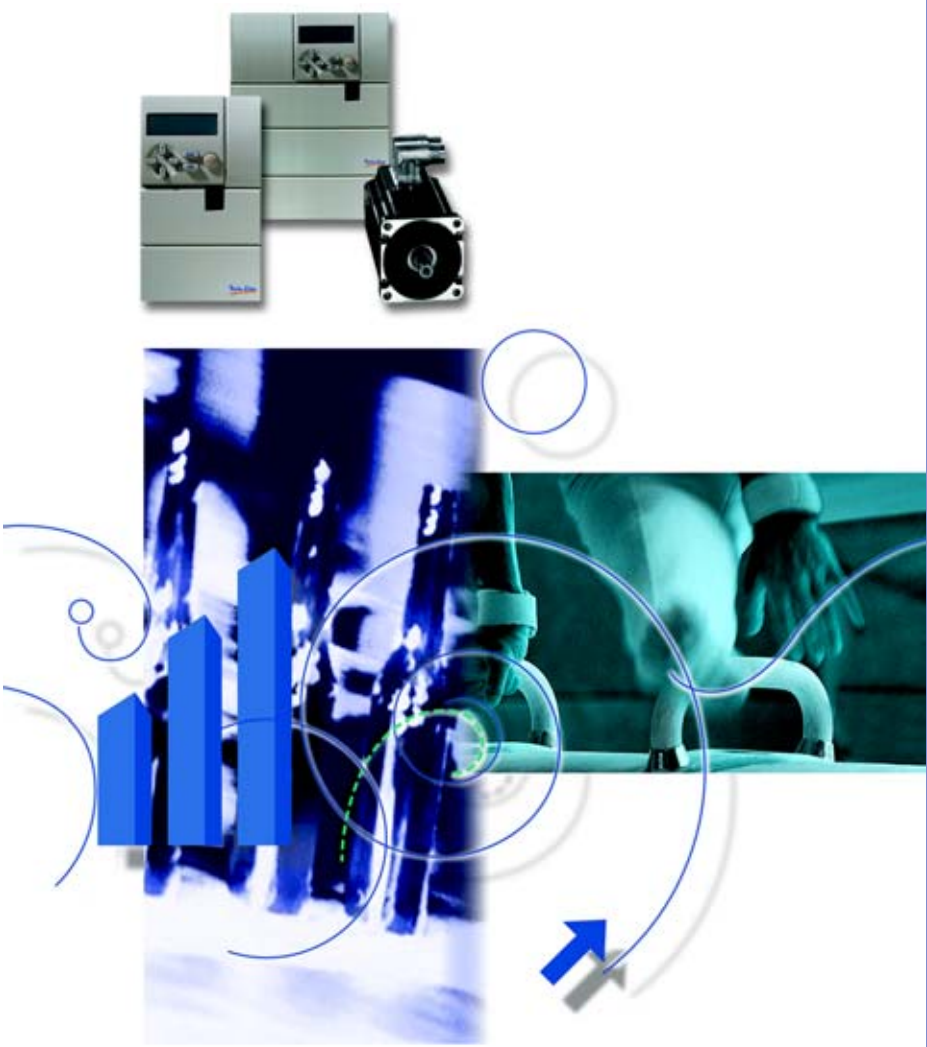
Twin Line
Telemecanique

Catalogue
April

2003

Motion control



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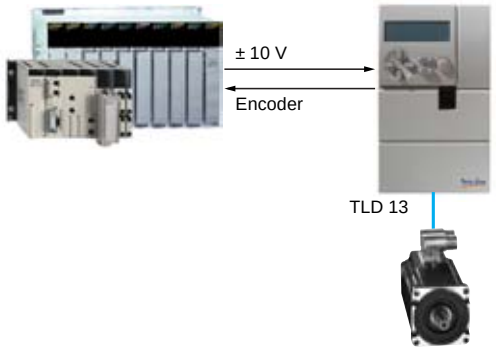
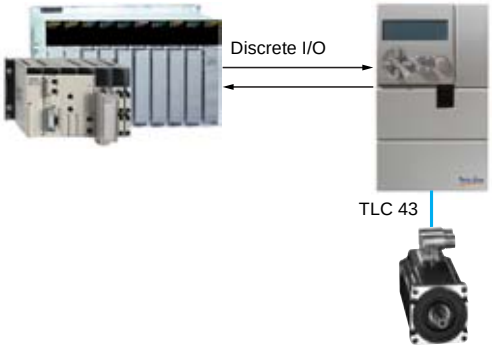
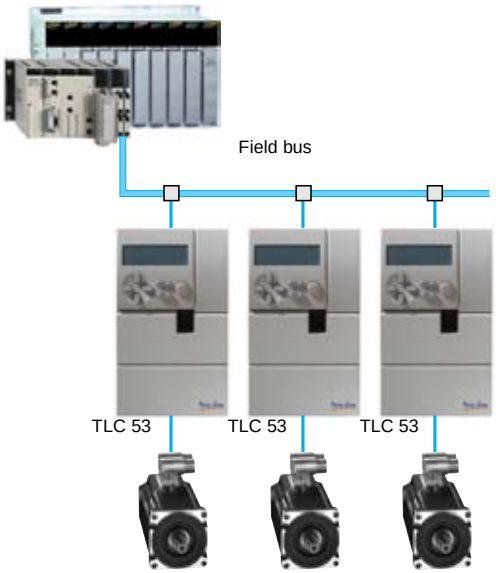
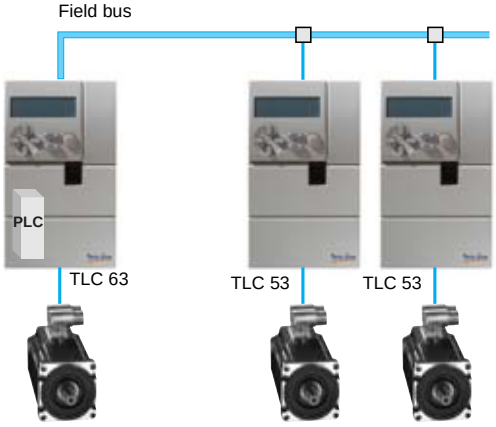
Motion control
Presentation









▲ Commercial launch planned for 3rd quarter of 2003.

Twin Line servodrives and SER brushless motors are the latest additions to the Schneider Electric range of motion control products.

In response to the demands of an ever widening range of industrial applications, we have created the most flexible servodrives possible, so that they can be economically integrated into machine designers' preferred architectures.

Twin Line TLD and TLC servodrives

Control built-in to PLC

Premium and Quantum automation platforms offer, as part of their interface ranges, axis control modules with analog outputs for position control functions: TSX CAY, multi-axis control modules (2 to 4 axes), or 140 MSB 10100 single-axis control modules.
These modules, associated with Twin Line **TLD 13** modules, offer unequalled ease of integration and installation of motion control (intelligent position control) in the automation sequence.

Discrete control

Twin Line **TLC 43** servodrives are fitted with a position controller that can be easily controlled via the discrete input/output lines of a PLC.
This simple configuration, offering all the precision of Twin Line servodrives, is for applications involving a small number of axes, with little synchronization and rarely requiring adjustment of servodrive settings.

Control by industrial field bus

The Twin Line **TLC 53** range of servodrives offers, in addition to built-in position control in the servodrive, a wide choice of communication bus connections.
This possibility of communication via industrial field buses widens the range of applications by facilitating remote adjustment and maintenance operations.

Programmable motion controller

In order to respond to applications which also require straightforward sequential control with field bus inputs/outputs, Twin Line **TLC 63** servodrives are motion controllers which can be programmed in graphic or textual automation languages, compliant with the standard IEC 61131-3.
The Twin Line **TLC 63** ▲ servodrive naturally occupies the master position of multi-axis applications managed by Twin Line TLC 53 servodrives.

SER brushless motors

The technology of **SER** brushless motors means they are well-suited to the most demanding dynamic and precision applications within continuous torque ranges from 0.3 to 13.4 Nm.
They are fitted with a thermal probe protection system and a single turn or multiturn SinCos Hiperface integrated sensor.
Depending on the model, they are fitted with:
- Failsafe holding brake.
- IP 41 or IP 56 degree of protection.
- Gearboxes of ratio 3:1, 5:1 or 8:1.

Motion control

Association of SER brushless motors and Twin Line servodrives

SER brushless motors (IP 41 or IP 56)		**Twin Line TLD and TLC servodrives** (IP 20 or IP 54)			
					
		TL● ●32 3 A / 750 W single phase	**TL● ●34** 3 A / 1.5 kW 3-phase	**TL● ●36** 6 A / 3 kW 3-phase	**TL● ●38** 16 A / 8 kW 3-phase
SER 364 3L 3S	12,000 rpm *(1)*	**0.3/0.8 Nm**			
SER 364 3L 5S		**0.3/1.1 Nm**			
SER 364 3L 7S		**0.3/1.3 Nm**			
SER 366 3L 3S		**0.5/1.1 Nm**			
SER 366 3L 5S		**0.5/1.6 Nm**			
SER 366 3L 7S		**0.5/2.1 Nm**			
SER 368 3L 3S		**0.7/1.5 Nm**			
SER 368 3L 5S		**0.7/1.9 Nm**			
SER 368 3L 7S		**0.7/3 Nm**			
SER 36A 3L 3S		**0.7/1.5 Nm**			
SER 36A 3L 5S		**0.9/2.1 Nm**			
SER 36A 3L 7S		**0.9/3.6 Nm**			
SER 39A 4L 3S	6000 rpm *(1)*	**1.1/2.4 Nm**			
SER 39A 4L 7S		**1.1/4 Nm**	**1.1/4 Nm**		
SER 39B 4L 3S		**4.2/2.2 Nm**	**4.2/2.2 Nm**	**7.8/2.2 Nm**	
SER 39B 4L 7S		**8/2.2 Nm**	**8/2.2 Nm**		
SER 39C 4L 3S		**2.3/4.8 Nm**	**2.3/4.8 Nm**	**2.9/11.5 Nm**	
SER 39C 4L 5S		**2.9/6.8 Nm**	**2.9/6.8 Nm**	**2.9/11.5 Nm**	
SER 39C 4L 7S		**2.9/11.5 Nm**	**2.9/11.5 Nm**		
SER 39D 4L 5S		**3.1/6.4 Nm**	**3.1/6.4 Nm**	**3.6/11.5 Nm**	
SER 3BA 4L 3S	6000 rpm *(1)*	**2.3/4.6 Nm**	**2.3/4.6 Nm**	**4.6/14.5 Nm**	**4.6/18 Nm**
SER 3BA 4L 5S		**4.3/7.6 Nm**	**4.3/7.6 Nm**	**4.6/18 Nm**	
SER 3BA 4L 7S		**4.6/12.8 Nm**	**4.6/12.8 Nm**	**4.6/18 Nm**	
SER 3BB 4L 3S		**3/6 Nm**	**3/6 Nm**	**6/19 Nm**	**6.6/25 Nm**
SER 3BB 4L 5S		**4/8 Nm**	**4/8 Nm**	**6.6/19.5 Nm**	**6.6/23 Nm**
SER 3BB 4L 7S		**6.6/15 Nm**	**6.6/15 Nm**	**6.6/25 Nm**	
SER 3BC 4L 5S	4500 rpm *(1)*	**4.3/8.5 Nm**	**4.3/8.5 Nm**	**8.5/27 Nm**	**10/38 Nm**
SER 3BC 4L 7S		**8.3/16.5 Nm**	**8.3/16.5 Nm**	**10/38 Nm**	**10/38 Nm**
SER 3BD 4L 5D				**8.7/26.8 Nm**	**13.4/40 Nm**
SER 3BD 4L 7S		**7.9/15.7 Nm**	**7.9/15.7 Nm**	**13.4/39 Nm**	**13.4/48 Nm**

0.3/0.8 Nm The 1st value corresponds to the continuous stall torque, 2nd value corresponds to the peak stall torque

Selected example: the motor **SER 364 3L 3S** associated with the servodrive **TL● ●32** answers to the demands of applications requiring at most 0.3 Nm of continuous stall torque, 0.8 Nm of peak torque and a maximum mechanical speed of 12,000 rpm.

(1) Maximum mechanical speed.

Motion control
Twin Line TLD 13 servodrives for servomotors

TLD 132/134

TLD 136/138

Presentation

Twin Line TLD 13 servodrives are specially designed for use with brushless motors. They are controlled by a setpoint voltage ± 10 V, in association with an axis control module (for example TSX CAY or 140 MSB 10100). They offer 11 discrete inputs (8 fixed allocation inputs, 2 limit switch detector inputs and 1 STOP function input) and 4 discrete outputs (3 fixed allocation outputs and 1 output for the brake control via the TLA BHO holding brake controller.
Depending on the parameter settings, the servodrive operates in speed controller, current controller or electronic gearbox mode.

Twin Line TLD 13 servodrives for servomotors are available in the following models:
- TLD 132: 3 A/750 W/230 V single phase.
- TLD 134: 3 A/1.5 kW/230…480 V 3-phase.
- TLD 136: 6 A/3 kW/230…480 V 3-phase.
- TLD 138: 16 A/8 kW/230…480 V 3-phase.

The principal characteristics of Twin Line TLD 13 servodrives are:
- The servodrive is powered directly from the mains supply, without a transformer (TT and TN grounding systems only).
- Built-in power supply EMC input filter, radiator and fan.
- Built-in brake power dissipation function.
- All electrical connections can be accessed via the front panel.
- Small and compact size.
- IP 20 degree of protection.

In addition, Twin Line TLD 13 servodrives:

- Accept SinCos Hiperface or resolver motor encoder returns.
- Can manage an external brake controller.

Choice of servodrive references

Nota : *Twin Line TLD 13 servodrives cater for a wide range of application needs.*
These functions and interfaces must be identified and defined when ordering each servodrive.

Motion control
Twin Line TLD 13 servodrives for servomotors

Functions

Parameter settings

The TLA PH OO operator interface *(1)* or the TLA PS CA commissioning tool *(1)*, which runs on Windows 98/NT/XP, enables the parameter definition of a complete servodrive and servomotor assembly as well as the copying of the parameters from one servodrive to another.

Operating modes

TLD 13 servodrives can be operated in four modes:
- Manual operation, with manual movement.
- Automatic operation with current regulator.
- Automatic operation with speed regulator.
- Automatic operation in electronic gearbox mode.

Manual movement

In this mode, the servodrive operates as a speed controller. This mode can be activated by:
- The TLA PS CA commissioning tool.
- The TLA PH OO operator interface.
- Discrete inputs, with 2 possible movement speeds.

Speed or current control

Speed or current control is active in automatic mode. The command value, within a range of ± 10 V, is received on the analog input of the servodrive.

Electronic gearbox

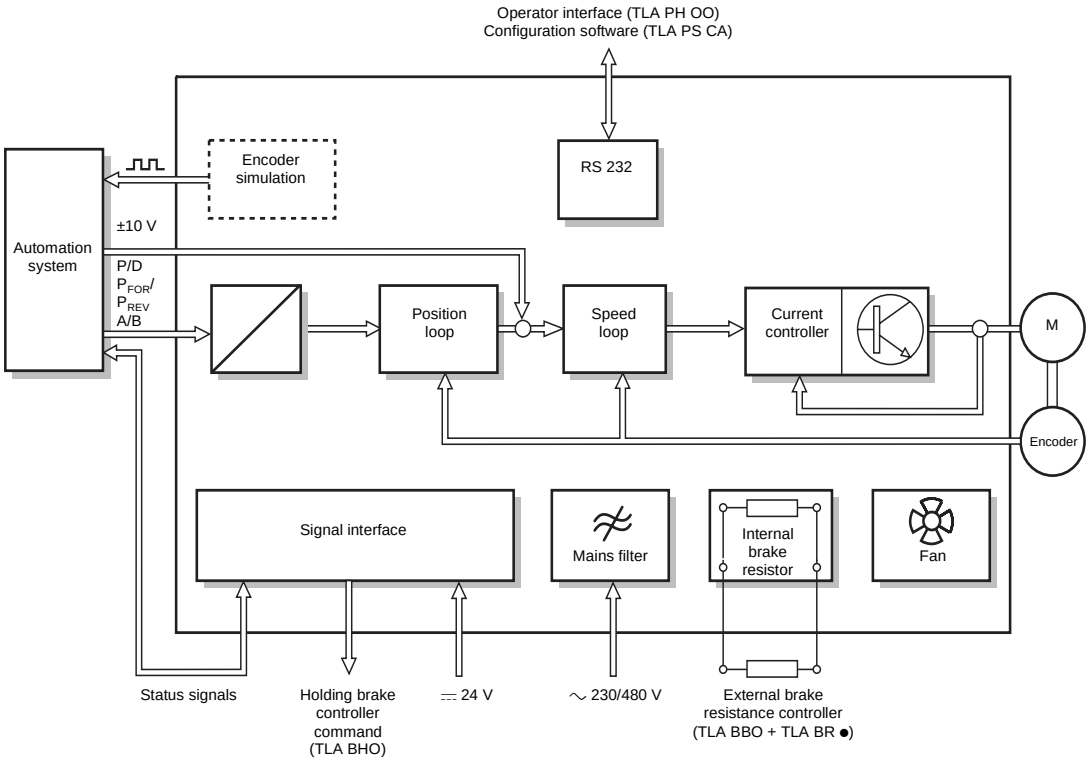
In electronic gearbox mode, the servodrive calculates a new position setpoint from a movement command and a variable reduction factor. This operating mode is selected when the position of one or more motors is required to follow the master signal of an automation device or encoder.
In electronic gearbox mode, the servodrive must be fitted to the M1 slot, with either an RS 422-C encoder module or a PULSE-C module for pulse/direction signals or for forward/reverse pulse signals.

Change of operating mode

It is possible to change from one operating mode to another while movement is in progress. The servodrive switches, without the motor being stopped, from one automatic operating mode to another. To change from manual mode to automatic mode, it stops the motor briefly and activates the drive parameters and the settings specific to the selected operating mode.

(1) Product to be ordered separately, see page 38.

Functions (continued)



Motion control
Twin Line TLD 13 servodrives for servomotors

Environment conditions

Ambient temperature	**°C**	0…50
Storage temperature	**°C**	– 40…+ 70
Relative humidity		15…85 %, non-condensing
Altitude	**m**	< 1000
Degree of protection		IP 20

Electrical characteristics

Type of servodrive			TLD 132	TLD 134	TLD 136	TLD 138
Power supply	Mains voltage	**V**	∿ 1 x 230 (- 20 %)… 240 (+ 10 %)	∿ 3 x 230 (- 20 %)…480 (+ 10 %)		
	Mains frequency	**Hz**	47…63			
	Consumption	**A**	6.5	4	7.5	20
	Inrush current	**A**	< 60			
	aM type external fuse	**A**	10			25
Motor	Rated power	**kW rms**	0.75	1.5	3	8
	Continuous current *(1)*	**A rms**	3		6	16
	Current peak value over 5 s max.	**A rms**	6		20	32
	Switching frequency	**kHz**	8/16			4/8
Motor cable	Cable length	**m**	⩽ 20			
	Shielding connection		At each end			
	Cross-section (depending on the length)	**mm²**	1.5	1.5…2.5		2.5…4
Continuous power bus connection			Maximum of two servodrives of the same power connected in parallel			
Internal brake resistance	Continuous operation	**W**	30	50	200	80
	Maximum unit brake power	**J**	50	80	100	130
Supply voltage ⎓ 24 V TBTS, DIN 19240,	Input voltage	**V**	20…30 unprotected against polarity inversions			
	Input ripple	**V**	< 2 (peak to peak)			
	Nominal input current	**A**	< 2.5			
Inputs (uninsulated)	Number of inputs		11 (8 fixed allocation inputs, 2 limit-switch detector inputs, 1 STOP function input)			
	Voltage at 1	**V**	⎓12…30 (I ⩾ 3 mA)			
	Voltage at 0	**V**	⎓ ⩽ 5 (I ⩽ 0.5 mA)			
	Current	**mA**	⩽ 7 under ⎓ 24 V			
	Filtering	**ms**	0.7…1.5			
Outputs (protected against short-circuits)	Number of outputs		4 (3 fixed allocation outputs, 1 brake control output via the TLA BHO holding brake controller)			
	Voltage	**V**	⎓ ⩽ 30			
	Load current	**mA**	⩽ 400			
	Voltage drop at 400 mA	**V**	⎓ ⩽ 1			
	Supporting inductive load	**mH**	150 /11 W			
Analog input	Voltage	**V**	± 10			
	Input resistance	**kΩ**	5			
	Resolution	**bits**	12			

(1) rms value in continuous operation at maximum ambient temperature.

Motion control
Twin Line TLD 13 servodrives for servomotors

TLD 132 2F2 ●●1●1 (3)

TLD 138 2F3 ●●1●1 (3)

References *(1)*

IP 20 degree of protection

Servodrive supply	Power	Power supply EMC input filter	Reference *(2)*	Weight kg
∿ **230 V single phase 50/60Hz**	0.750 kW	Built-in	**TLD 132 2F2 ●●1●1**	2.700
∿ **230…480 V 3-phase 50/60 Hz**	1.5 kW	Built-in	**TLD 134 2F3 ●●1●1**	3.700
	3 kW	Built-in	**TLD 136 2F3 ●●1●1**	6.600
	8 kW	Built-in	**TLD 138 2F3 ●●1●1**	10.800

(1) For connection cables and accessories, see pages 38 at 41.

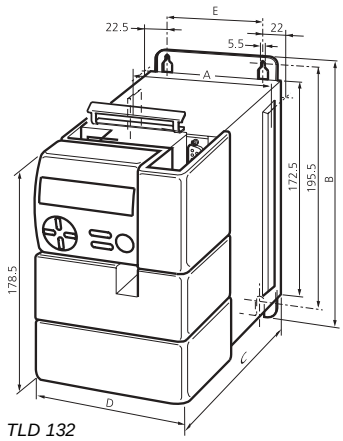
(2)To order a TLD 13 servodrive, fill out each reference

	TLD 13● 2F●	**●**	**●**	**1**	**●**	**1**
M1 Slot Position setpoint	Without module	**1**				
	RS 422-C Encoder module	**2**				
	PULSE-C Module	**3**				
M2 Slot Position feedback	Sincos Hiperface		**2**			
	Resolver *(4)*		**3**			
M3 Slot	Without module			**1**		
M4 Slot Communication	Without module				**1**	
	ESIM1-C Module				**2**	
	ESIM2-C Module				**3**	
	SSI-C Module				**4**	
–	–					**1**

For detailed module specifications, see page 10.

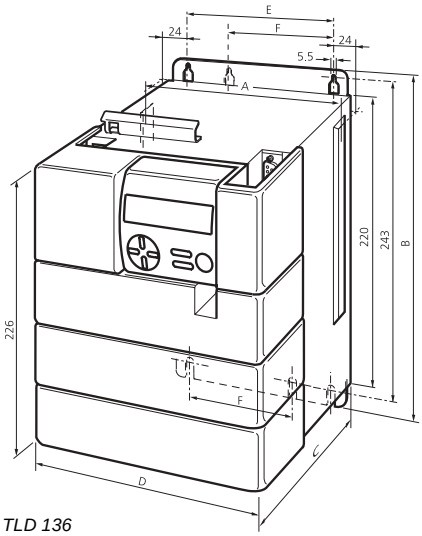
(3) The TLA PH OO operator interface is to be ordered separately, see page 38.
(4) Not compatible with SER motors in this catalog.

Dimensions (in mm)



TLD 132
TLD 134

	TLD 132	TLD 134
A	108	128
B	212.5	212.5
C	184.5	214.5
D	105.5	125.5
E	63	83



TLD 136
TLD 138

	TLD 136	TLD 138
A	178	248
B	260	260
C	244.5	244.5
D	176	246
E	130	200
F	–	120

Motion control
Twin Line TLD 13 servodrives
Interface modules

Presentation

Interface modules for Twin Line TLD 13 servodrives allow a configuration adapted to the application to be defined using the servodrive. See page 8.

RS 422-C module: encoder interface

The RS 422-C module receives signals from an external encoder in the form of A/B signals. It also uses the reference pulse. The electronic gearbox function is a typical application.

PULSE-C Module: pulse interface

The PULSE-C module receives position data in the form of a pulse/direction signal or a forward/reverse pulse signal.
The electronic gearbox function is a typical application.

HIFA-C Module: SinCos Hiperface interface

The HIFA-C module receives the position information from a motor fitted with a single turn or multiturn SinCos Hiperface absolute encoder (4096 revolutions).
The position of the rotor is detected optically and transmitted to the HIFA-C module in the form of analog and digital position data. The signals are decoded with 14 bit resolution, corresponding to 16 384 pulses/revolution.
The built-in digital interface allows initial position information, as well as all the motor parameters of the SinCos encoder memory, to be transmitted to the servodrive.

SSI-C Module: SSI encoder emulation

The SSI-C module supplies the absolute position of the motor to an axis control system via a synchronous serial interface. The resolution transmitted is of 4096 pulses/revolution for 4096 revolutions (24 bits).

ESIM1-C Module: encoder simulation

The ESIM1-C module supplies the position data of the motor in the form of incremental signals. These are two electrical quadrature phase signals (channels A/B), as well as the shiftable reference pulse (Z pulse). The transmitted resolution is 4096 revolutions/turn.

ESIM2-C Module: double encoder simulation

The module ESIM2-C supplies the A/B signals and reference pulse on 2 connectors in parallel.
A typical application is the connection of a second servodrive, in electric shaft mode (electronic gearbox).

Motion control
Twin Line TLD 13 servodrives
Interface modules

Characteristics

Type of interface module			**RS 422-C**	
Inputs	Type		RS 422, electrical connection to ⎓ 24 V ground	
	Input frequency	**kHz**	⩽ 400	
Outputs	External encoder supply	**V**	5 ± 5 %, 300 mA max., protected against short-circuits and overloads	
	Cable length	**m**	100 max.	
	Minimum cross-section	**mm²**	0.5 for supply 0.25 for signals	
Type of interface module			**PULSE-C**	
Inputs	Type	**V**	RS 422, or 4.5…30 open collector Electrical connection to ⎓ 24 V ground	
	Input resistance	**kΩ**	5	
	Pulse frequency	**kHz**	⩽ 200	
	Enable input frequency	**kHz**	⩽ 1	
Outputs	Type		Protected against short-circuits with open collector	
	Output voltage	**V**	⩽ 30	
	Output current	**mA**	⩽ 50	
Connections	Length with RS 422 connection	**m**	100 max.	
	Length, connected to open collector	**m**	10 max.	
	Minimum cross-section	**mm²**	0.14 for signal	
Type of interface module			**SSI-C**	
Outputs	Type		RS 422, electrical connection to ⎓ 24 V ground	
	Frequency		53 kHz…2 MHz	
Type of interface modules			**ESIM1-C**	**ESIM2-C**
Outputs	Type		RS 422, electrical connection to ⎓ 24 V ground	RS 422, electrical connection to ⎓ 24 V ground, signals A, B, I in parallel on two connectors

Motion control
Twin Line TLC 43/53/63 servodrives


TLC 432/532/632
(IP 20)


TLC 438/538/638
(IP 20)


TLC 434/534/634
(IP 54)

Presentation

Twin Line TLC 43/53/63 servodrives integrate, in addition to power electronics for brushless motors, a position system with 3 options, offering different levels of intelligent functions.

The higher-level automation system accesses:
- Drive parameters.
- The internal status.
- The indexer function via a discrete interface, serial link or field bus.

The architectures supported by this type of servodrive:
- Discharge the automation system from having to perform position and control functions for brushless motors.
- Allow automation systems to be easily extended (flexible architectures).
- Facilitate maintenance operations, by downloading of initial parameters from the automation device.
- Simplify wiring of installations.

Twin Line TLC 43/53/63 servodrives are fitted with 2 fast capture inputs and 1 fast output, for the electronic cam function (2 x 64 switching points max.).
A device for limiting vibrations during positioning protects its mechanical parts and prolongs the life of the machine.

The principal characteristics of Twin Line TLC 43/53/63 servodrives are:
- Power range: from 750 W to 8 kW.
- The servodrive is powered directly from the mains supply, without a transformer (TT and TN grounding systems only).
- Built-in EMC power supply input filter, radiator and fan.
- Built-in brake power dissipation function.
- All electrical connections can be accessed via the front panel.
- Small and compact size.
- IP 20 or IP 54 degree of protection depending on the model.

Discrete inputs/outputs

The 18 inputs and 7 outputs of the TLC 43/53/63 servodrives vary in their characteristics and use according to the operating mode selected. See table below.

Operating mode	Type of inputs/outputs	TLC 43	TLC 53	TLC 63
Definition of the network address (IO-Mode = 0)	Discrete inputs	3 position detector inputs		
		1 STOP function input		
		14 inputs (network address)	12 inputs (network address)	
	Fast inputs *(1)*	–	2 inputs	
	Discrete outputs	5 outputs available to the automation system		
		1 brake control output *(2)*		
	Fast output *(3)*	1 output		
Discrete inputs/outputs available to the automation system	Discrete inputs	3 position detector inputs		
		1 STOP function input		
		14 inputs (available to the automation system)	12 inputs (available to the automation system)	
	Fast inputs *(1)*	–	2 inputs	
	Discrete outputs	5 outputs available to the automation system		
		1 brake control output *(2)*		
	Fast output *(3)*	1 output		
Discrete fixed allocation inputs/outputs	Discrete inputs	3 position detector inputs		–
		1 STOP function input		–
		14 fixed allocation inputs	13 fixed allocation inputs	–
	Fast input *(1)*	–	1 input	–
	Discrete outputs	5 fixed allocation outputs		–
		1 brake control output *(2)*		–
	Fast output *(3)*	1 output		–

(1) Maximum response time of 30 µs.
(2) Via the TLA BHO holding brake controller.
(3) Maximum response time of 150 µs.

In addition, the Twin Line TLC 43/53/63 servodrives are:

- Configurable using:
  - an TLA PH OO operator interface *(1)*,
  - a TLA PS CA commissioning tool *(1)*, running Windows 98/NT/XP operating systems,
  - a TLA PS PB programming software *(1),* (for servodrive TLC 63 only) in languages complying with the standard IEC 61131-3.
- Compatible with SinCos Hiperface or resolver type motor encoder returns.
- Designed to manage an external brake controller.

Possible communication interfaces are:

- RS 485 serial link.
- CANopen (DS-402 profile) or DeviceNet buses.
- INTERBUS bus.
- Profibus DP bus.

Choice of servodrive references

Nota : *Twin Line TLC 43/53/63 servodrives cater to a wide range of application needs.* ***These functions and interfaces must be identified and defined when ordering each servodrive.***

Built-in protection systems

The following protection systems are built into TLC 43/53/63 servodrives:

- Monitoring of the servodrive or motor temperature (PTC probe).
- Detection of grounding.
- Detection of faults and phase short circuits.
- Monitoring of intermediary circuit voltage.

The robust integration of components such as the EMC supply input filter, radiator, fan, brake resistance and holding brake control facilitate its installation.

(1) To be ordered separately, see page 38.

Motion control
Twin Line TLC 43 servodrives

Functions

Twin Line TLC 43 servodrives with built-in position control via discrete inputs/outputs are equipped with 64 movement blocks (50 free blocks and 14 allocated blocks).

There are three possible operating modes defined using the configuration software:

- Controlling the built-in position controller via the discrete inputs/outputs of the servodrive. A communication interface is not required for this operating mode.
- Controlling the built-in position controller using a communication interface (slot M4). The discrete inputs/outputs are used to define the address and speed of the communication interface.
- Controlling the built-in position controller using a communication interface (slot M4). The discrete inputs/outputs are available to the automation system.

Operation by block

Each block defines a movement with speed control that can be carried out according to 2 modes of operation:

- Point-to-point position control.
- Speed controller.

A point-to-point position control block defines the following information:
- relative or absolute movement,
- target position,
- target speed,
- acceleration and deceleration ramps.

A movement block in speed control mode defines the following information:
- target speed,
- acceleration and deceleration ramps.

A complete range of controls is available:

- Operation by point-to-point movement block or in speed control mode.
- Parametering of electronic cam thresholds and direct activation/deactivation of outputs.
- Adjustment of acceleration and deceleration ramps.
- Reading or writing of the position.
- Triggering of a reference point movement.
- Reading and writing of all parameters.
- Activation and deactivation of outputs (regardless of mode).
- Reading of inputs (regardless of mode).
- Error processing.

Point-to-point position control

In point-to-point position controller mode, a position control command defines a movement from a point A to a point B. The position may be absolute (with reference to the axis reference point) or relative (with reference to the current position).

Speed control

In speed control mode, a setpoint speed is attributed to the axis and a movement is launched without a pre-defined target position. The axis moves at this speed until another speed or operating mode is selected. The setpoint speed is modified immediately, even while a movement is in progress.

Reference point

A reference point operation allows a defined axis position to be allocated to a specific mechanical position. This is done either by directly allocating the real position, or by carrying out a reference point movement.

The different types of reference point are:
- With movement to the upper or lower limit switch, or on the reference point cam.
- With or without 0 pulse.

Manual movement

All manual movement, controlled by the operator, can be carried out via the discrete inputs/outputs or using the user interface TLA PH OO or the configuration software TLA PS CA.

Teach-in

The teach-in consists in recording the current position value in the selected memory space. This operation allows you to record up to:

- 2 x 64 absolute threshold positions for the electronic cam function.
- 50 position blocks for the built-in position controller.

Acceleration and deceleration ramps

A linear acceleration and deceleration ramp (which may be separate) can be defined for the position control of the motors. A bumpless acceleration or deceleration phase is possible due to a filtering device which can be activated at any time.

Quick-Stop

The quick-stop function enables the motor to be immobilized as quickly as possible. It is possible to select a linear braking ramp or a torque ramp (maximum motor current).

Motion control
Twin Line TLC 43 servodrives for servomotors

TLC 432 2F2 (IP 20)

TLC 438 2F3 (IP 20)

TLC 434 5F3 (IP 54)

Presentation

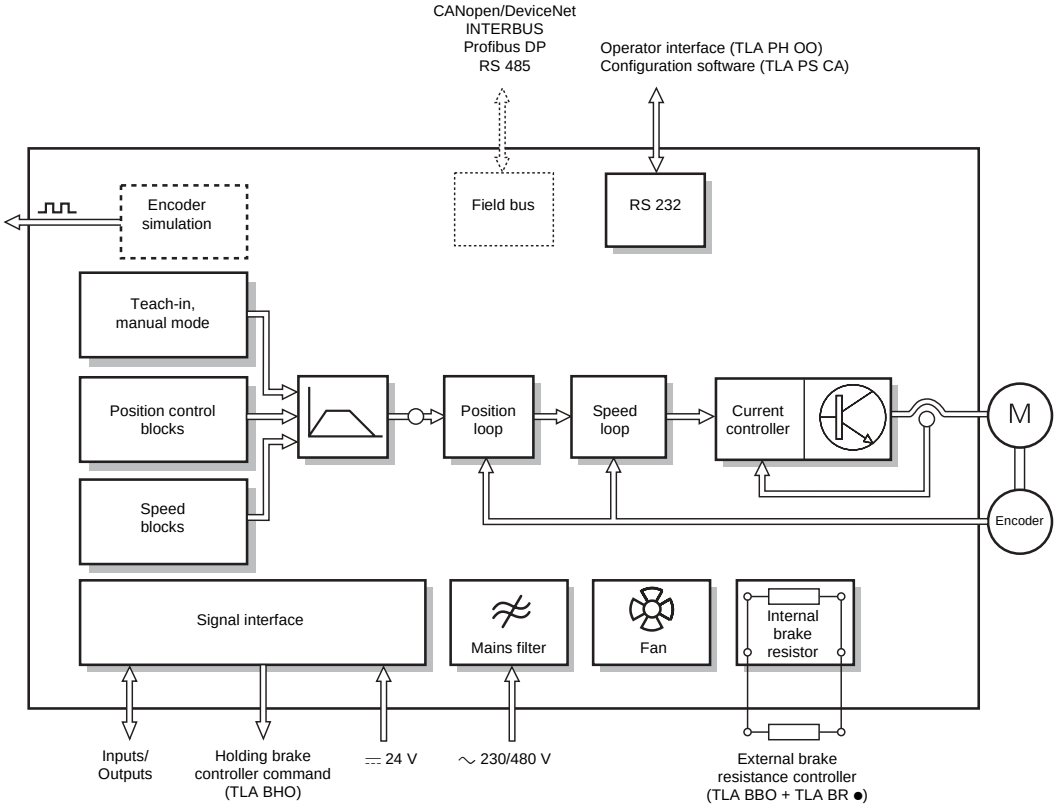
Twin Line TLC 43 servodrives for servomotors with built-in position controller and controlled via discrete inputs/outputs are available in the following models:

■ IP 20 degree of protection:
□ TLC 432 2F2: 3 A/750 W/230 V single phase,
□ TLC 434 2F3: 3 A/1.5 kW/230…480 V 3-phase,
□ TLC 436 2F3: 6 A/3 kW/230…480 V 3-phase,
□ TLC 438 2F3: 16 A/8 kW/230…480 V 3-phase.

■ IP 54 degree of protection:
□ TLC 432 5F2: 3 A/750 W/230 V single phase,
□ TLC 434 5F3: 3 A/1.5 kW/230…480 V 3-phase.
These IP 54 servodrives can be fitted with a built-in holding brake controller, depending on model.

An EMC supply input filter, radiator and fan are integrated as standard on all IP 20 and IP 54 servodrives.

Operating diagram



Motion control
Twin Line TLC 43 servodrives for servomotors

Environment conditions

Ambient temperature *(1)*		**°C**	0…+ 50 for IP 20 servodrives, 0…+ 45 for IP 54 servodrives
Storage temperature		**°C**	- 40…+ 70
Relative humidity			15 to 85 %, non-condensing
Altitude		**m**	< 1000
Standards and certifications	Products		UL 508 C
	Class of protection		Type 1 according to pr EN 50178
	Overvoltage		Category III according to pr EN 50178
	Pollution		Degree 2 according to pr EN 50178

Electrical characteristics

Type of servodrive			**TLC 432 ●F2 1●●●●**	**TLC 434 ●F3 1●●●●**	**TLC 436 2F3 1●●●●**	**TLC 438 2F3 1●●●●**
Degree of protection according to DIN EN 60529			IP 20 (TLC 432 2F2) IP 54 (TLC 432 5F2)	IP 20 (TLC 434 2F3) IP 54 (TLC 434 5F3)	IP 20	
Power supply	Mains voltage	**V**	∿ 1 x 230 (-20 %)…240 (+15 %)	∿ 3 x 230 (-20 %)…480 (+15 %)		
	Mains frequency	**Hz**	47…63			
	Consumption	**A**	6.5	4	7.5	20
	Inrush current	**A**	< 60			
	aM type external fuse	**A**	10			25
Motor	Rated power	**kW rms**	0.75	1.5	3	8
	Continuous current *(2)*	**A rms**	3		6	16
	Current peak value over 5 s max.	**A rms**	6		20	32
	Switching frequency	**kHz**	8/16			4/8
Motor cable	Cable length	**m**	⩽ 20			
	Shielding connection		At each end			
	Cross-section (depending on the length)	**mm²**	1.5	1.5…2.5		4
Continuous power bus connection			Maximum of two servodrives of the same power connected in parallel			
Internal brake resistance *(3)*	Continuous operation	**W**	30	50	200	80
	Maximum unit brake power	**J**	50	80	100	130
Power supply ⎓ 24 V TBTS, DIN 19240	Input voltage	**V**	20…30 V unprotected against polarity inversions			
	Input ripple	**V**	< 2 V peak to peak			
	Nominal input current	**A**	< 2.5			
Inputs (uninsulated)	Number of inputs		See page 12			
	Voltage at 1	**V**	⎓ 12…30 (I ⩾ 3 mA)			
	Voltage at 0	**V**	⎓ ⩽ 5 (I ⩽ 0.5 mA)			
	Current	**mA**	⩽ 7 under ⎓ 24 V			
	Filtering	**ms**	0.7…1.5			
Outputs (protected against short-circuits)	Number of outputs	**V**	See page 12			
	Voltage	**V**	⎓ ⩽ 30			
	Load current	**mA**	⩽ 400			
	Voltage drop at 400 mA	**V**	⎓ ⩽ 1			
	Supporting inductive load	**mH**	150 /11 W			
Analog input	Voltage	**V**	± 10			
	Input resistance	**kΩ**	5			
	Resolution	**bits**	10			

(1) For TLC 432 5F2 and TLC 434 5F3, operation outdoors or in a highly polluted environment is not recommended (clogging up of fan).
(2) rms value in continuous operation at maximum ambient temperature.
(3) For TLC 432 5F2 and TLC 434 5F3, depends on the ambient temperature and ventilation. Consult our regional office.

Motion control
Twin Line TLC 43 servodrives for servomotors

TLC 432 2F2 1●●●●
(3)

TLC 438 2F3 1●●●●
(3)

TLC 434 5F3 1●●●●

References *(1)*

IP 20 degree of protection

Servodrive supply	Power	Power supply EMC input filter	Reference *(2)*	Weight kg
∿ **230 V single phase 50/60 Hz**	0.750 kW	Built-in	**TLC 432 2F2 1●●●●**	2.700
∿ **230…480 V 3-phase 50/60 Hz**	1.5 kW	Built-in	**TLC 434 2F3 1●●●●**	3.700
	3 kW	Built-in	**TLC 436 2F3 1●●●●**	6.600
	8 kW	Built-in	**TLC 438 2F3 1●●●●**	10.800

IP 54 degree of protection

∿ **230 V single phase 50/60 Hz**	0.750 kW	Built-in	**TLC 432 5F2 1●●●●**	8.500
∿ **230…480 V 3-phase 50/60 Hz**	1.5 kW	Built-in	**TLC 434 5F3 1●●●●**	11.000

(1) For connection cables and accessories, see pages 38 to 41.

(2) To order a TLC 43 servodrive, fill out each reference

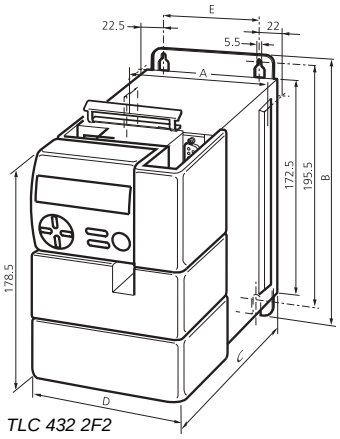
	TLC 43● ●F●	**1**	**●**	**●**	**●**	**●**
M1 slot	Without module	**1**				
M2 slot Position feedback	SinCos Hiperface		**2**			
	Resolver *(4)*		**3**			
M3 slot Encoder simulation	Without encoder simulation			**1**		
	ESIM3-C Simulation encoder			**2**		
M4 slot Communication	Without				**1**	
	RS 485-C				**2**	
	INTERBUS				**3**	
	CANopen/DeviceNet				**4**	
	Profibus-DP				**5**	
Built-in holding brake controller	Without					**1**
	With *(5)*					**2**

For detailed module specifications, see page 34.

(3) The TLA PH OO operator interface is to be ordered separately, see page 38
(4) Not compatible with SER motors in this catalog.
(5) This function can be integrated only on IP 54 servodrives. The holding brake controller, reference TLA BHO, must be ordered separately for IP 20 servodrives, see page 38.

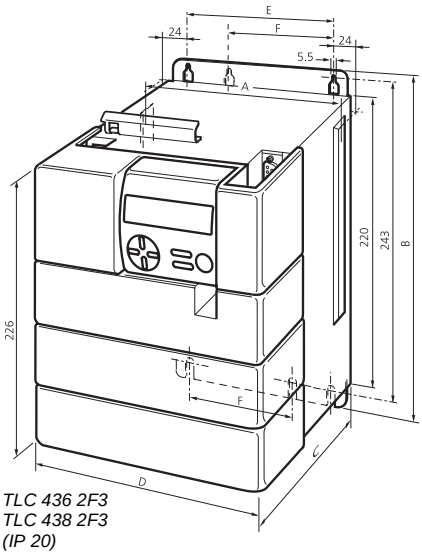
Motion control
Twin Line TLC 43 servodrives for servomotors

Dimensions (in mm)



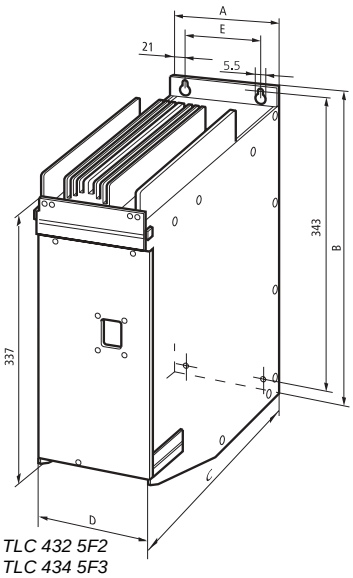
TLC 432 2F2
TLC 434 2F3
(IP 20)

	TLC 432 2F2	TLC 434 2F3
A	108	128
B	212.5	212.5
C	184.5	214.5
D	105.5	125.5
E	63	83



TLC 436 2F3
TLC 438 2F3
(IP 20)

	TLC 436 2F3	TLC 438 2F3
A	178	248
B	260	260
C	244.5	244.5
D	176	246
E	130	200
F	–	120



TLC 432 5F2
TLC 434 5F3
(IP 54)

	TLC 432 5F2	TLC 434 5F3
A	127	147
B	360	360
C	245	275
D	127	127
E	80	100

Motion control
Twin Line TLC 53 servodrives

Functions

Twin Line TLC 53 servodrives with built-in position control are equipped with an RS 485 interface or a communication interface via an industrial field bus. They are controlled by a PC or PLC.

Three user modes can be configured for the discrete inputs/outputs:

- Definition of network addresses, transmission speed, field bus profile (RS 485, CANopen/DeviceNet, INTERBUS, Profibus-DP). This authorizes the change and installation of the Twin Line TLC 53 servodrive, without requiring any other tool.
- Discrete reversible inputs/outputs available to the automation system via the field bus or RS 485 interface.
- Editing the internal states of the servodrive.

Position control commands

Each operating mode has a range of parameters specifically for adjustment and activation. For example, it is possible to set different movement speeds for each operating mode.
Switching between operating modes is carried out using a write command on the field bus.

Connection to the field bus enables the Master controller to select all operating modes and to modify all the parameters of these modes. The servodrive immediately carries out the instructions. A complete range of controls is available:

- Point-to-point position control.
- Speed control.
- Electronic gearbox.
- Activation of fast position capture inputs.
- Configuration of electronic cam thresholds and direct activation/deactivation of outputs.
- Adjustment of acceleration and deceleration ramps.
- Change of speed while movement is in progress.
- Reading or writing of the position.
- Triggering of a reference point movement.
- Reading and writing of all parameters.
- Activation and deactivation of outputs.
- Reading inputs.
- Error processing.

Point-to-point position control

In point-to-point position controller mode, a position control command defines a movement from a point A to a point B. The position may be absolute (with reference to the axis reference point) or relative (with reference to the current position).
All changes to the target position or the setpoint speed is processed immediately (even during movement of the axis).

Speed control

In speed control mode, a setpoint speed is attributed to the axis and a movement is launched without a pre-defined target position. The axis moves at this speed until another speed or operating mode is selected. The setpoint speed is modified immediately, even while a movement is in progress.

Position control commands *(continued)*

Electronic gearbox

In "electronic gearbox" operating mode, movement of the axis is specified by an "encoder" type input.
Three types of signal can be processed:
- A/B Signals.
- Pulse/direction signals.
- Forward/reverse pulse signals.

These signals are processed cyclically, given the adjustable reduction factor, to define a new setpoint position for the axis. The reduction factor can be modified while the axis is moving.
A point-to-point position controller command can also be superimposed on the axis movement in gearbox mode in order to carry out recalibration of the axes.

Reference point

A reference point operation allows a defined axis position to be allocated to a specific mechanical position. This is done either by directly allocating the real position, or by carrying out a reference point movement.

The different types of reference point are:
- With movement to the upper or lower limit switch, or on the reference point cam.
- With or without Z pulse.

Manual movement

All manual movement, controlled by the operator, can be carried out via the discrete inputs/outputs or using the TLA PH OO operator interface or the TLA PS CA commissioning software.

Teach-in

The teach-in consists in recording the current position value in the selected memory space. This operation allows you to record up to 2 x 64 absolute threshold positions for the electronic cam function.
It is activated by the input/output signals. The data can be read, written or copied by the field bus, the TLA PH OO operator interface or the TLA PS CA commissioning software.

Capture inputs

The current position value can be read by 1 or 2 fast inputs or by the index pulse of the position encoder.
It is possible to activate the capture inputs and to read the positions recorded by the field bus, the TLA PH OO operator interface or the TLA PS CA commissioning software.

Acceleration and deceleration ramps

A linear acceleration and deceleration ramp (which may be different) can be defined for the position control of the motors. A bumpless acceleration or deceleration phase is possible thanks to a filtering device which can be activated at any time.

Quick-Stop

The quick-stop function stops the motor as quickly as possible.
It is possible to select a linear braking ramp or a torque ramp (maximum motor current).

Motion control
Twin Line TLC 53 servodrives for servomotors

TLC 532 2F2 (IP 20)

TLC 538 2F3 (IP 20)

TLC 534 5F3 (IP 54)

Presentation

Twin Line TLC 53 servodrives for servomotors, with built-in position controller and controlled by field bus, are available in the following models:

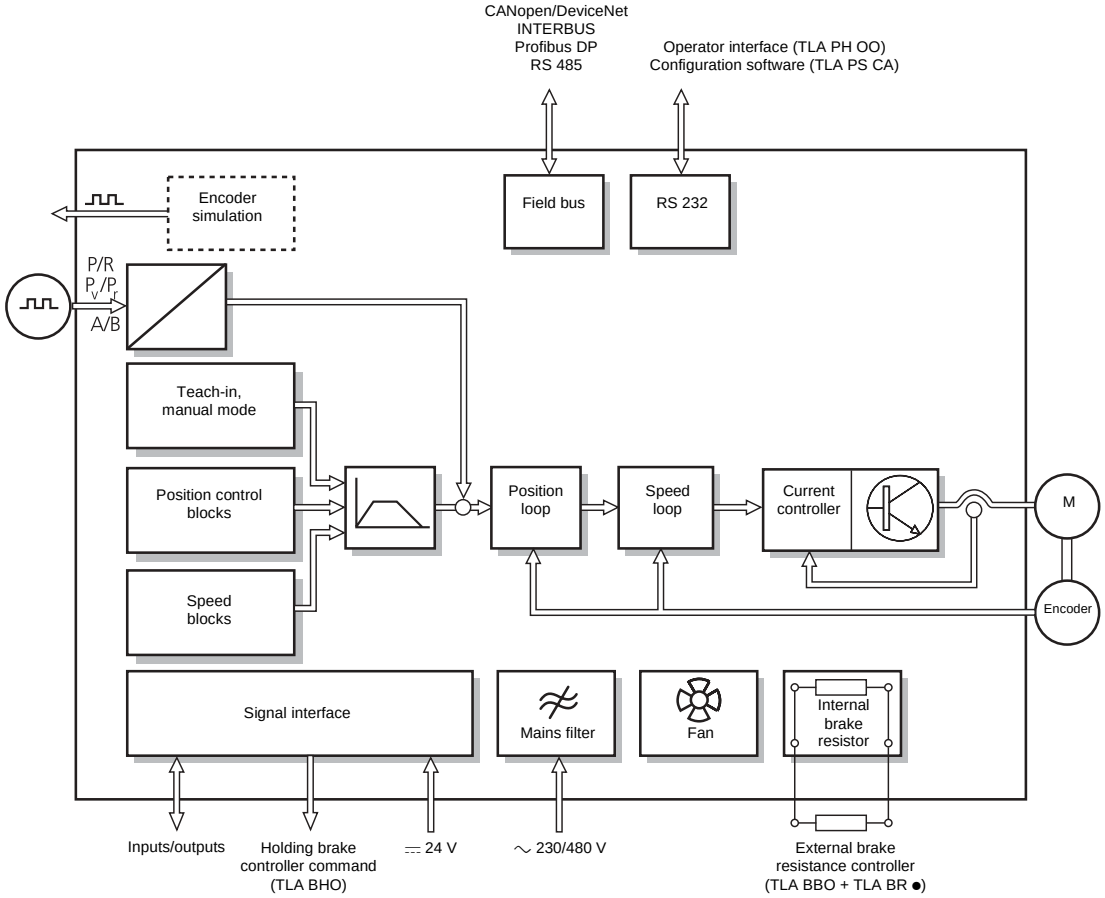
■ IP 20 degree of protection:
□ TLC 532 2F2: 3 A/750 W/230 V single phase,
□ TLC 534 2F3: 3 A/1.5 kW/230…480 V 3-phase,
□ TLC 536 2F3: 6 A/3 kW/230…480 V 3-phase,
□ TLC 538 2F3: 16 A/8 kW/230…480 V 3-phase.

■ IP 54 degree of protection:
□ TLC 532 5F2: 3 A/750 W/230 V single phase,
□ TLC 534 5F3: 3 A/1.5 kW/230…480 V 3-phase.

These IP 54 servodrives can be fitted with a built-in holding brake controller, depending on model.

An EMC supply input filter, radiator and fan are integrated as standard on all IP 20 and IP 54 servodrives.

Operating diagram



Motion control
Twin Line TLC 53 servodrives for servomotors

Environment conditions

Ambient temperature (1)		**°C**	0…+ 50 for IP 20 servodrives, 0…+ 45 for IP 54 servodrives
Storage and transport temperature		**°C**	- 40…+ 70
Relative humidity			15 to 85 %, non-condensing
Altitude		**m**	1000
Standards and certifications	Products		UL 508C
	Class of protection		Type 1 according to pr EN 50178
	Overvoltage		Category III according to pr EN 50178
	Pollution		Degree 2 according to pr EN 50178

Electrical characteristics

Type of servodrive			**TLC 532 ●F2●●●●●**	**TLC 534 ●F3●●●●●**	**TLC 536 2F3●●●●●**	**TLC 538 2F3●●●●●**
Degree of protection according to DIN EN 60259			IP 20 (TLC 532 2F2) IP 54 (TLC 532 5F2)	IP 20 (TLC 534 2F3) IP 54 (TLC 534 5F3)	IP 20	
Power supply	Mains voltage	**V**	∿ 1 x 230 V (-20 %)… 240 (+10 %)	∿ 1 x 230 (-20 %)…480 (+10 %)		
	Mains frequency	**Hz**	47…63			
	Consumption	**A**	6.5	4	7.5	20
	Inrush current	**A**	< 60			
	aM type external fuse	**A**	10			25
Motor	Rated power	**kW rms**	0.75	1.5	3	8
	Continuous current *(2)*	**A rms**	3		6	16
	Current peak value over 5 s max.	**A rms**	6		20	32
	Switching frequency	**kHz**	8/16			4/8
Motor cable	Cable length	**m**	⩽ 20 m			
	Shielding connection		At each end			
	Cross-section (depending on the length)	**mm²**	1.5	1.5…2.5		4
Continuous power bus connection			Maximum of two servodrives of the same power connected in parallel			
Internal brake resistance *(3)*	Continuous operation	**W**	30	50	200	80
	Maximum unit brake power	**J**	50	80	100	130
Supply voltage ⎓ 24 V TBTS, DIN 19240	Input voltage	**V**	20…30 V unprotected against polarity inversions			
	Input ripple	**V**	< 2 V peak to peak			
	Nominal input current	**A**	< 2.5			
Inputs (non isolated)	Number of inputs		See page 12			
	Voltage at 1	**V**	⎓ 12…30 (I ⩾ 3 mA)			
	Voltage at 0	**V**	⎓ ⩽ 5 (I ⩽ 0.5 mA)			
	Current	**mA**	⩽ 7 under ⎓ 24 V			
	Filtering	**ms**	0.7…1.5			
Outputs (protected against short-circuits)	Number of outputs		See page 12			
	Voltage	**V**	⎓ ⩽ 30			
	Load current	**mA**	⩽ 400			
	Voltage drop at 400 mA	**V**	⎓ ⩽ 1			
	Supporting inductive load	**mH**	150 /11 W			
Analog input	Voltage	**V**	± 10			
	Input resistance	**kΩ**	5			
	Resolution	**bits**	10			

(1) For TLC 532 5F2 and TLC 534 5F3, operation outdoors or in a highly polluted environment is not recommended (clogging up of fan).
(2) rms value in continuous operation at maximum ambient temperature.
(3) For TLC 532 5F2 and TLC 534 5F3, depends on the ambient temperature and ventilation. Consult our regional office.

Motion control
Twin Line TLC 53 servodrives for servomotors

TLC 532 2F2 ●●●●● (3)

TLC 538 2F3●●●●● (3)

TLC 534 5F3 ●●●●●

References *(1)*

IP 20 degree of protection

Servodrive supply	Power	EMC supply input filter	Reference *(2)*	Weight kg
∿ 230 V single phase 50/60Hz	0.750 kW	Built-in	TLC 532 2F2 ●●●●●	2.700
∿ 230…480 V 3-phase 50/60 Hz	1.5 kW	Built-in	TLC 534 2F3●●●●●	3.700
	3 kW	Built-in	TLC 536 2F3●●●●●	6.600
	8 kW	Built-in	TLC 538 2F3●●●●●	10.800

IP 54 degree of protection

∿ 230 V single phase 50/60Hz	0.750 kW	Built-in	TLC 532 5F2 ●●●●●	8.500
∿ 230…480 V 3-phase 50/60 Hz	1.5 kW	Built-in	TLC 534 5F3 ●●●●●	11.000

(1) For connection cables and accessories, see pages 38 to 41.

(2) To order a TLC 53 servodrive, fill out each reference

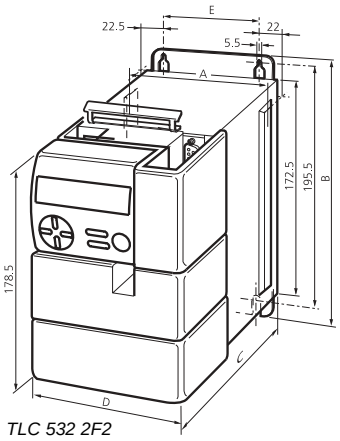
	TLC 53● ●F●	●	●	●	●	●
M1 slot Position setpoint	Without module	**1**				
	RS 422-C Encoder module	**2**				
	PULSE-C Module	**3**				
M2 slot Position feedback	SinCos Hiperface		**2**			
	Resolver *(4)*		**3**			
M3 slot Encoder simulation	Without encoder simulation			**1**		
	ESIM3-C Simulation encoder			**2**		
M4 slot Communication	Without				**1**	
	RS 485-C				**2**	
	INTERBUS				**3**	
	CANopen/DeviceNet				**4**	
	Profibus-DP				**5**	
Built-in holding brake controller	Without					**1**
	With *(5)*					**2**

For detailed module specifications, see page 34.

(3) The TLA PH OO operator interface is to be ordered separately, see page 38.
(4) Not compatible with SER motors in this catalog.
(5) This function can be integrated only on IP 54 type servodrives. The holding brake controller, reference TLA BHO, must be ordered separately for IP 20 servodrives, see page 38.

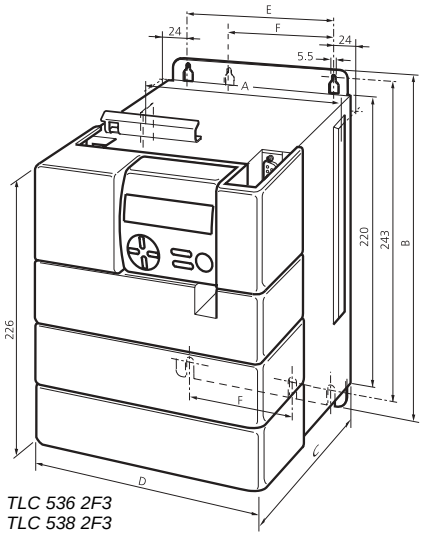
Motion control
Twin Line TLC 53 servodrives for servomotors

Dimensions in mm



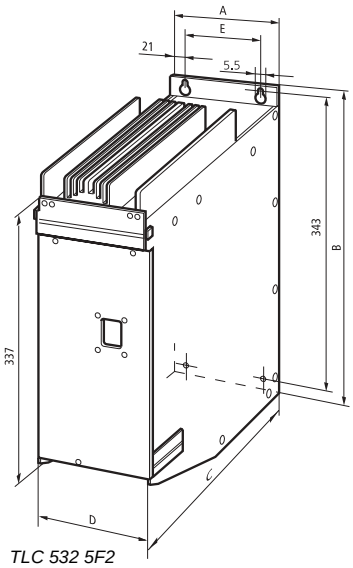
TLC 532 2F2
TLC 534 2F3
(IP 20)

	TLC 532 2F2	TLC 534 2F3
A	108	128
B	212.5	212.5
C	184.5	214.5
D	105.5	125.5
E	63	83



TLC 536 2F3
TLC 538 2F3
(IP 20)

	TLC 536 2F3	TLC 538 2F3
A	178	248
B	260	260
C	244.5	244.5
D	176	246
E	130	200
F	–	120



TLC 532 5F2
TLC 534 5F3
(IP 54)

	TLC 532 5F2	TLC 534 5F3
A	127	147
B	360	360
C	245	275
D	127	127
E	80	100

Motion control
Twin Line TLC 63 servodrives

Functions

The Twin Line TLC 63 servodrives are motion controllers which can be programmed in languages compliant with standard IEC 61131-3 for the control of:

- The built-in position controller.
- Local or field bus discrete inputs/outputs.

Applications are developed using the TLA PS PB programming software.

Programmable motion controller

Twin Line TLC 63 servodrives enable simultaneous motion control of a motor and application inputs/outputs. The inputs/outputs are processed cyclically at the same time as axis motion. The motion profiles can be freely defined and their execution synchronized with external events.

The following programming languages are available:

LD : ladder language
FBD : functional block diagram
IL : instruction list
ST : structured text
SFC : sequential function chart, Grafcet language
CFC : continuous function chart

The CANopen/DeviceNet communication module can be used for:

- Communication management between several TLC 63 servodrives.
- Control and command of TLC 43/53 servodrives with CANopen/DeviceNet communication.
- The display and modification of internal parameters using an operator interface.
- The control of discrete or analog remote inputs/outputs on the field bus.

Programmable motion controller *(continued)*

In addition to common programmable controller functions, a library of motion control functions is available with the TLA PS PB programming software:

- Relative and absolute point-to-point position control.
- Speed control.
- Electronic gearbox.
- Interface with fast position sensor inputs.
- Parametering of electronic cam thresholds and direct activation/deactivation of outputs.
- Adjustment of acceleration and deceleration ramps.
- Change of speed while movement is in progress.
- Reading or writing of the position.
- Triggering of a reference point movement.
- Reading and writing of all parameters.
- Activation and deactivation of outputs.
- Reading inputs.
- Error processing.
- Communication via the CANopen Master field bus.

Point-to-point position control

In point-to-point position controller mode, a position control command defines a movement from a point A to a point B. The position may be absolute (with reference to the axis reference point) or relative (with reference to the current position).
All changes to the target position or the setpoint speed is processed immediately (even during movement of the axis).

Speed control

In speed control mode, a setpoint speed is attributed to the axis and a movement is launched without a pre-defined target position. The axis moves at this speed until another speed or operating mode is selected. The setpoint speed is modified immediately, even while a movement is in progress.

Electronic gearbox

In "electronic gearbox" operating mode, movement of the axis is specified by an "encoder" type input.

Three types of signal can be processed:

- A/B Signals.
- Pulse/direction signals.
- Forward/reverse pulse signals.

These signals are processed cyclically, given the adjustable reduction factor, to define a new setpoint position for the axis. The reduction factor can be modified while the axis is moving.
A point-to-point position controller command can also be superimposed on the axis movement in gearbox mode in order to carry out recalibration of the axes.

Programmable motion controller *(continued)*

Reference point

A reference point operation allows a defined axis position to be allocated to a specific mechanical position. This is done either by directly allocating the real position, or by carrying out a reference point movement.

The different types of reference point are:
- With movement to the upper or lower limit switch, or on the reference point cam.
- With or without Z pulse.

Manual movement

All manual movement, under control of the operator, can be carried out using discrete inputs/outputs or via the TLA PH OO user interface or the TLA PS CA commissioning software compliant with the standard
IEC 61131-3 to activate movement of the motor, in a single step or in continuous operation.

Capture inputs

The current position value can be read by 2 fast inputs or by the index pulse of the position encoder.
It is possible to activate the capture inputs and to read the positions recorded by the field bus, the TLA PH OO operator interface or the TLA PS CA commissioning software, of the controller's programming language.

Programmable motion controller *(continued)*

Acceleration and deceleration ramps

A linear acceleration and deceleration ramp (which may be separate) can be defined for the position control of the motors. A bumpless acceleration or deceleration phase is possible due to a filtering device which can be activated at any time.

Quick-Stop

The quick-stop function enables the motor to be immobilized as quickly as possible. It is possible to select a linear braking ramp or a torque ramp (maximum motor current).

Motion control
Twin Line TLC 63 servodrives for servomotors

TLC 632 2F2 (IP 20)

TLC 638 2F3 (IP 20)

TLC 634 5F3 (IP 54)

Presentation

Twin Line TLC 63 servodrives, programmable motion controllers for servomotors are available in the following models:

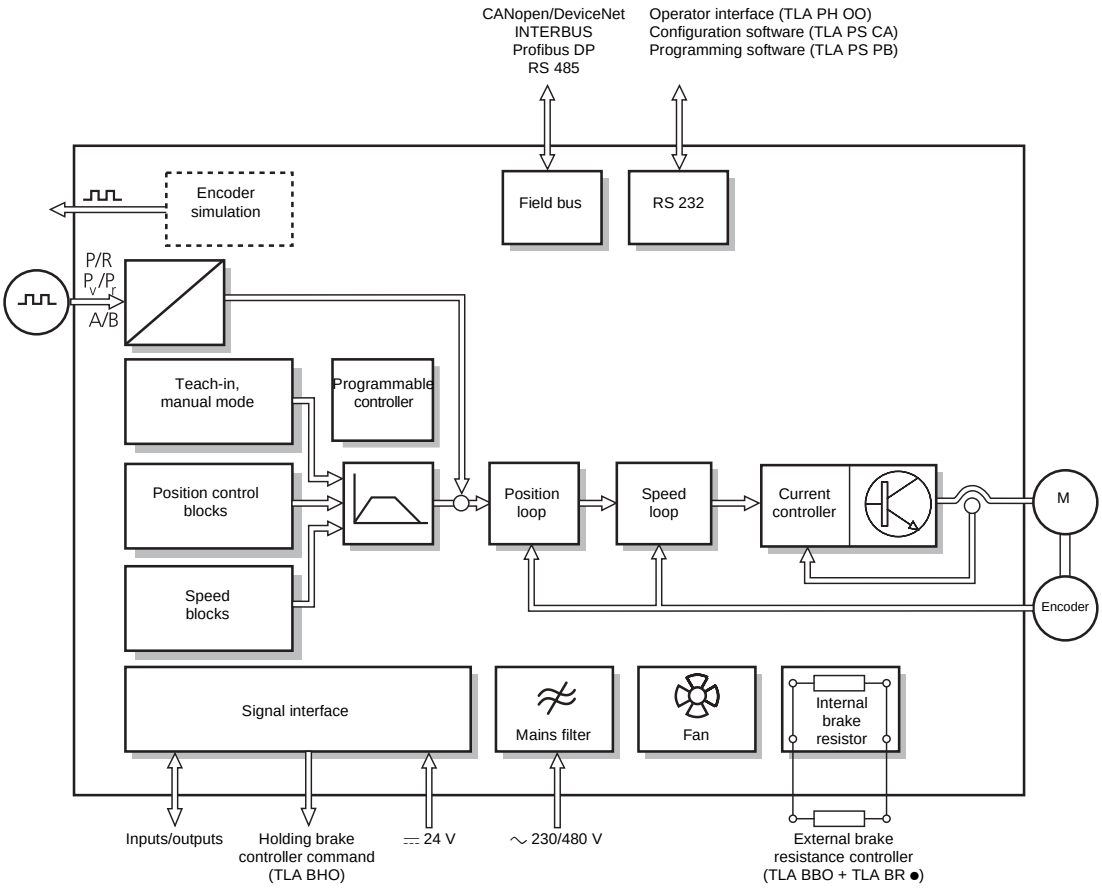
■ IP 20 degree of protection:
- □ TLC 632 2F2: 3 A/750 W/230 V single phase,
- □ TLC 634 2F3: 3 A/1.5 kW/230…480 V 3-phase,
- □ TLC 636 2F3: 6 A/3 kW/230…480 V 3-phase,
- □ TLC 638 2F3: 16 A/8 kW/230…480 V 3-phase.

■ IP 54 degree of protection:
- □ TLC 632 5F2: 3 A/750 W/230 V single phase,
- □ TLC 634 5F3: 3 A/1.5 kW/230…480 V 3-phase.

These IP 54 servodrives can be fitted with a built-in holding brake controller, depending on model.

An EMC supply input filter, radiator and fan are integrated as standard on all IP 20 and IP 54 servodrives.

Operating diagram



Motion control
Twin Line TLC 63 servodrives for servomotors

Environment conditions

Ambient temperature *(1)*		**°C**	0…+ 50 for IP 20 servodrives, 0…+ 45 for IP 54 servodrives
Storage and transport temperature		**°C**	- 40…+ 70
Relative humidity			15 to 85 %, non-condensing
Altitude		**m**	1000
Standards and certifications	Products		UL 508 C
	Class of protection		Type 1 according to pr EN 50178
	Overvoltage		Category III according to pr EN 50178
	Pollution		Degree 2 according to pr EN 50178

Electrical characteristics

Type of servodrive			**TLC 632 ●F2●●●●●**	**TLC 634 ●F3●●●●●**	**TLC 636 2F3●●●●●**	**TLC 638 2F3●●●●●**
Degree of protection according to DIN EN 60259			IP 20 (TLC 632 2F2) IP 54 (TLC 632 5F2)	IP 20 (TLC 634 2F3) IP 54 (TLC 634 5F3)	IP 20	
Power supply	Mains voltage	**V**	∿ 1 x 230 (-20 %)…240 (+10 %)	∿ 3 x 230 (-20 %)…480 (+10 %)		
	Mains frequency	**Hz**	47…63			
	Consumption	**A**	6.5	4	7.5	20
	Inrush current	**A**	< 60			
	aM type external fuse	**A**	10			25
Motor	Rated power	**kW rms**	0.75	1.5	3	8
	Continuous current *(2)*	**A rms**	3		6	16
	Current peak value over 5 s max.	**A rms**	6		20	32
	Switching frequency	**kHz**	8/16			4/8
Motor cable	Cable length	**m**	⩽ 20			
	Shielding connection		At each end			
	Cross-section (depending on the length)	**mm²**	1.5	1.5…2.5		4
Continuous power bus connection			Maximum of two servodrives of the same power connected in parallel			
Internal brake resistance *(3)*	Continuous operation	**W**	30	50	200	80
	Maximum unit brake power	**J**	50	80	100	130
Supply voltage ⎓ 24 V TBTS, DIN 19240	Input voltage	**V**	20…30 V unprotected against polarity inversions			
	Input ripple	**V**	< 2 V peak to peak			
	Nominal input current	**A**	< 2.5			
Inputs (non isolated)	Number of inputs		See page 12			
	Voltage at 1	**V**	⎓ 12…30 (I ⩾ 3 mA)			
	Voltage at 0	**V**	⎓ ⩽ 5 (I ⩽ 0.5 mA)			
	Current	**mA**	⩽ 7 under ⎓ 24 V			
	Filtering	**ms**	0.7…1.5			
Outputs (protected against short-circuits)	Number of outputs		See page 12			
	Voltage	**V**	⎓ ⩽ 30			
	Load current	**mA**	⩽ 400			
	Voltage drop at 400 mA	**V**	⎓ ⩽ 1			
	Supporting inductive load	**mH**	150 /11 W			
Analog input	Voltage	**V**	± 10			
	Input resistance	**kΩ**	5			
	Resolution	**bits**	10			
Size of memory for the programmable controller	Memory for application program	**Kb**	256			
	Memory data (Flash PROM)	**Kb**	8			
	Memory data saved in case of power outage	**bytes**	100			
	System data memory	**Kb**	128			

(6) For TLC 632 5F2 and TLC 634 5F3, operation outdoors or in a highly polluted environment is not recommended (clogging up of fan).
(7) rms value in continuous operation at maximum ambient temperature.
(8) For TLC 632 5F2 and TLC 634 5F3, depends on the ambient temperature and ventilation. Consult our regional office.

Motion control
Twin Line TLC 63 servodrives for servomotors

TLC 632 2F2 ●●●●● (3)

TLC 638 2F3●●●●● (3)

TLC 634 5F3 ●●●●●

References *(1)*

IP 20 degree of protection

Servodrive supply	Power	Power supply EMC input filter	Reference *(2)*	Weight kg
∿ **230 V single phase 50/60 Hz**	0.750 kW	Built-in	**TLC 632 2F2 ●●●●●** ▲	2.700
∿ **230…480 V 3-phase 50/60 Hz**	1.5 kW	Built-in	**TLC 634 2F3 ●●●●●** ▲	3.700
	3 kW	Built-in	**TLC 637 2F3 ●●●●●** ▲	6.600
	8 kW	Built-in	**TLC 638 2F3 ●●●●●** ▲	10.800

IP 54 degree of protection

∿ **230 V single phase 50/60 Hz**	0.750 kW	Built-in	**TLC 632 5F2 ●●●●●** ▲	8.500
∿ **230…480 V 3-phase 50/60 Hz**	1.5 kW	Built-in	**TLC 634 5F3 ●●●●●** ▲	11.000

(1) For connection cables and accessories, see pages 38 at 41.

(2)To order a TLC 63 servodrive, fill out each reference

	TLC 63● ●F●	●	●	●	●	●
M1 slot Position setpoint	Without module	**1**				
	RS 422-C Encoder module	**2**				
	PULSE-C Module	**3**				
M2 slot Position feedback	HIFA-C Module		**2**			
	Resolver *(4)*		**3**			
M3 slot Encoder simulation	Without simulation encoder			**1**		
	ESIM3-C Simulation encoder			**2**		
M4 slot Communication	Without				**1**	
	RS 485-C				**2**	
	INTERBUS				**3**	
	CANopen/DeviceNet				**4**	
	Profibus-DP				**5**	
Built-in holding brake controller	Without					**1**
	With *(5)*					**2**

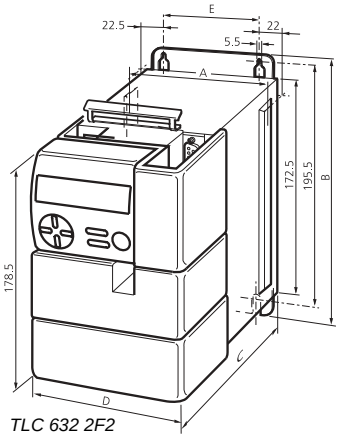
For detailed module specifications, see page 34.

(3) The TLA PH OO operator interface is to be ordered separately, see page 38.
(4) Not compatible with SER motors in this catalog.
(5) This function can be integrated only on IP 54 type servodrives. The holding brake controller, reference TLA BHO, must be ordered separately for IP 20 servodrives, see page 38.

▲ Commercial launch scheduled for 3rd quarter of 2003.

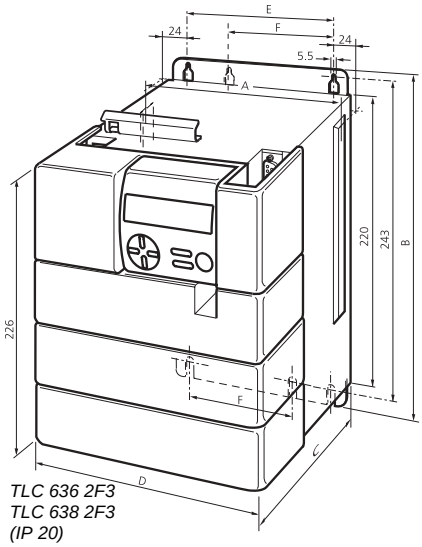
Motion control
Twin Line TLC 63 servodrives for servomotors

Dimensions (in mm)



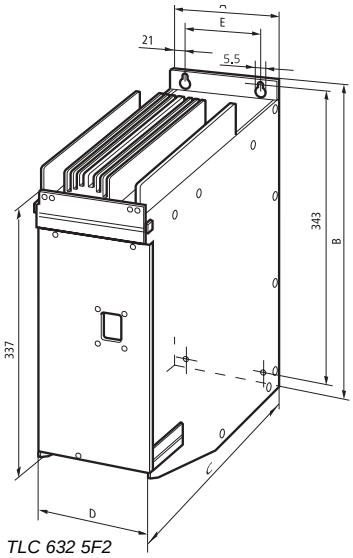
TLC 632 2F2
TLC 634 2F3
(IP 20)

	TLC 632 2F2	TLC 634 2F3
A	108	128
B	212.5	212.5
C	184.5	214.5
D	105.5	125.5
E	63	83



TLC 636 2F3
TLC 638 2F3
(IP 20)

	TLC 636 2F3	TLC 638 2F3
A	178	248
B	260	260
C	244.5	244.5
D	176	246
E	130	200
F	–	120



TLC 632 5F2
TLC 634 5F3
(IP 54)

	TLC 632 5F2	TLC 634 5F3
A	127	147
B	360	360
C	245	275
D	127	127
E	80	100

Motion control
Twin Line TLC 43/53/63 servodrives
Interface modules

Presentation

Interface modules for Twin Line TLC 43/53/63 servodrives allow a configuration adapted to the application to be defined using the servodrive. See pages 18, 24 and 32.

RS 422-C module: encoder interface

The RS 422-C module receives signals from an external encoder in the form of A/B signals. It also uses the reference pulse (Z pulse). Characteristic applications: electronic gearbox, external encoder as feedback of the position loop.

PULSE-C Module: pulse interface

The PULSE-C module receives position data in the form of a pulse/direction signal or a forward/reverse pulse signal. The electronic gearbox function is a typical application.

HIFA-C Module: SinCos Hiperface interface

The HIFA-C module receives the position information from a motor fitted with a single turn or multiturn SinCos Hiperface absolute encoder (4096 revolutions).
The position of the rotor is detected optically and transmitted to the HIFA-C module in the form of analog and digital position data. The signals are decoded with 14 bit resolution, corresponding to 16 384 pulses/revolution.
The built-in digital interface allows initial position information, as well as all the motor parameters of the SinCos encoder memory, to be transmitted to the servodrive.

ESIM3-C Module: encoder simulation

The ESIM3-C module supplies the position data of the motor in the form of incremental signals. These are electrical phase quadrature signals (A/B channels). The transmitted resolution is 1024 pulses/turn. There is no reference pulse.
One of the typical uses of this module is to provide a setpoint position to another Twin Line servodrive in electronic gearbox mode.

RS 485-C Communication module

The RS 485-C communication module is an asynchronous interface with four electrically insulated RS 485 wires.

INTERBUS communication module

This module is a communication module for the INTERBUS field bus.

CANopen/DeviceNet communication module

The CANopen bus is a serial sensor/actuator bus. It has a 2-wire connection with the CAN-Low and CAN-High lines.
The user can configure either the CANopen DS-402 profile, or the DeviceNet bus, keeping in mind that the following DeviceNet specifications are excluded:
- DEL diagnostics.
- Type of connector.
- Power supply via the field bus connector.

Profibus-DP communication module

The Profibus-DP bus is a rapid cyclical communication bus. It has a 2-wire RS 485 interface.

Motion control
Twin Line TLC 43/53/63 servodrives
Interface modules

Characteristics

Type of interface module		**RS 422-C**
For servodrives	Type	**TLC 53/63**
	Slot	M1
Inputs	Type	RS 422, electrical connection to ⎓ 24 V ground
	Input frequency	⩽ 400 kHz
Outputs	External encoder supply	5 V ± 5% 300 mA max., protected against short-circuits and overloads
	Cable length	100 m max.
	Minimum cross-section	0.5 mm^2 for power supply 0.25 mm^2 for signals
Type of interface module		**PULSE-C**
For servodrives	Type	**TLC 53/63**
	Slot	M1
Inputs	Type	RS 422, or 4.5…30 V open collector Electrical connection to ⎓ 24 V ground
	Input resistance	5 kΩ
	Pulse frequency	⩽ 200 kHz
	Enable input frequency	⩽ 1 kHz
Outputs	Type	Protected against short-circuits with open collector
	Output voltage	⩽ 30 V
	Output current	⩽ 50 mA
Connection	Maximum length	100 m with RS 422 connection; 10 m with connection to open collector
	Minimum cross-section	0.14 mm^2 for signals
Type of interface module		**ESIM1-C**
For servodrives	Type	**TLC 43/53/63**
	Slot	M3
A/B signal outputs		RS 422, electrical connection to ⎓ 24 V ground
Type of interface module		**RS 485-C**
For servodrives	Type	**TLC 43/53/63**
	Slot	M4
Type		In compliance with the standard RS 485 with electrical insulation and 4 wire interface
Transfer rate		Max. 38.4 Kbit/s
Supply voltage output		+ 12 V (9 V min/15 V max.)
Type of interface module		**INTERBUS**
For servodrives	Type	**TLC 43/53/63**
	Slot	M4
Type		In compliance with the INTERBUS specification
Transfer rate		500 Kbit/s
Max. length		400 m between connected components
Type of interface module		**CANopen/DeviceNet**
For servodrives	Type	**TLC 43/53/63**
	Slot	M4
Type		Level in compliance with the standard ISO 11898 with electrical insulation
Transfer rate		⩽ 1 Mbit/s configurable
Max. length		At 125 Kbit/s: 500 m max. At 500 Kbit/s: 100 m max.
Adapter resistor		120 Ω (to be fitted at each end)
Type of interface module		**Profibus-DP**
For servodrives	Type	**TLC 43/53/63**
	Slot	M4
Type		In compliance with the Profibus-DP specification, level RS 485 with electrical insulation
Transfer rate		⩽ 12 Mbit/s
Supply voltage output		+ 5 V (10 mA max.) only for the terminal resistor
Length		As per Profibus-DP standard

Motion control
Twin Line TLD/TLC servodrives
Separate components

TLA PH OO

Operator interface

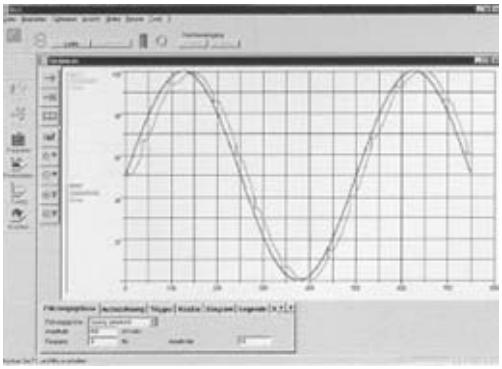
The TLA PH OO operator interface is designed to control Twin Line TLD/TLC servodrives, and to perform diagnostics for them. It can be plugged into IP 20 Twin Line servodrives.

It features a 3 x 16 character display in 4 languages (English, French, German and Italian). It can be connected to the RS 232 communication interface either directly (IP 20 model), or using the TLA CDC B G ●●● cable (ordered separately) of maximum length, 10 meters.

The interface allows you to:
- Consult information concerning the status of the motor, as well as the operating mode and status of the servodrive.
- Check and modify the internal parameters.
- Diagnose errors.
- Control movement in manual mode.
- Copy configuration from one servodrive to another.

Software applications

Configuration and adjustment software



TLA PS CA software screen

The TLA PS CA commissioning tool runs on Windows 98/NT/XP, in conjunction with Twin Line TLD/TLC servodrives.
The configuration and adjustment software enables installation and diagnostics to be carried out rapidly. It is ready for use, without the need for prior configuration.

TLA PS CA software functions:
- Entry and display of servodrive parameters.
- Archiving and reproduction of servodrive parameters.
- Manual position control of motor using a PC.
- Oscilloscope with the recording, display and archiving of movements.
- Offline/online management of position control parameters and data.
- Optimization of control loops.
- Display of mechanical frequency response (F.F.T).
- Diagnostics of operating faults.
- Assistant for facilitating the installation of Twin Line servodrives.

Depending on the type of servodrive, additional functions are available:
- Programming of movement tasks.
- Post-processing of movement lists and movement data.
- Reference point movements.

Programming software

The TLA PS PB programming software runs on Windows 98/NT, in conjunction with Twin Line TLC 63 servodrives and complies with IEC standard 61131-3.
The following programming languages are available:

LD : ladder language
FBD : functional block diagram
IL : instruction list
ST : structured text
SFC : sequential function chart, Grafcet language
CFC : continuous function chart

The CD-ROM reference TLA DOC CD RM contains:
- All useful documentation for the implementation of Twin Line TLD/TLC servodrives and communication networks.
- The description files of the communication interfaces for the SyCon network configuration tool:
  - the .eds files for the CANopen network
  - the .gsd files for the Profibus-DP network.

Motion control
Twin Line TLD/TLC servodrives
Separate components

TLA BBO

Brake resistance controller

The TLA BBO brake resistance controller for Twin Line TLD/TLC servodrives switches an external brake resistance onto the intermediate circuit of the servodrive, when this circuit reaches a high voltage level.

It is possible to connect the maximum of 2 Twin Line servodrives of the same power rating to the controller. The intermediate circuits of both units are connected in parallel. The controller is connected to the TLD/TLC servodrive using TLA CB AA A ●●● cables.

TLA BR●

Brake resistor

The TLA BR ● brake resistor is a high-performance resistor equipped with a shielded cable of 0.75 m in length for connecting to the brake resistor controller TLA BBO.

The brake resistor is designed with IP 54 degree of protection.
An attachment bracket is delivered with the product.

The brake resistor is available in two ohm values: 72 Ω or 150 Ω, and for a continuous power of 100 W or 200 W. The surface temperature must not exceed 250 °C.

TLA BHO

Holding brake controller

The TLA BHO holding brake controller amplifies the brake control signal transmitted by the Twin Line TLC/TLD servodrives, so that the brake is activated rapidly and produces as little heat as possible.
Depending on the type of motor used, it is possible to select whether the operation is carried out with or without a reduction in the brake voltage, using the rotary switch located on the servodrive.

Twin Line TLC servodrives with IP 54 degree of protection can be fitted to this controller, see pages 18, 24 and 32.

Motion control
Twin Line TLD/TLC servodrives
Separate components

TLA PH OO

References

Operator interface

Description	Use	Length	Reference	Weight kg
Operator interface	Can be directly connected to TLD/TLC (IP 20) servodrives Can be connected by cable to TLC (IP 54) servodrives	–	**TLA PH OO**	–
Connection cables (fitted with 2 9-pin SUB-D type connectors)	For remote connection of the TLA PH OO operator interface	1.5 m	**TLA CDC B G 015**	–
		3 m	**TLA CDC B G 030**	–
		5 m	**TLA CDC B G 050**	–
		10 m	**TLA CDC B G 100**	–

Software tools

Description	Use	Operating system	Reference	Weight kg
Commissioning software	For all TLD/TLC servodrives	Windows 98/NT/XP	**TLA PS CA**	–
Programming software	For the TLC 63 servodrive	Windows 98/NT/XP	**TLA PS PB**	–

Description	Use	Length	Reference	Weight kg
Connection cables (fitted with 2 9-pin SUB-D type connectors)	For connecting a TLD/TLC servodrive to a PC	5 m	**TLA CD P B G 050**	–
		10 m	**TLA CD P B G 100**	–

TLA BBO

Controller and brake resistors

Description	Use	Resistance value/Power	Reference	Weight kg
Brake resistance controller	For TLD/TLC servodrive	–	**TLA BBO**	–
Brake resistors (come equipped with a 0.75 m long cable and attachment bracket)	For the controller TLA BBO. The TLA BBO controller is connected using the cable supplied.	72 Ω/100 W	**TLA BR A**	–
		150 Ω/100 W	**TLA BR B**	–
		72 Ω/200 W	**TLA BR C**	–
		150 Ω/200 W	**TLA BR D**	–

TLA BR●

Description	Use	Cable cross-section	Length	Reference	Weight kg
Connection cables (free ends)	Connection between the TLD/TLC servodrive and the TLA BBO controller with the resistor TLA BR A/B	2 x 2.5 mm²	0.5 m	**TLA CB AA A 005**	–
			1.5 m	**TLA CB AA A 015**	–
			3 m	**TLA CB AA A 030**	–
			5 m	**TLA CB AA A 050**	–
	Connection between the TLD/TLC servodrive and the TLA BBO controller with the resistor TLA BR C/D	2 x 4 mm²	0.5 m	**TLA CB AA B 005**	–
			1.5 m	**TLA CB AA B 015**	–
			3 m	**TLA CB AA B 030**	–
			5 m	**TLA CB AA B 050**	–

Holding brake controller

Description	Use	Reference	Weight kg
Holding brake controller	For TLD/TLC (IP 20) servodrives	**TLA BHO**	–

TLA BHO

Motion control
Twin Line TLD/TLC servodrives
Separate components

References (continued)

Separate components

Description	For servodrive	Type	Reference	Weight kg
Line terminator for CANopen bus	TLC 43/53/63	Female, 9-pin	**TLA T A**	–
		Male, 9-pin	**TLA T B**	–
All connectors	TLD 13 for slots M1 and M2	SUB-D	**TLA T F**	–
	TLD/TLC for slots M1, M2, M3, M4 and RS 232 interface	SUB-D	**TLA T D**	–
Connection shielding accessory	TLD/TLC	–	**TLA T E**	–

Separate components for TLC (IP 54) servodrives

Cable support (inside the servodrive casing)	TLC (IP 54)	–	**TLA T C**	–
Cable seal	TLC (IP 54)	–	**TLA T K**	–
Fan	TLC (IP 54)	–	**TLA M S**	–

Twin Line CD-ROM

Description	Content	Reference	Weight kg
Twin Line CD-ROM	■ All useful documentation for the implementation of Twin Line TLD/TLC servodrives and communication networks. ■ The description files of the communication interfaces for the SyCon network configuration tool: □ the .eds files for the CANopen network □ the .gsd files for the Profibus-DP network.	**TLA DOC CD RM**	–

References (continued)

Connection cables for interface modules

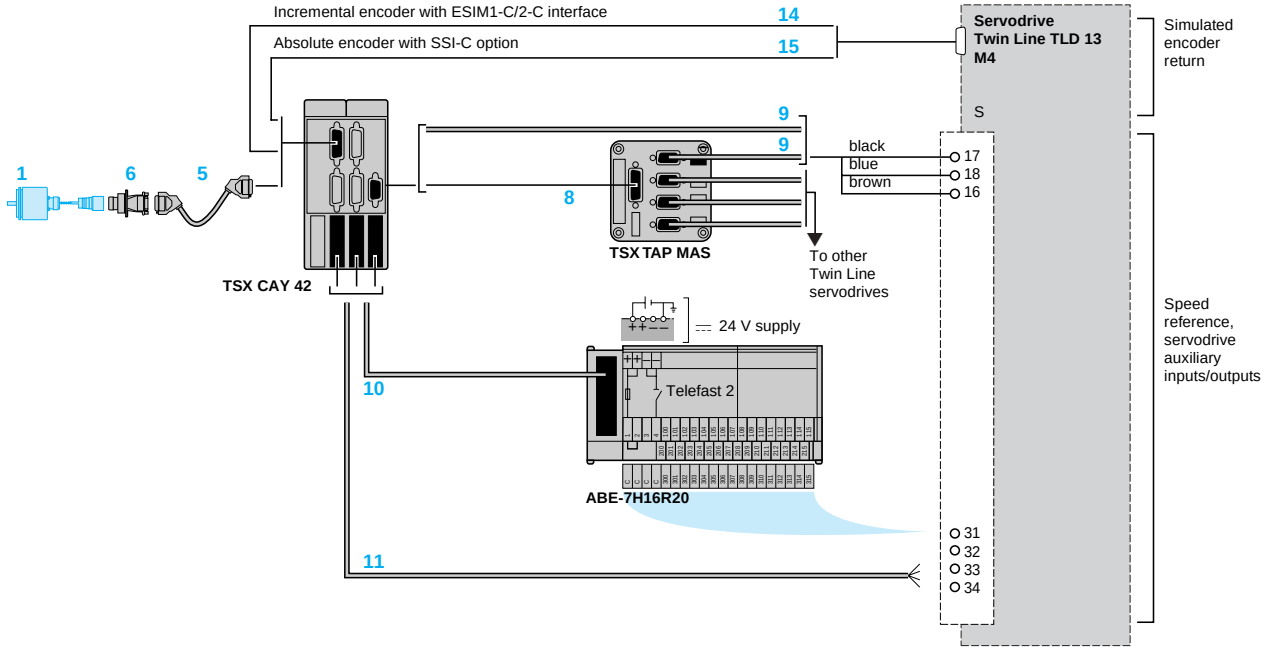
Description	For servodrive	Use	Composition	Length	Reference	Weight kg
Connection cables for RS 422-C encoder module	TLD 13, TLC 53/63	Connecting the servodrive to an incremental encoder	Free wire ends	0.5 m	**TLA CD C A C 005**	–
				1.5 m	**TLA CD C A C 015**	–
				3 m	**TLA CD C A C 030**	–
				5 m	**TLA CD C A C 050**	–
Connection cables for PULSE-C module	TLD 13, TLC 53/63	Connecting the servodrive to an external pulse control	Fitted with 2 x 15 pin SUB-D type connectors	0.5 m	**TLA CD C B B 005**	–
				1.5 m	**TLA CD C B B 015**	–
				3 m	**TLA CD C B B 030**	–
				5 m	**TLA CD C B B 050**	–
			Free wire ends	0.5 m	**TLA CD C A B 005**	–
				1.5 m	**TLA CD C A B 015**	–
				3 m	**TLA CD C A B 030**	–
				5 m	**TLA CD C A B 050**	–
Connection cables for modules RS 485-C	TLC 43/53/63	Connecting the servodrive to an RS 485 interface	Free wire ends	0.5 m	**TLA CD C A D 005**	–
				1.5 m	**TLA CD C A D 015**	–
				3 m	**TLA CD C A D 030**	–
				5 m	**TLA CD C A D 050**	–
Connection cables for CANopen/DeviceNet module	TLC 43/53/63	Connecting the servodrive to the bus	Fitted with 2 x 9 pin SUB-D type connectors	0.5 m	**TLA CD C A B 005**	–
				1.5 m	**TLA CD C A B 015**	–
				3 m	**TLA CD C A B 030**	–
				5 m	**TLA CD C A B 050**	–
Connection cables for InterBus modules	TLC 43/53/63	Connecting the servodrive to the bus	Fitted with 2 x 15 point SUB-D type connectors	0.5 m	**TLA CD C B F 005**	–
				5 m	**TLA CD C B F 050**	–
Connection cables for ESIM1-C/2-C or SSI-C modules	TLD 13	Incremental or absolute SSI encoder emulation	Free wire ends	0.5 m	**TLA CD C A E 005**	–
				1.5 m	**TLA CD C A E 015**	–
				3 m	**TLA CD C A E 030**	–
				5 m	**TLA CD C A E 050**	–
Connection cables for connecting ESIM1-C/2-C modules to an RS 422 interface and for connecting an ESIM3-C module	TLD 13, TLC 43/53/63	Connecting a TLD 13 servodrive fitted with a ESIM1-C/2-C module to the RS 422 interface of another TLD 13 servodrive. Connecting a TLC 43/53/63 servodrive fitted with a ESIM3-C module in "electronic gearbox" operating mode	Fitted with 2 x 15 point SUB-D type connectors	0.5 m	**TLA CD C B H 005**	–
				1.5 m	**TLA CD C B H 015**	–
				3 m	**TLA CD C B H 030**	–
				5 m	**TLA CD C B H 050**	–
Servomotor connection cables	TLD 13, TLC 43/53/63	–	–	–	See page 63	–

References (continued)

Connection cables for Premium platforms

Description	Use	Composition	Length	Reference	Weight kg
Connection cables for Premium platforms	Connecting the TLD 13 servodrive fitted with the ESIM1-C/2-C module to the TSX CAY module of the Premium PLC (incremental encoder interface)	Fitted with 2 x 15-pin SUB-D type connectors	2 m	**TSX CXP 273**	–
			6 m	**TSX CXP 673**	–
	Connecting the TLD 13 servodrive fitted with the SSI-C module to the TSX CAY module of the Premium PLC (SSI encoder interface)	Fitted with 2 x 15-pin SUB-D type connectors	2 m	**TSX CXP 253**	–
			6 m	**TSX CXP 653**	–

Connecting the Twin Line TLD 13 servodrive to the TSX CAY Premium module



1 Incremental or absolute encoder
5 TSX CCP S15●●● cable fitted with connectors (encoder return)
6 TSX TAP S15 05 connector
8 TSX CXP 213/613 cable fitted with connectors
9 TSX CDP 611 rolled ribbon cable fitted with connectors
10 TSX CDP●●3 cable fitted with connectors
11 TSX CDP●01 rolled ribbon cable fitted with connectors
14 TSX CXP 273/673 cable fitted with connectors (simulated incremental encoder return)
15 TSX CXP 253/653 cable fitted with connectors (simulated absolute SSI encoder return)

Nota : *for the components referenced 1 to 11, consult our "Lexium Motion Control" catalog No. AUTCD21124207ENG or our "Premium Automation Device Platform" catalog No. AUTC201496125ENG.*

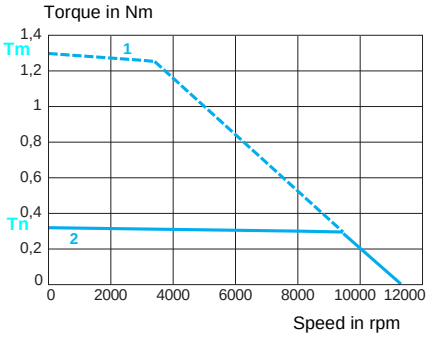
Motion control
SER brushless motors for Twin Line servodrives

Presentation

SER brushless motors are equipped with Neodymium Iron Borium (NdFeB) magnets and provide a high power density within a confined space, as well as a dynamic velocity range that meets all machine requirements.
Thermal protection is provided by an integral probe in the motor.
These motors support high overloads without risk of demagnetization. SER motors are certified "Recognized" (*UR*) by the Underwriters Laboratories. They are compliant with standard UL1004 and with European directives (marking CE).

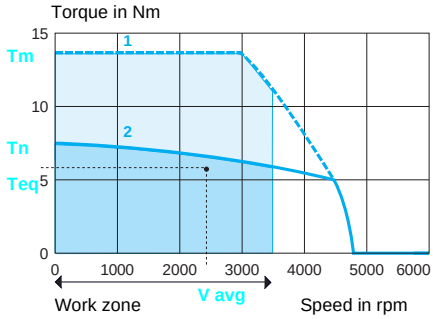
Depending on the model, SER brushless motors can be equipped with a shaft seal (IP 41 or IP 56), a holding brake and/or a gearbox.

Twin Line TLD/TLC servodrives, associated with SER motors, deliver a sinusoidal wave allowing perfect rotation, even at low speed.



Speed/torque characteristics

SER motors show torque/speed profiles similar to the example opposite with:
1 Peak torque at 230 V single phase or 400 V 3-phase (depending on the servodrive model).
2 Continuous torque at 230 V single phase or 400 V 3-phase (depending on the servodrive model).
where:
12,000 (in rpm) corresponds to the motor's maximum mechanical speed.
Tn (in Nm) represents the peak stall torque value.
Tn (in Nm) represents the continuous stall torque value.



Principle for determining the size of the motor according to the application

Torque/speed curves can be used to determine optimum motor size. For example, for a supply voltage of 400 V, 3-phase, the graphs used are graphs 1 and 2. The diagram of speeds and torques according to the motor cycle must also be defined (consult our catalog “Lexium Motion Control” no. AUTCD21124207EN).

■ Locate the work zone of the application in terms of speed.

■ Verify, using the motor cycle diagram, that the torques required by the application during the different cycle phases are located within the area bounded by graph 1 in the work zone.

■ Calculate the average speed S_{avg} and the equivalent thermal torque T_{eq}.

■ The point defined by S_{avg} and T_{eq} must be within the area bounded by graph 2 in the work zone.

The "Schneider Motion Sizer" motor sizing utility, will help the designer calculate the size of motors using application data.

Motion control
SER brushless motors for Twin Line servodrives

Functions

SER brushless motors have been developed to meet to the following requirements:
- Functional characteristics, robustness, safety, in compliance with IEC 34-1.
- Ambient operating temperature: - 25...+40 °C in compliance with DIN 50019R14.
- Relative humidity: ≤ 75 % yearly average/95 % for 30 days without condensation.
- Storage and transport temperature: - 25...+ 70 °C.
- Winding insulation class: F (threshold temperature for windings 155 °C) in compliance with VDE 0530.
- Supply and sensor connections using angled connectors rotatable through 310 °.
- Thermal protection by built-in PTC thermistor probe, controlled by the Twin Line servodrive.
- Out-of-round, concentricity and perpendicularity between flange and shaft as per DIN 42955, class N.
- Flange compliant with standard DIN 42948.
- Permitted mounting positions: no mounting restriction for IMB5 - IMV1 and IMV3 as per DIN 42950.
- Polyester resin based paint: opaque black RAL 9005.

Functions

- Degree of protection of the motor casing: IP 56 as per IEC 529.
- Degree of protection of the shaft end: IP 41 or IP 56 in accordance with IEC 529.
- Degree of protection of the gearbox (depending on model): IP 54 as per IEC 529.
- Integrated sensor, single turn or multiturn absolute encoder (4096 revolutions) SinCos Hiperface high resolution interface.
- Standard sized shaft end (as per DIN 42948):
  - motor without gearbox: smooth shaft end *(1)*,
  - motor equipped with gearbox: shaft end with key.

Holding brake (depending on model)

The integral brake fitted on SER motors (depending on the model) is a failsafe electro-magnetic holding brake.

⚠ The brake torque decreases when the motor temperature exceeds 80°C. Unless the maximum temperature of the motor is known and is less than 80°C according to the loads applied, do not expose the brake to more than 50% of its continuous torque value.

⚠ Do not use the holding brake as a dynamic brake for deceleration purposes.

Built-in encoder

The motor is fitted with an absolute encoder which, depending on the model, can be:
- A single turn or multiturn high-resolution absolute encoder, (4096 revolutions) with an angular shaft position precise to less than ± 45 arc seconds.

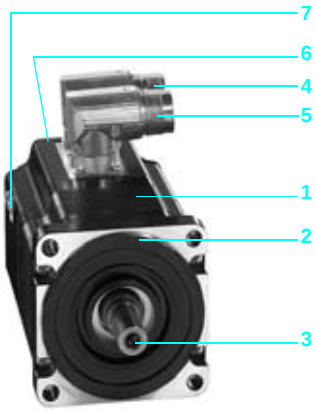
This performs the following functions:
- Gives the angular position of the rotor in such a way that flows can be synchronized.
- Measures the motor speed via the associated Twin Line servodrive.

This information is used by the speed controller of the Twin Line servodrive.
- May measure position information for the position controller of the Twin Line servodrive.
- Measures and, where necessary, transmits position information in incremental or absolute format, for the position return of a motion control module (Twin Line servodrive fitted with an ESIM module).

(1) For shaft end with key, consult our Regional Sales Office.

Description: page 44 | Characteristics: pages 45 to 59 | References: pages 60 and 61 | Dimensions: page 62

Motion control
SER brushless motors for Twin Line servodrives



Description

SER brushless motors with a 3-phase stator and an 8-pole rotator with Neodymium Iron Borium magnets (NdFeB) are comprise of:

1 Housing with a square cross-section, protected by black opaque polyester resin paint RAL 9005.

2 Axial flange with 4 fixing points in compliance with standard DIN 42948.

3 A smooth shaft end compliant with the standard DIN 42948 *(1)*.

4 A dust and damp-proof male screw connector for connecting the power cable. The output of this connector is continuously rotatable through an arc of 310°.

5 A dust and damp-proof male screw connector for connecting the encoder. The output of this connector is continuously rotatable through an arc of 310°.

6 A manufacturer's data plate located on the side opposite the shaft end.

7 A ground terminal.

Connector to be ordered separately, for connecting to Twin Line TLD/TLC servodrives. See pages 63.

Schneider Electric has taken great care to achieve the most appropriate match between SER motors and Twin Line servodrives. This compatibility is only guaranteed when cables sold by Schneider Electric are used (see pages 63).

(1) For shaft end with key, consult our Regional Sales Office.

Motion control
SER brushless motors for Twin Line servodrives

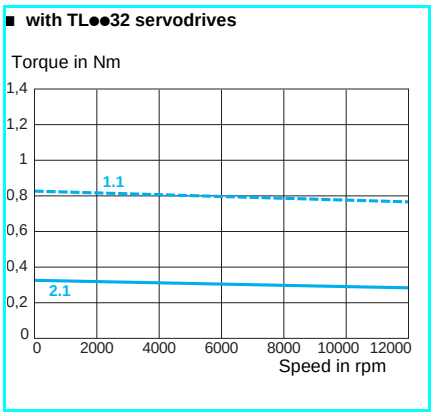
Characteristics of SER 364/366 motors

Type of SER motor				364 3L 3S	364 3L 5S	364 3L 7S	366 3L 3S	366 3L 5S	366 3L 7S
Torque (model without gearbox)	Associated with the Twin Line servodrive			TL●●32	TL●●32	TL●●32	TL●●32	TL●●32	TL●●32
	Continuous stall	Tn	**Nm**	0.32	0.32	0.32	0.54	0.54	0.54
	Peak stall	Tm	**Nm**	0.82	1.1	1.3	1.15	1.6	2.15
Current	Permanent		**A rms**	2.3	1.45	1.15	2.75	1.8	1.25
	Maximum		**A rms**	6		5.7	6		
Demagnetization current			**A**	11.5	7.3	5.7	13.5	8.5	6
Maximum mechanical speed			**rpm**	12 000					
Constants (at 25°C)	Torque		**Nm/A rms**	0.14	0.22	0.28	0.19	0.3	0.43
	Back emf		**V rms s/rad**	0.087	0.13	0.17	0.11	017	0.25
Rotor	Number of poles			6					
	Inertia without brake	Jm	**gm²**	0.01			0.018		
	Inertia with brake	Jm	**gm²**	0.017			0.025		
Stator (at 25 °C)	Resistance (phase/phase)		Ω	4.7	11.1	18.9	3.7	9.1	17.4
	Inductance (phase/phase)		**mH**	9.2	21.8	37.9	7.9	21	37.5
	Electrical time constant		**ms**	1.9	1.9	2	2.1	2.3	2.1
Holding brake (depending on model)				See page 64					
Gearbox (depending on model)				See page 66					

Speed/torque graphs

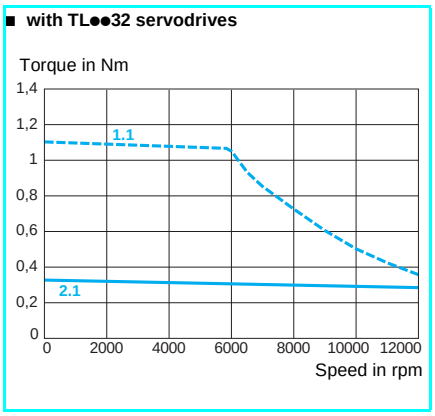
SER Motors 364 3L 3S

■ **with TL●●32 servodrives**



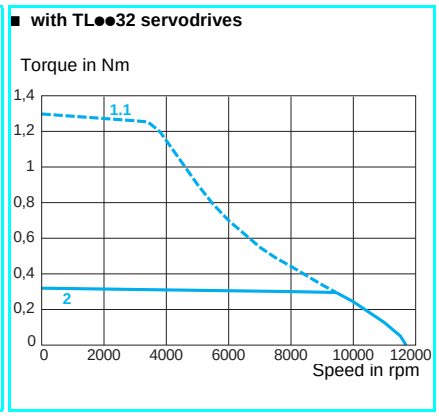
SER Motors 364 3L 5S

■ **with TL●●32 servodrives**



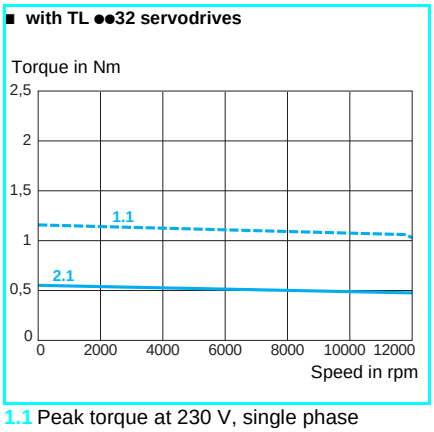
SER Motors 364 3L 7S

■ **with TL●●32 servodrives**



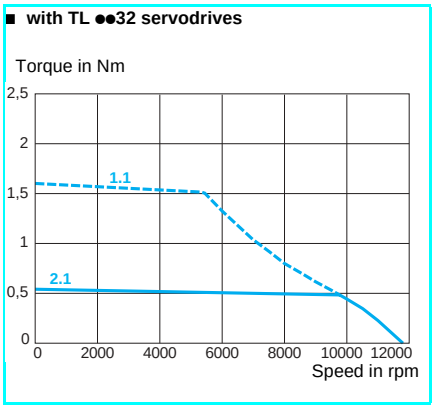
SER 366 3L 3S Motors

■ **with TL ●●32 servodrives**



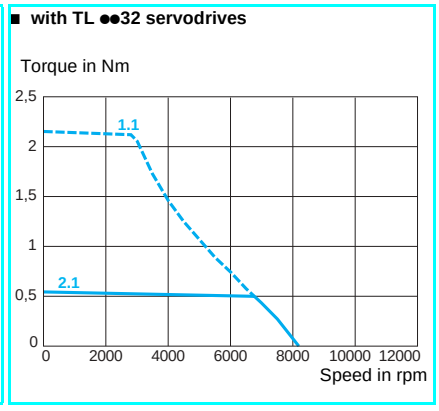
SER 366 3L 5S Motors

■ **with TL ●●32 servodrives**



SER 366 3L 7S Motors

■ **with TL ●●32 servodrives**



1.1 Peak torque at 230 V, single phase
2.1 Continuous torque at 230 V, single phase

Motion control
SER brushless motors for Twin Line servodrives

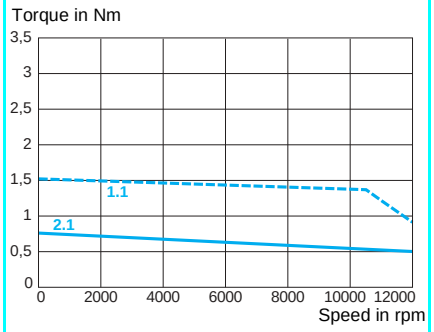
Characteristics of SER 368/36A motors

Types of SER motor				368 3L 3S	368 3L 5S	368 3L 7S	36A 3L 3S	36A 3L 5S	36A 3L 7S
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●32**	**TL●●32**	**TL●●32**	**TL●●32**	**TL●●32**
	Continuous stall	Tn	**Nm**	0.74	0.75	0.75	0.76	0.9	0.9
	Peak stall	Tm	**Nm**	1.5	1.92	3	1.5	2.1	3.6
Current	Permanent		**A rms**	3	2.1	1.15	3	2.3	1.2
	Maximum		**A rms**	6					
Demagnetization current			**A**	15.3	10.5	6	17.5	11.5	6
Maximum mechanical speed			**rpm**	12 000					
Constants (at 25°C)	Torque		**Nm/A rms**	0.25	0.35	0.65	0.25	0.39	0.75
	Back emf		**V rms s/rad**	0.14	0.21	0.37	0.15	0.23	0.44
Rotor	Number of poles			6					
	Inertia without brake	Jm	**gm²**	0.026			0.028		
	Inertia with brake	Jm	**gm²**	0.033			0.035		
Stator (at 25 °C)	Resistance (phase/phase)		Ω	3.4	7.3	23.7	2.7	6.1	23
	Inductance (phase/phase)		**mH**	7.6	15.9	53	6	14	54
	Electrical time constant		**ms**	2.2	2.1	2.2	2.2	2.3	2.3
Holding brake (depending on model)				See page 64					
Gearbox (depending on model)				See page 66					

Speed/torque graphs

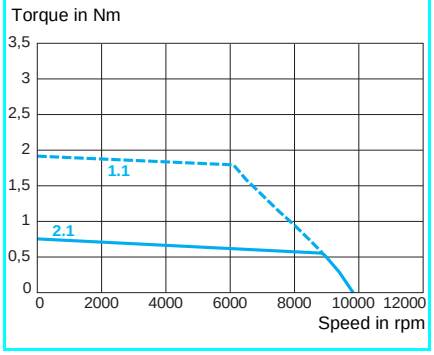
SER 368 3L 3S Motors

■ **with TL●●32 servodrives**



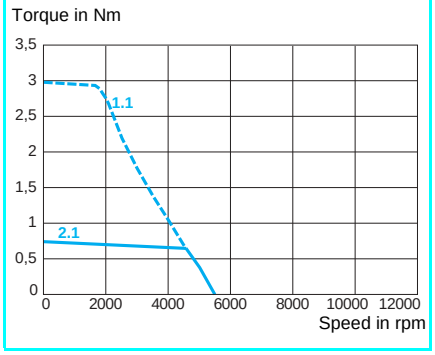
SER 368 3L 5S Motors

■ **with TL●●32 servodrives**



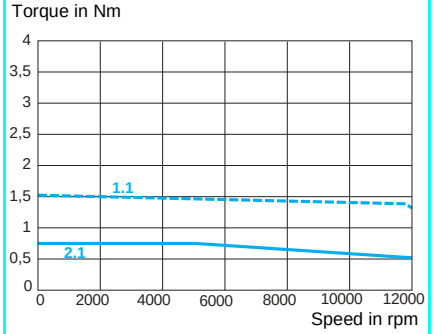
SER 368 3L 7S Motors

■ **with TL ●●32 servodrives**



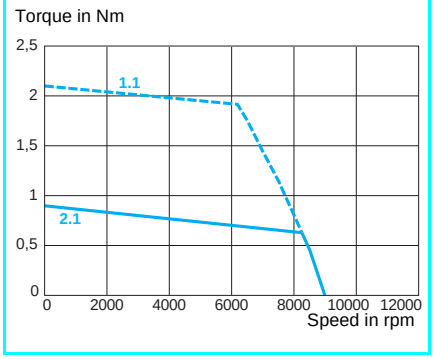
SER 36A 3L 3S Motors

■ **with TL●●32 servodrives**



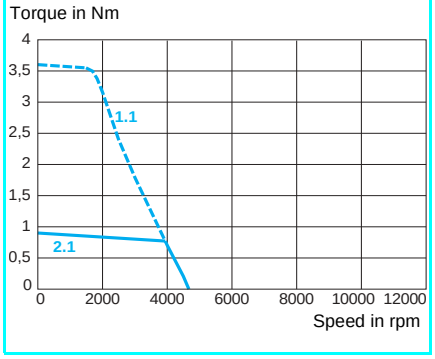
SER 36A 3L 5S Motors

■ **with TL●●32 servodrives**



SER 36A 3L 7S Motors

■ **with TL●●32 servodrives**



1.1 Peak torque at 230 V, single phase
2.1 Continuous torque at 230 V, single phase

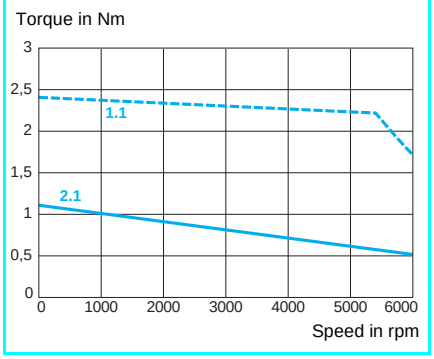
Characteristics of SER 39A motors

Type of motor				SER 39A 4L 3S	SER 39A 4L 7S	
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●32**	**TL●●34**
	Continuous stall	Tn	**Nm**	1.1		
	Peak stall	Tm	**Nm**	2.4	4	
Current	Permanent		**A rms**	2.6	1.3	
	Maximum		**A rms**	6		
Demagnetization current			**A**	12	6	
Maximum mechanical speed			**rpm**	6000		
Constants (at 25°C)	Torque		**Nm/A rms**	0.42	0.85	
	Back emf		**V rms s/rad**	0.26	0.48	
Rotor	Number of poles			8		
	Inertia without brake	Jm	**gm²**	0.085		
	Inertia with brake	Jm	**gm²**	0.105		
Stator (at 25 °C)	Resistance (phase/phase)		Ω	3.7	13	
	Inductance (phase/phase)		**mH**	13.6	47.9	
	Electrical time constant		**ms**	3.7		
Holding brake (depending on model)				See page 64		
Gearbox (depending on model)				See page 66		

Speed/torque graphs

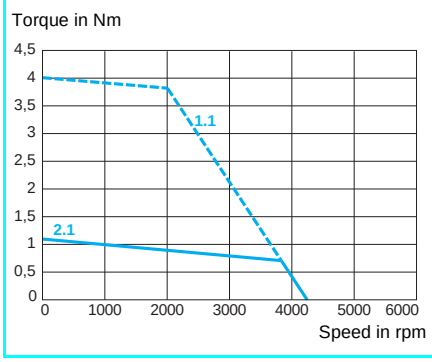
SER Motors 39 A 4L 3S

■ **with TL●●32 servodrives**

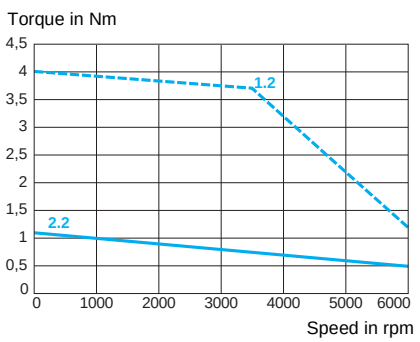


SER 39A 4L 7S Motors

■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

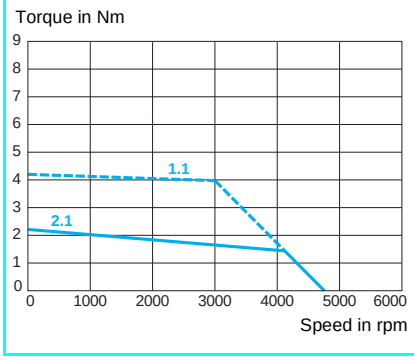
Characteristics of SER 39B motors

Type of motor				SER 39B 4L 3S			SER 39B 4L7S	
Torque (model without gearbox)	Associated with the Twin Line servodrive			TL●●32	TL●●34	TL●●36	TL●●32	TL●●34
	Continuous stall	Tn	**Nm**	2.2				
	Peak stall	Tm	**Nm**	4.2	4.2	7.8	8	
Current	Permanent		**A rms**	3			1.7	
	Maximum		**A rms**	6		12	6	
Demagnetization current			**A**	12			6	
Maximum mechanical speed			**rpm**	6000				
Constants (at 25°C)	Torque		**Nm/A rms**	0.73			1.29	
	Back emf		**V rms s/rad**	0.45			0.79	
Rotor	Number of poles			8				
	Inertia without brake	Jm	**gm²**	0.16				
	Inertia with brake	Jm	**gm²**	0.18				
Stator (at 25 °C)	Resistance (phase/phase)		Ω	5.4			13.7	
	Inductance (phase/phase)		**mH**	20.3			60.7	
	Electrical time constant		**ms**	3.7			4.4	
Holding brake (depending on model)				See page 64				
Gearbox (depending on model)				See page 66				

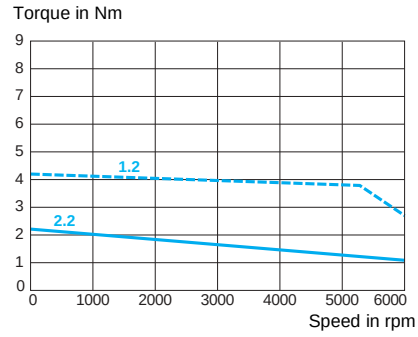
Speed/torque graphs

SER Motors 39B 4L 3S

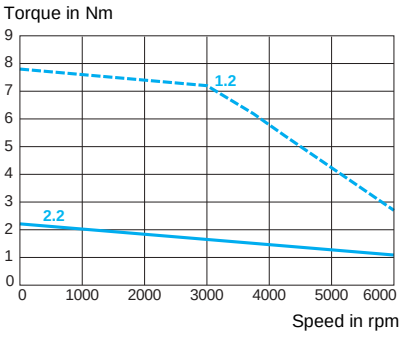
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**

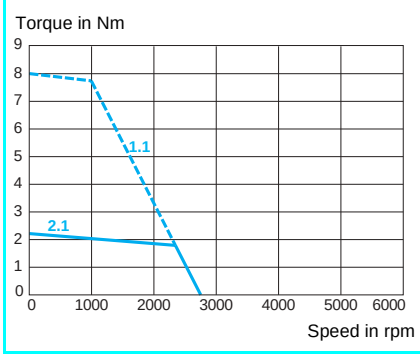


■ **with TL servodrives●●36**

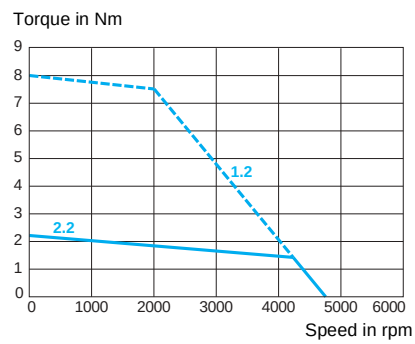


SER Motors 39B 4L 7S

■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

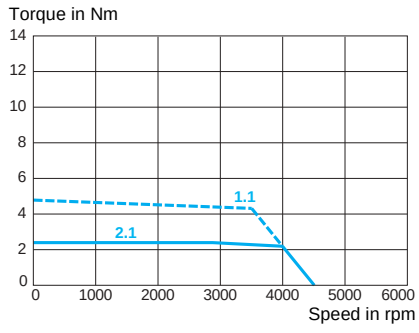
Characteristics of SER 39C motors

Type of motor				SER 39C 4L 3S			SER 39C 4L 5S		
Torque (model without gearbox)	Associated with the Twin Line servodrive			TL●●32	TL●●34	TL●●36	TL●●32	TL●●34	TL●●36
	Continuous stall	Tn	**Nm**	2.35		2.9			
	Peak stall	Tm	**Nm**	4.8	4.8	11.5	6.8	6.8	11.5
Current	Permanent		**A rms**	3		3.7	2.5		
	Maximum		**A rms**	6		18	6		12
Demagnetization current			**A**	18			12		
Maximum mechanical speed			**rpm**	6000					
Constants (at 25 °C)	Torque		**Nm/A rms**	0.78			1.16		
	Back emf		**V rms s/rad**	0.47			0.69		
Rotor	Number of poles			8					
	Inertia without brake	Jm	**gm²**	0.24					
	Inertia with brake	Jm	**gm²**	0.26					
Stator (at 25 °C)	Resistance (phase/phase)		Ω	3.3			7.5		
	Inductance (phase/phase)		**mH**	14.1			30.3		
	Electrical time constant		**ms**	4.3			4		
Holding brake (depending on model)				See page 64					
Gearbox (depending on model)				See page 66					

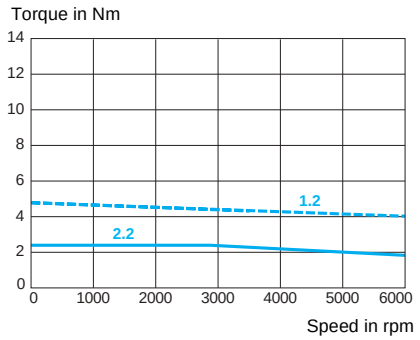
Speed/torque graphs

SER Motors 39C 4L 3S

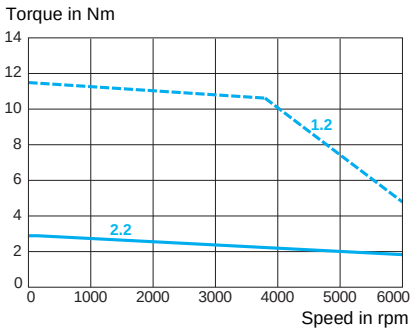
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**

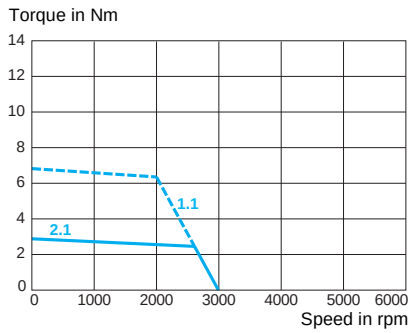


■ **with TL●●36 servodrives**

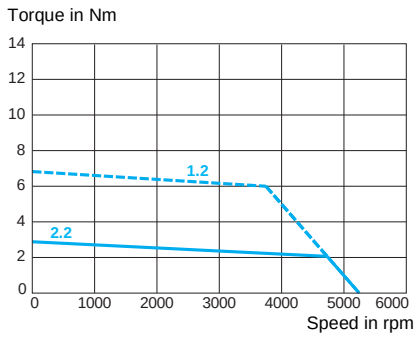


SER Motors 39C 4L 5S

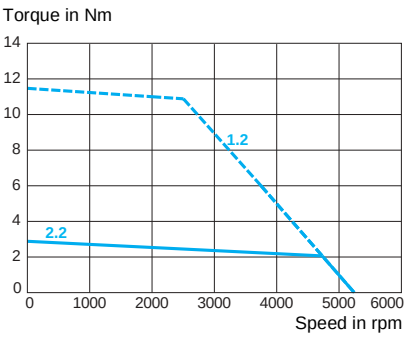
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●36 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

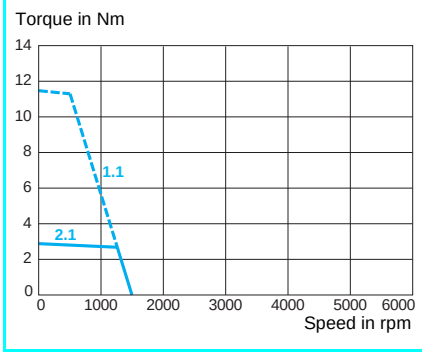
Characteristics of SER 39C/39D motors

Type of motor				SER 39C 4L 7S		SER 39D 4L 5S		
Torque (model without gearbox)	Associated with the Twin Line servodrive			TL●●32	TL●●34	TL●●32	TL●●34	TL●●36
	Continuous stall	Tn	**Nm**	2.9		3.1		3.6
	Peak stall	Tm	**Nm**	11.5	11.5	6.4	6.4	14.5
Current	Permanent		**A rms**	1.3		3		3.6
	Maximum		**A rms**	6				17.5
Demagnetization current			**A**	6		17.5		
Maximum mechanical speed			**rpm**	6000				
Constants (at 25°C)	Torque		**Nm/A rms**	2.2		1.03		
	Back emf		**V rms s/rad**	1.35		0.62		
Rotor	Number of poles			8				
	Inertia without brake	Jm	**gm²**	0.24		0.32		
	Inertia with brake	Jm	**gm²**	0.26		0.34		
Stator (at 25 °C)	Resistance (phase/phase)		Ω	27.5		4.2		
	Inductance (phase/phase)		**mH**	11.5		18.6		
	Electrical time constant		**ms**	4.2		4.4		
Holding brake (depending on model)				See page 64				
Gearbox (depending on model)				See page 66				

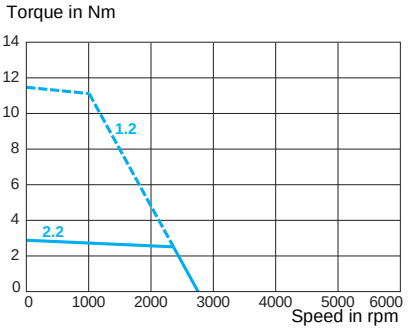
Speed/torque graphs

SER Motors 39C 4L 7S

■ **with TL●●32 servodrives**

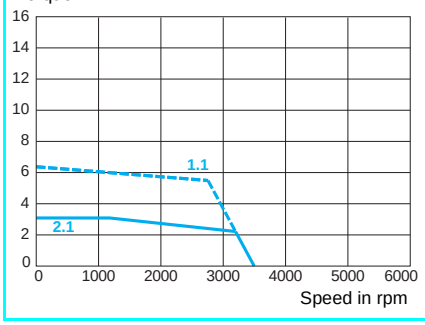


■ **with TL●●34 servodrives**

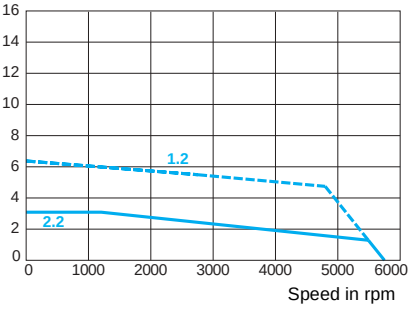


SER Motors 39D 4L 5S

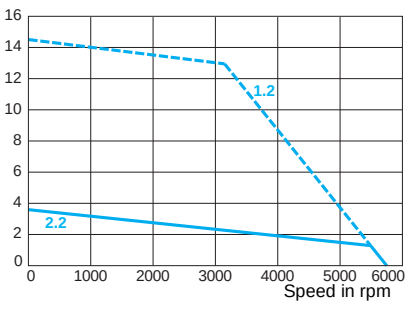
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●36 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

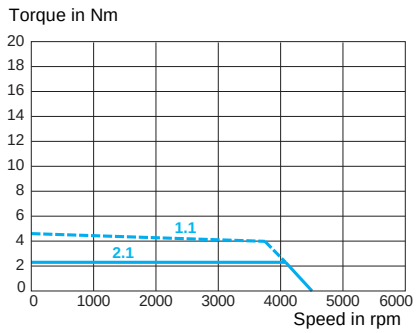
Characteristics of SER 3BA motors

Type of motor				SER 3BA 4L 3S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●38**
	Continuous stall	Tn	**Nm**	2.3		4.6	
	Peak stall	Tm	**Nm**	4.6	4.6	14.5	18
Current	Permanent		**A rms**	3		6	
	Maximum		**A rms**	6		20	30
Demagnetization current			**A**	30			
Maximum mechanical speed			**rpm**	6000			
Constants (at 25°C)	Torque		**Nm/A rms**	0.76			
	Back emf		**V rms s/rad**	0.42			
Rotor	Number of poles			8			
	Inertia without brake	Jm	**gm²**	0.4			
	Inertia with brake	Jm	**gm²**	0.43			
Stator (at 25 °C)	Resistance (phase/phase)		Ω	1.5			
	Inductance (phase/phase)		**mH**	12.6			
	Electrical time constant		**ms**	8.4			
Holding brake (depending on model)				See page 64			
Gearbox (depending on model)				See page 66			

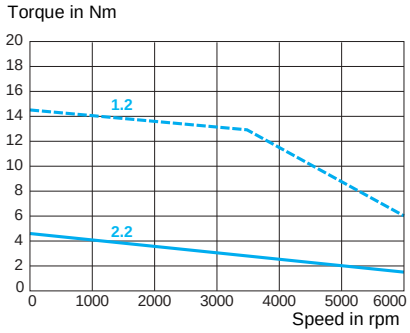
Speed/torque graphs

SER 3BA 4L 3S Motors

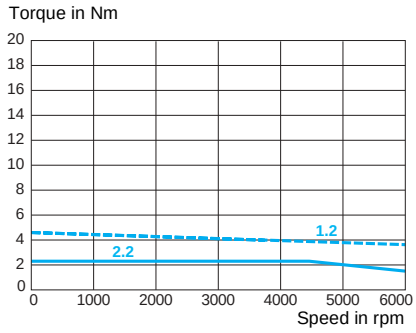
■ **with TL●●32 servodrives**



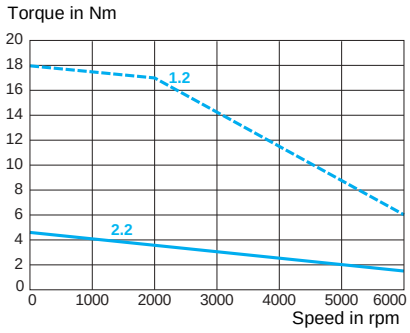
■ **with TL●●36 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

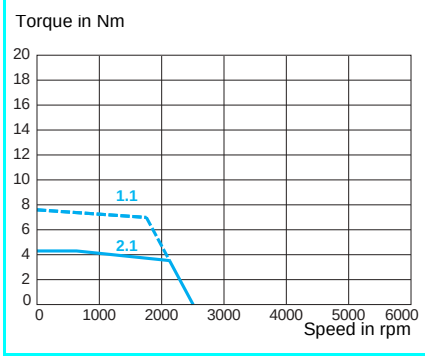
Characteristics of SER 3BA motors

Type of motor				SER 3BA 4L 5S			SER 3BA 4L 7S		
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●32**	**TL●●34**	**TL●●36**
	Continuous stall	Tn	**Nm**	4.3		4.6			
	Peak stall	Tm	**Nm**	7.6	7.6	18	12.8	12.8	18
Current	Permanent		**A rms**	3		3.3	1.8		
	Maximum		**A rms**	6		16.5	6		9
Demagnetization current			**A**	16.5			9		
Maximum mechanical speed			**rpm**	6000					
Constants (at 25°C)	Torque		**Nm/A rms**	1.44			2.55		
	Back emf		**V rms s/rad**	0.7			1.34		
Rotor	Number of poles			8					
	Inertia without brake	Jm	**gm²**	0.4					
	Inertia with brake	Jm	**gm²**	0.43					
Stator (at 25 °C)	Resistance (phase/phase)		Ω	4.5			18.1		
	Inductance (phase/phase)		**mH**	40.3			141		
	Electrical time constant		**ms**	9			7.8		
Holding brake (depending on model)				See page 64					
Gearbox (depending on model)				See page 66					

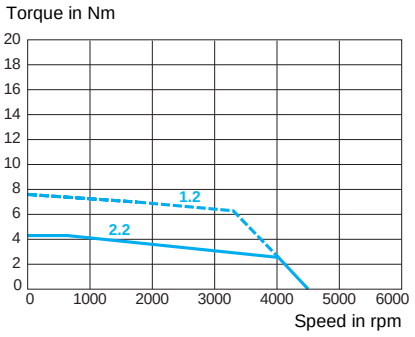
Speed/torque graphs

SER 3BA 4L 5S Motors

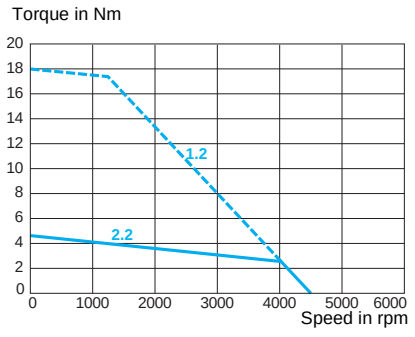
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**

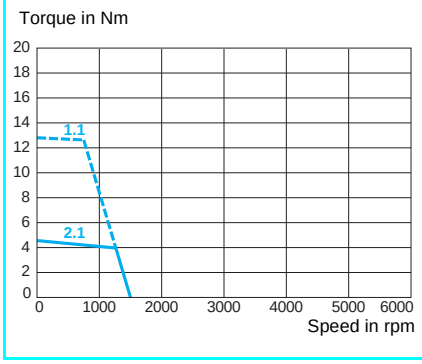


■ **with TL●●36 servodrives**

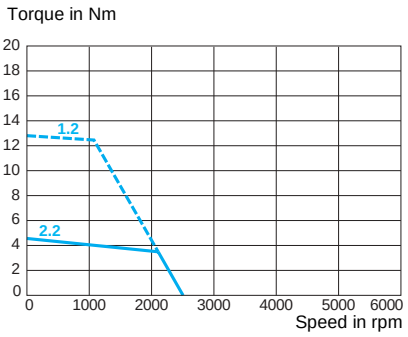


SER 3BA 4L 7S Motors

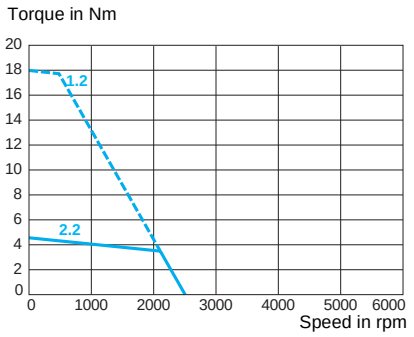
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●36 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

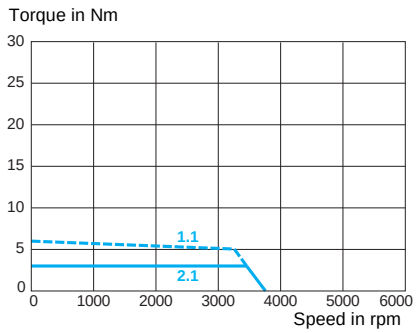
Characteristics of SER 3BB motors

Type of motor				SER 3BB 4L 3S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●38**
	Continuous stall	Tn	**Nm**	3		6	6.6
	Peak stall	Tm	**Nm**	6		19	25
Current	Permanent		**A rms**	3		6	6.6
	Maximum		**A rms**	6		20	32
Demagnetization current			**A**	32			
Maximum mechanical speed			**rpm**	6000			
Constants (at 25°C)	Torque		**Nm/A rms**	1			
	Back emf		**V rms s/rad**	0.56			
Rotor	Number of poles			8			
	Inertia without brake	Jm	**gm²**	0.8			
	Inertia with brake	Jm	**gm²**	0.83			
Stator (at 25 °C)	Resistance (phase/phase)		Ω	1.2			
	Inductance (phase/phase)		**mH**	11.3			
	Electrical time constant		**ms**	9.4			
Holding brake (depending on model)				See page 64			
Gearbox (depending on model)				See page 66			

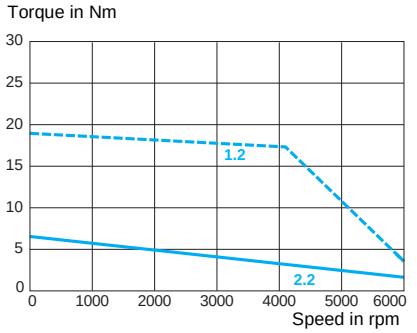
Speed/torque graphs

SER 3BB 4L 3S Motors

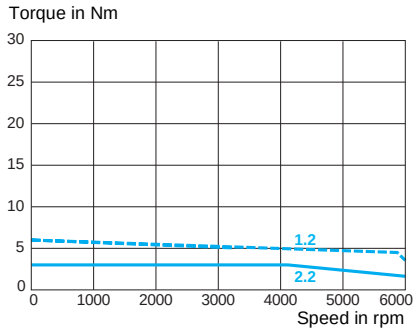
■ **with TL●●32 servodrives**



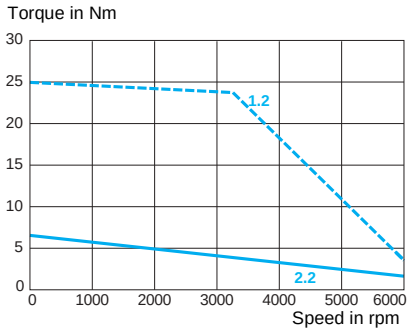
■ **with TL●●36 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

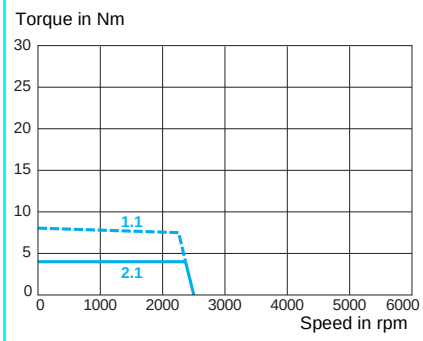
Characteristics of SER 3BB motors

Type of motor				SER 3BB 4L 5S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●38**
	Continuous stall	Tn	**Nm**	4		6.6	
	Peak stall	Tm	**Nm**	8	8	19.5	23
Current	Permanent		**A rms**	3		5	
	Maximum		**A rms**	6		20	24
Demagnetization current			**A**	24			
Maximum mechanical speed			**rpm**	6000			
Constants (at 25°C)	Torque		**Nm/A rms**	1.32			
	Back emf		**V rms s/rad**	0.78			
Rotor	Number of poles			8			
	Inertia without brake	Jm	**gm²**	0.8			
	Inertia with brake	Jm	**gm²**	0.83			
Stator (at 25 °C)	Resistance (phase/phase)		Ω	2.3			
	Inductance (phase/phase)		**mH**	21.2			
	Electrical time constant		**ms**	9.2			
Holding brake (depending on model)				See page 64			
Gearbox (depending on model)				See page 66			

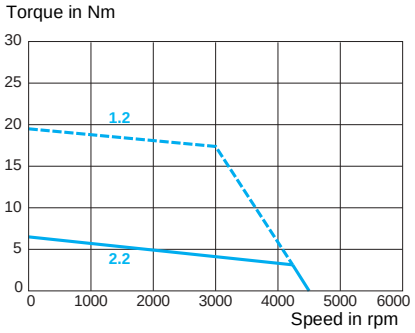
Speed/torque graphs

SER 3BB 4L 5S Motors

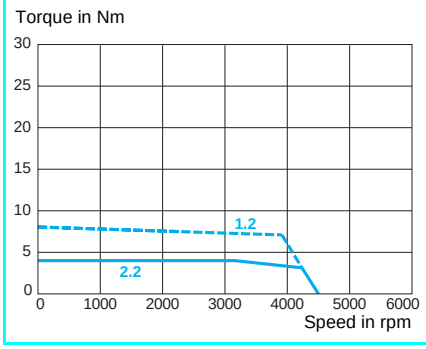
■ **with TL●●32 servodrives**



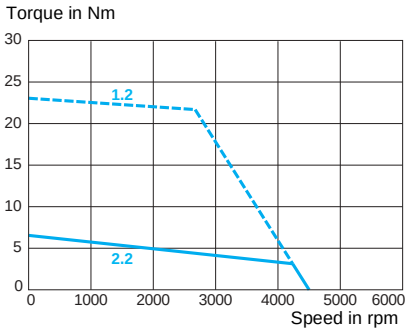
■ **with TL●●36 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

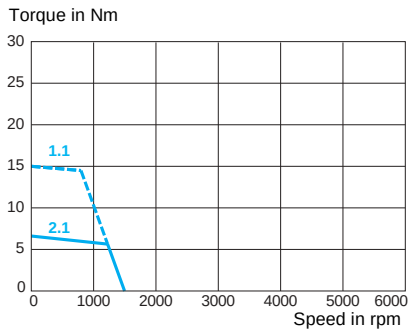
Characteristics of SER 3BB motors

Type of motor				SER 3BB 4L 7S		
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**
	Continuous stall	Tn	**Nm**	6.6		
	Peak stall	Tm	**Nm**	15	15	25
Current	Permanent		**A rms**	2.7		
	Maximum		**A rms**	6		12.5
Demagnetization current			**A**	12.5		
Maximum mechanical speed			**rpm**	6000		
Constants (at 25°C)	Torque		**Nm/A rms**	2.44		
	Back emf		**V rms s/rad**	1.42		
Rotor	Number of poles			8		
	Inertia without brake	Jm	**gm²**	0.8		
	Inertia with brake	Jm	**gm²**	0.83		
Stator (at 25 °C)	Resistance (phase/phase)		Ω	7.4		
	Inductance (phase/phase)		**mH**	70.2		
	Electrical time constant		**ms**	9.5		
Holding brake (depending on model)				See page 64		
Gearbox (depending on model)				See page 66		

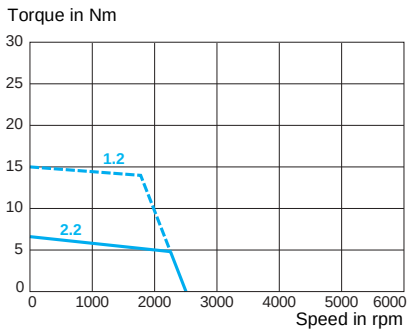
Speed/torque graphs

SER 3BB 4L 7S Motors

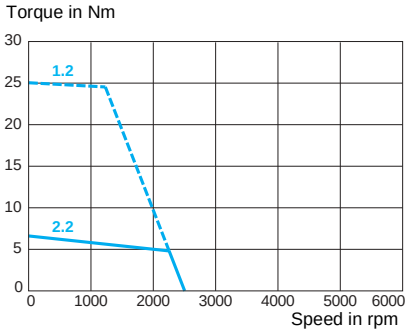
■ **with TL●●32 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●36 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

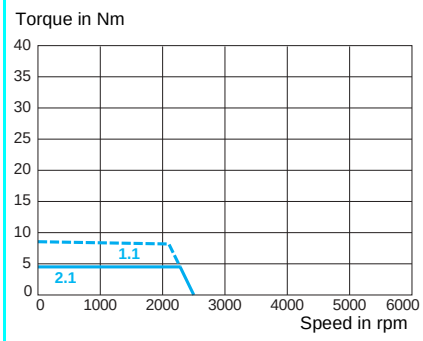
Characteristics of SER 3BC motors

Type of motor				SER 3BC 4L 5S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●38**
	Continuous stall	Tn	**Nm**	4.3		8.5	10
	Peak stall	Tm	**Nm**	8.5	8.5	27	38
Current	Permanent		**A rms**	3		6	7
	Maximum		**A rms**	6		20	32
Demagnetization current			**A**	32			
Maximum mechanical speed			**rpm**	4500			
Constants (at 25°C)	Torque		**Nm/A rms**	1.43			
	Back emf		**V rms s/rad**	0.87			
Rotor	Number of poles			8			
	Inertia without brake	Jm	**gm²**	1.13			
	Inertia with brake	Jm	**gm²**	1.17			
Stator (at 25 °C)	Resistance (phase/phase)		Ω	1.7			
	Inductance (phase/phase)		**mH**	17.2			
	Electrical time constant		**ms**	10.1			
Holding brake (depending on model)				See page 64			
Gearbox (depending on model)				See page 66			

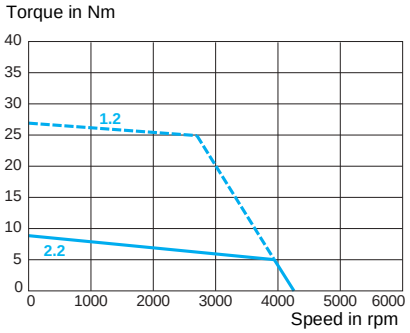
Speed/torque graphs

SER 3BC 4L 5S Motors

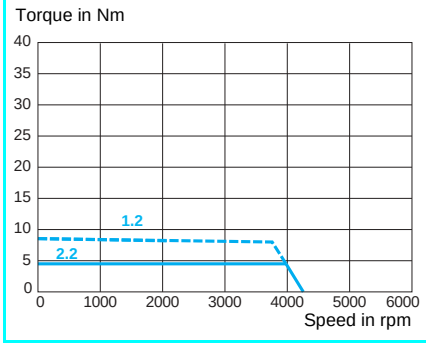
■ **with TL●●32 servodrives**



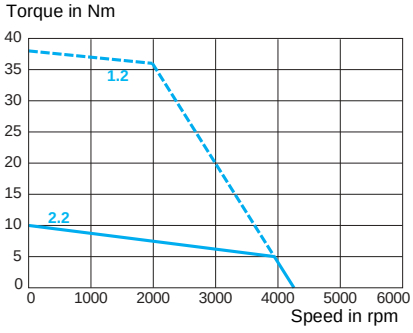
■ **with TL●●36 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

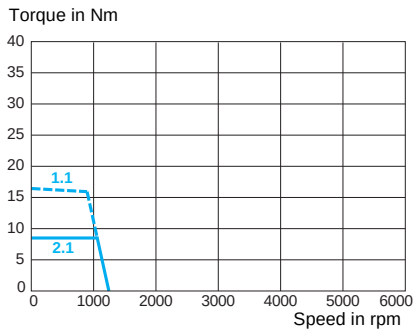
Characteristics of SER 3BC motors

Type of motor				SER 3BC 4L 7S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			**TL●●32**	**TL●●34**	**TL●●36**	**TL●●38**
	Continuous stall	Tn	**Nm**	8.3		10	
	Peak stall	Tm	**Nm**	16.5	16.5	38	38
Current	Permanent		**A rms**	3		3.6	
	Maximum		**A rms**	6		16.5	
Demagnetization current			**A**	16.5			
Maximum mechanical speed			**rpm**	4500			
Constants (at 25°C)	Torque		**Nm/A rms**	2.78			
	Back emf		**V rms s/rad**	1.68			
Rotor	Number of poles			8			
	Inertia without brake	Jm	**gm²**	1.13			
	Inertia with brake	Jm	**gm²**	1.17			
Stator (at 25 °C)	Resistance (phase/phase)		Ω	5.7			
	Inductance (phase/phase)		**mH**	62.5			
	Electrical time constant		**ms**	11			
Holding brake (depending on model)				See page 64			
Gearbox (depending on model)				See page 66			

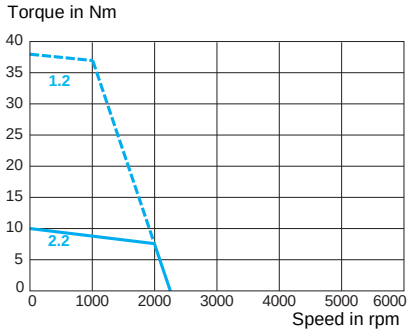
Speed/torque graphs

SER 3BC 4L 7S Motors

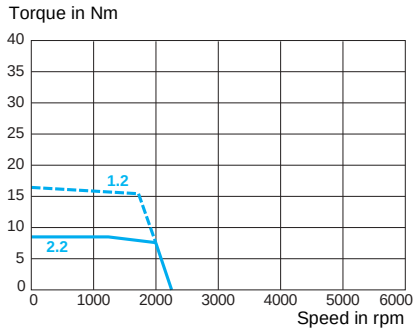
■ **with TL●●32 servodrives**



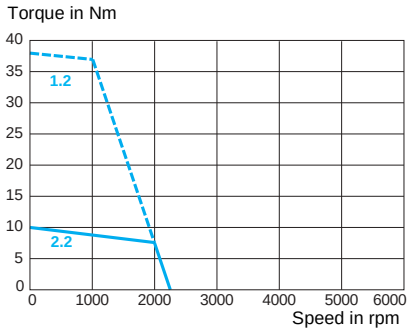
■ **with TL●●36 servodrives**



■ **with TL●●34 servodrives**



■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase

Motion control
SER brushless motors for Twin Line servodrives

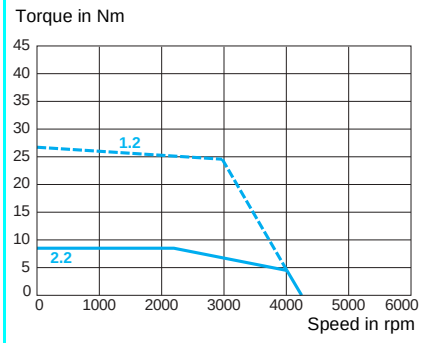
Characteristics of SER 3BD motors

Type of motor				SER 3BD 4L 5D		SER 3BD 4L 7S			
Torque (model without gearbox)	Associated with the Twin Line servodrive			TL●●36	TL●●38	TL●●32	TL●●34	TL●●36	TL●●38
	Continuous stall	Tn	**Nm**	8.7	13.4	7.9		13.4	
	Peak stall	Tm	**Nm**	26.8	40	15.7		39	48
Current	Permanent		**A rms**	6	9.2	3		5.1	
	Maximum		**A rms**	20	32	6		20	25
Demagnetization current			**A**	45		25			
Maximum mechanical speed			**rpm**	4500					
Constants (at 25°C)	Torque		**Nm/A rms**	1.46		2.62			
	Back emf		**V rms s/rad**	0.84		1.53			
Rotor	Number of poles			8					
	Inertia without brake	Jm	**gm²**	0.16					
	Inertia with brake	Jm	**gm²**	0.19					
Stator (at 25 °C)	Resistance (phase/phase)		Ω	1.3		3.75			
	Inductance (phase/phase)		**mH**	14.5		41.5			
	Electrical time constant		**ms**	11.2		11.1			
Holding brake (depending on model)				See page 64					
Gearbox (depending on model)				See page 66					

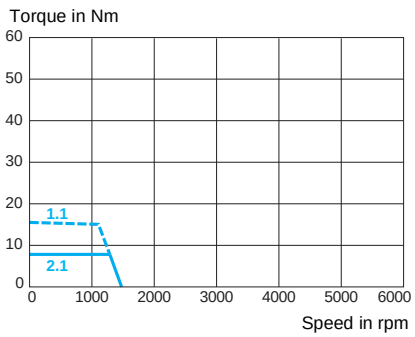
Speed/torque graphs

Motors SER 3BD 4L 5D — **SER 3BD 4L 7S**

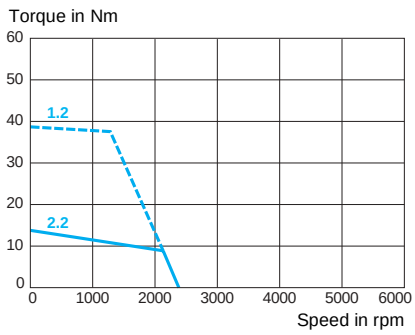
■ **withTL●●36 servodrives**



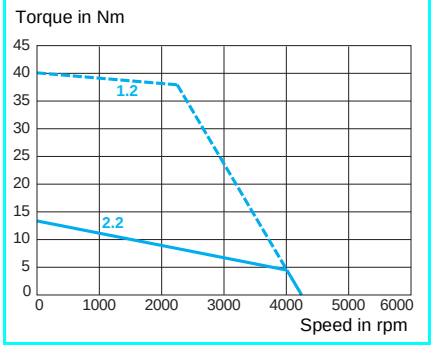
■ **with TL●●32 servodrives**



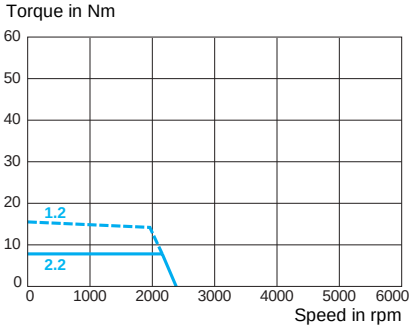
■ **with TL ●●36 servodrives**



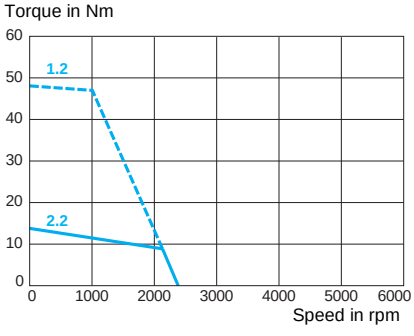
■ **with TL●●38 servodrives**



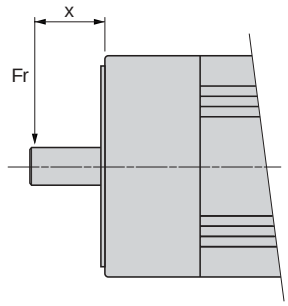
■ **with TL●●34 servodrives**

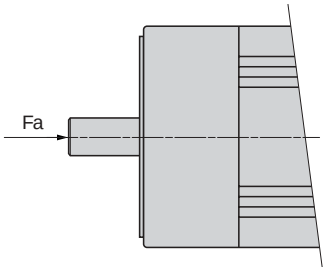


■ **with TL●●38 servodrives**



1.1 Peak torque at 230 V, single phase
1.2 Peak torque at 400 V, 3-phase
2.1 Continuous torque at 230 V, single phase
2.2 Continuous torque at 400 V 3-phase





Radial and axial forces permissible on the motor shaft

Even when motors are used under optimum conditions, their lifetime is limited by that of the bearings.

Conditions:

■ Nominal lifetime of bearings *(1)*	L10h = 20,000 hours
■ Speed	N = 4,000 rpm
■ Ambient temperature (temperature of bearings: 100 °C)	40 °C
■ Peak torque	cyclic ratio of 10%
■ Continuous torque	cyclic ratio of 100%
■ Force application point	X = 10 mm with SER 36● motors X = 15 mm with SER 39●motors X = 20 mm with SER 3B● motors

(1) Hours of use with a failure probability of 10 %

⚠ The following conditions must be respected:

- Radial and axial forces must not be applied simultaneously.
- The maximum pressure permissible on the shaft end is 1,800 N.
- Shaft end with IP 41 or IP 56 degree of protection.
- Bearings cannot be changed by the user as the built-in position sensor must be realigned after disassembly of the apparatus.

SER motors			364	366	368	36A	39A	39B	39C	39D	3BA	3BB	3BC	3BD
Maximum radial force Fr	Cyclic ratio 10 %	**N**	231	275	302	320	600	520	500	500	1480	1550	1530	760
	Cyclic ratio 100 %	**N**	89	107	117	124	340	400	430	450	690	800	860	760
Maximum axial force Fa	Cyclic ratio 10 %	**N**	299				1240				1770			
	Cyclic ratio 100 %	**N**	104				450				600			

Characteristics of motor-servodrive power connection cables

		TLA CP AAA 0●● 1	TLA CP AAB 0●● 1	TLA CP AAC 0●● 1
External sleeve		PUR orange colored RAL 2003		
Insulation		TPM or PP/PE		
Capacity	**pF/m**	< 70 (conductors/shielding)		
Number of conductors (shielded)		[(4 x 1.5 mm²) + (2 x 1.0 mm²)]	[(4 x 2.5 mm²) + (2 x 1.0 mm²)]	[(4 x 4mm²) + (2 x 1.0 mm²)]
External diameter	**mm**	11	13	15
Curvature radius (bend)	**mm**	110 (suitable for daisy-chaining)	130 (suitable for daisy-chaining)	150 (suitable for daisy-chaining)
Working voltage	**V**	600		
Maximum service length *(1)*	**m**	20		
Service temperature	**°C**	- 15…+ 85 (storage: - 40…+ 85)		
Certification		UL, CSA		

Characteristics of motor-servodrive encoder connection cables

		TLA CF ABA 0●● 1
Type of encoder		**SinCos Hiperface Encoder**
External sleeve		PUR green colored RAL 6018
Insulation		Polyester
Number of conductors (shielded)		5 x (2 x 0.25 mm²)+(2 x 0.5 mm²)
Connector		2 x 15-pin SUB-D type connectors
External diameter	**mm**	8.5 max
Curvature radius (bend)	**mm**	85 (suitable for daisy-chaining)
Working voltage	**V**	300
Maximum length *(1)*	**m**	20
Service temperature	**°C**	- 15…+ 85 (storage: - 40…+ 85)
Certification		UL, CSA

(1) For cable lengths of over 20 m, consult our Regional Sales Office.

Motion control
SER brushless motors for Twin Line servodrives

SER brushless motors

SER 364 3L3S ●●●●

Continuous stall torque	Associated servodrive *(1)*	Peak stall torque	Maximum mechanical speed	Reference *(2)*	Weight kg
0.3 Nm	TL● ●32	0.8 Nm	12,000 rpm	**SER 364 3L3S ●●●●**	1.110
0.3 Nm	TL● ●32	1.1 Nm	12,000 rpm	**SER 364 3L5S ●●●●**	1.110
0.3 Nm	TL● ●32	1.3 Nm	12,000 rpm	**SER 364 3L7S ●●●●**	1.110
0.5 Nm	TL● ●32	1.1 Nm	12,000 rpm	**SER 366 3L3S ●●●●**	1.420
0.5 Nm	TL● ●32	1.6 Nm	12,000 rpm	**SER 366 3L5S ●●●●**	1.420
0.5 Nm	TL● ●32	2.1 Nm	12,000 rpm	**SER 366 3L7S ●●●●**	1.420
0.7 Nm	TL● ●32	1.5 Nm	12,000 rpm	**SER 368 3L3S ●●●●**	1.730
0.7 Nm	TL● ●32	1.9 Nm	12,000 rpm	**SER 368 3L5S ●●●●**	1.730
0.7 Nm	TL● ●32	3 Nm	12,000 rpm	**SER 368 3L7S ●●●●**	1.730
0.7 Nm	TL● ●32	1.5 Nm	12,000 rpm	**SER 36A 3L3S ●●●●**	2.010
0.9 Nm	TL● ●32	2.1 Nm	12,000 rpm	**SER 36A 3L5S ●●●●**	2.010
0.9 Nm	TL● ●32	3.6 Nm	12,000 rpm	**SER 36A 3L7S ●●●●**	2.010
1.1 Nm	TL● ●32	2.4 Nm	6000 rpm	**SER 39A 4L3S ●●●●**	2.200
1.1 Nm	TL● ●32	4 Nm	6000 rpm	**SER 39A 4L7S ●●●●**	2.200
1.1 Nm	TL● ●34	4 Nm	6000 rpm		
2.2 Nm	TL● ●32	4.2 Nm	6000 rpm	**SER 39B 4L3S ●●●●**	3.300
2.2/2.2 Nm	TL● ●34/●36	4.2/7.8 Nm	6000 rpm		
2.2 Nm	TL● ●32	8 Nm	6000 rpm	**SER 39B 4L7S ●●●●**	3.300
2.2 Nm	TL● ●34	8 Nm	6000 rpm		
2.3 Nm	TL● ●32	4.8 Nm	6000 rpm	**SER 39C 4L3S ●●●●**	4.400
2.3/2.9 Nm	TL● ●34/●36	4.8/11.5 Nm	6000 rpm		
2.9 Nm	TL● ●32	6.8 Nm	6000 rpm	**SER 39C 4L5S ●●●●**	4.400
2.9/2.9 Nm	TL● ●34/●36	6.8/11.5 Nm	6000 rpm		
2.9 Nm	TL● ●32	11.5 Nm	6000 rpm	**SER 39C 4L7S ●●●●**	4.400
2.9 Nm	TL● ●34	11.5 Nm	6000 rpm		
3.1 Nm	TL● ●32	6.4 Nm	6000 rpm	**SER 39D 4L5S ●●●●**	6.100
3.1/3.6 Nm	TL● ●34/●36	6.4/11.5 Nm	6000 rpm		
2.3 Nm	TL● ●32	4.6 Nm	6000 rpm	**SER 3BA 4L3S●●●●**	5.000
2.3/4.6/4.6 Nm	TL● ●34/●36/●38	4.6/14.5/18 Nm	6000 rpm		
4.3 Nm	TL● ●32	7.6 Nm	6000 rpm	**SER 3BA 4L5S●●●●**	5.000
4.3/4.6 Nm	TL● ●34/●36	7.6/18 Nm	6000 rpm		

(1) The torque information contained in these tables concerns:
the servodrives TL● ●32 powered by 230 V single phase.
the servodrives TL● ●34/●36/●38 powered by 400 V 3-phase.
(2) See notes (2) on the opposite page.

Motion control
SER brushless motors for Twin Line servodrives

SER brushless motors *(continued)*

SER 3BA 4L7S ●●●●

Continuous stall torque	Associated servodrive *(1)*	Peak torque torque	Maximum mechanical speed	Reference *(2)*	Weight kg
4.6 Nm	TL● ●32	12.8 Nm	6000 rpm	**SER 3BA 4L7S●●●●**	5.000
4.6/4.6 Nm	TL● ●34/●36	12.8/18 Nm	6000 rpm		
3 Nm	TL● ●32	6 Nm	6000 rpm	**SER 3BB 4L3S●●●●**	8.000
3/6/6.6 Nm	TL● ●34/●36/●38	6/19/25 Nm	6000 rpm		
4 Nm	TL● ●32	8 Nm	6000 rpm	**SER 3BB 4L5S●●●●**	8.000
4/6.6/6.6 Nm	TL● ●34/●36/●38	8/19.5/23 Nm	6000 rpm		
6.6 Nm	TL● ●32	15 Nm	6000 rpm	**SER 3BB 4L7S●●●●**	8.000
6.6/6.6 Nm	TL● ●34/●36	15/25 Nm	6000 rpm		
4.3 Nm	TL● ●32	8.5 Nm	4500 rpm	**SER 3BC 4L5S●●●●**	11.000
4.3/8.5/10 Nm	TL● ●34/●36/●38	8.8/27/38 Nm	4500 rpm		
8.3 Nm	TL● ●32	16.5 Nm	4500 rpm	**SER 3BC 4L7S●●●●**	11.000
8.3/10/10 Nm	TL● ●34/●36/●38	16.5/38/38 Nm	4500 rpm		
8.7/13.4 Nm	TL● ●36/●38	26.8/40 Nm	4500 rpm	**SER 3BD 4L5D●●●●**	13.000
7.9 Nm	TL● ●32	15.7 Nm	4500 rpm	**SER 3BD 4L7S●●●●**	13.000
7.9/13.4/ 13.4 Nm	TL● ●34/●36/●38	15.7/39/48 Nm	4500 rpm		

(1) The torque information contained in these tables concerns:
the servodrives TL● ●32 powered by 230 V single phase.
the servodrives TL● ●34/●36/●38 powered by 400 V 3-phase.

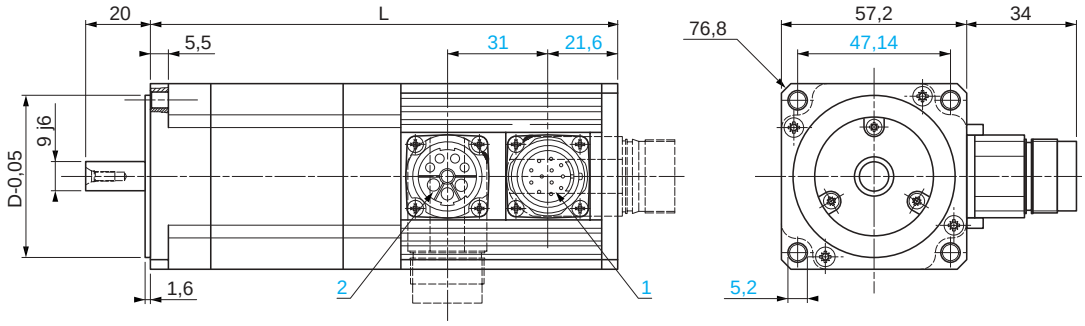
(2) To order an SER motor, fill out at the end of each reference

			SER 364 3L3S ●	●	●	●
Sensor integrated in motor	SinCos Hiperface, multiturn encoder		**MO**			
	SinCos Hiperface, single turn encoder		**SO**			
Shaft seal Holding brake	**IP 41**	Without holding brake		**A**		
		With holding brake		**1**		
	IP 56	Without holding brake		**B**		
		With holding brake		**2**		
Gearbox (see page **64**)						
Without gearbox					**O**	
	Shaft end	Smooth				**O**
		With key *(3)*				**–**
With gearbox (shaft end with key)						
	Type *(4)*	PLE 60			**1**	
		PLE 80			**2**	
		PLE 120			**3**	
		PLE 160			**4**	
	Reduction ratio	Ratio 3:1				**3**
		Ratio 5:1				**5**
		Ratio 8:1				**8**

(3) For gearboxes equipped with shaft end with key, consult our Regional Sales Office.
(4) For PLE gearboxes, see details page 64.

Dimensions (in mm)

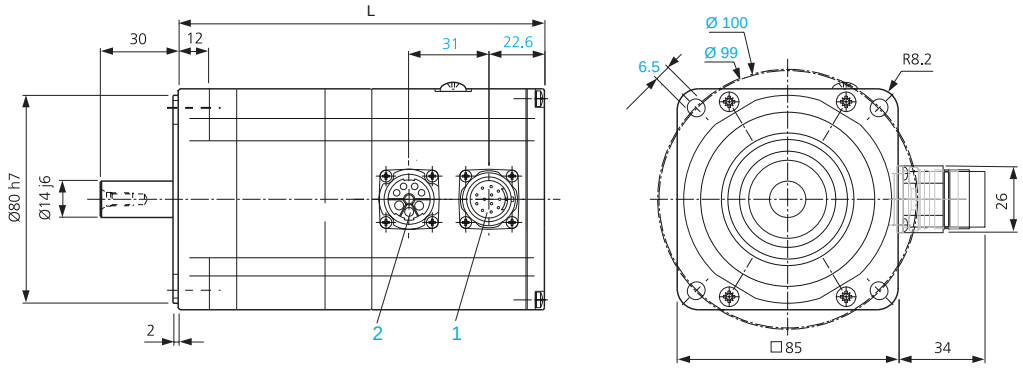
SER 364/366/368/36A



1 Encoder connector
2 Motor supply connector

	ý	∅ D	L (without brake)	L (with brake)
SER 364	9	50	125.8	165.3
SER 366	9	50	144.3	183.8
SER 368	9	50	162.8	202.3
SER 36A	9	50	181.3	220.8

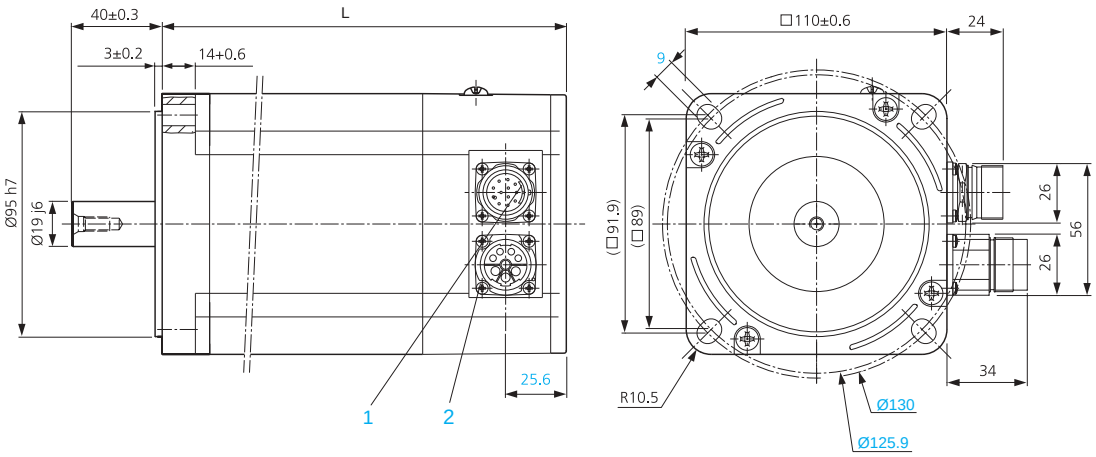
SER 39A/39B/39C/39D



1 Encoder connector
2 Motor supply connector

	ý	∅ D	L (without brake)	L (with brake)
SER 39A	14	80	141	186.5
SER 39B	14	80	171	216.5
SER 39C	14	80	201	246.5
SER 39D	14	80	231	276.5

SER 3BA/3BB/3BC/3BD



1 Encoder connector
2 Motor supply connector

	ý	∅ D	L (without brake)	L (with brake)
SER 3BA	19	95	132	198
SER 3BB	19	95	180	246
SER 3BC	19	95	228	294
SER 3BD	19	95	276	342

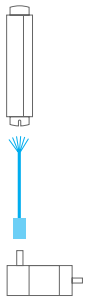
Motion control
SER brushless motors for Twin Line servodrives

Choice of SinCos Hiperface power cables and encoders

	Servodrives TLD/TLC	3 m	5 m	10 m	15 m	20 m *(1)*
Cables equipped with 1 connector (motor side)	TL● ●32		**TLA CP AAA 0●●1**			
	TL● ●34					
	TL● ●36			**TLA CP AAB 0●●1**		
	TL● ●38				**TLA CP AAC 0●●1**	
Cables fitted with connectors at both ends	SinCos Hiperface encoder	**TLA CF ABA 0●● 1**				

Connecting cables

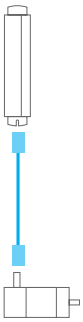
Cables equipped with 1 connector (motor side)



TLA CP AA● 0●● 1

Description	From	To	Composition	Length *(1)*	Reference	Weight kg
Power cables *(for use with servodrives, see table above)*	SER Motors	Twin Line servodrives TLD/TLC	[(4 x 1.5 mm²) + (2 x 1 mm²)]	3 m	**TLA CP AAA 003 1**	–
				5 m	**TLA CP AAA 005 1**	–
				10 m	**TLA CP AAA 010 1**	–
				15 m	**TLA CP AAA 015 1**	–
				20 m	**TLA CP AAA 020 1**	–
			[(4 x 2.5 mm²) + (2 x 1 mm²)]	3 m	**TLA CP AAB 003 1**	–
				5 m	**TLA CP AAB 005 1**	–
				10 m	**TLA CP AAB 010 1**	–
				15 m	**TLA CP AAB 015 1**	–
				20 m	**TLA CP AAB 020 1**	–
			[(4 x 4 mm²) + (2 x 1 mm²)]	3 m	**TLA CP AAC 003 1**	–
				5 m	**TLA CP AAC 005 1**	–
				10 m	**TLA CP AAC 010 1**	–
				15 m	**TLA CP AAC 015 1**	–
				20 m	**TLA CP AAC 020 1**	–

Cables fitted with connectors at both ends



TLA CF ABA 0●● 1

Description	From	To	Composition	Length *(1)*	Reference	Weight kg
SinCos Hiperface encoder cables fitted with two connectors	SER Motors	Twin Line servodrives TLD/TLC	[5 x (2 x 0.25 mm²) + 1 x (2 x 0.5 mm²)]	3 m	**TLA CF ABA 003 1**	–
				5 m	**TLA CF ABA 005 1**	–
				10 m	**TLA CF ABA 010 1**	–
				15 m	**TLA CF ABA 015 1**	–
				20 m	**TLA CF ABA 020 1**	–

(1) For cable lengths of over 20 m, consult our Regional Sales Office.

Motion control
SER motor options for Twin Line servodrives
Holding brake and encoder

Presentation

Holding brake

The holding brake is an electromagnetic pressure spring brake that blocks the motor's axle when the motor's current has been switched off. In case of an emergency, such as a power outage or an emergency stop, the drive is immobilized, significantly increasing safety. The blocking of the motor's axis is also necessary in cases of torque overload, such as in the case of vertical axis movement.

The holding brake is activated using the external control device TLA BHO which is available as an option.
When this mechanism is in use, heating of the brake is lessened by reducing the control voltage.
Warning! Overloads can damage the holding brake! Avoid static charges of more than 25% of the motor's holding torque with a vertical axis and holding brake.

Encoder

The standard measuring device is the single turn or multiturn SinCos Hiperface . This measurement device is perfectly suitable for the Twin Line range of controls. The use of this interface allows the motor to be identified by the servodrive and the control loops of the drive to be automatically initialized. This significantly facilitates installation.

Characteristics

Holding brake

Type of motor		SER 36●	SER 39●	SER 3B●
Holding torque M_{Br}	Nm	1.2	6	16
Inertia of rotor (brake only) J_{Br}	kgcm²	0.07	0.2	0.35
Electrical clamping power P_{Br}	W	10	24	28
Supply voltage	V	24		
Current	A	0.42	1	1.17
Opening time	ms	14	40	60
Closing time	ms	13	20	30
Weight (brake only)	kg	0.300	1.800	3.000

Encoders

Type of encoder		SinCos single turn	SinCos multiturn
Resolution using a Twin Line servodrive	points/ rpm	16384	16384
Precision of encoder (non-linear)	arc second	± 45	± 45
Measurement method		High resolution, optical	High resolution, optical
Interface		Hiperface	Hiperface
Module required		HIFA-C	HIFA-C
Operating temperature range	°C	- 20…+ 115	- 20…+ 115

Motion control
SER motor options for Twin Line servodrives
PLE gearboxes

Presentation (continued)

SER motors are also available with mounted PLE-type gearboxes.
Schneider Electric has selected and standardized the following gearbox models, available in a choice of 3 speed reduction ratios 3:1, 5:1 and 8:1.
The continuous stall torque and peak stall torque values available from the gearbox are obtained by multiplying the characteristic values of the motor by the reduction ratio and the efficiency of the gearbox (0.96).

Type of motor	Associated servodrive	Gearbox 3:1	Gearbox 5:1	Gearbox 8:1
SER 364 ●●●●	TL● ●32	PLE 60	PLE 60	PLE 60
SER 366 ●●●●	TL● ●32	PLE 60	PLE 60	PLE 80
SER 368 ●●●●	TL● ●32	PLE 60	PLE 60	PLE 80
SER 36A ●●●●	TL● ●32	PLE 60	PLE 80	PLE 80
SER 39A 4L3S	TL● ●32	PLE 80	PLE 80	PLE 80
SER 39A 4L7S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
SER 39B 4L3S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
SER 39B 4L7S	TL● ●32	PLE 80	PLE 80	PLE 120
	TL● ●34	PLE 80	PLE 80	PLE 120
SER 39C 4L3S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
SER 39C 4L5S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
SER 39C 4L7S	TL● ●32	PLE 80	PLE 80	PLE 120
	TL● ●34	PLE 80	PLE 80	PLE 120
SER 39D 4L5S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
SER 3BA 4L3S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
	TL● ●38	PLE 120	PLE 120	PLE 120
SER 3BA 4L5S	TL● ●32	PLE 80	PLE 80	PLE 120
	TL● ●34	PLE 80	PLE 80	PLE 120
	TL● ●36	PLE 120	PLE 120	PLE 120
SER 3BA 4L7S	TL● ●32	PLE 80	PLE 120	PLE 120
	TL● ●34	PLE 80	PLE 120	PLE 120
	TL● ●36	PLE 120	PLE 120	PLE 120
SER 3BB 4L3S	TL● ●32	PLE 80	PLE 80	PLE 80
	TL● ●34	PLE 80	PLE 80	PLE 80
	TL● ●36	PLE 80	PLE 80	PLE 120
	TL● ●38	PLE 120	PLE 120	PLE 160
SER 3BB 4L5S	TL● ●32	PLE 80	PLE 80	PLE 120
	TL● ●34	PLE 80	PLE 80	PLE 120
	TL● ●36	PLE 80	PLE 120	PLE 120
	TL● ●38	PLE 120	PLE 120	PLE 160
SER 3BB 4L7S	TL● ●32	PLE 80	PLE 120	PLE 120
	TL● ●34	PLE 80	PLE 120	PLE 120
	TL● ●36	PLE 120	PLE 120	PLE 160
SER 3BC 4L5S	TL● ●32	PLE 80	PLE 80	PLE 120
	TL● ●34	PLE 80	PLE 80	PLE 120
	TL● ●36	PLE 80	PLE 120	PLE 120
	TL● ●38	PLE 120	PLE 120	PLE 160
SER 3BC 4L7S	TL● ●32	PLE 80	PLE 120	PLE 120
	TL● ●34	PLE 80	PLE 120	PLE 120
	TL● ●36	PLE 120	PLE 160	PLE 160
	TL● ●38	PLE 120	PLE 160	PLE 160
SER 3BD 4L5D	TL● ●36	PLE 120	PLE 120	PLE 160
	TL● ●38	PLE 120	PLE 160	PLE 160
SER 3BD 4L7S	TL● ●32	PLE 80	PLE 120	PLE 120
	TL● ●34	PLE 80	PLE 120	PLE 120
	TL● ●36	PLE 120	PLE 160	PLE 160
	TL● ●38	PLE 120	PLE 160	PLE 160

Motion control
SER motor options for Twin Line servodrives
PLE gearboxes

Characteristics

Type of gearbox		PLE 60	PLE 80	PLE 120	PLE 160
Type of gearbox		Planetary gearbox with single reduction stage, straight teeth			
Backlash	**min arc**	< 20	< 12	< 8	< 6
Torsion rigidity	**Nm/ min arc**	1.5	4.5	11	32.5
Noise level	**dB (A)**	58	60	65	70
Junction box		Black anodized aluminum			
Shaft material		C 45			
Tightness of shaft output		IP 43			
Lubrication		No lubrication required			
Average lifetime *(1)*	**h**	10 000: S1 mode (permanent service) and 100% continuous torque 20 000: S1 mode (permanent service) and 85% continuous torque			
Mounting position		All positions			
Operating temperature	**°C**	- 25...+ 90 (Shot term, + 120)			
Weight (gearbox only)	**kg**	0.900	2.100	6.000	18.000

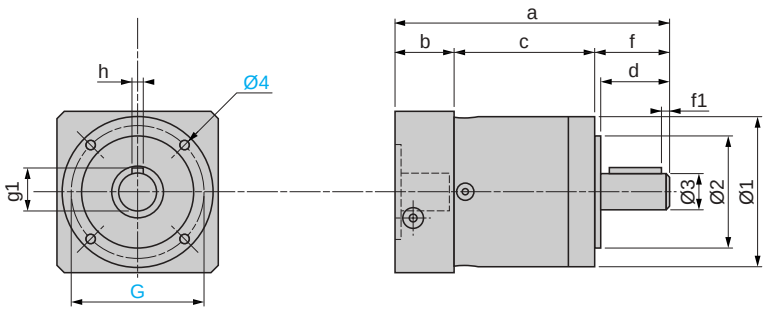
Combining an SER motor with a PLE gearbox

Type of gearbox			PLE 60	PLE 80	PLE 120	PLE 160
Efficiency			0.96			
Maximum permitted radial force *(2) (3)*		**N**	500	950	2000	6000
Maximum permitted axial force *(2)*		**N**	600	1200	2800	8000
Inertia of gearbox	**3:1**	**kgcm²**	0.135	0.77	2.63	12.14
	5:1	**kgcm²**	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.065	0.39	1.32	4.63
Continuous output torque T_{2N}	**3:1**	**Nm**	12	40	80	400
	5:1	**Nm**	16	50	110	450
	8:1	**Nm**	15	50	120	450

(1) Data in operating hours for a 10% fault probability rating.
(2) Values given for a minimum lifetime of 10,000 hours at an output speed of 100 rpm for a cyclic ratio = 1 (S1 mode) on electrical machines.
(3) Force applied at mid-distance from the output shaft.

Motion control
SER motor options for Twin Line servodrives
PLE gearboxes

Dimensions in mm



	PLE 60	PLE 80	PLE 120	PLE 160
a	106.5	134	176.5	255.5
b	24.5	33.5	47.5	64.5
c	47	60.5	74	104
d	30	36	50	80
f	35	40	55	87
f1	2.5	4	5	8
g1	16	22.5	28	43
h	5	6	8	12
Ø1	60	80	115	160
Ø2 *(1)*	40	60	80	130
Ø3 *(1)*	14	20	25	40
G	52	70	100	145
Ø4	M5 x 8	M6 x 10	M10 x 16	M12 x 20

(1) Tolerance H7.

Product certifications and marine classification authorities

In some countries, certification of certain electrical components is enforced by law. A standard conformity certificate is then issued by the official organization. Each certified product must carry approval symbols when enforced.
Use on board merchant navy vessels generally requires prior approval (= certification) of an electrical device by certain marine classification authorities.

Key	Certification body	Country
CSA	Canadian Standards Association	Canada
C-Tick	Australian Communication Authority	Australia
UL	Underwriters Laboratories	USA
Key	**Classification authority**	**Country**
ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
GOST	Institut de recherche Scientifique Gost Standardt	C.I.S.
LR	Lloyd's Register	United-Kingdom
RINA	Registro Italiano Navale	Italy
RRS	Register of Shipping	C.I.S.

The table below shows the situation as of the 01.05.2003 for certifications obtained or pending from organizations for base PLCs. Further information regarding certified modules can be obtained from your Regional Sales Office.

Normal execution Certified Pending certification	Certifications				Others		
	CSA Class 1 Div 2	C-Tick ACA	SIMTARS	UL	Class1 Div 2 Hazardous locations	BG	AS-i
	Canada	Australia	Australia	USA	Etats-Unis	Germany	Europe
ABE-7				E164866			
CCX 17				E95257			
Lexium MHD/BPH							
Magelis IPC				E95257			
Magelis TXBT-F	LR 44087-77	N998					
Magelis XBT-F/FC	LR 44087-77	N998					
Magelis XBT-H/P/E/HM/PM	LR 44087-77			E95257			
Micro	LR 58905-30	N998	NI97/0039 Ex2314X	E95257	LR 58905-30	*(1)*	*(2)*
Momentum		N998					
Nano	LR 58905-42	N998		E95257			
Premium	LR 58905-32S	N998	NI97/0039 Ex2314X	E95257	LR 58905-32S	*(3)*	*(4)*
Quantum							*(5)*
TBX	LR 58905-21 LR 58905-21 (S)	N998		E95257			
TSX/PMX 47 to 107	LR 58905-00			E95257			*(6)*
Twin Line TLD/TLC/SER							

(1) TSX DPZ 10D2A safety module.
(2) TSX SAZ 10 AS-i bus master module and TSX SUP A02/A05 AS-i bus power supplies.
(3) TSX PAY 262/282 safety modules.
(4) TSX SAY 100 AS-i bus master modules.
(5) 140 EIA 921 00 AS-i bus master module.
(6) TBX SAP 10 Fipio/AS-i gateway.

Product certifications and marine classification authorities (continued)

Normal execution Certified Pending certification	Sociétés de classification des navires								
	ABS US	BV France	CCS China	DNV Norway	GL Germany	GOST CEI	LR United-Kingdom	RINA Italy	RRS CIS
ABE-7					99155-96HH				
CCX 17									
Lexium MHD/BPH									
Magelis IPC									
Magelis TXBT-F									
Magelis XBT-F/FC									
Magelis XBT-H/P/E/HM/PM									
Micro	01-LD263915-PDA	450 16846001	BLP98720051/2	A7961	99086-96HH		97/00114	ELE/48896/1	01.188.011
Momentum									
Nano		450 17055001	BLP98720051/3	A7773			Temporary MSL/990159		
Premium	00MS 14569-X 00-LD186857-PDA	4501H 07135/B0	BLP98720051/1	A8206	99405-97HH		98/00088	ELE/35897/1	01.184.011
Quantum	00NY 5610-X			A7834	17 315-00HH		01/60002	MAC/13299CS1	01.186.011
TBX		450 37058A001		A7952	99405-97HH			ELE/43795/2	
TSX/PMX 47 à 107 (Serie 7)		450 15106D001		A7952	94511HH			ELE/43795/3 (TSX P107)	96089250 (TSX 47)
Twin Line TLD/TLC/SER									

Conformity to European Directives: CE marquing

All products are conformed to CE marquing.
See Community regulations page 74.

Schneider Electric worldwide

Up-dated: 22-03-2002

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Community regulations

European Directives

The opening of European markets implies a harmonization of regulations in the various European Union member states.
European Directives are documents used to remove obstacles to the free movement of goods and their application is compulsory in all states of the European Union.
Member states are obliged to transcribe each Directive into their national legislation and, at the same time, to withdraw any conflicting regulations.
The Directives, particularly those of a technical nature with which we are concerned, only set objectives, called “general requirements”.
The manufacturer must take all necessary measures to ensure that his products conform to the requirements of each Directive relating to his equipment.
As a general rule, the manufacturer affirms that his product conforms to the necessary requirements of the Directive(s) by applying the **e** label to his product.
e marking is applied to Telemecanique products where relevant.

The significance of e marking

p **e** marking on a product means that the manufacturer certifies that his product conforms to the relevant European Directives ; it is necessary in order that a product which is subject to a Directive(s) can be marketed and freely moved within the European Union.
p **e** marking is intended solely for the national authorities responsible for market regulation.

For electrical equipment, only conformity of the product to standards indicates that it is suitable for use, and only a guarantee by a recognised manufacturer can ensure a high level of quality.
One or more Directives, as appropriate, may apply to our products, in particular :
p The Low Voltage Directive 72/23/EEC amended by Directive 93/68/EEC: **e** marking under the terms of this Directive could not be applied before 1 January 1995 and is compulsory as of 1 January 1997.
p The Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC: **e** marking on the products covered by this Directive has been compulsory since 1 January 1996.

Protective treatment of equipment

Premium and Quantum PLCs meet the requirements of “TC” treatment *(1)*.
For installations in industrial production workshops or in an environment which corresponds to “TH” treatment *(2)*, Premium PLCs should be enclosed in casings with a minimum of IP 54 protection as prescribed by standards IEC 664 and NF C 20 040.
Premium and Quantum PLCs are supplied with an IP 20 protection index. They can therefore be installed without enclosure in locations with restricted access which do not exceed pollution degree 2 (control room which does not contain a machine or dust-producing activity).

(1) “TC” treatment : all climate treatment.
(2) “TH” treatment : treatment for hot and humid environments.

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