Elexant 4020i

Raychem

Single-point heat-tracing control module

PRODUCT OVERVIEW

Elexant 4020i-Mod-3P-IS

The Raychem Elexant 4020i is a compact, full-featured, touch screen based, single-point heat-tracing controller. It provides control and monitoring of Electric Heat-Tracing (EHT) circuits for both freeze protection and process temperature maintenance. This controller can monitor and alarm on high and low temperature, high and low current, ground-fault levels, voltage, and supports a host of additional features to offer the utmost in control and monitoring of EHT.

The Elexant 4020i controller provides three output types: a line powered electromechanical relay (EMR) for driving contactors in nonhazardous locations; a DC output for driving solid-state relays (SSRs) in nonhazardous and Class I Div. 2 / Zone 2 hazardous locations; and a 0-10V analog output for driving variable output power modules. Multiple communication ports allow flexible connectivity for remote monitoring, configuration, and ease of integration with Raychem Supervisor software or a Distributed Control System (DCS).

Control

The Elexant 4020i measures temperatures for up to three directly-connected temperature sensors. The controller also supports 4-20 mA inputs, allowing the use of external temperature sensor converters with thermocouples or other sensor types. The Elexant 4020i also features line sensing, ambient sensing, Proportional Ambient Sensing Control (PASC), and power limiting modes.

Safety limiter

The Safety Limiter option provides a redundant, functionally safe, high temperature cutout mechanism. Its IEC61508 SIL2 certification makes it suitable for safety-critical applications.

Monitoring

A complete set of parameters are measured, including ground fault, temperature, current, and voltage to ensure system integrity. The system can be set to periodically check the heating cable for faults, alerting maintenance personnel of a heat-tracing problem eliminating costly manual maintenance checks.

A programmable dry contact alarm relay is provided for local or remote alarm annunciation. The dedicated Safety Limiter contactor output provides hardware redundancy for the Safety Limiter option.

Installation

The Elexant 4020i modules can be mounted on symmetric 35 mm DIN-railes into an enclosure appropriate for the intended environment. Chemelex offers standard multi-circuit panels suitable for indoor or outdoor locations, and custom configurations are available to provide the most flexible solution. Installing is as simple as connecting the incoming and outgoing power wiring and temperature sensors as needed for the application.

The Elexant 4020i provides is an intuitive user interface that makes it easy to use and program. No additional programming devices are needed. Alarm conditions and programming settings are easy to read and interpret on the color touch screen. Settings are stored in non-volatile memory in the event of a power failure.

Communication

Elexant 4020i units come equipped with RS-485 and Ethernet ports and can be readily connected to a distributed control system (DCS). The units support both the Modbus RTU and ModBus/TCP protocols, and an optional ProfiBus module is also available. The controller may be networked to a host PC running Windows-based Raychem Supervisor software for central programming, status review, and alarm annunciation.

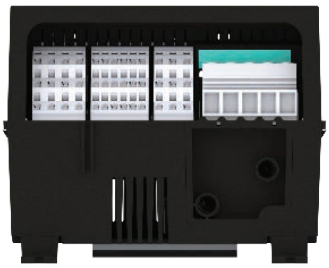
PRODUCT SPECIFICATIONS

Typical enclosure dimensions

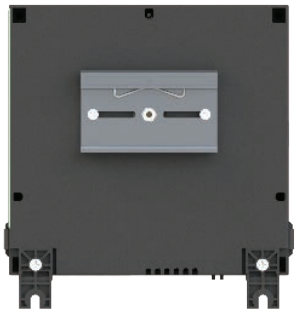
Elexant 4020i-Mod shown

Front View

Side View



Bottom View

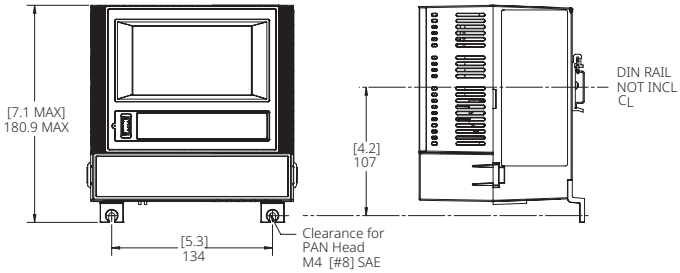


Rear View

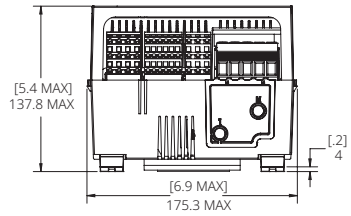
Mounting ([inches] mm)

Without IS barrier

Panel mounting on 35 mm DIN rails

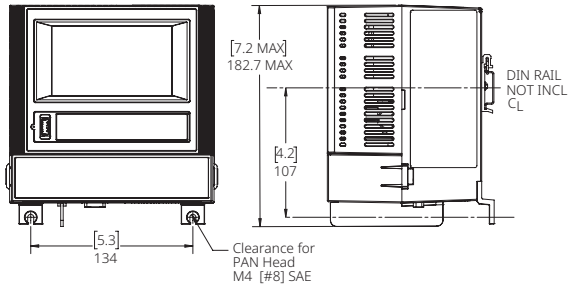


Single phase

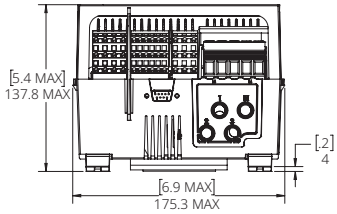


With IS barrier

Panel mounting on 35 mm DIN rails



Three phase



Technical details

Supply voltage	100 Vac to 277 Vac, +/–10%, 50-60 Hz	
Internal power consumption	< 24 W per 4020i module	
I.S temperature sensor inputs (Optional)	Um = 305 VAC	
Associated apparatus	Uo = 5.4 V	Ca = 65 uF
Entity parameters	Io = 0.083 A	La = 2 mH

Functional safety

Standard	IEC 61508:2010
Safety integrity level	SIL 2
Systematic capability	SC 3
Available only with the Safety Limiter option.	See Safety Limiter section of User Manual for detailed safety information.

Environmental

Ambient operating temperature	–40°C to 70°C (–40°F to 158°F)
Ambient storage temperature	–55°C to 85°C (–67°F to 185°F)
Relative humidity	0% to 90%, noncondensing
Environment	PD2, CAT III
Max altitude	2,000 m (6,562 ft)

Elexant 4020i control modules are packaged in DIN rail mount housings for installation onto symmetric 35 mm DIN rails into enclosures suitable for the intended environment.

Control & load

Load voltage, maximum	690 Vac, 50/60 Hz
Load current, maximum	63 A continuous (limited by the rating of the output device)
Control algorithms	EMR Version: On/Off, PASC, always on, always off SSR Version: On/Off, proportional, PASC, always on, always off
Control range	–200°C to 700°C (–328°F to 1292°F)

Monitoring

Temperature	Low alarm range High alarm range	–200°C to 700°C (–328°F to 1292°F) or OFF –200°C to 700°C (–328°F to 1292°F) or OFF
Ground fault	Alarm range Trip range	10 mA to 500 mA or OFF 10 mA to 500 mA or OFF
Current	Low alarm range High alarm range Power limit range	0.1 A to 100 A or OFF 0.1 A to 100 A or OFF 8 W to 30 kW
Voltage	Low alarm range High alarm range	80 Vac to 300 Vac or OFF 80 Vac to 300 Vac or OFF
Resistance	Low resistance range High resistance range	1% to 100% of deviation from nominal 1% to 250% of deviation from nominal
Autocycle	Diagnostic test interval	1 to 750 hours

Temperature sensor inputs

Standard

Quantity	3 Each can be individually set to one of the types below.

Types

100 Ω platinum RTD	3-wire, α=0.00385 ohms/ohm/°C –200°C to 700°C (–328°F to 1292°F), ± 1°C Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor
100 Ω nickel iron RTD	2-wire, α=0.00599 ohms/ohm/°C –73°C to 350°C (–99°F to 662°F), ± 1°C Can be extended with a 2-conductor shielded cable of 20 Ω maximum per conductor
100 Ω nickel RTD	2-wire, α=0.00618 ohms/ohm/°C –70°C to 250°C (–94°F to 482°F), ± 1°C Can be extended with a 2-conductor shielded cable of 20 Ω maximum per conductor
Thermocouple	Requires external 4-20 mA converter 4-20 mA current loop, ± 0.05 mA, 24 Vdc loop power

The Elexant 4020i-IS variants are equipped with intrinsic safety barriers at the RTD inputs.

RTD Intrinsic Safe (IS) associated apparatus entity parameters

Uo (Maximum output voltage): 5.4 V	La (Maximum External Inductance): 2 mH
Io (Maximum output current): 0.083 A	Ca (Maximum External Capacitance): 65 uF
Po (Maximum output power): 0.449 W	

Optional

Safety limiter	One dedicated temperature input
100 Ω platinum RTD	3-wire, α=0.00385 ohms/ohm/°C –200°C to 700°C (–328°F to 1292°F), ± 1°C Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor

Digital inputs		
Quantity	Two multi-purpose inputs for connection to external dry (voltage free) contact or DC voltage May be configured for Hand-Off-Auto (HOA) operation	
Rating	100 Ω max loop resistance or 5-24 Vdc @ 1 mA maximum	

Outputs		
Control relay	Form-A wet contact:	100 Vac to 277 Vac, 3 A, 50/60 Hz
DC (SSR) control output	12 Vdc @ 215 mA max.	
Analog (linear phase control)	0-10 Vdc @ 215 mA max.	
Alarm relay	Form-C dry contact:	100 Vac to 277 Vac, 3 A, 50/60 Hz
Auxiliary output	24 Vdc, max load of 250 mA @ 40°C, de-rated to 165 mA @ 60°C	

Configuration	
Method	Touch screen display
Units	°F or °C
Idle display	Sensor temperature, control temperature, heater current, voltage, power, alarm status
LEDs	Status, heater on, alarm conditions, receive / transmit data
Memory	Nonvolatile, restored after power loss, checksum data checking
Stored usage parameters	Minimum and maximum process temperature, maximum ground-fault current, minimum and maximum voltage, maximum heater current, power accumulator, contactor cycle count, total time in use, heater on time
Alarm conditions	Low / high temperature, low / high current, low / high voltage, low / high resistance, ground-fault alarm / trip, RTD failure, loss of programmed values, EMR or SSR failure, equipment protection trip, attached device alarm, Safety Limiter alarms, contactor lifetime exceeded
Alarm modes	Normal (solid on), flash (on & off), toggle (re-ring new alarms)
Control algorithms	EMR Version: On/Off, PASC, always on, always off SSR Version: On/Off, proportional, PASC, always on, always off
Equipment protection	Ground fault trip, low / high temperature limit, Soft-Start features: (heat-trace output limiting, SSR overcurrent protection, circuit breaker nuisance trip prevention)
Load shedding	Up to 8 zones, with temperature failsafe and communication timeout (requires Raychem Supervisor)
Profiles	Built-in default setting profiles for common heat trace applications Up to two additional user configurations can be saved and reloaded. Saved configurations can be saved to, and loaded from, a USB thumb drive
Network	Automatic network configuration with DHCP, or static IP configuration
Firmware updates	User updateable using a USB thumb drive
Multi-language interface	English, French, German, Spanish, Russian
Other	Password protection, text tags / identifiers for controller and temperature sensors

Connection terminals	
Power supply input	Screw terminals, 0.2 – 16.8 mm^2 (24 – 5 AWG)
Heating cable voltage sense input	Screw terminals, 0.2 – 16.8 mm^2 (24 – 5 AWG)
Ground (Earth)	Screw terminal, 0.2 – 16.8 mm^2 (24 – 5 AWG)
Torque range for screw terminals	1.2 – 1.5 Nm
Sensor / Other terminals	Cage clamp terminals, 0.08 – 3.3 mm^2 (28 – 12 AWG)

Communications

RS-485	
Type	2-wire RS-485
Cable	One shielded twisted pair
Length	1,200 m (4,000 ft) maximum
Quantity	Up to 247 devices per port
Data Rate	9600, 19.2 k, 38.4 k, 57.6 k baud
Parity	None, even, odd
Stop bits	0, 1, 2
Tx delay	0 – 5 seconds
Protocol	Modbus RTU

Ethernet	
Type	10/100 BaseT
Length	100 m (328 ft) maximum
Data rates	10 or 100 MB/s
Protocol	Modbus/TCP, DHCP
Connection terminals	Shielded 8-pin RJ-45

APPROVALS

For use in ordinary area when using EMR contactors.
For use in ordinary and hazardous area Zone 2 (Gas) and Class I Div 2 for SSR or purged panel versions

Temperature classification
T4

Product certification

For certifications in other regions (FM, CSA, IEx, UL etc.), please refer to the installation manual.

More details about product certification, approvals and conditions of safe use are available in the installation manual at www.chemelex.com.

ORDERING INFORMATION

Description	Catalog Number	Part Number	Weight (kg/lbs.)
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Single Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/Zone 2 locations)	10380-021	4020i-Mod-IS	1.3/2.9
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs and functional safety limiter. Single Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/Zone 2 locations)	10380-022	4020i-Mod-IS-LIM	1.2/2.6
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Three Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/Zone 2 locations)	10380-024	4020i-Mod-3P-IS	1.3/2.9
RTD Sensors			
Temperature Sensor with 2 m flexible cable and M16 gland, Pt100	MONI-PT100-260/2	1244-006615	0.14/0.3
Temperature Sensor with 5 m flexible cable and M16 gland, Pt100	MONI-PT100-260/5	1244-020817	0.35/0.8
Temperature Sensor with 10 m flexible cable and M16 gland, Pt100	MONI-PT100-260/10	1244-020816	0.7/1.5
Temperature Sensor with 2 m MI Cable and Junction Box, Pt100, ATEX	MONI-PT100-EXE	967094-000	0.5/1.1
Temperature Sensor with 2 m MI Cable and M16 gland, Pt100, ATEX	MONI-PT100-EXE-SENSOR	529022-000	0.13/0.3
Raychem – Supervisor Software	**Available for download at www.chemelex.com**		

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