

- Power controller

THYRITOP 20

H RL1 ----- MODEL

ENGLISH

User's manual



S A F E T Y I N S T R U C T I O N S

The following safety and operating instructions must be carefully read before assembly, installation and commissioning.

Obligation to give instructions

These operating instructions are part of the Thyristor switch Thyritop 20.

The operator of this device is obliged to provide, without restriction, these operating instructions to all persons transporting, commissioning, maintaining or performing other work on this device.

In accordance with the Product Liability Act, the manufacturer of a product has an obligation to provide explanations and warnings as follows:

- the use of the product other than for the intended use
- the residual product risk as well as
- operating errors and their consequences

The information given below must be understood in this respect. It is to warn the product user and protect him and his systems.

Proper use

- The Thyristor switch is a component which may only be used for control and regulation of electrical energy.
- The Thyristor switch may at most be operated using the maximum admissible connected load according to information on the type plate.
- The Thyristor switch may only be operated in connection with a suitable and series connected power supply disconnecting device.
- As a component, the Thyristor switch is unable to operate alone and must be projected for its intended use to minimize residual risks.

The Thyristor switch may only be operated in the sense of its intended use, otherwise hazards to persons (e.g. electric shocks, burns) and systems (e.g. overload) may arise.

Residual hazards of the product

- Even in case of proper use, should a fault occur, it is possible that control of currents, voltages and power is no longer performed in the load circuit by the Thyristor switch.

In case of destruction of the power components (e.g. break-down or high resistance), the following situations are possible: power interruption, half-wave operation, continuous power flow. If such a situation occurs, then load voltages and currents are produced from the physical dimensions of the overall power circuit. It must be ensured by system design that no uncontrolled large currents, voltages or power occur.

Maloperation and the results

- With maloperation it is possible that power, voltage or flow levels which are higher than planned reach the Thyristor switch or load. On principle, this can lead to the Thyristor switch or load being damaged.

Transport

- Thyristor switches are only to be transported in their original packaging (protection against damage e.g. due to jolting, knocking, soiling).

Installation

- If the Thyristor switch is brought into the operation room from a cold environment, moisture can occur. Prior to it being commissioned, the Thyristor switch must be absolutely dry. Therefore, wait for a minimum of two hours before commissioning.

Connection

- Prior to connection, it must be ensured that the voltage information on the type plate corresponds with the mains voltage.
- The electrical connection is carried out at the designated points with the required cross section and the appropriate screw cross sections.

Operation

- The Thyristor switch may only be connected to the mains voltage if it has been ensured that any hazard to people and system, especially in the load section, has been eliminated.
- Protect the device from dust and moisture
- Do not block vents.

Maintenance, service, malfunctions



CAUTION

For maintenance and repair work the Thyristor switch must be disconnected from all external voltage sources and protected against restarting. The voltage-free state is to be determined by means of suitable measuring instruments. This work is only to be carried out by a skilled electrician. The electrical regulations which are locally valid are to be adhered to.



CAUTION

The Thyristor switch contains dangerous voltages. Repairs may only be carried out by qualified and trained maintenance personnel.



CAUTION

Danger of electric shock. Even after disconnection from the mains voltage, capacitors may still contain a dangerously high power level.



CAUTION

Danger of electric shock. Even when the Thyristor switch is not triggered, the load circuit is not disconnected from the mains.



ATTENTION

Different components in the power section are screwed into place using exact torques. For safety reasons, power component repairs must be performed by CHAUVIN ARNOUX.

S A F E T Y I N S T R U C T I O N S

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➔ Safety regulations

Important instructions and explanations

The skilled personnel assembling and disassembling the devices, commissioning them and maintaining them must know and observe these safety regulations.



CAUTION

This instruction indicates work and operating procedures to be observed exactly to exclude hazards to persons.



ATTENTION

This instruction refers to work and operating procedures to be observed exactly to avoid damage or destruction of Thyritop 20 or parts thereof.



NOTE

This is where remarks on technical requirements and additional information is given which the user must observe.

Accident prevention rules

It is imperative that the accident prevention rules of the country of application and the generally applicable safety regulations are observed.



CAUTION

Before starting any work on Thyritop 20, the following safety regulations must be observed:

- switch voltage-free
- secure against switching on
- determine voltage-free state
- ground and short-circuit device
- cover or block neighbouring parts under voltage

Qualified personnel

Thyritop 20 may only be transported, installed, connected, commissioned, maintained and operated by specialists in command of the respective applicable safety and installation regulations. All work must be monitored by the responsible specialist personnel.

Intended use



CAUTION

The Thyristor switch may only be employed in the sense of its purpose of use (see the section of the chapter on safety instructions under the same name), otherwise hazards to persons (e.g. electric shocks, burns) and systems (e.g. overload) may occur.

Any unauthorized reconstruction and modification of Thyritop 20, use of spare and exchange parts not approved by CHAUVIN ARNOUX as well as any other use of Thyritop 20 is not permitted.

The person responsible for the system must ensure that:

- safety and operating instructions are available and observed,
- operating conditions and specifications are observed,
- protective installations are used,
- maintenance personnel are immediately notified or Thy 20 is immediately put out of commission if abnormal voltages or noises, higher temperatures, vibrations or similar occur, to determine the causes.

These operating instructions contain all information required by specialists for the use of Thyritop 20. Additional information and notes for unqualified persons and for the use of Thyritop 20 outside of industrial installations are not contained in these operating instructions.

The warranty obligation of the manufacturer applies only if these operating instructions are observed.

Warranty

No liability is assumed for employing applications not provided for by the manufacturer. The responsibility for the necessary measures to avoid hazards to persons and property is borne by the operator or the user. In case of complaints, please notify us immediately stating:

Type name	Production number
Complaint	Ambient conditions
Operating mode	Duration of use

Guidelines

The CE mark on the device confirms adherence to the general EC guidelines for 72/23 EEC – low voltage and for 89/339 EEC electromagnetic compatibility if the instructions on installation and commissioning described in the operating instructions are observed.

Remarks on the present operating instructions and Thyritop 20

Validity

These operating instructions refer to the latest technical specification of Thyritop 20 at the time of publication. The contents are not subject matter of the contract, but serve only as information. Modification of information contained in these operating instructions, especially technical data, operation, dimensions and weights, remain reserved at any time. AEG SVS reserves the right to content modifications and technical changes within the present operating instructions without obligation to notification. CHAUVIN ARNOUX is not obliged to update these operating instructions constantly.

Loss of warranty

Our supplies and services are subject to the general terms and conditions of delivery of the electrical industry as well as our general sales conditions. Any complaints on goods delivered are to be submitted, together with the delivery note, within eight days of receipt.

All guarantees made by CHAUVIN ARNOUX and its dealers will be cancelled without prior notice if other than original CHAUVIN ARNOUX spare parts or spare parts purchased by CHAUVIN ARNOUX are used for maintenance and repair.

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1. Introduction

Thyritop 20 meets the demands for simple assembly, speedy commissioning and safer operation.

For transport, assembly, installation, commissioning, operation and decommissioning, it is essential that the safety instructions included in these operating instructions are observed and made available to all persons handling this product.

In case of uncertainties or missing information, please contact your supplier.

1.1 General

Thyritop 20 is a Thyristor switch with the ability to communicate. It will also be referred to as power controller or simply controller. It can be used wherever voltages or currents need to be controlled or regulated in processing technology. With its good coupling ability to process and automation technology, high control precision and simple handling, Thyritop 20 is also future-orientated for new applications. The Thyritop 20 is suitable for a direct supply of ohmic loads.

1.2 Distinguishing features

Thyritop 20 has a wide range of distinguishing features, for instance:

- easy handling
- type range 230-500 Volts, 16-280A, single phase with additional 24V control voltage power supply also for mains voltages $> 0,43 \times U_{nom}$
- ohmic load
- load circuit monitoring
- relay indication
- operating modes 1:1, as well as 1:2, 1:3 and 1:5 (e.g. for commissioning)
- control with 24V signal (from 3V) via optional bus module
- series system interface
- electrical separation according to EN 50178 chapt. 3
- Connection for optional visualization and commissioning software

Options:

- Bus connection via bus adapter
Coupling to different bus systems, e.g. Profibus, Modbus RTU, CANopen, other bus systems on request.
- PC software Thyro-Tool Family, visualization and commissioning software

1.3 Type designation

The type designation of the Thyristor switch is derived from the construction of its power section:

Thyritop 20 1S	Thyristor switch with single phase power section suited for single phase loads
----------------	--

Example

...400-	with 400 Volt type voltage
...280	280 with 280 Amp type current
H	with integrated semi-conductor fuse
F	with ventilator (only 280 Amp types)
R	with indication relay
L	with load monitoring
1	designation Thyritop 20, 2002 series

The complete type range can be found in chapter 9, TYPE OVERVIEW.

➔ 2. Functions

2.1 Operating modes

Full wave switch

Depending on the digital set point signal (during set point = 1), the mains voltage is switched. In the operating mode 1:1 almost no harmonics are created. Whole multiples of the mains periods are always switched.

For commissioning etc, a reduced supply can be switched with the S1 switch or via the optional bus module, the control system thereby either forces the switching of every 2. wave or an equal number of positive and negative half waves.

In all operation modes d.c. components are avoided:

Operating mode	Load voltage
1:1	every mains full wave (nom. oper. mode, default setting)
1:2	every 2. mains full wave
1:3	every 3. mains full wave (d.c. free)
1:5	every 5. mains full wave (d.c. free)

2.1.1 Digital set point inputs

The Thyristor switch Thyritop 20 is equipped with two set point inputs which are electrically isolated from the mains for triggering signals:

- | | | |
|--|--|----------------------------|
| • Set point input 1 ¹⁾ | logic input 0-24 VDC ($R_i > 3.3 \text{ k}\Omega$) | IN: $U_{In} > 3 \text{ V}$ |
| • Set point input 2 | via bus module | |

2.2 Indications

The LEDs on the front signal the following states:

- | | | |
|---------------------|-------|--|
| • ON | GREEN | operating indication, power supply controller device |
| • LOAD FAULT | RED | fault present |

Blinking indications are described in chapter 3.2.

Activation of the integrated semiconductor fuse can be signalled using the K1 fault indicating relay (undercurrent detection).

Alarm relay K1

The relay K1 has a change over contact and is activated (default) if a fault is detected in the system (Chapt. 3.2). The functionality of the relay K1 can be changed by using Thyro-Tool Family. The following table shows the configuration of the corresponding terminals.

	Root	Make contact	Break contact
Alarm relay K1	X3.1	X3.2	X3.3

2.3 Monitoring

Thyritop 20 ...H RL1 signals faults occurring in the controller or load circuit. Signalling is performed via LED (LOAD FAULT) and via relay K1.

Monitoring of the mains voltage

The limiting values of the voltage are -57% for undervoltage monitoring and +10% for overvoltage monitoring. This produces the following absolute limiting values:

Type	Undervoltage	Overvoltage
230V	99V	253V
400V	172V	440V
500V	215V	550V

1) See also chapter 4.4 *DIGITAL SET POINT INPUT*

**NOTE**

The devices may only be operated up to the undervoltage limit if the electronics are supplied by an ext. 24V voltage. If the undervoltage limit is undercut the pulse lock is activated and relay K1 is released (default).

2.3.1 Load monitoring (undercurrent monitoring)

Thyritop 20 ... HRL1 is suited for monitoring loads which consist of one or several resistors in parallel or in series parallel connection.

Thyritop 20 recognises an increase in load resistance. The load monitor works as an undercurrent monitor on absolute values and is suitable for application in operating mode 1:1, and to a limited extent in operating modes 1:2, 1:3 and 1:5.

Load monitoring is delivered with the default setting OFF = left stop R205 (=0).

For all other settings the following applies:

If the load current undercuts the set level, the relay K1 is released with a delay (4 to 10 sec., depending on operating mode). The incident is indicated through a bus system which can be installed optionally.

A setting can be made according to the following table:

No. of parallel load resistances e.g.	Resistance increase in case of fault	$I_{load\ nom} / I_{type/controller}$	Recommended setting for poti R205	Poti revolutions ca.
1	Infinite	100%	50.0%	8.5
1		80%	40.0%	7
1		60%	30.0%	6
1		40%	20.0%	4.5
1		20%	10.0%	2.5
2	100.0%	100%	75.0%	12
2		80%	60.0%	9.5
2		60%	45.0%	7.5
2		40%	30.0%	6
2		20%	15.0%	3.5
3	50.0%	100%	83.3%	13
3		80%	66.7%	10.5
3		60%	50.0%	8.5
3		40%	33.3%	6
4	33.3%	100%	87.5%	13.5
4		80%	70.0%	12.5
4		60%	52.5%	9
4		40%	35.0%	6
5	25.0%	100%	90.0%	14
5		80%	72.0%	11.5
5		60%	54.0%	9
5		40%	36.0%	6.5

Tab. 1 Load monitoring

Deviating values are to be converted by percentage. The set monitoring value should always be "midpoint" between the value with load current and the value after interruption.



NOTE

Settings above 90% and below 10% are not practical. If low load currents are required, check if a controller with a lower type current can be used.

2.3.2 Equipment temperature monitoring

The control board is equipped with a temperature monitor.

If a fault occurs, the LED LOAD FAULT blinks and fault relay is activated (default).

2.3.3 Ventilator monitoring

The separately ventilated power controllers (F) are fitted with thermal monitoring. The temperature of the heat sink is measured. In case of a temperature overrange a LED indication is generated and relay K1 switches (default).

3. Operation

3.1 Configuration switch S1

A 4-pole DIL switch is situated at the front behind the hood. The individual switches are marked from 1-2 starting from the bottom and must be set before operation. They are only read in once when switched on (mains recovery). For safety reasons further operation is carried out with the hood closed. (3.2).

<u>S1-</u>	<u>1</u>	<u>2</u>	<u>Operating mode</u>
	0	0	1:1 operation, nominal operating mode (default setting)
	1	0	1:2 operation
	0	1	1:3 operation
	1	1	1:5 operation

For operations where initially no nominal load is possible (drying etc.) reduced power can be controlled by Thyritop 20 independently.

With 1:2 operation each 2. cycle is switched, with 1:3 and 1:5 operation half cycles are switched with alternating polarity so that while switched on the load is supplied with d.c.-free energy.

3.2 Thyro-Tool Family

Thyritop 20 1S...H1 is suitable for operation with the visualization and commissioning software Thyro-Tool Family. Special setting is necessary here:

<u>S1-</u>	<u>3</u>	
	0	Thyro-Tool mode not active
	1	Thyro-Tool mode active

Further information is contained in chapter 5.

3.3 Diagnosis / status indications

Faults can occur in the load circuit and in the controller itself or from the mains. Diagnosis of unexpected operating behaviour is performed by LEDs on the front panel of the control device.

Description:	LED's	Relay K1*	Description:
Frequency fault	Test LED blinks	open	outside 47Hz to 63Hz when switching on or zero crossing outside permissible tolerance range in operation
SYNC fault	Test LED blinks	open	Temp. monitoring responded (control board or contr. section)
Temp. monitoring	Test LED blinks	open	Load fault, undercurrent
Load fault	Load fault on	open	Controller fault
Flash values invalid	Load fault blinks	open	
Corr. values invalid	Test LED blinks		
Undercurrent	Test LED on	open	Mains fault
		* data for default	

Tab. 2 Status indications

➔ 4. External connections

Twisted or shielded control cables must be used to connect the control signals. If the controller is used in UL applications, only 60°C or 75°C copper conductors may be used for the power connections as specified in the Technical Data.

4.1 Power supply for Thyritop 20

Connecting the power supply is carried out as shown in the figures and TECHNICAL DATA.

4.2 Power supply for the control device

The control device is supplied directly from the power section (terminals U1, X1:1.2). This voltage also serves as mains synchronization. The mains connection is equipped for input voltages of $U_{nom} -15\%$ to $+10\%$ and nominal frequencies of 47Hz to 63Hz. Both terminals (X1:1.2 1.5mm² grid 3.81) are internally bridged. If a phase is connected to X1, a fused connection is necessary (figs. 4 and 5).

4.3 Additional control voltage input

The Thyristor switch Thyritop 20 is equipped with an additional 24V a.c./d.c. power supply input. [X11:1.2 1.5mm² grid 3.5].

If required, the control device can additionally be supplied with 24V a.c. or d.c., when operating with bus, for instance, or with voltages below the tolerance (e.g. with undervoltage of a 440V supply with a 500V Thyritop 20). The 24V voltage must be ungrounded (SELV) and may not be connected to the control ground. Several Thyritop 20 devices can be operated from a 24V supply. The input is reverse protected. The connection output for the control device is ca. 2W (5VA) per controller.

The 24V connecting lines must be fuse protected under valid regulations. A soldered fuse protects the device should internal short circuits occur.

4.4 Digital set point input

The set point input is a logic input to the terminals X11:1.2 (1.5mm² grid 3.5).

See also 2.1.1 Set point inputs.

It can be triggered with up to 24V d.c. between the terminals X22:1 (signal), 3 (ground). The signal ON recognizes the controller for input voltages > 3 Volt. The signal terminals can be connected with up to 1.5mm², in grid 3.5.

4.5 Block connection diagram

The above block connection diagram shows the functions of the H RL1 design. Central control element is a μ -controller.

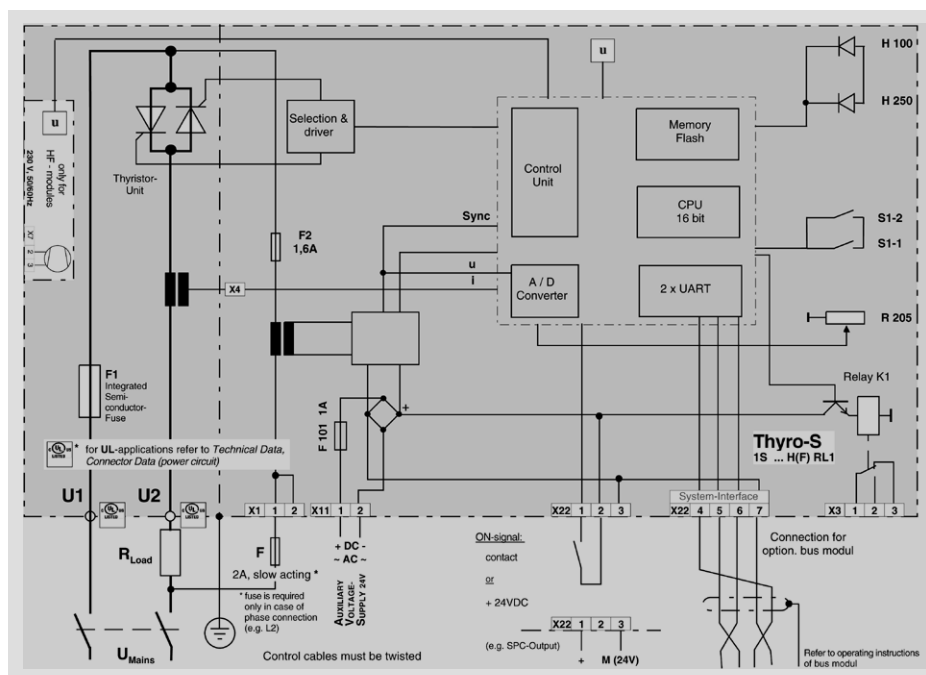


Fig. 1 Block connection diagram and connecting plan

4.6 Connections and terminal strips

This chapter describes all terminal strips and socket connectors.

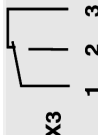
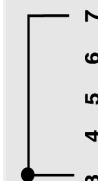


Indication relay K1			
	3	Opener, in case of fault closed	RM 5.08
	2	Closer, in case of fault open (rest current principle)	
	1	Root, common connection	
System interface			
	7	Control ground (5 / 3.3V)	RM 3.5
	6	RxD / connection to bus module	
	5	TxD / connection to bus module	
	4	Bus module recognition / set point selection	
	3	Ground	
	2	Pos. current supply unstabilized (can be used as source for K1.1)	
	1	Control signal (On > 3V)	
X22			
	2	24V additional voltage supply a.c. / - d.c.	RM 3.5
	1	24V additional voltage supply a.c. / + d.c.	
X11			
	2	L2/N supply connection - synchr. voltage supply frequency	RM 3.81
	1	supply connection – synchr. voltage supply frequency	RM 3.81
X1			
X4	Internal current transformer connection		

Fig. 2 Terminal plan







	H 100	LED	GREEN	ON	
	H 250	LED	RED	LOAD FAULT	
	S1- 3	Thyro-Tool mode			Chap. 3.2
	S1- 2	Operating mode			Chap. 3.1
	S1- 1	Operating mode			
	R 205	Load monitoring	LOAD FAULT		Chap. 2.3

Fig. 3 Operation

5. Interfaces

The Power Controllers of type range Thyritop 20...1 (and Thyritop 30...1) are all equipped with a system interface at terminal strip X22. Either a bus module or a PC interface with a PC connection can be operated from this.

5.1 Bus module at the system interface

The optional bus module enables the Thyritop 20 range Power Controller to be connected to a field bus. The bus module is hereby connected to the Power Controller's system interface (terminal strip X22) with prefabricated cables on the bus module side. Up to eight Thyritop 20 (or also combined with Thyro-A) can be connected to the bus system with one bus module, e.g. Profibus-DP, Modbus RTU or CANopen. The bus module connection configuration is identical for all available bus modules. Further information can be obtained from the operating instructions of the respective bus module.



REMARK

The access to set value, actual values and parameters made possible through bus provides further useful functions for application.

5.2 PC interface RS232 at the system interface

The Power Controller is connected to a PC via the serial interface (COM1, COM2 ...) with the PC-INTERFACE RS232. In addition, an RS232-DATALINE Order No. 0048764 is needed (not crossed, the connection 2, 3, 5, 4 and 7 are used). The PC-INTERFACE RS232 must be connected to the terminal strip X22 according to the instructions included.

5.2.1 Thyro-Tool Family

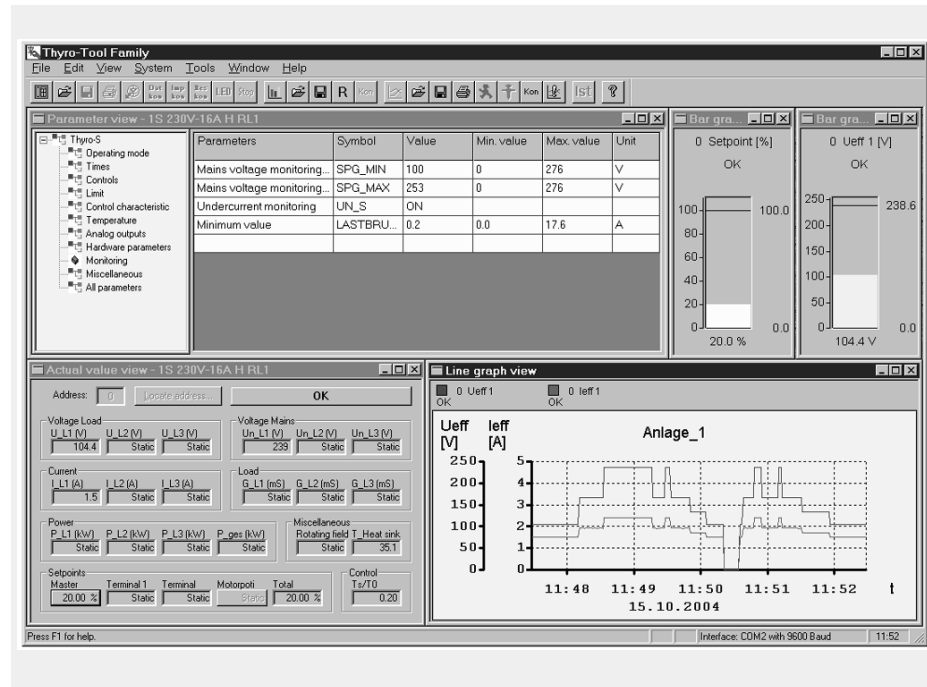


Fig. 4 User surface Thyro-Tool Family

Power Controllers of the Thyritop 20 range can be operated and set effortlessly with the aid of the PC software THYRO-TOOL FAMILY. Necessary for working with Thyro-Tool Family is that the connection between PC and Power Controller is present (see 5.2). This makes visual readings and parameter viewing possible. If Thyritop 20 is not operated in Thyro-Tool mode, certain parameters can be changed. In Thyro-Tool mode changes to almost all parameters are possible.

To change over the set point a switch can be connected to the PC-INTERFACE RS232 and X1.3. If these terminals are connected, the digital set point of THYRO-TOOL FAMILY is active. With open terminals the analogue set point at X2.4 is used.

➔ 6. Mains load optimization

Thyritop 20 is not suitable for mains load optimization in multiple controller applications. If mains load optimization is necessary, Thyristor controllers of type Thyritop 30 or Thyritop 40 must be used.

➔ 7. Connecting diagrams

Thyritop 20 can be employed in single phase switch and in three phase switches which can be transposed to single phase switches, e.g. star connections with MP conductor or N conductor and in open delta connection.

It is possible to apply 2 identical Thyritop 20 as a three phase saver circuit (with delta load or star without N), if the triggering signal for both controllers is set up at the same time. See fig. 6.

With the optional bus connection, inputs cannot be connected in series.

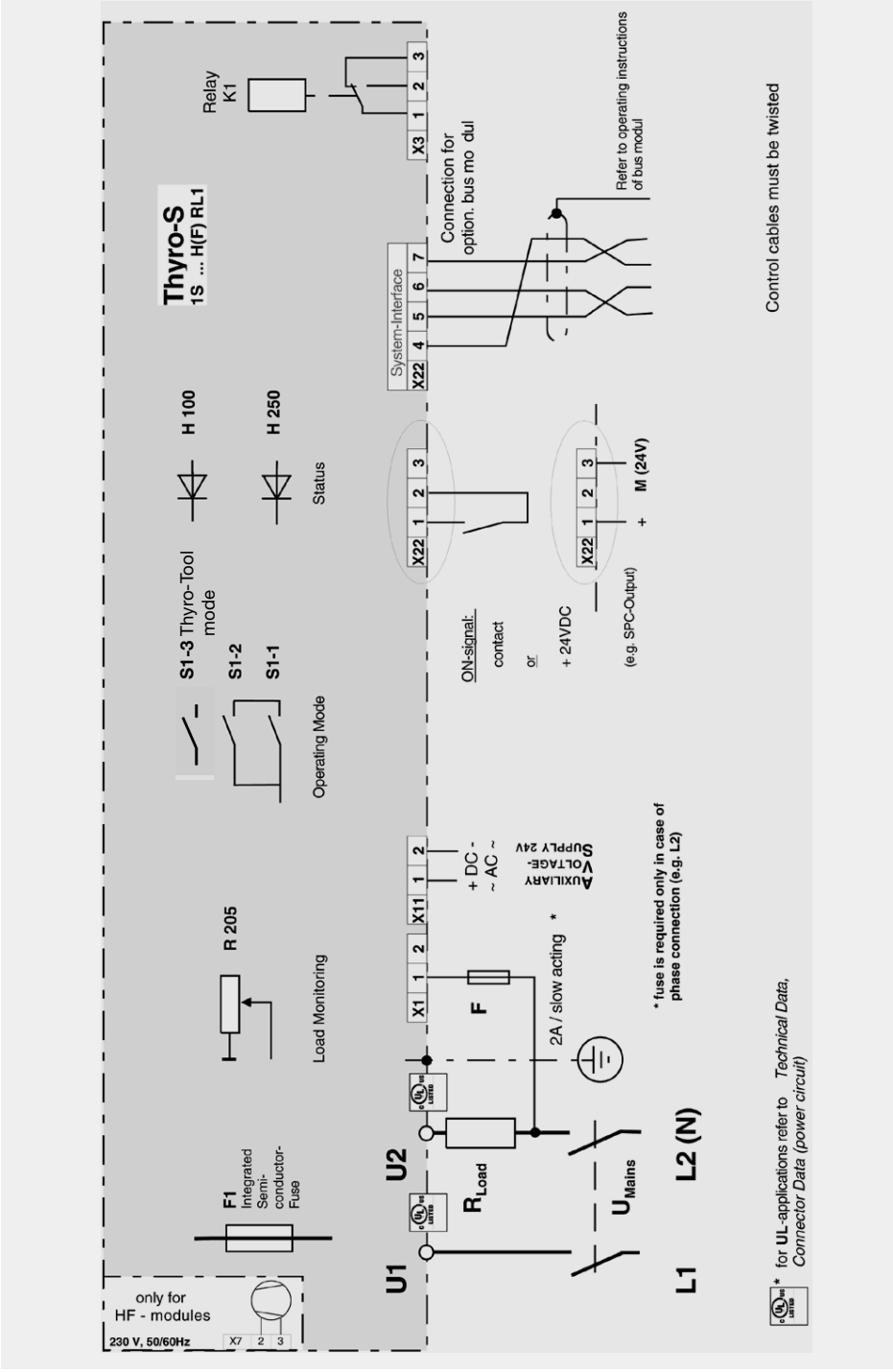


Fig. 5 Connecting diagram 1S

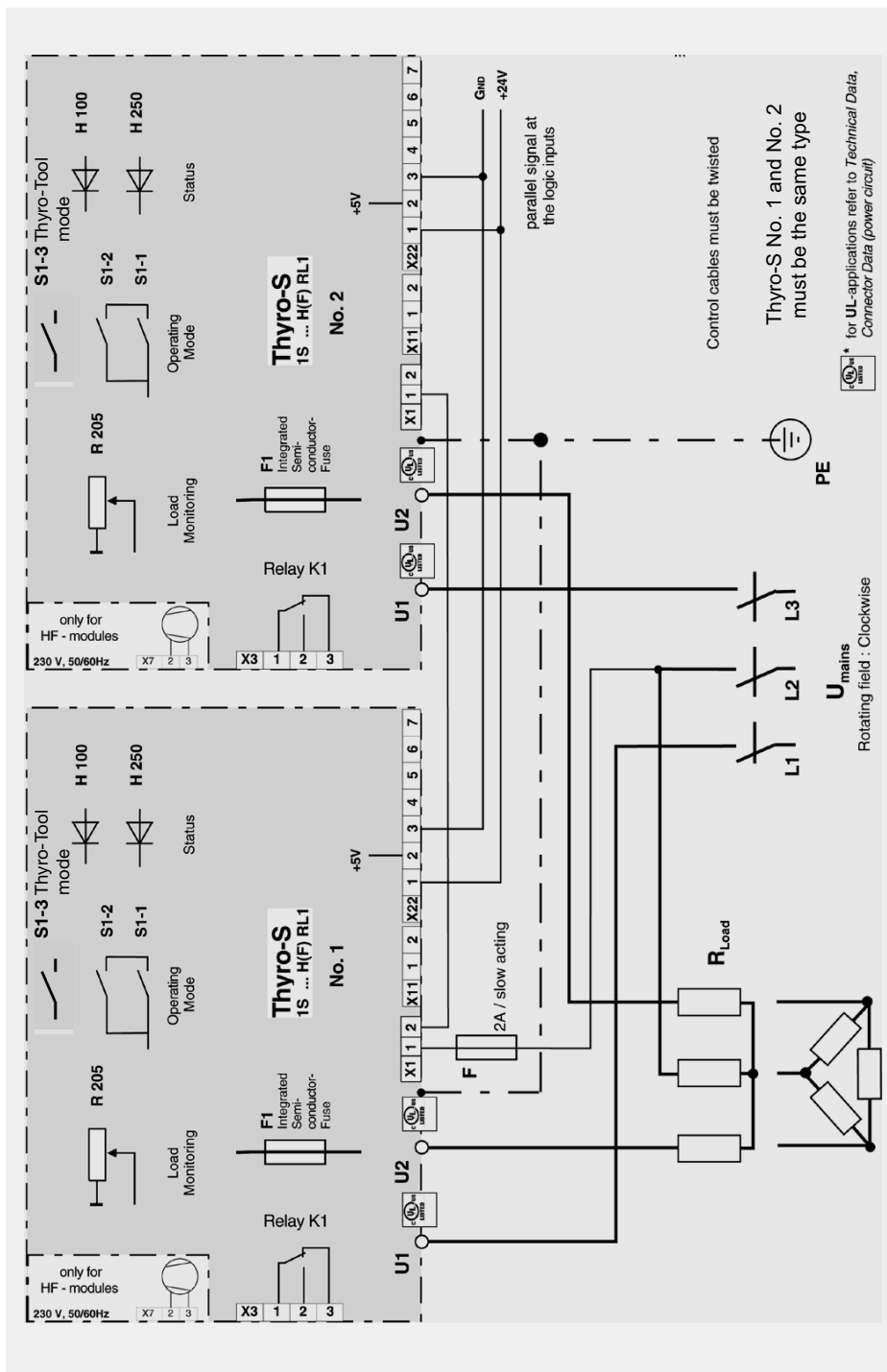


Fig. 6 Connecting diagram 2x1S

8. Special remarks

8.1 Installation

Thyritop 20 requires a vertical fitting position. With cabinet mounting sufficient ventilation of the cabinet must be ensured. The distance between the Power Controller and the cabinet ceiling or other mountings should be at least 150mm. The distance below the Power Controller should be at least 100mm. The devices may be installed next to each other without lateral distance. Heating up of the device by heat sources must be avoided. The dissipation of the Power Controller is stated in the Type overview table.



ATTENTION

Grounding must be carried out according to local electricity board regulations! (grounding screw for protective conductor connection on fastening adapter is provided).

The grounding also serves EMV devices (Y capacitor 4.7 nF).

For Thyritop 20 with type currents up to 60A adapters can be delivered for the 35mm top-hat rail assembly.

8.2 Commissioning

The device must be connected to the mains and the associated load according to the corresponding connecting plans.

On delivery the device is parameterized and adjusted to the respective power section. If a different operating mode is desired, then it must be set with the DIL switch 1 and 2 by the user (commissioning phase).



ATTENTION

Heat sinks and neighbouring plastic parts are hot during operation!

8.3 Service

The devices delivered have been produced under quality standard ISO 9001. Should nevertheless faults or problems occur

8.4 Checklist

- **LED ON green lights up** -> power supply available
- **LED ON green does not light up**

Check fuse control 500V 1.6A, if defective, check external wiring, also applies to faults of external fusing, check power controller fusing. If fuse is defect then check load and wiring to load. Synchronization voltage is supplied to X1.1 supply (load) voltage must also be supplied by 24V current supply.

Check 5 Volt between X22.2 (+) and X22.3 (ground). If this voltage is absent or too low, there is a defective component.

- **Supply available but no load current**

Check connection signal (digital set point) is present

Check for interruption in load circuit

Check blinking LED signals (chapt. 3.3)

- **Load current does not have expected value**

Check connection signal (digital set point) for continuous signal ON

With optional bus module:

Check bus connection signal (bus set point) for continuous signal ON

Check all parallel load resistances for current conduction

- **Load current flows uncontrolled**

Check connections in the controller (with initial commissioning)

In rare cases a Thyristor short-circuit can occur

➔ 9. Type overview

Thyristor switches with incorporated semiconductor, system bus interface, additional 24V d.c./a.c. control voltage supply, relay indication and load current monitoring.

Type 1S	Current	Type capacity [kW]			Dissipation [W]	Dimension in mm / kg				Dim. draw	Current transf.	Fuse F1
		230V	400V	500V		L	H	D	Weight			
H RL 1	16	3.7	6.4	8	30	45	131	127	0.7	851	40	20
H RL 1	30	6.9	12	15	47	45	131	127	0.7	851	40	40
H RL 1	45	10	18	22.5	48	52	190	182	1.7	853	100	63
H RL 1	60	14	24	30	80	52	190	182	1.7	853	100	80
H RL 1	100	23	40	50	105	75	190	190	1.9	854	100	200
H RL 1	130	30	52	65	150	125	320	237	4	856	150	200
H RL 1	170	39	68	85	210	125	320	237	4	856	200	315
HF RL 1	280	64	112	140	330	125	370	237	5	858	300	350

➔ 10. Technical data

Type voltage

230 Volt -15%	+10%	> 99V with addit. 24V supply
400 Volt -15%	+10%	> 172V with addit. 24V supply
500 Volt -15%	+10%	> 200V with addit. 24V supply

Mains frequency

all models 47Hz to 63Hz; $\Delta f = 6\text{Hz}$;
max. frequency change 5% per half wave

Load description

ohmic load

Operating modes

Name	Load signal, with digital set point = ON
1:1 =	all full wave = default setting
1:2 =	every 2. mains full wave
1:3 =	every 3. mains half wave (d.c. free)
1:5 =	every 5. mains halve wave (d.c. free)

Digital set point inputs (connection signals)

The Thyritop 20 has 2 set point inputs. Safety disconnected from the mains (SELV, PELV).

Set point 1: Logic input 0-24V $R_i > 3,3 \text{ k}\Omega$ ON $> 3V$
Set point 2: System interface, connection from superset automation system via optional bus module

Relay outputs

Change-over contact, contactor material: AgSnO₂ / Au plated.

The relay can be used for weak load circuits ($> 5V$ 20mA), but not after a prior load with 230V a.c.

Max. values; 250V 6A 180W, 1500VA

Insulation strength 4kV 8mm

Ambient temperature

35°C external cooling (F model with integrated ventilator)

45°C self air cooling

At higher temperatures it is possible to operate with reduced type current:

Temperature range up to 55°C: type current -2% /°C

Power connections

Type current	Connector U1,U2,	Earthing screw	Conductor cross sect.
16 A	Bracket / M4	Bracket / M4	6 mm ² , max.
30 A	Bracket / M4	Bracket / M4	6 mm ² , max.
45 A*	M 6	M 6	50 mm ² , max.
60 A*	M 6	M 6	50 mm ² , max.
100 A*	M 6	M 6	50 mm ² , max.
130 A	M 8	M 10	95 / 120 mm ²
170 A	M 8	M 10	95 / 120 mm ²
280 A	M 10	M 10	150 / 185 mm ²

With UL applications only use 60° or 60°C/75° copper conductors (except for control circuit).

* With UL applications only use 75°C copper conductors (except for control circuit).

Torques for connection screws [Nm]

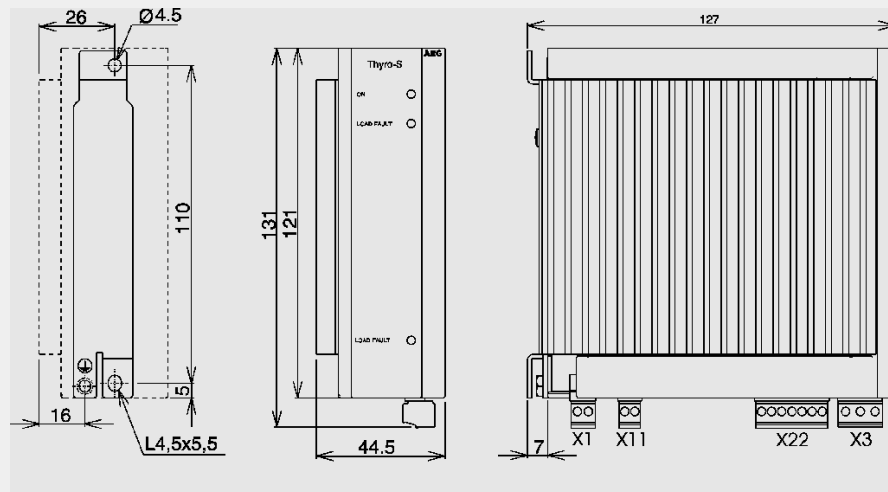
Screw	Min value	Nom. value	Max value
M 2	0.22	0.25	0.28 (Phoenix terminal)
M 4	0.85	1.3	1.7
M 6	2.95	4.4	5.9
M 8	11.5	17	22.5
M10	22	33	44

Ventilation 230V, 50-60Hz

Thyritop 20	Type current 50Hz	Type current 60Hz	Air volume	Noise level
1S 280 F	0.13A	0.13A	120m ³ /h	67dB(A)

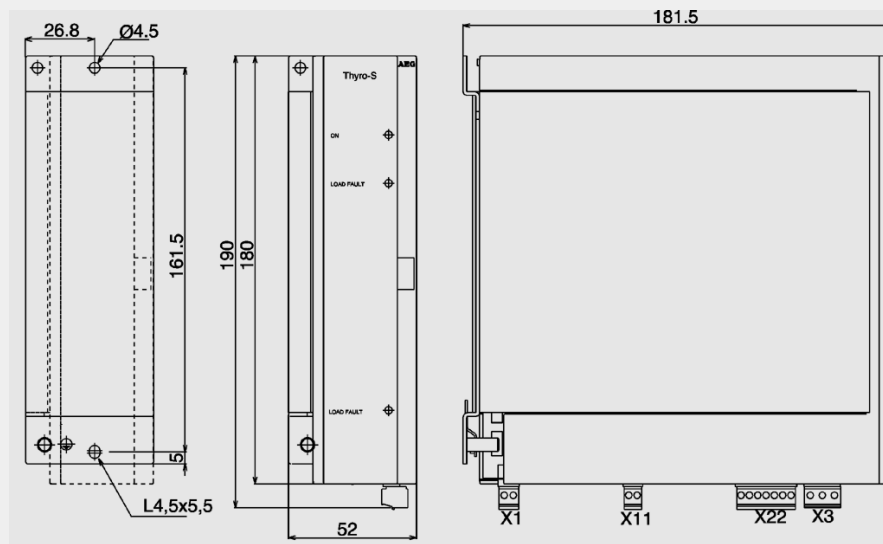
The ventilators must run with Thyritop 20 switched on, connection to X7

➔ 11. Dimensional drawings



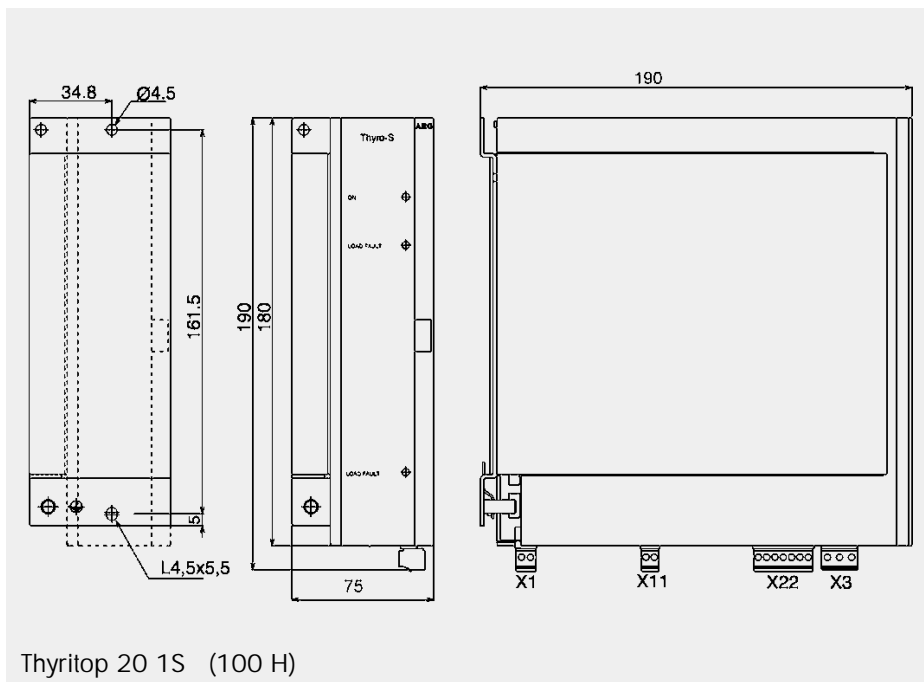
Thyritop 20 1S (16 H, 30 H)

Dimensional drawing 851

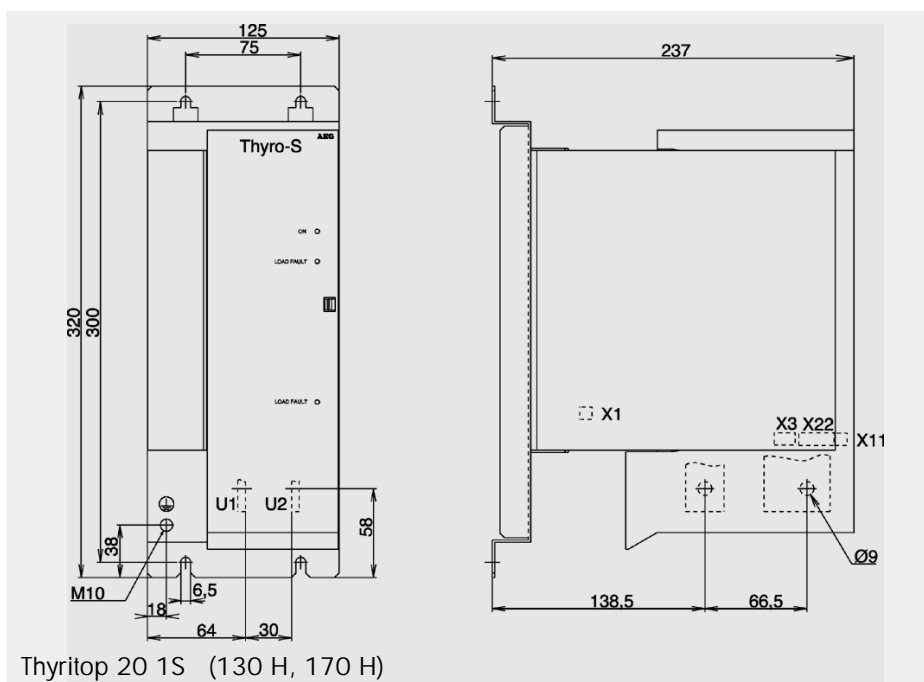


Thyritop 20 1S (45 H, 60H)

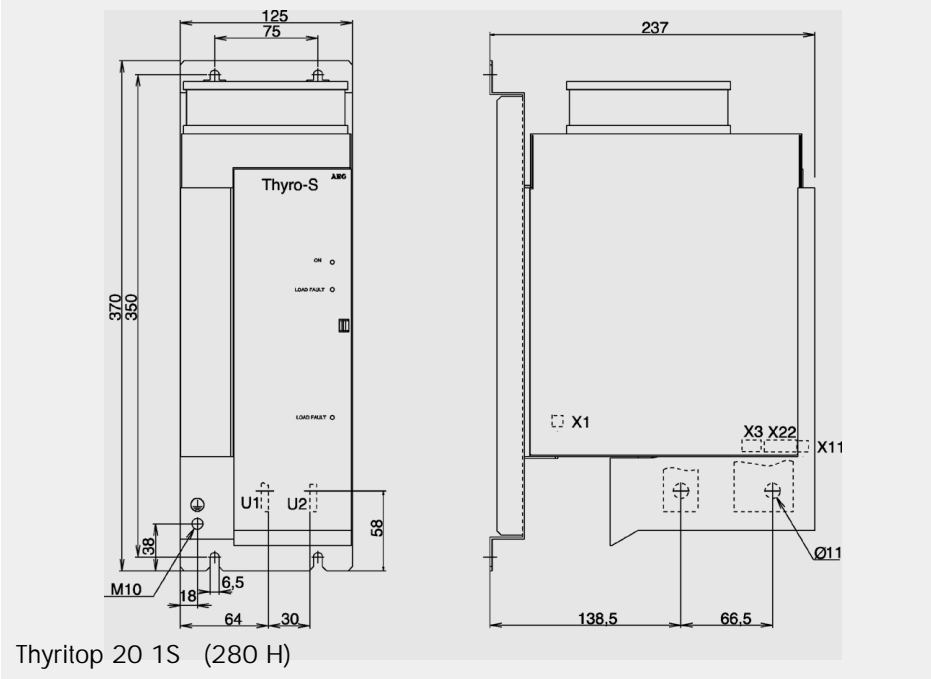
Dimensional drawing 853



Dimensional drawing 854



Dimensional drawing 856



Dimensional drawing 858

➞ 12. Accessories and options

Order no. 8.000.006.763 Support for 35mm snap-on assembly
16A and 30A

Order no. 8.000.010.791 Support for 35mm snap-on assembly for 45A and 60A

Order no. 2.000.000.380 PC software Thyro-Tool Family

Order no. 2.000.000.845 PC-Interface RS232 (requires additional data line)

Order no. 0048764 RS232 data line

Order no. 2.000.000.841 Bus module Profibus DP

Order no. 2.000.000.842 Bus module Modbus RTU

Order no. 2.000.000.843 Bus module CANopen

Order no. 2.000.000.848 Bus module connector cable for 4 controllers, 2.5m long

Order no. 2.000.000.849 Bus module connector cable for 4 controllers, 1.5m long

➞ 13. Approvals and conformities

No product norm exists for Thyristor switches so that a useful norm structure can be built up based on the corresponding basic norms ensuring reliable application and comparison potential.



CAUTION

Thyristor switches are not devices for disconnection in the sense of DIN VDE 0105 T1 and may therefore be operated only in connection with a suitable mains isolating device (e.g. switch, isolating link).

Approvals and conformities for Thyritop 20 are available

- Quality standard according to DIN EN ISO 9001
- UL registration, file no. E 135074, with consideration to Canadian National Standard C 22.2 No. 14-95
- CE conformity
- Low voltage directive 73/23 EEC
- EMV directive 89/336 EEC; 92/31 EEC



In detail

Conditions for use

Built-in unit (VDE 0160)

General requirements

Design, vertical installation

Operating conditions

DIN EN 50 178

DIN EN 60146-1-1:12.97

DIN EN 60 146-1-1; K. 2.5

Operating location, industry sector		CISPR 6
Temperature behaviour		DIN EN 60 146-1-1; K 2.2
Storage temperature		-25°C - +55°C
Transport temperature		-25°C - +70°C
Operating temperature		-10°C - +35°C with external cooling (280A) -10°C - +45°C with self air cooling -10°C - +55°C with reduced type current -2%/°C
Load class	1	DIN EN 60 146-1-1 T.2
Humidity class	F	DIN EN 50 178 Tab. 7
Overvoltage category	ÜIII	DIN EN 50 178 Tab. 3
Degree of pollution	2	DIN EN 50 178 Tab. 2
Air pressure		900 mbar * 1000m above NN
Safe isolation up to 500 V mains voltage:		DIN EN 50 178 Chap. 3
Air and creeping distances		casing / mains potential ≥ 5.5 mm casing / control potential ≥ 2.5 mm mains voltage /contr. potent. ≥ 8 mm interface /contr. Potent. -/- mains voltages interact 2.5 mm
Test voltage		DIN EN 50 178 Tab 18
Tests according to		DIN EN 60 146-1-1 4.
EMV noise emission		EN 61000-6-4
Noise suppr. control device	Class A	DIN EN 55011:3.91 CISPR 11
EMV noise resistance		EN 61000-6-2
Compatibility level	Class 3	EN 61000-2-4:7.95
ESD	8 kV (A)	EN 61000-4-2:3.96
Electromagnetic fields	10 V/m	EN 61000-4-3:3.95
Burst mains lines	2 kV (A)	EN 61000-4-4:.95
control lines	2 kV (A)	
Surge mains lines	2 kV unsym.	EN 61000-4-5:.95
	1 kV sym.	EN 61000-4-5:.95
control lines	0.5 kV	
Line-conducted		EN 61000-4-6

Further norms are adhered to, e.g. voltage dips according to 61000-4-11:8.94 are ignored by the control device or registered by triggering monitoring. Generally an automatic start is made after the mains returns within the tolerances.



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