

Raychem

Elexant 4020i

Installation Instructions





DESCRIPTION

The Raychem Elexant 4020i is a compact, full-featured, touch-screen based, single point heat-tracing control module. 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.

TOOLS REQUIRED

- 3 mm head flat blade screwdriver for IO terminal
- 5 mm head flat blade screwdriver for power terminals

APPROVALS

Hazardous Locations

UL
LISTED
E4905419
Proc. Cont. Eq.
Use in Haz. Loc.
(Associated Apparatus)



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

UL 21 ATEX 2616X (for IS versions only)
DEMKO 18 ATEX 2091 X (for non-IS versions)
UL21UKEX2316X
II 3 (1)G Ex ec nC [ia Ga] IIC T4 Gc
IECEX UL 18 .0098X

I.S Temperature Sensor Inputs (Optional) $U_m = 305 \text{ VAC}$

Associated Apparatus $U_o = 5.4 \text{ V}$ $C_a = 65 \text{ uF}$

Entity Parameters $I_o = 0.083 \text{ A}$ $L_a = 2 \text{ mH}$

KIT CONTENTS

Item	Qty	Description
A	1	Elexant 4020i module

VARIANTS (NOT ALL VARIANTS ARE AVAILABLE IN ALL REGIONS)

Type	Description
4020i-Mod	Elexant 4020i controller module. Single phase loads. (Approved for Class I, Div. 2/Zone 2 locations)
4020i-Mod-IS	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 Class I, Div.2/Zone 2, Div.1/Zone 1 locations)
4020i-Mod-IS-LIM	Elexant 4020i controller module with intrinsically safe barriers on RTD inputs and functional safety limiter. Single Phase loads. (Approved for Class I, Div. 2/Zone 2 locations, RTDs may be placed in Class I, Div.2/Zone 2, Div.1/Zone 1 locations)
4020i-Mod-3P-IS	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 Class I, Div.2/Zone 2, Div.1/Zone 1 locations)

WARNING:

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire.

GENERAL

Module Supply voltage	100 Vac to 277 Vac, +/-10%, 50-60 Hz
Internal power consumption	< 24 W
Electromagnetic Compatibility	IEC 61326-1:2012 / EN 61326-1:2013

ENVIRONMENTAL

Materials	Fiber-Reinforced Plastic (FRP) or stainless steel (SS304)
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)

CONTROL & LOAD

Load Voltage, maximum	690 Vac, 50/60 Hz
Load Current, maximum	63 A continuous (limited by the rating of the output device)

TEMPERATURE SENSOR INPUTS

Quantity	Three temperature inputs each of which can be individually set to one of the types below.
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Types

100 Ω platinum RTD	3-wire, $\alpha=0.00385$ ohms/ohm/°C Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor
100 Ω nickel iron RTD	2-wire, $\alpha=0.00599$ ohms/ohm/°C Can be extended with a 2-conductor shielded cable of 20 Ω maximum per conductor
100 Ω nickel RTD	2-wire, $\alpha=0.00618$ ohms/ohm/°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 provided in device, external loop power can also be used

Optional - Limiter Versions Only

Safety Limiter	One dedicated temperature input for the safety limiter
100 Ω platinum RTD	3-wire, $\alpha=0.00385$ ohms/ohm/°C

Refer to H60624 - 40X0i Operator Manual for directions on installing, operating, and maintaining the Safety Limiter.
Intrinsic Safety Barriers included on RTD Inputs when using IS models.

RTD Intrinsic Safety 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 μ F
Po (Maximum Output Power): 0.449 W	

DIGITAL INPUTS

Quantity	Two multi-purpose inputs for connection to external dry (voltage free) contact or DC voltage
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	

CONNECTION TERMINALS

Power Supply Input	Screw terminals, 24 – 5 AWG (0.2 – 16.8 mm ²)
Heating Cable Output	Screw terminals, 24 – 5 AWG (0.2 – 16.8 mm ²)
Torque Range for Screw Terminals	1.2 – 1.5 Nm
Ground (Earth)	Three box lugs, 14 – 2 AWG (2.0 – 33.6 mm ²)
Sensor / Other Terminals	Cage clamp terminals, 28 – 12 AWG (0.08 – 3.3 mm ²)
Minimum Conductor Temp. Rating	80°C

MOUNTING

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

1 Phase Version



Front



Top



Bottom

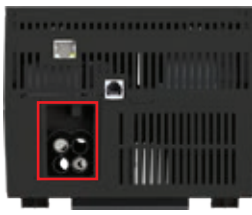


Side

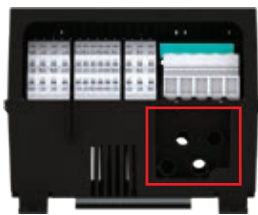
3 Phase Version



Front



Top



Bottom



Side

CONNECTIONS AND INDICATORS

A. TB1 Wiring

Terminals	Function
1	TS1 (White)
2	TS1 (Red)
3	TS1 (Red)
4	TS2 (White)
5	TS2 (Red)
6	TS2 (Red)
7	TS3 (White)
8	TS3 (Red)
9	TS3 (Red)
10	TS Lim (White)
11	TS Lim (Red)
12	TS Lim (Red)

B. TB2 Wiring

Terminals	Function
1	TC3+
2	TC2+
3	TC1+
4	TC3-
5	TC2-
6	TC1-
7	- No Connect
8	SSR-
9	SSR+
10	DIGITAL INPUT (COM)
11	DIGITAL INPUT 1
12	DIGITAL INPUT 2
13	RS485 IN+
14	RS485 IN-
15	RS485 COM
16	RS485 OUT+
17	RS485 OUT-
18	RS485 COM

C. TB1 Wiring

Terminals	Function
1	24 V+ OUT
2 ⚠	Limiter Relay
3 ⚠	Output Relay
4	24 V COM
5	External Jumper Required
6	External Jumper Required
7 ⚠	Alarm_NC
8 ⚠	Alarm _COM
9 ⚠	Alarm_NO

D. TB4 Wiring

Terminals	Function
1 ⚠	EGND
2 ⚠	POWER IN (L1)
3 ⚠	POWER IN (L2/N)
4 ⚠	L1 ACV Sense
5 ⚠	L2/N ACV Sense

⚠ **WARNING:** Shock Hazard.
Disconnect from live voltage prior
to accessing terminals

E. Status LEDs

Status:	Indicates status of Elexant 4020i module
Off	No power
Green	Normal operation, no internal faults
Red	Device Reset
Flash R/G	Unlocked/Calibrated

Output Shows status of switched
output

COMM

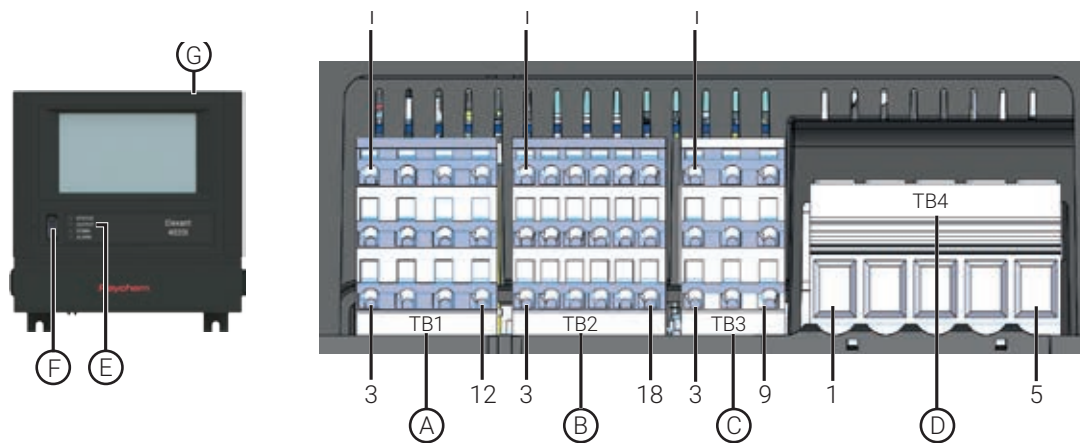
Flash Green	Receive Active
Flash Red	Transmit Active

Alarm

Red	Illuminates when an alarm is present
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F. USB Connector

G. Ethernet Connection

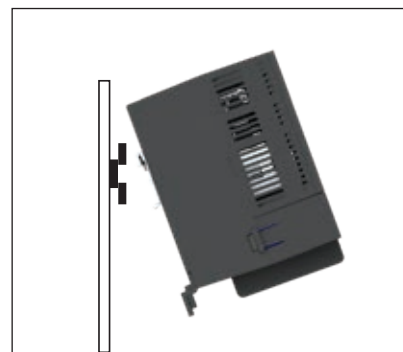
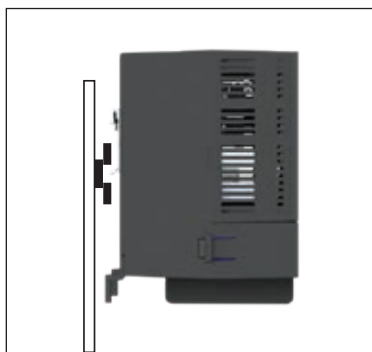
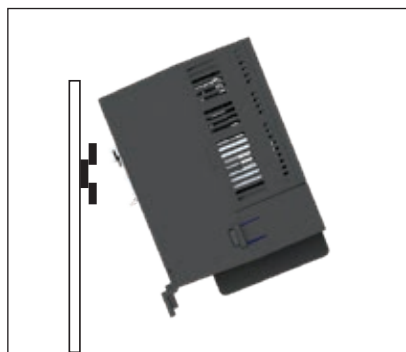


Mounting the Elexant 4020i

The Elexant 4020i module mounts onto a DIN 35 rail.

Mounting: Insert the rear top of the module into the DIN rail, then push down and inwards to engage the clip.

Removal: Push the module downwards to disengage the clip, then rotate the module toward you.



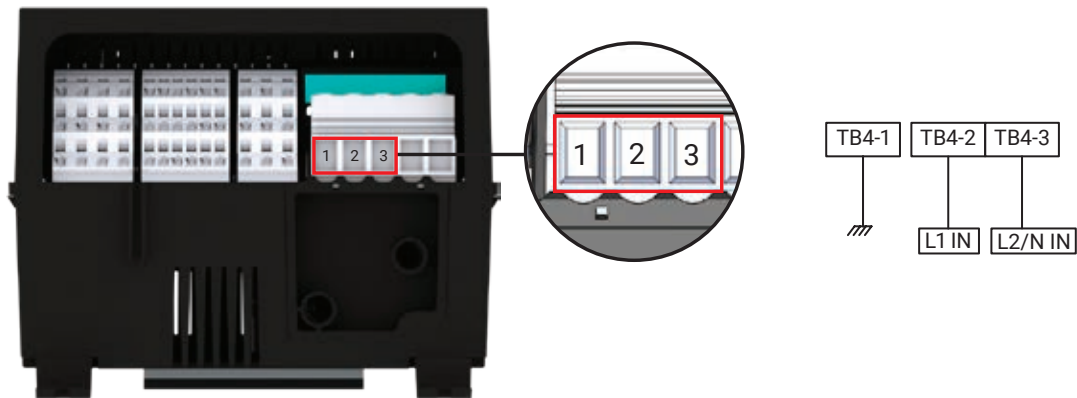
1

Input Power

The input power connection is made at the screw terminals on TB-4.

Refer to the CONNECTIONS section on page 3 for terminal block details.

The incoming ground connection should be terminated on the field terminal block located on the mounting plate.

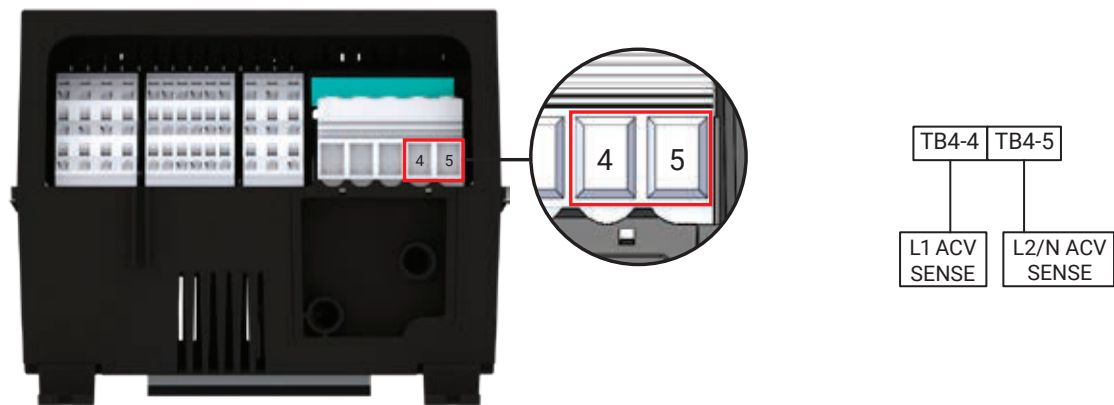


2

AC Voltage Sense

Connect either L-N or L-L of the load power for AC voltage sensing features (277 VAC Max).

Refer to the CONNECTION section on page 3 for terminal block details.



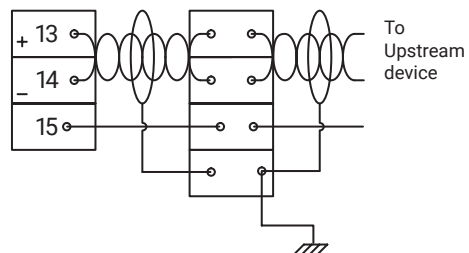
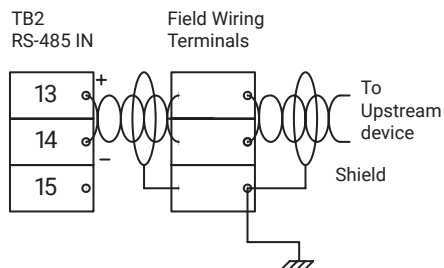
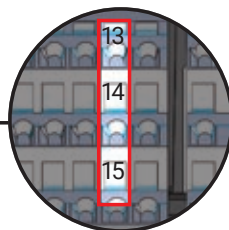
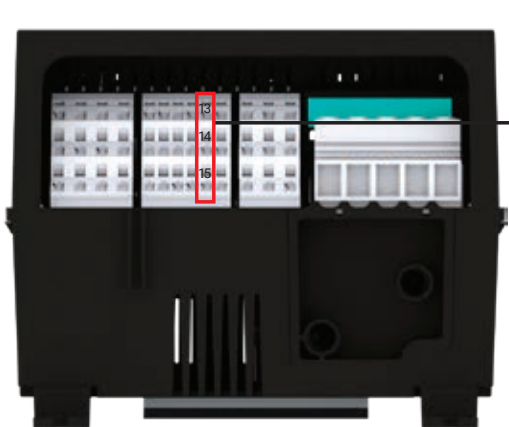
RS-485 IN

Wiring for RS-485 communications may be terminated on a panel mounted terminal block.

No shield wires should be terminated on terminals of TB2.

Refer to the CONNECTIONS section on page 3 for terminal block details.

Terminate cable shields on panel mounted field terminals.



For best performance, an additional third signal ground wire is connected between COM and the signal ground of the upstream device. This wiring method will reduce noise induced through ground potential differences.

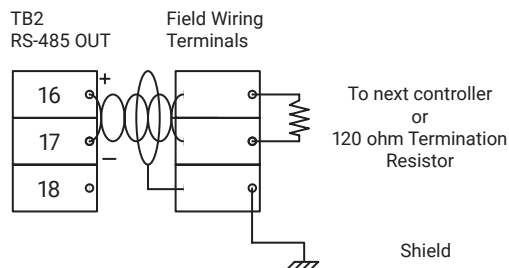
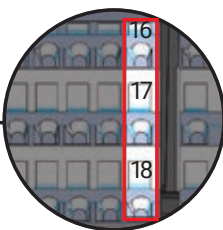
RS-485 OUT

Wiring for RS-485 communications may be terminated on a panel mounted terminal block.

No shield wires should be terminated on terminals of TB2.

Refer to the CONNECTIONS section on page 3 for terminal block details.

Terminate cable shields on panel mounted field terminals.



Note: Install a 120 ohm termination resistor as shown if this is the last device in the communications bus

5

Ethernet

An Ethernet connection is made via the RJ45 connector using a CAT 5E cable terminated with an RJ45 connector



6

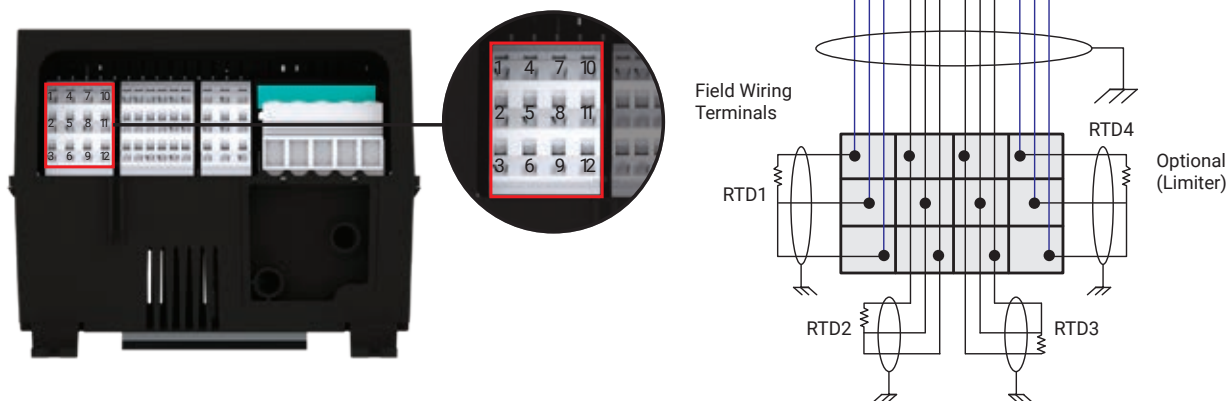
USB Connector

The USB connector on the front of the unit can be used to import and export User setting configurations for ease of programming units and uploading of new firmware.



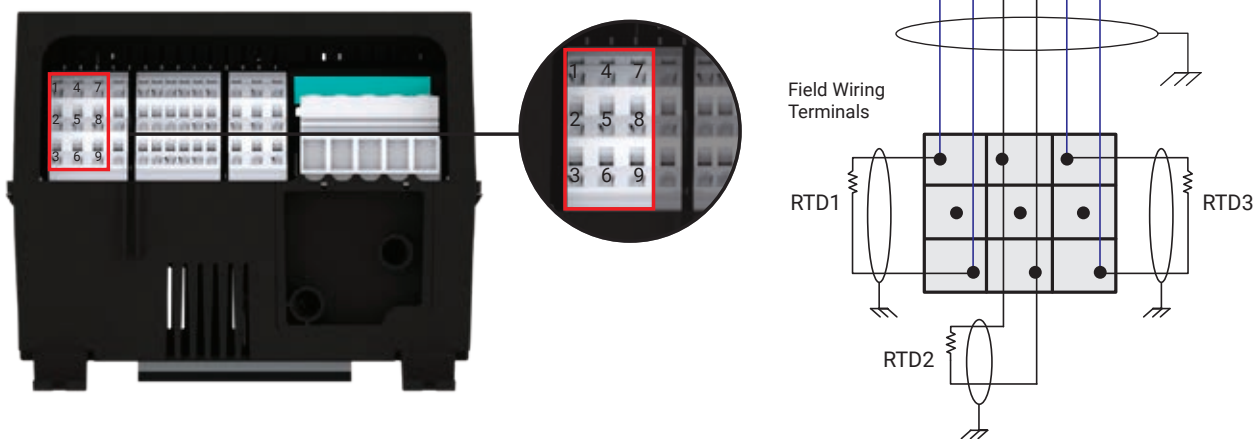
3-Wire RTD Connections

RTD field wires may be terminated on a panel-mounted terminal block. Connections are the same for all three RTD inputs and for the Limiter if included. Refer to the CONNECTION section on page 3 for terminal block details. Terminate cable shields on panel mounted field terminal.



2-Wire RTD Connections

For all RTD terminations, the RTD field wires must be terminated on a panel-mounted terminal block. Connections are the same for all three RTD's. Refer to the Connections section on page 3 for terminal block details. Terminate cable shields at the panel mounted field terminal block on chassis ground plate.



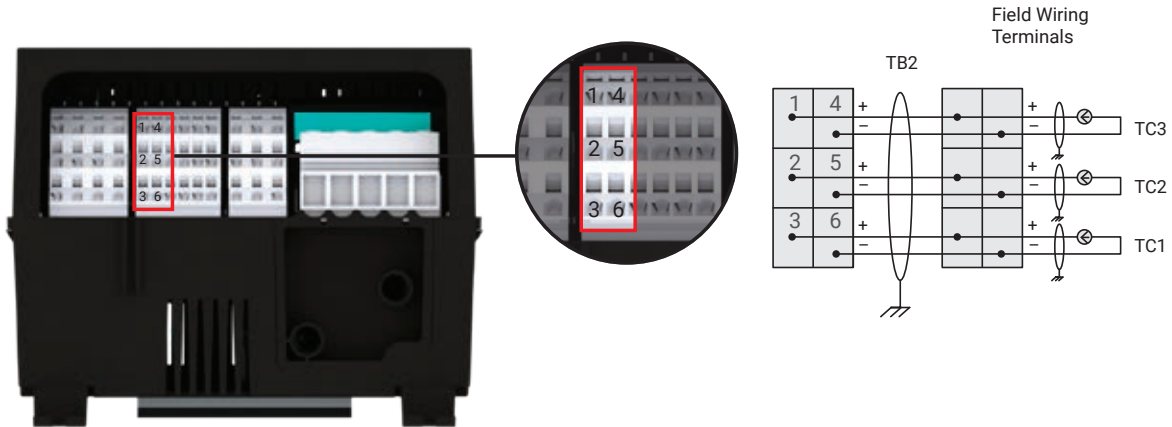
4 – 20 mA Connections

Wiring for 4-20 mA connections may be terminated on a panel mounted terminal block.

Connections are the same for all three 4-20 mA channels.

Refer to the CONNECTIONS section on page 3 for terminal block details.

Terminate cable shields on panel mounted field terminals.



Load Connections Contactor - Single Phase/Three phase

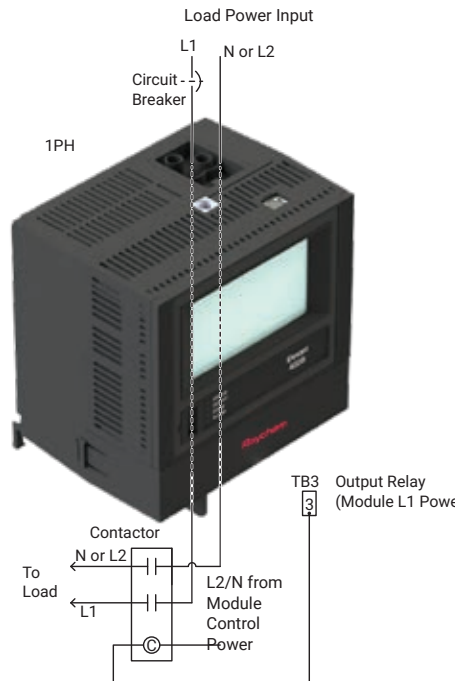
Exelant 4020i Single Phase

The output connection to the contactor coil is made using TB3. The internal pilot relay will switch the module supply voltage (up to 277 V) to the contactor coil.

Refer to the CONNECTIONS section on page 3 for terminal block details.

⚠ WARNING: Shock Hazard. Disconnect from live voltage prior to accessing terminals

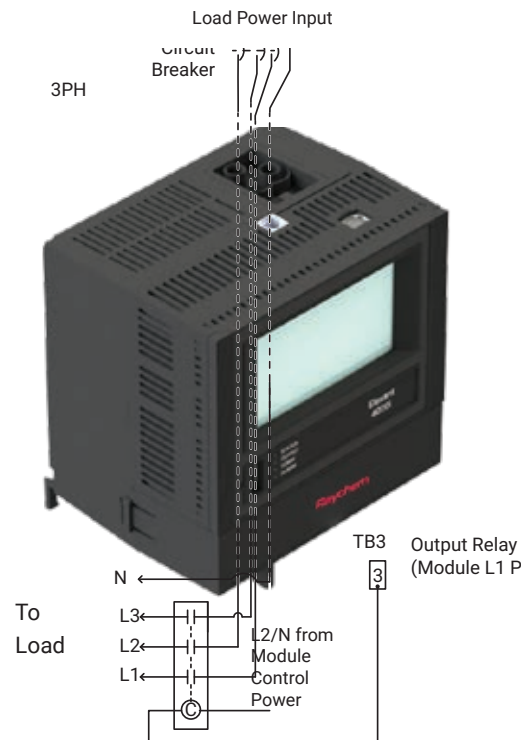
⚠ WARNING: Maximum wire OD is 8.70 mm. Refer to local Electrical Standards for information on proper wire size.



Exelant 4020i Three Phase

⚠ WARNING: Shock Hazard. Disconnect from live voltage prior to accessing terminals

⚠ WARNING: Maximum wire OD is 8.70 mm. Refer to local Electrical Standards for information on proper wire size.



Load Connections to SSR - Single Phase/Three phase

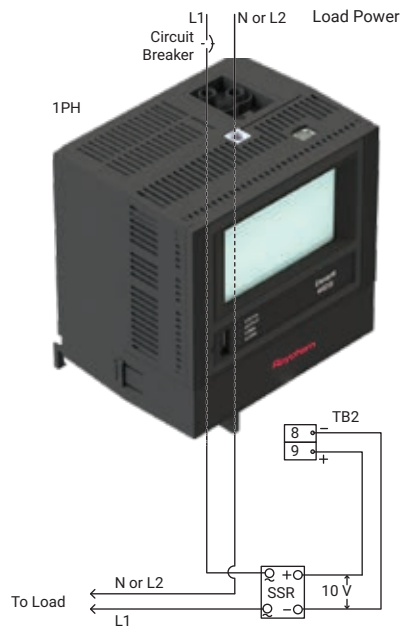
Elexant 4020i Single Phase, Single Pole

The control connections to the SSR are made using TB2. The internal SSR driver will provide a DC voltage to the SSR.

Refer to the CONNECTIONS section on page 3 for terminal block details.

⚠ WARNING: Shock Hazard. Disconnect from live voltage prior to accessing terminals

⚠ WARNING: Maximum wire OD is 8.70 mm. Refer to local Electrical Standards for information on proper wire size.



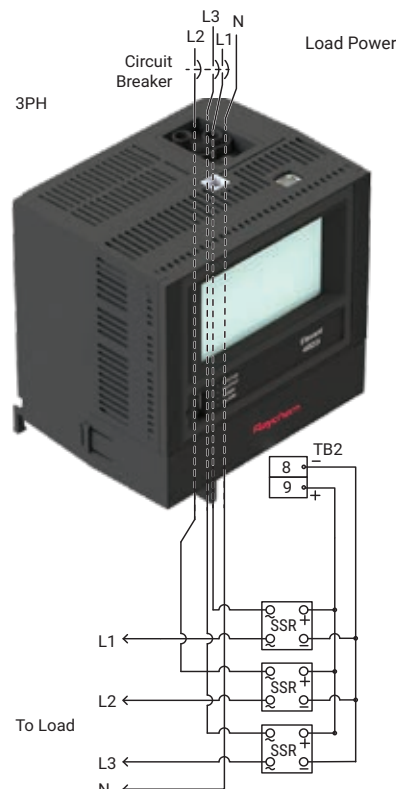
Elexant 4020i Single Phase Two Pole



⚠ WARNING: Shock Hazard. Disconnect from live voltage prior to accessing terminals

⚠ WARNING: Maximum wire OD is 8.70 mm. Refer to local Electrical Standards for information on proper wire size.

Elexant 4020i Three Phase



⚠ WARNING: Shock Hazard. Disconnect from live voltage prior to accessing terminals

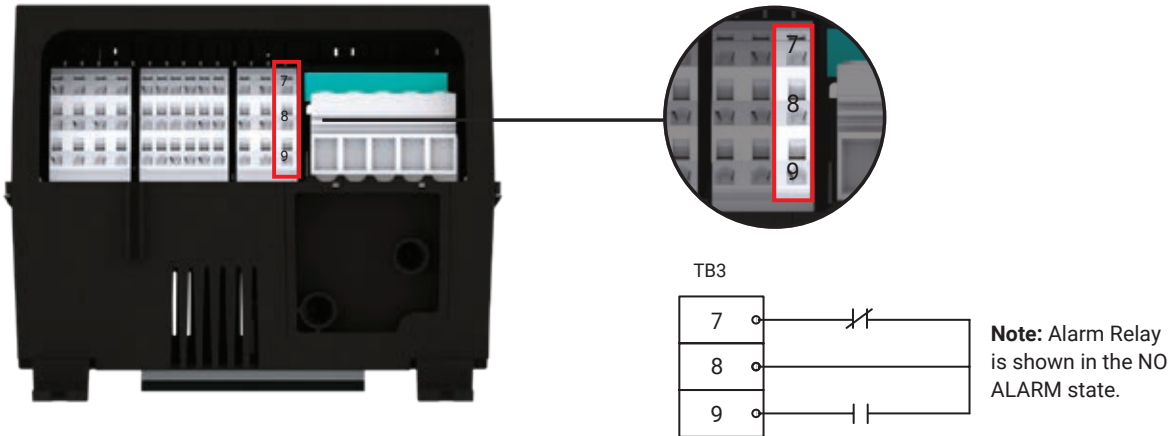
⚠ WARNING: Maximum wire OD is 8.70 mm. Refer to local Electrical Standards for information on proper wire size.

Alarm Relay

The multi-purpose Alarm relay is energized in the normal state (No Alarms), and configured as Fail Safe.

The alarm relay connections provide a Form C dry contact, rated at 277 V max (3 A).

Refer to the CONNECTIONS section on page 3 for terminal block details.

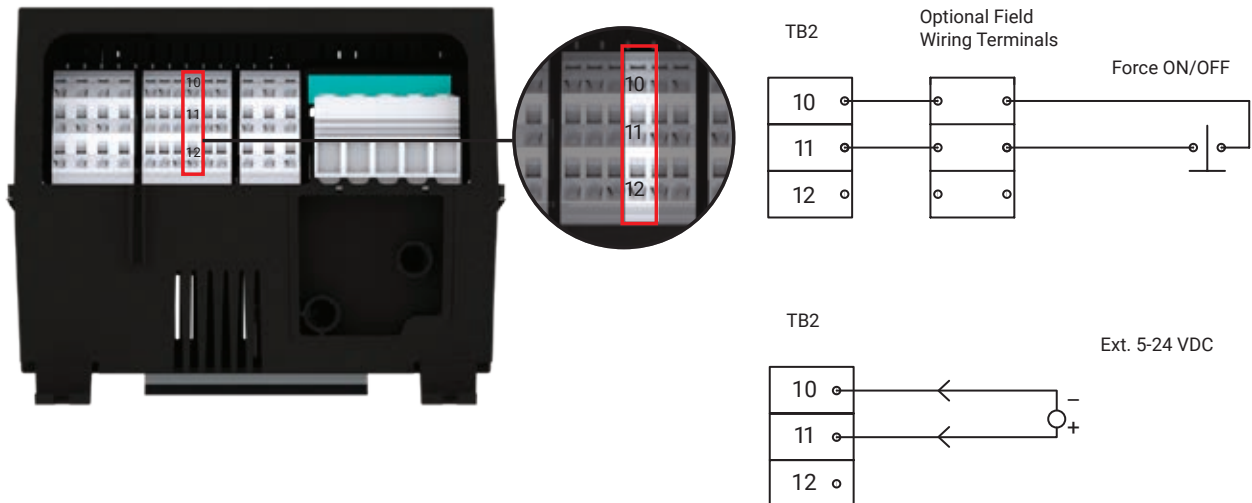


Digital Inputs

Digital Inputs Multi-purpose input for connection to external dry (voltage free) contact or DC voltage.

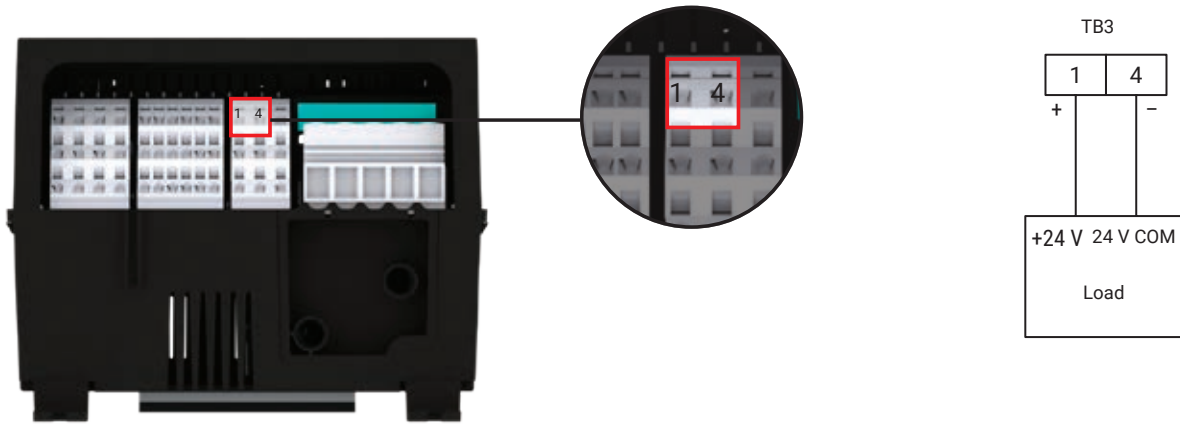
Rating 100 Ω max loop resistance or 5-24 Vdc @ 1 mA maximum

Refer to the CONNECTIONS section on page 3 for terminal block details.



AUX 24 V OUTPUT

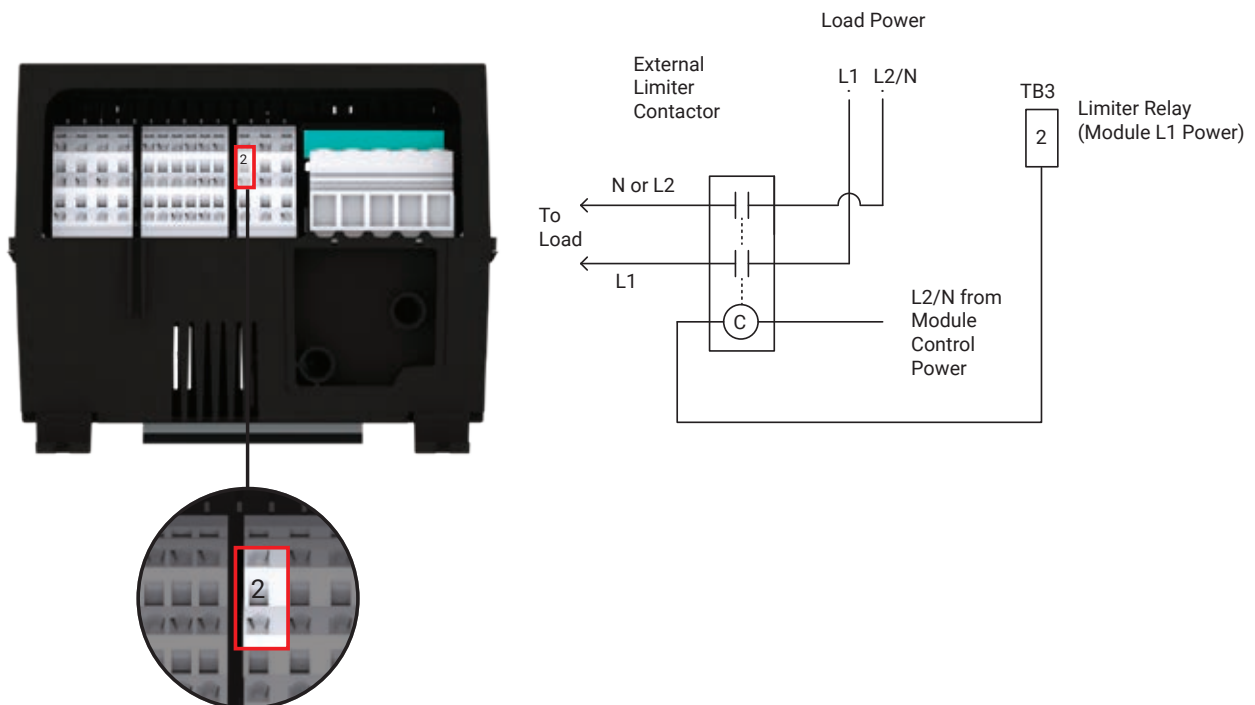
This 24 VDC may be used to power peripheral equipment if required. Refer to the CONNECTIONS section on page 3 for terminal block details.



Limiter Relay Connections

The optional Limiter contactor is placed in line with the load. When the limiter has tripped, the relay will interrupt the power to the load.

Refer to the CONNECTIONS section on page 3 for terminal block details.



Intrinsic Safety RTD Connections – If Equipped

For models that include Intrinsic Safety barriers for the RTD connections, the terminal block TB1 will be blue. Each RTD wiring pair is to be considered a separate circuit.

RTD1 Circuit: TB1-1, TB1-2, TB1-3

RTD2 Circuit: TB1-4, TB1-5, TB1-6

RTD3 Circuit: TB1-7, TB1-8, TB1-9

Limiter RTD Circuit: TB1-10, TB1-11, TB1-12

Associated Apparatus Entity Parameters

U_o (Maximum Output Voltage): 5.4 V

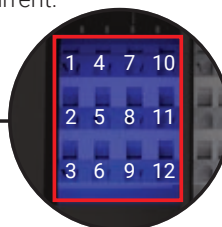
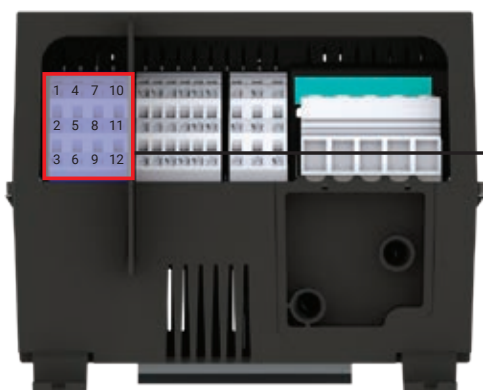
I_o (Maximum Output Current): 0.083 A

P_o (Maximum Output Power): 0.449 W

L_a (Maximum External Inductance): 2 mH

C_a (Maximum External Capacitance): 65 μ F

The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.



Intrinsically Safe RTD Terminal Connection

Class I, Division 2, Group A,B,C,D
Class I, Zone 2, Group IIC
IEC EX/ATEX/UKEx Zone 2



Class I, Div 1, Group A, B, C, D
Class I, Zone 1, Group IIC
Class I, Zone 0, Group IIC
IEC EX/ATEX/UKEx Zone 1, Zone 0



Specific Conditions of Use

This associated apparatus is intended for connection only to simple apparatus as defined in:

- Article 504.2 and installed and temperature classified in accordance with Article 504.10(D) of the National Electrical Code (ANSI/NFPA 70)
- Clause 3.5.5 and installed and temperature classified in accordance with Clause 16.4 of IEC 60079-14
- Section F3 in Appendix F and installed and temperature classified in accordance with Section F4.2 in Appendix F of the Canadian Electrical Code, Part 1 (C22.1)
- Or other local codes, as applicable.

When connecting to simple apparatus, the cable length shall not exceed 3000 m (9842 ft).

Associated apparatus must be installed in an enclosure suitable for the application in accordance with the National Electrical Code (ANSI/NFPA 70) for installation in the United States, the Canadian Electrical Code for installations in Canada, or other local codes, as applicable.

The associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.

Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.06 for installing intrinsically safe equipment.


Intrinsically safe circuits must be wired and separated in accordance with:


- Article 504.20 of the National Electrical Code (ANSI/NFPA 70)
- Clause 16.2 of IEC 60079-14
- Section F4.2 in Appendix F of the Canadian Electrical Code, Part 1 (C22.1)
- or other local codes, as applicable.


This associated apparatus has not been evaluated for use in combination with another associated apparatus.


Control equipment must not use or generate more than 305 V rms (Um) or dc with respect to earth.


- The enclosure of the device shall be fitted with a locking mechanism such that it is only accessible with the use of a tool.
- Provisions shall be made, external to the apparatus, to provide the transient protection device to be set at a level not exceeding 140% of the rated voltage at the input terminals of this apparatus.
- To maintain an internal pollution degree 2 environment, after opening the enclosure, make sure there is no visible condensation or dust. Power the device and let it heat up for 5 minutes before closing the enclosure door.
- Only install in areas with low risk of mechanical impact.
- This equipment must be mounted in an ATEX/UKEx/IECEx certified Zone 2 enclosure that provides a minimum ingress protection of IP 54 when used in a Zone 2 environment. The enclosure shall only be accessible with the use of a tool.


 **WARNING:** Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2 hazardous and nonhazardous locations

 **AVERTISSEMENT** - Risque D'explosion - La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2

 **WARNING:** Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous

 **AVERTISSEMENT** - Risque D'explosion - Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux

 **WARNING:** Explosion Hazard - To prevent the risk of electrostatic discharge, only clean the equipment enclosure with a damp cloth

 **AVERTISSEMENT** - Risque D'explosion - Pour éviter tout risque de décharge électrostatique, ne nettoyez le boîtier de l'appareil qu'avec un chiffon humide

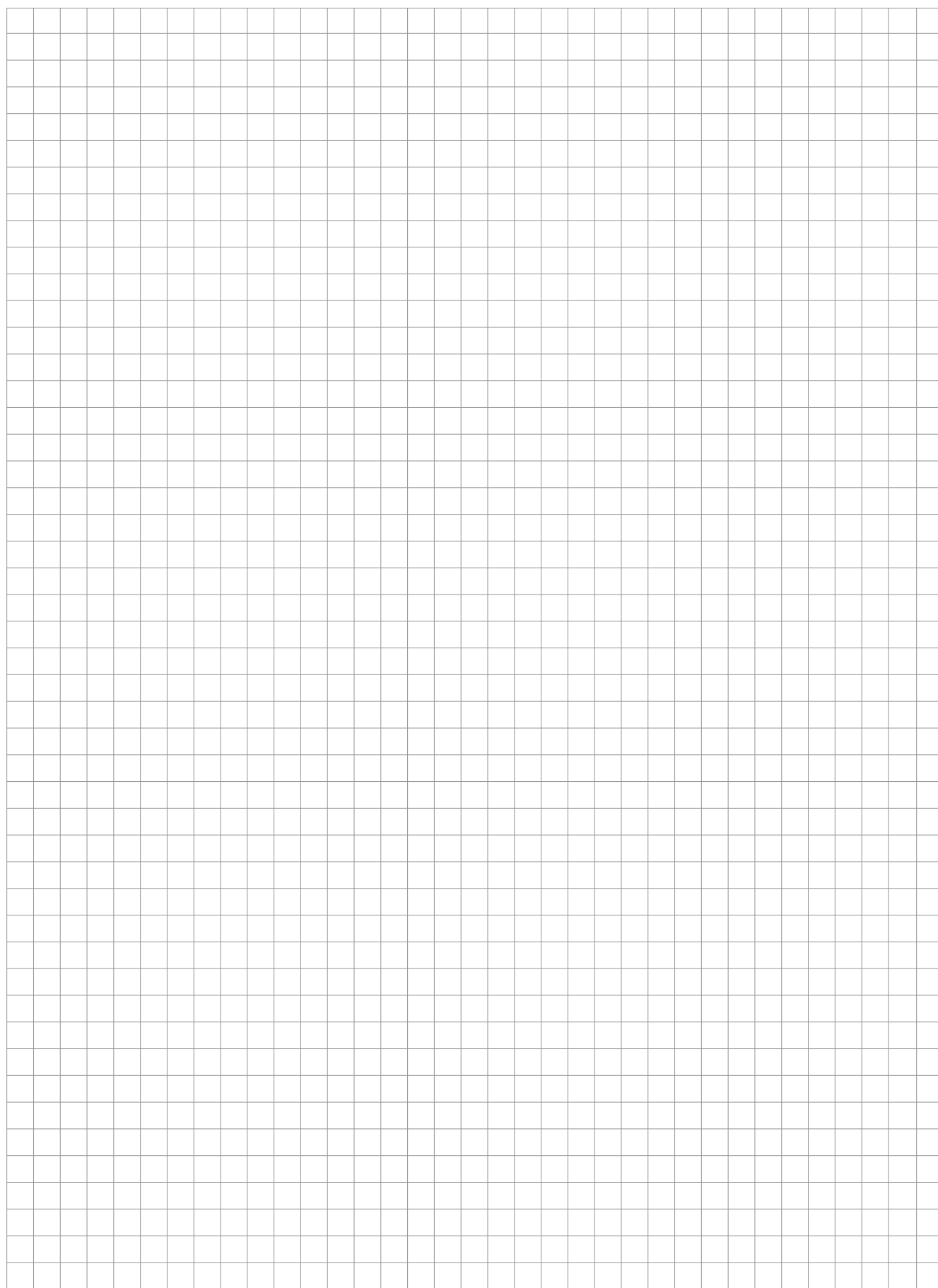
The Elexant 4020i contains no user serviceable parts. Contact your Chemelex representative for service and a Return Authorization number if required.

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chemelex
excellence is everything

Raychem

Tracer

Pyrotenax

Nuheat