator panel facing outwards through a suitable opening.

All connections are made via removable terminal blocks at the controller top and bottom.

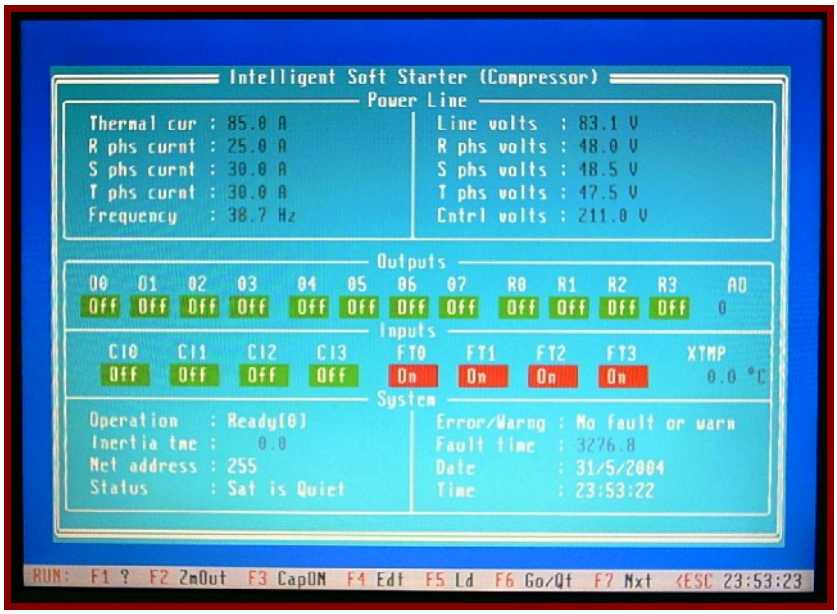
All ISFT parameters can be set or edited locally (via the front panel switches) and/or through the serial port (EIA-RS-232 and EIA-RS-485). The parameters can be set at any time while the controller is powered. In this way the controller operation can be determined dynamically (as in the case of fuzzy control).

The ISFT controller is automatically detected when in a Quamatic or similar network. In this case, all data, parameters, settings etc are available on-line in hard real time.

For ordering information, see page 11.

7. Quamatic Software

All Cognito Quam products with serial communications are automatically detected by Quamatic software. Quamatic is our open, freely available, free-to-use and easy-to-implement byte level protocol described and specified fully in the product's manual.



Detailed projection screen of ISFT data

Diagnostic, setup and operation binaries are also available for free on request by e-mail from <sftsw@cognitoquam.gr>.

8. Ordering Information

Ordering Information	
Model	**Description**
BAO-1	12+8 Bit I/O and analog output panel controller and logger
BSFT10	10 KW Basic Soft Start-Stop
BSFT12	12 KW Basic Soft Start-Stop
BSTT11	11 KW Basic Soft Start
ISFT	Intelligent motor starting panel controller
NSFT10	10 HP Standard soft starter
NSFT10-SL	10 HP Ready soft starter system, local control only
NSFT10-SN	10 HP Ready soft starter system, local and network control
NSFT15	15 HP Standard soft starter
NSFT15-SL	15 HP Ready soft starter system, local control only
NSFT15-SN	15 HP Ready soft starter system, local and network control
NSFT20	20 HP Standard soft starter
NSFT20-SL	20 HP Ready soft starter system, local control only
NSFT20-SN	20 HP Ready soft starter system, local and network control
NSFT25	25 HP Standard soft starter
NSFT25-SL	25 HP Ready soft starter system, local control only
NSFT25-SN	25 HP Ready soft starter system, local and network control
NSFT30	30 HP Standard soft starter
NSFT30-SL	30 HP Ready soft starter system, local control only
NSFT30-SN	30 HP Ready soft starter system, local and network control
NSFT35	35 HP Standard soft starter
NSFT35-SL	35 HP Ready soft starter system, local control only
NSFT35-SN	35 HP Ready soft starter system, local and network control
NSFT40	40 HP Standard soft starter
NSFT40-SL	40 HP Ready soft starter system, local control only
NSFT40-SN	40 HP Ready soft starter system, local and network control
NSFT45	45 HP Standard soft starter
NSFT45-SL	45 HP Ready soft starter system, local control only
NSFT45-SN	45 HP Ready soft starter system, local and network control
NSFT50	50 HP Standard soft starter
NSFT50-SL	50 HP Ready soft starter system, local control only
NSFT50-SN	50 HP Ready soft starter system, local and network control
NSFT55	55 HP Standard soft starter
NSFT55-SL	55 HP Ready soft starter system, local control only
NSFT55-SN	55 HP Ready soft starter system, local and network control
NSFT60	60 HP Standard soft starter
NSFT60-SL	60 HP Ready soft starter system, local control only
NSFT60-SN	60 HP Ready soft starter system, local and network control
NSFT75	75 HP Standard soft starter
NSFT75-SL	75 HP Ready soft starter system, local control only
NSFT75-SN	75 HP Ready soft starter system, local and network control
NSFT90	90 HP Standard soft starter
NSFT90-SL	90 HP Ready soft starter system, local control only
NSFT90-SN	90 HP Ready soft starter system, local and network control
NSFTQ-L	NSFT/ICCD panel controller, local control only
NSFTQ-N	NSFT/ICCD panel controller, local and network control
XFR400230	Control voltage supply transformer, 90VA, 400/230 VAC

9. Cognito Quam Profile

Cognito Quam Electrotechnologies Ltd. (established in 1990) is a privately held engineering and commercial company specializing in industrial electronics and their application. The company expertise covers all aspects of applications for the factory environment namely measurement (transducers and sensors), data processing and communication, control and actuation, automation and robotics and power and energy electronics.

Cognito Quam has contributed and been involved in the design and development of the following technologies, machinery and devices:

- Power factor controllers,
- Motor voltage and frequency inverters and converters,
- Thermal load control and management,
- Robotic interfaces and protocol converters,
- Adaptive panel controllers,
- Robotics controllers,
- Variable speed drives,
- Olive oil processing rejects control equipment (FAIR contract),
- Low Voltage and EMC CE marking compliance devices and equipment for production lines,
- Portable dioxine-furan instrumentation (SMT contract),
- Three-phase programmable soft-starters,
- Hard real time job scheduling systems,
- Hard real time industrial distributed data systems (Brite-EuRam subcontract),
- Calibration rig and supplies for power meters,
- Electrical utility Hall effect energy and power meters,
- Industrial data networks,
- Battery chargers and UPS inverters,
- Solar power air conditioning telemetry and control systems (Thermie subcontract)
- Small switching power supplies,
- Multi-port communication PC cards,
- Ship oily water separators, and
- Modem controllers.

Cognito Quam also offers its research and development services in integrating its products in larger industrial systems products as well as in the design of new and challenging devices and equipment. As such the company cooperates closely and supports its customers in their efforts for a better product.