

# ELEXANT 4020i



## SINGLE-POINT HEAT-TRACING CONTROL MODULE



Elexant 4020i-Mod-3P-IS

### PRODUCT OVERVIEW

The nVent 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 0-10V analog output for driving variable output power modules. Multiple communication ports allow flexible connectivity for remote monitoring, configuration, and ease of integration with nVent 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 4-20mA 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 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 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 nVent 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

#### Hazardous locations



Class I, Division 2, Group A,B,C,D T4 Type 4X  
Class I, Zone 2, AEx nA nC [ia Ga] IIC T4 Gc  
Ex ec nC [ia Ga] IIC T4 Gc



DEMKO 18 ATEX 2091 X  
IECEX UL 18 .0098X  
II 3 (1)G Ex ec nC [ia Ga] IIC T4 Gc



#### I.S Temperature Sensor Inputs (Optional) Associated Apparatus Entity Parameters

Um = 305VAC  
Uo = 5.4V  
Io = 0.083A

Ca = 65uF  
La = 2mH

Electromagnetic Compatibility IEC 61326-1:2012 / EN 61326-1:2013  
Supply voltage 100Vac to 277Vac, +/-10%, 50-60Hz  
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 35mm DIN rails into enclosures suitable for the intended environment.

## CONTROL & LOAD

Load Voltage, maximum 690Vac, 50/60Hz  
Load Current, maximum 63A 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



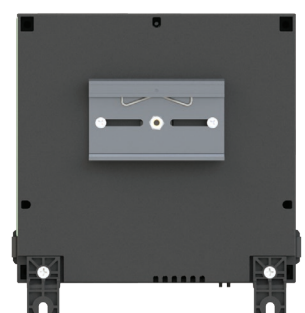
Front View



Side View



Bottom View

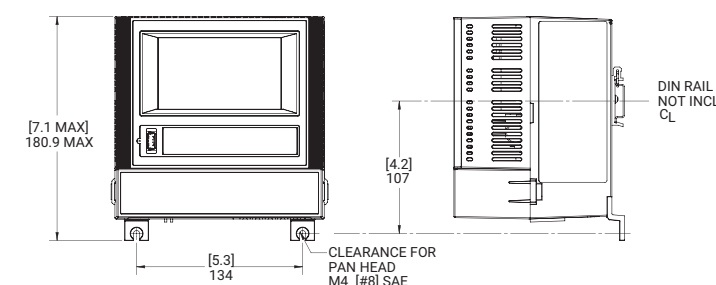


Rear View

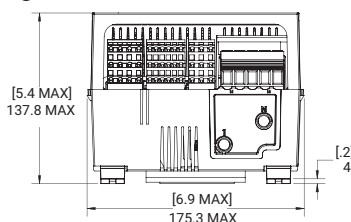
## MOUNTING ([INCHES] MM)

### Without IS Barrier

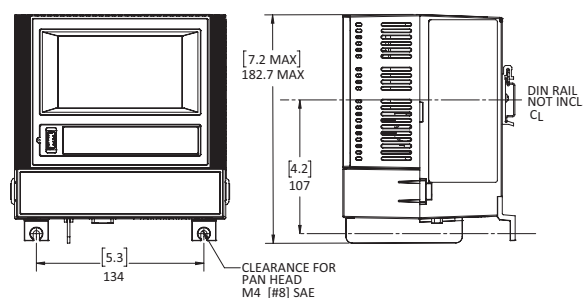
Panel mounting on 35 mm DIN rails



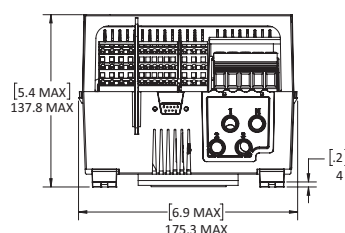
### Single Phase



### With IS Barrier



### Three Phase with ProfiBus



## MONITORING

Temperature	Low alarm range	-200°C to 700°C (-328°F to 1292°F) or OFF
	High alarm range	-200°C to 700°C (-328°F to 1292°F) or OFF
Ground fault	Alarm range	10mA to 500mA or OFF
	Trip range	10mA to 500mA or OFF
Current	Low alarm range	0.1A to 100A or OFF
	High alarm range	0.1A to 100A or OFF
	Power limit range	8 W to 30 kW
Voltage	Low alarm range	80Vac to 300Vac or OFF
	High alarm range	80Vac to 300Vac or OFF
Resistance	Low resistance range	1% to 100% of deviation from nominal
	High resistance range	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 4-20mA current loop, $\pm 0.05\text{mA}$ , 24Vdc 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 $\Omega$ max loop resistance or 5-24Vdc @ 1mA maximum

## OUTPUTS

Control Relay	Form-A wet contact:	100Vac to 277Vac, 3A, 50/60Hz
DC (SSR) Control Output	12Vdc @ 215 mA max.	
Analog (Linear Phase Control)	0-10Vdc @ 215 mA max.	
Alarm Relay	Form-C dry contact:	100Vac to 277Vac, 3A, 50/60Hz
Auxiliary Output	24Vdc, max load of 250mA @ 40°C, de-rated to 165mA @ 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 nVent 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 – 16.8mm <sup>2</sup> )
Heating cable voltage sense input	Screw terminals, 24 – 5 AWG (0.2 – 16.8mm <sup>2</sup> )
Ground (Earth)	Screw terminal, 24 – 5 AWG (0.2 – 16.8mm <sup>2</sup> )
Torque range for screw terminals	1.2 – 1.5 Nm
Sensor / Other terminals	Cage clamp terminals, 28 – 12 AWG (0.08 – 3.3 mm <sup>2</sup> )

## 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.)
<b>Elxant 4020i control module.</b> Single Phase loads. (Approved for Class I, Div. 2 / Zone 2 locations)	10380-020	4020i-Mod	1.2/2.6
<b>Elxant 4020i controller module with intrinsically safe</b> 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
<b>Elxant 4020i controller module.</b> Three Phase loads. (Approved for Class I, Div. 2 / Zone 2 locations)	10380-023	4020i-Mod-3P	1.3/2.9
<b>Elxant 4020i controller module with intrinsically safe</b> 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
<b>RTD Sensors</b>			
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
<b>nVent RAYCHEM – Supervisor Software</b>	<b>Available for download at <a href="http://www.nvent.com">www.nvent.com</a></b>		

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