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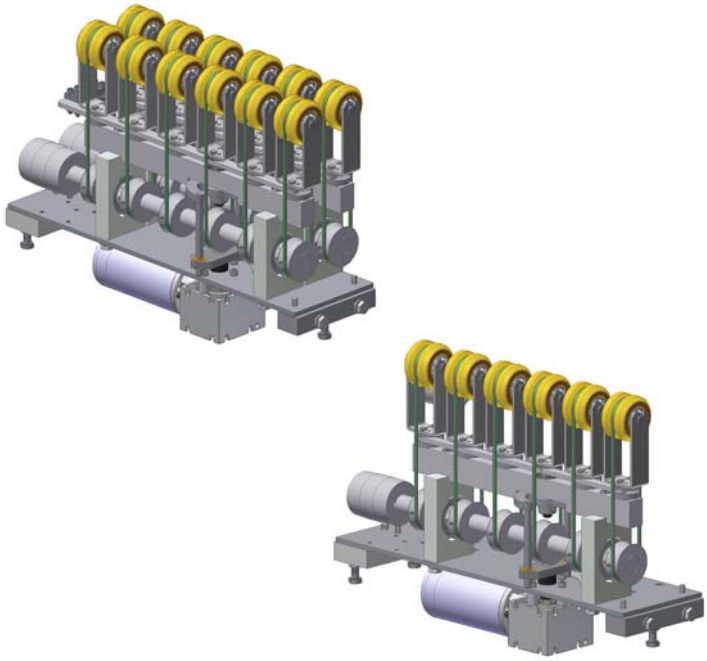

Electrical swivel roller bar TS 4800/TS 2800-60

Electrical operating instructions

Product	TS 4800/TS 2800-60 Electrical swivel roller bar
Manufacturer	TRANSNORM SYSTEM GmbH Förster Str. 2 D-31177 Harsum Tel. +49 (0) 5127 4020 Fax +49 (0) 5127 4400 info@transnorm.de http://www.transnorm.com
Documentation	Electrical operating instructions, -TRANSLATION- Version 3.0 ENG, 15.04.2020

These operating instructions must be retained for future use.

Edition

V 1.0	Initial version
V 1.1	Remaining risks updated
V 1.2	Revised edition
V 1.3	Switching sequence revised
V 1.4	Correction in the "Control" and "Emergency stop" sections
V 2.0	Completely revised edition
V 2.1	"Reference run", "Swivel operation" edited and "Drive fault" added
V 2.2	"Reference run" revised due to firmware update
V 3.0	Revised edition

Contents

Applicable documents

EC Declaration of Incorporation

Please refer to the operating instructions of the relevant conveyor type for the corresponding EC Declaration of Incorporation.

Introduction

Purpose of the document

These operating instructions enable you to safely operate the delivered machine, defined as partly completed machinery by the EC Machinery Directive, in compliance with its intended use.
Please read these instructions carefully before commissioning the machine. For further technical information, please refer to the order confirmation supplied separately.

You will find information on the following topics in the sections below:

- The safe handling of the machine
- Technical specifications
- Transporting, installing and putting the machine into operation
- Maintenance instructions
- Machine repairs
- Fault detection and correction
- Decommissioning the machine and disposal

Validity

These operating instructions apply to the operating company/integrator and all persons working on or with the machine.

Illustrations

The illustrations show simplified views of the machine.
We reserve the right to carry out technical modifications in the course of further development. If assembly is not described, it will be carried out in exactly the opposite order to disassembly.

Due to the numerous possible system configurations of our machines, details shown in the illustrations may differ from the machine supplied. See the order confirmation for an exact description of your specific machine.

Using the instructions

Different circumstances are indicated using specific text/formulations. Important information is additionally marked by special symbols. The following is an overview of the different ways information is formulated.

➔ This is a single, complete step.

1. This is the first step in a series of actions.

↳ This is a useful remark on a specific step.

? *This is a problem that may arise.*
This is the cause of the problem.
➔ This is a measure to solve the problem.

✓ You have completed a series of actions.

✓ You have completed the entire activity.

This is a notice.
Notices provide additional information.

Safety instructions

Safety instructions warn of risks and remaining risks and offer information on how to prevent them.

The signal words CAUTION, WARNING and DANGER indicate the level of severity of the risk.
The following overview explains the safety instructions used in this document.

DANGER

This notice warns of risk of death or fatal injury
This states the cause of the danger.
➔ You must take this action to avert the danger.

WARNING

This notice warns of moderate or minor injury
This states the cause of the danger.
➔ You must take this action to avert the danger.

CAUTION

This notice warns of damage to materials or to the machine
This states the cause of the danger.
➔ You must take this action to avert the danger.

Copyright protection

This publication must be treated as strictly confidential. It is intended only for in-company use by an authorised group of persons. and must not be disclosed to third parties without the written approval of TRANSNORM SYSTEM GmbH.

All documents are protected in accordance with the Copyright Protection Act. The transfer and duplication of documents, also by way of extract, is strictly prohibited. Non-compliance shall be prosecuted and subject to the payment of compensation.

Service

Our service team is available to provide technical information on our products and their systematic application.

Please have the following information ready when contacting us with queries or when ordering spare parts:

- Machine type
- Order/project number
- Item number

You will find this information on the type identification plate of your machine. It is located near the drive unit.


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www.transnorm.com Made in Germany

TS TYP **Förderertyp**

Seriennummer	
Baujahr	
Projekt-Nr.	
Position	

TRANSNORM SYSTEM GmbH type identification plate, sample

You will find our contact data at the end of these operating instructions.

Warranty

We shall not be liable for any defects or damage resulting from incorrect use, improper operation or maintenance. We would like to expressly point out that only original spare parts and
accessories approved by TRANSNORM SYSTEM GmbH may be used.

Unless otherwise stipulated in the contract, the warranty period begins on the day of delivery or with notification of readiness to deliver.

Please report any warranty claims as soon as a fault is identified. Please quote the order (project) and item number when making a claim.

The warranty shall be in line with statutory regulations. Further claims are excluded.

Please note that the warranty shall be rendered null and void in the case of:

- Improper use
- Improper connection and preparation not included within our scope of service
- Improper use of controls
- Failure to use original spare parts and accessories
- Conversions or structural modifications which have not been authorised by us in writing beforehand

Wearing parts are generally excluded from the terms of warranty

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Safety

Operating conditions

The conveyor, hereinafter referred to as the machine, is an incomplete machine as defined by the EC Machinery Directive. The machine has been manufactured in keeping with current scientific and technological developments.

However, the machine may pose risks under the following circumstances:

- Any use other than that intended
- Improper operation
- Non-permitted operating conditions
- Failure to follow these instructions
- Failure to comply with the general safety regulations during transport and installation

Intended use

The machine illustrated on the front page is approved solely for the purpose of transporting unit loads corresponding to requirements defined in the service specifications and is intended to be integrated in a fully automatic intralogistic system with a master controller.

Use other than or use that goes beyond that specified is deemed as not for its intended purpose and is therefore prohibited.

Never use the machine to transport persons.

It may only be used in a protected industrial environment with restricted access.

The manufacturer accepts no liability for damage arising from improper use of the machine.

Non-permitted operating conditions

Operation of the machine is prohibited under the following circumstances:

- There are people or objects in the hazardous areas
- Safety devices are not working or have been removed
- If the machine is malfunctioning or damaged
- Maintenance intervals have been exceeded
- Operating parameters have been changed without authorisation

Responsibilities of the operating company/integrator

Machine safety can only be guaranteed when all necessary measures have been implemented.
The operating company/integrator is responsible for planning and implementing appropriate measures.

These instructions are an integral part of the machine. When selling the machine, the operating company must pass on this document to the buyer.

The operating company/integrator of the machine is responsible for its safety. This applies especially to:

- Installation as a complete machine with functioning and compliant safety devices.
- Integration of the machine in such a way that no additional danger/hazards are created.
- The safety of all persons in the vicinity of the machine.
- Fault-free operation of the machine.

Minimising the danger of injury

Take steps to guarantee the safety of persons in the vicinity of the machine, for example:

- Ensure that all work on the machine is carried out by qualified and authorised personnel.
- Ensure that at least two people carry out any maintenance and repair work.
- Make sure all operators are familiar with the safety devices.
- Ensure that the machine and its environment are kept clean and tidy at all times.
- Provide all personnel with protective equipment, such as suitable safety footwear (S1), close-fitting clothing and gloves to protect against mechanical dangers.
  Make sure the protective clothing is worn.
- Provide instructions on how to proceed or act in the event of malfunctions.
- Clarify any issues relating to occupational health and safety as well as environmental protection.

Operating the machine fault-free

Implement the following measures to ensure fault-free operation of the machine:

- Ensure that these instructions are complete, in legible condition and accessible to all personnel at all times.
- Only operate the machine when fully functional and in perfect working order.
- Regularly check the machine and its safety equipment are functioning correctly.

Implement installation layout

Observe the following basic safety principles when connecting several separate components to form an overall system:

- Install guards in areas where there are tail pulley assembles, apex bends, roller arches, conveyor gates, pre-conveyors and transfer drives.
- In any area where there is a transfer drive or conveyor gate, the conveyor belt must have the same speed or run faster in the outfeed section than in the infeed section.
- The national safety regulations valid in the country of the user as well as additional branch-specific regulations must be observed.

Commissioning

This conveyor system is a "partly completed" machine, as defined by the Machinery Directive 2006/42/EC, Article 2g.
This partly completed machine may only carry out an intralogistic function when combined with an appropriate control system and, where applicable, other (partly completed) machinery. It must not be commissioned until it has been ascertained that the partly completed machinery which is the subject of this documentation or the machinery into which it is incorporated comply with the requirements of the Machinery Directive.

Personnel qualification

Installation, maintenance and repair work as well as commissioning demand specialist know-how and qualification of the personnel above and beyond that required for normal operation.
We recommend that you work only with technical personnel trained and authorised by TRANSNORM SYSTEM GmbH.

All persons working at or on the machine must:

- be suitable and sufficiently qualified to carry out the work required.
- have received instruction on handling the machine and be familiar with the protective devices .
- have read and understood these operating instructions and especially the relevant sections relating to their work.
- be familiar with basic occupational health and safety and accident prevention regulations, and with sector-specific regulations.

In these instructions, a distinction is made between the following groups of personnel:

Definition of the personnel groups

Personnel group	Definition
Operating company	The operating company is defined as that using the machine for its intended purpose and having the machine operated by suitable and instructed persons .
Integrator	The integrator installs the partly completed machine for the operating company and integrates it into an overall system of machines with a master controller and safety technology. (Responsible for ensuring conformity of the overall system)
Operating personnel	Personnel who are appropriately instructed by the operating company in the : ▪ Functional and operating procedures for the machine ▪ Possible dangers arising from improper use ▪ Protective devices and measures
Specialised staff	Technically qualified and authorised by the operating company to carry out specific tasks such as installation, maintenance and troubleshooting. Corresponding training in theory and practice is a prerequisite.

The following work is to be carried out by specialised personnel only:

Work requiring specialised knowledge

Work on	Specialised knowledge
Pneumatic components	Such work may only be carried out by personnel with specialised knowledge of and experience in handling pneumatic systems.
Electrical components	Such work may be carried out under the guidance and supervision of an electrician in accordance with the codes of electrical engineering practice.

Remaining risks regarding the machine

The machine's protective devices offer protection against injury.
For some tasks, however, personnel are required to enter the danger zone.
Therefore, an element of risk always remains.

Remaining risks for operating personnel

The following table will enable operating personnel to identify and avoid fundamental dangers and hazards. Professional conduct and implementation of the corresponding measures will help prevent any remaining risks in advance.

Measures for operating personnel to avert risk and prevent damage

Danger	Cause	Measure
Risk of injury	Sharp-edged machine parts	When troubleshooting: ▪ Be alert and proceed with caution ▪ Avoid hectic movements ▪ Wear appropriate protective clothing
	Rotating parts	When troubleshooting: ▪ Do not reach into rotating parts ▪ Wear appropriate protective clothing ▪ Observe warning labels on the machine
	Hot electric motors	▪ Do not touch
	Accumulation of conveyed material	Before remedying a fault: ▪ Watch the conveyor system carefully ▪ Assess whether the system needs to be stopped due to an unclear situation While remedying a fault: ▪ Keep body parts away from the conveyed loads ▪ Remove any pile-up of conveyed material ▪ Only switch the system on again when pile-up of conveyed material has been removed
	Conveyed loads	During operation: ▪ Do not reach into conveyed loads ▪ Observe warning labels on the machine When troubleshooting: ▪ Assess whether the system needs to be stopped due to an unclear situation ▪ If necessary, secure the system so that it cannot restart inadvertently ▪ Be alert and proceed with caution
Damage to the environment	Leaking operating materials	During operation: ▪ Inform technical personnel/shift supervisor

Remaining risks for technical personnel

The following table is intended to help the technical personnel (responsible for installation, repairs or troubleshooting) to detect and avoid fundamental dangers and hazards. Professional conduct and implementation of the corresponding measures will help prevent any remaining risks in advance.

It is important to observe the instructions and safety instructions described in the relevant sections during installation, maintenance and repairs. This is particularly important for work that requires the removal of protective devices.

Measures for technical personnel to avert risk and prevent damage

Danger	Cause	Measure
Risk of fatal injury	Accidental machine restart	During maintenance/repair work: ▪ Inform your colleagues that it is prohibited to re-start the machine until notified otherwise ▪ Disconnect the power supply ▪ Apply a label to prevent accidental re-connection of the power supply ▪ Prevent accidental re-connection of the power supply as described in the operating instructions of the system
	Electricity	Machine shut-down: ▪ Disrupt power supply ▪ Secure system against accidental re-start ▪ Establish that the power is off
	Falling or slipping loads	Transport and installation: ▪ Observe the centre of gravity of the machine and the permissible lifting load of the hoists ▪ Secure the machine and hoists to prevent slipping ▪ Read the section on "Transport and installation" and carefully observe the instructions For ceiling suspension of conveying systems: ▪ Observe the assembly instructions of the suspensions used
Fire hazard	Non-permitted operating conditions, e.g., accumulation of load residue, packaging abrasion, dust	During maintenance/repair work: ▪ Observe maintenance intervals

Measures for technical personnel to avert risk and prevent damage

Danger	Cause	Measure
Risk of injury	Sharp-edged machine parts	During maintenance/repair work: ▪ Be alert and proceed with caution ▪ Avoid hectic movements ▪ Wear appropriate protective clothing
	Rotating parts	For maintenance and adjusting works: ▪ Do not reach into rotating parts ▪ Wear close-fitting protective clothing ▪ Have one or more other persons assist you ▪ Observe warning labels on the machine
	Falling machine parts	During maintenance/repair work: ▪ Support heavy parts (especially motors) ▪ Do not step under loose parts or touch them ▪ Secure working area so that personnel are not at risk When working at suspended machines: ▪ Cordon off the work area ▪ Have a second person supervise the operation ▪ Put tools and parts down carefully and prevent them from falling
	Hot electric motors	Before touching: ▪ Allow enough time for them to cool down ▪ Wear suitable and thick protective clothing
	Accumulation of conveyed material	Before remedying a fault: ▪ Carefully observe conveyor system ▪ Assess whether the system needs to be stopped due to an unclear situation While remedying a fault: ▪ Keep body parts away from the conveyed loads ▪ Remove any pile-up of conveyed material ▪ Only switch the system on again when pile-up of conveyed material has been removed
	Conveyed loads	During operation: ▪ Do not reach into conveyed loads ▪ Observe warning labels on the machine While remedying a fault: ▪ Assess whether the system needs to be stopped due to an unclear situation ▪ If necessary, secure the system so that it cannot restart inadvertently ▪ Be alert and proceed with caution During maintenance/repair work: ▪ Disconnect the machine from electric supply during works ▪ Secure the system against accidental re-start

Measures for technical personnel to avert risk and prevent damage

Danger	Cause	Measure
Damage to the environment	Leaking operating materials	During disposal: ▪ Collect operating materials in suitable containers ▪ Dispose of waste oil, lubricating grease, cleaning agents containing solvents and similar products correctly

Protective devices

The machine is equipped with various covers to protect parts of the body from crushing injuries or from being drawn in. The protective devices and safety equipment are listed in the following.

It is strictly prohibited to render unserviceable, bypass or remove protective devices. These devices may only be temporarily removed for maintenance or repair purposes. If the purchasing contract specifies that certain safety equipment is not included in the scope of delivery, the operating company/integrator must assess the potential dangers in accordance with the Machinery Directive. If it proves necessary to install additional guards, especially at pinch points and transfer points, they must be installed in accordance with applicable national regulations and guidelines.

If the machine is suspended from the ceiling, safety devices, which prevent the risk posed by falling parts, must be installed in accordance with valid national regulations and guidelines.

Refer to the maintenance schedule for information on inspection intervals.

Protective devices

Please refer to the operating instructions of the specific conveyor type for the corresponding mechanical protective devices.

Description

General description

Each swivel roller bar is equipped with a brushless 24V DC motor. A terminal box containing a standardised terminal block for connecting
each swivel roller bar drive is mounted on the conveyor. Up to eight swivel roller bar drives can be connected in the terminal box.

The swivel roller bars are controlled via digital IO signals.

For service reasons, the terminal box must not be modified in any way other than described in these electrical operating instructions and the installation of additional components in the terminal box is not permitted.

The swivel roller bar does not have its own programmable logic controller. The control system must be provided by the customer.

Delivery state

The swivel roller bar is fully configured (speeds, ramps, motor data, etc.). The initial position (central middle position) and the stop points are set. The system has undergone a full test run.

Fuse protection for the swivel drive

Each swivel roller bar is equipped with a brushless 24V DC motor. Each motor requires a current of approx. 2 amperes during the swivel operation. At start-up, this current can briefly increase by a factor of 3.

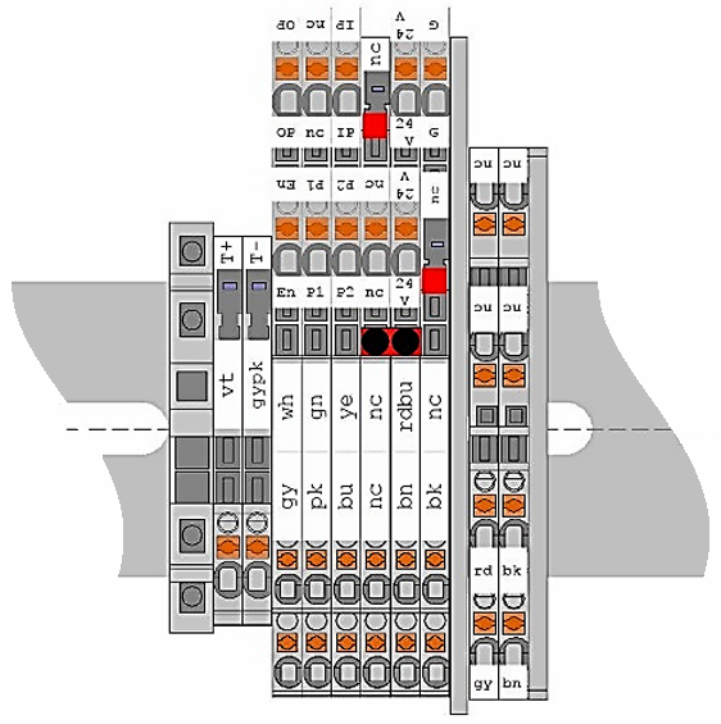
In order to avoid having to supply the sum of the peak currents when operating multiple drives simultaneously, we recommend switching on/swivelling the drives at 30 ms intervals. This corresponds to the material flow at a conveyor speed of 2 m/s and a pitch of 60 mm.

The swivel angles are stored in the swivel motor and may only be changed by employees of TRANSNORM SYSTEM GmbH.

Customer interface

General

A standardised terminal block is available for the customer to integrate the swivel bar in thehigher-level system control. All the cables of a swivel roller bar drive are connected to this terminal block ex works.



Terminal block of swivel roller bar drive

The customer can use the four plug-in contacts supplied with this terminal block to set up all the connections required for operation. This makes it easier to disconnect the swivel roller bar drive from the higher-level control prior to servicing. Not all signals transmitted by the swivel roller bar drive are required to operate the swivel roller bar. The relevant contacts for the redundant signals are marked "nc" (not connected) on the connector side of the terminal block and must not be connected.

Table 1: Connection cable of swivel roller bar drive

Colour	Function	Cross-section	Description on motor side/terminal	Description on connection side/connector
White	Enable	0.34 mm²	wh	En
Brown	Not used	0.34 mm²	BN	nc
Green	Position 1	0.34 mm²	gn	P1
Yellow	Position 2	0.34 mm²	ye	P2
Grey	Not used	0.34 mm²	gy	nc
Pink	Swivel roller bar ready	0.34 mm²	pk	OP
Blue	In position	0.34 mm²	bu	IP
Red	Not used	0.34 mm²	rd	nc
Black	Not used	0.34 mm²	bk	nc
Violet	Programming interface +	0.34 mm²	vt	T+
Grey/pink	Programming interface -	0.34 mm²	gypk	T-
Red/blue	Logic supply + (24V)	0.34 mm²	rdbu	24V
Grey	Ballast resistor	1.5 mm²	gy	nc
Brown	Power supply	1.5 mm²	BN	24V
Black	Power/signal GNG	1.5 mm²	bk	G

One terminal block is provided for each swivel roller bar drive. The terminal box contains the terminal blocks for up to eight swivel roller bar drives.

Connector plugs

Four plug-in contacts are provided to integrate the swivel roller bar drive in the customer's control unit. Each plug may only be connected to its assigned position. The plugs and respective slots are therefore clearly marked.

CAUTION

Damage to the swivel roller bar drive
Plugs inserted into incorrect slots.
➔ Always insert plugs at the assigned positions

Power supply plug

Power is supplied to the load circuit of the swivel roller bar drive via this plug.

Table 2: Plug for load power supply

Contact	Description	Function	Cross-section
1	24V	24V load supply	1.5 mm²
2	G	GND	1.5 mm²

Plug for logic power supply

Power is supplied to the logic circuit of the swivel roller bar drive via this plug.

Table 3: Plug for logic power supply

Contact	Description	Function	Cross-section
1	24V	24V logic supply	0.34 mm²

Plug for swivel roller bar drive inputs

The swivel roller bar drive is controlled via this plug. The meaning of the signals is described in the "Control and signal sequence" section.

Table 4: Plug for swivel roller bar drive inputs

Contact	Description	Function	Cross-section
1	EN	Enable	0.34 mm²
2	P1	Position 1	0.34 mm²
3	P2	Position 2	0.34 mm²
4	nc	Not used	-

Plug for swivel roller bar drive outputs

The status of the swivel roller bar drive can be retrieved via this plug. The meaning of the signals is described in the "Control and signal sequence" section.

Table 5: Plug for swivel roller bar drive outputs

Contact	Description	Function	Cross-section
1	OP	Ready	0.34 mm²
2	nc	Not used	-
3	IP	In position	0.34 mm²

Service interface

Each terminal block is fitted with an additional service terminal to allow Transnorm service technicians access the drive parameters whenever necessary. The plug for this terminal is not required for operation of the swivel roller bar drive and is therefore not included in the scope of delivery.

Table 6: Service interface

Contact	Description	Function	Cross-section
1	T+	Programming interface +	-
2	T-	Programming interface -	-

Emergency stop

If the protective devices are properly installed, the drive does not pose any unacceptable risk. In order to minimise the remaining risk, however, the drive must be integrated in the emergency stop mechanism on the system side.

As the drive has no internal galvanic isolation of the load and logic voltage, it is important to ensure that the load and logic voltage supply is safely switched off when required. The power supply of the PLC outputs that control the swivel roller bar must also be disconnected (separate potential group).

According to our risk analysis, a performance level of PLr C is required for the quality of the shutdown system in accordance with DIN EN ISO 13849-1:2015.

Control and signal sequence

The load and logic supply of the motor must be connected to a corresponding 24V DC power supply to enable control of the swivel roller bar. If this is the case, the motor is ready for operation and the "Swivel roller bar ready" signal changes from "0" to "1".

- Reference run
  After the supply voltage has been applied, the swivel roller bar must first be referenced. To do this, the "Enable" signal is set to "1".
  The following applies for drives with firmware version **T031** (shipped **before 15.06.2019**): Once the logic power supply is connected, the drive requires a certain amount of time to reach full operational readiness. The drive cannot perform a reference run during this time. It simply moves in one direction and remains in this position until the "Enable" signal is no longer active. For this reason, you must always wait **a minimum of 10 seconds** between connecting the logic power supply and activating the "Enable" signal so that the drive can reach full operational readiness before the reference run is initiated.

  This waiting time has already been configured in the parameters of some swivel drives prior to delivery to ensure that the drive reaches full operational readiness before the reference run is started.
  In this case, the reference run always starts 10 seconds after the "Enable" signal is activated, regardless of how long the logic power supply has already been connected for. The swivel drive may drift slightly during this waiting time. These restrictions do not apply to more recent drives with firmware version **T033** or later (shipped **after 15.06.2019**). If the application requires that you switch off the logic power supply frequently, please note that the drive cannot be referenced in time intervals of less than one minute.

  The "Enable" signal must remain set during the entire operating time of the swivel roller bar. Following a successful reference run, the swivel roller bar automatically moves to the initial position (central middle position) if no swivel signal is present. As soon as this position is reached, the "in position" signal changes from "0" to "1".
- Right/left swivel operation:
  To trigger a swivel operation, the respective signal (swivel right or swivel left) must be set to "1". The swivel roller bar then moves to the selected position.

  Please note that the swivel roller bar may move in the opposite direction to the one just activated due to the installation position of the swivel drive on the swivel unit. Take this into consideration when activating the direction or resolve the problem by interchanging the two corresponding wires at the connection point on the swivel drive.

  During the swivel operation, the "in position" signal is set to "0". As soon as the swivel roller bar has reached the target position, the "in position"

signal changes again from "0" to "1". The swivel roller bar remains in position as long as the respective signal (swivel right or swivel left) is present. If there is no swivel signal, the swivel roller bar automatically returns to the initial position. During the swivel operation, the "in position" signal is set to "0". As soon as the swivel roller bar has reached the initial position, the "in position" signal changes again from "0" to "1". In order to change swivel position quickly, it is permitted to switch directly from one swivel position to the other. In this case, the swivel roller bar moves directly to the respective swivel position without stopping in the initial position. If the "Swivel right" and "Swivel left" signals are present simultaneously, the swivel roller bar moves to an undefined position (possibly initial position).

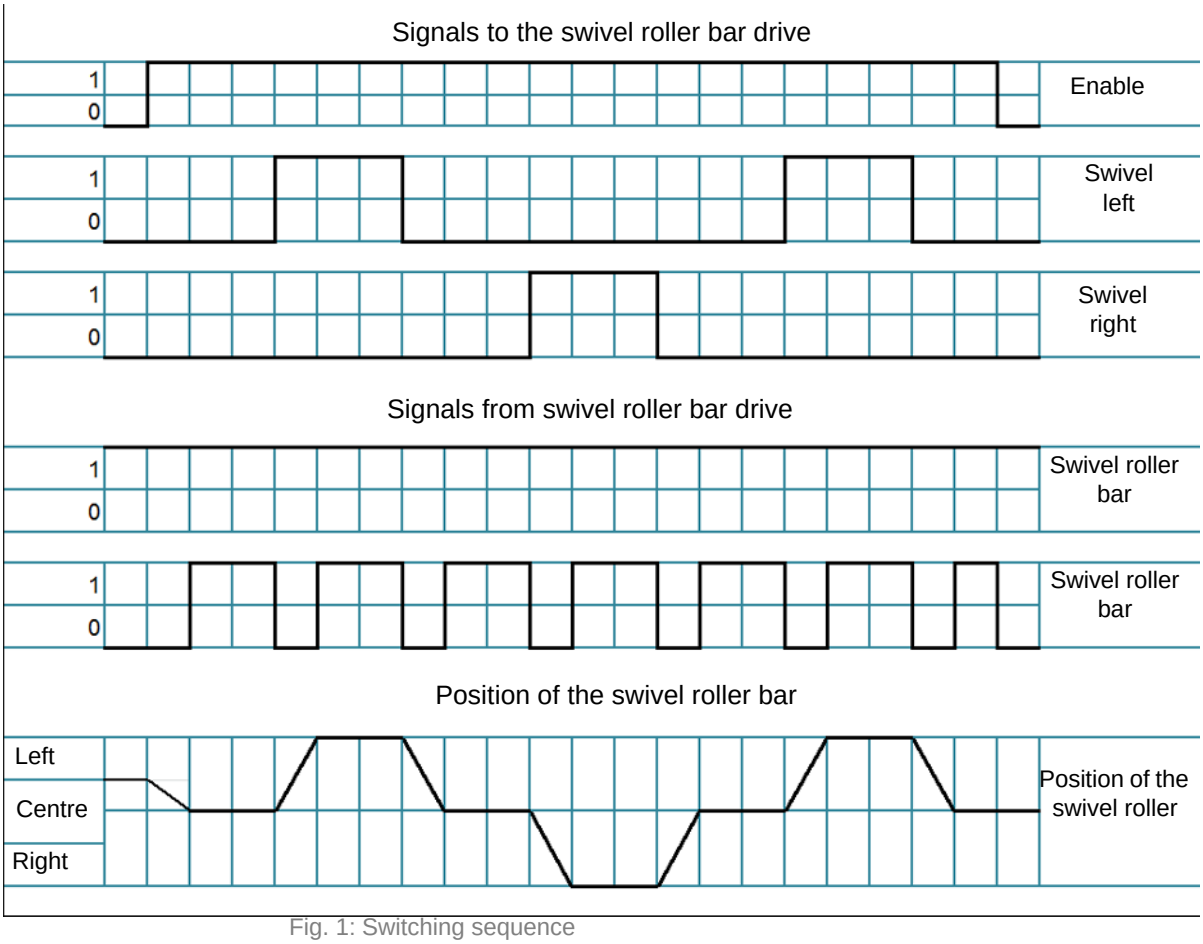


Fig. 1: Switching sequence

Drive fault

In the event of a fault, the drive control resets the "Swivel bar ready" signal. The drive stops executing movement commands. In order to acknowledge pending faults, the "Enable" signal must be activated (positive edge).

Once the fault has been acknowledged, the drive activates the "Swivel bar ready" signal. If the drive has already been referenced and is located in a defined position, the "in position" signal is also activated. Otherwise another reference run must be performed.

Contact details

In the event of uncertainty or problems during installation, maintenance, repair or operation of the machine, please first consult the corresponding section of the operating instructions.
If this information does not solve your problem, please contact TRANS-NORM SYSTEM GmbH.

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Fax: 0 41 82 / 28 55 52	Fax: 0 50 31 / 9 02 03 21

Service branch - West	Service branch - South
Saverio Gadaleta	Marko Kilank
Tel.: 0 21 73 / 93 82 48	Tel.: 0 71 43 / 96 46 68
Mobile: 01 72 / 97 12 877	Mobile: 01 72 / 43 82 446
Fax: 0 21 73 / 93 82 76	Fax: 0 71 43 / 96 58 51

Suggestions and information

...on this documentation or the machine should be sent to the first address listed above.