

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 relay 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 0-10 V 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.

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. No safety limiter offered for NA currently.

Ground-Fault Protection

National electrical codes require ground-fault equipment protection on all heat-tracing circuits. The Elexant 4020i control modules incorporate ground-fault sensing with alarm and trip functionality. Internal self-tests are automated, eliminating the need for manual testing. Heat-tracing circuits equipped with Elexant 4020i controllers do not require additional ground-fault detection equipment, simplifying installation and reducing costs.

Installation

The Elexant 4020i comes ready to install into an enclosure appropriate for the intended environment. The modules are available in 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 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 RS485 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. The controller may be networked to a host PC running Windows-based Raychem Supervisor software for central programming, status review, and alarm annunciation.

GENERAL

Area of Use	Nonhazardous locations (when using EMR contactors) Nonhazardous and Class I, Division 2/Zone 2 hazardous locations (SSR or purged panel versions)
Approvals	<p>Hazardous locations</p> <p> E4905419 Proc. Cont. Eq. Use in Haz. Loc. (Associated Apparatus)</p> <p> IECEx UL 18.0098X DEMKO 18 ATEX 2091 X UL21UKEX2316X II 3 (1)G Ex ec nC [ia Ga] IIC T4 Gc</p> <hr/> <p>I.S Temperature Sensor Inputs (Optional) Associated Apparatus Entity Parameters</p> <p>Um = 305VAC Uo = 5.4V Io = 0.083A</p> <p>Ca = 65uF La = 2mH</p>
Electromagnetic Compatibility	IEC 61326-1:2012 / EN 61326-1:2013
Supply voltage	100 Vac to 277 Vac, +/-10%, 50-60 Hz
Internal power consumption	< 24W per 4020i module

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: On/Off, PASC, always on, always off SSR: On/Off, proportional, PASC, always on, always off
Control Range	-200°C to 700°C (-328°F to 1292°F)

TYPICAL ENCLOSURE DIMENSIONS

Elexant 4020i-Mod shown



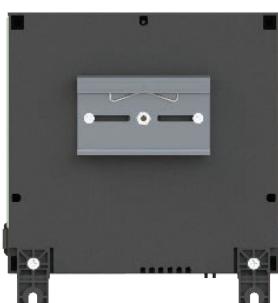
Front View



Side View



Bottom View

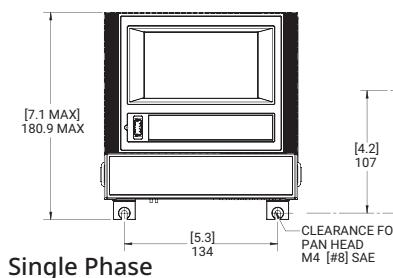


Rear View

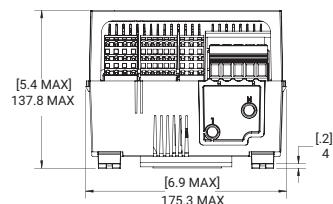
MOUNTING ([INCHES] MM)

Without IS Barrier

Panel mounting on 35 mm DIN rails



Single Phase



MONITORING

Temperature	Low alarm range High alarm range	-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

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

Intrinsic Safety Barriers included on RTD Inputs when using IS models.

RTD Intrinsic Safety Associated Apparatus Entity Parameters

Uo (Maximum Output Voltage): 5.4V	La (Maximum External Inductance): 2mH
Io (Maximum Output Current): 0.083A	Ca (Maximum External Capacitance): 65uF
Po (Maximum Output Power): 0.449W	

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: On/Off, PASC, always on, always off SSR: 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, 24 – 5 AWG (0.2 – 16.8 mm ²)
Heating cable voltage sense input	Screw terminals, 24 – 5 AWG (0.2 – 16.8 mm ²)
Ground (Earth)	Screw terminal, 24 – 5 AWG (0.2 – 16.8 mm ²)
Torque range for screw terminals	1.2 – 1.5 Nm
Sensor / Other terminals	Cage clamp terminals, 28 – 12 AWG (0.08 – 3.3 mm ²)

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, 19.2k, 38.4k, 57.6k 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

ORDERING DETAILS

Description	Catalog number	Part number	Weight (kg/lbs.)
Elexant 4020i control module. Single Phase loads. (Approved for Class I, Div. 2 / Zone 2 locations)	10380-020	4020i-Mod	1.2/2.6
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Single Phase loads. (Approved for Class I, Div. 2 / Zone 2 locations, RTDs may be placed in Zone 1/Div. 1 locations)	10380-021	4020i-Mod-IS	1.3/2.9
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Three Phase loads. (Approved for Class I, Div. 2 / Zone 2 locations, RTDs may be placed in Zone 1/Div. 1 locations)	10380-024	4020i-Mod-3P-IS	1.3/2.9
RTD Sensors			
100-ohm platinum RTD with 10 foot stainless steel corrugated sheath	RTD10CS	RTD10CS	0.5/1.1
RTD, ambient, cable style	RTD-200	254741	0.05/0.1
C1D1 RTD, – 100°F to 900°F, pipe mounted	RTD7AL	RTD7AL	0.9/2.0
RTD, – 100°F to 900°F, pipe mounted	RTD4AL	RTD4AL	0.6/1.2
Raychem – Supervisor Software	Available for download at www.chemelex.com		

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