

ACVATIX™

# Electrothermal actuators

STA.., STP..



# For radiator valves, small valves, zone and combi valves PICV

- ST..121.., STA126.., ST..162..: Operating voltage AC/DC 24 V
- ST..161..: Operating voltage AC 24 V
- ST..321.. ST..326..: Operating voltage AC 230 V
- Positioning force 125 N, 6.5 mm (ST..65..)
- Positioning force 100 N, 4 mm (ST..40..)
- Connection cables 1m, 2 m, 5 m, 10 m / halogen free: 1 m, 5 m, 10 m
- Direct assembly for valve threaded connection M30×1.5 mm
- IP54 housing protective class
- Visible position indicator 360°
- Thermal expansion element
- First open function for low force valve mounting for NC actuators
- Robust construction, quiet operation, no maintenance required
- Degree of pollution 2
- ST..121.., ST..161.., ST..162.., AC/DC 24 V protection class III, overvoltage category I (1500 V)
- ST..321.., ST..326.. AC 230 V, protection class II, overvoltage category II (2500 V)



#### Application

- Used in interior rooms.
- For Siemens valves:
  - Radiator valves: VDN.., VEN.., VUN..
  - Small valves: VD1..CLC.., VVP47.., VXP47.., VMP47..
  - Zone valves: VVI46.., VXI46..
  - PICV: VQP46.., VQI46.., VPP46..: DN 10, 15, 20, 25, 32, VPI46..: DN 15, 20, 25, 32
  - Radiator PICV: VPD..-135, VPE..-135, VPU..-135
- For third-party valves
  - Mounting with the appropriate adapter, see page 9
  - Comap, Danfoss, Giacomini, MMA Markaryd, Vaillant, Beulco, Strawa
  - Direct assembly using the ASA80 adapter (included)

Honeywell/MNG, Heimeier, Herz

#### Technical design

#### Actuator operation

The electro thermal actuators STA.. and STP.. feature silent operation and are maintenance-free.

When the control signal is applied to the actuator, the temperature of the heating element rises, which causes the solid expansion medium to expand. It transfers its stroke directly to the installed valve.

The valve starts to open after preheating beforehand for approximately 1.5 minute if the heating element is switched on in a cold state (room temperature) and achieves the maximum stroke after another ca. 3 min (AC 230 V) or 2 min (AC/DC 24 V).

The expansion elements cools down when switched off and the actuator spring closes the valve (NC variants).

	NC (normally closed)	NO (normally open)		
Actuator	STA	STP		
De-energized	<ul><li>Valve stem is fully extended</li><li>Valve (NO) is closed.</li></ul>	<ul> <li>Valve stem is retracted.</li> <li>The valve's (NC) own spring return closes the valve.</li> </ul>		
Action at startup	<ul> <li>Valve stem retracts.</li> <li>The valve's (NO) own spring return opens the valve.</li> </ul>	<ul><li>Valve stem is fully extended</li><li>Valve (NC) opens.</li></ul>		
Valve	Example:	Typical examples:		
	<ul> <li>Radiator valves (VN)</li> <li>Small valves (VD1CLC)</li> <li>Zone valves (VI46)</li> <li>Radiator PICV: VPD135, VPE135, VPU135</li> <li>VQ46, VP46: DN 10, 15, 20, 25, 32)</li> </ul>	• Small valves (VP47)		
State without actuator	<ul><li>Valve is open without actuator.</li><li>Valve stem is fully extended.</li></ul>	<ul><li>Valve is closed without actuator.</li><li>Valve stem is fully extended.</li></ul>		

# First open function

The NC version has a first open function (activated as part of the delivery). The first open function allows low-force assembly of the actuator and is used to flush the plant prior to commissioning. The First open function automatically unlocks once power is connected (for more than 6 min.) during commissioning.

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### **Definition NC/NO**

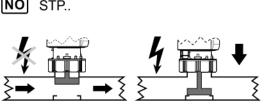
**NC** versions are closed when deenergized:

The valve is closed when idle after the actuator is assembled. The actuator spindle retracts and the valve opens as soon as the actuator is connected to power.

Valve state with deenergized actuator: Closed.

NC STA.. 4  $\rightarrow$   $\rightarrow$ NO STP..

**NO** versions open when deenergized: The valve is open when idle after the actuator is assembled. The actuator spindle fully extends and the valve closes as soon as the actuator is connected to power. Valve state with deenergized actuator: Open.



The valve is closed in a deenergized state for most valve applications featuring thermal actuators.

Actuators with the opposite control action are used when the reserved function is required: The valve is open in a deenergized state.

# $\Rightarrow$ NO function: STA.. + NC Valve / STP.. + NO valve

Response on a deenergized actuator				
Valve	Туре	STA	STP	
Radiator valves	VDN, VEN, VUN	Closed	Open <sup>1), 2)</sup>	
Small valves	VD1CLC	Closed	Open <sup>1), 2)</sup>	
	VVP47, VPI47, VMP47	A ↔ AB open <sup>1), 2)</sup>	A ↔ AB closed	
Zone valves	VVI46, VXI46	AB ↔ A closed	AB ↔ A open <sup>1), 2)</sup>	
PICV	VPD135, VPE135, VPU135 VPP46.10 VPP46, VPI46: DN 15, 20, 25, 32 VQP46, VQI46	Closed	Open <sup>1), 2)</sup>	

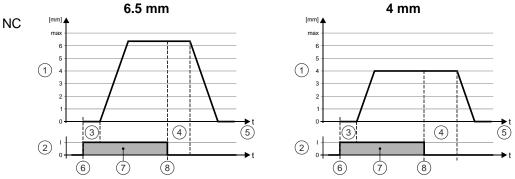
<sup>1)</sup> Controller must support NO valve-actuator combinations.

<sup>2)</sup> Combination not recommend since is does not make sense from an energy viewpoint outside demand periods.

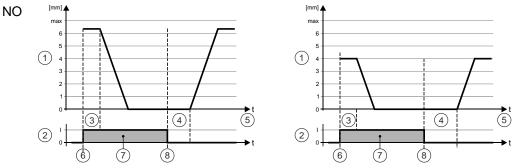
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# Positioning times, opening / closing

## 2-position



- When the voltage is switched on and after the dead time has elapsed, the valve is opened uniformly by stem movement.
- By switching off the voltage and after the hold-up time has elapsed, the valve is closed uniformly by the closing force of the compression spring.
- The closing force of the compression spring is matched to the closing force of the valves and keeps the valve closed when the valve is deenergized.

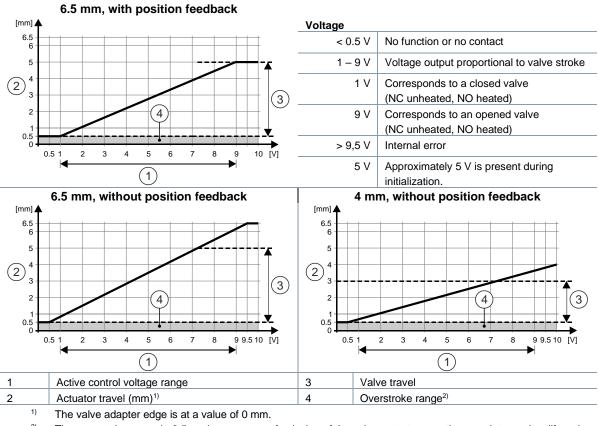


- When the voltage is switched on and after the dead time has elapsed, the valve is closed uniformly by stem movement.
- By switching off the voltage and after the hold-up time has elapsed, the valve is opened uniformly by the closing force of the compression spring.

1	Stroke		Stroke		4	Hold-up time (ca. 3 min.)
	Voltage	9	5	Time		
2	I	On	6	Switch-on time		
	0	Off	7	Voltage switched on		
3	3 Dead time (ca. 2 min.)		8	Switch off time		

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#### **Modulating control**



<sup>2)</sup> The overstroke range (~ 0,5 mm) ensures a safe closing of the valve actuator over the complete product lifecycle of the electrothermic actuator. As a result, the position indicator protrudes slightly.

Some room controllers control thermal actuators with PDM/TPI signals. This increases response time. The ambient temperature of the actuator must be <  $40^{\circ}$ C for optimum control.

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#### Valve travel detection

STA161.40L10	STA161.65L10	STA162.65L10
STP161.40L10	STP161.65L10	STP162.65L10

The actuator determines the valve travel and automatically adjusts the active control voltage range accordingly.

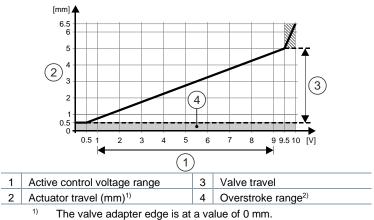
This enables the valve to be actuated even more precisely and prevents the drive from running empty. The full voltage stroke of the controller is used for flow control.

#### NC variant:

The actuator is opened without power by the "First open" function when delivered. During initial commissioning, the "First open" function is automatically unlocked by applying the operating voltage and valve path detection is carried out. The entire initialization process takes 25 minutes. The "First-open" function is unlocked after 6 minutes and the valve path detection is completed after another 19 minutes. The actuator is then fully operational.

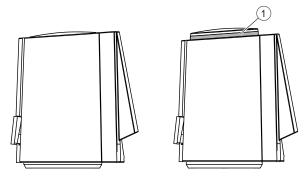
#### NO variant:

During initial commissioning, the valve path is detected by applying the operating voltage. The entire initialization process takes 19 minutes. The actuator is then fully operational.



<sup>2)</sup> The overstroke range (~ 0,5 mm) ensures a safe closing of the valve actuator over the complete product lifecycle of the electrothermic actuator. As a result, the position indicator protrudes slightly.

#### **Position indication**



The movement and position of the actuator valve is indicated by the stroke indicator (1).

The stroke indicator indicates:

- The valve stem is fully extended
- The NC valve is closed.
- The NO valve is open.

#### Type summary Туре Stock Stroke Position Positioning Operating Auxiliary Position **Connection cable** deenergized number signal switch feedback voltage STA121.65L10 S55174-A201 NC AC/DC 24 V STP121.65L10 S55174-A203 NO 1 m STA321.65L10 S55174-A200 NC AC 230 V STP321.65L10 S55174-A202 NO S55174-A205 STA121.65L20 NC AC/DC 24 V STP121.65L20 S55174-A207 NO 2 m STA321.65L20 S55174-A204 NC AC 230 V STP321.65L20 S55174-A206 NO 2-position STA121.65H20 S55174-A208 AC/DC 24 V 2) 2 m 6,5 mm Halogen-free STA321.65H20 NC S55174-A209 AC 230 V 2) S55174-A211 STA121.65/00 AC/DC 24 V STP121.65/00 Not included: S55174-A213 NO See "Cable overview" STA321.65/00 S55174-A210 NC on page 8 AC 230 V STP321.65/00 S55174-A212 NO STA161.65L10 S55174-A214 NC AC 24 V STP161.65L10 S55174-A215 NO DC 0..10V Yes STA162.65L10 S55174-A216 NC STP162.65L10 S55174-A217 NO AC/DC 24 V STA121.40L10 S55174-A219 NC STP121.40L10 S55174-A221 NO 1 m STA321.40L10 S55174-A218 NC AC 230 V 2-position STP321.40L10 S55174-A220 NO 4,0 mm STA126.40L10 S55174-A225 AC/DC 24 V Yes STA326.40L10 S55174-A224 NC AC 230 V STA161.40L10 S55174-A222 Yes DC 0..10V AC 24 V STP161.40L10 S55174-A223 NO

<sup>1)</sup> NC = Normally Closed = (Valve) closed when deenergized NO = Normally Open = (Valve) open when deenergized

2) Halogen free as per VDE 0207-24

#### **Cable overview**

Туре	Stock number	Description	Cable length	Actuators
ASY21L10	S55845-Z278	PVC cable	1 M	
ASY21L20	S55845-Z279	PVC cable	2 m	
ASY21L50	S55845-Z280	PVC cable	5 m	STA121.65/00,
ASY21L100	S55845-Z281	PVC cable	10 m	STA321.65/00, STP121.65/00,
ASY21L10H	S55845-Z282	Halogen-free cable	1 m	STP321.65/00,
ASY21L50H	S55845-Z283	Halogen-free cable	5 m	
ASY21L100H	S55845-Z284	Halogen-free cable	10 m	
ASY61L10	S55845-Z285	PVC cable, no position feedback	1 m	
ASY61L20	S55845-Z286	PVC cable, no position feedback	2 m	
ASY61L50	S55845-Z287	PVC cable, no position feedback	5 m	
ASY61L100	S55845-Z288	PVC cable, no position feedback	10 m	
ASY61L10H	S55845-Z289	Halogen-free cable, no position feedback	1 m	
ASY61L50H	S55845-Z290	Halogen-free cable, no position feedback	5 m	STA161.65L10
ASY61L100H	S55845-Z291	Halogen-free cable, no position feedback	10 m	STA162.65L10
ASY62L10	S55845-Z292	PVC cable, position feedback	1 m	STP161.65L10
ASY62L20	S55845-Z293	PVC cable, position feedback	2 m	STP162.65L10
ASY62L50	S55845-Z294	PVC cable, position feedback	5 m	
ASY62L100	S55845-Z295	PVC cable, position feedback	10 m	
ASY62L10H	S55845-Z296	Halogen-free cable, position feedback	1 m	
ASY62L50H	S55845-Z297	Halogen-free cable, position feedback	5 m	
ASY62L100H	S55845-Z298	Halogen-free cable, position feedback	10 m	

Smart Infrastructure

#### Adapter for third-party valves

Туре	Order number	For valves manufactured by
ASA04H	S55845-Z304	Beulco floor heating
ASA10	S55845-Z305	Strawa floor heating
ASA26	S55845-Z299	Giacomini
ASA59	S55845-Z300	Danfoss RAV/L
ASA72	S55845-Z301	Danfoss RAV
ASA78	S55845-Z302	Danfoss RA
ASA80	S55845-Z303	M30×1.5
AV52 1)	BPZ:AV52	СОМАР
AV59 <sup>1)</sup>	BPZ:AV59	Vaillant
AV61 <sup>1)</sup>	BPZ:AV61	MMA Markaryd

<sup>1)</sup> Assembled with adapter for third-party valves and adapter ASA80

#### Scope of delivery

Actuators, valves and accessories are supplied in separate packages. Adapter ASA80 is included with the actuator.

#### Ordering (example)

With Siemens valves and direct assemble on third-party valves

Туре	Stock number	Designation	Number of pieces
STA321.65L10	S55174-A200	Electrothermal actuators	1

#### With adapter for third-party valves, see Accessories, page 9

Туре	Stock number	Designation	Number of pieces
STP161.65L10	S55174-A215	Electrothermal actuators	1
ASA78	S55845-Z302	Third-party valve adapter on Danfoss RA	1

#### With cable, see "Cable overview" on page 8

Туре	Stock number	Designation Number	
STA321.65/00	S55174-A210	Electrothermal actuators	1
ASY21L100H	S55845-Z284	Halogen-free cable 10 m	1

With cable and adapter for third-party valves, see Accessories, page 9

Туре	Stock number	Designation	Number of pieces
STA121.65/00	S55174-A211	Electrothermal actuators	1
ASA26	S55845-Z299	Giacomini	1
ASY21L50	S55845-Z-280	PVC cable: 5m	1

#### **Equipment combinations**

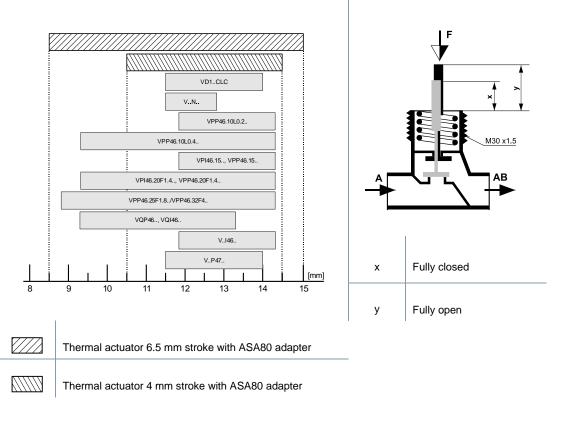
Valve type	Valve type	Actuator	k <sub>vs</sub> [m³/h]	∨ [l/h]	PN class	Data sheet
VDN, VEN, VUN	Radiator valves	STA40	0.091.41	-		N2105, N2106
VPD135, VPE135, VPU135	Pressure independent control valves (PICV)	STA40	-	20135	PN 10	A6V13089932
VD1CLC	Small valves	STA40	0.252.6	-		N2103
VVI46, VXI46	Zone valves	STA65	25	-	DNAC	N4842
VVP47, VXP47, VMP47	Small valves	STP65	0.254	-	PN16	N4847
VPP46, VPI46: DN 10, 15, 20, 25, 32	PICV	STA65, STP65	-	303400	PN25	N4855
VQP46, VQI46	PICV	STA65	-	301800		A6V11877580

#### Siemens valves

k<sub>vs</sub> Flow nominal value for cold water (5...30 °C) through a fully opened valve (H<sub>100</sub>) at a differential pressure of 100 kPa (1 bar)

V Volumetric flow at 0.5 mm stroke

#### Siemens valves closing dimension



#### Third-party valves

- Beulco
- COMAP
- Danfoss
- Giacomini

•

- Honeywell/MNG
  - Heimeier
- Herz

Strawa

- MMA Markaryd •
- Watts (Cazzaniga)

.

Vaillant

10

Title	Contents	Document ID
Electrothermal actuators STA, STP	Data sheet: Product description	A6V14028280
Electrothermal actuators STA, STP,	Additional mounting instruction	A5W00365796 (A6V14047515)
Electrothermal actuators		
ST161.40L10		A5W00438734A (A6V14084612)
ST321.40L10		A5W00438744A (A6V14084638)
ST121.40L10		A5W00438748A (A6V14084639)
ST162.65L10		A5W00438750A (A6V14084666)
ST161.65L10		A5W00438753A (A6V14084669)
ST121.65	Mounting instructions	A5W00442573A (A6V14084671)
ST321.65		A5W00442575A (A6V14084672)
ST321.65/00		A5W00442578A (A6V14084673)
ST121.65/00		A5W00442580A (A6V14084674)
ST126.40L10		A5W00442582A (A6V14084676)
ST326.40L10		A5W00442584A (A6V14084677)
Valves		
Product range overview	Data sheet: Product description	N2100
Radiator valves VDN1, VEN1		N2105
ST121, VDN2, VEN2, VUN2	1	N2106
Pressure independent control valves (PICV) VPD135, VPE135, VPU135		A6V13089932
Small valves (VD1CLC.)		N2103
2-port and 3-port zone valves PN16 VVI46, VXI46		N4842
2-port and 3-port zone valves PN16 VVP47, VXP47		N4847
	-	

PICV PN25 VPP46.., VPI46..

Open/close PICV PN25 VQP46.., VQI46..

N4855

A6V11877580

# Notes

Safety

# 



**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage.

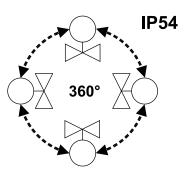
• Observe national provisions and comply with the appropriate safety regulations.

<u>A</u>	<ul> <li>Risk of injury from electrical shock</li> <li>Do not install with defective cable.</li> <li>Disconnect power prior to assembling or removing the device.</li> <li>Do not attach cables to warm piping.</li> <li>Using an external fuse.</li> <li>Power 24V versions with a transformer or power supply that meet requirements of safety extra low voltage to IEC 60730-1 as well as requirements per IEC 61558-2-6 or IEC 61558-2-16.</li> </ul>		

Mounting instructions included (see page 11)

#### **Mounting positions**

Actuators may be installed in all positions. IP54 guaranteed.

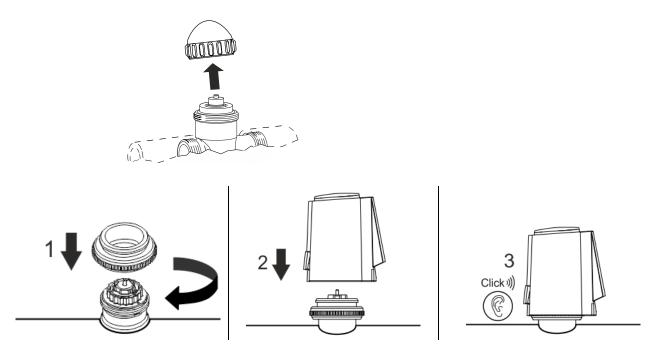


# Mounting on valve

Disconnect power prior to mounting. Do not use pipe wrenches or wrenches.

⇒ Remove the protective cover from the valve body

- 1. Screw on the valve adapter by hand
- 2. Position the actuator vertically on the valve adapter
- 3. Engage the actuator manually by applying vertical pressure on the valve adapter until you hear it click.
- ⇒ Connect operating voltage after mounting.

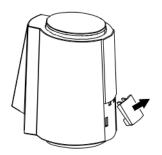


#### Mounting on third-party valve

Adapter ASA80 must also be used in some case in addition to the adapter for third-party valves, see Accessories, page 9.

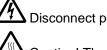
Adapter ASA80 is included in the order for STA.., STP.. And can also be ordered separately.

# Protection against dismantling



Remove the locking key prevents dismantling, the actuator position is secured, e.g. on the radiator.

Removal



Disconnect power prior to removing.

 $\Delta$  Caution! The valve body can still be hot. Wait until the device has cooled down.

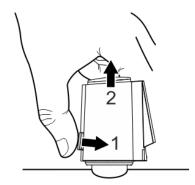
Do not use pipe wrenches or wrenches.

1. Lightly press the locking key

⇒ The grid comes off.

2. Vertically lift the valve by hand.

The valve adapter can remain on the valve if changing to another STA/STP valve.



#### Maintenance

STA.. and STP.. actuators are maintenance free.

#### Disposal



This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection

and recycling facilities in accordance with local and national legislation. For additional details, refer to <u>Siemens informations on disposal</u>. Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Power supply				
Operating voltage	ST121, STA126, ST162	AC/DC 24 V +20 %10 %, 5060 Hz (AC version)		
	ST161	AC 24 V -10 %+20 %, 5060 Hz		
	ST321	AC 230 V +/-10 %, 5060 Hz		
Power consumption	ST65	1.2 W		
	ST40	1.0 W		
Switch-on current	ST21.40, ST26	< 300 mA for max. 2 min.		
	ST16	< 320 mA for max. 2 min.		
	ST21.65	< 550 mA for max. 100 ms		
Rated surge voltage	ST121, STA126, ST161, ST162 (24 V versions)	1000 V		
	ST321 (230 V versions)	2500 V		
Auxiliary switch		3 A resistive load		
	ST126.40L10	1 A inductive load		
		5 A resistive load		
	ST326.40L10	1 A inductive load		
Connection cable	Length	See "Cable overview" on page 8		
	Cross-section	2 x 0.75 mm <sup>2</sup>		

Functional data				
Positioning time	ST161.40	AC 24V	30 s/mm	
	ST121.40	AC/DC 24V		
	ST321.40	40.0001/		
	STA326.40	– AC 230V	ca. 3.5 min.	
	STA126.40	AC/DC 24 V		
	ST162.65	- AC/DC 24 V	20 5/22	
	ST161.65	AC 24 V		
	STA121.65	AC/DC 24 V	ca. 4.5 min.	
	STA321.65	AC 230 V	ca. 4.5 min.	
Positioning force	ST65	125 N		
	ST40	100 N		
Nominal stroke	STA65, STP65	6.5 mm		
	STA40, STP40	4.0 mm		
Permissible medium temperature		1100 °C <sup>1)</sup>		

Degree of protection				
Protection class	ST121, STA126, ST161, ST162 (AC/DC 24 V)	III as per IEC 60730-1		
	ST321, ST326 (AC 230 V)	II as per IEC 60730-1		
Housing type		IP54 to EN 60529		

Environmental conditions			
Operation		IEC 60721-3-3:2019	
	Temperature	050 °C	
	Humidity (non-condensing)	<85 % r.h.	
Transport, storage		IEC 60721-3-1:2019 IEC 60721-3-2:2019	
	Temperature	-2550 °C	
	Humidity (non-condensing)	<85 % r.h.	

Directives an	Directives and standards			
EU-directives		Low voltage directive: 2014/35/EU EMC directive 2014/30/EU GL RoHS 2011/65/EU		
amer S.I. 2 amer S.I. 2		S.I. 2016 No. 1101       Electrical Equipment (Safety) Regulations 2016, and related         amendments       Electromagnetic Compatibility Regulations 2016, and related         amendments       Electromagnetic Compatibility Regulations 2016, and related         S.I. 2012 No. 3032       Restriction of the Use of Certain Hazardous Substances in         Electrical and Electronic Equipment Regulations 2012, and related amendments		
Standards		EN 60730-1:2011 EN 60730-2-14:1997 + A1:2001 + A11:2005 + A2:2008 EN IEC 63000:2018		
EU DoC	STA	8000072738 <sup>2)</sup>		
STP		A5W00004469 <sup>2)</sup>		
UKCA DoC	A DoC STA A5W00508176A <sup>2)</sup>			
STP		A5W00508178A <sup>2)</sup>		

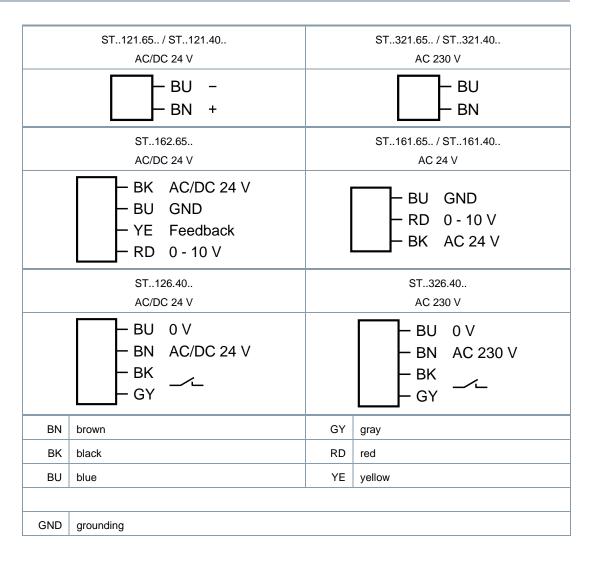
Environmental compatibility				
The product environmental declaration *) contains data	ST16	A5W00677660A 2)		
on environmentally compatible product design and assessments (RoHS compliance, materials	ST21.40			
uisposai).	ST26.40	A5W00580039A <sup>2)</sup>		
	ST21.65L			
	ST21.65H	A5W00580036A <sup>2)</sup>		
	ST21.65/00	A5W00580038A <sup>2)</sup>		
	ASY21	A31100360036A -/		
	ASY6	A5W00677657A 2)		
	ASA	A5W00580040A <sup>2)</sup>		

Dimensions		
Thread	M30×1.5	
W x H x D	See "Dimensione" on page 10	
Weight	See "Dimensions" on page 19	

- <sup>1)</sup> Higher temperatures possible based on adapter
- 2) Documents available at <u>http://www.sid.siemens.com</u>

# Connection diagrams

# Internal diagram



# Dimensions

[mm]	Туре	kg [kg]	
	ST161.65	0.111	
	ST162.65.		
	ST321.65		
	ST121.65	0.110	
	ST321./00		
	ST121./00		
	ST326.40	0.150	
	ST126.40		

[mm]	Туре	kg [kg]
	ST161.40L10	0.111
	ST321.40L10	
	ST121.40L40	0.100

Туре	Stock number	Valid from rev. no.	Туре	Stock number	Valid as of RevNO.
STA121.65L10	S55174-A201	A	STP121.65L10	S55174-A203	A
STA321.65L10	S55174-A200	A	STP321.65L10	S55174-A202	A
STA121.65L20	S55174-A205	A	STP121.65L20	S55174-A207	A
STA321.65L20	S55174-A204	A	STP321.65L20	S55174-A206	A
STA121.65H20 2)	S55174-A208	A	STP121.65/00	S55174-A213	A
STA321.65H20 2)	S55174-A209	A	STP321.65/00	S55174-A212	A
STA121.65/00	S55174-A211	A	STP161.65L10	S55174-A215	A
STA321.65/00	S55174-A210	A	STP162.65L10	S55174-A217	A
STA161.65L10	S55174-A214	A	STP121.40L10	S55174-A221	A
STA162.65L10	S55174-A216	A	STP321.40L10	S55174-A220	A
STA121.40L10	S55174-A219	A	STP161.40L10	S55174-A223	A
STA321.40L10	S55174-A218	A			
STA126.40L10	S55174-A225	A			
STA326.40L10	S55174-A224	A			
STA161.40L10	S55174-A222	A			

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