

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 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 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.

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 35mm DIN-rails into an enclosure appropriate for the intended environment. nVent 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 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, and an optional ProfiBus module is also available. 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)
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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

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)

Elxant 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 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)

TYPICAL ENCLOSURE DIMENSIONS

Elexant 4020i-Mod shown



Front View



Side View



Bottom View

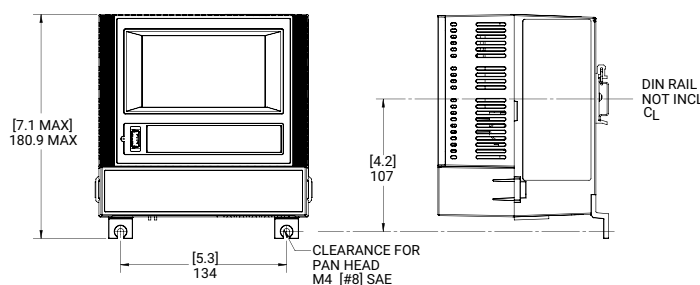


Rear View

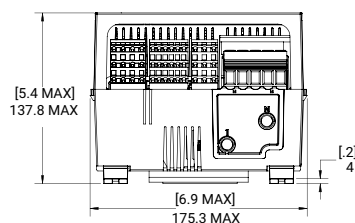
MOUNTING ([INCHES] MM)

Without IS Barrier

Panel mounting on 35 mm DIN rails

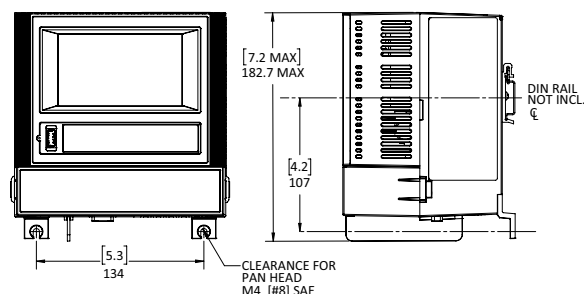


Single Phase

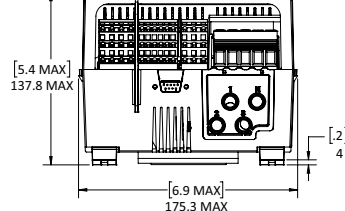


With IS Barrier

Panel mounting on 35 mm DIN rails



Three Phase 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

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

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	

Optional

Safety Limiter	One dedicated temperature input
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

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 5-24Vdc @ 1mA maximum

OUTPUTS

Control Relay	Form-A wet contact:	100Vac to 277Vac, 3A, 50/60Hz
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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 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 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, 0.2 – 16.8mm ² (24 – 5 AWG)
Heating cable voltage sense input	Screw terminals, 0.2 – 16.8mm ² (24 – 5 AWG)
Ground (Earth)	Screw terminal, 0.2 – 16.8mm 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, 19.2k, 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

Profibus (optional)

Length 1,200 m (4,000 ft) maximum
Quantity Up to 32 devices per port
Data rates up to 12 MB/s
Protocol Profibus DPV0
Connection terminals DB9 connector

ORDERING DETAILS

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
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Includes ProfiBus communication module.. Single Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/ Zone 2 locations)	10380-025	4020i-Mod-IS-PRF	1.3/2.9
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Includes ProfiBus communication module. communication module. Single Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/ Zone 2 locations)	10380-026	4020i-Mod-IS- LIM-PRF	1.2/2.6
Elexant 4020i controller module with intrinsically safe barriers on RTD inputs. Includes ProfiBus communication module. Three Phase loads. (Approved for Zone 2 locations. RTDs may be placed in Zone 0/Zone 1/ Zone 2 locations)	10380-027	4020i-Mod-3P-IS- PRF	1.2/2.6

RTD Sensors

Temperature Sensor with 2m flexible cable and M16 gland, PT100	MONI-PT100-260/2	1244-006615	0.14/0.3
Temperature Sensor with 5m flexible cable and M16 gland, PT100	MONI-PT100-260/5	1244-020817	0.35/0.8
Temperature Sensor with 10m flexible cable and M16 gland, PT100	MONI-PT100-260/10	1244-020816	0.7/1.5
Temperature Sensor with 2m MI Cable and Junction Box, PT100, ATEX	MONI-PT100-EXE	967094-000	0.5/1.1
Temperature Sensor with 2m MI Cable and M16 gland, PT100, ATEX	MONI-PT100-EXE-SENSOR	529022-000	0.13/0.3

nVent RAYCHEM – Supervisor Software

Available for download at www.nvent.com

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